INTERIM MEASURES WORK PLAN
SOUTH REPEATER BUILDING
SOLID WASTE MANAGEMENT UNIT 121
HYDRAULIC CONTAINMENT AND GROUNDWATER TREATMENT SYSTEM FOR PER- AND POLYFLUOROALKYL SUBSTANCES
KENNEDY SPACE CENTER, FLORIDA

Prepared for:

Environmental Assurance Branch
National Aeronautics and Space Administration
Kennedy Space Center, Florida 32899

A-E Contract 80KSC019D0010
Task Order 80KSC021F0096

October 2024
Revision 0

Prepared by:
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In accordance with the provisions of Florida Statutes, Chapter 471, this Interim Measures Work Plan for the Kennedy Space Center located at Merritt Island, Florida, has been prepared under the direct supervision of a Professional Engineer registered in the State of Florida. This work was performed in accordance with generally accepted professional engineering practices pursuant to Chapter 471 of the Florida Statutes. The data, findings, recommendations, specifications, or professional opinions were prepared solely for the use of the National Aeronautics and Space Administration and the Florida Department of Environmental Protection. AECOM Technical Services, Inc. makes no other warranty, either expressed or implied, and is not responsible for the interpretation by others of these data.

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

ADP	Advance Data Package
AECOM	AECOM Technical Services, Inc.
bls	Below land surface
BMP	Best Management Practices
BOSS	Base Operations & Spaceport Services
CCR	Construction Completion Report
CS	Confirmatory Sampling
DEP	Department of Environmental Protection
DMMA	Dredge Material Maintenance Area
DoD	Department of Defense
DOE	Department of Energy
DPT	Direct push technology
EPA	United States Environmental Protection Agency
Ft/day	Feet per day
GAC	Granular Activated Carbon
gpm	Gallons per minute
HASP	Health and Safety Plan
HCTS	Hydraulic Containment and Groundwater Treatment System
HDPE	High-density polyethylene
HFPO-DA	Hexafluoropropylene oxide dimer acid
HPT	Hydraulic Profiling Tool
IDW	Investigative derived waste
IM	Interim Measures
IMWP	Interim Measures Work Plan
KNPR	Kennedy NASA Procedural Requirements
KSC	Kennedy Space Center
KSCRT	KSC Remediation Team
mg/kg	Milligram per kilogram
MOT	Maintenance of Traffic

MOTR	Multiple Object Tracking Radar
NASA	National Aeronautics and Space Administration
Ng/L	Nanograms per liter
NPDES	National Pollution Discharge Elimination System
OM&M	Operation, maintenance, and monitoring
PE	Professional Engineer
PFAS	Per- and polyfluoroalkyl substances
PFBA	Perfluorobutanoic acid
PFBS	Perfluorobutanesulfonic acid
PFDOA	Perfluorododecanoic acid
PFHxA	Perfluorohexanoic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PFTeA	Perfluorotetradecanoic acid
PFUNA	Perfluoroundenanoic acid
pGCTL	provisional Groundwater Cleanup Target Level
pH	Potential Hydrogen
PLC	Programmable logic controller
PPE	Personal protective equipment
pSCTL	provisional Soil Cleanup Target Level
psi	Pounds per square inch
pSWSL	provisional Surface Water Screening Level
PVC	Polyvinyl chloride
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
REC	Record of Environmental Consideration
RPM	Remediation Project Manager
RSL	Regional Screening Level

SAS	Surficial Aquifer System
SDR	Standard-dimension ratio
SOP	Standard Operating Procedure
SWMU	Solid Waste Management Unit
USGS	United States Geological Survey

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EXECUTIVE SUMMARY

This document presents the design details of a granular activated carbon (GAC) hydraulic containment and groundwater treatment system Interim Measures Work Plan for the South Repeater Building site (South Repeater, Solid Waste Management Unit 121), located at John F. Kennedy Space Center (KSC), Florida. The interim measures (IM) treatment area includes the source area and downgradient property boundary, which have been impacted by per- and polyfluoroalkyl substances (PFAS). The objectives of the IM are to treat the source area and mitigate PFAS migration to areas outside of KSC boundaries. This document was prepared by AECOM Technical Services, Inc., for the National Aeronautics and Space Administration under Contract 80KSC019D0010, Task Order 80KSC021F0096.

Confirmatory sampling (CS) activities were initiated based on samples collected from investigation derived waste drums that had concentrations of PFAS above the Florida Department of Environmental Protection provisional groundwater cleanup levels of 70 nanograms per liter. A subsequent interview with the KSC Fire Chief indicated that an unknown amount of aqueous film-forming foam was utilized to extinguish brush fires north-northeast of the South Repeater Building. Therefore, this site was moved into CS activities.

CS activities were conducted from January 2022 through June 2023 to include monitoring well installation and soil, groundwater, and surface water sampling. Details of these activities are included in the PFAS CS Report (NASA 2024c). Following the CS activities, additional sampling activities were required to delineate the impacts to surface water and groundwater. Additional activities were completed from July 2023 through November 2023 and included groundwater sampling, Hydraulic Profiling Tool activities, and surface water sampling. Hydrogeological tests, including a pumping pilot study, were completed between December 2023 and February 2024. Details of these activities are included in the Interim Measures Pilot Study Completion Report (NASA 2024b). Modeling activities were completed utilizing the results from the pilot study to determine the optimal extraction well design and appropriate layout for the GAC hydraulic containment and groundwater treatment system.

The IM consists of the installation and operation of 19 extraction wells and an associated groundwater treatment system. A total of 13 wells will be installed to a depth of 34 feet below land surface (bls) to target the upper medium-grained sand with shell layer. A total of six wells will be installed to a depth of 56 feet bls to target the lower layer of poorly graded sand with shell fragments. The system will be designed to operate each extraction well simultaneously using submersible pumps at flow rates of 5 or 10 gallons per minute (gpm), excluding one extraction well with a flow rate of 30 gpm. The extracted groundwater will be conveyed to a groundwater treatment system, where it will be treated via GAC prior to disposal via infiltration.

To evaluate treatment system performance, baseline groundwater sampling will be conducted prior to treatment system startup. Performance monitoring will be completed quarterly for the first year. A total of eight performance monitoring wells will be installed to a depth of 12 feet

bls, and eight performance monitoring wells will be installed to a depth of 30 feet bls. In addition to the installation of 16 performance monitoring wells, 12 existing monitoring wells will be incorporated into the performance monitoring program.

Following installation of the GAC hydraulic containment and groundwater treatment system, operation, maintenance, and monitoring (OM&M) events will be conducted for the first 10 days of startup, weekly during the first month, and bimonthly thereafter. The frequency of site OM&M visits may be reduced to monthly, following a review of the first 6 months of operation. The system will also be monitored remotely to confirm operations, with electronic notifications of system shutdowns and/or alarm conditions. In the event of system shutdown, an on-site inspection will be completed within 48 hours of the notification. The overall schedule is estimated to take up to 10 months from IMWP implementation to system startup.

1. INTRODUCTION

The National Aeronautics and Space Administration (NASA), through its Environmental Assurance Branch, is managing the assessment and remediation activities at the South Repeater Building (N6-1118) site at the John F. Kennedy Space Center (KSC), Florida. AECOM Technical Services, Inc. (AECOM) prepared this Interim Measures Work Plan (IMWP) for NASA under Contract 80KSC019D0010, Task Order 80KSC021F0096.

1.1 OVERVIEW

This document is an IMWP for a granular activated carbon (GAC) hydraulic containment and groundwater treatment system (HCTS) at the South Repeater Building and immediate vicinity (the Site) located at KSC, Florida, as shown on **Figure 1-1**. The Site is located along the southwestern edge of KSC on the east side of Tel-4 Road, as shown on **Figure 1-2**. Private residential and agricultural properties are located to the west and southwest of the Site. The Site has been designated as Solid Waste Management Unit (SWMU) 121 under KSC's Resource Conservation and Recovery Act (RCRA) Corrective Action program.

The interim measures (IM) design detailed in this IMWP is based on pilot study testing that was completed from December 2023 through February 2024 and is detailed in the July 2024 Pilot Study Completion Report (NASA 2024b). This IMWP presents the approach and design for full-scale hydraulic containment and remediation of per- and polyfluoroalkyl substances (PFAS) impacted groundwater using extraction and treatment through a GAC system.

1.2 PURPOSE

The purpose of this IMWP is to summarize PFAS impacts to groundwater and, using the results of the pilot study, design a full-scale GAC HCTS. This IMWP includes a summary of historical PFAS sampling at the Site, a summary of the pilot study activities, details from groundwater modeling, and the proposed design of the GAC HCTS. It also includes details about site preparation, system installation, operation and maintenance activities, and performance monitoring. An Advance Data Package (ADP) of the elements of this IMWP was presented to the KSC Remediation Team (KSCRT) in June 2024. Meeting minutes are included in **Appendix A**.

1.3 INTERIM MEASURES OBJECTIVES

The objectives of the IM are to hydraulically contain PFAS-impacted groundwater through a series of extraction wells and install a full-scale GAC treatment system. The goal of the GAC HCTS is to contain groundwater with concentrations of PFAS greater than the United States Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) to within the KSC property boundaries and then treat that groundwater to levels of PFAS lower than the Florida Department of Environmental Protection (DEP), provisional groundwater cleanup target levels (pGCTLs) for perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). EPA RSLs are currently under review. As data is collected, it will be analyzed with the current EPA RSLs at the time.

1.4 INTERIM MEASURES WORK PLAN ORGANIZATION

The remainder of this IMWP is organized as follows:

- **Section 2, Site History and Current Conditions**: Summarizes the site history and existing site conditions, including lithology and hydrogeology.
- **Section 3, Pilot Study and Pre-Interim Measures Field Activities**: Summarizes the results from the Pilot Study and describes activities completed prior to the IM activities, including baseline groundwater sampling and modeling. Summarizes the pilot study activities (slug, step, and pump tests).
- **Section 4, Interim Measures Overview and Design**: Presents the designs for the extraction wells, groundwater conveyance network, and GAC treatment system.
- **Section 5, Permitting and Site/Construction Preparation**: Presents the personnel trainings, permits, and site preparations necessary for the full-scale HCTS installation.
- **Section 6, Implementation Timeline, Exit Strategy, and Costing**: Outlines the system installation schedule, quality control oversight procedures, and cost estimate for implementation.
- **Section 7, System Startup, Operation, and Maintenance**: Describes the HCTS startup plan, operation schedule, and maintenance program.
- **Section 8, Waste Management**: Describes how waste generated from site activities will be stored, transported, and disposed of.
- **Section 9 Performance Monitoring and Reporting**: Provides an estimated project timeline and describes the reports that will be prepared following system installation and startup.
- **Section 10, References**: Provides a list of the references used to develop this document.

2. SITE HISTORY AND CURRENT CONDITIONS

This section summarizes the background and current conditions at the Site to include lithology, hydrogeology, and the current understanding of PFAS impacts. Included is a summary of historical sampling to date of different environmental media and the extent of impacts determined by the sampling activities.

2.1 SITE LOCATION AND HISTORY

KSC is located on the east coast of Florida, to the north and west of Cape Canaveral, as shown on **Figure 1-1**. KSC is situated in Brevard and Volusia Counties between the Merritt Island Barge Canal to the south, the town of Oak Hill to the north, the Atlantic Ocean and Cape Canaveral Space Force Station to the east, and the Indian River to the west. The Site is located in the southern region of KSC outside of the secure boundaries on the east side of Tel-4 Road, as shown on **Figure 1-2**. Prior to the construction of the South Repeater Building, the area was undeveloped. In 1962, the South Repeater Building was constructed and utilized as a workshop and storage area for the Fiber Optics department. It is currently a telecommunications facility. The Multiple Object Tracking Radar Tower (MOTR) was constructed south of the South Repeater Building in 2003 after being relocated from the Cape Canaveral Space Force Station.

2.2 BACKGROUND

The Hazardous and Solid Waste Amendments portion of the NASA RCRA Permit (EPA ID No. FL 6 800 014 585), issued by DEP, requires identification and evaluation of all known SWMUs and Areas of Concern located on KSC property. In support of this requirement, the South Repeater Building site (N6-1118) was initially identified as Potential Release Location 210 and then as SWMU 121 after confirmation of PFAS in groundwater above the pGCTL (NASA 2012).

Following site reconnaissance and personnel interviews about historical site activities, a SWMU assessment was completed. During sampling of investigative derived waste (IDW) from assessment events, concentrations of PFAS were detected in IDW samples. The Site was identified for PFAS investigation when a review of the groundwater IDW sampling results indicated that PFOS concentrations were above the DEP pGCTL of 70 nanograms per liter (ng/L) at a concentration of 1,750 ng/L. An interview with the KSC Fire Chief indicated that an unknown amount of aqueous film-forming foam was utilized to extinguish brush fires north-northeast of the South Repeater Building circa 1998. Therefore, this site was included in a PFAS center-wide assessment (NASA 2022) and recommended for further investigation.

CS activities were conducted from January 2022 through June 2023 to include monitoring well installation and soil, groundwater, and surface water sampling. Details of these activities are included in the Per- and Polyfluoroalkyl Substance Confirmatory Sampling Report (NASA 2024c). Following the CS activities, additional sampling was required to delineate the impacts to surface water, groundwater, and soil. Additional activities were completed from July 2023 through November 2023 and included groundwater sampling, Hydraulic Profiling Tool (HPT) activities, and surface water sampling. Details of these activities are included in the Interim Measures Pilot Study Completion Report (NASA 2024b). Historical PFAS investigation tables and figures are provided in **Appendix B**.

2.3 CURRENT CONDITIONS

The following sections provides a summary of soil, groundwater, and surface water sampling completed and the results. Soil and groundwater results were compared to the May 2024 EPA RSLs. Soil, groundwater, and surface water results were also compared to the March 2022 DEP provisional cleanup target or screening levels.

2.3.1 Soil Sampling

During site assessment and CS activities, a total of 119 soil samples were collected from 64 soil boring locations, completed during soil assessment, DPT, and HPT events, from various depths on or near the Site. Soil boring sampling results are provided in **Table 2-1**. The soil samples were analyzed for 29 individual PFAS compounds by EPA Method 537M. Additional information about these sampling activities was provided within the PFAS Confirmatory Sampling Report (NASA 2024c) and the IM Pilot Study Completion Report (NASA 2024b).

Results indicated that concentrations of PFOS were detected above the EPA residential RSL (0.013 milligrams per kilogram [mg/kg]) and the DEP provisional soil cleanup target level (pSCTL) for leachability (0.007 mg/kg) within 30 soil boring locations. Concentrations of PFOS ranged from 0.00043 mg/kg to 0.229 mg/kg. Vertical PFAS impacts in soil ranged from surface to 13 feet below land surface (bls). Historical soil boring sampling results are provided in **Appendix B** and depicted on **Figure 2-1**.

2.3.2 Direct Push Technology Groundwater Sampling

During CS activities, a total of 323 direct push technology (DPT) groundwater samples were collected from 54 locations from six depth intervals (2-6 feet bls, 8-12 feet bls, 16-20 feet bls, 23-27 feet bls, 40-44 feet bls, and 55-59 feet bls). These samples were collected and analyzed for 29 PFAS compounds via EPA Method 537. DPT locations are depicted on **Figure 2-2**. Additional information about these sampling activities was provided within the PFAS Confirmatory Sampling Report (NASA 2024c) and the IM Pilot Study Completion Report (NASA 2024b).

Results from the DPT groundwater sampling, and corresponding depths, are listed in **Table 2-2**. Results indicated that concentrations of PFOS, PFOA, perfluorononanoic acid (PFNA), and perfluorohexanesulfonic acid (PFHxS) exceeded one or more of their respective EPA RSLs at 50 of the 54 DPT locations, or 154 of the 392 samples. PFOS and/or PFOA results were above their individual (70 ng/L for each) or cumulative pGCTL (70 ng/L additively) at 22 of the 54 DPT location, or 40 of the 392 samples. The maximum concentrations of PFOS, PFOA, and PFHxS were detected at DPT location A3RB-DPT0010 within the 2- to 6-foot depth interval, at concentrations of 7,480 ng/L, 316 ng/L, and 17,200 ng/L, respectively. The maximum PFNA concentration of 7.3 ng/L was detected at A3RB-DPT0050 within the 8- to 12-foot depth interval. Concentrations of perfluorobutanesulfonic acid (PFBS), hexafluoropropylene oxide dimer acid (HFPO-DA), perfluorobutanoic acid (PFBA), perfluorohexanoic acid (PFHxA), perfluorododecanoic acid (PFDOA), perfluorotetradecanoic acid (PFTeA), and perfluoroundecanoic acid (PFUNA) were below their respective EPA RSLs.

2.3.3 Monitoring Well Groundwater Sampling

During CS activities, a total of 71 groundwater samples were collected from 27 monitoring wells. These samples were collected and analyzed for 29 PFAS compounds via EPA Method 537s. Monitoring well locations are depicted on **Figure 2-3**. Additional information about these sampling activities was provided in the PFAS Confirmatory Sampling Report (NASA 2024c).

Analytical results from the monitoring well groundwater sampling and corresponding screen intervals are provided in **Table 2-3**. Results indicated that PFOS, PFOA, and/or PFHxS concentrations were above their respective EPA RSLs of 4 ng/L, 6 ng/L and 39 ng/L, respectively, in 11 monitoring wells. PFOS and/or PFOA were above their respective or cumulative pGCTL in samples from eight monitoring wells. Maximum concentrations for each of these constituents were observed from samples collected from monitoring well A3RB-MW0003 with concentrations of 10,000 ng/L, 159 ng/L, and 5,100 ng/L, respectively. Concentrations of PFBS, HFPO-DA, PFBA, PFHxA, PFDOA, PFTEA, and PFUNA were below their respective EPA RSLs.

2.3.4 Surface Water Sampling

During CS activities surface water samples were collected from 10 locations within drainage ditches and swales surrounding the Site. A total of 36 samples were collected from the 10 locations at different times and analyzed for 29 PFAS compounds via Method 537. Additional information about these sampling activities was provided in the PFAS Confirmatory Sampling Report (NASA 2024c) and the IM Pilot Study Completion Report (NASA 2024b).

Results showed concentrations of PFOS were above the DEP provisional surface water screening level (pSWSL) of 10 ng/L at 9 of the 10 locations, with a maximum PFOS concentration of 1,170 ng/L at location A3RB-SW0010. PFOA concentrations at each location were below the pSWSL of 500 ng/L, with a maximum concentration of 9 ng/L at location A3RB-SW0009. Analytical results are provided in **Table 2-4** and depicted on **Figure 2-4**.

2.4 TOPOGRAPHY AND SURFACE FEATURES

Merritt Island is a barrier island complex containing soils of differing ages relative to proximity to the Atlantic Ocean. Younger soils with ridge and swale topography are present on the eastern side of the island, while the western portion contains older soils that are flatter and devoid of ridges and swales (NASA 2010).

The shallow aquifer system of KSC consists of sand, shelly sand, silt, clay, and calcareous clay. Groundwater flow patterns in the Surficial Aquifer System (SAS) are typical of an island aquifer system that is surrounded by high salinity water (United States Geological Survey [USGS] 2000). These patterns are termed "variable density flow"; freshwater infiltrates high topographic locations and flows downward and radially before discharging to surface water.

The South Repeater Building is surrounded by scrub and tree covered land to the north, east, and south, and private residential and agricultural properties are located to the southwest of the site. Land to the west of the Repeater Building was formerly a citrus grove. Wetlands are located to the east of the South Repeater Building, and stormwater drainage ditches are located along Tel-4 Road and D'albora Road southwest of the South Repeater Building. Two borrow ponds are also located northwest of the South Repeater Building and west of Tel-4 Road. **Figure 2-5** shows an aerial of the site with lidar data representing topography overlain.

2.5 GEOLOGY

The United States Department of Agriculture (USDA) Web Soil Survey describes the soils under the Site as predominantly Immokalee with small areas of Anclote (USDA 2022). The Immokalee series consists of deep and very deep, poorly drained and very poorly drained soils that formed in sandy marine sediments. They occur on flatwoods and in depressions of Peninsular Florida. The Anclote series consists of very deep, very poorly drained, rapidly permeable soils in depressions, poorly defined drainage ways, and floodplains. They formed in thick beds of sandy marine sediments. Other soil classes located within a 0.5-mile radius of the Site include Bradenton, Copeland, Myakka, Pomello, and St. Johns.

Three soil cores (A3RB-SB0047, A3RB-SB0048, and AR3B-SB0061) were completed east and southwest of the South Repeater Building to total depths of 64 feet bls, 65 feet bls, and 60 feet bls. These soil cores indicated that soils are poorly graded, dark grayish-brown sand from the surface to 5 feet bls. A white medium-grained sand with shell extends from 5 feet bls to 24 feet bls. From 24 feet bls to 31 feet bls, the cores consisted of greenish-gray clayey sand with a small amount of shell fragments. Soils from 31 feet bls to 55 feet bls consisted of gray poorly graded sand with shell fragments throughout. Soils transition into a dense gray clayey sand with shell fragments from 55 to 59 feet bls. A grey medium stiff lean clay extends to 65 feet bls. This information is represented in a lithologic cross section oriented southwest to northeast at the South Repeater Building area, provided in **Appendix B**.

2.6 HYDROLOGY

Precipitation at KSC is routed to on-site shallow stormwater ditches and/or swales prior to discharging to surrounding water bodies. Several stormwater conveyance structures or holding areas were observed at the Site (NASA 2024a). Storm sewer culvert lines are located under paved portions of the area. Additionally, a ditch runs north to south along the east side of the South Repeater Building and turns to become east to west between the building and the MOTR. An open drainage ditch runs from north to south between the east side of Tel-4 Road and the South Repeater Building. Designated and potential wetlands within a 0.5-mile radius are located to the north, east, southeast, and west of the area (NASA 2012).

2.7 HYDROGEOLOGY

The SAS of KSC consists of sand, shelly sand, silt, clay, and calcareous clay. Groundwater flow patterns within the SAS are typical of an island aquifer system that is surrounded by high salinity water (USGS 2000). These patterns are termed “variable density flow”; freshwater infiltrates high topographic locations and flows downward and radially before discharging to surface water. Groundwater typically flows west at the Site; groundwater elevations collected from the Pilot Study were reported in the Pilot Study Completion Report (NASA 2024b) and copies are provided in **Appendix B**.

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3. PILOT STUDY AND PRE-INTERIM MEASURES FIELD ACTIVITIES

A pilot study was completed from November 2023 to February 2024 to confirm design parameters for full-scale implementation of a HCTS. The following sections summarize the pilot study field activities completed, including HPT activities; extraction and observation well installation; slug, step, and pump tests; baseline sampling; and IDW management. Complete details are provided in the Pilot Study Completion Report (NASA 2024b).

3.1 HPT ACTIVITIES

HPT activities provided information on the subsurface such as ranges of hydraulic conductivity, apparent depth of the confining clay layer, pressure, and electrical conductivity. The results from the HPT activities indicated a lower permeability zone with low or zero hydraulic conductivity in the 20- to 30-foot bls range, with the highest conductivities, up to 160 feet per day (ft/day), in the 20- to 45-foot bls interval. It appears the confining clay layer starts anywhere from 50 feet bls to 75 feet bls from west to east. The HPT data were utilized during groundwater modeling efforts. The 20 HPT locations are depicted on **Figure 3-1**.

3.2 PILOT STUDY CONSTRUCTION ACTIVITIES

Pilot study construction activities included the installation of three extraction and nine observation wells, a valve/flow meter manifold, and conveyance piping to a weir tank (provided by others) on the east side of Tel-4 Road. A GAC treatment system and frac tanks used to store groundwater until treated and pumped out were provided by others. Following treatment through the GAC system, the effluent was pumped to a prepared infiltration area in the swale on the east side of Tel-4 Road, just north of the treatment system as depicted on **Figure 3-2**.

3.2.1 Extraction and Observation Well Installations

Three extraction wells and nine observation wells were installed west of Tel-4 Road in the pilot study area as depicted on **Figure 3-2**. The extraction and observation wells were clustered in groups of three, with each well in the cluster installed at a different depth. The three clusters of observation wells were installed at three separate locations, one cluster each upgradient, side gradient, and downgradient of the extraction wells' location.

The shallow extraction well screen interval, approximately 5 feet bls to 10 feet bls, was designed and installed to capture groundwater in the shallow, silty-fine sand layer that occurs above the first shell hash layer. The intermediate extraction well screen interval, approximately 15 feet bls to 25 feet bls, was designed and installed to capture groundwater in the highly permeable layer between 10 feet bls and 25 feet bls. The deep extraction well screen interval, approximately 35 feet bls to 55 feet bls, was designed and installed to capture groundwater in the second highly permeable layer between 30 feet bls and 55 feet bls.

3.2.2 Pump and Piping Details

A Grundfos Redi-Flo 4-inch submersible pump utilized for the pilot study was connected to a 1.5-inch flexible polyvinyl chloride (PVC) hose. The hose was then connected to a manifold constructed of 1.5-inch PVC piping and included a flow meter, globe valve, and pressure gauge.

3.2.3 Baseline Groundwater Sampling

Following the construction of the pilot study extraction and observation wells, a baseline groundwater sampling event was completed. Groundwater samples were collected from each of the nine observation wells (A3RB-MW0028 through A3RB-MW0036) and each of the three extraction wells (A3RB-EW0001, A3RB-EW0002, and A3RB-EW0003). Analytical results indicated that concentrations of PFOA in observation well A3RB-MW0032 exceeded the EPA RSL of 6 ng/L at a concentration of 7 ng/L. Concentrations of PFOS in six observation wells (A3RB-MW0029, A3RB-MW0030, A3RB-MW0032, A3RB-MW0033, A3RB-MW0035, and A3RB-MW0036) and two extraction wells (A3RB-EW0002 and A3RB-EW0003) exceeded the EPA RSL of 4 ng/L. Maximum concentrations were located at A3RB-MW0029 at a concentration of 31.9 ng/L. Concentrations of PFBS, PFNA, PFHxS, HFPO-DA, PFBA, PFHxA, PFDOA, PFTeA, and PFUNA were below their respective EPA RSLs. Additionally, PFAS concentrations were below the FDEP pGCTLs in groundwater collected from each well sampled. Baseline groundwater sampling data are provided on **Figure 3-3** and in **Table 3-1**.

3.3 Pilot Study Testing and Results

To confirm aquifer conditions to design a full-scale GAC HCTS, tests were conducted during the pilot study including slug, step, and pump tests. Prior to initiation of testing, water level transducers were installed in each extraction and observation well to capture groundwater elevation throughout the pilot study. Following the testing, modeling was completed to assist in the design of the full-scale system. Details of the pilot study are included in the Pilot Study Completion Report (NASA 2024b).

3.3.1 Slug Tests

Slug tests were completed on December 20 and 21, 2023, for each observation and extraction well and confirmatory slug tests were completed on January 3, 2024. Slug tests were completed to assist in calculating the hydraulic conductivity of the aquifer within the site boundary.

Water-level changes obtained from the transducers and manual readings for each slug test were analyzed using AQTESOLV, which uses the Springer and Gelhar method of curve fitting. Hydraulic conductivity was estimated by curve fitting with AQTESOLV. The average hydraulic conductivity values (calculated using AQTESOLV) are provided below for each depth interval:

- Shallow – 22.55 ft/day
- Intermediate – 3.9 ft/day

- Deep – 7.66 ft/day

A range of pumping rates for the step-tests was also calculated based on the data acquired during the slug tests as follows:

- Shallow – 1.5 to 3.0 gallons per minute (gpm)
- Intermediate – 3.5 to 11 gpm
- Deep – 10 to 30 gpm

3.3.2 Step Tests

Step tests were completed from January 10 to 12, 2024, to confirm slug test results and evaluate flow rates for extended pumping periods. The step tests consisted of three 2-hour pumping periods for each extraction well with successively greater pumping rates that spanned the range of possible flow rates estimated from the slug tests **(Exhibit 4-1)**.

Exhibit 4-1: Step Test Flow Rates

Extraction Well ID (screen interval - feet bls)	Aquifer Interval	Step #1 Flowrate	Step #2 Flowrate	Step #3 Flowrate
A3RB-EW0002 (5-10)	Shallow	1-1.5 gpm	2 gpm	3 gpm
A3RB-EW0003 (15-25)	Intermediate	3.5 gpm	8 gpm	11 gpm
A3RB-EW0001 (35-55)	Deep	10 gpm	19.5 gpm	30 gpm

bls – below land surface
gpm – gallons per minute

3.3.3 Pump Tests

Following the step tests, an evaluation was completed to estimate the flow rates that could be sustained for a 72-hour pump test, without causing too much drawdown within the SAS. Three 72-hour pump tests were completed in January and February 2024, one for each extraction well, starting with the shallow well, to assess extraction well and aquifer performance during long-term pumping conditions. At the start of each pump test, the submersible pump was set and started. Manual water levels were collected every 10 minutes for the first hour, once an hour for the next 47 hours, and once every 4 hours for the remainder of the pumping period. The pumping rate and totalized flow were checked at the same rate as the manual water levels throughout the test.

At the completion of each 72-hour pumping period and immediately prior to turning off the pump, manual groundwater level measurements were collected in each extraction, observation, and background monitoring well. Manual water levels were collected every 10 minutes for the first hour of the recovery period. The pump and transducers were kept in the wells for a 72-hour recovery period. When the recovery phase was completed, the transducers were pulled, and the data were downloaded. Following the shallow extraction well, the intermediate and deep extraction well pump tests were completed in this same manner. The sustained flow rates used for the pump tests are provided in **Exhibit 4-2**.

Exhibit 4-2: Pump Test Flow Rates

Extraction Well ID (screen interval - feet bls)	Aquifer Interval	Flowrate
A3RB-EW0002 (5-10)	Shallow	3 gpm
A3RB-EW0003 (15-25)	Intermediate	10 gpm
A3RB-EW0001 (35-55)	Deep	23 gpm

bls – below land surface
gpm – gallons per minute

3.4 Numerical Modeling

Following the slug, step, and pump tests, modeling was performed to evaluate the potential for hydraulic containment of PFAS-impacted groundwater within the vicinity of the Site.

3.4.1 Modeling Objectives

The primary objective of the modeling study was to develop a numerical model for groundwater flow, focusing on evaluating the optimum design to provide hydraulic containment of localized PFAS-impacted groundwater via a hydraulic containment system. The groundwater flow model was developed for the uppermost hydrological unit at the Site, the SAS, an unconfined aquifer situated above the confining layer of estuarine clay, identified as the aquifer most impacted by PFAS (NASA 2003). A detailed description of the modeling efforts is provided in **Appendix C** and summarized here.

The groundwater model domain covered 3.7 square miles and was vertically divided into five layers, representing the SAS as depicted on Figure 1 and Figure 2 in **Appendix C**. The vertical model layers were divided as follows:

- Layer 1 exhibited variable thickness, extending from the ground surface to approximately 4 feet below the simulated water table, and incorporated the silty fine sand layer encountered at thicknesses of 5 feet bls to 10 feet bls.
- Layers 2 and 3 were 10 feet and 7 feet thick, respectively, and part of the highly permeable layer of shell hash with sand.
- Layer 4 was about 3 feet thick and represented the lower permeability zone of clayey sand and clay.
- Layer 5 was the lowest highly permeable layer of shell hash and sand just above the confining unit of estuarine clay, with variable thickness ranging from 8 feet thick around the southeast of the Site to about 72 feet in the north of the domain.

Initially a steady-state groundwater flow model was developed and calibrated using groundwater elevation data collected on February 16, 2024, as detailed in **Appendix C**. Following the calibration of the steady-state model, a transient model was created. The transient groundwater model setup involved defining stress periods based on the pilot study pump tests. For predictive simulations of different pumping scenarios, a separate transient model was established using calibrated parameters and incorporating a stress period of 20 years. The boundary conditions in the predictive simulation remained unchanged, from the steady-state and transient models consistent with those of the calibrated models, except for removing the pump test extraction wells and adding extraction wells for the full-scale hydraulic containment system for the entire boundary.

Drawdown hydrographs for the extraction and monitoring wells during the pump tests demonstrated reasonable model-simulated transient flow conditions and other hydrologic features, including drains and the operation of pump test extraction wells.

3.4.2 Predictive Results/Pumping Scenario

To optimize the capture of the PFAS plume across each depth interval within the SAS, predictive simulations were conducted to determine the most effective configuration for extraction well placement. The calibrated transient model was used to simulate a period spanning 20 years to explore various pumping scenarios. Throughout these simulations, boundary conditions, including general head boundaries and drains, remained consistent with those of the calibrated transient model. The focus areas for the placement of pumping wells were west of Tel-4 Road and close to D’albora Road within the KSC property boundary where known PFAS-impacted groundwater was predominantly moving to the west.

3.4.3 Particle Tracking and Optimum Well Design

A particle tracking package was utilized to compare the capture zones of extraction wells in different pumping scenarios, which aided in the determination of the optimal well locations. Two methods of particle tracking were employed for this analysis. Reverse tracking involved distribution of particles around the extraction wells at each layer, tracing their pathways backward in time. Forward particle tracking, on the other hand, was used to trace particles forward in time, assessing whether particles distributed at the edge of the known PFAS-impacted groundwater footprint were successfully captured. Integrating the results of both reverse and forward tracking analyses assisted in identifying the most effective extraction well configurations for capturing the known PFAS-impacted groundwater across each depth interval of interest within the aquifer.

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4. INTERIM MEASURES OVERVIEW AND DESIGN

Using the data collected from the pilot study and results from the numerical modeling efforts, a full-scale GAC HCTS was designed for the Site. The following provides an overview of the GAC HCTS and details the design. Hydraulic containment will be completed by extracting groundwater through the use of extraction wells. Groundwater treatment will be completed by pumping the extracted groundwater through GAC vessels. Clean effluent will either be discharged to a new infiltration gallery (Option 1) or an existing Dredged Material Management Area (DMMA) (Option 2).

The modeling results determined that 19 extraction wells were required for the full-scale implementation of GAC HCTS: 13 shallow-intermediate and 6 deep surficial aquifer interval wells. The locations are shown on **Figure 4-1**. The extracted groundwater will be conveyed to a GAC treatment system, as depicted in **Drawing C-1**. This section describes the design of the extraction wells, groundwater conveyance network, the GAC treatment system, subsequent disposal of clean effluent, and performance monitoring well installations.

4.1 STAFF GAUGES

During IM activities, six staff gauges will be installed, as shown in **Figure 4-1**, within water bodies within the site vicinity. Staff gauges will be surveyed and surface water elevation data will be collected to evaluate surface-to-groundwater interactions.

4.2 EXTRACTION WELL DETAILS

The extraction well construction details presented in this section are based on the hydrogeology data collected prior to and during the pilot study. Soil cores A3RB-SB0047, A3RB-SB0048, and A3RB-SB0061 were completed at the Site prior to the pilot study. Soil samples were collected from each shell hash layer and submitted to the laboratory for grain size analysis to aid in selecting an optimized filter pack material and slot size for the screened intervals.

The shallow-intermediate extraction well interval will capture groundwater within and just below the first shell hash layer that exists between 17 feet bls and 32 feet bls, with screen intervals of 18 feet bls to 34 feet bls. A minimum of 5 feet of screen will be installed within the first shell hash layer capturing the shallow interval groundwater. Screen intervals for the shallow-intermediate extraction wells may be altered in the field so that the screen is not installed within the semi-confining unit found across the site at depths from 32 feet bls to 34 feet bls. The deep extraction well interval will capture groundwater in the second highly permeable shell hash layer between 30 feet bls and 55 feet bls, with wells screened across the same depth interval. As provided in **Appendix C**, Figure 8A shows the reverse particle tracking model for the planned extraction well screen intervals indicating sufficient capture in the key permeable layers (Layer 2-shallow, Layer 3-intermediate and Layer 5-deep). **Drawing C-2** presents the well construction details for the extraction wells. Construction details include the following:

- Minimum borehole diameter is 10 inches.
- Each extraction well will be constructed of 6-inch diameter, Schedule 80 PVC casing followed by a stainless-steel continuous wire-wrapped screen. These materials provide better longevity when pulling pumps for servicing and/or redevelopment with chemicals.
- The well screen for the shallow-intermediate extraction wells will be 0.020 slot screen with a Southern Products #1A sand filter pack (or equivalent).
- The well screen for the deep extraction wells will be 0.035 slot screen with a Southern Products #2 sand filter pack.
- The casing sections will be flush joint threaded with a Neoprene O-ring or other means of rendering the joint airtight, without using products that may contain PFAS.
- A 1-foot PVC, or stainless steel, well sump, designed to collect intruding fines within the well casing, will be installed below the screen.
- The filter pack will be installed in the annular space around the well screen and extend approximately 2 feet above the top of the screen.
- A bentonite clay seal, consisting of either pressed pellet or chip bentonite clay, will be installed through the inside of the drive casing via tremie pipe during well installation activities. The drive casing will be raised as the bentonite seal is installed, taking care to not raise the casing above the bentonite seal before the seal is set. The bentonite seal will be installed to the full borehole diameter achieving a minimum thickness of 3 feet. The depth of the top of the bentonite seal will be confirmed by direct measurement during installation. The bentonite seal will be left to hydrate for the time recommended by the manufacturer before continuing well installation activities.
- Type I/II Portland cement (grout), mixed with potable water using a 1:1 grout to water ratio, will then be installed from the bentonite seal to approximately 2 feet bls. The filter pack and grout will be installed using a tremie pipe to ensure a continuous filter and seal free of voids.

Each extraction well will be developed for a maximum of 4 hours, using a surge block and centrifugal pump. Well development activities will be performed no sooner than 24 hours after installation to allow sufficient time for grout curing. The suction line will be lowered to the bottom of the well while pumping. Groundwater extraction will be completed for a minimum of five minutes and until the well is visibly free of silt and sand. The groundwater removed during well development will be containerized in 55-gallon, open lid, steel drums. The 55-gallon drums will be positioned on spill pallets that are contained in clamshells. Clamshells will be secured with straps when not in use.

4.3 Extraction Well Pump and Transducer

Each extraction well will be equipped with a submersible pump lowered to approximately 12 inches above the top of the screened interval. The pumps will be secured using 3/32-inch diameter 1x19 stainless steel wire rope connected to the well vault using anchoring as depicted on **Drawing C-3**. The submersible pumps will be sized according to the flow rate and head required for each extraction well location. Since each extraction well is designed with similar construction parameters, the main factors affecting the pump size calculations were flow rate and hydraulic head. The design pressure, flow rate, and pump size for each well is shown on **Drawing C-2**. Friction loss and static head calculations used to size the pumps are provided in **Appendix D**.

In addition to a submersible pump, each extraction well will have a water level transducer set just above the submersible pump. The purpose of the transducer is to monitor the depth of the water column within each extraction well. Each transducer will have a transmitter that will transmit water level information to a central programmable logic controller (PLC).

4.4 PIPING AND WELL VAULTS

Inside each 6-inch Schedule 80 PVC well, Schedule 80 flexible PVC hose will be used to convey groundwater from the submersible pump to the wellhead. The sizes are variable and shown in **Table 4-1** and on **Drawing C-1**. The wellheads will be finished as shown on **Drawing C-3**. At the top of the extraction well, a king nipple will be used to connect the flexible hosing to a Schedule 80 PVC union, and the remaining piping will continue to be rigid Schedule 80 PVC within each vault. The rigid PVC will turn 90 degrees just above the well seal and contain a check valve prior to a sample port, to allow for sample collection.

Extraction wells will be completed within well vaults constructed of a minimum of 3,500 pounds per square inch (psi) concrete as shown on **Drawing C-3**, with a H-20 rated vault lid. Extraction well piping for water conveyance within each vault will be constructed of Schedule 80 PVC. Extraction well piping from outside of the well vaults to the treatment system will be high density polyethylene (HDPE) standard-dimension ratio (SDR) 11 and will vary in size in accordance with **Drawing C-2**. Piping was sized to overcome hydraulic head and maintain a velocity between 3 and 8 feet per second, so as the water would not flow too slow (to maintain solids suspension and prevent sediment buildup) or too fast (causing scouring conditions) within the pipe.

Power and communication conduits required for the pump and transducer will be 1-inch HDPE SDR 13.5 piping and be laid above water piping and have a minimum separation of 1 inch within the same type and 18 inches from separate line types as depicted on **Drawing C-5**. Electrical loads used to size the piping are provided in **Appendix D**.

Piping from each extraction well will be installed in trenches as shown on **Drawing C-4** and detailed on **Drawing C-5**. There will be a minimum separation of 1 inch between extraction well piping within each trench. Extraction well piping will be pressure tested in accordance with ASTM F2164-21. Components that should not be included in a hydrostatic pressure test will be isolated prior to testing. Any piping that fails testing will be repaired and retested. Water used for testing will be reused for each test.

4.5 HORIZONTAL DIRECTIONAL DRILLING

Conveyance piping will be horizontal directionally drilled under Tel-4 Road and the South Repeater Building driveway. Conduit sleeves will be 12 inches or 8 inches in diameter to allow for electrical, communication, and extraction well transfer lines to extend underneath the road and driveway. The conduit sleeves of different pipe types will have a minimum of 18 inches of separation. The details of these trenches are provided on **Drawing C-1**, **Drawing-C-4**, and **Drawing C-5**.

4.6 INFLUENT MANIFOLD

An influent manifold will be constructed prior to the GAC treatment system influent tank as depicted on **Drawing C-6**. The HDPE pipe from each extraction well will transition from HDPE to PVC prior to the manifold vault. Each extraction well will have a flow meter and globe valve installed within a newly constructed manifold vault. The flow meter will have a minimum of 10-pipe diameters and 5-pipe diameters of straight pipe, upgradient and downgradient, respectively, of the flow meter, or as required by the manufacturer. The HDPE pipe will transition far enough upstream to accommodate the straight pipe requirements. The flow meter will have a local display and the ability to transmit flow rates to a PLC and be capable of displaying instantaneous rate and totalized flow. A flow throttling valve (e.g., globe valve) will be installed downflow of each flow meter to allow for adjustment of the pump flow rate to match the design flow rate. The influent manifold vault will be constructed of 3,500 psi concrete and have two hinge-assist lids.

Each groundwater conveyance pipe of the hydraulic containment system will connect to a 4-inch Schedule 80 PVC manifold located prior to the influent tank at the treatment system, as depicted on **Drawing C-6**. The manifold will be painted to protect the PVC from ultraviolet radiation. Steel strut channels will be used to anchor the manifold to the concrete pad. The manifold will be connected to the influent tank with Schedule 80 rigid or flexible PVC.

4.7 GROUNDWATER GAC TREATMENT SYSTEM

The recovered groundwater will be treated on-site through GAC. Influent will be pumped initially to a 21,000 gallon influent tank (approximately 18,000 gallon usable volume) for removal of sediments, then through bag filters (10 micron) for further removal of particulates and then into GAC vessels for removal of PFAS. The GAC vessels were designed to have a minimum empty bed contact time of 19 minutes and surface loading rate of 4 gpm/square foot to 10 gpm/square foot. There will be four 10,000-pound aqueous phase GAC vessels, two parallel trains (treating 75 gpm each) with two vessels in series (lead and lag) for each train. The GAC treatment system layout is shown on **Drawing C-6**.

The GAC treatment system will be located northwest of the South Repeater Building as shown on **Drawing C-1** and housed in a 50-foot by 30-foot by16-foot-tall, prefabricated steel building. New concrete slabs will be constructed for the influent tank and treatment system building as shown on **Drawing S-1**. The building will have lighting, ventilation, and lightning protection as shown in **Drawing E-1**.

4.8 ELECTRICAL

The treatment building, as depicted on **Drawing E-1**, shall have one 120 volt (V), ground-fault circuit interrupter receptacle on each short wall and two on each long wall at 18 inches above the concrete pad. Lighting will be provided by four 4-foot industrial light emitting diode (LED) fixtures.

The power riser diagram and panel schedules for the building and system are provided on **Drawing E-2** and **Drawing E-3**, respectively. A main distribution panel, two sub-panels, a step-down transformer (480V to 240/120V), and electrical disconnects for the treatment system pumps will be provided in Underwriters Laboratories listed cabinets.

4.8.1 Control Panel and Telemetry System Details

The GAC HCTS will be equipped with a PLC with a human machine interface display to allow for automatic scheduled adjustments during operation, and a telemetry system to allow for remote monitoring and control. The Process and Instrumentation Diagram (PI&D) is provided on **Drawing C-7**. This system will also allow personnel to monitor and control the following:

- Submersible pump function (on/off) with the ability to operate individual pumps when needed.
- Receive signals from the 19 in-well transducers. These will monitor groundwater levels and if the level drops too low it will send a signal to the PLC to shut down the associated submersible pump.
- Receive signals from the 19 flow transmitters. The flow rate data will be transmitted to the PLC.
- Signals from the influent transfer tank float tree, with a low, high, and high-high alarm. The low and high alarms will send an email, while the high-high alarm will shut off the GAC HCTS.
- Receive signals and control the GAC treatment system pumps (on/off) individually.
- Receive input signals from pressure transmitters upstream and downstream of the bag filters. When the differential pressure reaches a predetermined set point, the GAC HCTS will shut down.
- Receive signals from the pressure transmitters associated with the GAC vessels and alarm set points and capable of shutting down the GAC HCTS.
- Receive a signal from each of the GAC vessel downstream flow transmitters and provide real-time flow rates for each, as well as a totalized value for each.
- Should Option 1 be chosen by NASA to transfer process water to an infiltration gallery, the PLC will be capable of receiving input signals from the effluent transfer tank float tree and infiltration gallery transducer.

- Should Option 1 be chosen by NASA, the PLC will be capable of sending output signals to relays or directly to a motor contactor to control the effluent transfer pump (on/off).
- Should Option 1 be chosen by NASA, the PLC will be capable of receiving an input single from the infiltration gallery float switch. If an alarm condition exists, the PLC will shut down the GAC HCTS.
- Receive an input signal from the treatment building sump float switch and if an alarm condition exists, the PLC will shut down the GAC HCTS.

For each shut down scenario, an email will be sent to AECOM with the alarm conditions.

4.9 EFFLUENT DISCHARGE DESIGN

The effluent discharge area is expected to receive approximately 216,000 gallons of treated groundwater per day and is located approximately one and one-half miles east of the Site. There are two options for the effluent discharge, as depicted on **Drawing C-8** and **Drawing C-9**, following GAC treatment. Both options include using 4-inch HDPE SDR 11 piping to convey the effluent from the treatment system to the discharge area.

Option 1 includes a 6,000-gallon vertical, flat bottom, effluent water tank, following the anti-siphon loop and a centrifugal pump at the treatment system. The centrifugal pump will be used to pump the effluent from the tank to an infiltration gallery as depicted on **Drawing C-9**. The 4-inch conveyance pipe will run east along SE 22nd Street until the infiltration gallery area where it will turn south until the midway point of two laterals of the infiltration gallery. The conveyance pipe will then branch into two 3-inch conveyance lines leading to each train of the infiltration gallery as shown on **Drawing C-9**. The infiltration gallery legs will be constructed of 3-inch perforated HDPE pipe and encased in #57 stone with geotextile fabric encasing the stone. Infiltration gallery sizing calculations are provided in **Appendix E**.

Option 2 consists of the 4-inch conveyance piping that will end at an existing DMMA, as depicted on **Drawing C-8**. The DMMA consists of approximately 43 acres (with an approximately 2-acre water body) surrounded by an earthen berm about 13 feet high and 20 feet wide at the top. It is used periodically (at 5 to 10 year intervals) for decanting dredge spoils from the Banana River Lagoon. The DMMA engineer has confirmed that it has adequate capacity to receive up to 216,000 gallons per day of treated effluent. The conveyance piping outlet will have a 4-inch hinged flapper valve leading to a riprap apron, also shown on **Drawing C-8**. The riprap apron was designed in accordance with the *US Army Corp of Engineers Erosion and RipRap Requirements at Culvert and Storm-Drain Outlets* (USACE 1970), and calculations are provided in **Appendix D**. NASA is currently working on permitting to discharge to the DMMA. If permitting is not obtained in time, the infiltration gallery will be constructed with a 4-inch tee at the gallery and a cap on the east side for future installation of piping to the DMMA.

Prior to discharge of effluent, DPT groundwater samples will be collected around the DMMA to establish baseline results for PFAS.

4.10 Performance Monitoring Well Details

4.10.1 Performance Monitoring Well Installation Details

A total of eight shallow performance monitoring wells screened from 2 feet bls to 12 feet bls and eight intermediate performance monitoring wells screened from 20 feet bls to 30 feet bls will be installed to monitor groundwater elevations during the treatment system operation. Performance monitoring wells will be located in various areas to ensure that there is coverage upgradient, side gradient, and downgradient of the treatment system area. The locations of these wells are provided on **Figure 4-1**. Construction details include the following:

- Minimum borehole diameter is 8 inches via rotosonic drilling.
- Each performance monitoring well will be constructed with a 2-inch diameter Schedule 40 PVC casing followed by a Schedule 40 PVC screen.
- The shallow performance monitoring wells will be installed to 12 feet bls with a 10-foot 0.010 slot, Schedule 40 PVC screen, a 10.5-foot 20/30 fine sand filter pack, and a 6-inch bentonite clay seal above the filter pack.
- The intermediate performance monitoring wells will be installed to 30 feet bls with a 10-foot 0.010 slot, Schedule 40 PVC screen, a 11-foot 20/30 fine sand filter pack, and a 2-foot bentonite clay seal above the filter pack.
- The 20/30 fine sand filter pack will be installed in the annular space around the well screen.
- The bentonite seal will be installed to the full borehole diameter.
- Type I/II Portland cement (grout), mixed with potable water using a 1:1 grout to water ratio will be installed from the bentonite seal to land surface.
- Stick-up lockable protective risers were installed in a 2-foot by 2-foot by 4-inch concrete pad aboveground to provide protection for the well casing.

The wells will be developed following installation until groundwater is clear.

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5. PERMITTING AND SITE/CONSTRUCTION PREPARATION

5.1 ENVIRONMENTAL CHECKLIST AND RECORD OF ENVIRONMENTAL CONSIDERATION

A KSC Environmental Checklist (Form 21-608) was completed in July 2024 and resulted in Record of Environmental Consideration (REC) 12950 for performing site-wide land clearing, soil boring activities, installation of the GAC HCTS, and subsequent groundwater monitoring. A copy of REC 12950 is provided in **Appendix F**. Site activities will follow the requirements established in the REC that protect wildlife and historical artifacts and follow the applicable guidelines for erosion and sediment control prevention, waste management, and permitting.

5.1.1 Erosion and Sediment Control

The HCTS may disturb more than one acre of land but less than 5 acres: therefore, a National Pollution Discharge Elimination System (NPDES) permit and Stormwater Pollution Prevention Plan will be prepared. Standard stormwater best management practices (BMPs) will be followed. Additionally, Paragraph 3.a.5 of the REC for this site requires control devices where the possibility of sediment discharge outside of project boundaries or impact to surrounding stormwater conveyances and other surface waters may occur. Sediment is not expected to discharge outside of the project boundaries; however, silt fence will be installed around the perimeter of the construction area, and silt socks will be installed around stormwater catch basins or across any stormwater swales that discharge from the Site. Vegetation that is cleared will be mulched on-site, providing a surface protection to reduce erosion. Stockpiled native soil from trenching activities will be covered to reduce potential sediment runoff. Additional BMPs will be used as necessary for any land disturbance activities.

5.1.2 Ecological Survey

As outlined in Paragraph 3.a.3 of the REC, the site has potential to impact gopher tortoise and scrub jay habitat. Fourteen days prior to beginning each phase of land clearing or activities that impact vegetation, a biological survey will be scheduled to identify areas of potential concern. Contact information is provided within REC 12950 in **Appendix F**. Appropriate mitigation actions by NASA will be taken, if needed, based on the findings of the wildlife survey.

5.1.3 Dig Permit and Utility Locate

Prior to implementing any intrusive activities, a dig permit will be obtained for clearing and ground penetrating work by submitting an Excavation/Utility Locate Permit Request to KSC’s permit office. Dig permit applications will include in-person marking of the locations for intrusive work, presence on-site during the locate, and maintenance of the markings throughout the construction activities. Utility locates by both the KSC Utility Locate office and Florida’s Sunshine 811 will be completed with enough lead time to allow for any changes that may become apparent during utility locate efforts. Ground penetrating work will not commence until utility locates are complete and the Excavation/Utility Locate Permit Request is signed by a KSC locator. Based on previous dig permits, the site is designated as either Category A or Category B, depending on the specific location. Category B restricts work during launch and test activities and applies to the area surrounding the South Repeater Building and MOTR Tower. Areas west of Tel-4 Road and north of the South Repeater Building are designated as Category A where activities can proceed during all launch operations.

5.2 Communication Plan

The NASA remediation project manager (RPM), Deda Johansen, will be notified prior to any field events or access to the site. These notifications may be through the weekly update, email, or phone call from the AECOM task order manager.

5.3 Hot Work Permit

Completion of hot work permits is required for heat producing equipment or any work that will produce sparks during any construction activities such as utility electrical hookups or HDPE pipe welding. Prior to beginning the work, AECOM will coordinate with the KSC Fire Department to obtain the permit and will renew the permit every 30 days until such work is completed.

5.4 Electrical Service Installation

A NASA-owned 225kVA, 13.2 KV to 480Y/277V transformer will be moved from the Paint and Oil Locker facility and delivered to the Site. The transformer will be set on a newly constructed transformer pad and tested to confirm that it is operational. Required testing includes an oil sample test, transformer turns ratio test, and power factor test. The transformer will be bolted into place on the concrete pad. This transformer location is provided on **Drawing S-1**. Prior to connecting, AECOM's electrical subcontractor will provide arc flash calculations for review by NASA's Control Configuration Board. Once approved, a power outage will be coordinated with KSC Base Operations & Spaceport Services (BOSS). Following BOSS approval, the subcontractor will obtain required electrical permits, coordinate installation of a power meter with KSC's utility company and mobilize to the site to complete installation of subsurface wiring and conduit from the transformer to the existing medium voltage switchgear and treatment building.

5.5 Site Security and Badging

The Site is located in a remote part of KSC, south of the restricted area. However, Site access remains restricted to badged personnel or badged contractors only. A 6-foot chain link fence will be installed in areas where there is a potential for public access to provide a secure area for staff during system installation, operation, and maintenance activities. Location of this fence is shown on **Figure 5-1**. Temporary security fencing with a minimum height of 4 feet will be installed around open trenching areas to maintain a minimum distance of 50 feet where possible.

5.6 CLEARING AND GRUBBING

Prior to the start of construction activities, vegetation clearing activities will be required. Prior to clearing, the proposed areas will be marked for inspection and ecological survey. Clearing locations may be shifted as necessary based on the results of the ecological survey. Pathways for the trenches will be cleared up to 25 feet wide. If tree felling is required, the trees will be cut into manageable pieces and left in a neat pile on-site. Grubbing will be performed to remove stumps and any remaining roots to a depth of 24 inches.

5.7 SITE PLAN

A Site Plan will be submitted to NASA Master Planning for approval of site construction activities, including the trenching, treatment system building, influent tank, extraction wells, and infiltration gallery locations. Work will be performed in adherence to any action items required by comments attached to the approval.

5.8 OVERSIZED LOADS

There is currently no equipment or vehicle load planned for transport that exceeds the maximum width, height, length, or weight criteria set forth in Chapter 316 of the Florida Statutes. Additionally, oversized equipment or vehicles are not planned for transport to or from the site.

If transport of oversized loads on KSC property becomes necessary, transport will be coordinated with KSC Protective Services prior to mobilization and performed in accordance with KSC NASA Procedure Requirements (KNPR) 1600.1, paragraph 11.9, *Overweight and Oversized Vehicles on KSC Roadways,* and comply with Department of Transportation regulations. Loads or vehicles that oppose the flow or impede normal traffic will have a flag on each corner of the equipment and vehicle. Written authorization in the form of a Work Order, Support Request, Work Assignment, Shipping Order, or other KSC-approved documentation will be obtained prior to the movement of equipment and vehicles requiring an escort.

5.9 MAINTENANCE OF TRAFFIC

A Maintenance of Traffic (MOT) plan is not expected to be needed; however, the proposed Florida Department of Transportation (MOT Index 102-602 will be used for temporary traffic control during the installation of equipment within 15 feet from the edge of pavement along Tel-4 Road, if necessary. The MOT index is provided as **Appendix G**. Activities will also be carried out in accordance with KNPR 8715.7, paragraph 3.27, *Work Zone Maintenance of Traffic*.

- Employees working within 15 feet of a roadway or street shall wear reflective vests, compliant with ANSI/ISEA 107 –2015 Class 2 High-Visibility Safety Apparel.
- Signs will be incorporated in accordance with the Florida Department of Transportation specifications.

- Site supervisor managing traffic control setup will be trained to the intermediate or advanced MOT level.
- The verification of training will be submitted in the training section of the Health and Safety Plan (HASP).

No flagmen are anticipated to be required.

5.10 PROJECT SUPPORT AREA

An area within the fenced portion of the site will be designated for storing equipment and materials and administrative responsibilities, on-site meetings, job trailer, parking, and portable facilities (i.e., lavatory). See **Figure 5-1** for the locations of proposed support areas.

5.11 SPILL PREVENTION

Protective measures will be in place for the possible release of materials from heavy equipment, drilling machinery, equipment decontamination, and/or sampling activities. Heavy equipment and drill rigs will be inspected prior to use to confirm hydraulic lines, seals, and tanks are free from leaks. IDW, water from equipment decontamination, and purge water from sampling activities will be stored in frac tanks or new 55-gallon steel drums on spill pallets that are contained in clamshells. Clamshells will be secured with straps when not in use. Fueling of vehicles will not occur on-site. If heavy equipment will be required on-site, any fuel containers required will be held in secondary containment and fueling will be completed with containment beneath the piece of equipment being fueled.

5.11.1 Spill Response

Work trucks will be equipped with a spill kit and first aid kit, and a minimum of one work truck will have a copy of the HASP to aid in the response of a spill. A hand and eyewash station will be available on-site to respond to dermal contact exposures. Procedures if a spill occurs:

1. Contact emergency telephone number located in the HASP if spill results in personal injury or fire.
2. Notify the AECOM Construction Supervisor immediately.
3. Construction Supervisor will notify:
    a. NASA RPM and AECOM Project Manager
    b. KSC security within 8 hours of the incident
4. AECOM Project Manager will initiate an incident report to the Environmental Health and Safety Department.

The Construction Supervisor will direct spill cleanup, containment, and emergency response activities while designating qualified and trained individuals.

5.12 PRE-CONSTRUCTION CONDITIONS SURVEY

The Site Safety Officer/Construction Supervisor will perform a walk-through of the site prior to commencing site activities. The purpose of the walk-through is to survey the overall site and specific construction areas for conditions that may require modifications to the approach of scheduled activities. Examples of notable conditions would be evidence of new wildlife habitats, evidence of site security breaches, or saturated site conditions limiting heavy equipment access. The pre-construction walk-through will be documented and include written observations, photos, video, and list of attendees.

5.13 CONSTRUCTION QUALITY ASSURANCE

To fulfill construction quality assurance objectives, the Site Safety Officer and overseer of construction activities will record daily construction activities, adhere to the safety procedures outlined in the HASP, and self-perform or assign to competent persons the task of testing successful operation of the system and piping network. Inspection, testing, and monitoring activities will be documented with written records and photos and reported as necessary.

5.14 SITEWISE™ INVESTIGATIONS

Various quantifiable sustainability metrics were assessed throughout this IMWP, including but not limited to greenhouse gas emissions, energy use, emissions of criteria pollutants, water consumption, resource consumption, and accident risk. SiteWise™, a tool developed by the United States Navy, United States Army Corps of Engineers, and Batelle was utilized to assess the environmental footprint of this IMWP. The production of required materials; transportation of required materials, equipment, and personnel; on-site activities to be performed; and amount of waste produced were calculated and input into SiteWise™. Findings are provided in **Appendix H**, including a detailed analysis for each component of the processed workplan along with a comprehensive summary sheet. Component one includes the installation of extraction wells and piping, component two includes the installation of the treatment system, and component three includes civil/electrical work.

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6. IMPLEMENTATION TIMELINE, EXIT STRATEGY, AND COSTING

This section outlines the approximate project and construction timeline, and the procedures for quality control oversight.

6.1 PROJECT SCHEDULE

The anticipated construction timeline is 6 to 9 months from IMWP approval to system startup. The approximate project schedule is outlined as follows:

- Approximately 45 calendar days for Implementation Work Plan preparation, HASP updates, site plan submittal and approval, dig permit submittal and approval, coordination of activities with facility personnel, procurement of subcontractors, and utility locate.
- 5 working days for oversight of vegetation clearing and utility locate.
- 35 working days for extraction and performance monitoring well installation.
- 12 working days for performance monitoring well, extraction well survey.
- 45 calendar days for baseline groundwater sampling, obtaining data from the laboratory, and analyzing the data.
- 150 calendar days for trenching and piping installation to include pump installation and well completions
- 10 calendar days for GAC treatment system installation.
- 30 calendar days for treatment system building installation.
- 180 calendar days for electrical and wiring installation.
- 30 calendar days for control panel and communications wiring installation.
- 3 working days for system startup (two personnel for system startup and troubleshooting).
- 30 calendar days for system operation (month one).
- 75 days for preparation of Construction Completion Report (CCR) and presentation of the CCR ADP to the KSCRT that includes the first quarter of performance monitoring results. Presentation date is dependent on KSCRT schedule.
- 60 calendar days for NASA CCR review and submittal to DEP following the presentation.

Some events may overlap, which will condense the estimated timeline.

Following installation, a semi-annual Performance Monitoring Report will be prepared that summarizes operation, maintenance, and monitoring (OM&M) activities, the results of performance monitoring events, an evaluation of IM progress, and recommendations for future OM&M activities. The report will be signed and sealed by a Florida-registered Professional Engineer (PE). The semi-annual performance monitoring report will also include elements formerly included in a CCR. These include:

- Summary of extraction well installation activities
- Summary of the IM

- Summary of remediation system startup activities, along with effluent sampling results
- Lessons learned
- Electrical and mechanical diagrams
- Signature and seal of a Florida licensed PE

6.2 EXIT STRATEGY

The GAC HCTS will be operated for hydraulic containment while NASA continues investigations of PFAS affected groundwater in the South Repeater Building area and evaluating potential additional or alternate remediation technologies. It is currently anticipated that the GAC HCTS will operate for multiple years. The timeline for shutting down the GAC HCTS and beginning post-active remediation monitoring will be assessed annually as those investigations and evaluations progress.

6.3 COSTS

The capital and annual OM&M costs for the GAC HCTS are provided in **Appendix I**. The estimated capital cost for installation of the system is $5,225,889. The estimated annual cost for the first year of operation to include OM&M events and performance monitoring events is $421,455. The total cost for the IM, assuming a 3-to-5-year operation period is approximately $7,270,584. These costs include several options that may or may not be implemented and if not implemented may be reduce costs by approximately $212,167.73.

7. SYSTEM STARTUP, OPERATION, AND MAINTENANCE

7.1 OVERVIEW

The GAC HCTS will comprise 19 extraction wells with submersible pumps, a GAC treatment system, and an effluent discharge area. Prior to system startup, a baseline sampling event will be performed, which will include collecting samples from 28 performance monitoring wells.

Following startup, OM&M events will be conducted daily for the first week, weekly for the remainder of the first month, and monthly for the next 12 months, and quarterly for the first year. Additionally, seven shallow and four deep extraction wells will be sampled during startup and weekly for the first month, then monthly, and quarterly thereafter. Quarterly performance monitoring events will be completed and included in the semi-annual OM&M and Performance Monitoring Report. Performance monitoring will be performed quarterly for the first year and then semi-annually thereafter. The treatment system will be equipped with telemetry to allow prompt response to alarm conditions and monitor daily operation. Details of sampling, startup, and monitoring activities are provided in the following sections.

7.2 BASELINE SAMPLING

To document and evaluate groundwater elevations and quality prior to system start-up and operation, groundwater elevations and samples from 12 existing and 16 newly installed monitoring wells will be collected using low-flow purging. Samples will be analyzed by EPA Method 1633 for 40 PFAS compounds and Department of Defense (DoD) Department of Energy (DoE) Quality Systems Manual (QSM) Version 5.4 or later. Sampling will be performed in accordance with Florida DEP Standard Operating Procedures (SOPs) for groundwater sampling (FDEP 2017) and the KSC Sampling and Analysis Plan (NASA 2018).

To evaluate potential surface water and groundwater interactions, surface water elevations will also be collected from six newly installed staff gauges at the same time as groundwater elevation data collection.

7.3 COMMISSIONING AND STARTUP

7.3.1 Commissioning

Prior to system startup, each GAC HCTS component will be tested to confirm it is working as designed. Additionally, the system will be inspected to confirm that it has been constructed as designed, components have been properly installed, and the system operates as specified, or if modifications will be required. Initial operational data will be documented and evaluated in preparation for complete startup. Commissioning activities include:

- Pre-commissioning check

- Functional performance tests of individual components
- Pre-startup functional performance system testing of the components

A proposed site-specific checklist, included in **Appendix J**, will be completed to document that equipment and instrumentation have been properly installed, secured, and lubricated, as necessary, and that protective covers on rotating equipment are in place. Inspections of equipment lockout, safety valves, and site security devices will also be completed. Any deficiencies will be corrected to meet operational requirements prior to full-scale operation. The checklist will be initialed by the team member(s) performing the inspection.

7.3.2 System Startup and Prove-Out

After commissioning, the initial startup procedure for the GAC HCTS will include:

- Inspection of the system to identify whether any operational conditions have changed (e.g., checking all pumps, filters, and drains for fouling, etc.).
- Electrical disconnects are in energized positions.
- Confirming electrical connections are secure and electric breakers and switches are in the "ON" position.
- Verifying valves are in the correct position.
- Confirming system connections appear secure and are in the proper position.

Initially, each extraction well will be phased into operation before starting the pump at the next extraction well. Once each extraction well has been started, the flow for each pump will be adjusted and confirmed it matches the design flow as shown in **Table 4-1**. Following pump start-up, and flow confirmation, the GAC treatment system will be started. The treatment system pump will be started to pump water through the system. During the initial phased system startup, pressure, flow rates, and other parameters will be recorded, and adjustments will be made as needed to match design flow rates and pressures. Groundwater elevations from 28 monitoring wells and six staff gauges will be recorded before, during, and after system startup. These monitoring wells and staff gauges are presented on **Figure 4-1**.

Startup activities are anticipated to take 10 days. Preparation activities prior to mobilizing to the field include preparing the site-specific startup checklist provided in **Appendix J**, reviewing the maintenance manual for the GAC treatment system, reviewing the startup plan, checking and calibrating field instruments, packing the field vehicle with appropriate personal protective equipment (PPE) and tools, and obtaining decontamination supplies.

The general startup sequence for normal operation of the system will include verifying the following:

- Valves are in their proper positions.
- Electrical breakers are in the "ON" position.

- Alarm conditions on the control panel are cleared.
- Effluent outlets are clear.

Once the start-up sequence verifications are confirmed, the system will be started and flows throughout the system will be verified. Flow rates for the extraction wells at the manifold should align with **Table 4-1**. Any adjustments will be noted on the startup checklist. After the necessary system adjustments, pre-sets, and programming have been completed, the system will be determined ready for full operation and will begin the operation phase. During start-up, a sample from the influent prior to the GAC vessels and effluent from each carbon vessel will be collected and sent to SGS for analysis of PFAS. This will occur after the first 8-hour run period and every 8 hours thereafter for the first day and daily for the first week.

7.4 ROUTINE OM&M

Each OM&M field event is anticipated to take 3 days with a two-person team. Preparation activities prior to mobilizing to the field include reviewing the OM&M plan, checking and calibrating field instruments, confirming sample bottle orders, packing the field vehicle with appropriate PPE and tools, and obtaining decontamination supplies. A customized OM&M field log, provided in **Appendix J**, will be used for the Site hydraulic containment and groundwater remediation system, and improved as needed. OM&M events will include:

- Inspection of the system to identify whether any operational conditions have changed (e.g., checking all pumps, filters, and drains for fouling, etc.)
- Inspecting the control panel and telemetry system
- Inspecting flow meters and pressure gauges and replace as needed
- Confirming electrical connections are secure
- Verifying valves are in the correct position
- Confirming system connections appear secure and are in the proper position
- Recording flow meter readings
- Recording system pressure readings
- Performing required maintenance, as necessary
- Sample collection for analysis of PFAS from the influent prior to the GAC vessels
- Sample collection for analysis of PFAS from the effluent each GAC vessel
- Recording water level measurements from 14 newly installed Performance Monitoring wells, 2 existing monitoring wells, and six new staff gauges
- Checking HCTS treated effluent discharge area conditions

Additional site visits will be required for evaluation of system faults/shutdowns, to repair/restart the system and shut down/restart the system due to weather. The system and associated process lines will be fully depressurized prior to performing any maintenance activities. Results of the OM&Ms will be compared to design parameters and adjustments will be made as necessary.

OM&M logs will be revised as needed to capture adjustments to system settings and routine maintenance activities.

7.5 GAC Change-Out and Preventive Maintenance

The GAC vessels are anticipated to need to be changed out every 3 to 6 months. Sample results from monthly OM&M activities will be reviewed upon receipt to confirm break through has not occurred. Once break through has occurred for either lead vessel, change-out services will be scheduled. During GAC changeouts, anticipated to take one day, the GAC HCTS will be shut down the day prior to change-out activities. The lead and lag vessels will be drained. On the day the GAC is changed out, the GAC vessel valves will be switched so that the lag vessels become the lead vessels. The original lead vessels will have the GAC replaced and become the new lag vessels. This process will continue for subsequent change-outs so that the lag vessels always have the new GAC.

Preventive maintenance (e.g., bag filter cleaning) or system repairs will be completed per the preventive maintenance schedule per manufacturer’s instructions and on an as-needed basis. The bag filters have differential pressure gauges that will transmit a signal and hence an email letting personnel know that they need to be cleaned or replaced. The GAC vessels also have pressure gauges, and when the pressure differential exceeds a known set point, an email will be sent letting personnel know that a GAC changeout needs to be scheduled. Preventive maintenance or repairs to any mechanical or electrical components will be performed after the component has been de-energized and a lock-out/tag-out has been completed. Maintenance activities are anticipated to include, but are not limited to:

- GAC change-out
- Cleaning or replacing bag filters
- Trimming grass and picking up debris from around the extraction wells, manifold, and remediation system areas

Extraction and system pumps will be pulled from service during select OM&M events to provide routine maintenance according to manufacturer recommendations.

8. WASTE MANAGEMENT

8.1 INVESTIGATION DERIVED WASTE

IDW will be containerized in 55-gallon steel drums up to 80% capacity. Soil will be stored in open-top drums, while development and decontamination water will be stored in closed-top drums. Following the well installation event, the IDW drums will be transported to the Components Cleaning Facility or Paint and Oil Locker IDW storage areas and positioned on the provided secondary containment pallets.

One soil sample will be collected from each drum of drill cuttings and analyzed by SGS in accordance with EPA Method 537M for 29 PFAS compounds incorporating the requirements of the DoD DoE QSM 5.4 or later. One aqueous sample will be collected from each drum of development and decontamination water and analyzed by SGS in accordance with EPA Method 1633 for 40 PFAS compounds and DoD DoE QSM 5.4 or later, EPA Method 300.0 for nitrates, and EPA Method 365.4 for total phosphorus.

Each liquid drum should have a potential hydrogen (pH) between 6 and 8.5 standard units, and if the pH of a drum is outside this range, a dilute solution of base or acid will be added to the IDW incrementally until the pH is within the desired range. Approximate IDW quantities, pH levels (and adjustment), and spill pallet/drum IDs will be documented on an IDW Log that is provided to the NASA RPM following each field activity.

The soil wastes will be managed based on comparison of the results for PFOS and PFOA to the Florida DEP pSCTLs. The DEP will be notified of results and the proposed method of disposition if analytical results are above the pSCTLs. Liquid wastes are expected to be treated through NASA's GAC system for PFAS IDW.

8.2 CONSTRUCTION WASTE

Non-IDW waste generated during the system installation and startup procedures will be disposed of in a roll-off dumpster. A waste hauler will be contracted to haul off the waste when the dumpster is at capacity. The dumpster will be stationed on the east side of Tel-4 Road where the ground is stable.

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9. PERFORMANCE MONITORING AND REPORTING

Following the startup to monitor the performance of the GAC HCTS a total of 28 select monitoring wells and 11 select extraction wells, as depicted on **Figure 4-1**, will be sampled weekly for the first month, once a month for two months and quarterly thereafter. The performance monitoring activities will gather data on the potential migration of PFAS-impacted groundwater and concentrations of PFAS within the groundwater within the vicinity of the Site.

During each performance monitoring event, groundwater elevations and samples will be collected at the 28 performance monitoring wells. Surface water elevations will be collected from the six newly installed staff gauges. The groundwater samples will be submitted to SGS, a Florida certified laboratory, and analyzed in accordance with EPA Method 1633 for 40 PFAS compounds incorporating the requirements of DoD DoE QSM 5.4 or later. The monitoring wells and extraction wells to be sampled during performance monitoring events are listed in **Table 9-1**.

A semi-annual performance monitoring report will be included with the OM&M report. The performance monitoring report will include:

- Treatment system updates
- Groundwater elevation summary
- Groundwater analytical summary
- Recommendations for future system operation

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10. REFERENCES

National Aeronautics and & Space Administration. (2003). *Environmental Setting Reference Manual* (KSC FORM 16-12 (REV. 7/92); pp. 1–191). John F. Kennedy Space Center.

DoD/DOE. 2021. *Department of Defense (DoD) Department of Energy (DoE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories Version 5.4.* October 2021.

FDEP. 2018. *Department of Environmental Protection Standard Operating Procedures for Field Activities*, DEP-SOP-001/01. Florida Department of Environmental Protection. April 2018.

FDEP. 2022. *Per- and Polyfluoroalkyl Substances (PFAS) Dynamic Plan*. Florida Department of Environmental Protection Division of Waste Management. March 2022.

J.P Bohan 1970. *Erosion and Riprap Requirements at Culvert and Storm-Drain Outlets*. Conducted by USACE. January 1970.

MDEQ. 2018. *PFAS Sampling Guidelines*. Michigan Department of Environmental Quality.

NASA. 2010. *Environmental Resources Document*. March 2010.

NASA. 2012. *Area 3 Repeater Building (A3RB) (N6-1118) PRL 210, SWMU Assessment Report/Confirmatory Sampling Work Plan (Revision 0)*. MESC/IHA Environmental Services Branch. August 2013.

NASA. 2016. *Kennedy NASA Procedural Requirements, KSC Construction Contractor Safety and Health Practices Procedural Requirements, KNPR 8715.7.* Safety and Mission Assurance. National Aeronautics and Space Administrations. August 2016.

NASA. 2017. *KSC Sampling and Analysis Plan RCRA Corrective Action Program at the Kennedy Space Center, Florida*. Prepared by Geosyntec Consultants, Inc. August 2017.

NASA. 2021. *Interim Measures Report Area 3 Repeater Building Potential Release Location 210, John F. Kennedy Space Center, Florida (Revision 0)*. Prepared by AECOM. February 2021.

NASA. 2022. *Phase II and III Solid Waste Management Unit Assessment and Confirmatory Sampling Report, Center-Wide Per- and Polyfluoroalkyl Substances. Potential Release Location 237*. Prepared by AECOM. July 2022.

NASA 2024a. *Forensic Analysis of Per- and Polyfluoroalkyl Substances Impacts in the South Repeater Building Area (SWMU 121) Kennedy Space Center Florida*. Prepared by AECOM. March 2024.

NASA. 2024b. *Per- and Polyfluoroalkyl Substances Confirmatory Sampling Report, South Repeater Building (SWMU 121)*, *Kennedy Space Center, Florida*. Prepared by AECOM. March 2024.

NASA. 2024c. *Interim Measures Pilot Study Completion Report, South Repeater Building (SWMU 121), Hydraulic Containment and Groundwater Treatment System for Per- and Polyfluoroalkyl Substances*. Prepared by AECOM. July 2024.

USDA. 2022. *USDA Web Soil Survey*. Web Soil Survey. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

United States Geological Survey. 2000. "Is Seawater Intrusion Affecting Ground Water on Lopez Island, Washington?" USGS Fact Sheet 057-00.

TABLES

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Table 2-1
Soil Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location ID	Sample Date	Depth Interval (ft bls)	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTRIA
EPA RSL for Soil, Residential (mg/kg)				0.00063	0.000019	1.9	0.019	0.13	0.023	7.8	3.2	0.32	6.3	1.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EPA RSL for Soil, Industrial (mg/kg)				0.0082	0.25	25	0.25	1.6	0.35	120	41	4.1	82	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EPA RSL for Soil, Leachability (MCL) (mg/kg)				0.00003	0.000061	--	0.000042	0.0000042	0.00001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EPA RSL for Soil, Leachability (SSL) (mg/kg)				0.0000015	0.00000004	0.000025	0.000017	0.00024	0.0003	0.00065	0.0000015	0.017	0.94	0.0045	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DEP pSCTL, Residential (mg/kg)				1.3	1.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DEP pSCTL, Industrial (mg/kg)				25	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DEP pSCTL, Leachability (mg/kg)				0.007	0.002	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A3RB-SB0047	1/14/2022	21 - 21	NM	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U
	1/14/2022	58 - 58	NM	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
A3RB-SB0048	6/13/2022	61 - 61	NM	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
A3RB-SB0049	12/22/2022	0 - 0.5	NM	**0.0015**	**0.00057 J**	0.00070 U	0.00070 U	**0.002**	0.00070 U	**0.00070 J**	0.00070 U	0.0035 U	0.00070 U	0.0035 U	0.0035 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.0035 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.0035 U	**0.00053 J**	0.00070 U	0.0035 U
	12/22/2022	0.5 - 2	NM	**0.0013 J**	0.00070 U	0.00070 U	0.00070 U	**0.0064**	0.00070 U	**0.00055 J**	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	**0.00038 J**	0.00070 U	0.00070 U
A3RB-SB0050	12/22/2022	0 - 0.5	NM	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
	12/22/2022	0.5 - 2	NM	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
	12/22/2022	0.5 - 2	FD	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
A3RB-SB0051	12/22/2022	0 - 0.5	NM	**0.0012 J**	0.00070 U	0.00070 U	0.00070 U	**0.00080 J**	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.0035 U	0.00070 U	0.00070 U	0.00070 U
	12/22/2022	0.5 - 2	NM	**0.00061 J**	0.00068 U	0.00068 U	0.00068 U	**0.00057 J**	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U
A3RB-SB0052	12/22/2022	0 - 0.5	NM	**0.0031**	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
	12/22/2022	0.5 - 2	NM	**0.0018**	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U
A3RB-SB0053	12/22/2022	0 - 0.5	NM	**0.005**	0.00060 U	0.00060 U	0.00060 U	**0.0038**	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U
	12/22/2022	0.5 - 2	NM	**0.0033**	0.00061 U	0.00061 U	0.00061 U	**0.00069 J**	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
A3RB-SB0054	12/22/2022	0 - 0.5	NM	**0.0015**	0.00052 U	0.00052 U	0.00052 U	**0.00053 J**	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
	12/22/2022	0.5 - 2	NM	**0.0012**	0.00057 U	0.00057 U	0.00057 U	**0.00035 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
A3RB-SB0055	12/22/2022	0 - 0.5	NM	**0.00044 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U
	12/22/2022	0.5 - 2	NM	**0.00040 J**	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
A3RB-SB0056	12/22/2022	0 - 0.5	NM	**0.00047 J**	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.0025 U	0.00051 U	0.00051 U	0.0025 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	**0.00034 J**	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.0025 U	0.00051 U	0.00051 U	0.0025 U
	12/22/2022	0.5 - 2	NM	**0.00043 J**	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.0026 U	0.00052 U	0.00052 U	0.0026 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.0026 U	0.00052 U	0.00052 U	0.0026 U
A3RB-SB0057	12/22/2022	0 - 0.5	NM	**0.0144**	0.00055 U	**0.0012**	0.00055 U	**0.0274**	0.00055 U	0.00055 U	**0.00060 J**	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	**0.00045 J**	0.00055 U	**0.0027**	0.00055 U	0.00055 U
	12/22/2022	0.5 - 2	NM	**0.0061**	0.00060 U	**0.00031 J**	0.00060 U	**0.0091**	0.00060 U	0.00060 U	**0.00050 J**	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	**0.00041 J**	0.00060 U	**0.00057 J**	0.00060 U	0.00060 U
A3RB-SB0058	12/22/2022	0 - 0.5	NM	**0.0011**	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	12/22/2022	0.5 - 2	NM	**0.0014**	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U
A3RB-SB0059	12/22/2022	0 - 0.5	NM	**0.00049 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	**0.00047 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
	12/22/2022	0.5 - 2	NM	**0.002**	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
A3RB-SB0060	12/22/2022	0 - 0.5	NM	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	12/22/2022	0 - 0.5	FD	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U	0.0028 U	0.0028 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U
	12/22/2022	0.5 - 2	NM	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
A3RB-SB0061	3/8/2023	59 - 59	NM	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U
A3RB-SB0062	11/7/2023	4-4	NM	**0.0052**	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.0031 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.0031 U	0.00062 U
	11/7/2023	7-7	NM	**0.0013 J**	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.0036 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U
	11/7/2023	43-43	NM	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.0032 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U
	11/7/2023	53-53	NM	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.0034 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U
A3RB-SB0063	11/8/2023	13-13	NM	**0.00043 J**	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.0031 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U
A3RB-SB0064	11/8/2023	27-27	NM	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0032 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
A3RB-SB0065	11/8/2023	7-7	NM	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.0027 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
A3RB-SB0066	11/8/2023	23-23	NM	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
A3RB-SB0067	11/8/2023	47-47	NM	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U
A3RB-SB0084	11/8/2023	17-17	NM	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U
A3RB-SB0085	11/8/2023	25-25	NM	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0032 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
A3RB-SB0086	11/8/2023	13-13	NM	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.0035 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U
	11/8/2023	20-20	NM	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0033 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
A3RB-SB0087	11/9/2023	23-23	NM	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.0034 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U
	11/9/2023	27-27	NM	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.0029 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U
A3RB-SB0088	11/9/2023	17-17	NM	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.0039 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
A3RB-SB0089	11/9/2023	17-17	NM	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
	11/9/2023	27-27	NM	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.0037 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U
A3RB-SB0090	11/9/2023	13-13	NM	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U
A3RB-SB0091	11/10/2023	13-13	NM	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U
A3RB-SB0098	1/2/2024	0-0.5	NM	**0.0034**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.0027 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
	1/2/2024	0.5-1.0	NM	**0.0026**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
A3RB-SB0099	1/2/2024	0-0.5	NM	**0.0052**	0.00054 U	0.00054 U	0.00054 U	**0.0011**	0.00054 U	0.00054 U	0.00054 U	**0.0017**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	**0.00062 J**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	**0.00053 J**	**0.00028 J**	0.00054 U
	1/2/2024	0.5-1.0	NM	**0.006**	0.00058 U	0.00058 U	0.00058 U	**0.00081 J**	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	**0.00032 J**	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	**0.0028**	0.00058 U	0.00058 U	0.00058 U	**0.0010 J**	**0.00030 J**	0.00058 U
	1/2/2024	0.5-1.0	FD	**0.0052**	0.00057 U	0.00057 U	0.00057 U	**0.00081 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	**0.00040 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	**0.0037**	0.00057 U	0.00057 U	0.00057 U	**0.00078 J**	**0.00031 J**	0.00057 U
A3RB-SB0100	1/2/2024	0-0.5	NM	**0.0015**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
	1/2/2024	0.5-1.0	NM	**0.00095 J**	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.0027 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
A3RB-SB0101	1/2/2024	0-0.5	NM	**0.0031**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
	1/2/2024	0-0.5	FD	**0.0019**	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.0027 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
	1/2/2024	0.5-1.0	NM	**0.0016**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.0027 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U

Notes:

Results in the table and the laboratory analytical report are in parts per million (milligram per kilogram, or mg/kg).
Bolded type indicates the compound was detected.
Yellow highlighted cell indicates an exceedance of FDEP pSCTLs for Leachability (mg/kg) as of May 2024.
Depth intervals are measured in feet below land surface (bls).
Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.
Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory operating conditions, based on the precision and accuracy results for standards that are run with the sample.
-- indicates that a screening value is not available as of October 2024 for that compound.

Abbreviations:

A3RB = Area 3 Repeater Building
DEP - Florida Department of Environmental Protection
EPA = Environmental Protection Agency
FD = Field Duplicate
J = Estimated value
bls = below land surface
NM = Normal Sample
PFAS = Per-and polyfluoroalkyl substances
pSCTL = Provisional Soil Cleanup Target Level
RSL = Regional Screening Level
U = Result was below the laboratory Reporting Limit

PFAS - Compounds

Perflurooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perflurobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUDS)
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)

PFAS - Compounds Continued

N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDoDA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide (PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTetDA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUDA)

Table 2-2
DPT Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location ID	Sample Date	Depth Interval (ft bls)	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTRIA
EPA Residential RSL for Tapwater (ng/L)				0.2	0.0027	600	5.9	39	1.5	1800	990	100	2000	600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FDEP pGCTL (ng/L)				70	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A3RB-DPT0008	1/19/2022	2 - 6	NM	***212***	**5.3 J**	**6.6 J**	5.5 U	**132**	11 U	**7.7 J**	**11.4**	5.5 U	5.5 U	5.5 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	5.5 U	5.5 U	**3.5 J**	**3.3 J**	5.5 U	5.5 U	**8.2 J**	**6.0 J**	5.5 U
A3RB-DPT0008	1/19/2022	2 - 6	FD	***201***	**5.2 J**	**6.4 J**	4.2 U	**126**	8.3 U	**7.5 J**	**11**	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	**3.1 J**	4.2 U	4.2 U	**7.8 J**	**6.1 J**	4.2 U
A3RB-DPT0008	1/19/2022	8 - 12	NM	**10.3**	4.2 U	4.2 U	4.2 U	**10.3**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0008	1/19/2022	23 - 27	NM	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	9.1 U	9.1 U	4.5 U	4.5 U	4.5 U	4.5 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
A3RB-DPT0008	1/19/2022	40 - 44	NM	**3.5 J**	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0008	1/19/2022	55 - 59	NM	***107***	**3.4 J**	4.2 U	4.2 U	**54**	8.3 U	**5.9 J**	**4.7 J**	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	**2.6 J**	**2.3 J**	4.2 U
A3RB-DPT0009	1/19/2022	2 - 6	NM	***227***	**27.9**	**208**	5.0 U	**3770**	10 U	**25.5**	**186**	5.0 U	50 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	5.0 U	5.0 U	**32.7**	**27**	5.0 U	5.0 U	**291**	**54.1**	5.0 U
A3RB-DPT0009	1/19/2022	8 - 12	NM	4.2 U	4.2 U	**3.5 J**	4.2 U	**17.4**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0009	1/19/2022	23 - 27	NM	4.2 U	4.2 U	4.2 U	4.2 U	**10.9**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0009	1/19/2022	40 - 44	NM	**4.6 J**	4.2 U	4.2 U	4.2 U	**12.9**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0009	1/19/2022	55 - 59	NM	**39.3**	4.2 U	4.2 U	4.2 U	**141**	8.3 U	8.3 U	**8.0 J**	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	**10.3**	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	2 - 6	NM	***7480***	***316***	**439**	**3.4 J**	**17200**	10 U	**60**	**626**	5.0 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	500 U	5.0 U	5.0 U	**267**	**113**	5.0 U	5.0 U	**639**	**147**	5.0 U
A3RB-DPT0010	1/24/2022	8 - 12	NM	**17.3**	4.2 U	**2.7 J**	4.2 U	**38.1**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	**2.4 J**	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	8 - 12	FD	**15.1**	4.2 U	**3.1 J**	4.2 U	**38**	8.3 U	8.3 U	**2.1 J**	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	**2.2 J**	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	23 - 27	NM	**54.1**	4.2 U	**3.0 J**	4.2 U	**64.8**	8.3 U	8.3 U	**2.9 J**	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	**2.9 J**	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	40 - 44	NM	**5.2 J**	4.2 U	4.2 U	4.2 U	**9**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	55 - 59	NM	***333***	**9.0 J**	**25.2**	4.5 U	**417**	9.1 U	9.1 U	**13.1**	23 U	4.5 U	4.5 U	45 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	45 U	45 U	4.5 U	4.5 U	**6.9 J**	**2.3 J**	4.5 U	4.5 U	**18.2**	**3.6 J**	23 U
A3RB-DPT0011	1/24/2022	2 - 6	NM	**4.8 J**	4.6 U	**35.5**	4.6 U	**145**	9.2 U	9.2 U	**28**	4.6 U	4.6 U	4.6 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	9.2 U	45 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	**32.8**	**7.8 J**	4.6 U
A3RB-DPT0011	1/24/2022	8 - 12	NM	4.2 U	4.2 U	4.2 U	4.2 U	**4.0 J**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0011	1/24/2022	23 - 27	NM	**14.4**	4.2 U	4.2 U	4.2 U	**2.2 J**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0011	1/24/2022	40 - 44	NM	**10.3**	4.2 U	4.2 U	4.2 U	**3.0 J**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0011	1/24/2022	55 - 59	NM	**47.6**	4.2 U	4.2 U	4.2 U	**13.4**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0012	1/26/2022	2 - 6	NM	4.2 U	4.2 U	4.2 U	4.2 U	**3.5 J**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0012	1/26/2022	8 - 12	NM	**7.6 J**	**2.4 J**	4.2 U	4.2 U	**14.3**	8.3 U	**6.7 J**	**4.5 J**	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	**3.9 J**	4.2 U
A3RB-DPT0012	1/26/2022	23 - 27	NM	**2.8 J**	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0012	1/26/2022	32 - 36	NM	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0012	1/26/2022	55 - 59	NM	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0013	3/29/2022	2 - 6	NM	**21.0 J**	**13.5 J**	22 U	22 U	**24.1 J**	44 U	**62.6 J**	22 U	22 U	22 U	22 U	44 U	44 U	44 U	44 U	44 U	44 U	44 U	44 U	44 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U
A3RB-DPT0013	3/29/2022	8 - 12	NM	***126***	**4.5 J**	**4.0 J**	4.4 U	**101**	8.7 U	**4.7 J**	**5.9 J**	4.4 U	4.4 U	4.4 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	43 U	4.4 U	4.4 U	**2.7 J**	4.4 U	4.4 U	4.4 U	**4.8 J**	4.4 U	4.4 U
A3RB-DPT0013	3/29/2022	23 - 27	NM	**27**	**3.4 J**	**3.0 J**	4.0 U	**35.9**	8.0 U	8.0 U	**3.4 J**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	**3.1 J**	**2.2 J**	4.0 U
A3RB-DPT0013	3/29/2022	40 - 44	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0013	3/29/2022	55 - 59	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0014	3/29/2022	2 - 6	NM	21 U	21 U	21 U	21 U	21 U	42 U	42 U	21 U	21 U	21 U	21 U	42 U	42 U	42 U	42 U	42 U	42 U	42 U	42 U	42 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U
A3RB-DPT0014	3/29/2022	8 - 12	NM	**47.6**	4.5 U	4.5 U	4.5 U	**20.1**	9.1 U	9.1 U	4.5 U	4.5 U	4.5 U	4.5 U	9.1 U	9.1 U	9.1 U	**5.1 J**	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
A3RB-DPT0014	3/29/2022	23 - 27	NM	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	8.7 U	8.7 U	4.4 U	22 U	4.4 U	22 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	43 U	43 U	43 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	4.4 U	4.4 U	22 U
A3RB-DPT0014	3/29/2022	40 - 44	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0014	3/29/2022	55 - 59	NM	**6.6 J**	4.5 U	4.5 U	4.5 U	4.5 U	9.1 U	9.1 U	4.5 U	4.5 U	4.5 U	4.5 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
A3RB-DPT0015	3/29/2022	2 - 6	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0015	3/29/2022	8 - 12	NM	**12.2**	4.0 U	4.0 U	4.0 U	**3.0 J**	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0015	3/30/2022	23 - 27	NM	**47.9**	4.0 U	4.0 U	4.0 U	**26.3**	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0015	3/30/2022	40 - 44	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0015	3/30/2022	55 - 59	NM	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	9.5 U	9.5 U	4.8 U	4.8 U	4.8 U	4.8 U	9.5 U	9.5 U	9.5 U	9.5 U	9.5 U	9.5 U	9.5 U	9.5 U	48 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
A3RB-DPT0016	3/30/2022	2 - 6	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0016	3/30/2022	2 - 6	FD	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0016	3/30/2022	8 - 12	NM	***205***	**5.7 J**	**12.6**	4.0 U	**293**	8.0 U	**6.0 J**	**12.2**	4.0 U	20 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	**4.9 J**	**2.5 J**	4.0 U	4.0 U	**17.4**	**3.8 J**	4.0 U
A3RB-DPT0016	3/30/2022	23 - 27	NM	**55.8**	**5.9 J**	**10.6**	4.2 U	**141**	8.3 U	8.3 U	**8.0 J**	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	**4.7 J**	**2.4 J**	4.2 U	4.2 U	**11.2**	**3.3 J**	4.2 U
A3RB-DPT0016	3/30/2022	40 - 44	NM	**3.4 J**	4.2 U	4.2 U	4.2 U	**3.6 J**	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0016	3/30/2022	55 - 59	NM	**21.6**	5.0 U	5.0 U	5.0 U	**18.7**	10 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
A3RB-DPT0017	6/10/2022	3 - 6	NM	**11.6**	**3.8 J**	**4.9 J**	4.3 U	**8.2 J**	43 U	**31.2**	22 U	4.3 U	22 U	4.3 U	8.7 U	8.7 U	43 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	43 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	4.3 U	22 U	4.3 U
A3RB-DPT0017	6/10/2022	8 - 12	NM	**48.9**	**3.4 J**	**3.6 J**	4.0 U	**41.8**	8.0 U	**7.4 J**	**4.3 J**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	**3.8 J**	**3.5 J**	4.0 U
A3RB-DPT0017	6/10/2022	8 - 12	FD	**37**	**3.0 J**	**3.4 J**	4.5 U	**30.7**	9.1 U	**6.2 J**	**3.1 J**	4.5 U	4.5 U	4.5 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	45 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	**3.1 J**	4.5 U
A3RB-DPT0017	6/13/2022	23 - 27	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0017	3/7/2023	40 - 44	NM	**10.7**	2.2 U	**3.3 J**	2.2 U	**10.9**	4.3 U	**5.3 J**	2.2 U	2.2 U	2.2 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	**2.7 J**	2.2 U	2.2 U
A3RB-DPT0017	3/7/2023	55 - 59	NM	2.0 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0018	6/10/2022	2 - 6	NM	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	4.2 U	21 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0018	6/10/2022	8 - 12	NM	***164***	**4.7 J**	**6.8 J**	4.2 U	**153**	8.3 U	**5.9 J**	**7.1 J**	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	**2.2 J**	4.2 U	4.2 U	4.2 U	**7.8 J**	4.2 U	4.2 U
A3RB-DPT0018	6/10/2022	23 - 27	NM	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	8.7 U	8.7 U	4.3 U	4.3 U	4.3 U	4.3 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	43 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
A3RB-DPT0019	6/10/2022	2 - 6	NM	***260***	**4.6 J**	**11.1**	4.2 U	**236**	8.3 U	**5.8 J**	**10.6**	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	**4.1 J**	**2.6 J**	4.2 U	4.2 U	**15.5**	4.2 U	4.2 U
A3RB-DPT0019	6/10/2022	8 - 12	NM	***523***	**7.1 J**	**18.6**	4.0 U	**402**	8.0 U	**7.0 J**	**17**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	**8**	**4.0 J**	4.0 U	4.0 U	**26.3**	**8.2**	4.0 U
A3RB-DPT0019	6/10/2022	23 - 27	NM	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	9.1 U	9.1 U	4.6 U	4.6 U	4.6 U	4.6 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	45 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U
A3RB-DPT0019	3/9/2023	40 - 44	NM	**4.9**	2.1 U	11 U	2.1 U	**3.0 J**	21 U	21 U	2.1 U	11 U	2.1 U	11 U	21 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	21 U	21 U	21 U	11 U	11 U	2.1 U	2.1 U	2.1 U	11 U	11 U	11 U	11 U
A3RB-DPT0019	3/9/2023	55 - 59	NM	2.3 U	2.3 U	12 U	2.3 U	2.3 U	4.7 U	4.7 U	2.3 U	2.3 U	2.3 U	2.3 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	12 U	2.3 U	2.3 U
A3RB-DPT0020	12/12/2022	2 - 6	NM	5.0 U	5.0 U	25 U	5.0 U	**28.7**	10 U	**10.3 J**	25 U	5.0 U	25 U	5.0 U	10 U	10 U	50 U	10 U	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	25 U	25 U	25 U	5.0 U
A3RB-DPT0020	12/12/2022	8 - 12	NM	1.9 U	1.9 U	9.3 U	1.9 U	**2.0 J**	3.7 U	**2.3 J**	9.3 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U
A3RB-DPT0020	12/12/2022	23 - 27	NM	5.0 U	5.0 U	25 U	5.0 U	5.0 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	5.0 U

Table 2-2
DPT Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location ID	Sample Date	Depth Interval (ft bls)	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTRIA
EPA Residential RSL for Tapwater (ng/L)				0.2	0.0027	600	5.9	39	1.5	1800	990	100	2000	600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FDEP pGCTL (ng/L)				70	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A3RB-DPT0020	12/12/2022	40 - 44	NM	5.0 U	5.0 U	25 U	5.0 U	5.0 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	5.0 U
A3RB-DPT0020	12/12/2022	55 - 59	NM	**24.6**	**8.1 J**	28 U	5.6 U	**29.9**	11 U	**113**	**8.2 J**	5.6 U	5.6 U	5.6 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	56 U	5.6 U	5.6 U	5.6 U	**5.0 J**	5.6 U	28 U	28 U	**7.7 J**	5.6 U
A3RB-DPT0021	12/12/2022	2 - 6	NM	5.0 U	5.0 U	25 U	5.0 U	**7.8 J**	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	25 U	5.0 U
A3RB-DPT0021	12/12/2022	8 - 12	NM	**2.0 J**	1.9 U	19 U	1.9 U	19 U	3.7 U	**4.8 J**	19 U	19 U	19 U	19 U	37 U	3.7 U	37 U	3.7 U	37 U	37 U	37 U	37 U	37 U	19 U	19 U	1.9 U	19 U	1.9 U	19 U	19 U	19 U	19 U
A3RB-DPT0021	12/12/2022	23 - 27	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U
A3RB-DPT0021	12/12/2022	40 - 44	NM	5.0 U	5.0 U	25 U	5.0 U	5.0 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	5.0 U
A3RB-DPT0021	12/12/2022	40 - 44	FD	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	9.3 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U
A3RB-DPT0021	12/12/2022	55 - 59	NM	**10.4**	**2.9 J**	25 U	5.0 U	**9.2 J**	10 U	**7.6 J**	5.0 U	5.0 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	5.0 U	**3.5 J**	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	5.0 U
A3RB-DPT0022	12/12/2022	2 - 6	NM	5.0 U	5.0 U	25 U	5.0 U	5.0 U	10 U	**6.9 J**	25 U	25 U	25 U	5.0 U	50 U	10 U	50 U	10 U	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	25 U	25 U	25 U	25 U
A3RB-DPT0022	12/13/2022	8 - 12	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	**2.6 J**	9.3 U	1.9 U	9.3 U	1.9 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	9.3 U	9.3 U	1.9 U
A3RB-DPT0022	12/13/2022	16 - 20	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U
A3RB-DPT0022	12/13/2022	23 - 27	NM	5.0 U	5.0 U	50 U	5.0 U	5.0 U	10 U	100 U	5.0 U	50 U	5.0 U	50 U	100 U	10 U	10 U	10 U	10 U	10 U	100 U	100 U	100 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	50 U	50 U	50 U
A3RB-DPT0022	12/13/2022	40 - 44	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	9.3 U	9.3 U	1.9 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	9.3 U	9.3 U
A3RB-DPT0022	12/13/2022	55 - 59	NM	**3.8 J**	3.0 U	15 U	3.0 U	**1.8 J**	6.1 U	**6.8 J**	15 U	15 U	15 U	15 U	30 U	6.1 U	30 U	6.1 U	6.1 U	6.1 U	30 U	6.1 U	30 U	15 U	3.0 U	3.0 U	15 U	3.0 U	15 U	15 U	15 U	15 U
A3RB-DPT0023	12/13/2022	2 - 6	NM	**7.8**	**1.9 J**	9.3 U	1.9 U	**13.6**	3.7 U	**7.3 J**	**2.3 J**	9.3 U	9.3 U	9.3 U	19 U	19 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	9.3 U	1.9 U	1.9 U	**2.3 J**	1.9 U	9.3 U	9.3 U	9.3 U	9.3 U
A3RB-DPT0023	12/13/2022	8 - 12	NM	***993***	**6.8**	**11.4**	**2.1 J**	**375**	3.7 U	**5.4 J**	**13.9**	9.3 U	9.3 U	9.3 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**15.6**	**3.7**	1.9 U	9.3 U	**25.4**	**3.8**	1.9 U
A3RB-DPT0023	12/13/2022	23 - 27	NM	**1.4 J**	2.0 U	10 U	2.0 U	2.0 U	4.1 U	20 U	10 U	2.0 U	10 U	10 U	4.1 U	4.1 U	20 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	10 U	2.0 U	2.0 U	10 U	2.0 U	10 U	10 U	10 U	2.0 U
A3RB-DPT0023	12/13/2022	40 - 44	NM	**23.4**	1.9 U	9.6 U	1.9 U	**12.5**	3.8 U	19 U	1.9 U	1.9 U	9.6 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.6 U	9.6 U	9.6 U	1.9 U
A3RB-DPT0023	12/13/2022	40 - 44	FD	**7.7**	2.3 U	7.2 U	2.3 U	**2.9 J**	4.5 U	14 U	2.3 U	2.3 U	2.3 U	2.3 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	22 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	7.2 U	7.2 U	7.2 U	2.3 U
A3RB-DPT0023	12/13/2022	55 - 59	NM	**28.1**	2.0 U	3.9 U	2.0 U	**14.9**	3.9 U	7.8 U	2.0 U	2.0 U	3.9 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	3.9 U	2.0 U
A3RB-DPT0024	12/14/2022	2 - 6	NM	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	**5.1 J**	5.0 U	5.0 U	25 U	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	5.0 U
A3RB-DPT0024	12/14/2022	8 - 12	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	**4.2 J**	1.9 U	9.3 U	9.3 U	1.9 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	9.3 U	9.3 U
A3RB-DPT0024	12/14/2022	23 - 27	NM	**5.6**	2.0 U	10 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	10 U	10 U	2.0 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	10 U	10 U	10 U
A3RB-DPT0024	12/14/2022	40 - 44	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0024	12/14/2022	55 - 59	NM	**3.7 J**	2.5 U	13 U	2.5 U	2.5 U	5.0 U	5.0 U	2.5 U	2.5 U	2.5 U	2.5 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	13 U	13 U	2.5 U
A3RB-DPT0025	12/14/2022	2 - 6	NM	1.9 U	1.9 U	**10.9**	1.9 U	**2.3 J**	3.7 U	**7.9**	1.9 U	9.3 U	9.3 U	9.3 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**2.0 J**	1.9 U	9.3 U
A3RB-DPT0025	12/14/2022	8 - 12	NM	**6.5**	1.9 U	**3.0 J**	1.9 U	**10.9**	3.7 U	3.7 U	1.9 U	1.9 U	9.3 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	**2.4 J**	9.3 U	1.9 U
A3RB-DPT0025	12/14/2022	8 - 12	FD	**6.3**	1.9 U	**3.0 J**	1.9 U	**10.6**	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	**2.3 J**	9.3 U	1.9 U
A3RB-DPT0025	12/14/2022	16 - 20	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	1.9 U
A3RB-DPT0025	12/14/2022	23 - 27	NM	**2.3 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	10 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U
A3RB-DPT0025	12/14/2022	40 - 44	NM	**3.6 J**	2.5 U	13 U	2.5 U	**1.4 J**	5.0 U	**4.0 J**	2.5 U	13 U	2.5 U	13 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	25 U	13 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	13 U	13 U	13 U
A3RB-DPT0025	12/14/2022	55 - 59	NM	2.0 U	2.0 U	10 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	10 U	2.0 U
A3RB-DPT0026	12/15/2022	2 - 6	NM	**5.2**	1.9 U	**9.5**	1.9 U	**20.1**	3.7 U	**11.5**	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	**4.8**	1.9 U	1.9 U
A3RB-DPT0026	12/15/2022	8 - 12	NM	**2.3 J**	1.9 U	**2.4 J**	1.9 U	**8.8**	3.7 U	**3.1 J**	1.9 U	1.9 U	9.3 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**1.8 J**	1.9 U	1.9 U
A3RB-DPT0026	12/15/2022	23 - 27	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U
A3RB-DPT0026	12/15/2022	40 - 44	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0026	12/15/2022	55 - 59	NM	**3.3 J**	2.6 U	13 U	2.6 U	**1.4 J**	5.3 U	**3.7 J**	2.6 U	13 U	13 U	13 U	26 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	26 U	26 U	26 U	13 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	13 U	13 U	13 U
A3RB-DPT0027	12/14/2022	2 - 6	NM	***745 E***	**7.9**	**12.1 J**	**0.99 J**	**285**	3.7 U	**18.8 J**	**14.8**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**9.2**	**3.5 J**	1.9 U	9.3 U	**14.5 J**	**6.3 J**	1.9 U
A3RB-DPT0027	12/15/2022	2 - 6	FD	***582***	**6.9**	**11.8**	1.9 U	**259**	3.7 U	**19.4**	**14.1**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**7.9**	**3.4 J**	1.9 U	1.9 U	**17.3**	**5.9**	1.9 U
A3RB-DPT0027	12/15/2022	8 - 12	NM	***812***	**7.5**	**23.8**	2.2 U	**487**	4.3 U	**7.3 J**	**20.3**	11 U	2.2 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	**12**	**4.1 J**	2.2 U	2.2 U	**37.4**	**6.4**	2.2 U
A3RB-DPT0027	12/20/2022	16 - 20	NM	***107***	**7.8**	**29.2**	2.1 U	**285**	4.3 U	**5.0 J**	**19.3**	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	21 U	21 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	**6.9**	**5**	2.1 U	11 U	**30**	**6.5**	2.1 U
A3RB-DPT0027	12/20/2022	23 - 27	NM	***142***	**9.7**	**30.2**	2.4 U	**417**	4.9 U	**4.5 J**	**19.2**	12 U	2.4 U	12 U	24 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	24 U	24 U	24 U	12 U	2.4 U	**13.6**	**4.3 J**	2.4 U	2.4 U	**35.8**	**5.9**	12 U
A3RB-DPT0027	12/20/2022	55 - 59	NM	**1.2 J**	2.1 U	10 U	2.1 U	2.1 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	10 U	10 U	2.1 U
A3RB-DPT0028	12/19/2022	2 - 6	NM	**4.9**	2.4 U	2.4 U	2.4 U	**2.3 J**	4.8 U	**11.1**	**1.2 J**	12 U	12 U	2.4 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U		2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U
A3RB-DPT0028	12/19/2022	8 - 12	NM	2.2 U	2.2 U	11 U	2.2 U	2.2 U	4.3 U	22 U	11 U	2.2 U	11 U	2.2 U	4.3 U	4.3 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	2.2 U
A3RB-DPT0028	12/19/2022	16 - 20	NM	2.4 U	2.4 U	12 U	2.4 U	2.4 U	4.8 U	24 U	12 U	2.4 U	2.4 U	2.4 U	4.8 U	4.8 U	24 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	12 U	2.4 U
A3RB-DPT0028	12/19/2022	23 - 27	NM	2.1 U	2.1 U	11 U	2.1 U	2.1 U	4.3 U	21 U	11 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	21 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	11 U	11 U	2.1 U
A3RB-DPT0028	12/19/2022	40 - 44	NM	2.2 U	2.2 U	11 U	2.2 U	2.2 U	4.4 U	22 U	11 U	11 U	2.2 U	2.2 U	22 U	4.4 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	2.2 U	11 U	2.2 U	2.2 U	11 U	11 U	11 U
A3RB-DPT0028	12/19/2022	55 - 59	NM	2.6 U	2.6 U	5.2 U	5.2 U	5.2 U	5.3 U	**6.0 JB**	5.2 U	5.2 U	5.2 U	5.2 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	26 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U
A3RB-DPT0029	12/20/2022	2 - 6	NM	**35**	**5.6**	**10.6**	2.2 U	**48.8**	4.3 U	**43.5**	**4.0 J**	2.2 U	2.2 U	2.2 U	4.3 U	4.3 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	**2.7 J**	2.2 U	11 U	**6.1**	**4.3**	2.2 U
A3RB-DPT0029	12/20/2022	8 - 12	NM	**43**	**1.8 J**	**3.8 J**	2.4 U	**32.9**	4.8 U	**7.3 JB**	**1.9 J**	2.4 U	2.4 U	2.4 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	**3.4 J**	**1.2 J**	2.4 U
A3RB-DPT0029	12/20/2022	16 - 20	NM	2.1 U	2.1 U	10 U	2.1 U	2.1 U	4.2 U	21 U	10 U	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	10 U	10 U	2.1 U
A3RB-DPT0029	12/20/2022	23 - 27	FD	2.3 U	2.3 U	12 U	2.3 U	**1.4 J**	4.7 U	23 U	12 U	2.3 U	12 U	2.3 U	4.7 U	4.7 U	23 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	12 U	12 U	2.3 U
A3RB-DPT0029	12/20/2022	23 - 27	NM	2.3 U	2.3 U	11 U	2.3 U	2.3 U	4.5 U	23 U	11 U	2.3 U	2.3 U	2.3 U	4.5 U	4.5 U	23 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	11 U	11 U	11 U	2.3 U
A3RB-DPT0029	12/20/2022	40 - 44	NM	**7.3**	2.4 U	12 U	2.4 U	**3.1 J**	4.9 U	**3.0 J**	2.4 U	2.4 U	2.4 U	2.4 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	12 U	2.4 U
A3RB-DPT0029	12/20/2022	55 - 59	NM	**4.2 J**	2.3 U	11 U	2.3 U	**2.1 J**	4.5 U	23 U	2.3 U	11 U	11 U	11 U	23 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	11 U	2.3 U	2.3 U	2.3 U	2.3 U	11 U	11 U	11 U	11 U
A3RB-DPT0030	3/6/2023	2 - 6	NM	***82.2***	**3.0 J**	**5.0 J**	4.0 U	**112**	8.0 U	**5.0 J**	**7.5 J**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	**3.2 J**	4.0 U	4.0 U	4.0 U	**2.1 J**	**7.7 J**	4.0 U
A3RB-DPT0030	3/6/2023	8 - 12	NM	**9.0 B**	1.9 U	9.4 U	1.9 U	**8.9**	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.4 U	9.4 U	1.9 U
A3RB-DPT0030	3/6/2023	16 - 20	NM	2.1 U	1.9 U	1.9 U	1.9 U	**1.3 J**	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0030	3/6/2023	23 - 27	NM	**42.1**	**1.1 J**	2.1 U	2.1 U	**9.2**	4.3 U	**7.2 J**	**1.5 J**	2.4 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.9 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0030	3/6/2023	40 - 44	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	2.0 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0030	3/6/2023	55 - 59	NM	**1.7 J**	2.1 U	2.1 U	2.1 U	**1.6 J**	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0031	3/6/2023	2 - 6	NM	***635***	**12.8**	**67.9**	4.0 U	**735**	8.0 U	**13.3 J**	**37.5**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	**23.7**	**6.2 J**	4.0 U	4.0 U	**8.7**	**89.9**	4.0 U
A3RB-DPT0031	3/6/2023	8 - 12	NM	***116***	**2.3 J**	**9.8 J**	2.0 U	**105**	3.9 U	**4.8 J**	**7.0**	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	**4.6**	**1.3 J**	2.0 U	2.0 U	**1.9 J**	**16.3 J**	2.0 U

Table 2-2
DPT Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

			Analyte	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTRIA
EPA Residential RSL for Tapwater (ng/L)				**0.2**	**0.0027**	**600**	**5.9**	**39**	**1.5**	**1800**	**990**	**100**	**2000**	**600**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FDEP pGCTL (ng/L)				**70**	**70**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Location ID	**Sample Date**	**Depth Interval (ft bls)**	**Sample Type**																													
A3RB-DPT0031	3/6/2023	16 - 20	NM	**5.9**	2.1 U	2.1 U	2.1 U	**4.6**	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0031	3/6/2023	23 - 27	NM	**62.5**	**1.2 J**	**2.4 J**	2.0 U	**42.4**	3.9 U	20 U	**1.9 J**	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	**1.4 J**	2.0 U	2.0 U	9.8 U	9.8 U	**5.0 J**	2.0 U
A3RB-DPT0031	3/6/2023	40 - 44	NM	***136***	**1.2 J**	**4.2 J**	2.1 U	**47.1**	4.3 U	21 U	**2.2 J**	11 U	2.1 U	11 U	21 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	4.3 U	21 U	11 U	2.1 U	**2.1 J**	2.1 U	2.1 U	11 U	11 U	**6.0 J**	11 U
A3RB-DPT0031	3/6/2023	40 - 44	FD	***148***	**1.1 J**	9.3 U	1.9 U	**51.2**	3.7 U	19 U	**2.2 J**	9.3 U	1.9 U	9.3 U		3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	3.7 U	19 U	9.3 U	1.9 U	**2.4 J**	1.9 U	1.9 U	9.3 U	9.3 U	**5.2 J**	9.3 U
A3RB-DPT0031	3/6/2023	55 - 59	NM	**10.1**	2.1 U	2.1 U	2.1 U	**4.5**	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0032	3/7/2023	2 - 6	NM	**50.2**	4.0 U	4.0 U	4.0 U	**28.1**	8.0 U	8.0 U	**2.4 J**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0032	3/7/2023	8 - 12	NM	**37.9**	4.0 U	**2.7 J**	4.0 U	**27.1**	8.0 U	**6.2 J**	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	4.0 U
A3RB-DPT0032	3/7/2023	16 - 20	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**2.7 J**	2.0 U	2.0 U
A3RB-DPT0032	3/7/2023	23 - 27	NM	**3.5 J**	4.0 U	4.0 U	4.0 U	**6.8 J**	8.0 U	**4.1 J**	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0032	3/7/2023	40 - 44	NM	**10.2**	4.0 U	4.0 U	4.0 U	**4.1 J**	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0032	3/7/2023	55 - 59	NM	**4.7**	2.2 U	2.2 U	2.2 U	**1.6 J**	4.3 U	4.3 U	2.2 U	2.2 U	2.2 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0033	3/8/2023	2 - 6	NM	**66.6**	**5.5**	**5.7**	2.3 U	**47.6**	23 U	**18.3 J**	**2.0 J**	2.3 U	2.3 U	2.3 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	2.3 U	2.3 U	**1.9 J**	**1.6 J**	2.3 U	11 U	**2.0 J**	**4.3 J**	2.3 U
A3RB-DPT0033	3/8/2023	8 - 12	NM	**36.0**	**3.8 J**	**3.4 J**	2.2 U	**20.8**	22 U	**6.9 J**	**2.3 J**	2.2 U	2.2 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	**1.6 J**	2.2 U	11 U	**2.1 J**	**2.2 J**	2.2 U
A3RB-DPT0033	3/8/2023	16 - 20	NM	2.2 U	2.2 U	11 U	2.2 U	2.2 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	2.2 U
A3RB-DPT0033	3/9/2023	23 - 27	NM	2.2 U	2.2 U	11 U	2.2 U	2.2 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	2.2 U
A3RB-DPT0033	3/9/2023	40 - 44	NM	**6.0**	2.6 U	13 U	2.6 U	**2.6 J**	5.3 U	5.3 U	2.6 U	2.6 U	13 U	2.6 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	26 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	13 U	13 U	13 U	2.6 U
A3RB-DPT0033	3/9/2023	40 - 44	FD	**2.5 J**	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0033	3/9/2023	55 - 59	NM	**7.5**	2.4 U	12 U	2.4 U	**3.2 J**	4.8 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	2.4 U
A3RB-DPT0034	3/10/2023	2 - 6	NM	***103***	**7.4**	15 U	3.0 U	**132**	6.0 U	**36.9 J**	**9.8**	15 U	3.0 U	15 U	29 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	29 U	29 U	29 U	15 U	3.0 U	**7.7**	**2.7 J**	3.0 U	3.0 U	**5.7 J**	**15.8 J**	15 U
A3RB-DPT0034	3/10/2023	8 - 12	NM	***203***	**7.2**	**18.8 J**	1.9 U	**240**	19 U	**13.6 J**	**13.6**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**8.3**	**3.2 J**	1.9 U	1.9 U	**9.0 J**	**28.6**	1.9 U
A3RB-DPT0034	3/10/2023	23 - 27	NM	**8.0**	**1.6 J**	14 U	2.7 U	**8.0**	5.5 U	27 U	2.7 U	14 U	2.7 U	14 U	27 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	27 U	27 U	27 U	14 U	2.7 U	2.7 U	2.7 U	2.7 U	14 U	14 U	**2.0 J**	14 U
A3RB-DPT0034	3/10/2023	40 - 44	NM	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	11 U	11 U	5.5 U	5.5 U	5.5 U	5.5 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	55 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
A3RB-DPT0034	3/10/2023	55 - 59	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.1 U	8.1 U	4.0 U	4.0 U	4.0 U	4.0 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0035	3/10/2023	2 - 6	NM	**14.0**	**1.3 J**	**7.1 J**	2.4 U	**17.3**	4.8 U	**28.5**	2.4 U	2.4 U	2.4 U	2.4 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	**2.9 J**	2.4 U	2.4 U	2.4 U	12 U	**6.5**	2.4 U
A3RB-DPT0035	3/10/2023	8 - 12	NM	**23.2**	**1.3 J**	**16.7**	1.9 U	**52.2**	3.7 U	**6.5 J**	**2.8 J**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**2.6 J**	1.9 U	1.9 U	1.9 U	**1.1 J**	**12.7**	1.9 U
A3RB-DPT0035	3/10/2023	8 - 12	FD	**21.1**	**1.3 J**	**15.8**	1.9 U	**49.6**	3.7 U	**6.2 J**	**2.7 J**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**2.5 J**	1.9 U	1.9 U	1.9 U	**1.1 J**	**12.2**	1.9 U
A3RB-DPT0035	3/10/2023	16 - 20	NM	7.7 U	**4.3 J**	**33.9**	7.7 U	**147**	15 U	15 U	**18.3**	7.7 U	7.7 U	7.7 U	77 U	15 U	15 U	15 U	15 U	15 U	15 U	77 U	15 U	7.7 U	7.7 U	7.7 U	**4.0 J**	7.7 U	7.7 U	**6.0 J**	**34.2**	38 U
A3RB-DPT0035	3/13/2023	23 - 27	NM	2.6 U	2.6 U	13 U	2.6 U	2.6 U	5.2 U	25 U	13 U	13 U	2.6 U	13 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	25 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	13 U	2.6 U	2.6 U
A3RB-DPT0035	3/13/2023	40 - 44	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	9.3 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U
A3RB-DPT0035	3/13/2023	55 - 59	NM	4.0 U	4.0 U	20 U	4.0 U	4.0 U	8.1 U	40 U	4.0 U	20 U	4.0 U	20 U	40 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	40 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	20 U	20 U
A3RB-DPT0036	3/13/2023	2 - 6	NM	**8.2**	**2.3 J**	**11.5 J**	1.9 U	**60.0**	3.7 U	**15.7 J**	**7.7 J**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	**14.5 J**	**12.4 J**	1.9 U
A3RB-DPT0036	3/13/2023	8 - 12	NM	**12.7**	**2.6 J**	9.3 U	1.9 U	**19.8**	3.7 U	**11.2 J**	9.3 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U
A3RB-DPT0036	3/13/2023	16 - 20	NM	3.5 U	3.5 U	17 U	3.5 U	3.5 U	7.0 U	7.0 U	3.5 U	3.5 U	3.5 U	3.5 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	34 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	17 U	17 U	3.5 U
A3RB-DPT0036	3/13/2023	23 - 27	NM	5.2 U	5.2 U	26 U	5.2 U	5.2 U	10 U	53 U	26 U	26 U	5.2 U	26 U	10 U	10 U	10 U	10 U	10 U	10 U	53 U	53 U	53 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	26 U	26 U	5.2 U
A3RB-DPT0036	3/13/2023	40 - 44	NM	3.4 U	3.4 U	17 U	3.4 U	3.4 U	6.8 U	34 U	17 U	3.4 U	3.4 U	3.4 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	34 U	3.4 U	3.4 U	3.4 U	17 U	3.4 U	3.4 U	17 U	17 U	3.4 U
A3RB-DPT0036	3/13/2023	40 - 44	FD	2.0 U	2.0 U	10 U	2.0 U	2.0 U	4.1 U	21 U	10 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	21 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	21 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	10 U	10 U	2.0 U
A3RB-DPT0036	3/13/2023	55 - 59	NM	4.3 U	4.3 U	22 U	4.3 U	4.3 U	8.6 U	44 U	4.3 U	22 U	4.3 U	22 U	44 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	44 U	8.6 U	44 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	22 U	22 U
A3RB-DPT0037	3/15/2023	2 - 6	NM	**14.2**	**2.1 J**	**10.8 J**	1.9 U	**68.1**	3.7 U	19 U	9.3 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**1.4 J**	9.3 U	1.9 U	1.9 U	9.3 U	**9.5 J**	1.9 U
A3RB-DPT0037	3/15/2023	2 - 6	FD	**15.7**	**2.0 J**	**10.1 J**	1.9 U	**66.8**	3.7 U	19 U	9.3 U	9.3 U	9.3 U	1.9 U	19 U	3.7 U	19 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**1.5 J**	9.3 U	1.9 U	9.3 U	9.3 U	**10 J**	9.3 U
A3RB-DPT0037	3/15/2023	8 - 12	NM	***70.7***	**4.5 J**	**22.3 J**	2.4 U	**162**	4.8 U	98 U	24 U	24 U	2.4 U	24 U	4.8 U	4.8 U	4.8 U	4.8 U	49 U	4.8 U	49 U	49 U	49 U	2.4 U	24 U	**3.8 J**	24 U	2.4 U	24 U	24 U	**18.6 J**	2.4 U
A3RB-DPT0037	3/15/2023	16 - 20	NM	4.3 U	4.3 U	22 U	4.3 U	**3.9 J**	8.7 U	43 U	4.3 U	4.3 U	4.3 U	4.3 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	43 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	22 U	4.3 U
A3RB-DPT0037	3/15/2023	23 - 27	NM	3.1 U	3.1 U	15 U	3.1 U	3.1 U	6.2 U	30 U	3.1 U	15 U	3.1 U	15 U	30 U	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	30 U	6.2 U	30 U	15 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	15 U	15 U	15 U
A3RB-DPT0037	3/15/2023	40 - 44	NM	1.9 U	1.9 U	9.6 U	1.9 U	1.9 U	3.8 U	19 U	1.9 U	9.6 U	1.9 U	9.6 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	9.6 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.6 U	9.6 U	9.6 U
A3RB-DPT0037	3/15/2023	55 - 59	NM	4.2 U	4.2 U	21 U	4.2 U	4.2 U	8.5 U	42 U	4.2 U	21 U	4.2 U	21 U	42 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	42 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	21 U	21 U
A3RB-DPT0038	5/2/2023	2 - 6	NM	**47.0**	**3.9 J**	**4.5**	2.1 U	**47.8**	4.3 U	**31.5**	**3.3 J**	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	20 U	2.1 U	2.1 U	**1.4 J**	**2.2 J**	2.1 U	2.0 U	**4.0 J**	**4.8**	2.1 U
A3RB-DPT0038	5/2/2023	8 - 12	NM	***191***	**2.4 J**	**5.8**	1.9 U	**93.3**	3.8 U	**6.0 J**	**4.7**	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	**2.1 J**	**1.4 J**	1.9 U	1.9 U	**2.0 J**	**5.9**	1.9 U
A3RB-DPT0038	5/2/2023	23 - 27	NM	**3.5 J**	**2.3 J**	**11.4**	2.0 U	**65.6**	4.0 U	20 U	**6.9**	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U	2.0 U	**2.0 J**	**1.8 J**	2.0 U	2.0 U	**2.2 J**	**10.1**	2.0 U
A3RB-DPT0038	5/2/2023	23 - 27	FD	**2.8 J**	**2.3 J**	**12.7**	2.0 U	**72.2**	4.0 U	20 U	**7.4**	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	**1.9 J**	**2.0 J**	2.0 U	2.0 U	**2.2 J**	**11.4**	2.0 U
A3RB-DPT0038	5/2/2023	40 - 44	NM	**7.6**	**1.3 J**	**3.8 J**	2.4 U	**10.3**	4.8 U	**24.1**	**1.9 J**	2.4 U	2.4 U	2.4 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	**1.5 J**	2.4 U
A3RB-DPT0038	5/2/2023	55 - 59	NM	**7.1**	2.2 U	2.2 U	2.2 U	**4.1 J**	4.4 U	**4.2 J**	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0039	5/2/2023	2 - 6	NM	**5.5**	**2.8 J**	**2.0 J**	1.9 U	**9.3**	3.8 U	**22.8 J**	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	**1.1 J**	1.9 U	1.9 U	9.6 U	1.9 U	1.9 U
A3RB-DPT0039	5/2/2023	8 - 12	NM	**15.6**	1.9 U	**2.3 J**	1.9 U	**23.4**	3.8 U	19 U	**1.6 J**	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**2.2 J**	1.9 U
A3RB-DPT0039	5/2/2023	16 - 20	NM	**1.1 J**	1.9 U	1.9 U	1.9 U	**2.4 J**	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0039	5/2/2023	16 - 20	FD	**1.6 J**	2.0 U	2.0 U	2.0 U	**2.5 J**	4.1 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0039	5/2/2023	23 - 27	NM	**2.4 J**	2.1 U	2.1 U	2.1 U	**8.1**	4.2 U	21 U	**1.0 J**	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	**1.6 J**	2.1 U
A3RB-DPT0039	5/2/2023	40 - 44	NM	**1.8 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	**4.9 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0039	5/2/2023	55 - 59	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	2.0 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0040	5/3/2023	2 - 6	NM	***131***	**2.5 J**	2.0 U	2.0 U	**12.9**	4.0 U	**3.0 J**	**1.1 J**	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0040	5/3/2023	8 - 12	NM	***90.8***	**4.6**	**26.2**	2.2 U	**178**	4.3 U	**12.2 J**	**4.0 J**	11 U	2.2 U	11 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	11 U	2.2 U	**7.3**	**1.3 J**	2.2 U	2.2 U	**2.0 J**	**27.8**	11 U
A3RB-DPT0040	5/3/2023	16 - 20	NM	**1.5 J**	2.4 U	12 U	2.4 U	2.4 U	24 U	24 U	2.4 U	12 U	2.4 U	2.4 U	24 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	12 U
A3RB-DPT0040	5/3/2023	23 - 27	NM	**1.6 J**	2.4 U	2.4 U	2.4 U	2.4 U	4.9 U	4.9 U	2.4 U	12 U	2.4 U	2.4 U	24 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	12 U
A3RB-DPT0040	5/3/2023	40 - 44	NM	**3.1 J**	2.2 U	11 U	2.2 U	**3.0 J**	4.4 U	22 U	11 U	11 U	2.2 U	11 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	4.4 U	22 U	11 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	11 U	11 U
A3RB-DPT0040	5/3/2023	40 - 44	FD	**2.0 J**	2.3 U	12 U	2.3 U	**1.9 J**	4.7 U	23 U	12 U	12 U	12 U	12 U	23 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	12 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	12 U	12 U	12 U
A3RB-DPT0040	5/3/2023	55 - 59	NM	**6.4**	2.4 U	2.4 U	2.4 U	**1.8 J**	4.8 U	23 U	2.4 U	2.4 U	12 U	2.4 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U

Table 2-2
DPT Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location ID	Sample Date	Depth Interval (ft bls)	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTRIA
			Analyte	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTRIA
			EPA Residential RSL for Tapwater (ng/L)	0.2	0.0027	600	5.9	39	1.5	1800	990	100	2000	600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			FDEP pGCTL (ng/L)	70	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A3RB-DPT0041	5/3/2023	2 - 6	NM	101	8.7	1.7 J	2.2 U	79.3	4.3 U	20.5	1.5 J	2.2 U	2.2 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.2 U	2.2 U	31.9	2.2 U	2.2 U	2.2 U	2.2 U	2.1 J	2.2 U
A3RB-DPT0041	5/3/2023	8 - 12	NM	158	15.0	10 U	2.0 U	17.4	4.0 U	22.0	2.1 J	2.0 U	2.0 U	2.0 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.4 U	2.0 U	2.0 U	18.2	2.0 J	2.0 U	10 U	2.3 J	10 U	2.0 U
A3RB-DPT0041	5/3/2023	16 - 20	NM	19.8	2.2 U	3.6 J	2.2 U	27.4	4.3 U	22 U	2.2 U	11 U	2.2 U	2.2 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.3 J	2.2 U	2.2 U	2.2 U	2.2 U	4.2 J	11 U
A3RB-DPT0041	5/3/2023	23 - 27	NM	13.0	1.7 J	3.1 J	2.1 U	17.6	4.2 U	21 U	1.8 J	10 U	10 U	10 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	10 U	2.1 U	1.1 J	2.1 U	2.1 U	2.1 U	10 U	2.9 J	10 U
A3RB-DPT0041	5/3/2023	40 - 44	NM	28.1	2.3 J	2.3 U	2.3 U	3.6 J	4.7 U	23 U	2.3 U	12 U	12 U	12 U	23 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	12 U	2.3 U	2.7 J	2.3 U	2.3 U	2.3 U	12 U	2.3 U	12 U
A3RB-DPT0041	5/3/2023	55 - 59	NM	3.4 J	2.2 U	11 U	2.2 U	2.2 U	4.3 U	22 U	11 U	11 U	11 U	11 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	11 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	11 U	11 U
A3RB-DPT0042	8/28/2023	2 - 6	NM	18.4	7.4	2.0 J	1.6 J	6.9	4.7 U	47.1	5.6	2.3 U	2.3 U	4.7 U	2.3 U	2.3 U	2.3 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	2.3 U	2.3 U	3.3 J	2.3 U	2.3 U	2.3 U	1.9 J	4.7 U
A3RB-DPT0042	8/28/2023	8 - 12	NM	18.9	2.3 J	1.8 J	2.0 U	8.3	4.0 U	10.7	1.8 J	2.0 U	2.0 U	20 U	2.0 U	10 U	2.0 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	1.2 J	2.0 U	10 U	2.0 U	1.1 J	4.0 U
A3RB-DPT0042	8/28/2023	16 - 20	NM	15.3	5	9.2	1.9 J	10	4.3 U	27.2	3.4 J	11 U	11 U	22 U	11 U	2.2 U	11 U	22 U	4.3 U	22 U	22 U	22 U	22 U	22 U	11 U	2.2 U	2.0 J	2.2 U	11 U	2.2 U	1.3 J	22 U
A3RB-DPT0042	8/28/2023	23 - 27	NM	11.4	3.3 J	12.5	2.3 U	5.4	4.7 U	24.4	4.3 J	12 U	12 U	23 U	12 U	2.3 U	12 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	12 U	2.3 U	2.3 U	2.3 U	12 U	2.3 U	2.3 U	23 U
A3RB-DPT0042	8/28/2023	40 - 44	NM	8.5	2.2 J	2.6 J	2.3 U	2.0 J	4.7 U	8.0 J	1.9 J	2.3 U	12 U	4.7 U	12 U	2.3 U	12 U	23 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	12 U	2.3 U	2.3 U	2.3 U	12 U	2.3 U	2.3 U	23 U
A3RB-DPT0042	8/28/2023	55 - 59	NM	3.0 J	2.1 U	1.4 J	2.1 U	2.1 U	4.3 U	4.7 J	2.1 U	2.1 U	11 U	4.3 U	11 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	11 U	2.1 U	2.1 U	21 U
A3RB-DPT0043	8/28/2023	2 - 6	NM	3.6 J	2.1 U	2.1 U	2.1 U	1.9 J	4.3 U	7.1 J	2.1 U	2.1 U	2.1 U	4.3 U	2.1 U	11 U	2.1 U	21 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	11 U	2.1 U	2.1 U	4.3 U
A3RB-DPT0043	8/28/2023	8 - 12	NM	4.9	1.2 J	2.2 U	2.2 U	3.1 J	4.4 U	7.0 J	2.2 U	2.2 U	2.2 U	22 U	2.2 U	11 U	2.2 U	22 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U
A3RB-DPT0043	8/28/2023	16 - 20	NM	4.6	1.1 J	1.9 U	1.9 U	3.5 J	3.8 U	19 U	1.9 U	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U
A3RB-DPT0043	8/28/2023	40 - 44	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	20 U	2.0 U	2.0 U	10 U	4.0 U	10 U	2.0 U	10 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	10 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	20 U
A3RB-DPT0043	8/28/2023	40 - 44	FD	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	2.0 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	4.0 U
A3RB-DPT0043	8/28/2023	55 - 59	NM	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	5.7 U	3.2 J	2.9 U	2.9 U	14 U	5.7 U	14 U	2.9 U	14 U	5.7 U	5.7 U	5.7 U	5.7 U	5.7 U	5.7 U	29 U	14 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	29 U
A3RB-DPT0044	8/29/2023	2 - 6	NM	332	4.8	9.8	2.1 U	258	4.2 U	4.7 J	11.1	2.1 U	2.1 U	4.2 U	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	NA	NA	5.5	2.2 J	NA	NA	12.5	4.0 J	4.2 U
A3RB-DPT0044	8/29/2023	8 - 12	NM	555	7.9	22.5	1.2 J	491	3.8 U	19 U	21.3	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	NA	NA	10.6	4.3	NA	NA	28.9	7.2	3.8 U
A3RB-DPT0044	8/29/2023	16 - 20	NM	327	5	15.5	2.1 U	284	4.2 U	3.6 J	13.3	2.1 U	2.1 U	4.2 U	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	NA	NA	7.5	2.4 J	NA	NA	20.1	4.3	4.2 U
A3RB-DPT0044	8/29/2023	23 - 27	NM	34.5	1.9 J	1.8 J	2.4 U	21	4.8 U	4.8 U	2.0 J	2.4 U	2.4 U	4.8 U	2.4 U	2.4 U	12 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	NA	NA	2.4 U	2.4 U	NA	NA	1.8 J	2.6 J	4.8 U
A3RB-DPT0044	8/29/2023	40 - 44	NM	31.5	2.4 U	1.2 J	2.4 U	17.2	4.9 U	4.9 U	1.2 J	2.4 U	2.4 U	4.9 U	2.4 U	2.4 U	2.4 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	NA	NA	2.4 U	2.4 U	NA	NA	2.4 U	2.4 U	4.9 U
A3RB-DPT0045	8/31/2023	2 - 6	NM	5.3	2.0 U	3.1 J	2.0 U	8.1	4.0 U	3.4 J	2.0 U	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.1 J	2.0 U	4.0 U
A3RB-DPT0045	8/31/2023	8 - 12	NM	1.8 J	1.5 J	2.0 U	2.0 U	1.6 J	3.9 U	8.3	1.2 J	2.0 U	2.0 U	3.9 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	9.8 U	2.0 U	2.0 U	3.9 U
A3RB-DPT0045	8/31/2023	8 - 12	FD	2.4 J	2.6 J	0.99 J	1.8 U	1.9 J	3.6 U	18	2.6 J	1.8 U	1.8 U	3.6 U	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	1.8 U	1.8 U	9.1 U	1.8 U	1.8 U	3.6 U
A3RB-DPT0045	8/31/2023	16 - 20	NM	2.6 J	1.0 J	1.1 J	2.1 U	2.1 J	4.2 U	4.8 J	2.1 U	2.1 U	10 U	4.2 U	10 U	2.1 U	10 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	10 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	21 U
A3RB-DPT0045	8/31/2023	23 - 27	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	19 U	1.9 U	1.9 U	9.6 U	3.8 U	9.6 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U
A3RB-DPT0045	8/31/2023	55 - 59	NM	1.3 J	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	4.3 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	11 U	2.1 U	2.1 U	4.3 U
A3RB-DPT0046	9/1/2023	2 - 6	NM	37.2	1.5 J	11.5	1.8 U	156	3.6 U	20.4	1.8 U	1.8 U	1.8 U	3.6 U	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	NA	NA	6	1.8 U	NA	NA	12.9	1.8 U	3.6 U
A3RB-DPT0046	9/1/2023	8 - 12	NM	121	6	22.7	2.0 U	196	4.0 U	18.5 J	10.3	2.0 U	2.0 U	4.0 U	2.0 U	10 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	NA	NA	7.4	2.4 J	NA	NA	23.8	4.2	4.0 U
A3RB-DPT0046	9/1/2023	16 - 20	NM	19.4	5	19.3	2.1 U	105	4.2 U	5.3 J	10.9	2.1 U	2.1 U	4.2 U	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	NA	NA	3.5 J	2.6 J	NA	NA	15.8	4.1 J	4.2 U
A3RB-DPT0046	9/1/2023	23 - 27	NM	2.6 U	2.6 U	3.4 J	2.6 U	6.4	5.3 U	26 U	1.8 J	2.6 U	13 U	5.3 U	13 U	2.6 U	13 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	NA	NA	2.6 U	2.6 U	NA	NA	1.9 J	2.6 U	26 U
A3RB-DPT0046	9/1/2023	40 - 44	NM	2.4 J	1.5 J	2.6 J	2.7 U	3.7 J	5.4 U	5.4 U	2.7 U	2.7 U	2.7 U	5.4 U	2.7 U	2.7 U	2.7 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	NA	NA	2.7 U	2.7 U	NA	NA	2.7 U	2.7 U	5.4 U
A3RB-DPT0046	9/1/2023	55 - 59	NM	1.8 J	1.1 J	1.7 J	2.0 U	2.1 J	4.1 U	4.1 U	2.0 U	2.0 U	2.0 U	4.1 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	NA	NA	2.0 U	2.0 U	NA	NA	2.0 U	2.0 U	4.1 U
A3RB-DPT0046	9/1/2023	55 - 59	FD	2.9 J	1.6 J	2.1 J	2.2 U	3.2 J	4.4 U	3.6 J	1.2 J	2.2 U	2.2 U	4.4 U	2.2 U	2.2 U	11 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	NA	NA	2.2 U	2.2 U	NA	NA	2.2 U	2.2 U	4.4 U
A3RB-DPT0047	9/1/2023	2 - 6	NM	2.2 U	2.2 U	6.6	2.2 U	2.2 U	4.3 U	4.3 U	2.2 U	11 U	11 U	4.3 U	11 U	2.2 U	11 U	4.3 U	4.3 U	4.3 U	22 U	22 U	22 U	22 U	11 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	22 U
A3RB-DPT0047	9/1/2023	8 - 12	NM	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	4.3 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U
A3RB-DPT0047	9/1/2023	16 - 20	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U
A3RB-DPT0047	9/1/2023	23 - 27	NM	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	2.1 U	2.1 U	2.1 U	4.2 U	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	4.2 U
A3RB-DPT0047	9/1/2023	40 - 44	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	4.0 U
A3RB-DPT0047	9/1/2023	55 - 59	NM	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	4.2 U	21 U	2.1 U	2.1 U	10 U	4.2 U	10 U	2.1 U	10 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	10 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	21 U
A3RB-DPT0048	9/5/2023	2 - 6	NM	2.1 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	2.6 J	1.9 U	1.9 U	1.9 U	3.7 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U
A3RB-DPT0048	9/5/2023	8 - 12	NM	6.5	2.2 U	3.0 J	2.2 U	8.6	4.4 U	22 U	2.2 U	2.2 U	2.2 U	4.4 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	1.7 J	2.2 U	4.4 U
A3RB-DPT0048	9/5/2023	16 - 20	NM	2.1 U	2.1 U	1.5 J	2.1 U	10 U	21 U	21 U	10 U	2.1 U	10 U	4.2 U	10 U	2.1 U	10 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	10 U	2.1 U	10 U	2.1 U	10 U	2.1 U	10 U	21 U
A3RB-DPT0048	9/5/2023	23 - 27	NM	2.2 U	2.2 U	2.2 U	2.2 U	11 U	22 U	22 U	11 U	2.2 U	11 U	4.4 U	11 U	2.2 U	2.2 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	11 U	2.2 U	11 U	2.2 U	11 U	22 U
A3RB-DPT0048	9/5/2023	23 - 27	FD	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	4.5 U	4.5 U	2.3 U	2.3 U	11 U	4.5 U	11 U	2.3 U	11 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	11 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	11 U	23 U
A3RB-DPT0048	9/5/2023	40 - 44	NM	2.1 U	2.1 U	2.5 J	2.1 U	2.1 U	4.2 U	21 U	2.1 U	2.1 U	10 U	4.2 U	10 U	2.1 U	10 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	10 U	2.1 U	10 U	2.1 U	2.1 U	2.1 U	10 U	21 U
A3RB-DPT0048	9/5/2023	55 - 59	NM	2.2 U	2.2 U	2.2 U	2.2 U	11 U	22 U	4.4 U	11 U	2.2 U	2.2 U	4.4 U	2.2 U	2.2 U	2.2 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	11 U	2.2 U	2.2 U	2.2 U	11 U	4.4 U
A3RB-DPT0049	9/5/2023	2 - 4	NM	28.9	1.1 J	10.2	2.1 U	52.8	4.3 U	6.5 J	2.0 J	2.1 U	2.1 U	4.3 U	2.1 U	2.3 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.5 U	2.1 U	1.3 J	2.1 U	2.1 U	2.1 U	6.2	1.4 J	4.3 U
A3RB-DPT0049	9/5/2023	8 - 12	NM	8.6	2.1 U	1.7 J	2.1 U	9.1	4.3 U	3.5 J	2.1 U	2.1 U	2.1 U	4.3 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U
A3RB-DPT0049	9/5/2023	16 - 20	NM	1.7 J	2.3 U	3.2 J	2.3 U	11.6	4.5 U	23 U	2.3 U	2.3 U	11 U	4.5 U	11 U	2.3 U	11 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	11 U	2.3 U	2.3 U	2.3 U	2.3 U	1.2 J	2.3 U	23 U
A3RB-DPT0049	9/5/2023	40 - 44	NM	4.8	2.2 U	4.2 J	2.2 U	9.5	4.3 U	4.3 U	2.2 U	2.2 U	2.2 U	4.3 U	2.2 U	2.2 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	1.3 J	2.2 U	4.3 U
A3RB-DPT0049	9/5/2023	55 - 59	NM	2.2 J	2.4 U	2.5 J	2.4 U	4.1 J	4.8 U	2.7 J	2.4 U	2.4 U	12 U	4.8 U	12 U	2.4 U	12 U	24 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	12 U	2.4 U	12 U	2.4 U	12 U	2.4 U	12 U	24 U
A3RB-DPT0050	9/5/2023	8 - 12	NM	4.7	16.7 J	9.4 U	7.2	1.9 J	19 U	20.8 J	23.2	1.9 U	1.9 U	19 U	1.9 U	1.9 U	1.9 U	19 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	35.6	1.9 U	9.4 U	9.4 U	31.3	3.8 U
A3RB-DPT0050	9/5/2023	8 - 12	FD	5.2	17.1 J	9.4 U	7.3	2.1 J	19 U	22.0 J	23.8	1.9 U	1.9 U	19 U	1.9 U	1.9 U	1.9 U	19 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	36.6	1.9 U	9.4 U	9.4 U	33.4	3.8 U
A3RB-DPT0050	9/5/2023	16 - 20	NM	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	4.2 U	5.6 J	1.3 J	2.1 U	2.1 U	4.2 U	2.1 U	2.1 U	2.1 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	1.1 J	2.1 U	2.1 U	2.1 U	3.4 J	4.2 U
A3RB-DPT0050	9/5/2023	23 - 27	NM	3.3 J	1.9 U	1.5 J	1.9 U	1.0 J	19 U	4.3 J	9.4 U	1.9 U	9.4 U	3.8 U	9.4 U	1.9 U	9.4 U	19 U	3.8 U	3.8 U	3.8 U	19 U	3.8 U	19 U	9.4 U	1.9 U	9.4 U	1.9 U	1.9 U	1.9 U	9.4 U	19 U
A3RB-DPT0050	9/5/2023	40 - 44	NM	200	12.5 J	14.9	6.4 J	42.8	23 U	14.8	9.6 J	11 U	11 U	23 U	11 U	2.3 U	11 U	23 U	23 U	23 U	23 U	23 U	23 U	23 U	11 U	1.5 J	12.3 J	2.3 U	11 U	1.5 J	8.3 J	23 U
A3RB-DPT0051	9/6/2023	2 - 6	NM	27.9	1.4 J	1.9 J	1.9 U	12.8	3.8 U	27.3 J	2.2 J	1.9 U	1.9 U	3.8 U	1.9 U	9.4 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.2 J	1.9 U	1.9 U	1.9 U	1.9 U	3.0 J	3.8 U
A3RB-DPT0051	9/6/2023	8 - 12	NM	135	3.3 J	3.7 J	1.9 U	75.9	3.8 U	11.1 J	5.2	1.9 U	1.9 U	3.8 U	1.9 U	9.4 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	2.7 J	1.5 J	0.99 J	9.4 U	5	2.9 J	3.8 U
A3RB-DPT0051	9/6/2023	16 - 20	NM	65.8	1.8 J	3.4 J	1.9 U	52.2	3.8 U	6.2 J	3.0 J	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.7 J	1.9 U	1.9 U	9.4 U	3.5 J	1.5 J	3.8 U
A3RB-DPT0051	9/6/2023	23 - 27	NM	4.7	1.3 J	1.9 J	2.0 U	5.5	3.9 U	7.9	0.99 J	2.0 U	9.8 U	3.9 U	9.8 U	2.0 U	9.8 U	20 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	9.8 U	2.0 U	9.8 U	2.0 U	9.8 U	2.0 U	1.3 J	20 U
A3RB-DPT0051	9/6/2023	40 - 44	NM	1.6 J	2.1 U	2.1 U	2.1 U	1.7 J	4.2 U	2.5 J	2.1 U	2.1 U	2.1 U	4.2 U	2.1 U	10 U	2.1 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	10 U	4.2 U

Table 2-2
DPT Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

			Analyte	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTRIA
EPA Residential RSL for Tapwater (ng/L)				0.2	0.0027	600	5.9	39	1.5	1800	990	100	2000	600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FDEP pGCTL (ng/L)				70	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Location ID	**Sample Date**	**Depth Interval (ft bls)**	**Sample Type**																													
A3RB-DPT0051	9/6/2023	40 - 44	FD	**1.4 J**	1.9 U	1.9 U	1.9 U	**1.7 J**	3.8 U	**2.3 J**	1.9 U	1.9 U	1.9 U	3.8 U	1.9 U	9.4 U	1.9 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.4 U	3.8 U
A3RB-DPT0051	9/6/2023	55 - 59	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.4 U	3.8 U
A3RB-DPT0052	9/6/2023	2 - 6	NM	**4.2 J**	2.3 U	**4.0 J**	2.3 U	**7.9**	4.5 U	**9.1**	2.3 U	2.3 U	11 U	4.5 U	11 U	2.3 U	11 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	4.5 U	23 U	11 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	11 U	23 U
A3RB-DPT0052	9/6/2023	8 - 12	NM	**5.9**	2.0 U	**2.1 J**	2.0 U	**14.9**	3.9 U	**3.2 J**	**1.0 J**	2.0 U	2.0 U	3.9 U	2.0 U	9.8 U	2.0 U	20 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	9.8 U	2.0 U	9.8 U	**1.8 J**	**1.1 J**	3.9 U
A3RB-DPT0052	9/6/2023	16 - 20	NM	2.3 U	2.3 U	2.3 U	2.3 U	**3.1 J**	4.6 U	23 U	11 U	2.3 U	11 U	4.6 U	11 U	11 U	2.3 U	23 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	23 U	2.3 U	2.3 U	11 U	2.3 U	11 U	2.3 U	11 U	23 U
A3RB-DPT0052	9/6/2023	23 - 27	NM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	22 U	2.2 U	2.2 U	2.2 U	4.4 U	2.2 U	2.2 U	2.2 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	11 U	2.2 U	11 U	2.2 U	11 U	4.4 U
A3RB-DPT0052	9/6/2023	40 - 44	NM	2.2 U	2.2 U	2.2 U	2.2 U	11 U	4.4 U	22 U	11 U	2.2 U	2.2 U	4.4 U	2.2 U	11 U	2.2 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	11 U	2.2 U	2.2 U	2.2 U	11 U	4.4 U
A3RB-DPT0052	9/6/2023	55 - 59	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	2.0 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U	10 U	4.0 U
A3RB-DPT0053	9/6/2023	2 - 6	NM	**15.5**	2.4 U	**2.5 J**	2.4 U	**22.7 J**	4.8 U	**7.7 J**	2.4 U	2.4 U	12 U	4.8 U	12 U	2.4 U	12 U	24 U	24 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	12 U	2.4 U	12 U	2.4 U	2.4 U	**1.7 J**	**1.9 J**	24 U
A3RB-DPT0053	9/6/2023	8 - 12	NM	**16.1 J**	**1.6 J**	**6.3 J**	9.8 U	**35.2**	20 U	**8.4**	**2.4 J**	2.0 U	9.8 U	20 U	9.8 U	2.0 U	2.0 U	20 U	20 U	20 U	3.9 U	20 U	3.9 U	20 U	2.0 U	9.8 U	9.8 U	9.8 U	9.8 U	**5.9 J**	**2.4 J**	20 U
A3RB-DPT0053	9/6/2023	8 - 12	FD	**13.7 J**	**1.3 J**	**5.5 J**	9.3 U	**33.1**	19 U	**7.3 J**	**2.0 J**	1.9 U	9.3 U	19 U	9.3 U	1.9 U	1.9 U	19 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	9.3 U	9.3 U	9.3 U	9.3 U	**4.6**	**1.9 J**	19 U
A3RB-DPT0053	9/6/2023	16 - 20	NM	**8.1**	**1.1 J**	**4**	1.9 U	**24.8**	19 U	**6.7 J**	**1.8 J**	1.9 U	1.9 U	19 U	1.9 U	1.9 U	1.9 U	19 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	**2.9 J**	**1.7 J**	3.7 U
A3RB-DPT0053	9/6/2023	23 - 27	NM	**10.4**	**1.2 J**	**4.1**	1.9 U	**27.1**	3.8 U	**5.8 J**	**1.9 J**	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**3.6 J**	**1.6 J**	3.8 U
A3RB-DPT0053	9/6/2023	40 - 44	NM	1.9 U	1.9 U	1.9 U	1.9 U	**1.3 J**	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U
A3RB-DPT0053	9/6/2023	55 - 59	NM	2.2 U	11 U	11 U	2.2 U	**1.3 J**	22 U	22 U	11 U	2.2 U	2.2 U	22 U	2.2 U	2.2 U	2.2 U	22 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	11 U	2.2 U	2.2 U	11 U	11 U	4.4 U
A3RB-DPT0054	9/26/2023	2 - 6	NM	**6**	**1.4 J**	2.1 U	2.1 U	**3.2 J**	4.2 U	**5.3 J**	2.1 U	2.1 U	2.1 U	4.2 U	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	**1.1 J**	4.2 U
A3RB-DPT0054	9/26/2023	8 - 12	NM	**2.1 J**	11 U	2.2 U	2.2 U	**1.4 J**	4.3 U	**4.9 J**	11 U	2.2 U	2.2 U	22 U	2.2 U	2.2 U	2.2 U	22 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	11 U	2.2 U	2.2 U	2.2 U	11 U	4.3 U
A3RB-DPT0054	9/26/2023	16 - 20	NM	2.2 U	11 U	11 U	2.2 U	11 U	22 U	22 U	11 U	2.2 U	11 U	22 U	11 U	2.2 U	11 U	22 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	11 U	2.2 U	11 U	2.2 U	2.2 U	11 U	11 U	22 U
A3RB-DPT0054	9/26/2023	23 - 27	NM	**4.0 J**	**1.7 J**	2.7 U	2.7 U	**2.3 J**	27 U	**2.7 J**	14 U	2.7 U	14 U	27 U	14 U	2.7 U	14 U	27 U	27 U	5.4 U	5.4 U	5.4 U	5.4 U	27 U	14 U	2.7 U	14 U	2.7 U	14 U	2.7 U	14 U	27 U
A3RB-DPT0054	9/26/2023	40 - 44	NM	2.0 U	2.0 U	2.0 U	2.0 U	10 U	4.1 U	20 U	10 U	2.0 U	10 U	4.1 U	10 U	10 U	2.0 U	20 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	10 U	2.0 U	10 U	2.0 U	10 U	20 U
A3RB-DPT0054	9/26/2023	55 - 59	NM	2.3 U	2.3 U	2.3 U	2.3 U	12 U	4.7 U	**2.4 J**	12 U	2.3 U	2.3 U	4.7 U	2.3 U	2.3 U	2.3 U	23 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	2.3 U	2.3 U	12 U	2.3 U	2.3 U	2.3 U	12 U	4.7 U
A3RB-DPT0055	9/26/2023	2 - 6	NM	**18.8**	2.7 U	**1.9 J**	2.7 U	**22.1**	26 U	**7.2 J**	13 U	2.7 U	2.7 U	5.3 U	2.7 U	13 U	2.7 U	26 U	5.3 U	5.3 U	5.3 U	26 U	5.3 U	5.3 U	13 U	2.7 U	13 U	2.7 U	13 U	**1.3 J**	**1.3 J**	26 U
A3RB-DPT0055	9/26/2023	8 - 12	NM	2.2 U	11 U	**1.3 J**	2.2 U	**3.5 J**	22 U	22 U	11 U	2.2 U	11 U	22 U	11 U	2.2 U	11 U	22 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	11 U	2.2 U	11 U	2.2 U	2.2 U	11 U	11 U	22 U
A3RB-DPT0055	9/26/2023	16 - 20	NM	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	4.7 U	23 U	2.3 U	2.3 U	2.3 U	4.7 U	2.3 U	2.3 U	2.3 U	23 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	4.7 U
A3RB-DPT0055	9/26/2023	16 - 20	FD	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	20 U	10 U	2.0 U	2.0 U	4.1 U	2.0 U	2.0 U	2.0 U	20 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U	10 U	4.1 U
A3RB-DPT0055	9/26/2023	23 - 27	NM	16 U	3.1 U	3.1 U	3.1 U	3.1 U	6.3 U	6.3 U	3.1 U	3.1 U	3.1 U	6.3 U	3.1 U	3.1 U	3.1 U	6.3 U	6.3 U	6.3 U	6.3 U	6.3 U	6.3 U	31 U	16 U	16 U	3.1 U	16 U	3.1 U	3.1 U	3.1 U	31 U
A3RB-DPT0055	9/26/2023	40 - 44	NM	**3.1 J**	2.5 U	2.5 U	2.5 U	**2.2 J**	5.0 U	**3.3 J**	2.5 U	2.5 U	2.5 U	5.0 U	2.5 U	2.5 U	2.5 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5.0 U
A3RB-DPT0055	9/26/2023	55 - 59	NM	**4.8 J**	4.5 U	4.5 U	4.5 U	4.5 U	9.1 U	9.1 U	4.5 U	23 U	4.5 U	9.1 U	4.5 U	4.5 U	23 U	9.1 U	9.1 U	9.1 U	46 U	9.1 U	9.1 U	46 U	23 U	23 U	4.5 U	23 U	23 U	4.5 U	4.5 U	46 U
A3RB-DPT0056	9/27/2023	2 - 6	NM	***139***	**7.5**	**33.8**	1.9 U	**855**	19 U	**11.5 J**	**38.7**	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	**9.2**	**6.0 J**	1.9 U	9.6 U	**51**	**7.3 J**	3.8 U
A3RB-DPT0056	9/27/2023	8 - 12	NM	**36.3**	2.0 U	**1.2 J**	2.0 U	**13.5 J**	20 U	20 U	10 U	2.0 U	2.0 U	4.1 U	2.0 U	2.0 U	2.0 U	20 U	20 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	10 U	10 U	20 U
A3RB-DPT0056	9/27/2023	16 - 20	NM	**13**	2.3 U	2.3 U	2.3 U	**8.9 J**	4.5 U	23 U	11 U	2.3 U	11 U	4.5 U	11 U	2.3 U	11 U	23 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	11 U	2.3 U	11 U	2.3 U	2.3 U	2.3 U	11 U	23 U
A3RB-DPT0056	9/27/2023	23 - 27	NM	**26.3**	2.5 U	2.5 U	2.5 U	**22**	5.0 U	25 U	2.5 U	2.5 U	13 U	5.0 U	13 U	2.5 U	13 U	25 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	25 U	13 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	13 U	25 U
A3RB-DPT0056	9/27/2023	40 - 44	NM	***131***	**1.8 J**	**10.7**	3.0 U	**71.5**	6.1 U	6.1 U	**3.7 J**	3.0 U	3.0 U	6.1 U	3.0 U	3.0 U	3.0 U	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U	6.1 U	3.0 U	**2.6 J**	3.0 U	3.0 U	3.0 U	**3.7 J**	3.0 U	6.1 U
A3RB-DPT0056	9/27/2023	55 - 59	NM	**16.1**	2.3 U	**1.2 J**	2.3 U	**14.8**	4.5 U	4.5 U	2.3 U	2.3 U	2.3 U	4.5 U	2.3 U	2.3 U	2.3 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	4.5 U
A3RB-DPT0057	9/27/2023	2 - 6	NM	***119***	**11.6**	**3.7 J**	2.1 U	**15.8**	4.2 U	**14.4**	**2.3 J**	2.1 U	2.1 U	4.2 U	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	**5.2**	**1.6 J**	2.1 U	2.1 U	**2.0 J**	**3.9 J**	4.2 U
A3RB-DPT0057	9/27/2023	2 - 6	FD	***110***	**10.2**	**2.9 J**	2.0 U	**11.1**	3.9 U	**13**	**1.7 J**	2.0 U	2.0 U	3.9 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	**5.1**	**1.4 J**	2.0 U	2.0 U	**1.2 J**	**3.3 J**	3.9 U
A3RB-DPT0057	9/27/2023	8 - 12	NM	**16.2**	**2.8 J**	**3.0 J**	**1.2 J**	**6.1**	4.7 U	**8.7 J**	**2.1 J**	2.3 U	2.3 U	4.7 U	2.3 U	2.3 U	2.3 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	2.3 U	**1.7 J**	**3.6 J**	2.3 U	2.3 U	2.3 U	**4.2 J**	4.7 U
A3RB-DPT0057	9/27/2023	16 - 20	NM	2.1 U	2.1 U	2.1 U	2.1 U	**1.2 J**	4.2 U	21 U	2.1 U	2.1 U	2.1 U	4.2 U	2.1 U	2.1 U	2.1 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	2.1 U	2.1 U	2.1 U	2.1 U	10 U	2.1 U	**1.5 J**	4.2 U
A3RB-DPT0057	9/27/2023	23 - 27	NM	**15.8**	**1.8 J**	2.2 U	2.2 U	**2.3 J**	4.4 U	22 U	2.2 U	11 U	11 U	4.4 U	11 U	2.2 U	11 U	22 U	4.4 U	22 U	22 U	22 U	22 U	22 U	11 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	**1.6 J**	22 U
A3RB-DPT0057	9/27/2023	40 - 44	NM	**6.8**	2.0 U	**1.6 J**	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	4.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U
A3RB-DPT0057	9/27/2023	55 - 59	NM	**1.3 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	2.0 U	2.0 U	2.0 U	4.1 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U
A3RB-DPT0058	3/21/2024	2 - 6	NM	**1.9 J**	2.2 U	2.2 U	2.2 U	**1.1 J**	4.4 U	**2.8 J**	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	2.2 U
A3RB-DPT0058	3/21/2024	2 - 6	FD	**1.1 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	2.0 U
A3RB-DPT0058	3/21/2024	8 - 12	NM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0058	3/21/2024	16 - 20	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	**4.9 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0058	3/21/2024	23 - 27	NM	**4.7**	**4.0 J**	**25.2**	2.2 U	**1.6 J**	4.4 U	**22.5 J**	**4.8**	11 U	11 U	11 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	11 U	2.2 U	2.2 U	**1.6 J**	2.2 U	11 U	11 U	**1.5 J**	11 U
A3RB-DPT0058	3/21/2024	40 - 44	NM	2.0 U	2.0 U	**1.9 J**	2.0 U	2.0 U	4.0 U	**6.4 J**	**1.2 J**	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	2.0 U
A3RB-DPT0058	3/21/2024	55 - 59	NM	2.0 U	2.0 U	**1.3 J**	2.0 U	2.0 U	4.0 U	**3.0 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	2.0 U
A3RB-DPT0059	3/21/2024	2 - 6	NM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	**2.5 J**	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0059	3/21/2024	8 - 12	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	2.0 U	2.0 U	10 U	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	2.0 U
A3RB-DPT0059	3/21/2024	16 - 20	NM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0059	3/21/2024	16 - 20	FD	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0059	3/21/2024	23 - 27	NM	**2.4 J**	**1.4 J**	**3.4 J**	2.2 U	2.2 U	4.4 U	**4.6 J**	**1.3 J**	11 U	2.2 U	11 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	11 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	**1.1 J**	11 U
A3RB-DPT0059	3/21/2024	40 - 44	NM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	2.2 U	11 U	2.2 U	11 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	4.4 U	22 U	11 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	2.2 U	2.2 U	11 U
A3RB-DPT0059	3/21/2024	55 - 59	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.6 U	1.9 U	9.6 U	1.9 U
A3RB-DPT0060	3/21/2024	2 - 6	NM	2.2 U	2.2 U	11 U	2.2 U	2.2 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	2.2 U
A3RB-DPT0060	3/21/2024	8 - 12	NM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0060	3/21/2024	16 - 20	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	10 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	10 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0060	3/21/2024	23 - 27	NM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	11 U	2.2 U	2.2 U	2.2 U	4.4 U	4.4 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	2.2 U	11 U	2.2 U
A3RB-DPT0060	3/21/2024	40 - 44	NM	**2.2 J**	3.1 U	**41.3**	3.1 U	3.1 U	6.3 U	31 U	16 U	3.1 U	3.1 U	16 U	6.3 U	6.3 U	31 U	6.3 U	6.3 U	6.3 U	6.3 U	6.3 U	31 U	16 U	3.1 U	3.1 U	16 U	3.1 U	16 U	16 U	16 U	3.1 U
A3RB-DPT0060	3/22/2024	55 - 59	NM	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5.0 U	5.0 U	2.5 U	2.5 U	2.5 U	2.5 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
A3RB-DPT0061	3/22/2024	2 - 6	NM	**1.9 J**	2.4 U	12 U	2.4 U	**1.9 J**	24 U	**3.1 J**	12 U	2.4 U	2.4 U	12 U	4.8 U	4.8 U	24 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	**1.8 J**	2.4 U
A3RB-DPT0061	3/22/2024	16 - 20	NM	**6.9**	14 U	14 U	14 U	2.8 U	28 U	28 U	14 U	14 U	2.8 U	14 U	28 U	28 U	28 U	5.6 U	28 U	28 U	28 U	28 U	28 U	14 U	14 U	2.8 U	14 U	2.8 U	14 U	14 U	14 U	14 U
A3RB-DPT0061	3/22/2024	23 - 27	NM	3.6 U	18 U	18 U	18 U	3.6 U	36 U	7.1 U	18 U	18 U	3.6 U	18 U	36 U	36 U	7.1 U	7.1 U	36 U	36 U	36 U	36 U	36 U	18 U	18 U	3.6 U	18 U	3.6 U	18 U	18 U	18 U	18 U

Table 2-2
DPT Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location ID	Sample Date	Depth Interval (ft bls)	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA	11CL-PF3OUDS
EPA Residential RSL for Tapwater (ng/L)				**0.2**	**0.0027**	**600**	**5.9**	**39**	**1.5**	**1800**	**990**	**100**	**2000**	**600**	**--**
FDEP pGCTL (ng/L)				**70**	**70**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
A3RB-DPT0061	3/22/2024	40 - 44	NM	**2.1 J**	13 U	13 U	13 U	2.5 U	25 U	25 U	13 U	13 U	2.5 U	13 U	25 U
A3RB-DPT0061	3/22/2024	55 - 59	NM	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	5.0 U	5.0 U	2.5 U	13 U	2.5 U	13 U	25 U

Location ID	Sample Date	Depth Interval (ft bls)	Sample Type	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTRIA
EPA Residential RSL for Tapwater (ng/L)				**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
FDEP pGCTL (ng/L)				**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
A3RB-DPT0061	3/22/2024	40 - 44	NM	25 U	25 U	5.0 U	25 U	25 U	25 U	25 U	25 U	13 U	13 U	2.5 U	**1.4 J**	2.5 U	13 U	13 U	13 U	13 U
A3RB-DPT0061	3/22/2024	55 - 59	NM	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	25 U	25 U	13 U	13 U	2.5 U	2.5 U	2.5 U	13 U	2.5 U	2.5 U	13 U

Notes:

Results in the table above and the laboratory analytical report are in parts per trillion (nanogram per liter, or ng/L).

Bolded type indicates the compound was detected.

Yellow highlighted cell indicates an exceedance of EPA Regional Screening Level for Tapwater (ng/L) as of May 2024.

Yellow highlighted cell with *italics* indicates an exceedance of FDEP provisional Groundwater Cleanup Target Level (ng/L) as of March 2022.

Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.

Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory operating conditions, based on the precision and accuracy results for standards that are run with the sample.

Depth intervals are measured in feet below land surface (bls).

-- indicates that a screening value is not available as of October 2024 for that compound.

Abbreviations:

A3RB = Area 3 Repeater Building
DPT = Direct Push Technology
E = Indicates value exceeds calibration range
EPA = Environmental Protection Agency
FD = Field Duplicate
FDEP = Florida Department of Environmental Protection
J = Estimated value
NM = Normal Sample
PFAS = Per-and polyfluoroalkyl substances
pGCTL = Provisional Groundwater Cleanup Target Level
RSL = Regional Screening Level
U = Result was below the laboratory Reporting Limit

PFAS - Compounds

Perflurooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUDS)
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDoDA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)

PFAS - Compounds Continued

Perfluorooctane sulfonamide (PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTetDA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUDA)

Table 2-3
Monitoring Well Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Sample Date	Depth Interval (feet bls)	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHPS	PFHpA	PFNS	PFOSA	PFPeS	PFPeA	PFTRIA
	EPA Residential RSL for Tapwater (ng/L)				0.2	0.0027	600	5.9	39	1.5	1800	990	100	2000	600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	FDEP pGCTL (ng/L)				70	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	A3RB-MW0001	5/31/2022	20.0 - 30.0	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-MW0001	5/25/2023	20.0 - 30.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0001	4/9/2024	20.0 - 30.0	NM	1.8 U	1.8 U	8.9 U	1.8 U	8.9 U	3.6 U	3.6 U	8.9 U	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	18 U	3.6 U	3.6 U	18 U	3.6 U	3.6 U	3.6 U	1.8 U	8.9 U	1.8 U	8.9 U	1.8 U	1.8 U	8.9 U	8.9 U	1.8 U
	A3RB-MW0002	5/31/2022	2.0 - 12.0	NM	***3330***	**20.6**	**30.9**	**4.5 J**	**1550**	8.0 U	**12.6 J**	**50.2**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	**2.2 J**	**26.9**	**8.1**	**20.6**	4.0 U	**62.1**	**15.4**	4.0 U
	A3RB-MW0002	5/23/2023	2.0 - 12.0	NM	***880***	**6.1**	**16.3**	2.1 U	**389**	4.3 U	**3.6 J**	**13.4**	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	20 U	2.1 U	2.1 U	**8.7**	**2.1 J**	2.1 U	10 U	**27.6**	**3.7 J**	2.1 U
	A3RB-MW0002	4/9/2024	2.0 - 12.0	NM	***1690***	**6.7**	**10.2 J**	**1.5 J**	**318**	3.8 U	**5.6 J**	**13**	1.9 U	19 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	38 U	**5**	**1.4 J**	**8.0 J**	**3.2 J**	**3.2 J**	19 U	**13.1 J**	**4.2**	1.9 U
	A3RB-MW0003	5/31/2022	2.0 - 12.0	NM	***6290***	***76.8***	**116**	4.0 U	**3720**	8.0 U	**14.6 J**	**127**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	80 U	4.0 U	4.0 U	**78.2**	**24**	4.0 U	4.0 U	**195**	**32.9**	4.0 U
	A3RB-MW0003	5/23/2023	2.0 -12.0	NM	***7150***	***87.2***	**173**	**4.9 J**	**5100**	19 U	**36.4 J**	**175**	9.3 U	46 U	9.3 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	93 U	9.3 U	9.3 U	**106**	**29.7**	9.3 U	46 U	**283**	**48.4 J**	9.3 U
	A3RB-MW0003	4/9/2024	2.0 - 12.0	NM	***10000***	***159***	**174**	**14.7 J**	**3960**	19 U	**35.6 J**	**270**	9.3 U	9.3 U	9.3 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	9.3 U	9.3 U	**237**	**56.9**	**54.5**	9.3 U	**296**	**66.7**	9.3 U
	A3RB-MW0004	5/31/2022	2.0 - 12.0	NM	***79.3***	**5.5 J**	**64**	4.0 U	**726**	8.0 U	**12.7 J**	**10.6**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	**9.2**	**3.1 J**	4.0 U	4.0 U	**68.2**	**10.8**	4.0 U
	A3RB-MW0004	5/23/2023	2.0 - 12.0	NM	**45.6**	**3.0 J**	**26.5**	2.0 U	**288**	4.1 U	**6.1 J**	**4.3**	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	19 U	2.0 U	2.0 U	**5.1**	**1.5 J**	2.0 U	9.3 U	**29.0**	**4.0 J**	2.0 U
	A3RB-MW0004	4/11/2024	2.0 - 12.0	NM	***208***	**10.8**	**91.3**	**1.2 J**	**1390**	3.7 U	**16.0 J**	**34**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**12.3**	**7.5 J**	1.9 U	9.3 U	**110**	**13.5 J**	1.9 U
	A3RB-MW0005	5/31/2022	2.0 - 12.0	NM	**3.4 J**	4.0 U	4.0 U	4.0 U	**3.1 J**	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-MW0005	5/25/2023	2.0 - 12.0	NM	**3.5 J**	1.9 U	**1.2 J**	1.9 U	**5.2**	3.7 U	**8.9**	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0005	4/10/2024	2.0 - 12.0	NM	**3.1 J**	1.8 U	1.8 U	1.8 U	**2.7 J**	3.6 U	**4.2 J**	1.8 U	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	8.9 U	1.8 U	1.8 U	1.8 U
	A3RB-MW0006	5/31/2022	20.0 - 30.0	NM	**2.7 J**	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-MW0006	5/25/2023	20.0 - 30.0	NM	**4.1 J**	2.2 U	2.2 U	2.2 U	**2.1 J**	4.3 U	4.3 U	2.2 U	2.2 U	2.1 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
	A3RB-MW0006	4/10/2024	20.0 - 30.0	NM	**3.5 J**	1.8 U	8.9 U	1.8 U	**2.8 J**	3.6 U	3.6 U	8.9 U	1.8 U	1.8 U	1.8 U	18 U	3.6 U	18 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	8.9 U	8.9 U	8.9 U	1.8 U
	A3RB-MW0007	5/31/2022	20.0 - 30.0	NM	***260***	**3.9 J**	**10.5**	4.0 U	**229**	8.0 U	8.0 U	**12.7**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	**2.8 J**	4.0 U	**3.3 J**	**2.0 J**	4.0 U	4.0 U	**16**	**4.9 J**	4.0 U
	A3RB-MW0007	5/25/2023	20.0 - 30.0	NM	***263***	**3.7**	**8.6**	1.9 U	**251**	3.7 U	**2.4 J**	**9.0**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**4.7**	**1.6 J**	1.9 U	1.9 U	**15.2**	**2.8 J**	1.9 U
	A3RB-MW0007	4/10/2024	20.0 - 30.0	NM	***360***	**3.0 J**	**7.8 J**	1.8 U	**198**	3.6 U	**2.0 J**	**7.2 J**	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	18 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	**2.6 J**	1.8 U	**3.0 J**	**1.5 J**	**3.0 J**	8.9 U	**10.1 J**	**2.4 J**	1.8 U
	A3RB-MW0008	5/31/2022	20.0 - 30.0	NM	***186***	**2.3 J**	**7.0 J**	4.0 U	**141**	8.0 U	8.0 U	**6.9 J**	4.0 U	20 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	**9.9**	**3.3 J**	4.0 U
	A3RB-MW0008	5/25/2023	20.0 - 30.0	NM	***156***	**2.0 J**	**6.6**	1.9 U	**120**	3.7 U	3.7 U	**5.8**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**2.3 J**	**1.1 J**	1.9 U	1.9 U	**10.2**	**1.9 J**	1.9 U
	A3RB-MW0008	4/10/2024	20.0 - 30.0	NM	***108***	**1.2 J**	**4.4**	1.8 U	**80.2**	3.5 U	3.5 U	**3.2 J**	1.8 U	1.8 U	1.8 U	3.5 U	3.5 U	18 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	18 U	1.8 U	1.8 U	**1.3 J**	1.8 U	1.8 U	1.8 U	**5.2 J**	**1.3 J**	1.8 U
	A3RB-MW0009	5/31/2022	20.0 - 30.0	NM	***1500***	**15.5**	**49.1**	4.0 U	**1070**	8.0 U	**11.1 J**	**42.2**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	80 U	4.0 U	4.0 U	**17.1**	**6.6 J**	4.0 U	40 U	**65.6**	**16.8**	4.0 U
South Repeater Building	A3RB-MW0009	5/31/2022	20.0 - 30.0	FD	***1110***	**11.6**	**39**	4.0 U	**856**	8.0 U	**9.1 J**	**34.2**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	**14.6**	**5.8 J**	**4.1 J**	4.0 U	**51.1**	**12.9**	4.0 U
	A3RB-MW0009	5/24/2023	20.0 - 30.0	NM	***858***	**9.5**	**33.2**	**1.3 J**	**680**	3.7 U	**7.7**	**28.0**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**12.8**	**4.7**	1.9 U	9.3 U	**44.1**	**9.1 J**	1.9 U
	A3RB-MW0009	5/24/2023	20.0 - 30.0	FD	***795***	**9.4**	**30.9**	**1.2 J**	**633**	3.7 U	**7.0 J**	**26.1**	1.9 U	9.3 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**14.0**	**4.5**	1.9 U	9.3 U	**49.1**	**8.6 J**	1.9 U
	A3RB-MW0009	4/10/2024	20.0 - 30.0	NM	***673***	**5.6**	**19.2**	1.8 U	**444**	3.5 U	**4.0 J**	**15.3 J**	1.8 U	1.8 U	1.8 U	3.5 U	3.5 U	18 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	18 U	1.8 U	1.8 U	**5.8 J**	**2.9 J**	**3.0 J**	8.8 U	**23.1**	**5.2 J**	1.8 U
	A3RB-MW0010	5/31/2022	2.0 - 12.0	NM	***331***	**6.5 J**	**14.8**	4.0 U	**429**	8.0 U	**5.8 J**	**15.3**	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	**5.8 J**	**3.2 J**	4.0 U	4.0 U	**22.9**	**5.3 J**	4.0 U
	A3RB-MW0010	5/24/2023	2.0 - 12.0	NM	***174***	**2.1 J**	**3.9**	1.9 U	**85.4**	3.7 U	**3.5 J**	**4.2**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	**2.1 J**	**1.2 J**	1.9 U	1.9 U	**5.9**	**1.7 J**	1.9 U
	A3RB-MW0010	4/10/2024	2.0 - 12.0	NM	***259***	**4.5**	**10.1 J**	1.8 U	**299**	3.6 U	**5.8 J**	**9.8 J**	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	**3.8**	**2.4 J**	**1.8 J**	1.8 U	**13.4 J**	**3.5 J**	1.8 U
	A3RB-MW0010	4/10/2024	2.0 - 12.0	FD	***264***	**4.6**	**10.0 J**	1.9 U	**291**	3.7 U	**5.8 J**	**9.8 J**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**3.7**	**2.3 J**	**1.7 J**	1.9 U	**13.9 J**	9.3 U	1.9 U
	A3RB-MW0011	5/24/2023	54.0 - 59.0	NM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	2.2 U	2.2 U	2.2 U
	A3RB-MW0011	4/9/2024	54.0 - 59.0	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	A3RB-MW0012	5/24/2023	35.0 - 45.0	NM	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	11 U	2.1 U	11 U	2.1 U
	A3RB-MW0012	4/9/2024	35.0 - 45.0	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	2.0 U	10 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	A3RB-MW0013	5/24/2023	20.0 - 30.0	NM	**6.2**	2.1 U	2.1 U	2.1 U	**2.8 J**	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	11 U	2.1 U
	A3RB-MW0013	4/9/2024	20.0 - 30.0	NM	**8.8**	1.9 U	1.9 U	1.9 U	**2.3 J**	3.8 U	**2.0 J**	1.9 U	1.9 U	9.6 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0014	5/24/2023	2.0 - 12.0	NM	**2.6 J**	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0014	4/9/2024	2.0 - 12.0	NM	**3.5 J**	**1.7 J**	**1.5 J**	2.0 U	**1.5 J**	4.0 U	**3.6 J**	**1.1 J**	2.0 U	10 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**2.4 J**	2.0 U
	A3RB-MW0015	5/24/2023	20.0 - 30.0	NM	**12.2**	**1.3 J**	**3.2 J**	1.9 U	**18.2**	3.7 U	3.7 U	**1.4 J**	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	**1.7 J**	1.9 U	1.9 U	9.3 U	**3.1 J**	1.9 U	1.9 U
	A3RB-MW0015	4/9/2024	20.0 - 30.0	NM	**15.7**	**1.5 J**	**2.7 J**	2.0 U	**18.1**	4.0 U	**3.9 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	**1.9 J**	2.0 U	2.0 U	10 U	**2.8 J**	2.0 U	2.0 U
	A3RB-MW0016	5/24/2023	2.0 - 12.0	NM	***133***	**11.0**	**1.3 J**	2.1 U	**12.7**	4.2 U	**8.7**	**1.7 J**	2.1 U	2.1 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	**14.0**	**1.7 J**	2.1 U	2.1 U	2.1 U	**1.5 J**	2.1 U
	A3RB-MW0016	4/9/2024	2.0 - 12.0	NM	***76.2***	**2.0 J**	**2.2 J**	1.9 U	**21.6**	3.8 U	**5.9 J**	1.9 U	1.9 U	9.6 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	**8.7**	1.9 U	1.9 U	1.9 U	**2.0 J**	**0.97 J**	1.9 U
	A3RB-MW0017	5/23/2023	54.0 - 59.0	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U
	A3RB-MW0017	4/10/2024	54.0 - 59.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	9.6 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0018	5/23/2023	35.0 - 45.0	NM	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	4.5 U	4.5 U	2.3 U	2.3 U	2.3 U	2.3 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	22 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
	A3RB-MW0018	4/10/2024	35.0 - 45.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	9.6 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0019	5/23/2023	30.0 - 40.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0019	5/23/2023	30.0 - 40.0	FD	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0019	4/10/2024	30.0 - 40.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0020	5/23/2023	2.0 - 12.0	NM	**2.8 J**	**0.99 J**	1.9 U	1.9 U	**1.1 J**	3.7 U	**8.1**	**1.0 J**	1.9 U	9.3 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	1.9 U
	A3RB-MW0020	4/10/2024	2.0 - 12.0	NM	**2.1 J**	**1.1 J**	1.9 U	1.9 U	1.9 U	3.8 U	**5.9 J**	1.9 U	1.9 U	9.6 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.6 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0020	4/10/2024	2.0 - 12.0	FD	**2.0 J**	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	**5.9 J**	1.9 U	1.9 U	9.6 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0021	5/23/2023	20.0 - 30.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0021	4/10/2024	20.0 - 30.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	9.6 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.6 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0022	5/23/2023	54.0 - 59.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
South Repeater Building	A3RB-MW0022	4/9/2024	54.0 - 59.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0023	5/23/2023	54.0 - 59.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	21 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	10 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0023	4/11/2024	54.0 - 59.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	9.4 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0024	5/24/2023	35.0 - 45.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0024	4/10/2024	35.0 - 45.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0025	5/24/2023	35.0 - 45.0	NM	**1.3 J**	1.9 U	1.9 U	1.9 U	**2.6 J**	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0025	5/24/2023	35.0 - 45.0	FD	**1.6 J**	1.9 U	1.9 U	1.9 U	**3.0 J**	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0025	4/10/2024	35.0 - 45.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	9.4 U	9.4 U	1.9 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.4 U	1.9 U	1.9 U	9.4 U

Table 2-3
Monitoring Well Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

South Repeater Building	A3RB-MW0026	5/25/2023	35.0 - 45.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	1.9 U
	A3RB-MW0026	4/10/2024	35.0 - 45.0	NM	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	1.8 U	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	8.9 U	1.8 U	8.9 U	1.8 U
	A3RB-MW0027	5/24/2023	54.0 - 59.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0027	4/10/2024	54.0 - 59.0	NM	**1.1 J**	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0027	4/10/2024	54.0 - 59.0	FD	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	1.8 U	1.8 U	1.8 U	1.8 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	8.9 U	1.8 U	1.8 U	1.8 U

Notes:

Results in the table above and the laboratory analytical report are in parts per trillion (nanogram per liter, or ng/L).

Bolded type indicates the compound was detected.

Yellow highlighted cell indicates an exceedance of EPA Regional Screening Level for Tapwater (ng/L) as of May 2024.

Yellow highlighted cell with *italics* indicates an exceedance of FDEP provisional Groundwater Cleanup Target Level (ng/L) as of March 2022.

Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.

Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory operating conditions, based on the precision and accuracy results for standards that are run with the sample.

Depth intervals are measured in feet below land surface (bls).

-- indicates that a screening value is not available as of October 2024 for that compound.

Abbreviations:

A3RB = Area 3 Repeater Building

DPT = Direct Push Technology

EPA = Environmental Protection Agency

FD = Field Duplicate

FDEP = Florida Department of Environmental Protection

J = Estimated value

NM = Normal Sample

PFAS = Per-and polyfluoroalkyl substances

pGCTL = Provisional Groundwater Cleanup Target Level

RSL = Regional Screening Level

U = Result was below the laboratory Reporting Limit

PFAS - Compounds

Perflurooctanesulfonic acid (PFOS)

Perfluorooctanoic acid (PFOA)

Perfluorobutanesulfonic acid (PFBS)

PFAS - Compounds Continued

Perfluorononanoic acid (PFNA)

Perfluorohexanesufonic acid (PFHxS)

Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)

Perfluorobutanoic acid (PFBA)

Perfluorohexanoic acid (PFHxA)

11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUDS)

4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)

4:2 Fluorotelomer sulfonate (4:2FTS)

6:2 Fluorotelomer sulfonate (6:2FTS)

8:2 Fluorotelomer sulfonate (8:2FTS)

9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)

N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)

N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)

N-Methylperfluorooctane-sulfonamide (MeFOSA)

Perfluorodecanesulfonic acid (PFDS)

Perfluorodecanoic acid (PFDA)

Perfluorododecanoic acid (PFDoDA)

Perfluoroheptanesulfonic acid (PFHpS)

Perfluoroheptanoic acid (PFHpA)

Perfluorononanesulfonic acid (PFNS)

Perfluorooctane sulfonamide (PFOSA)

Perfluoropentanesulfonic acid (PFPES)

Perfluoropentanoic acid (PFPEA)

Perfluorotetradecanoic acid (PFTetDA)

Perfluorotridecanoic acid (PFTRIA)

Perfluoroundecanoic acid (PFUDA)

Table 2-4
Surface Water Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

			Analyte	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFDoDA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTetDA	PFTRIA	PFUDA
			FDEP pSWSL (ng/L)	10	500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Location	Location ID	Sample Date	Sample Type	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
South Repeater Building	A3RB-SW0001	12/16/2022	NM	**7.6**	2.4 U	12 U	2.4 U	**2.2 J**	4.9 U	24 U	4.9 U	4.9 U	**61.3**	4.9 U	4.9 U	4.9 U	4.9 U	24 U	**10.6**	12 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	12 U	2.4 U	12 U	12 U
	A3RB-SW0001	7/28/2023	NM	**13.4**	**1.3 J**	**1.5 J**	1.8 U	**18.5**	3.6 U	**8.9**	**1.2 J**	3.6 U	3.6 U	3.6 U	**10.8**	3.6 U	3.6 U	3.6 U	3.6 U			1.8 U	1.8 U	1.8 U	1.8 U			1.2 J	5.6	1.8 U	1.8 U	1.8 U
	A3RB-SW0001	10/20/2023	NM	**5.2**	2.0 U	9.8 U	2.0 U	**4.5**	20 U	**6.3 J**	9.8 U	3.9 U	3.9 U	20 U	20 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	9.8 U	2.0 U	9.8 U	9.8 U	9.8 U	9.8 U	2.0 U	2.0 U
	A3RB-SW0001	4/11/2024	NM	**5.8**	**1.0 J**	8.9 U	1.8 U	**2.6 J**	3.6 U	**3.7 J**	8.9 U	3.6 U	3.6 U	18 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	8.9 U	8.9 U	8.9 U	1.8 U	1.8 U	1.8 U
	A3RB-SW0002	12/16/2022	NM	**5.5 J**	3.2 U	16 U	3.2 U	**1.6 J**	6.5 U	32 U	6.5 U	6.5 U	**27.1**	6.5 U	6.5 U	6.5 U	6.5 U	32 U	**10.8 J**	3.2 U	3.2 U	16 U	3.2 U	3.2 U	3.2 U	3.2 U	16 U	16 U	16 U	3.2 U	16 U	3.2 U
	A3RB-SW0002	7/28/2023	NM	**14.1**	**1.2 J**	**1.7 J**	1.8 U	**26.2**	3.6 U	**8.4**	**1.5 J**	3.6 U	3.6 U	3.6 U	**6.6 J**	3.6 U	3.6 U	3.6 U	3.6 U			1.8 U	1.8 U	1.8 U	1.8 U			**1.6 J**	**4.3**	1.8 U	1.8 U	1.8 U
	A3RB-SW0002	10/20/2023	NM	**5.3**	2.0 U	10 U	2.0 U	**3.3 J**	20 U	**5.4 J**	10 U	4.0 U	4.0 U	20 U	20 U	4.0 U	4.0 U	20 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	2.0 U
	A3RB-SW0003	12/16/2022	NM	**2.9 J**	**1.1 J**	11 U	2.2 U	**1.3 J**	4.4 U	4.4 U	4.4 U	4.4 U	**19.7**	4.4 U	4.4 U	4.4 U	4.4 U	22 U	**8.5 J**	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	**2.2 J**	11 U	2.2 U	2.2 U
	A3RB-SW0003	7/28/2023	NM	**24.6**	**1.3 J**	**2.4 J**	1.8 U	**48.9**	3.6 U	**7.7**	**2.2 J**	3.6 U	3.6 U	3.6 U	**5.4 J**	3.6 U	3.6 U	3.6 U	3.6 U			1.8 U	1.8 U	1.8 U	1.8 U			**3.0 J**	**3.4 J**	8.9 U	1.8 U	1.8 U
	A3RB-SW0003	7/28/2023	FD	**22.8**	**1.3 J**	**2.3 J**	1.8 U	**50.1**	3.6 U	**8.0**	**2.2 J**	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U			1.8 U	1.8 U	1.8 U	**0.89 J**			**2.6 J**	**4.7**	1.8 U	1.8 U	1.8 U
	A3RB-SW0003	10/20/2023	NM	**4.3**	2.0 U	10 U	2.0 U	1.7 J	20 U	**6.5 J**	10 U	4.0 U	4.0 U	20 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	2.0 U
	A3RB-SW0003	4/11/2024	NM	**2.2 J**	1.8 U	8.9 U	1.8 U	**0.93 J**	3.6 U	**2.8 J**	8.9 U	3.6 U	3.6 U	18 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	8.9 U	8.9 U	8.9 U	8.9 U	1.8 U	1.8 U
	A3RB-SW0004	12/16/2022	NM	**3.3 J**	2.4 U	12 U	2.4 U	2.4 U	4.9 U	4.9 U	4.9 U	4.9 U	**9.4 J**	4.9 U	4.9 U	4.9 U	4.9 U	24 U	**9.3 J**	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	**1.3 J**	12 U	2.4 U	2.4 U
	A3RB-SW0004	10/20/2023	NM	**2.8 J**	2.0 U	10 U	2.0 U	**1.4 J**	20 U	**5.8 J**	10 U	4.0 U	4.0 U	20 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	10 U	**1.3 J**	2.0 U	2.0 U	2.0 U
	A3RB-SW0004	4/11/2024	NM	**1.1 J**	1.8 U	8.9 U	1.8 U	1.8 U	3.6 U	**2.2 J**	8.9 U	3.6 U	3.6 U	18 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	8.9 U	8.9 U	8.9 U	1.8 U	1.8 U	1.8 U
	A3RB-SW0005	12/16/2022	NM	**72.3**	**4.9**	11 U	2.2 U	**64.6**	4.4 U	4.4 U	4.4 U	4.4 U	**16.4**	4.4 U	4.4 U	4.4 U	4.4 U	22 U	**8.0 J**	2.2 U	2.2 U	2.2 U	**1.1 J**	**2.1 J**	**4.6**	2.2 U	11 U	11 U	**3.7 J**	2.2 U	2.2 U	2.2 U
	A3RB-SW0005	7/28/2023	NM	**83.8**	**5.7**	**6.6**	1.8 U	**79.4**	3.6 U	**8.0**	**6.1**	3.6 U	3.6 U	3.6 U	**38.6**	3.6 U	3.6 U	3.6 U	3.6 U			1.8 U	1.8 U	**1.9 J**	**2.8 J**			**5.2**	**4.1**	8.9 U	1.8 U	1.8 U
	A3RB-SW0005	10/20/2023	NM	**77.4**	**4.4**	**3.9**	2.0 U	**54.8**	20 U	**7.9**	**4.0**	3.9 U	3.9 U	20 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	2.0 U	**1.3 J**	**2.0 J**	2.0 U	9.8 U	**3.3 J**	**3.7 J**	2.0 U	2.0 U	2.0 U
	A3RB-SW0006	12/16/2022	NM	**49.6**	**5.8**	9.3 U	1.9 U	**15**	3.7 U	3.7 U	3.7 U	3.7 U	**11.4**	3.7 U	3.7 U	3.7 U	3.7 U	19 U	**7.7**	1.9 U	1.9 U	1.9 U	1.9 U	**1.6 J**	**1.9 J**	1.9 U	9.3 U	9.3 U	**2.1 J**	1.9 U	1.9 U	1.9 U
	A3RB-SW0006	7/28/2023	NM	**31.5**	**3.0 J**	**3.7**	1.8 U	**21.0**	3.6 U	**11.3 J**	**2.8 J**	3.6 U	3.6 U	3.6 U	**26.6**	3.6 U	3.6 U	3.6 U	3.6 U			1.8 U	1.8 U	1.8 U	**1.9 J**			**2.3 J**	**5.7**	8.9 U	1.8 U	1.8 U
	A3RB-SW0006	10/20/2023	NM	**77.8**	**5.1**	**5.5**	2.2 U	**67.0**	22 U	**8.3 J**	**4.6**	4.3 U	4.3 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	**1.5 J**	**2.2 J**	2.2 U	11 U	**4.0 J**	**3.8 J**	11 U	2.2 U	2.2 U
	A3RB-SW0007	12/16/2022	NM	**69.7**	**5.5**	9.3 U	1.9 U	**31.5**	3.7 U	3.7 U	3.7 U	3.7 U	**16.9**	3.7 U	3.7 U	3.7 U	3.7 U	19 U	**8.3**	1.9 U	1.9 U	1.9 U	**0.94 J**	**1.7 J**	**2.9 J**	1.9 U	9.3 U	9.3 U	**2.6 J**	1.9 U	1.9 U	1.9 U
	A3RB-SW0007	12/16/2022	FD	**71.6**	**5.4**	**3.5 J**	1.9 U	**31.2**	3.7 U	3.7 U	3.7 U	3.7 U	**11.9**	3.7 U	3.7 U	3.7 U	3.7 U	19 U	**8.3**	1.9 U	1.9 U	9.3 U	**0.98 J**	**1.9 J**	**2.9 J**	1.9 U	9.3 U	**2.7 J**	**2.3 J**	9.3 U	9.3 U	1.9 U
	A3RB-SW0007	7/28/2023	NM	**27.9**	**2.8 J**	**3.6**	1.8 U	**18.6**	3.6 U	**10.2 J**	**2.8 J**	3.6 U	3.6 U	3.6 U	**16.7**	3.6 U	3.6 U	3.6 U	3.6 U			1.8 U	1.8 U	1.8 U	**1.7 J**			**1.5 J**	**4.4**	1.8 U	1.8 U	1.8 U
	A3RB-SW0007	10/20/2023	NM	**68.0**	**5.3**	**5.3**	1.9 U	**55.7**	19 U	**8.8**	**4.4**	3.8 U	3.8 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	**1.3 J**	**2.3 J**	1.9 U	9.6 U	**3.5 J**	**4.0**	9.6 U	1.9 U	1.9 U
	A3RB-SW0008	12/16/2022	NM	**86.1**	**5.5**	**7.1**	1.9 U	**78.3**	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	**9.4**	1.9 U	1.9 U	1.9 U	**2.7 J**	**1.8 J**	**5.3**	1.9 U	9.6 U	**8**	**3.1 J**	1.9 U	1.9 U	1.9 U
	A3RB-SW0008	7/28/2023	NM	**30.3**	**3.0 J**	**3.5 J**	1.8 U	**21.3**	3.6 U	**10.3**	**2.7 J**	3.6 U	3.6 U	3.6 U	**8.1**	3.6 U	3.6 U	3.6 U	3.6 U			1.8 U	1.8 U	1.8 U	**1.7 J**			**1.5 J**	**3.9**	1.8 U	1.8 U	1.8 U
	A3RB-SW0008	10/20/2023	NM	**46.9**	**5.5**	**5.4**	2.0 U	**48.2**	20 U	**9.5**	**4.1**	4.0 U	4.0 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	**1.1 J**	**2.1 J**	2.0 U	10 U	**3.2 J**	**4.0**	10 U	2.0 U	2.0 U
	A3RB-SW0009	3/15/2023	NM	**661**	**9**	**21.3**	**1.0 J**	**385**	3.7 U	3.7 U	3.7 U	3.7 U	**141**	3.7 U	3.7 U	3.7 U	3.7 U	19 U	**10.1 J**	1.9 U	1.9 U	1.9 U	**13.9 J**	**4.1**	**21**	9.3 U	9.3 U	**38.5**	**8.6 J**	9.3 U	1.9 U	1.9 U
	A3RB-SW0009	10/20/2023	NM	**502**	**8.9**	**19.1**	**0.96 J**	**345**	19 U	**9.7**	**17.5 J**	19 U	3.8 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	9.4 U	**13.4**	**3.6 J**	1.9 U	9.4 U	**26.2**	**7.3 J**	9.4 U	9.4 U	1.9 U
	A3RB-SW0009	4/11/2024	NM	**506**	**8.1**	**17.2**	1.8 U	**394**	3.6 U	**7.7**	**16.1**	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	1.8 U	**13.5**	**3.3 J**	**1.3 J**	8.9 U	**40.3**	**4.7 J**	1.8 U	1.8 U	1.8 U
	A3RB-SW0009	4/11/2024	FD	**469**	**8.2**	**17.7**	1.8 U	**368**	3.6 U	**7.5**	**16.1**	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	1.8 U	**13.3**	**3.4 J**	**1.4 J**	8.9 U	**41**	**5.0 J**	1.8 U	1.8 U	1.8 U
	A3RB-SW0010	3/15/2023	NM	**562**	**8.9**	**19.9**	1.9 U	**367**	3.7 U	3.7 U	3.7 U	3.7 U	**41**	3.7 U	3.7 U	3.7 U	3.7 U	19 U	**10.2**	1.9 U	1.9 U	1.9 U	**14.9 J**	**4**	**20.2**	9.3 U	9.3 U	**35.3**	**9.3 J**	9.3 U	1.9 U	1.9 U
	A3RB-SW0010	10/20/2023	NM	**520**	**8.9**	**17.7 J**	2.0 U	**381**	20 U	**9.9**	**18.0 J**	20 U	3.9 U	20 U	**28.3**	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	9.8 U	**13.5**	**3.7 J**	2.0 U	9.8 U	**25.5**	**6.0**	9.8 U	9.8 U	2.0 U
	A3RB-SW0010	10/20/2023	FD	**435**	**8.4**	**17.8 J**	2.0 U	**365**	20 U	**9.5**	**17.2 J**	4.1 U	4.1 U	20 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	2.0 U	**12.2**	**3.5 J**	2.0 U	2.0 U	**24.6**	**5.8**	10 U	2.0 U	2.0 U
	A3RB-SW0010	4/11/2024	NM	**1170**	**8.6**	**17.1**	**0.92 J**	**410**	3.6 U	**7.9**	**16**	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	18 U	1.8 U	1.8 U	1.8 U	**18.7**	**3.4 J**	**4.5**	8.9 U	**40.4**	**5.2 J**	1.8 U	1.8 U	1.8 U

Notes:
Results in the table above and the laboratory analytical report are in parts per trillion (nanogram per liter, or ng/L).
Bolded type indicates the compound was detected.
Yellow highlighted cell indicates an exceedance of FDEP provisional Surface Water Screening Levels (ng/L) as of March 2022.
Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.
Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory operating conditions, based on the precision and accuracy results for standards that are run with the sample.
-- indicates that a screening value is not available as of October 2024 for that compound.

Abbreviations:
A3RB = Area 3 Repeater Building
J = Estimated value
FD = Field Duplicate
FDEP = Florida Department of Environmental Protection
NM = Normal Sample
PFAS = Per-and polyfluoroalkyl substances
pSWSL = Provisional Surface Water Screening Level
U = Result was below the laboratory Reporting Limit

PFAS - Compounds
Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)

PFAS - Compounds Continued
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11CL-PF3OUDS = 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9CL-PF3ONS = 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDoDA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide (PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTetDA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUDA)

Table 3-1
Baseline Groundwater Sampling Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location ID	Sample Date	Depth Interval (feet bls)	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	PFDoDA	PFTetDA	PFUDA
EPA Residential RSL for Tapwater (ng/L)				0.2	0.0027	600	5.9	39	1.5	1800	990	100	2000	600
FDEP pGCTL (ng/L)				70	70	--	--	--	--	--	--	--	--	--
A3RB-MW0028	12/14/2023	35 - 55	NM	1.8 U	0.92 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.8 U	1.8 U	1.8 U
A3RB-MW0029	12/14/2023	15 - 25	NM	**30.4**	**1.3 J**	**1.8 J**	2.0 U	**26.4**	2.0 U	**2.1 J**	3.9 U	2.0 U	2.0 U	2.0 U
A3RB-MW0029	12/14/2023	15 - 25	FD	**31.9**	**1.4 J**	**1.8 J**	2.0 U	**31.5**	2.0 U	**1.6 J**	3.9 U	2.0 U	2.0 U	2.0 U
A3RB-MW0030	12/14/2023	5 - 10	NM	**15.8**	**1.4 J**	2.2 U	2.2 U	**15.5**	2.2 U	**1.5 J**	**7.5 J**	2.2 U	2.2 U	2.2 U
A3RB-MW0031	12/14/2023	35 - 55	NM	1.9 U	0.94 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U
A3RB-MW0032	12/14/2023	5 - 10	NM	**14.0**	**7.0**	**5.4**	**1.6 J**	**21.5**	2.2 U	**6.0**	**49.5**	2.2 U	2.2 U	2.2 U
A3RB-MW0033	12/14/2023	15 - 25	NM	**24.2**	**1.5 J**	**2.6 J**	1.9 U	**28.1**	1.9 U	**1.7 J**	3.8 U	1.9 U	1.9 U	1.9 U
A3RB-MW0034	12/14/2023	35 - 55	NM	1.8 U	0.92 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.8 U	1.8 U	1.8 U
A3RB-MW0035	12/14/2023	5 - 10	NM	**15.7**	**3.9**	**2.9 J**	**1.2 J**	**14.4**	1.8 U	**3.9**	**25.9**	1.8 U	1.8 U	1.8 U
A3RB-MW0036	12/14/2023	15 - 25	NM	**8.0**	**1.1 J**	**1.5 J**	**0.68 J**	**8.3**	1.9 U	**1.5 J**	**3.2 J**	1.9 U	1.9 U	1.9 U
A3RB-EW0001	1/12/2024	35 - 55	NM	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	7.4 U	3.7 U	3.7 U	3.7 U
A3RB-EW0002	1/10/2024	5 - 10	NM	**11.7**	**2.8 J**	**3.8 J**	3.7 U	**14.8**	3.7 U	**3.0 J**	**27.4 J**	3.7 U	3.7 U	3.7 U
A3RB-EW0003	1/11/2024	15 - 25	NM	**22.9**	**1.6 J**	**2.1 J**	**1.2 J**	**20.9**	3.7 U	**1.9 J**	**4.2 J**	3.7 U	3.7 U	3.7 U

Location ID	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHPS	PFHpA	PFNS	PFOSA	PFPeS	PFPeA	PFTRIA
EPA Residential RSL for Tapwater (ng/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FDEP pGCTL (ng/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A3RB-MW0028	3.7 U	3.7 U	7.3 U	7.3 U	7.3 U	3.7 U	3.7 U	3.7 U	3.7 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.8 U	1.8 U
A3RB-MW0029	3.9 U	3.9 U	7.8 U	7.8 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	2.0 U	2.0 U	**0.56 J**	2.0 U	2.0 U	2.0 U	**2.0 J**	**1.3 J**	2.0 U
A3RB-MW0029	3.9 U	3.9 U	7.8 U	7.8 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	2.0 U	2.0 U	**0.73 J**	**0.99 J**	2.0 U	2.0 U	**1.9 J**	**1.1 J**	2.0 U
A3RB-MW0030	4.4 U	4.4 U	8.9 U	8.9 U	8.9 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	2.2 U	2.2 U
A3RB-MW0031	3.8 U	3.8 U	7.5 U	7.5 U	7.5 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U
A3RB-MW0032	4.4 U	4.4 U	8.8 U	8.8 U	8.8 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	**4.4**	2.2 U	2.2 U	**2.0 J**	**6.8 J**	2.2 U
A3RB-MW0033	3.8 U	3.8 U	7.5 U	7.5 U	7.5 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**2.1 J**	1.9 U	1.9 U
A3RB-MW0034	3.7 U	3.7 U	7.3 U	7.3 U	7.3 U	3.7 U	3.7 U	3.7 U	3.7 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.8 U	1.8 U
A3RB-MW0035	3.7 U	3.7 U	7.3 U	7.3 U	7.3 U	3.7 U	3.7 U	3.7 U	3.7 U	1.8 U	1.8 U	1.8 U	**2.6 J**	1.8 U	1.8 U	**1.4 J**	**4.0 J**	1.8 U
A3RB-MW0036	3.7 U	3.7 U	7.4 U	7.4 U	7.4 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	**0.61 J**	1.9 U	1.9 U	3.7 U	**1.7 J**	1.9 U
A3RB-EW0001	7.4 U	7.4 U	15 U	15 U	15 U	7.4 U	7.4 U	7.4 U	7.4 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	7.4 U	3.7 U	3.7 U
A3RB-EW0002	7.4 U	7.4 U	15 U	15 U	15 U	7.4 U	7.4 U	7.4 U	7.4 U	3.7 U	3.7 U	3.7 U	**1.9 J**	3.7 U	3.7 U	7.4 U	**5.7 J**	3.7 U
A3RB-EW0003	7.4 U	7.4 U	15 U	15 U	15 U	7.4 U	7.4 U	7.4 U	7.4 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	7.4 U	**3.2 J**	3.7 U

Notes:

Results in the table above and the laboratory analytical report are in parts per trillion (nanogram per liter, or ng/L).

Bolded type indicates the compound was detected.

Yellow highlighted cell indicates an exceedance of EPA Regional Screening Level for Tapwater (ng/L) as of May 2024.

Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.

Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory operating conditions, based on the precision and accuracy results for standards that are run with the sample.

Depth intervals are measured in feet below land surface (bls).

-- indicates that a screening value is not available as of October 2024 for that compound.

Abbreviations:

A3RB = Area 3 Repeater Building
DPT = Direct Push Technology
EPA = Environmental Protection Agency
FD = Field Duplicate
FDEP = Florida Department of Environmental Protection
J = Estimated value
NM = Normal Sample
PFAS = Per-and polyfluoroalkyl substances
pGCTL = Provisional Groundwater Cleanup Target Level
RSL = Regional Screening Level
U = Result was below the laboratory Reporting Limit

PFAS - Compounds

Perflurooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)

PFAS - Compounds Continued

Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUDS)
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDoDA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide(PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTetDA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUDA)

Table 4-1
Submersible Pump Type and Pipe Size
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Surficial Aquifer Interval	Well ID	Easting[1]	Northing[1]	Flow Rate (gpm)	Flexible Hose Diameter (inches)	Pump Model[2]
Shallow/ Intermediate	A3RB-EW0004	231577	459251	5	1	5SQ05-90
Shallow/ Intermediate	A3RB-EW0005	231737	459251	5	1	5SQ05-140
Shallow/ Intermediate	A3RB-EW0006	231417	459251	5	1	5SQ05-90
Shallow/ Intermediate	A3RB-EW0007	231257	459251	5	1	5SQ05-140
Shallow/ Intermediate	A3RB-EW0008	231097	459251	5	1	5SQ05-140
Deep	A3RB-EW0009	230987	459251	5	1	5SQ05-140
Shallow/ Intermediate	A3RB-EW0010	230987	459251	10	1.25	10SQE05-160
Shallow/ Intermediate	A3RB-EW0011	230987	459411	10	1.25	10SQE05-110
Shallow/ Intermediate	A3RB-EW0012	231097	459411	5	1	5SQ05-140
Deep	A3RB-EW0013	231257	459411	5	1	5SQ05-140
Shallow/ Intermediate	A3RB-EW0014	231417	459411	5	1	5SQ05-90
Shallow/ Intermediate	A3RB-EW0015	231577	459411	5	1	5SQ05-90
Deep	A3RB-EW0016	231737	459411	5	1	5SQ05-90
Shallow/ Intermediate	A3RB-EW0017	231797	459101	5	1.25	15SQE05-70
Deep	A3RB-EW0018	231796	458940	5	1	5SQ05-90
Shallow/ Intermediate	A3RB-EW0019	231828	459344	10	1.25	15SQE05-70
Deep	A3RB-EW0020	231828	459344	10	1.25	15SQE05-70
Shallow/ Intermediate	A3RB-EW0021	231757	460201	30	1.5	22SQ10-160
Deep	A3RB-EW0022	231727	460171	10	1.25	15SQE05-70

[1] Northing and Easting based on Florida State Plane East, North American Datum 1983

[2] Grundfos submersible pump model shown. Equivalent is acceptable upon approval.

gpm - gallons per minute

Table 9-1
Performance Monitoring Well Sampling Network
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Sampling Location	Screen Interval (feet bls)	Purpose of Sample Location	Baseline Sampling	Sampling Frequency	Analytical Method
A3RB-MW0004	2 - 12	Location east of South Repeater Building	X	Weekly for the first month, once a month for two months, quarterly thereafter	PFAS Method 1633
A3RB-MW0023	55 - 59	Location east of South Repeater Building	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0017	55 - 59	Provides information south of impacted Area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0019	30 - 40	Provides information south of impacted Area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0020	2 - 12	Provides information south of impacted Area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0021	20 - 30	Provides information south of impacted Area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0005	2 - 12	Provides information within the southern poriton of the impacted area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0006	20 - 30	Provides information within the southern poriton of the impacted area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0010	2 - 12	Located within the central portion of the treatment area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0025	35 - 45	Located within the central portion of the treatment area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0015	20 - 30	Located northwest of the treatment area within the impacted area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0016	2 - 12	Located northwest of the treatment area within the impacted area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0037	2 - 12	Located north of the treatment area next to impacted surface water feature	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0038	20 - 30	Located north of the treatment area next to impacted surface water feature	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0039	2 - 12	Located north of the treatment area next to impacted surface water feature	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0040	20 - 30	Located north of the treatment area next to impacted surface water feature	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0041	2 - 12	Located within the impacted area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0042	20 - 30	Located within the impacted area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0043	2 - 12	Located within the central portion of the treatment area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0044	20 - 30	Located within the central portion of the treatment area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0045	2 - 12	Used to monitor performance on the southwest border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0046	20 - 30	Used to monitor performance on the southwest border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0047	2 - 12	Used to monitor performance on the southern border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0048	20 - 30	Used to monitor performance on the southern border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0049	2 - 12	Used to monitor performance on the southern border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0050	20 - 30	Used to monitor performance on the southern border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0051	2 - 12	Used to monitor performance on the eastern portion of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-MW0052	20 - 30	Used to monitor performance on the eastern portion of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	

Table 9-1
Performance Monitoring Well Sampling Network
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Sampling Location	Screen Interval (feet bls)	Purpose of Sample Location	Baseline Sampling	Sampling Frequency	Analytical Method
A3RB-EW0004	18 - 34	Used to monitor performance on the southern border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	PFAS Method 1633
A3RB-EW0006	18 - 34	Used to monitor performance on the southern border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-EW0008	18 - 34	Used to monitor performance on the southern border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-EW0009	30 - 55	Used to monitor performance within the deeper interval on the southern and western border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-EW0011	18 - 34	Used to monitor performance on the western border of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-EW0013	30 - 55	Used to monitor performance of the deeper interval on the western portion of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-EW0015	18 - 34	Used to monitor performance on the western portion of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-EW0017	18 - 34	Used to monitor performance on the southeastern portion of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-EW0018	30 - 55	Used to monitor performance of the deeper interval on the southeastern portion of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-EW0019	18 - 34	Used to monitor performace within the treatment area	X	Weekly for the first month, once a month for two months, quarterly thereafter	
A3RB-EW0022	30 - 55	Used to monitor performace of the deeper interval on the northwestern portion of the site	X	Weekly for the first month, once a month for two months, quarterly thereafter	

Notes
bls - below land surface
PFAS - per- and polyfluoroalkyl substances

FIGURES

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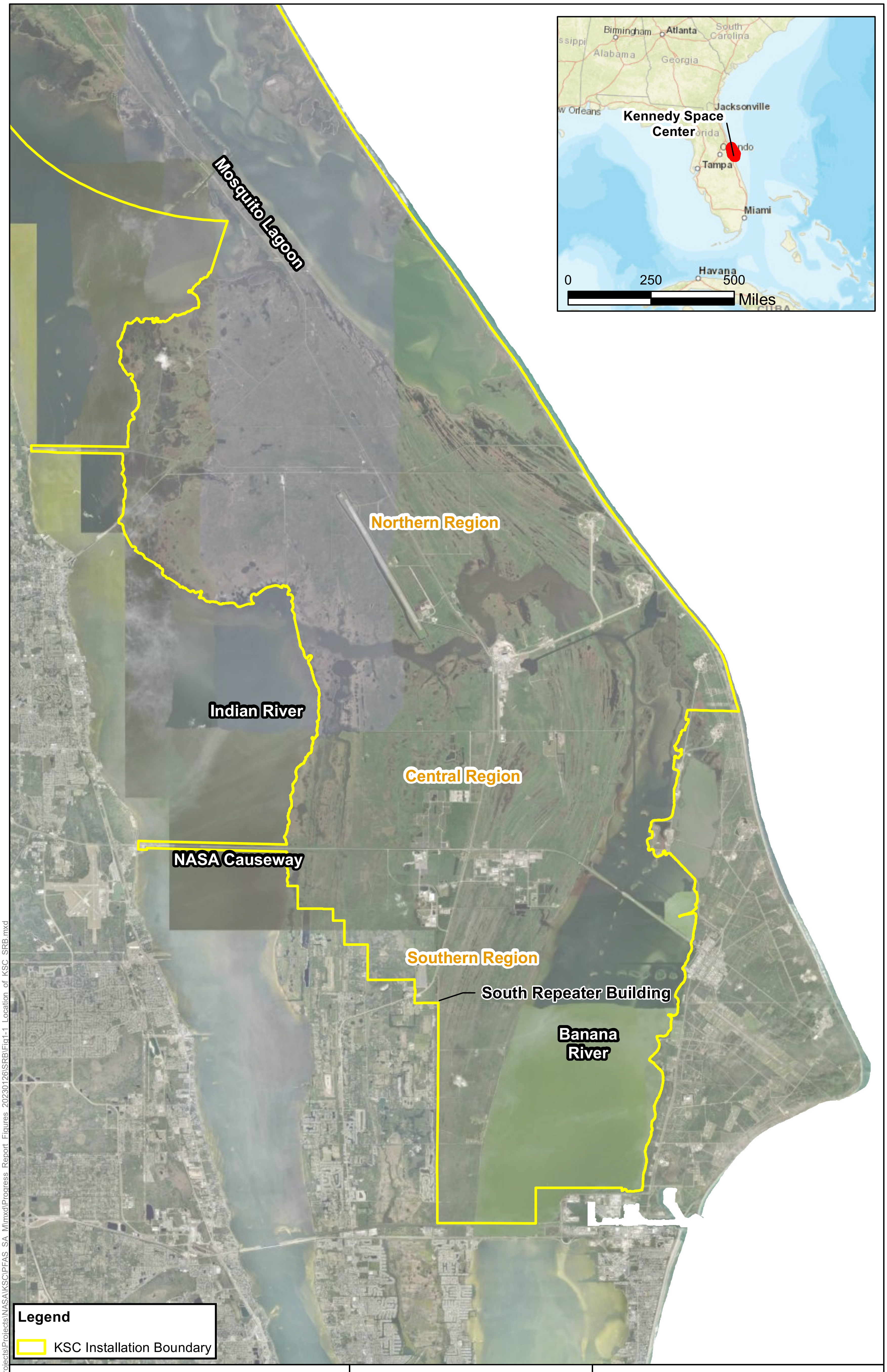

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Mapping Notes:
-Orthoimagery Source: Brevard County, 2018.
-Projection: NAD 1983 StatePlane Florida East FIPS 0901
-Scale: 1 Inch = 11,000 Feet

AECOM

0 5,500 11,000 Feet

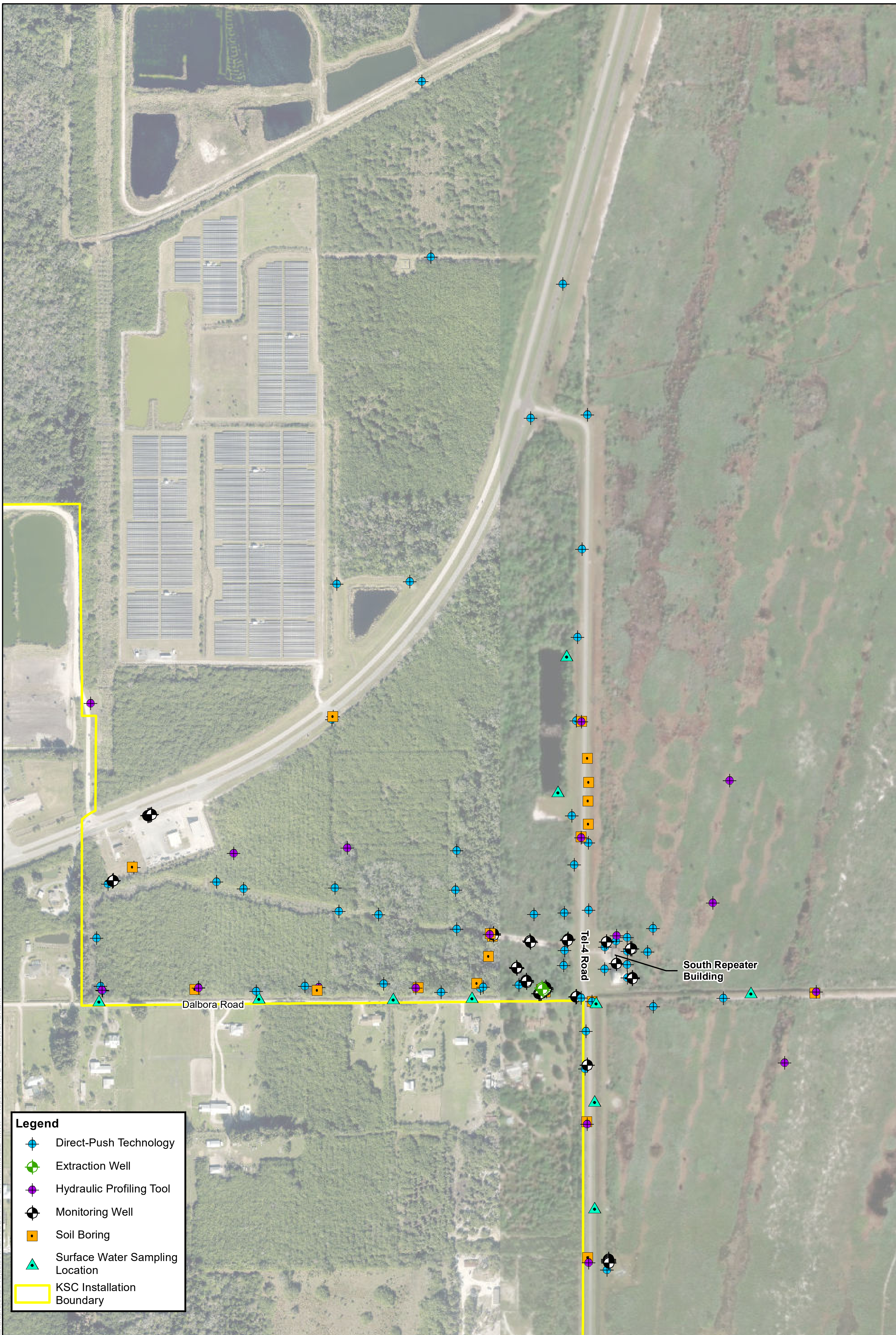
N

JOHN F. KENNEDY SPACE CENTER
MERRITT ISLAND, FLORIDA

DATE: 12/27/2023

DRWN BY: SD / AD

FIGURE 1-1
LOCATION OF KENNEDY SPACE CENTER
AND SOUTH REPEATER BUILDING



MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

AECOM

N

0 150 300 600 Feet

JOHN F. KENNEDY
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: LG | Date Saved: 10/8/2024

FIGURE 1-2
SITE LAYOUT
SOUTH REPEATER BUILDING

Legend

- Soil Sample Location, Sample Result Below pSCTL (Leachability)
- Soil Sample Location, Sample Result Exceeds pSCTL (Leachability)
- KSC Installation Boundary

Notes:
1. EPA = Environmental Protection Agency.
2. FD = Field Duplicate.
3. FDEP = Florida Department of Environmental Protection.
4. J = Estimated concentration.
5. NM = Normal sample.
6. PFOA = Perfluorooctanoic acid.
7. PFOS = Perfluorooctane sulfonic acid.
8. PFBS = Perfluorobutanesulfonic acid.
9. PFNA = Perfluorononanoic acid.
10. PFHxS = Perfluorohexanesulfonic acid.
11. pSCTL = provisional Soil Cleanup Target Level
12. HFPO-DA = Hexafluoropropylene oxide-dimer acid.
13. RSL = Regional Screening Level.
14. SB = Soil Boring.
15. U = Result was below the laboratory Method Detection Limit.
16. mg/kg = Milligrams per kilogram.
17. Depth is presented in feet below land surface.
18. Results in **bold** are above the RL.
19. Results in **bold and blue** are above FDEP pSCTLs for leachability.
20. Soil results are compared to pSCTLs set forth by FDEP in 2024. Regional Screening Levels (RSLs) set forth by EPA in 2024, provided in the RSL Resident Soil Table (HQ = 0.1), are listed for reference but not compared to.
21. Soil results are presented in mg/kg.
22. - = Screening value not yet established

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 125 Feet

Soil Screening Values (mg/kg)

Analyte	EPA RSL (Residential)	EPA RSL (Industrial)	EPA RSL (Leachability, MCL)	EPA RSL (Leachability, SSL)	FDEP pSCTL (Residential)	FDEP pSCTL (Industrial)	FDEP pSCTL (Leachability)
PFOS	0.00063	0.0082	0.00003	0.0000015	1.3	25	0.007
PFOA	0.000019	0.25	0.000061	0.00000004	1.3	25	0.002
PFBS	1.9	25	-	0.000025	-	-	-
PFNA	0.019	0.25	0.000042	0.000017	-	-	-
PFHxS	0.13	1.6	0.0000042	0.00024	-	-	-
HFPO-DA	0.023	0.35	0.00001	0.0003	-	-	-
PFBA	7.8	120	-	0.00065	-	-	-
PFHxA	3.2	41	-	0.0000015	-	-	-

0 250 500 1,000
Feet

N

AECOM

JOHN F. KENNEDY
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: LG/AD

Date Saved: 9/23/2024

FIGURE 2-1
PFAS SOIL SAMPLING RESULTS
SOUTH REPEATER BUILDING

Legend

- DPT Location, Sample Result Exceeds 1000x RSL
- DPT Location, Sample Result Exceeds 100x RSL
- DPT Location, Sample Result Exceeds 10x RSL
- DPT Location, Sample Result Exceeds RSL
- DPT Location, Sample Results Below RSL
- DPT Location, Sample Result Below MDL
- KSC Installation Boundary

Groundwater Screening Values (ng/L)				
Analyte	EPA RSL for tapwater (Residential)	FDEP pGCTL (Residential)	FDEP pGCTL (Industrial)	FDEP pGCTL (Leachability)
PFOS	**0.2**	**70**	**70**	**70**
PFOA	**0.0027**	**70**	**70**	**70**
PFBS	**600**	-	-	-
PFNA	**5.9**	-	-	-
PFHxS	**39**	-	-	-
HFPO-DA	**1.5**	-	-	-
PFBA	**1800**	-	-	-
PFHxA	**990**	-	-	-

Notes:
1. B = Analyte found in associated method blank.
2. DPT = Direct Push Technology.
3. EPA = Environmental Protection Agency.
4. FD = Field Duplicate.
5. FDEP = Florida Department of Environmental Protection.
6. ft = Feet.
7. I = Result is >/= MDL but < Practical Quantitation Limit.
8. J = Estimated concentration.
9. MDL = Method Detection Limit.
10. MW = Monitoring Well.
11. ng/L = Nanograms per liter.
12. NM = Normal sample.
13. PFOA = Perfluorooctanoic acid.
14. PFOS = Perfluorooctane sulfonic acid.
15. PFBA = Perfluorobutanoic acid.
16. PFBS = Perfluorobutanesulfonic acid.
17. PFNA = Perfluorononanoic acid.
18. PFHxA = Perfluorohexanoic acid.
19. PFHxS = Perfluorohexanesulfonic acid.
20. HFPO-DA = Hexafluoropropylene oxide-dimer acid.
21. pGCTL = Provisional Groundwater Cleanup Target Level.
22. RSL = Regional Screening Levels.
23. U = Result was below the laboratory Method Detection Limit.
24. Depth of well screen interval is presented in feet below land surface.
25. Groundwater results are presented in ng/L. Units have been converted from values reported in micrograms per liter (µg/L).
26. Groundwater results are compared to Regional Screening Levels (RSLs) set forth by EPA, 2024. Regional Screening Level Resident Tapwater Table (TR=1E-06, HQ=0.1).
27. Groundwater results are also compared to FDEP pGCTLs, set forth by FDEP, 2024.
28. Results in **bold** are above the MDL.
29. Results in **bold and red** are above a screening value.
30. - = Screening value not yet established.

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 300 Feet

0 150 300 600
Feet

N

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JOHN F. KENNEDY
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: A. Dudas | Date Saved: 6/6/2024

FIGURE 2-2
DPT GROUNDWATER SAMPLING LOCATIONS AND ANALYTICAL RESULTS
SOUTH REPEATER BUILDING

A3RB-MW0013

Location ID	A3RB-MW0013
Date	05/24/2023
Screen Interval	20.0 - 30.0
Sample Type	NM
Analyte	
PFOS	**6.2**
PFOA	2.1 U
PFBS	2.1 U
PFNA	2.1 U
PFHXS	**2.8 J**
HFPO-DA	4.3 U
PFBA	21 U
PFHXA	2.1 U

A3RB-MW0014

Location ID	A3RB-MW0014	A3RB-MW0014
Date	05/24/2023	05/24/2023
Screen Interval	2.0 - 12.0	2.0 - 12.0
Sample Type	NM	FD
Analyte		
PFOS	**2.6 J**	**2.6 J**
PFOA	1.9 U	1.9 U
PFBS	1.9 U	1.9 U
PFNA	1.9 U	1.9 U
PFHXS	1.9 U	1.9 U
HFPO-DA	3.7 U	3.7 U
PFBA	3.7 U	3.7 U
PFHXA	1.9 U	1.9 U

A3RB-MW0012

Location ID	A3RB-MW0012
Date	05/24/2023
Screen Interval	35.0 - 45.0
Sample Type	NM
Analyte	
PFOS	2.1 U
PFOA	2.1 U
PFBS	2.1 U
PFNA	2.1 U
PFHXS	2.1 U
HFPO-DA	4.3 U
PFBA	21 U
PFHXA	2.1 U

A3RB-MW0011

Location ID	A3RB-MW0011
Date	05/24/2023
Screen Interval	54.0 - 59.0
Sample Type	NM
Analyte	
PFOS	2.2 U
PFOA	2.2 U
PFBS	2.2 U
PFNA	2.2 U
PFHXS	2.2 U
HFPO-DA	4.3 U
PFBA	22 U
PFHXA	2.2 U

A3RB-MW0016

Location ID	A3RB-MW0016
Date	05/24/2023
Screen Interval	2.0 - 12.0
Sample Type	NM
Analyte	
PFOS	**133**
PFOA	**11.0**
PFBS	**1.3 J**
PFNA	2.1 U
PFHXS	**12.7**
HFPO-DA	4.2 U
PFBA	**8.7**
PFHXA	**1.7 J**

A3RB-MW0015

Location ID	A3RB-MW0015
Date	05/24/2023
Screen Interval	20.0 - 30.0
Sample Type	NM
Analyte	
PFOS	**12.2**
PFOA	**1.3 J**
PFBS	**3.2 J**
PFNA	1.9 U
PFHXS	**18.2**
HFPO-DA	3.7 U
PFBA	3.7 U
PFHXA	**1.4 J**

A3RB-MW0008

Location ID	A3RB-MW0008	A3RB-MW0008
Date	05/31/2022	05/25/2023
Screen Interval	20.0 - 30.0	20.0 - 30.0
Sample Type	NM	NM
Analyte		
PFOS	**186**	**156**
PFOA	**2.3 J**	**2.0 J**
PFBS	**7.0 J**	**6.6**
PFNA	4.0 U	1.9 U
PFHXS	**141**	**120**
HFPO-DA	8.0 U	3.7 U
PFBA	8.0 U	3.7 U
PFHXA	**6.9 J**	**5.8**

A3RB-MW0026

Location ID	A3RB-MW0026
Date	05/25/2023
Screen Interval	35.0 - 45.0
Sample Type	NM
Analyte	
PFOS	1.9 U
PFOA	1.9 U
PFBS	1.9 U
PFNA	1.9 U
PFHXS	1.9 U
HFPO-DA	3.7 U
PFBA	19 U
PFHXA	1.9 U

A3RB-MW0009

Location ID	A3RB-MW0009	A3RB-MW0009	A3RB-MW0009	A3RB-MW0009
Date	05/31/2022	05/31/2022	05/24/2023	05/24/2023
Screen Interval	20.0 - 30.0	20.0 - 30.0	20.0 - 30.0	20.0 - 30.0
Sample Type	NM	FD	NM	FD
Analyte				
PFOS	**1500**	**1110**	**858**	**795**
PFOA	**15.5**	**11.6**	**9.5**	**9.4**
PFBS	**49.1**	**39.0**	**33.2**	**30.9**
PFNA	4.0 U	4.0 U	**1.3 J**	**1.2 J**
PFHXS	**1070**	**856**	**680**	**633**
HFPO-DA	8.0 U	8.0 U	3.7 U	3.7 U
PFBA	**11.1 J**	**9.1 J**	**7.7**	**7.0 J**
PFHXA	**42.2**	**34.2**	**28.0**	**26.1**

A3RB-MW0024

Location ID	A3RB-MW0024
Date	05/24/2023
Screen Interval	35.0 - 45.0
Sample Type	NM
Analyte	
PFOS	1.9 U
PFOA	1.9 U
PFBS	1.9 U
PFNA	1.9 U
PFHXS	1.9 U
HFPO-DA	3.7 U
PFBA	3.7 U
PFHXA	1.9 U

A3RB-MW0025

Location ID	A3RB-MW0025	A3RB-MW0025
Date	05/24/2023	05/24/2023
Screen Interval	35.0 - 45.0	35.0 - 45.0
Sample Type	NM	FD
Analyte		
PFOS	**1.3 J**	**1.6 J**
PFOA	1.9 U	1.9 U
PFBS	1.9 U	1.9 U
PFNA	1.9 U	1.9 U
PFHXS	**2.6 J**	**3.0 J**
HFPO-DA	3.7 U	3.7 U
PFBA	3.7 U	3.7 U
PFHXA	1.9 U	1.9 U

A3RB-MW0010

Location ID	A3RB-MW0010	A3RB-MW0010
Date	05/31/2022	05/24/2023
Screen Interval	2.0 - 12.0	2.0 - 12.0
Sample Type	NM	NM
Analyte		
PFOS	**331**	**174**
PFOA	**6.5 J**	**2.1 J**
PFBS	**14.8**	**3.9**
PFNA	4.0 U	1.9 U
PFHXS	**429**	**85.4**
HFPO-DA	8.0 U	3.7 U
PFBA	**5.8 J**	**3.5 J**
PFHXA	**15.3**	**4.2**

A3RB-MW0027

Location ID	A3RB-MW0027
Date	05/24/2023
Screen Interval	54.0 - 59.0
Sample Type	NM
Analyte	
PFOS	1.9 U
PFOA	1.9 U
PFBS	1.9 U
PFNA	1.9 U
PFHXS	1.9 U
HFPO-DA	3.7 U
PFBA	3.7 U
PFHXA	1.9 U

A3RB-MW0007

Location ID	A3RB-MW0007	A3RB-MW0007
Date	05/31/2022	05/25/2023
Screen Interval	20.0 - 30.0	20.0 - 30.0
Sample Type	NM	NM
Analyte		
PFOS	**260**	**263**
PFOA	**3.9 J**	**3.7**
PFBS	**10.5**	**8.6**
PFNA	4.0 U	1.9 U
PFHXS	**229**	**251**
HFPO-DA	8.0 U	3.7 U
PFBA	8.0 U	**2.4 J**
PFHXA	**12.7**	**9.0**

A3RB-MW0002

Location ID	A3RB-MW0002	A3RB-MW0002	A3RB-MW0002	A3RB-MW0002
Date	09/21/2021	09/21/2021	05/31/2022	05/23/2023
Screen Interval	2.0 - 12.0	2.0 - 12.0	2.0 - 12.0	2.0 - 12.0
Sample Type	FD	NM	NM	NM
Analyte				
PFOS	**1630**	**1750**	**3330**	**880**
PFOA	**13.2**	**13.7**	**20.6**	**6.1**
PFBS	**60.7**	**63.7**	**30.9**	**16.3**
PFNA	**2.3 I**	**2.6 I**	**4.5 J**	2.1 U
PFHXS	**1820**	**1950**	**1550**	**389**
HFPO-DA	8.0 U	8.0 U	8.0 U	4.3 U
PFBA	NS	NS	**12.6 J**	**3.6 J**
PFHXA	**54.3**	**56.5**	**50.2**	**13.4**

A3RB-MW0022

Location ID	A3RB-MW0022	A3RB-MW0022
Date	05/23/2023	05/23/2023
Screen Interval	54.0 - 59.0	54.0 - 59.0
Sample Type	NM	FD
Analyte		
PFOS	1.9 U	1.9 U
PFOA	1.9 U	1.9 U
PFBS	1.9 U	1.9 U
PFNA	1.9 U	1.9 U
PFHXS	1.9 U	1.9 U
HFPO-DA	3.7 U	3.7 U
PFBA	3.7 U	3.7 U
PFHXA	1.9 U	1.9 U

A3RB-MW0003

Location ID	A3RB-MW0003	A3RB-MW0003
Date	05/31/2022	05/23/2023
Screen Interval	2.0 - 12.0	2.0 - 12.0
Sample Type	NM	NM
Analyte		
PFOS	**6290**	**7150**
PFOA	**76.8**	**87.2**
PFBS	**116**	**173**
PFNA	4.0 U	**4.9 J**
PFHXS	**3720**	**5100**
HFPO-DA	8.0 U	19 U
PFBA	**14.6 J**	**36.4 J**
PFHXA	**127**	**175**

A3RB-MW0001

Location ID	A3RB-MW0001	A3RB-MW0001
Date	05/31/2022	05/25/2023
Screen Interval	20.0 - 30.0	20.0 - 30.0
Sample Type	NM	NM
Analyte		
PFOS	4.0 U	1.9 U
PFOA	4.0 U	1.9 U
PFBS	4.0 U	1.9 U
PFNA	4.0 U	1.9 U
PFHXS	4.0 U	1.9 U
HFPO-DA	8.0 U	3.7 U
PFBA	8.0 U	3.7 U
PFHXA	4.0 U	1.9 U

A3RB-MW0005

Location ID	A3RB-MW0005	A3RB-MW0005
Date	05/31/2022	05/25/2023
Screen Interval	2.0 - 12.0	2.0 - 12.0
Sample Type	NM	NM
Analyte		
PFOS	**3.4 J**	**3.5 J**
PFOA	4.0 U	1.9 U
PFBS	4.0 U	**1.2 J**
PFNA	4.0 U	1.9 U
PFHXS	**3.1 J**	**5.2**
HFPO-DA	8.0 U	3.7 U
PFBA	8.0 U	**8.9**
PFHXA	4.0 U	1.9 U

A3RB-MW0021

Location ID	A3RB-MW0021
Date	05/23/2023
Screen Interval	20.0 - 30.0
Sample Type	NM
Analyte	
PFOS	1.9 U
PFOA	1.9 U
PFBS	1.9 U
PFNA	1.9 U
PFHXS	1.9 U
HFPO-DA	3.7 U
PFBA	3.7 U
PFHXA	1.9 U

A3RB-MW0006

Location ID	A3RB-MW0006	A3RB-MW0006
Date	05/31/2022	05/25/2023
Screen Interval	20.0 - 30.0	20.0 - 30.0
Sample Type	NM	NM
Analyte		
PFOS	**2.7 J**	**4.1 J**
PFOA	4.0 U	2.2 U
PFBS	4.0 U	2.2 U
PFNA	4.0 U	2.2 U
PFHXS	4.0 U	**2.1 J**
HFPO-DA	8.0 U	4.3 U
PFBA	8.0 U	4.3 U
PFHXA	4.0 U	2.2 U

A3RB-MW0023

Location ID	A3RB-MW0023
Date	05/23/2023
Screen Interval	54.0 - 59.0
Sample Type	NM
Analyte	
PFOS	1.9 U
PFOA	1.9 U
PFBS	1.9 U
PFNA	1.9 U
PFHXS	1.9 U
HFPO-DA	3.7 U
PFBA	3.7 U
PFHXA	1.9 U

A3RB-MW0004

Location ID	A3RB-MW0004	A3RB-MW0004
Date	05/31/2022	05/23/2023
Screen Interval	2.0 - 12.0	2.0 - 12.0
Sample Type	NM	NM
Analyte		
PFOS	**79.3**	**45.6**
PFOA	**5.5 J**	**3.0 J**
PFBS	**64.0**	**26.5**
PFNA	4.0 U	2.0 U
PFHXS	**726**	**288**
HFPO-DA	8.0 U	4.1 U
PFBA	**12.7 J**	**6.1 J**
PFHXA	**10.6**	**4.3**

A3RB-MW0017

Location ID	A3RB-MW0017
Date	05/23/2023
Screen Interval	54.0 - 59.0
Sample Type	NM
Analyte	
PFOS	2.0 U
PFOA	2.0 U
PFBS	2.0 U
PFNA	2.0 U
PFHXS	2.0 U
HFPO-DA	4.1 U
PFBA	4.1 U
PFHXA	2.0 U

A3RB-MW0019

Location ID	A3RB-MW0019	A3RB-MW0019
Date	05/23/2023	05/23/2023
Screen Interval	20.0 - 30.0	20.0 - 30.0
Sample Type	FD	NM
Analyte		
PFOS	1.9 U	1.9 U
PFOA	1.9 U	1.9 U
PFBS	1.9 U	1.9 U
PFNA	1.9 U	1.9 U
PFHXS	1.9 U	1.9 U
HFPO-DA	3.7 U	3.7 U
PFBA	3.7 U	3.7 U
PFHXA	1.9 U	1.9 U

A3RB-MW0018

Location ID	A3RB-MW0018
Date	05/23/2023
Screen Interval	35.0 - 45.0
Sample Type	NM
Analyte	
PFOS	2.3 U
PFOA	2.3 U
PFBS	2.3 U
PFNA	2.3 U
PFHXS	2.3 U
HFPO-DA	4.5 U
PFBA	4.5 U
PFHXA	2.3 U

A3RB-MW0020

Location ID	A3RB-MW0020
Date	05/23/2023
Screen Interval	2.0 - 12.0
Sample Type	NM
Analyte	
PFOS	**2.8 J**
PFOA	**0.99 J**
PFBS	1.9 U
PFNA	1.9 U
PFHXS	**1.1 J**
HFPO-DA	3.7 U
PFBA	**8.1**
PFHXA	**1.0 J**

Legend

Media Type, Exceedance Level

- MW Location, Sample Result Below RSL
- MW Location, Sample Result Exceeds RSL
- MW Location, Sample Result Exceeds 10x RSL
- MW Location, Sample Result Exceeds 100x RSL
- MW Location, Sample Result Exceeds 1000x RSL
- KSC Installation Boundary

Groundwater Screening Values (ng/L)

Analyte	EPA RSL for tapwater	FDEP pGCTL (Residential)	FDEP pGCTL (Industrial)	FDEP pGCTL (Leachability)
PFOS	**0.2**	**70**	**70**	**70**
PFOA	**0.0027**	**70**	**70**	**70**
PFBS	**600**	-	-	-
PFNA	**5.9**	-	-	-
PFHxS	**39**	-	-	-
HFPO-DA	**1.5**	-	-	-
PFBA	**1800**	-	-	-
PFHxA	**990**	-	-	-

Notes:
1. EPA = Environmental Protection Agency.
2. FD = Field Duplicate.
3. FDEP = Florida Department of Environmental Protection.
5. J = Estimated concentration.
6. I = >/= Result is Method Detection Limit but < Practical Quantitation Limit.
7. MW = Monitoring Well.
8. NM = Normal sample.
9. PFOA = Perfluorooctanoic acid.
10. PFOS = Perfluorooctane sulfonic acid.
11. PFBS = Perfluorobutanesulfonic acid.
12. PFNA = Perfluorononanoic acid.
13. PFHxS = Perfluorohexanesulfonic acid.
14. pSCTL = provisional Groundwater Cleanup Target Level
15. HFPO-DA = Hexafluoropropylene oxide-dimer acid.
16. RSL = Regional Screening Level.
17. SB = Soil Boring.
18. U = Result was below the laboratory Method Detection Limit (MDL).
19. ng/L = Nanograms per liter.
20. Depth of well screen interval is presented in feet below land surface.
21. Groundwater results are compared to Regional Screening Levels (RSLs) set forth by EPA, 2024. Regional Screening Level Resident Tapwater Table (TR=IE-06, HQ = 0.1).
22. Groundwater results are also compared to FDEP pGCTLs, set forth by FDEP, 2024.
23. Groundwater results are presented in ng/L. Units have been converted from values reported in micorgrams per liter (µg/L).
24. Results in **bold** are above the MDL.
25. Results in **bold and red** are above a screening value.
26. - = Screening value not yet established.

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 170 Feet

0 125 250 500 Feet

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SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: S. Durgan | Date Saved: 10/8/2024

FIGURE 2-3
PFAS MONITORING WELL SAMPLING RESULTS
SOUTH REPEATER BUILDING

A3RB-SW0010

Location ID / Date / Sample Type	A3RB-SW0010 03/15/2023 NM	A3RB-SW0010 10/20/2023 NM	A3RB-SW0010 10/20/2023 FD	A3RB-SW0010 04/11/2024 NM
Analyte				
PFOA	**8.9**	**8.9**	**8.4**	**8.6**
PFOS	**562**	**520**	**435**	**1170**

A3RB-SW0009

Location ID / Date / Sample Type	A3RB-SW0009 03/15/2023 NM	A3RB-SW0009 10/20/2023 NM	A3RB-SW0009 04/11/2024 NM	A3RB-SW0009 04/11/2024 FD
Analyte				
PFOA	**9.0**	**8.9**	**8.1**	**8.2**
PFOS	**661**	**502**	**506**	**469**

A3RB-SW0003

Location ID / Date / Sample Type	A3RB-SW0003 12/16/2022 NM	A3RB-SW0003 07/28/2023 FD	A3RB-SW0003 07/28/2023 NM	A3RB-SW0003 10/20/2023 NM	A3RB-SW0003 04/11/2024 NM
Analyte					
PFOA	**1.1 J**	**1.3 J**	**1.3 J**	2.0 U	1.8 U
PFOS	**2.9 J**	**22.8**	**24.6**	**4.3**	**2.2 J**

A3RB-SW0007

Location ID / Date / Sample Type	A3RB-SW0007 12/16/2022 FD	A3RB-SW0007 12/16/2022 NM	A3RB-SW0007 07/28/2023 NM	A3RB-SW0007 10/20/2023 NM
Analyte				
PFOA	**5.4**	**5.5**	**2.8 J**	**5.3**
PFOS	**71.6**	**69.7**	**27.9**	**68.0**

A3RB-SW0008

Location ID / Date / Sample Type	A3RB-SW0008 12/16/2022 NM	A3RB-SW0008 07/28/2023 NM	A3RB-SW0008 10/20/2023 NM
Analyte			
PFOA	**5.5**	**3.0 J**	**5.5**
PFOS	**86.1**	**30.3**	**46.9**

A3RB-SW0005

Location ID / Date / Sample Type	A3RB-SW0005 12/16/2022 NM	A3RB-SW0005 07/28/2023 NM	A3RB-SW0005 10/20/2023 NM
Analyte			
PFOA	**4.9**	**5.7**	**4.4**
PFOS	**72.3**	**83.8**	**77.4**

A3RB-SW0004

Location ID / Date / Sample Type	A3RB-SW0004 12/16/2022 NM	A3RB-SW0004 10/20/2023 NM	A3RB-SW0004 04/11/2024 NM
Analyte			
PFOA	2.4 U	2.0 U	1.8 U
PFOS	**3.3 J**	**2.8 J**	**1.1 J**

A3RB-SW0002

Location ID / Date / Sample Type	A3RB-SW0002 12/16/2022 NM	A3RB-SW0002 07/28/2023 NM	A3RB-SW0002 10/20/2023 NM
Analyte			
PFOA	3.2 U	**1.2 J**	2.0 U
PFOS	**5.5 J**	**14.1**	**5.3**

A3RB-SW0006

Location ID / Date / Sample Type	A3RB-SW0006 12/16/2022 NM	A3RB-SW0006 07/28/2023 NM	A3RB-SW0006 10/20/2023 NM
Analyte			
PFOA	**5.8**	**3.0 J**	**5.1**
PFOS	**49.6**	**31.5**	**77.8**

A3RB-SW0001

Location ID / Date / Sample Type	A3RB-SW0001 12/16/2022 NM	A3RB-SW0001 07/28/2023 NM	A3RB-SW0001 10/20/2023 NM	A3RB-SW0001 04/11/2024 NM
Analyte				
PFOA	2.4 U	**1.3 J**	2.0 U	**1.0 J**
PFOS	**7.6**	**13.4**	**5.2**	**5.8**

Legend

Media Type, Exceedance Level

- SW Location, Sample Result Below SWSL
- SW Location, Sample Result Above SWSL
- KSC Installation Boundary

Surface Water Screening Level Values		
Analyte	Human Health (ng/L)	Ecological Health (ng/L)
PFOA	**500**	**1,300,000**
PFOS	**10**	**37,000**

Notes:
1. FD = Field Duplicate.
2. FDEP = Florida Department of Environmental Protection.
3. J = Estimated concentration.
4. NM = Normal sample.
5. PFOA = Perfluorooctanoic acid.
6. PFOS = Perfluorooctane sulfonic acid.
7. SWSL = Surface Water Screening Level.
8. U = Result was below the laboratory Method Detection Limit.
9. ng/L = Nanogram per liter.
10. Results in **bold** are above the MDL.
11. Results in **bold and red** are above a screening value.
12. Surface water results are compared to screening values set forth in Table 5 of FDEP PFAS Dynamic Plan dated March 2022, for Human Health based on Probabilistic Risk Assessment.
13. Surface water results are presented in ng/L. Units have been converted from values reported in micrograms per liter (µg/L) and Dynamic Plan screening values have been converted accordingly.

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 160 Feet

0 130 260 520 Feet

N

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SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: L. Greene | Date Saved: 6/5/2024

FIGURE 2-4
PFAS SURFACE WATER SAMPLING RESULTS
SOUTH REPEATER BUILDING

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

0 420 840 1,680 Feet

N

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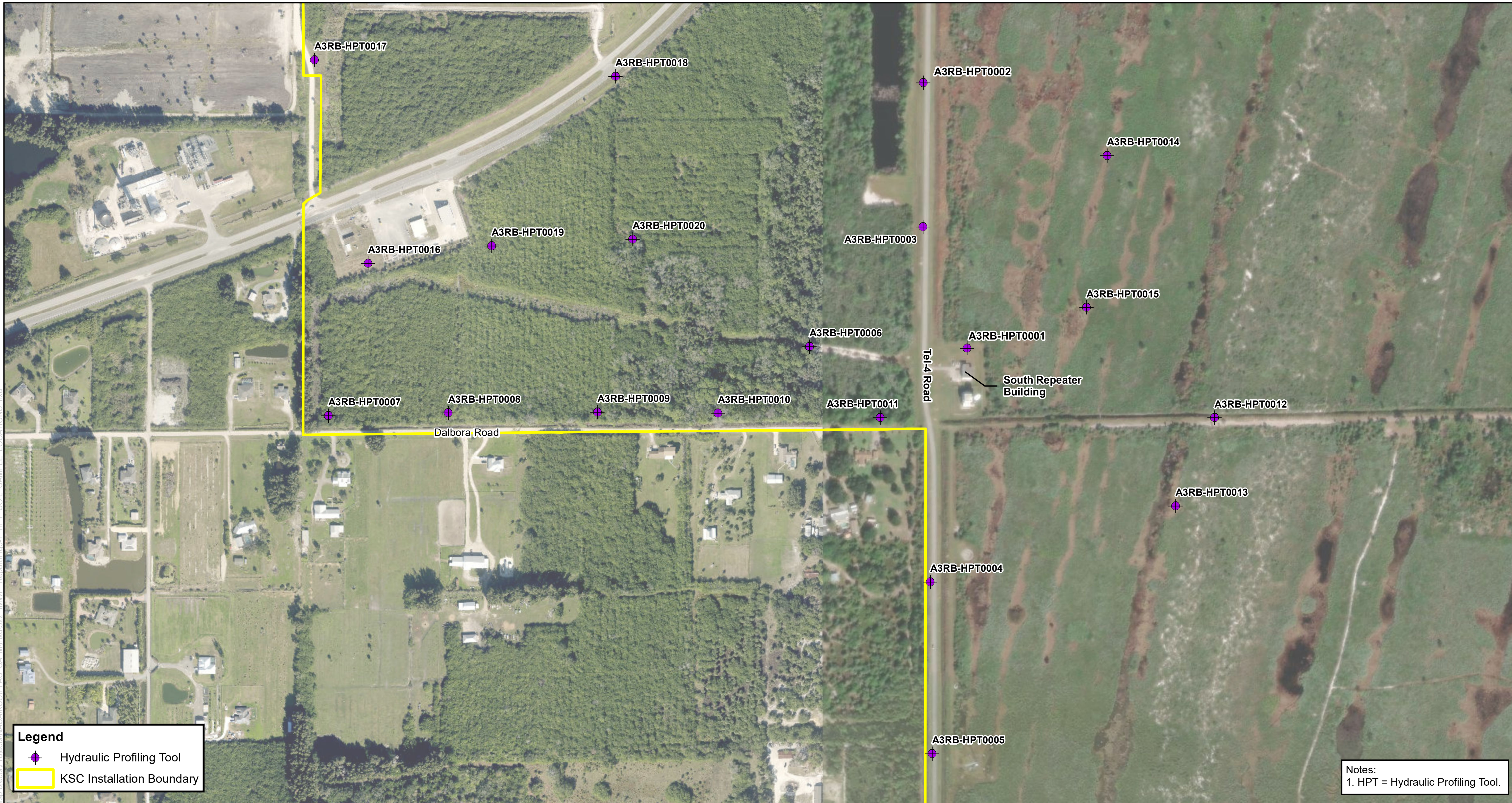
MERRITT ISLAND, FLORIDA

Drawn By: DA

Date Saved: 10/9/2024

FIGURE 2-5
SITE VICINITY TOPOGRAPHY
SOUTH REPEATER BUILDING



MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

0 200 400 800 Feet

N

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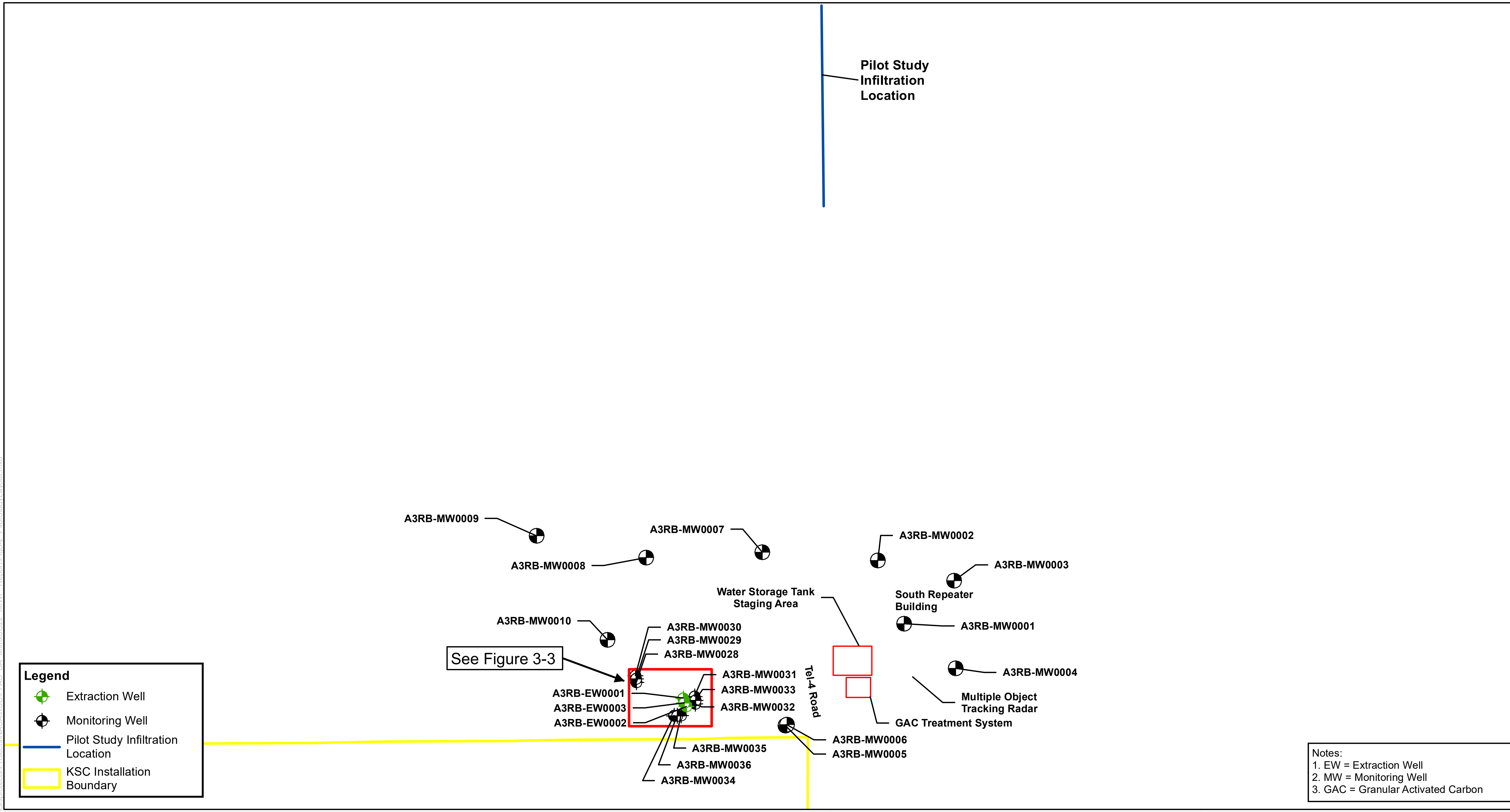
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: JY | Date Saved: 10/9/2024

FIGURE 3-1
HPT LOCATIONS



MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 75 Feet

0 65 130 260
Feet

N

[redacted]

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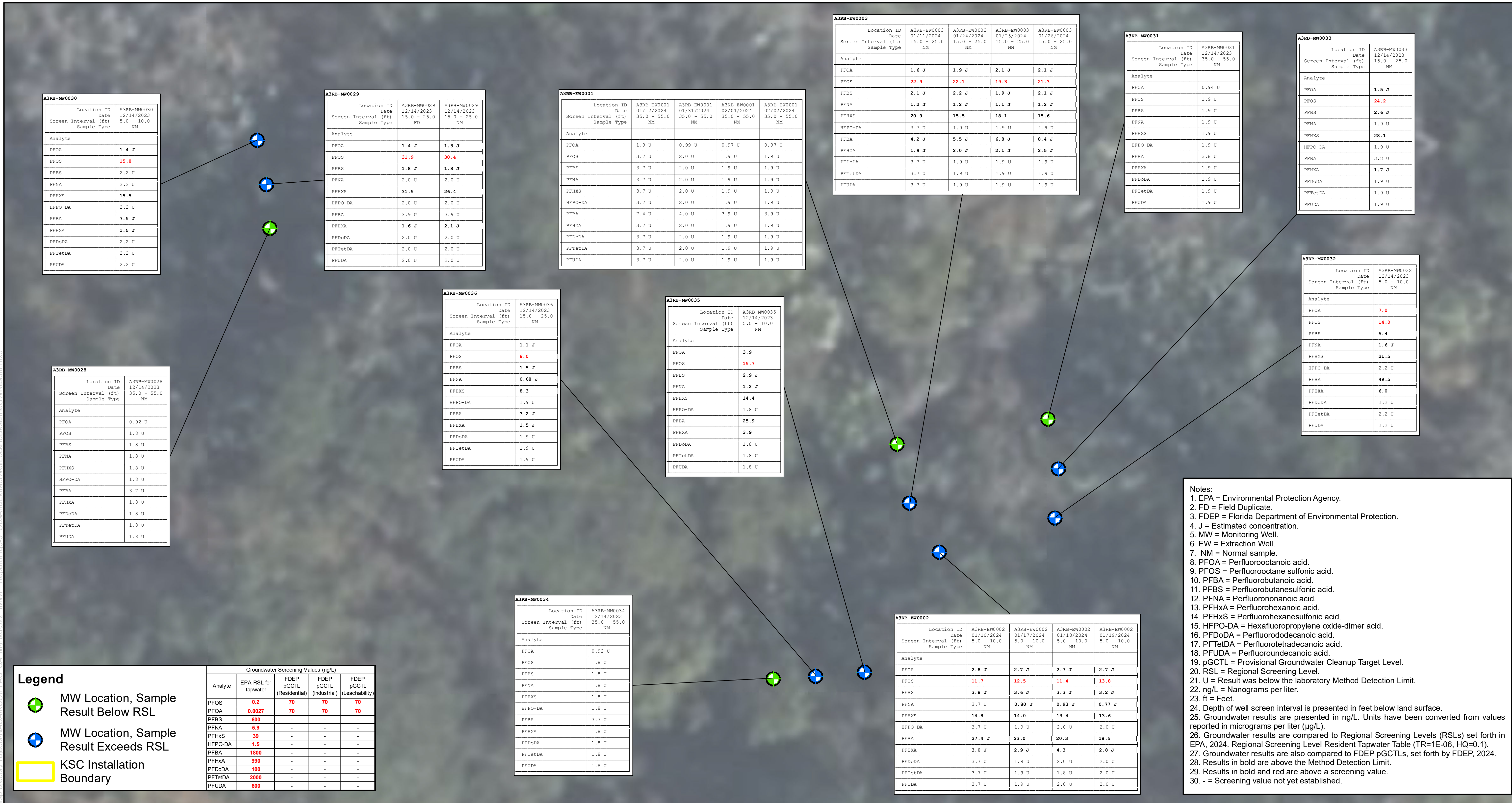
MERRITT ISLAND, FLORIDA

Drawn By: SD | Date Saved: 10/9/2024

FIGURE 3-2
PILOT STUDY LAYOUT
FEBRUARY 2024

Document Path: \\NADTC1VFP172\Data\Gisprojects\Projects\NASA\KSC\PFAS_SA_M\mxd\522_IMWP_Report\Fig3-2_PilotStudyLayout.mxd



A3RB-MW0030

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-MW0030 12/14/2023 5.0 - 10.0 NM
Analyte	
PFOA	**1.4 J**
PFOS	**15.8**
PFBS	2.2 U
PFNA	2.2 U
PFHXS	**15.5**
HFPO-DA	2.2 U
PFBA	**7.5 J**
PFHXA	**1.5 J**
PFDoDA	2.2 U
PFTetDA	2.2 U
PFUDA	2.2 U

A3RB-MW0029

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-MW0029 12/14/2023 15.0 - 25.0 FD	A3RB-MW0029 12/14/2023 15.0 - 25.0 NM
Analyte		
PFOA	**1.4 J**	**1.3 J**
PFOS	**31.9**	**30.4**
PFBS	**1.8 J**	**1.8 J**
PFNA	2.0 U	2.0 U
PFHXS	**31.5**	**26.4**
HFPO-DA	2.0 U	2.0 U
PFBA	3.9 U	3.9 U
PFHXA	**1.6 J**	**2.1 J**
PFDoDA	2.0 U	2.0 U
PFTetDA	2.0 U	2.0 U
PFUDA	2.0 U	2.0 U

A3RB-EW0001

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-EW0001 01/12/2024 35.0 - 55.0 NM	A3RB-EW0001 01/31/2024 35.0 - 55.0 NM	A3RB-EW0001 02/01/2024 35.0 - 55.0 NM	A3RB-EW0001 02/02/2024 35.0 - 55.0 NM
Analyte				
PFOA	1.9 U	0.99 U	0.97 U	0.97 U
PFOS	3.7 U	2.0 U	1.9 U	1.9 U
PFBS	3.7 U	2.0 U	1.9 U	1.9 U
PFNA	3.7 U	2.0 U	1.9 U	1.9 U
PFHXS	3.7 U	2.0 U	1.9 U	1.9 U
HFPO-DA	3.7 U	2.0 U	1.9 U	1.9 U
PFBA	7.4 U	4.0 U	3.9 U	3.9 U
PFHXA	3.7 U	2.0 U	1.9 U	1.9 U
PFDoDA	3.7 U	2.0 U	1.9 U	1.9 U
PFTetDA	3.7 U	2.0 U	1.9 U	1.9 U
PFUDA	3.7 U	2.0 U	1.9 U	1.9 U

A3RB-EW0003

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-EW0003 01/11/2024 15.0 - 25.0 NM	A3RB-EW0003 01/24/2024 15.0 - 25.0 NM	A3RB-EW0003 01/25/2024 15.0 - 25.0 NM	A3RB-EW0003 01/26/2024 15.0 - 25.0 NM
Analyte				
PFOA	**1.6 J**	**1.9 J**	**2.1 J**	**2.1 J**
PFOS	**22.9**	**22.1**	**19.3**	**21.3**
PFBS	**2.1 J**	**2.2 J**	**1.9 J**	**2.1 J**
PFNA	**1.2 J**	**1.2 J**	**1.1 J**	**1.2 J**
PFHXS	**20.9**	**15.5**	**18.1**	**15.6**
HFPO-DA	3.7 U	1.9 U	1.9 U	1.9 U
PFBA	**4.2 J**	**5.5 J**	**6.8 J**	**8.4 J**
PFHXA	**1.9 J**	**2.0 J**	**2.1 J**	**2.5 J**
PFDoDA	3.7 U	1.9 U	1.9 U	1.9 U
PFTetDA	3.7 U	1.9 U	1.9 U	1.9 U
PFUDA	3.7 U	1.9 U	1.9 U	1.9 U

A3RB-MW0031

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-MW0031 12/14/2023 35.0 - 55.0 NM
Analyte	
PFOA	0.94 U
PFOS	1.9 U
PFBS	1.9 U
PFNA	1.9 U
PFHXS	1.9 U
HFPO-DA	1.9 U
PFBA	3.8 U
PFHXA	1.9 U
PFDoDA	1.9 U
PFTetDA	1.9 U
PFUDA	1.9 U

A3RB-MW0033

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-MW0033 12/14/2023 15.0 - 25.0 NM
Analyte	
PFOA	**1.5 J**
PFOS	**24.2**
PFBS	**2.6 J**
PFNA	1.9 U
PFHXS	**28.1**
HFPO-DA	1.9 U
PFBA	3.8 U
PFHXA	**1.7 J**
PFDoDA	1.9 U
PFTetDA	1.9 U
PFUDA	1.9 U

A3RB-MW0032

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-MW0032 12/14/2023 5.0 - 10.0 NM
Analyte	
PFOA	**7.0**
PFOS	**14.0**
PFBS	**5.4**
PFNA	**1.6 J**
PFHXS	**21.5**
HFPO-DA	2.2 U
PFBA	**49.5**
PFHXA	**6.0**
PFDoDA	2.2 U
PFTetDA	2.2 U
PFUDA	2.2 U

A3RB-MW0036

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-MW0036 12/14/2023 15.0 - 25.0 NM
Analyte	
PFOA	**1.1 J**
PFOS	**8.0**
PFBS	**1.5 J**
PFNA	**0.68 J**
PFHXS	**8.3**
HFPO-DA	1.9 U
PFBA	**3.2 J**
PFHXA	**1.5 J**
PFDoDA	1.9 U
PFTetDA	1.9 U
PFUDA	1.9 U

A3RB-MW0035

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-MW0035 12/14/2023 5.0 - 10.0 NM
Analyte	
PFOA	**3.9**
PFOS	**15.7**
PFBS	**2.9 J**
PFNA	**1.2 J**
PFHXS	**14.4**
HFPO-DA	1.8 U
PFBA	**25.9**
PFHXA	**3.9**
PFDoDA	1.8 U
PFTetDA	1.8 U
PFUDA	1.8 U

A3RB-MW0028

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-MW0028 12/14/2023 35.0 - 55.0 NM
Analyte	
PFOA	0.92 U
PFOS	1.8 U
PFBS	1.8 U
PFNA	1.8 U
PFHXS	1.8 U
HFPO-DA	1.8 U
PFBA	3.7 U
PFHXA	1.8 U
PFDoDA	1.8 U
PFTetDA	1.8 U
PFUDA	1.8 U

A3RB-MW0034

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-MW0034 12/14/2023 35.0 - 55.0 NM
Analyte	
PFOA	0.92 U
PFOS	1.8 U
PFBS	1.8 U
PFNA	1.8 U
PFHXS	1.8 U
HFPO-DA	1.8 U
PFBA	3.7 U
PFHXA	1.8 U
PFDoDA	1.8 U
PFTetDA	1.8 U
PFUDA	1.8 U

A3RB-EW0002

Location ID / Date / Screen Interval (ft) / Sample Type	A3RB-EW0002 01/10/2024 5.0 - 10.0 NM	A3RB-EW0002 01/17/2024 5.0 - 10.0 NM	A3RB-EW0002 01/18/2024 5.0 - 10.0 NM	A3RB-EW0002 01/19/2024 5.0 - 10.0 NM
Analyte				
PFOA	**2.8 J**	**2.7 J**	**2.7 J**	**2.7 J**
PFOS	**11.7**	**12.5**	**11.4**	**13.8**
PFBS	**3.8 J**	**3.6 J**	**3.3 J**	**3.2 J**
PFNA	3.7 U	**0.80 J**	**0.93 J**	**0.77 J**
PFHXS	**14.8**	**14.0**	**13.4**	**13.6**
HFPO-DA	3.7 U	1.9 U	2.0 U	2.0 U
PFBA	**27.4 J**	**23.0**	**20.3**	**18.5**
PFHXA	**3.0 J**	**2.9 J**	**4.3**	**2.8 J**
PFDoDA	3.7 U	1.9 U	2.0 U	2.0 U
PFTetDA	3.7 U	1.9 U	1.8 U	2.0 U
PFUDA	3.7 U	1.9 U	2.0 U	2.0 U

Legend

MW Location, Sample Result Below RSL

MW Location, Sample Result Exceeds RSL

KSC Installation Boundary

Groundwater Screening Values (ng/L)				
Analyte	EPA RSL for tapwater	FDEP pGCTL (Residential)	FDEP pGCTL (Industrial)	FDEP pGCTL (Leachability)
PFOS	0.2	70	70	70
PFOA	0.0027	70	70	70
PFBS	600	-	-	-
PFNA	5.9	-	-	-
PFHxS	39	-	-	-
HFPO-DA	1.5	-	-	-
PFBA	1800	-	-	-
PFHxA	990	-	-	-
PFDoDA	100	-	-	-
PFTetDA	2000	-	-	-
PFUDA	600	-	-	-

Notes:
1. EPA = Environmental Protection Agency.
2. FD = Field Duplicate.
3. FDEP = Florida Department of Environmental Protection.
4. J = Estimated concentration.
5. MW = Monitoring Well.
6. EW = Extraction Well.
7. NM = Normal sample.
8. PFOA = Perfluorooctanoic acid.
9. PFOS = Perfluorooctane sulfonic acid.
10. PFBA = Perfluorobutanoic acid.
11. PFBS = Perfluorobutanesulfonic acid.
12. PFNA = Perfluorononanoic acid.
13. PFHxA = Perfluorohexanoic acid.
14. PFHxS = Perfluorohexanesulfonic acid.
15. HFPO-DA = Hexafluoropropylene oxide-dimer acid.
16. PFDoDA = Perfluorododecanoic acid.
17. PFTetDA = Perfluorotetradecanoic acid.
18. PFUDA = Perfluoroundecanoic acid.
19. pGCTL = Provisional Groundwater Cleanup Target Level.
20. RSL = Regional Screening Level.
21. U = Result was below the laboratory Method Detection Limit.
22. ng/L = Nanograms per liter.
23. ft = Feet.
24. Depth of well screen interval is presented in feet below land surface.
25. Groundwater results are presented in ng/L. Units have been converted from values reported in micrograms per liter (µg/L).
26. Groundwater results are compared to Regional Screening Levels (RSLs) set forth in EPA, 2024. Regional Screening Level Resident Tapwater Table (TR=1E-06, HQ=0.1).
27. Groundwater results are also compared to FDEP pGCTLs, set forth by FDEP, 2024.
28. Results in bold are above the Method Detection Limit.
29. Results in bold and red are above a screening value.
30. - = Screening value not yet established.

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

0 5 10 20 Feet

N

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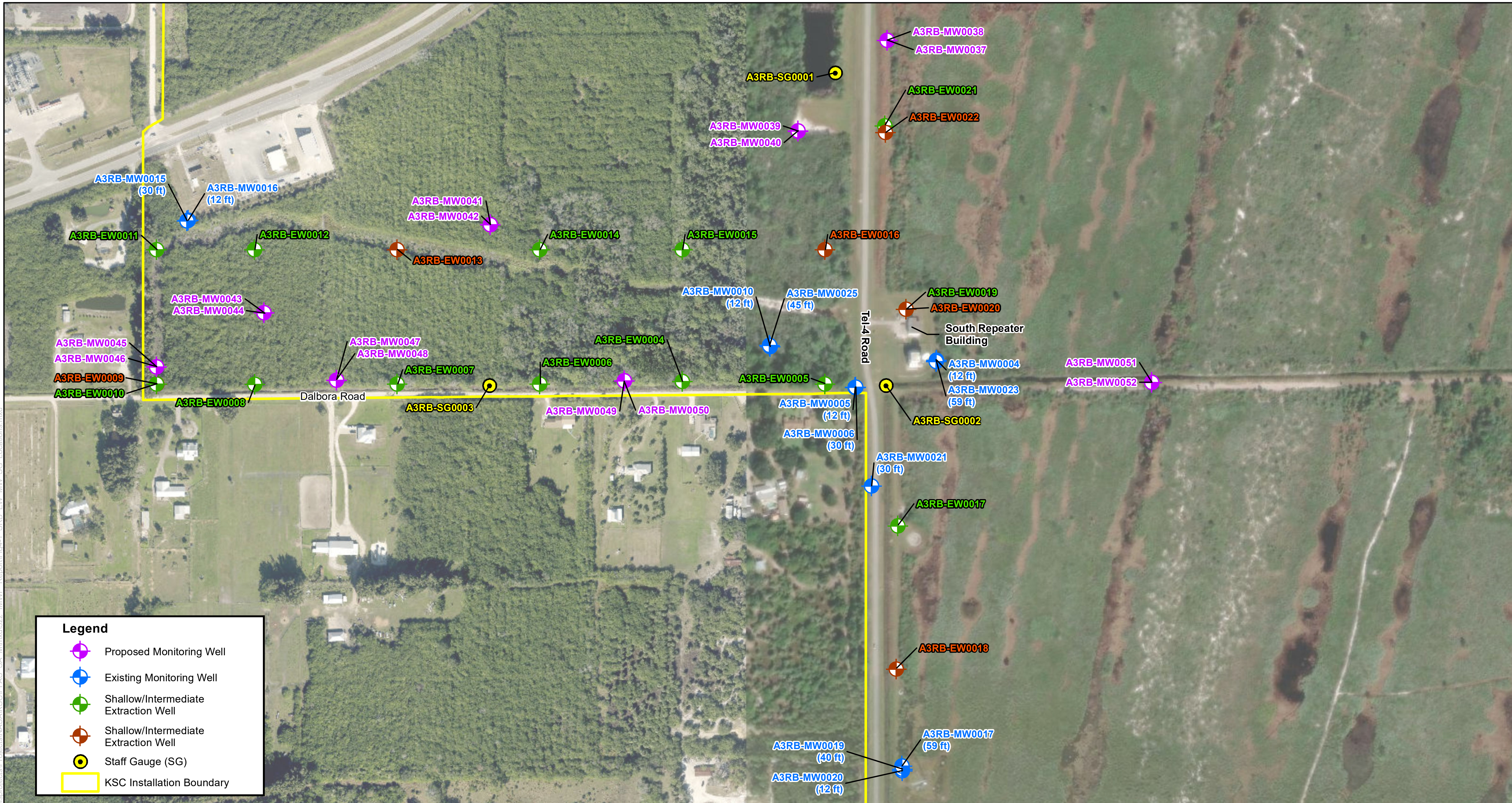
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: DA | Date Saved: 10/11/2024

FIGURE 3-3 OBSERVATION AND EXTRACTION WELL LOCATIONS AND BASELINE GROUNDWATER SAMPLING RESULTS



MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

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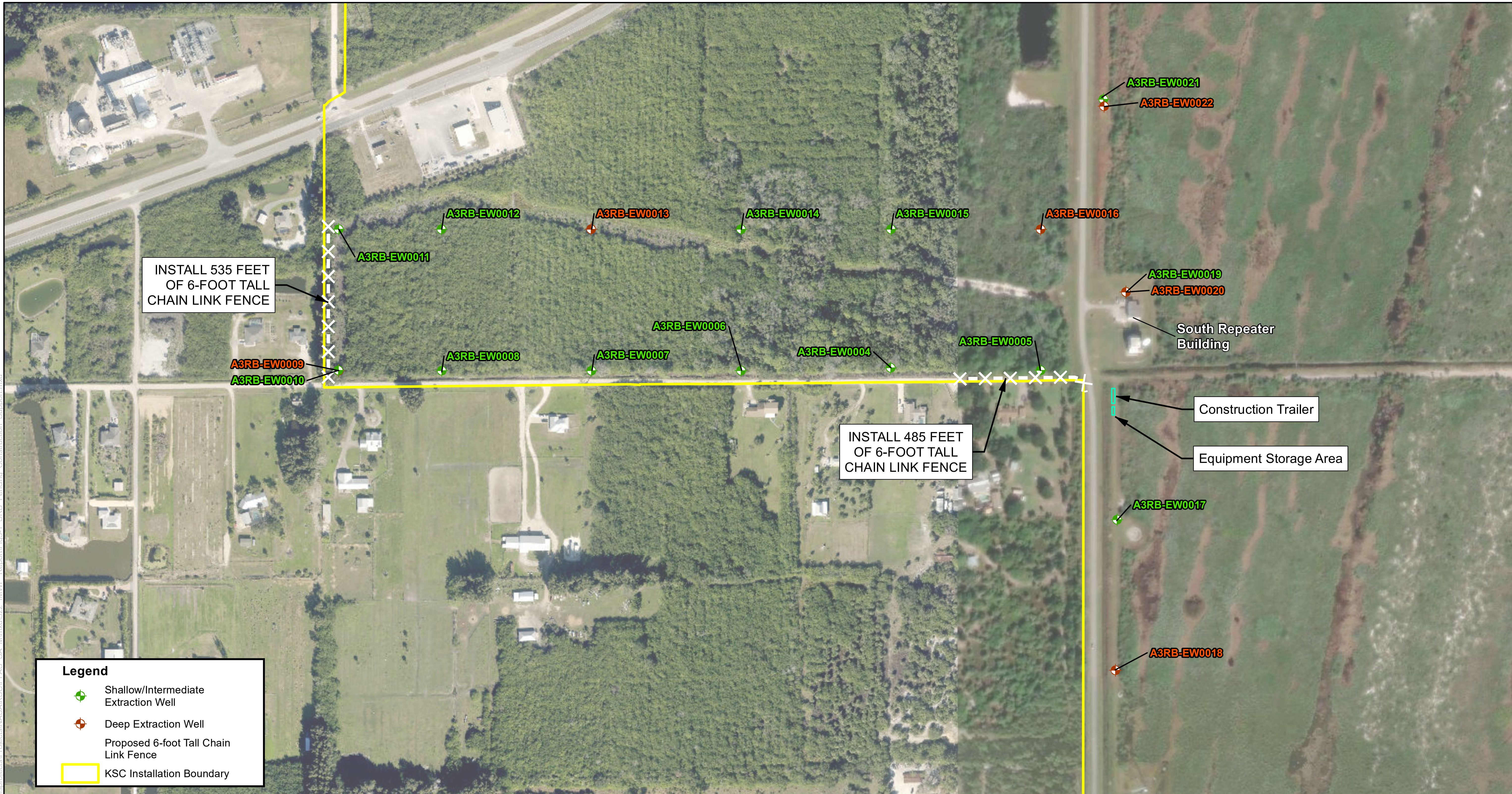
FIGURE 4-1
EXTRACTION WELL, PERFORMANCE MONITORING WELL, AND STAFF GAUGE LOCATIONS SOUTH REPEATER BUILDING



MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

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FIGURE 5-1
FENCING AND CONSTRUCTION SUPPORT AREAS
SOUTH REPEATER BUILDING

DRAWINGS

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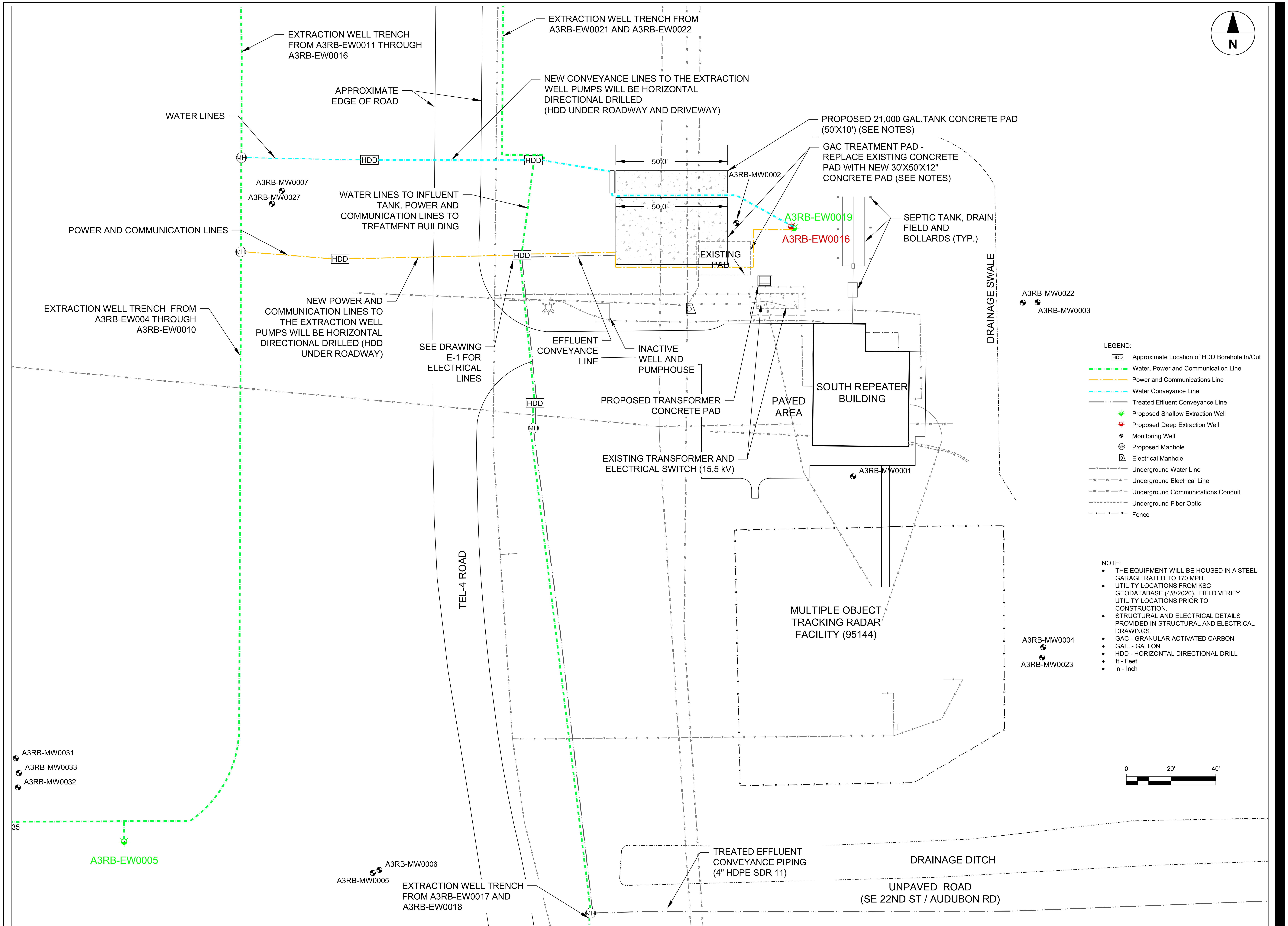

NOTE:
- THE EQUIPMENT WILL BE HOUSED IN A STEEL GARAGE RATED TO 170 MPH.
- UTILITY LOCATIONS FROM KSC GEODATABASE (4/8/2020). FIELD VERIFY UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
- STRUCTURAL AND ELECTRICAL DETAILS PROVIDED IN STRUCTURAL AND ELECTRICAL DRAWINGS.
- GAC - GRANULAR ACTIVATED CARBON
- GAL. - GALLON
- HDD - HORIZONTAL DIRECTIONAL DRILL
- ft - Feet
- in - Inch

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PROJECT

SOUTH REPEATER BUILDING

NASA, John F. Kennedy Space Center
Merritt Island, Florida

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NASA

John F. Kennedy
Space Center
Merritt Island, Florida

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REGISTRATION

DANIEL M. COUGHLIN
FLORIDA PROFESSIONAL LICENSE
NO. 66619

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

60667657

SHEET TITLE

GAC TREATMENT SYSTEM AND PIPING LAYOUT

SHEET NUMBER

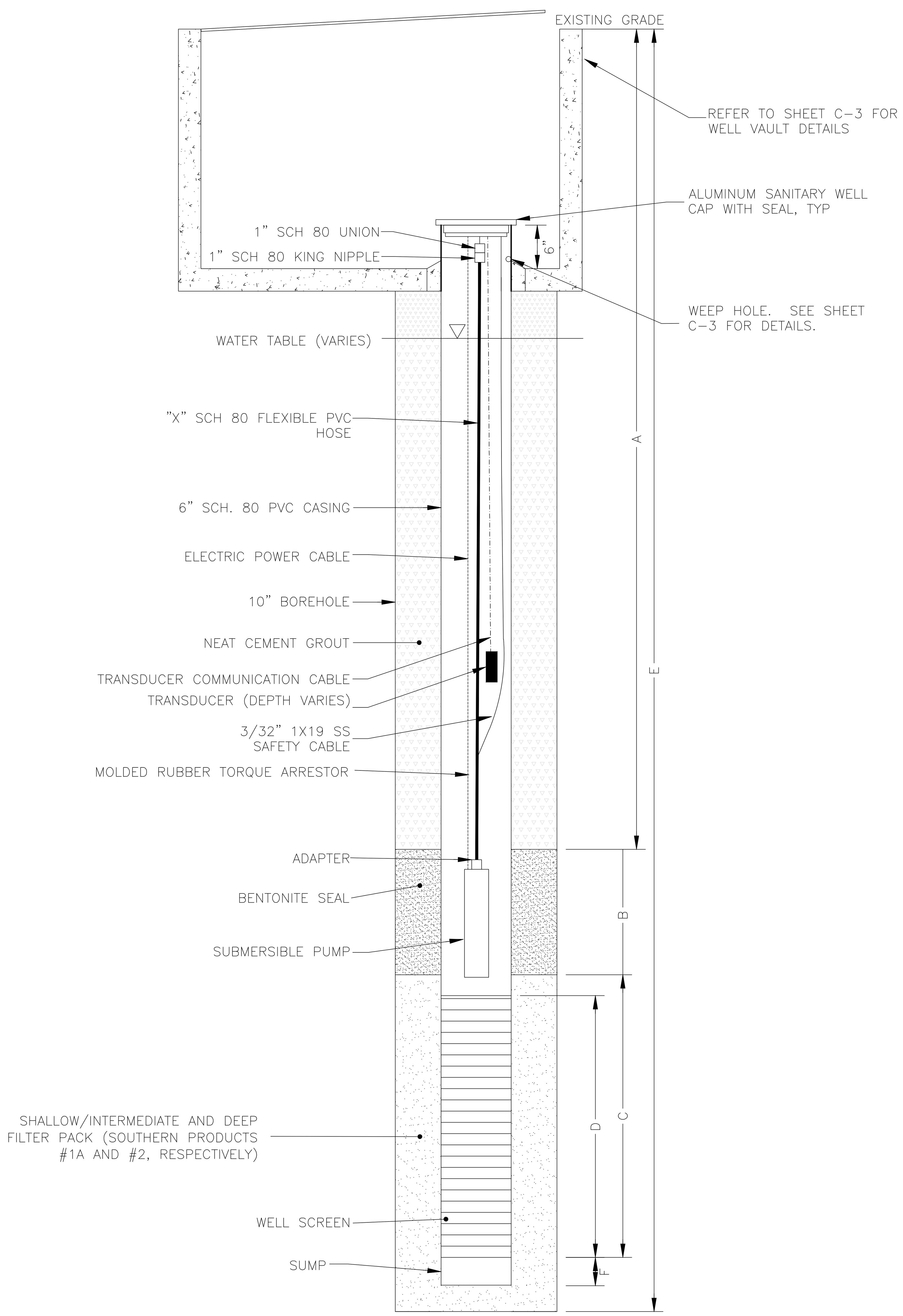
C-1

11" x 17"

Printed on ___% Post-Consumer Recycled Content Paper

								Dimensions (in feet)						
Surficial Aquifer Interval	Well ID	Easting	Northing	Flow Rate (gpm)	Head (ft)	Flexible Hose Diameter X" (inches)	Pump Make/ Model[1]	A	B	C	D	E	F	Bollards[2]
Shallow/ Intermediate	A3RB-EW0004	231577	459251	5	54.4	1	5SQ05-90	13	3	17	15	34	1	Yes
Shallow/ Intermediate	A3RB-EW0005	231737	459251	5	43	1	5SQ05-140	13	3	17	15	34	1	Yes
Shallow/ Intermediate	A3RB-EW0006	231417	459251	5	76.1	1	5SQ05-90	13	3	17	15	34	1	Yes
Shallow/ Intermediate	A3RB-EW0007	231257	459251	5	106.1	1	5SQ05-140	13	3	17	15	34	1	Yes
Shallow/ Intermediate	A3RB-EW0008	231097	459251	5	125.8	1	5SQ05-140	13	3	17	15	34	1	Yes
Deep	A3RB-EW0009	230987	459251	5	170.7	1	5SQ05-140	29	3	23	20	56	1	Yes
Shallow/ Intermediate	A3RB-EW0010	230987	459251	10	116.1	1.25	10SQE05-160	13	3	17	15	34	1	Yes
Shallow/ Intermediate	A3RB-EW0011	230987	459411	10	119.2	1.25	10SQE05-110	13	3	17	15	34	1	Yes
Shallow/ Intermediate	A3RB-EW0012	231097	459411	5	125.8	1	5SQ05-140	13	3	17	15	34	1	Yes
Deep	A3RB-EW0013	231257	459411	5	136.1	1	5SQ05-140	29	3	23	20	56	1	Yes
Shallow/ Intermediate	A3RB-EW0014	231417	459411	5	76.1	1	5SQ05-90	13	3	17	15	34	1	Yes
Shallow/ Intermediate	A3RB-EW0015	231577	459411	5	54.4	1	5SQ05-90	13	3	17	15	34	1	Yes
Deep	A3RB-EW0016	231737	459411	5	73.6	1	5SQ05-90	29	3	23	20	56	1	Yes
Shallow/ Intermediate	A3RB-EW0017	231797	459101	5	46.7	1.25	15SQE05-70	13	3	17	15	34	1	No
Deep	A3RB-EW0018	231796	458940	5	98	1	5SQ05-90	29	3	23	20	56	1	No
Shallow/ Intermediate	A3RB-EW0019	231828	459344	10	33.9	1.25	15SQE05-70	13	3	17	15	34	1	No
Deep	A3RB-EW0020	231828	459344	10	63.9	1.25	15SQE05-70	29	3	23	20	56	1	No
Shallow/ Intermediate	A3RB-EW0021	231757	460201	30	79.9	1.5	22SQ10-160	13	3	17	15	34	1	No
Deep	A3RB-EW0022	231727	460171	10	78.3	1.25	15SQE05-70	29	3	23	20	56	1	No

NOTE:
1. [1]Or an equivalent SP model
2. ALL pumps to be provided with 240 volt motors
3. [2]Each extraction well noted shall have a bollard installed on each corner of the well vault. See Drawing C-3 for details.

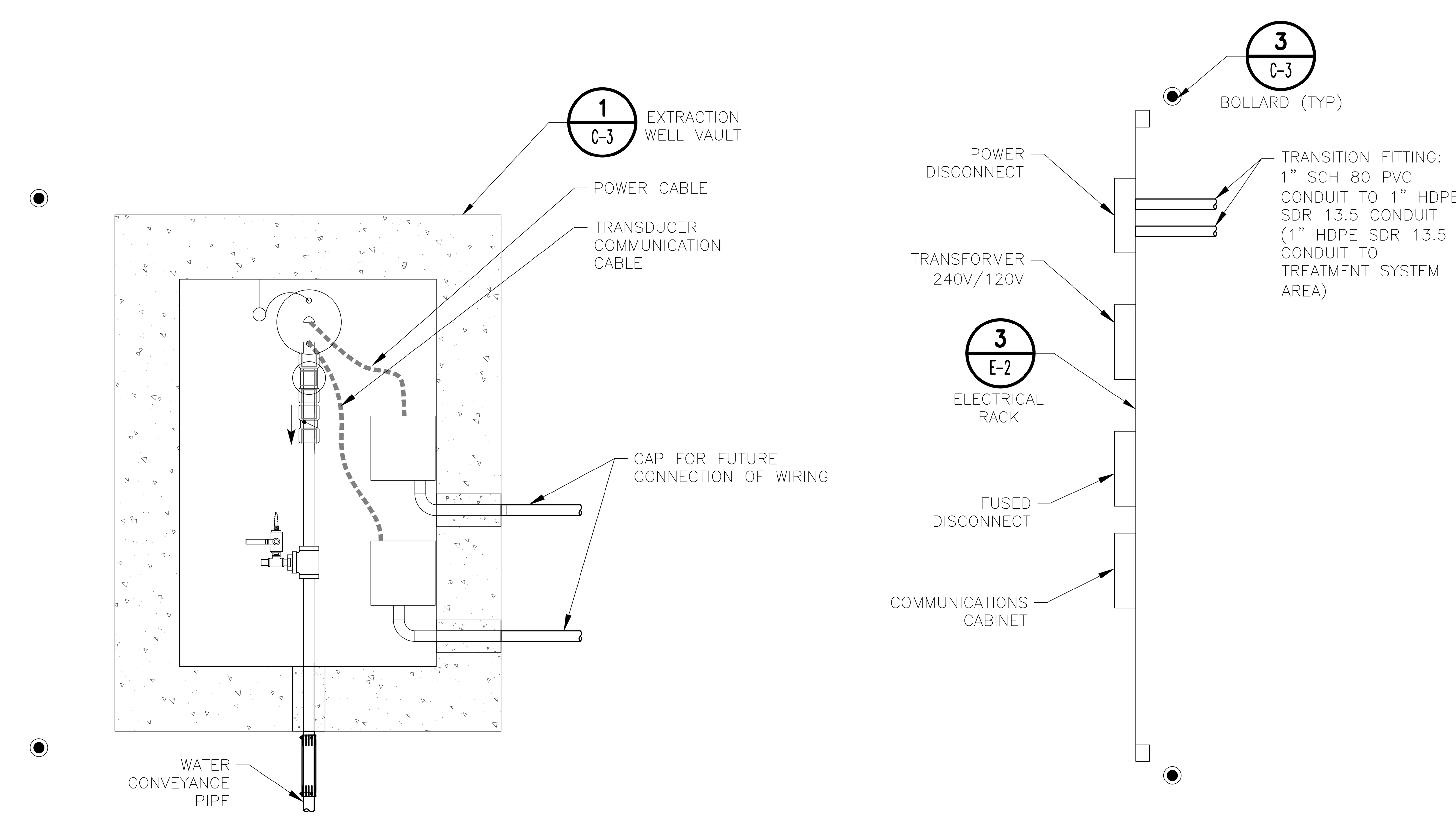


TYPICAL EXTRACTION WELL DETAIL

NOT TO SCALE

TYPICAL EXTRACTION WELL DETAIL

NOT TO SCALE



EXTRACTION WELL VAULT AND POWER/COMMUNICATIONS RACK LAYOUT

NOT TO SCALE

NOTE:
EXTRACTION WELL VAULT AND POWER/COMMUNICATIONS RACK LAYOUT (SEE DETAILS ON DRAWING C-3 FOR WELL VAULT AND E-2 FOR ELECTRICAL/COMMUNICATION RACK)

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Merritt Island, Florida

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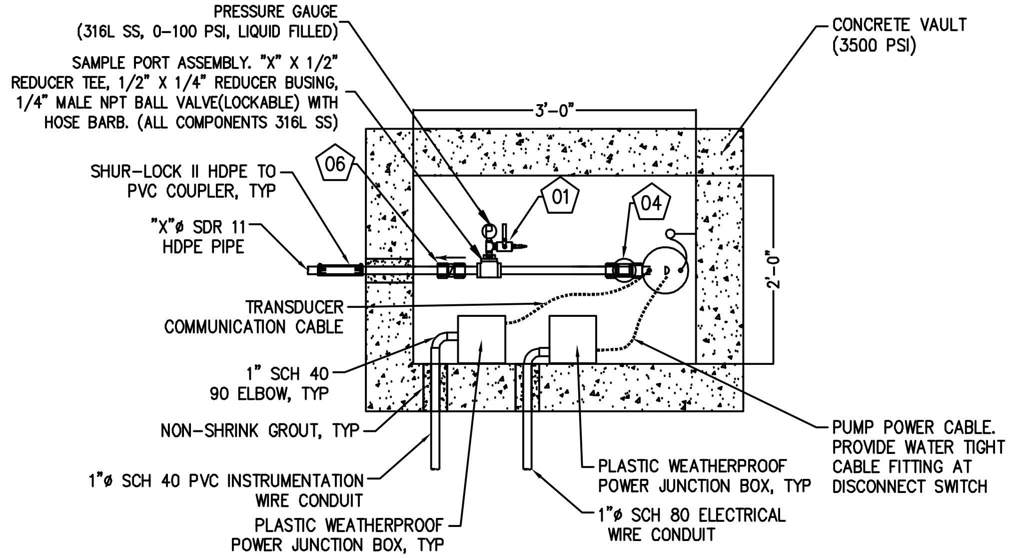
I/R	DATE	DESCRIPTION

KEY PLAN

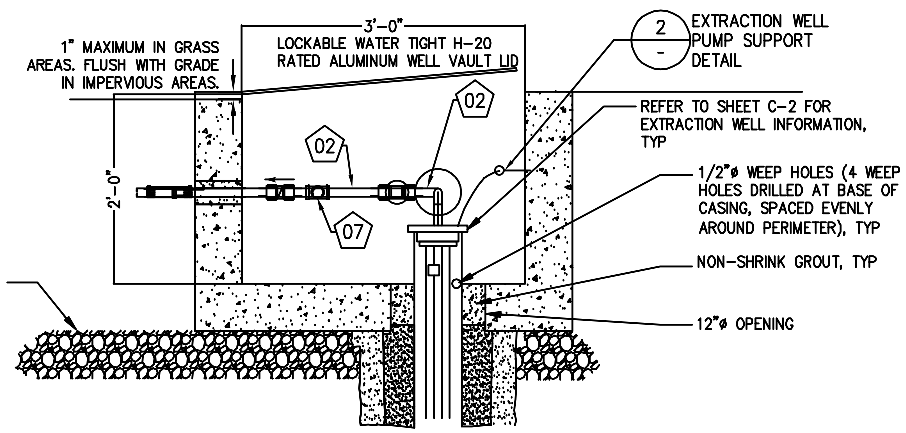
PROJECT NUMBER
60667657

SHEET TITLE
EXTRACTION WELL CONSTRUCTION DETAILS

SHEET NUMBER
C-2



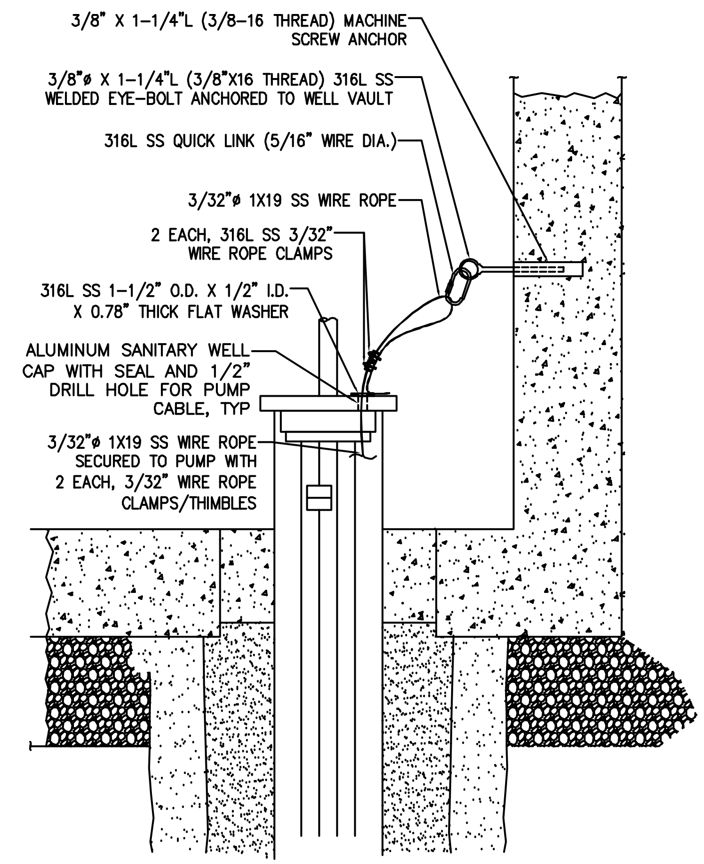
PLAN VIEW



PROFILE VIEW

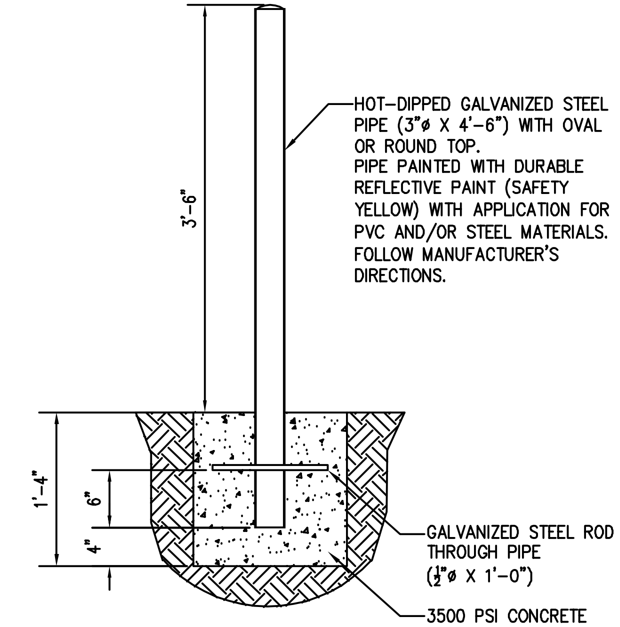
1 - EXTRACTION WELL DETAIL, TYP
SCALE: 1" = 1'-0"

1 0 1
SCALE: 1" = 1'-0"



PROFILE VIEW

2 - EXTRACTION WELL PUMP SUPPORT DETAIL
SCALE: NOT TO SCALE

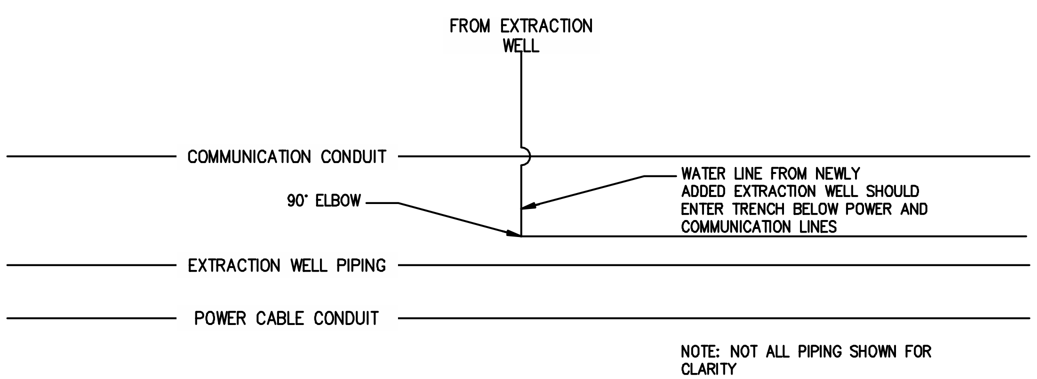


3 - BOLLARD DETAIL, TYP
SCALE: 1" = 1'-0"

DETAIL INFORMATION	
NUMBER	DESC
01	316L SS BALL VALVE (LOCKABLE)
02	"X" ø SCH 80 PVC PIPE
03	"X" x 1/2" 316L SS REDUCER BUSHING
04	"X" 316L SS BALL VALVE
05	"X" SCH 80 PVC 90 ELBOW
06	"X" CHECK VALVE
07	316L SS 1" X 1/2" REDUCING TEE

NOTE: LOCKABLE DISCONNECT SWITCH AND INSTRUMENTATION ENCLOSURE ARE FIELD LOCATED AS NECESSARY.

Well ID	Flow Rate (gpm)	Flex Hose, PVC Pipe and Fittings Diameter "X" (inches)	Electrical Conduit Size (Sch 80 PVC) (QTY =1)
A3RB-EW0004	5	1	1"
A3RB-EW0005	5	1	1"
A3RB-EW0006	5	1	1"
A3RB-EW0007	5	1	1"
A3RB-EW0008	5	1	1"
A3RB-EW0009	5	1	1"
A3RB-EW0010	10	1.25	1"
A3RB-EW0011	10	1.25	1"
A3RB-EW0012	5	1	1"
A3RB-EW0013	5	1	1"
A3RB-EW0014	5	1	1"
A3RB-EW0015	5	1	1"
A3RB-EW0016	5	1	1"
A3RB-EW0017	5	1.25	1"
A3RB-EW0018	5	1	1"
A3RB-EW0019	10	1.25	1"
A3RB-EW0020	10	1.25	1"
A3RB-EW0021	30	1.5	1"
A3RB-EW0022	10	1.25	1"



4 - TRENCH DETAIL AT EXTRACTION WELL LOCATION, TYP
SCALE: N.T.S.

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ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

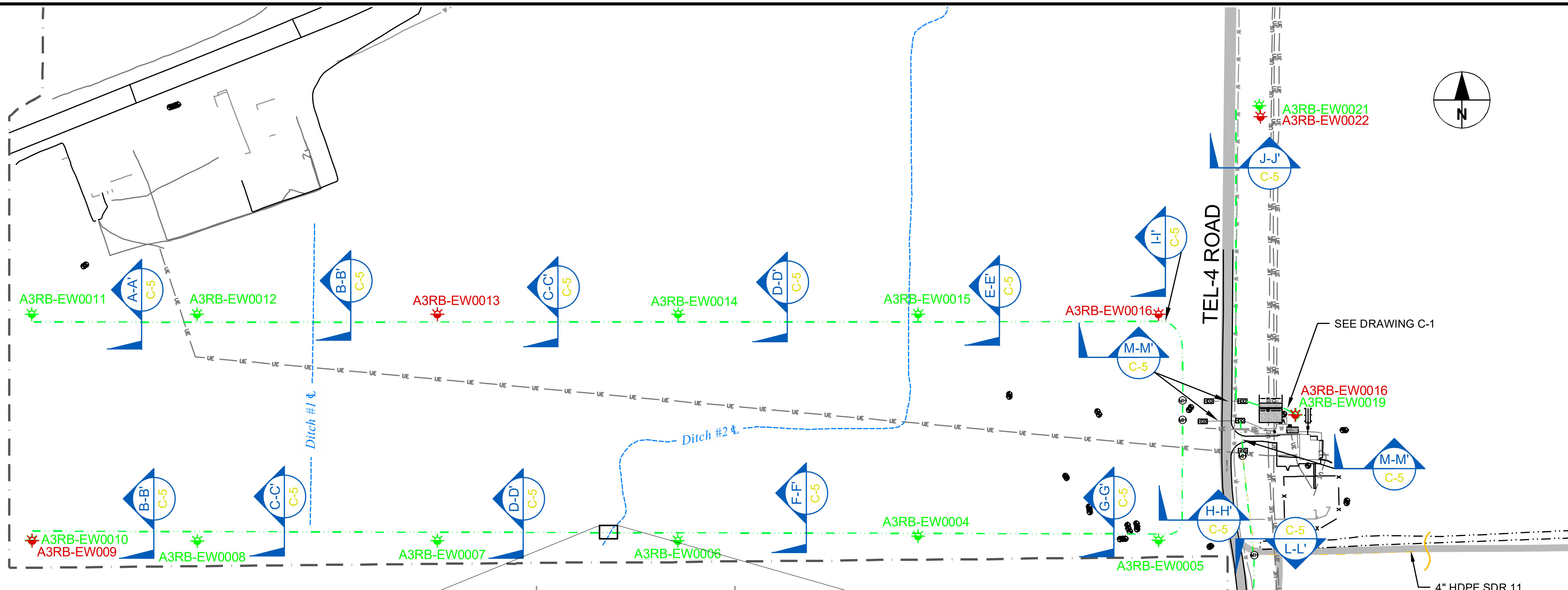
PROJECT NUMBER
60667657

SHEET TITLE
WELL VAULT DETAILS

SHEET NUMBER
C-3

11" x 17"
Project Management Initials: Designer: Checked: Approved:
Last saved by: BARRONM(2024-10-01) Last Plotted: 2024-10-01
Filename: M:\500_DELIVERABLES\513_SOUTH REPEATER PUMP IMWP\00_AECOM DRAFT\FIGURES\CAD\DRAWINGS\20240930\C-3 WELL VAULT DETAILS.DWG

Printed on ___% Post-Consumer Recycled Content Paper

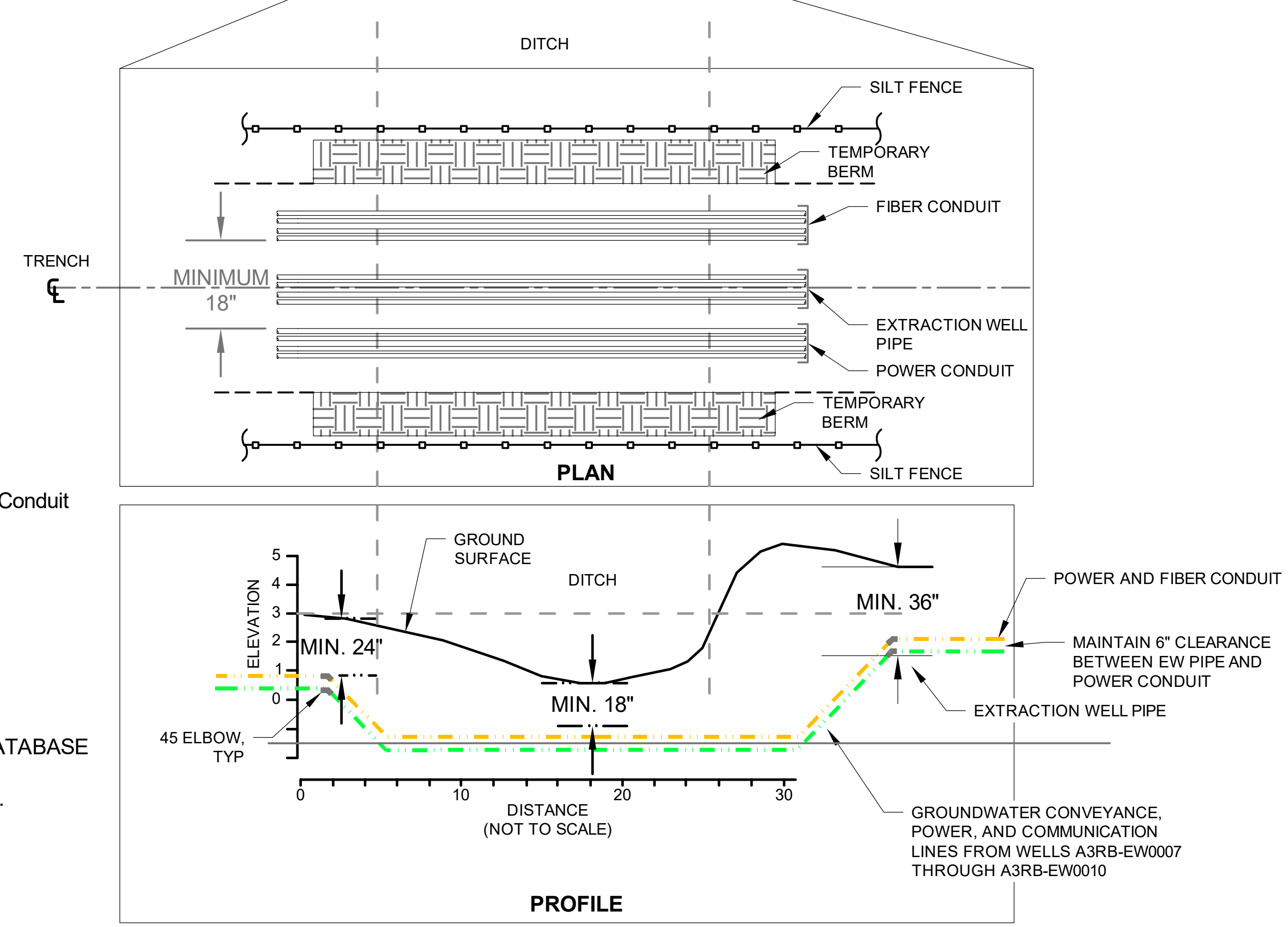


LEGEND:

- Shallow Extraction Well
- Deep Extraction Well
- Monitoring Well
- Trench Line
- Manhole
- Cross-Section Location
- Underground Water Line
- Underground Electrical Line
- Underground Communication Conduit
- Underground Fiber Optic
- Fence
- KSC Installation Boundary

NOTE:

- UTILITY LOCATIONS FROM KSC GEODATABASE (4/8/2020).
- DITCH LOCATIONS ARE APPROXIMATE.



TRENCH DRAINAGE DITCH CROSSING
(NOT TO SCALE)

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REGISTRATION

ISSUE/REVISION

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KEY PLAN

PROJECT NUMBER
60667657

SHEET TITLE
TRENCH CROSS-SECTION LOCATIONS

SHEET NUMBER
C-4

11" x 17"
Approved: ___ Checked: ___ Designer: ___ Project Management Initials: ___

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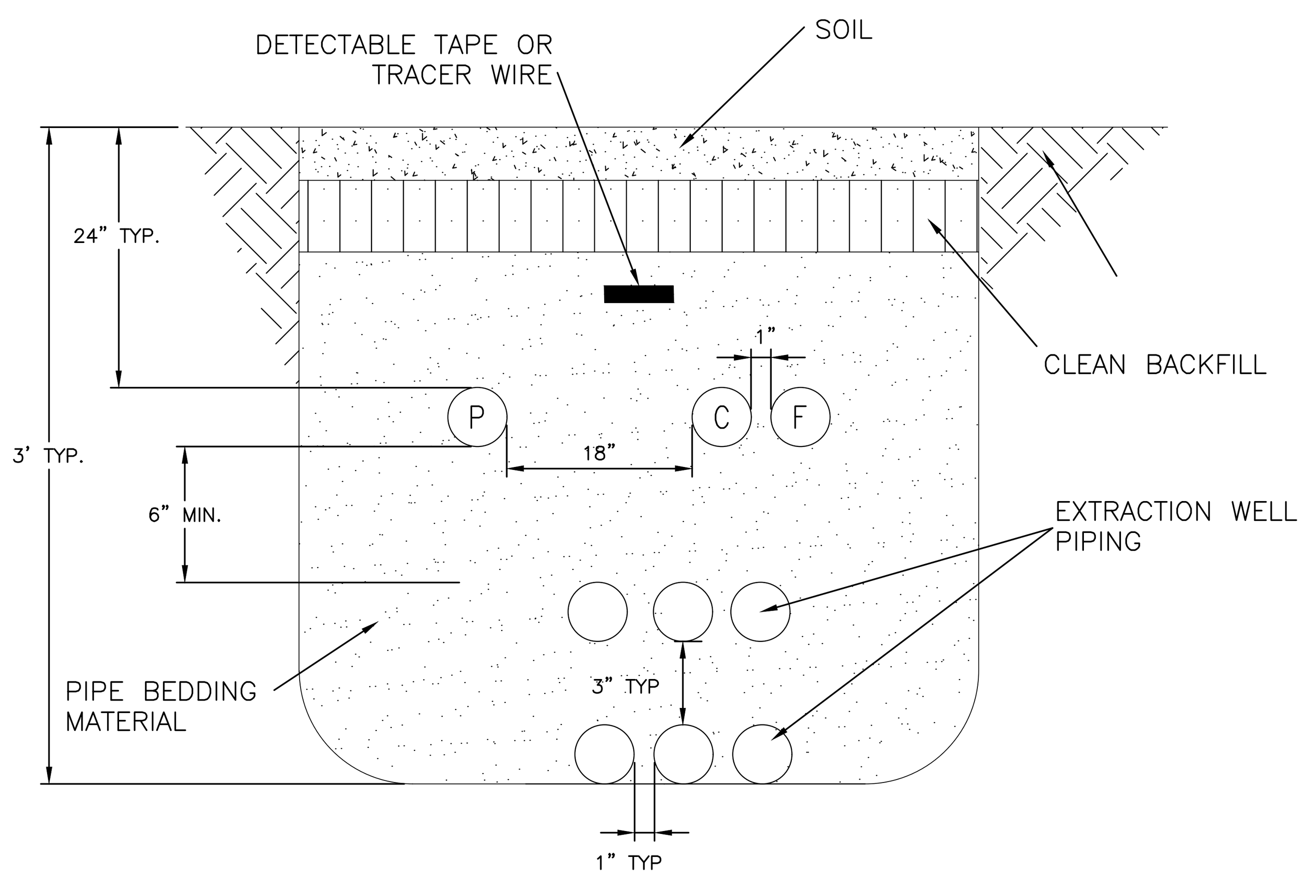


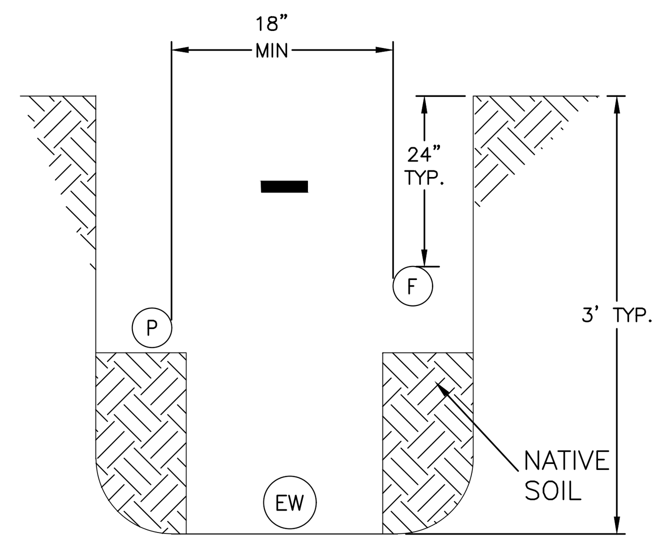
TRENCH CONSTRUCTION AND PIPE BEDDING DETAIL, TYP

NOTES:

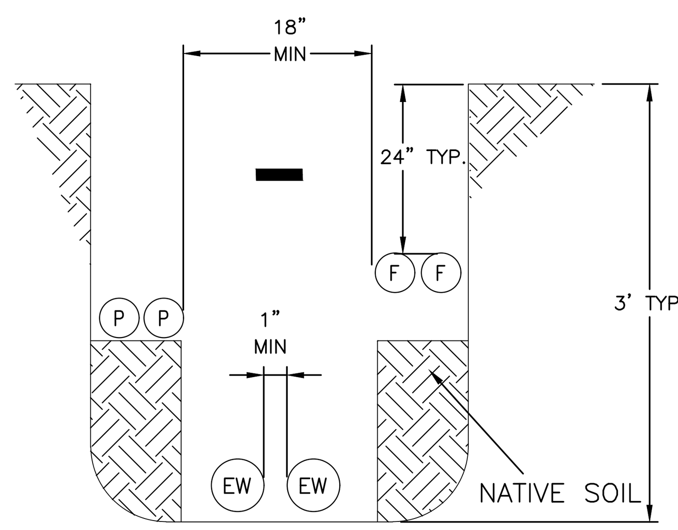
1. PIPE DIAMETER NOT DRAWN TO SCALE.
2. MULTIPLE STRIPS OF DETECTABLE TAPE WILL BE PLACED IN TRENCHES GREATER THAN 3 FEET IN WIDTH.
3. SURFACE SHALL BE REPAIRED TO EXISTING CONDITIONS

LEGEND:

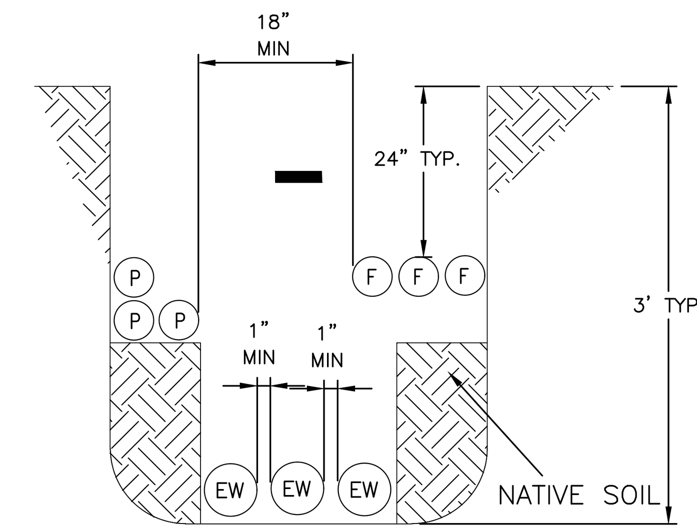
- P — POWER
- F — FIBER OPTIC
- C — CONTROL
- EW — EXTRACTION WELL PIPE HDPE SDR 11
- HORIZONTAL DIRECTIONAL DRILLING BOREHOLE



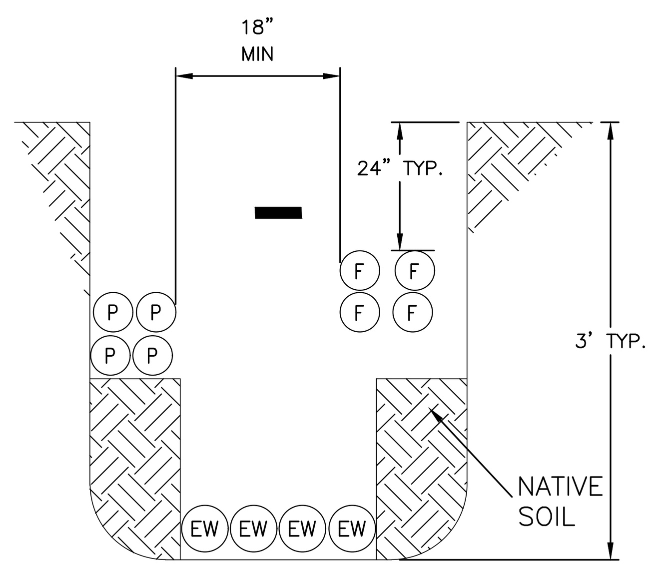
TRENCH SECTION A–A'
NOT TO SCALE



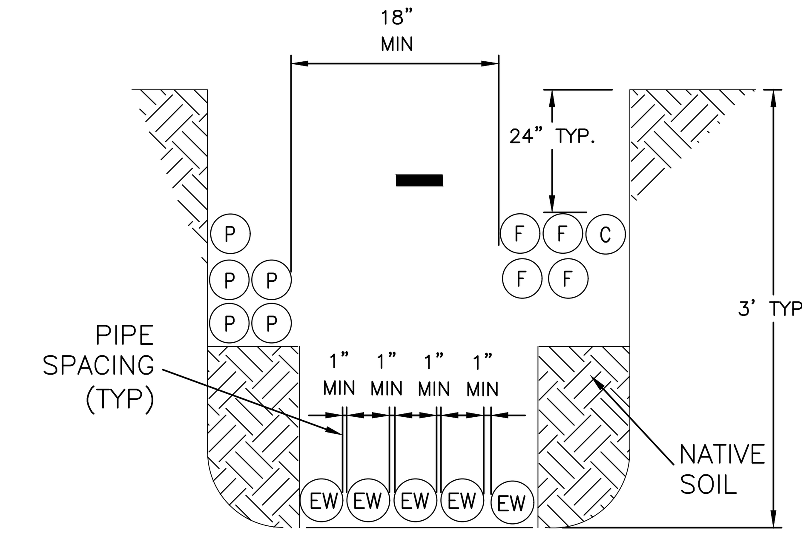
TRENCH SECTION B–B'
NOT TO SCALE



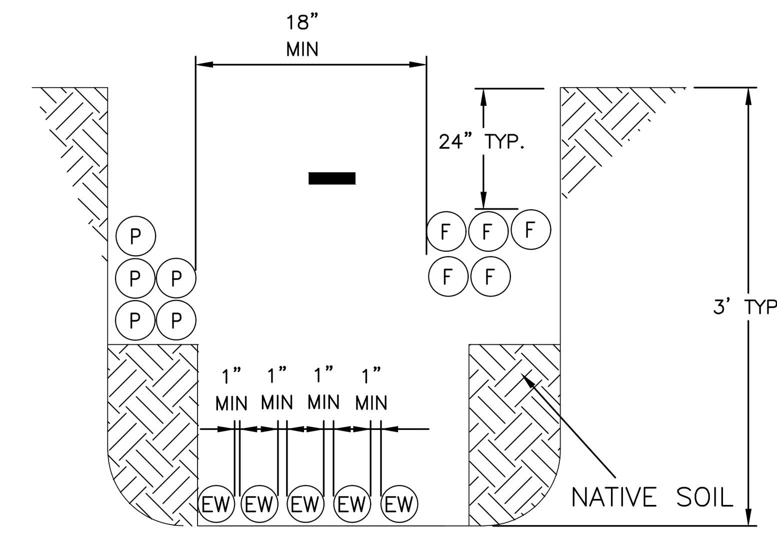
TRENCH SECTION C–C'
NOT TO SCALE



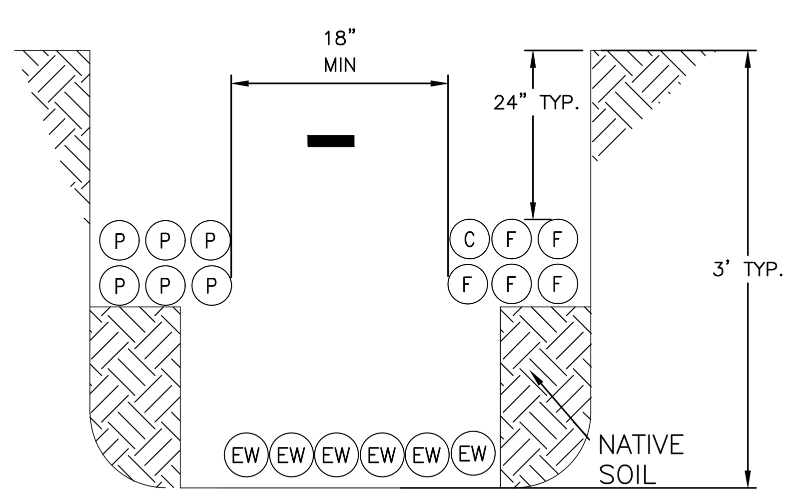
TRENCH SECTION D–D'
NOT TO SCALE



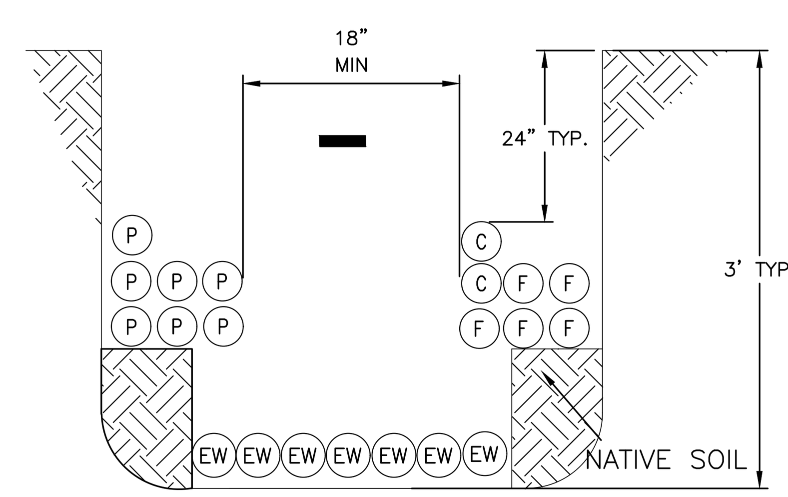
TRENCH SECTION E–E'
NOT TO SCALE



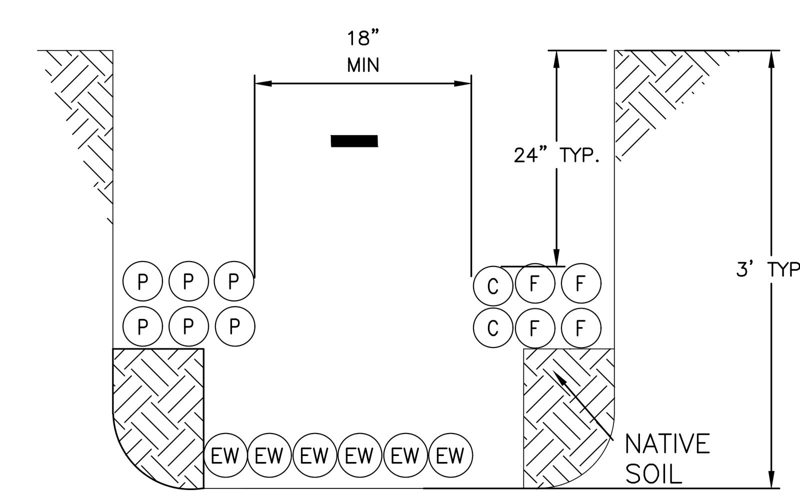
TRENCH SECTION F–F'
NOT TO SCALE



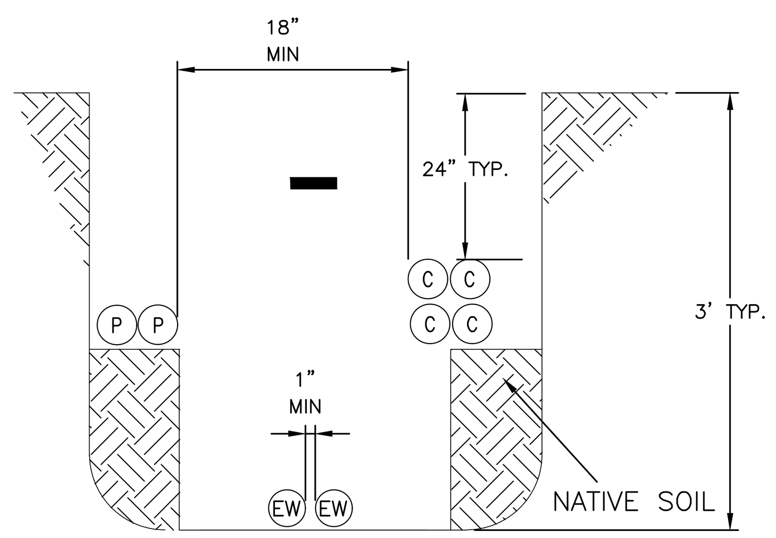
TRENCH SECTION G–G'
NOT TO SCALE



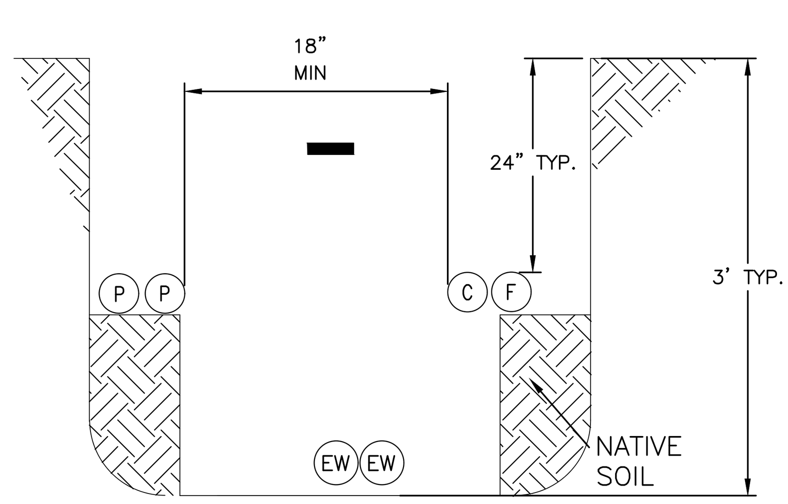
TRENCH SECTION H–H'
NOT TO SCALE



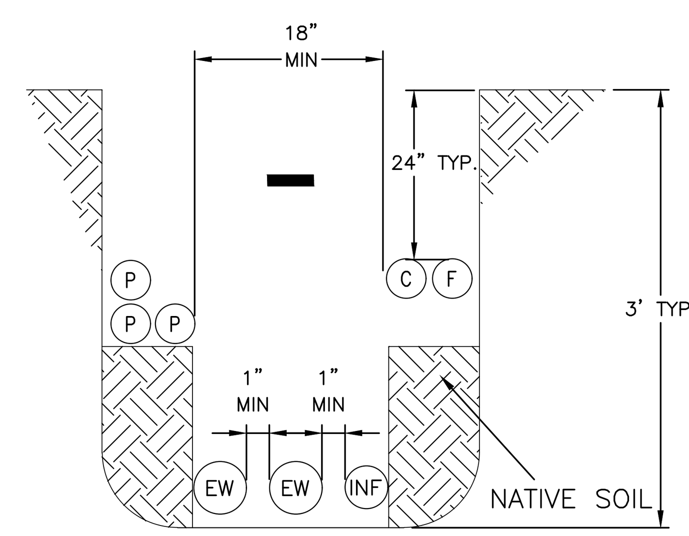
TRENCH SECTION I–I'
NOT TO SCALE



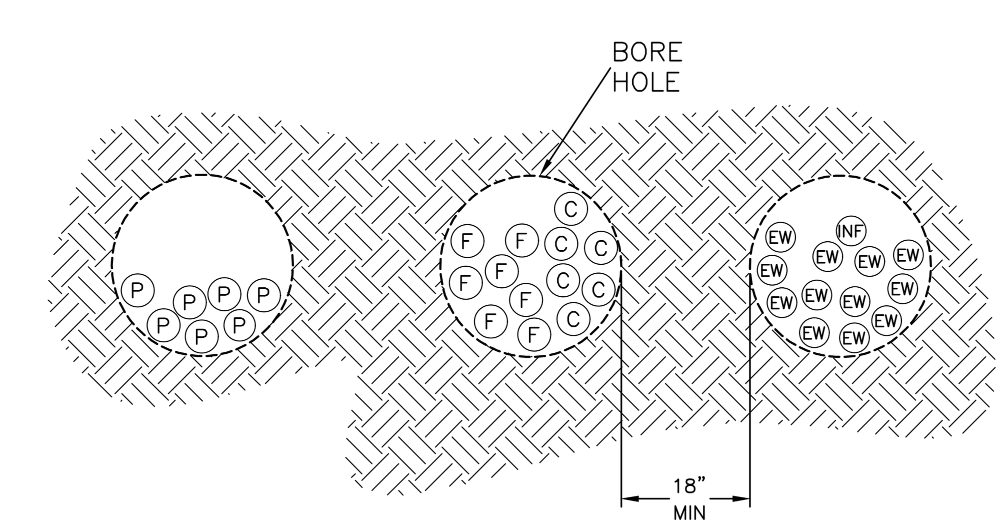
TRENCH SECTION J–J'
NOT TO SCALE



TRENCH SECTION K–K'
NOT TO SCALE



TRENCH SECTION L–L'
NOT TO SCALE



TRENCH SECTION M–M'
NOT TO SCALE

NOTE:

1. GENERAL BOREHOLE NUMBER OF LINES TO BE FIELD VERIFIED.

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KEY PLAN

PROJECT NUMBER
60667657

SHEET TITLE
TRENCH CROSS-SECTION DETAILS

SHEET NUMBER
C-5

11" x 17"
Project Management Initials: ____ Designer: ____ Checked: ____ Approved: ____
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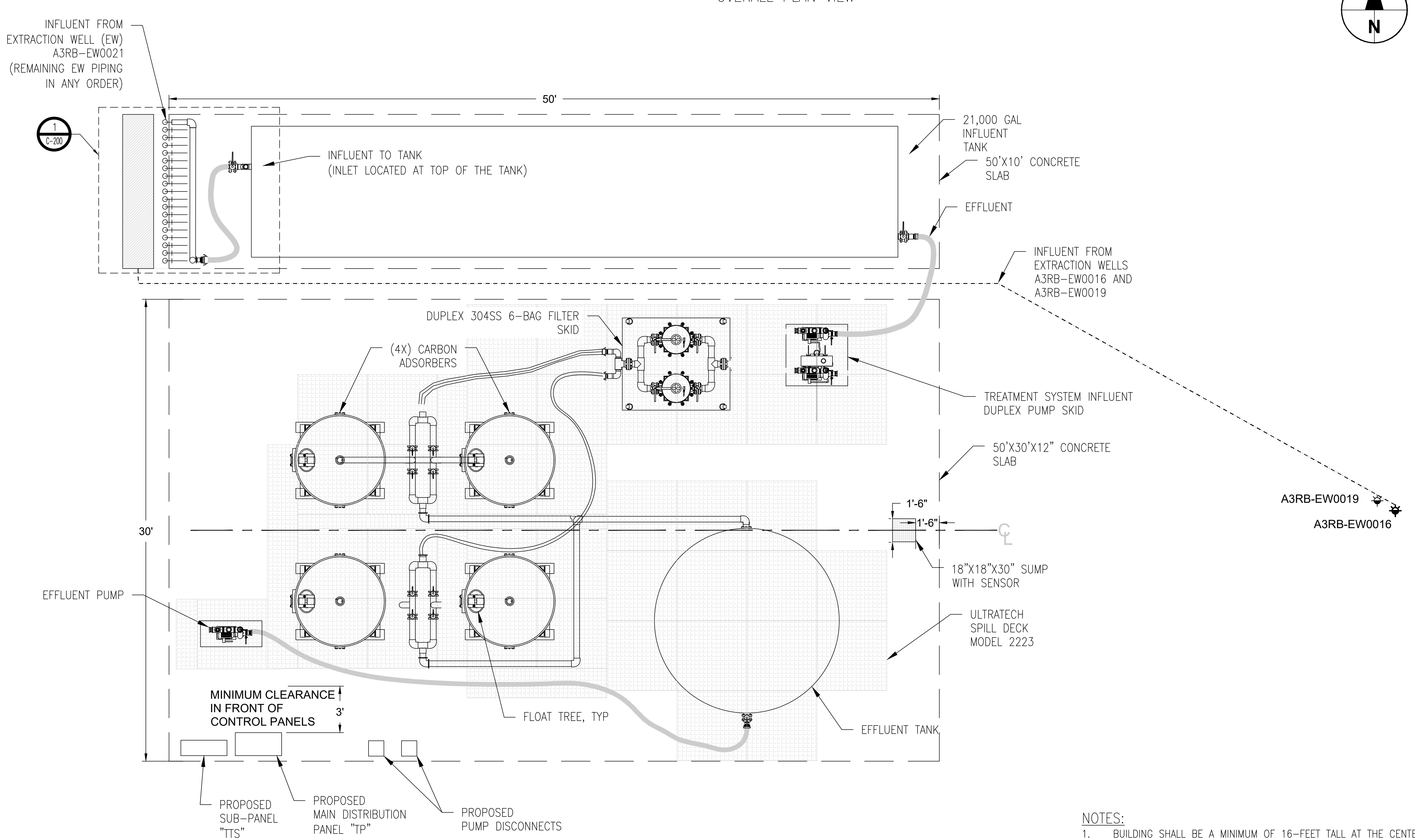
TREATMENT SYSTEM

OVERALL PLAN VIEW



0 80' 160'

NOTES:

1. BUILDING SHALL BE A MINIMUM OF 16-FEET TALL AT THE CENTER AND 14-FEET TALL AT THE EDGES AND HAVE TWO 12' X 14' ROLLUP DOORS ON THE SOUTH SIDE AND A MAN DOOR ON THE WEST SITE. PRE-FAB STEEL STRUCTURE WITH LIGHTING AND VENTILATION.
2. SPILL DECK TO BE USED BENEATH ALL EQUIPMENT CONTAINING GROUNDWATER, TO INCLUDE HOSES.
3. DESIGN FLOW RATE: 150 GPM
4. NOT ALL VALVES, CONNECTIONS, ETC. SHOWN FOR CLARITY
5. ELECTRICAL POWER BY OTHERS

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KEY PLAN

PROJECT NUMBER

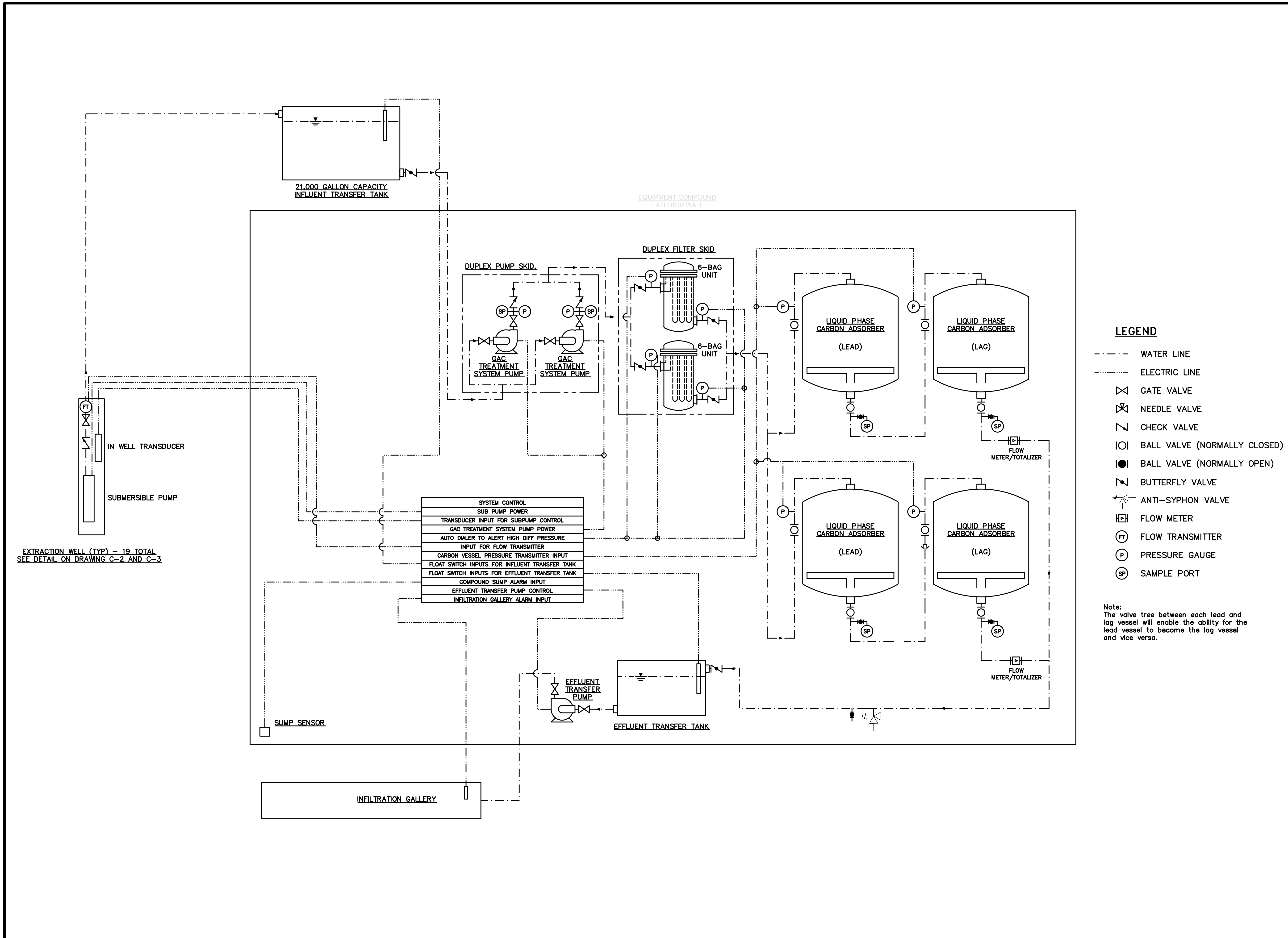
60667657

SHEET TITLE

GAC TREATMENT SYSTEM LAYOUT

SHEET NUMBER

C-6



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KEY PLAN

PROJECT NUMBER

60667657

SHEET TITLE

PROCESS FLOW DIAGRAM

SHEET NUMBER

C-7

11" x 17"

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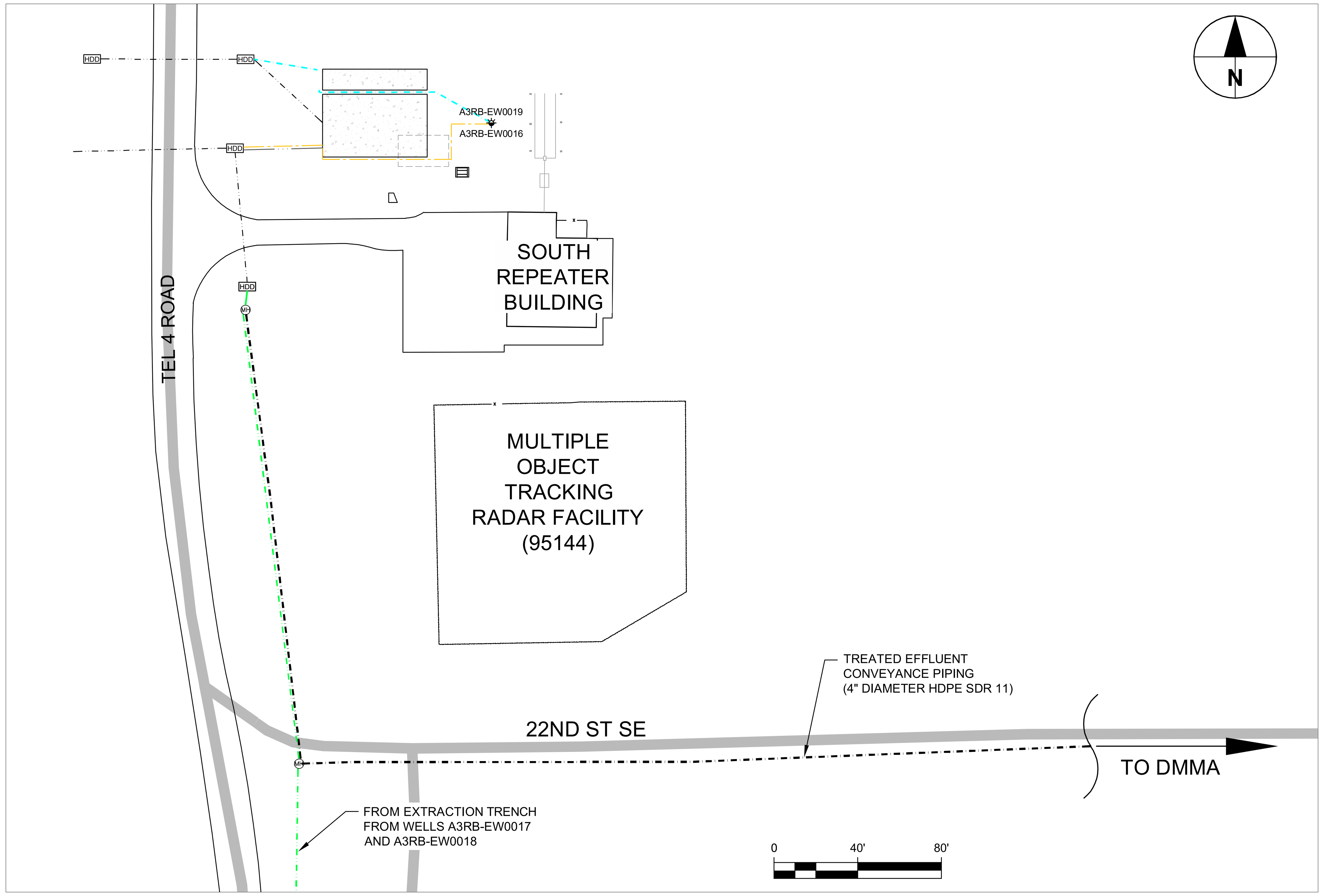
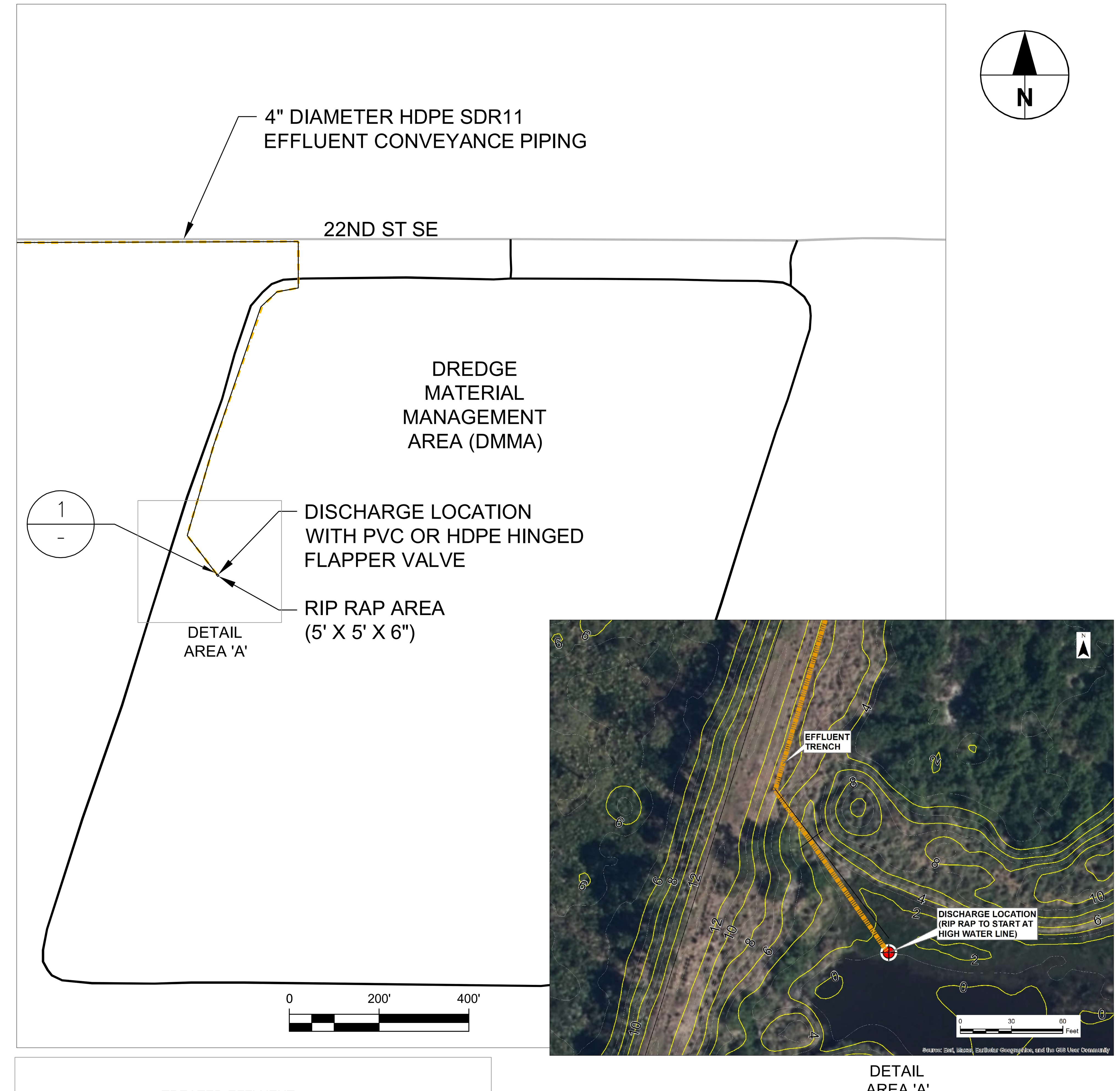
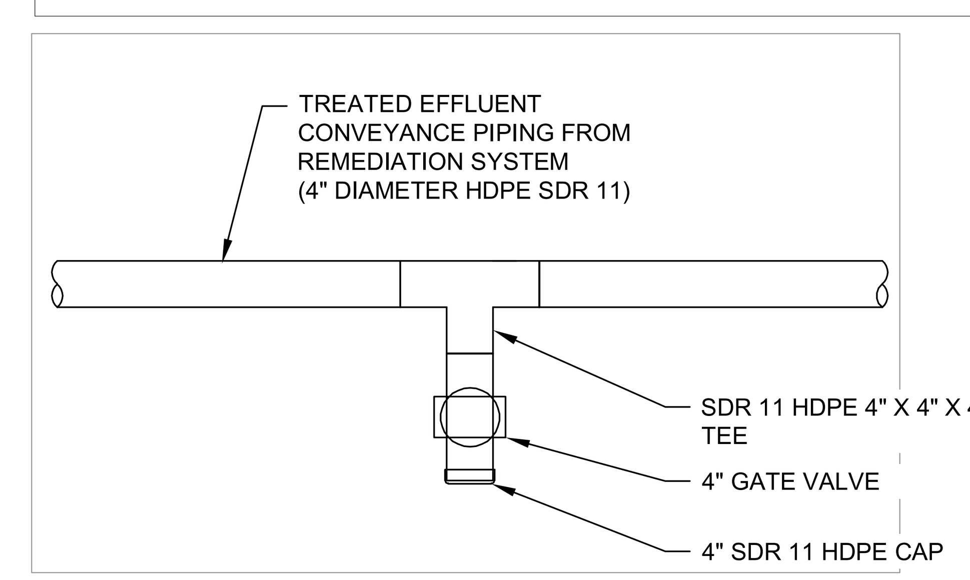






2 INFILTRATION GALLERY LOCATION - DETAIL POTENTIAL FUTURE DISCHARGE LOCATION

(Approximately 5,550 feet east of Manhole)

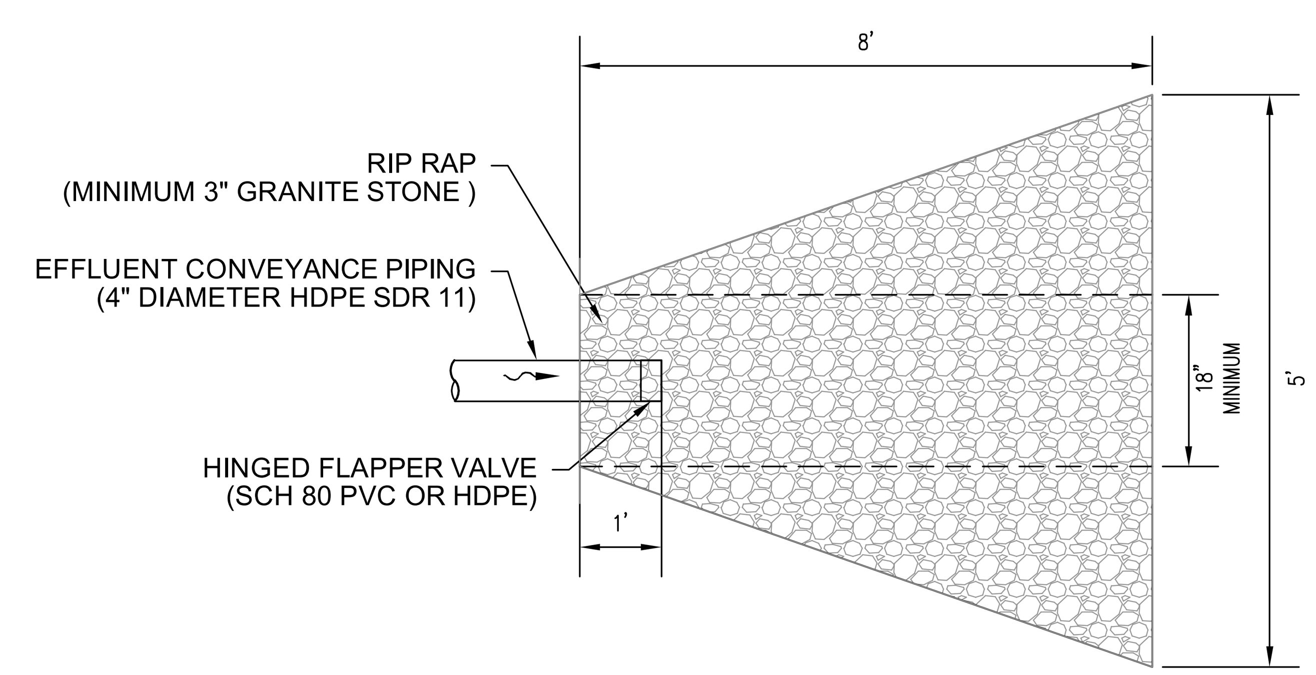
SCALE: N.T.S.

LEGEND:

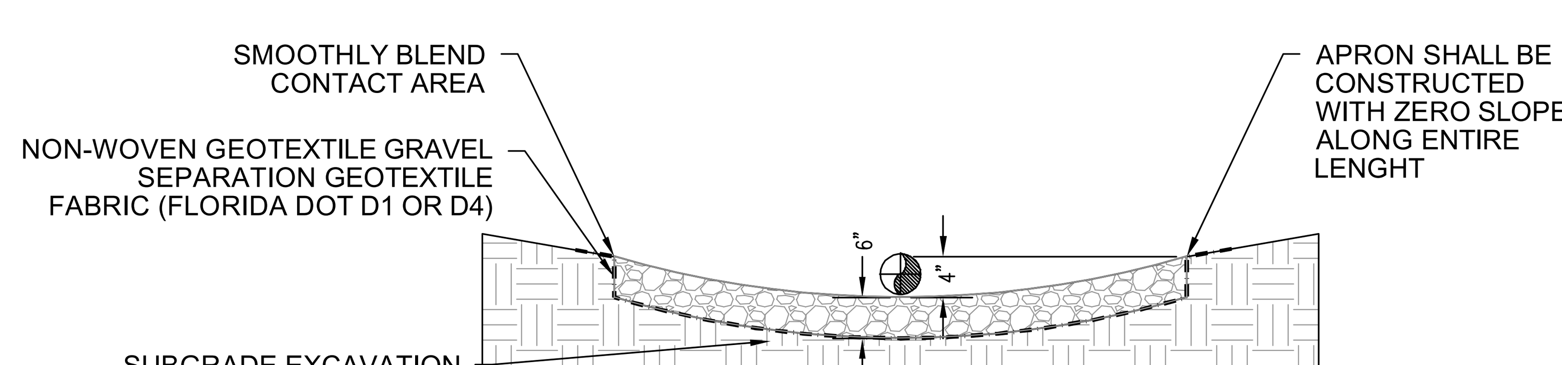
- HDD Approximate Location of HDD Borehole In/Out
- Extraction Pump Electrical Line
- Water, Power and Communication Line
- Power and Communications Line
- Water Conveyance Line
- Proposed Shallow Extraction Well
- Proposed Deep Extraction Well
- Monitoring Well
- Proposed Manhole
- Electrical Manhole
- Underground Water Line
- Underground Electrical Line
- Underground Communications Conduit
- Underground Fiber Optic
- Fence

NOTE:

- UTILITY LOCATIONS FROM KSC GEODATABASE (4/8/2020). FIELD VERIFY UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
- HDD - HORIZONTAL DIRECTIONAL DRILL
- ft - Feet
- in - Inch
- N.T.S. = NOT TO SCALE



PLAN VIEW



PROFILE VIEW

1 RIP RAP DETAIL, TYP

SCALE: N.T.S.

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KEY PLAN

PROJECT NUMBER

60667657

SHEET TITLE

TREATMENT SYSTEM EFFLUENT - DMMA

SHEET NUMBER

C-8

11" x 17"

Project Management Initials: ___ Designer: ___ Checked: ___ Approved: ___

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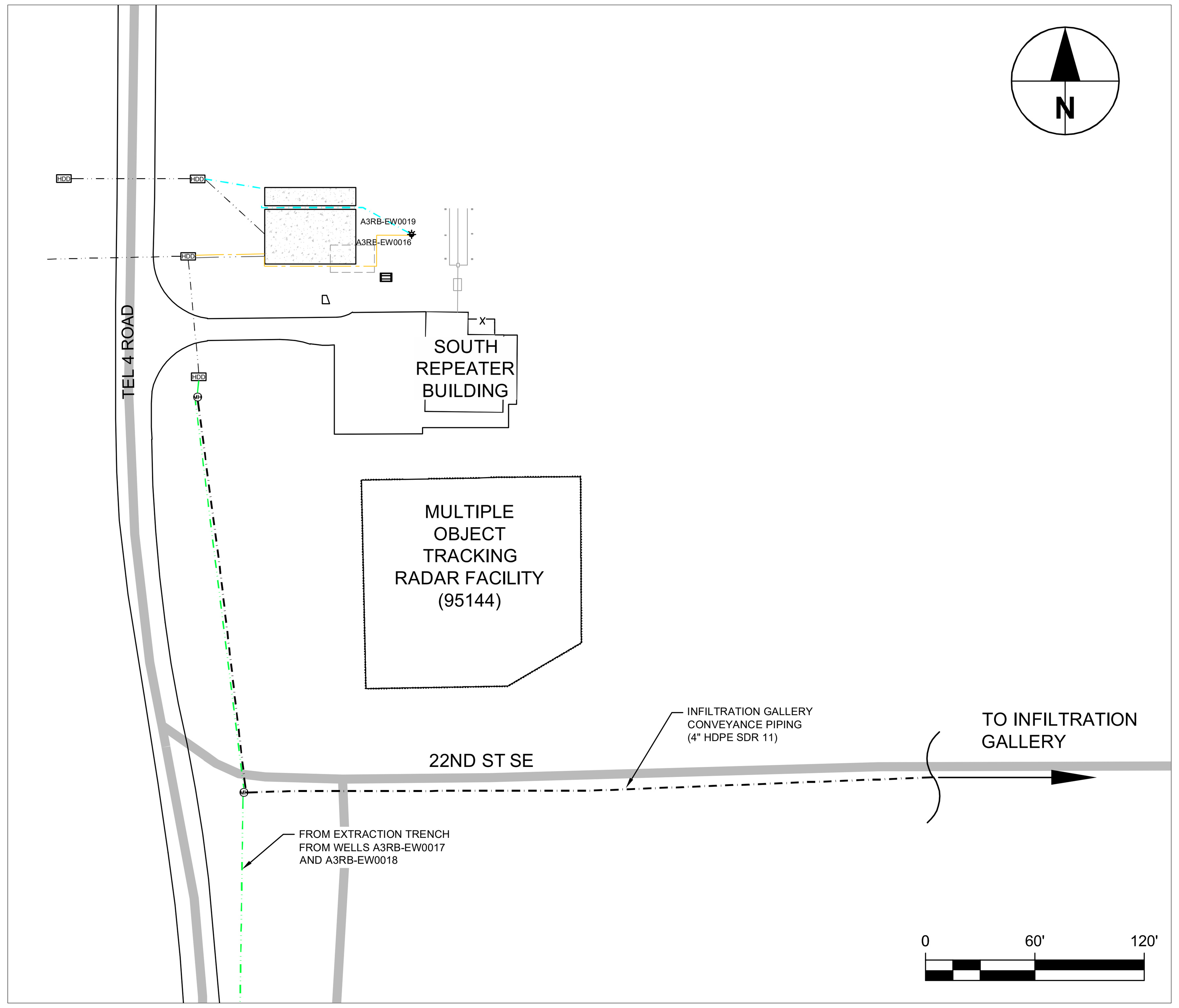
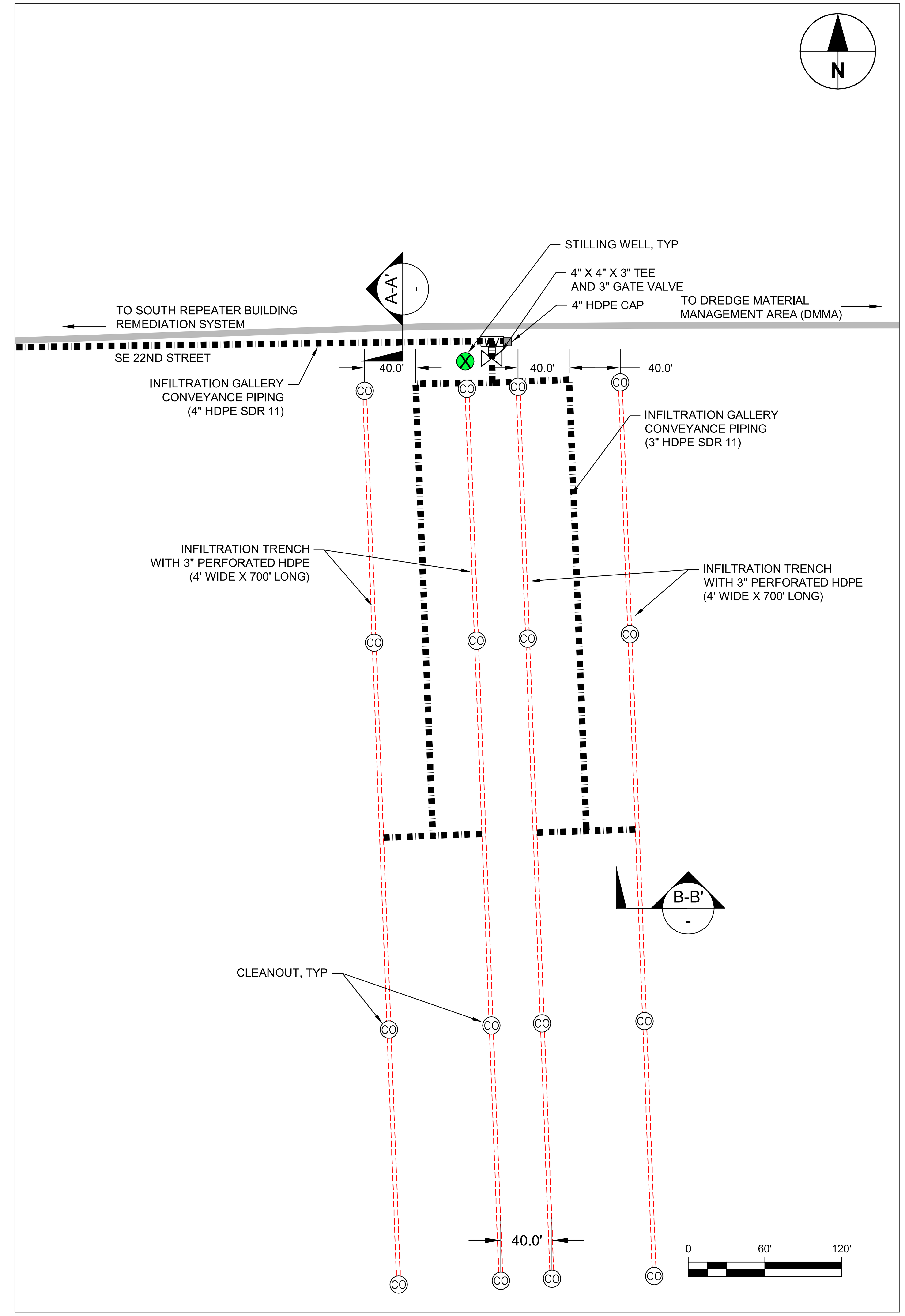


LEGEND:

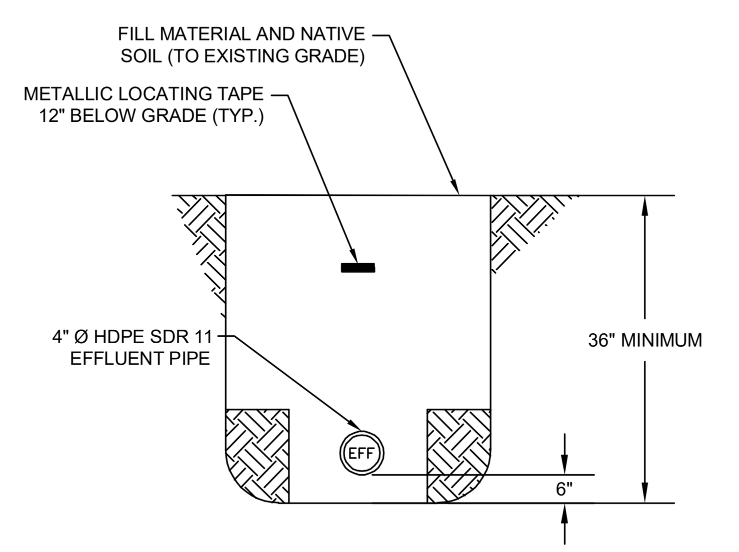
- HDD Approximate Location of HDD Borehole In/Out
- Extraction Pump Electrical Line
- Water Conveyance and Communication Lines
- Stilling Well
- Monitoring Well
- Cleanout Manhole
- Electrical Manhole
- Underground Water Line
- Underground Electrical Line
- Underground Communications Conduit
- Underground Fiber Optic
- Fence

NOTE:

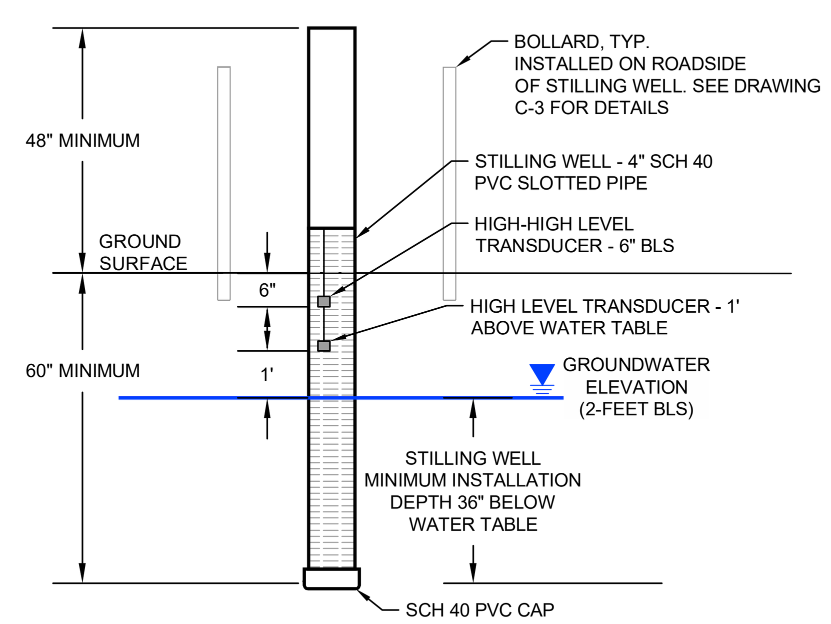
- UTILITY LOCATIONS FROM KSC GEODATABASE (4/8/2020). FIELD VERIFY UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
- HDD - HORIZONTAL DIRECTIONAL DRILL
- ft - Feet
- in - Inch
- BLS - BELOW LAND SURFACE



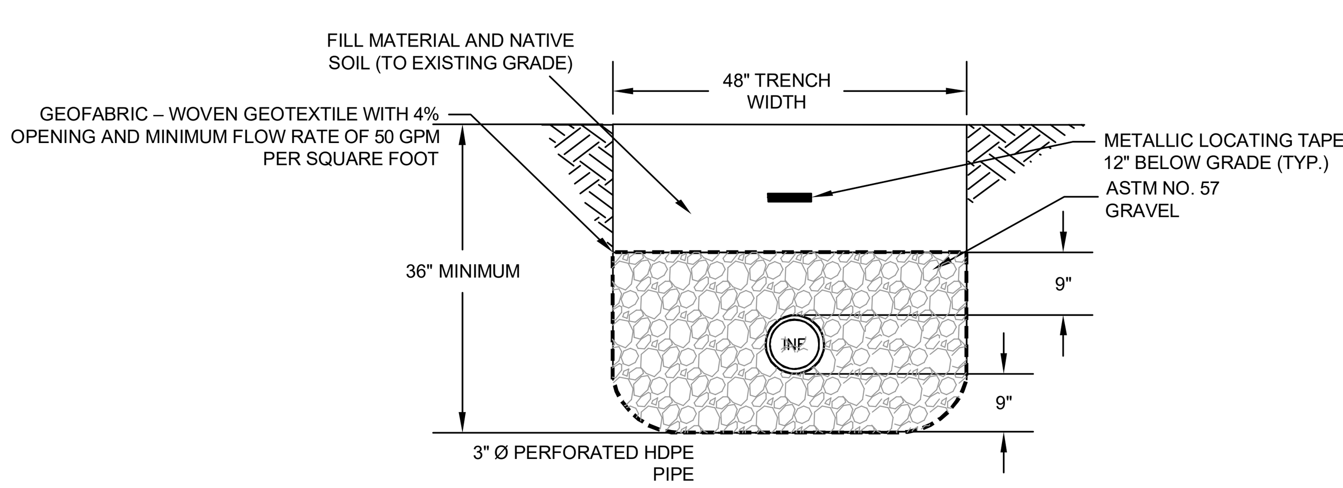
TRENCH DETAIL
SCALE: 1" = 60'



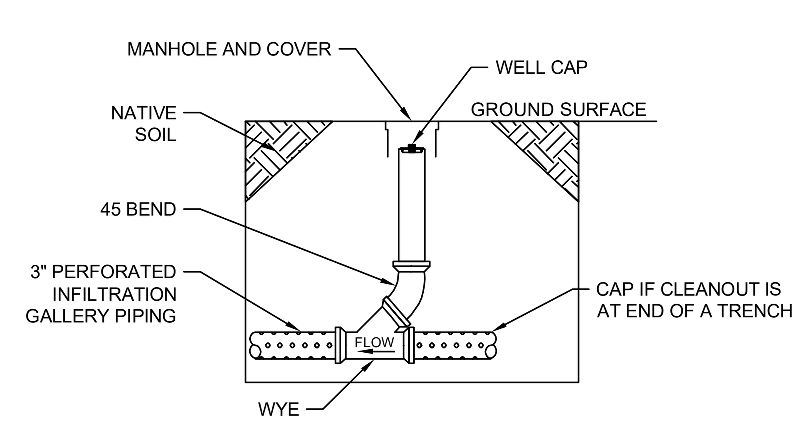
TRENCH SECTION A-A'
TYPICAL INFILTRATION GALLERY CONVEYANCE PIPING
SCALE: N.T.S.



TYPICAL STILLING WELL
SCALE: N.T.S.



TRENCH SECTION B-B'
SCALE: N.T.S.



CLEANOUT DETAIL
SCALE: N.T.S.

LEGEND:

- EFF 5" SDR 11 EFFLUENT CONVEYANCE PIPE
- INF 3" HDPE PERFORATED PIPE

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NO. 66619

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KEY PLAN

PROJECT NUMBER

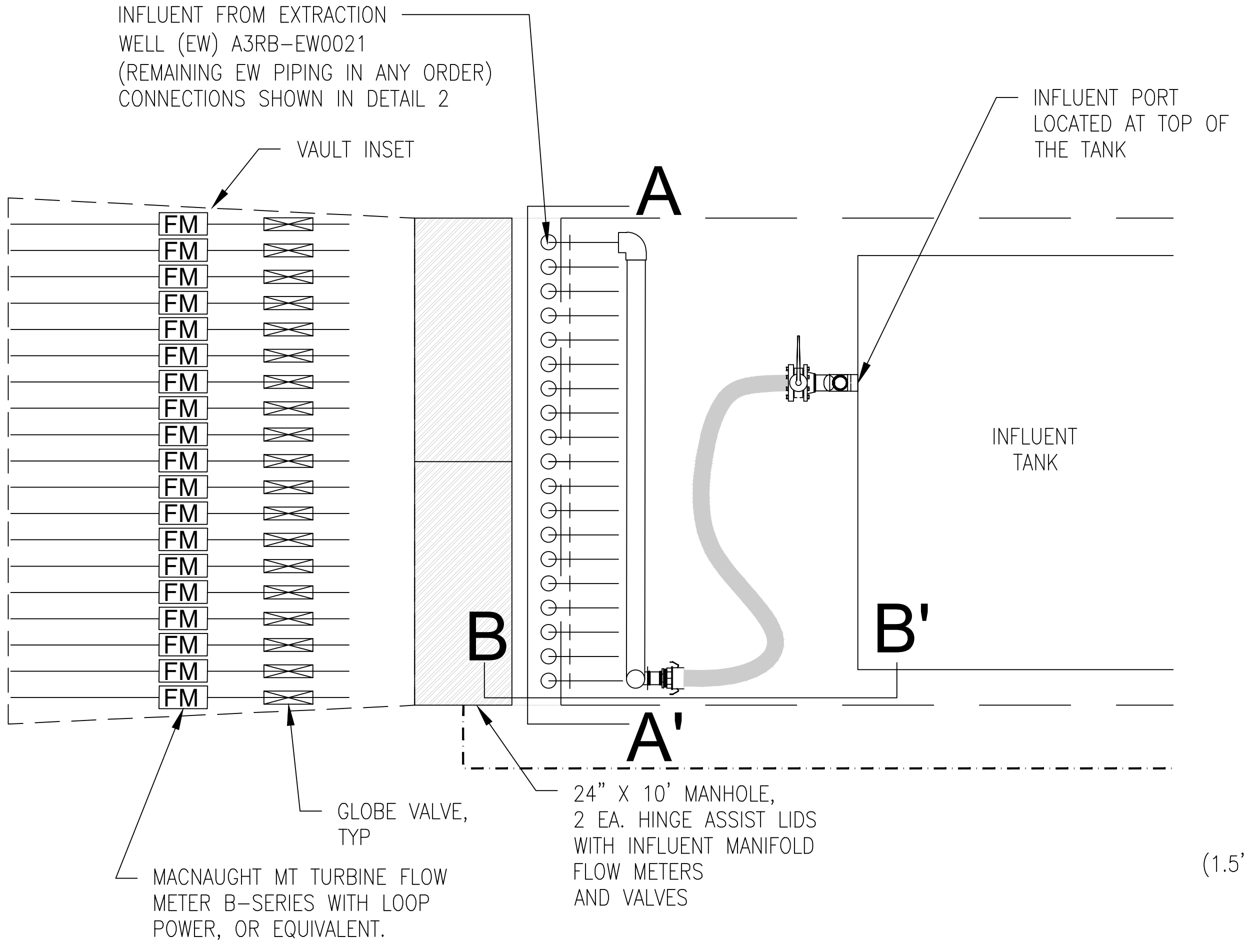
60667657

SHEET TITLE

TREATMENT SYSTEM EFFLUENT - INFILTRATION GALLERY

SHEET NUMBER

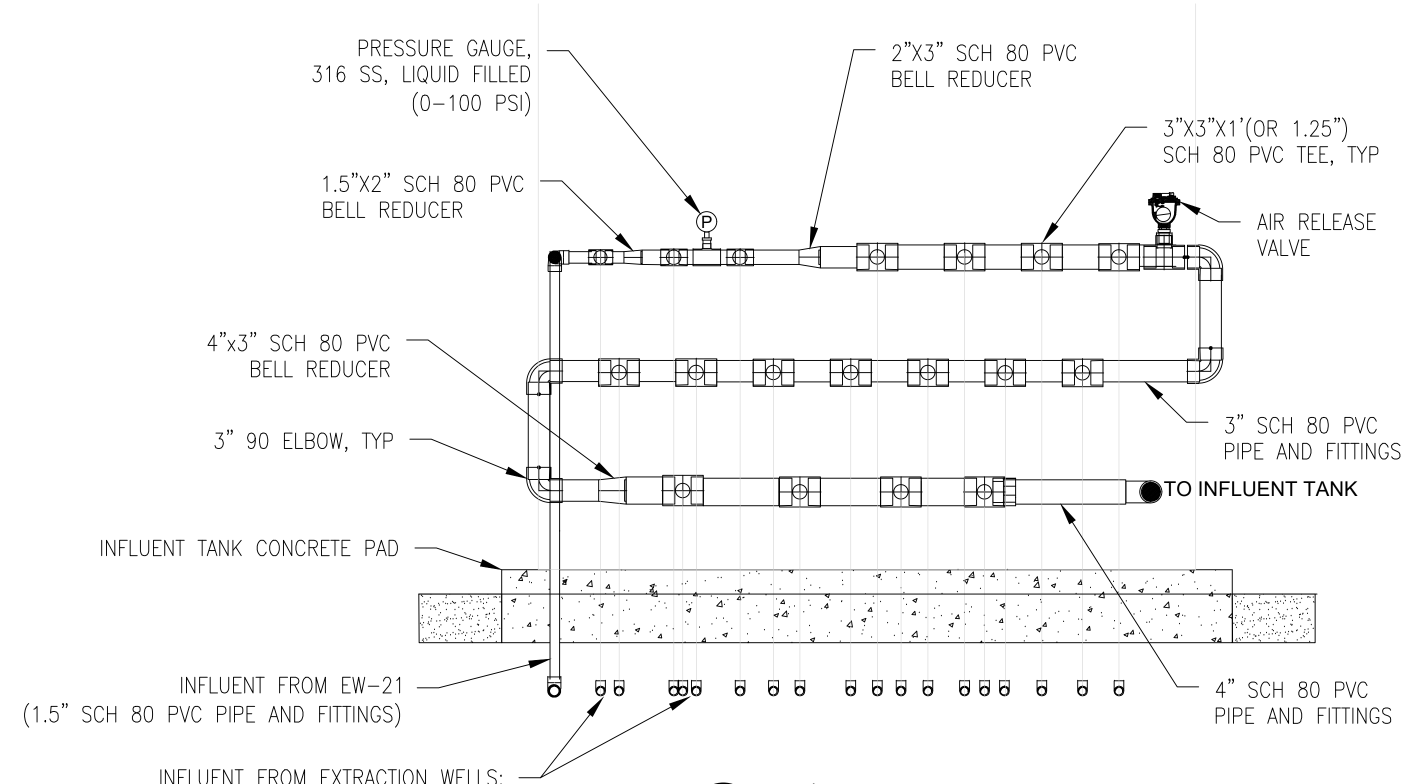
C-9



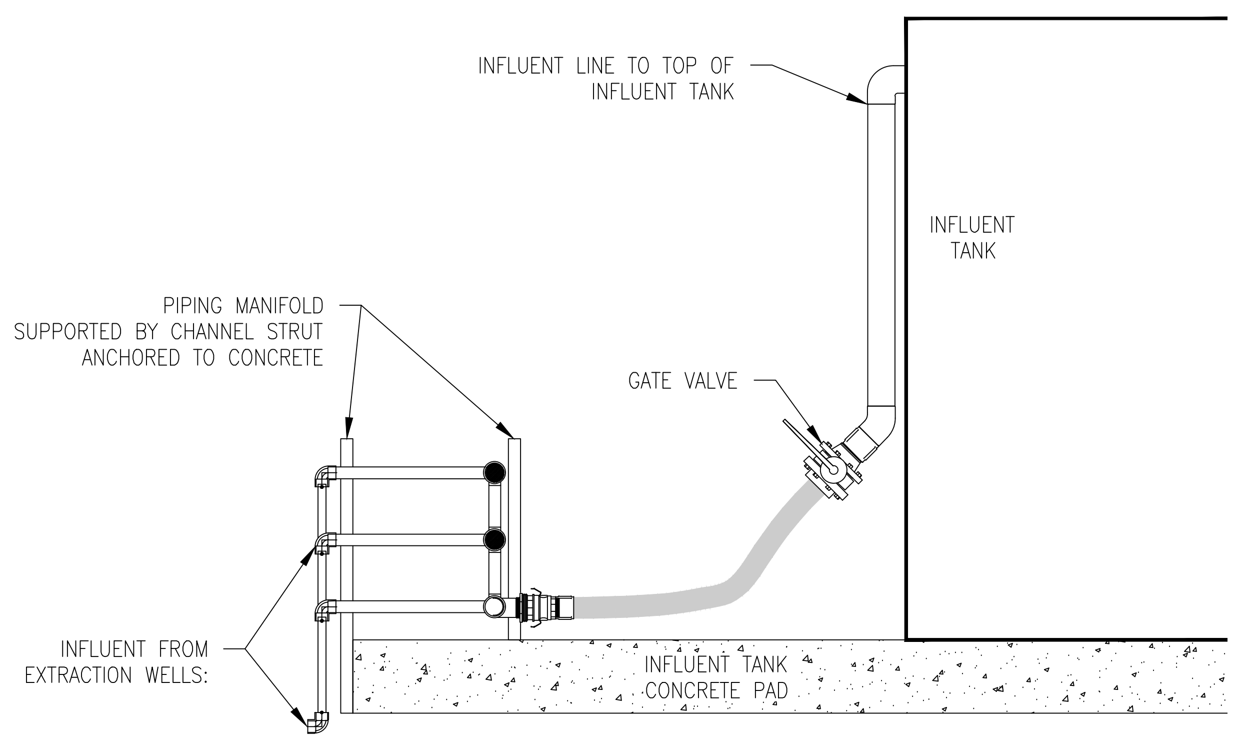
1 INFLUENT VAULT AND MANIFOLD DETAIL
- SCALE: NOT TO SCALE

PLAN VIEW

N



2 A-A' INFLUENT MANIFOLD DETAIL
- SCALE: NOT TO SCALE



3 B-B' INFLUENT MANIFOLD DETAIL
- SCALE: NOT TO SCALE

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I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER
60667657

SHEET TITLE
TREATMENT SYSTEM DETAILS

SHEET NUMBER
C-200

ANSI D 22" x 34"
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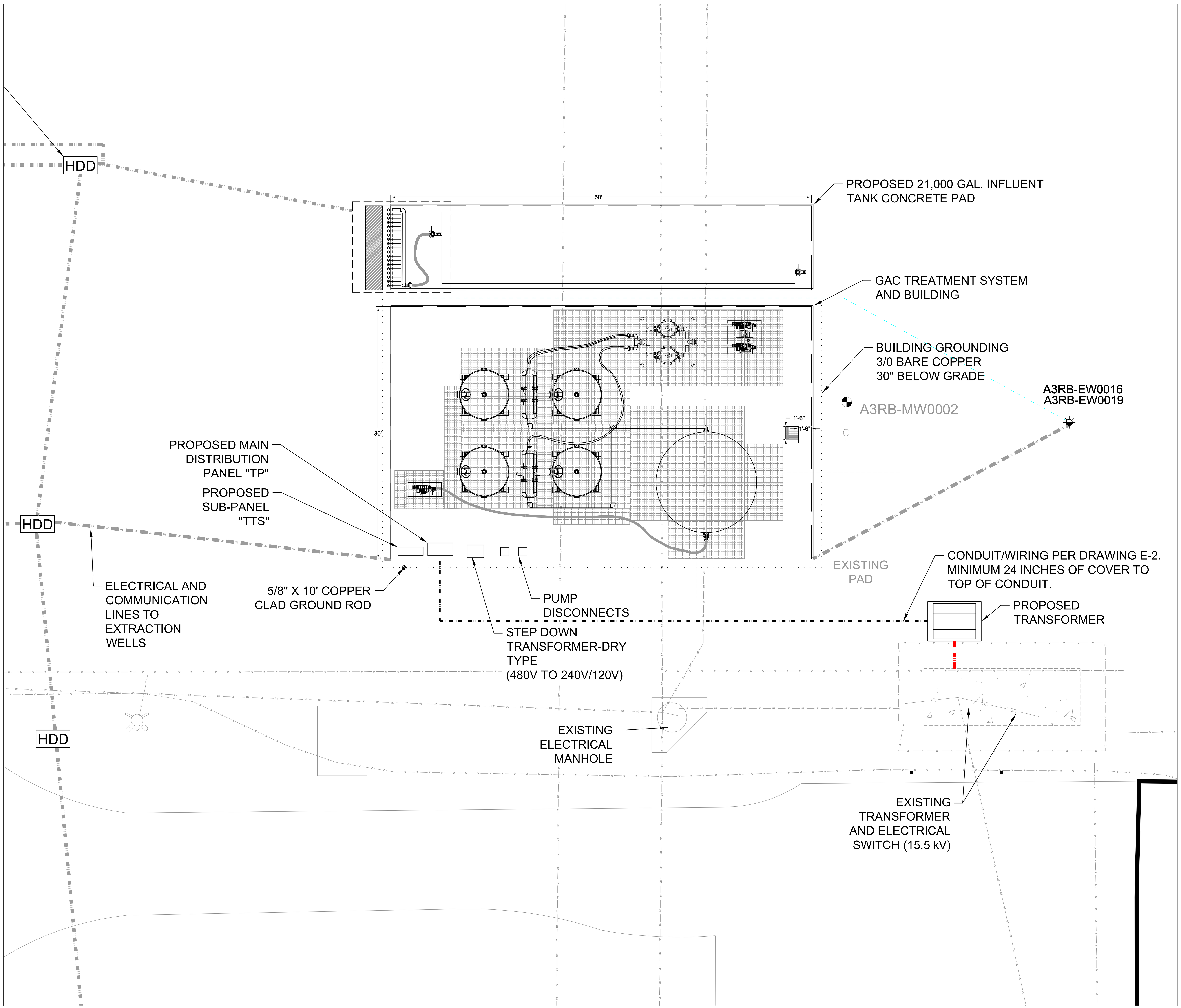

LEGEND:

- HDD Approximate Location of HDD Borehole In/Out
- New Switchgear to Transformer Power Distribution Trench with Concrete Encased Conduit (See Detail Sheet E-200)
- New Extraction Pump Electrical Line
- Power, Water, and Communication Lines
- Monitoring Well
- Groundwater Extraction Well
- Electrical Manhole
- Existing Underground Water Line
- Existing Underground Electrical Line
- Existing Underground Communications Conduit
- Existing Underground Fiber Optic
- Existing Fence

NOTE:

- THE EQUIPMENT WILL BE HOUSED IN A STEEL GARAGE RATED TO 170 MPH.
- SEE DRAWING G-1 FOR DETAILS ON THE LIGHTNING PROTECTION
- UTILITY LOCATIONS FROM KSC GEODATABASE (4/8/2020). FIELD VERIFY UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
- GAC - GRANULAR ACTIVATED CARBON
- GAL. - GALLON
- HDD - HORIZONTAL DIRECTIONAL DRILL
- ft - Feet
- in - Inch

0 6' 12'

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SOUTH REPEATER BUILDING

NASA, John F. Kennedy Space Center
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REGISTRATION

Henryk B. Juszczyk
Florida Professional License No. 58082

ISSUE/REVISION

I/R	DATE	DESCRIPTION
I	2024-07-01	

KEY PLAN

PROJECT NUMBER

60667657

SHEET TITLE

ELECTRICAL LAYOUT

SHEET NUMBER

E-1

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

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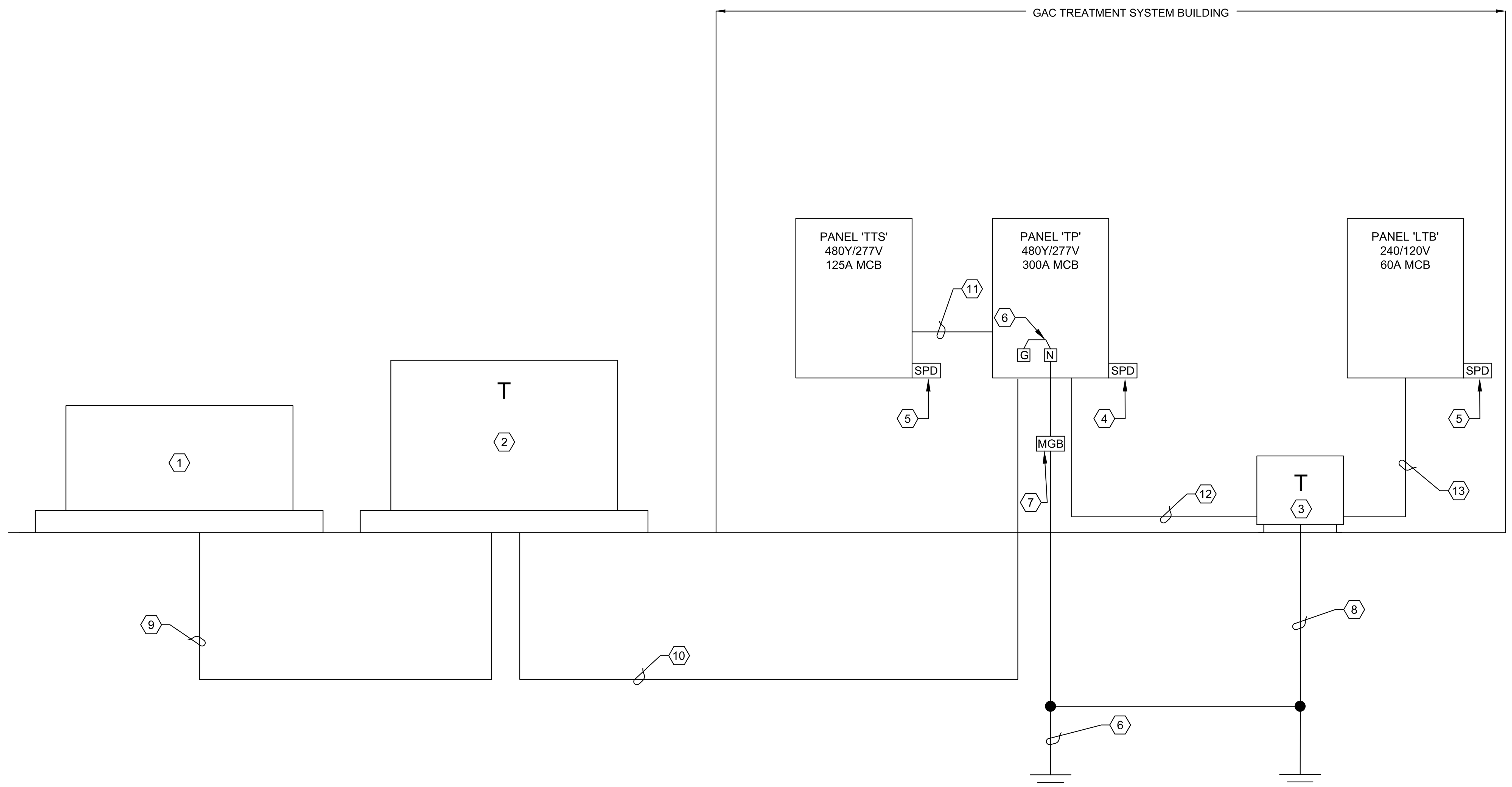
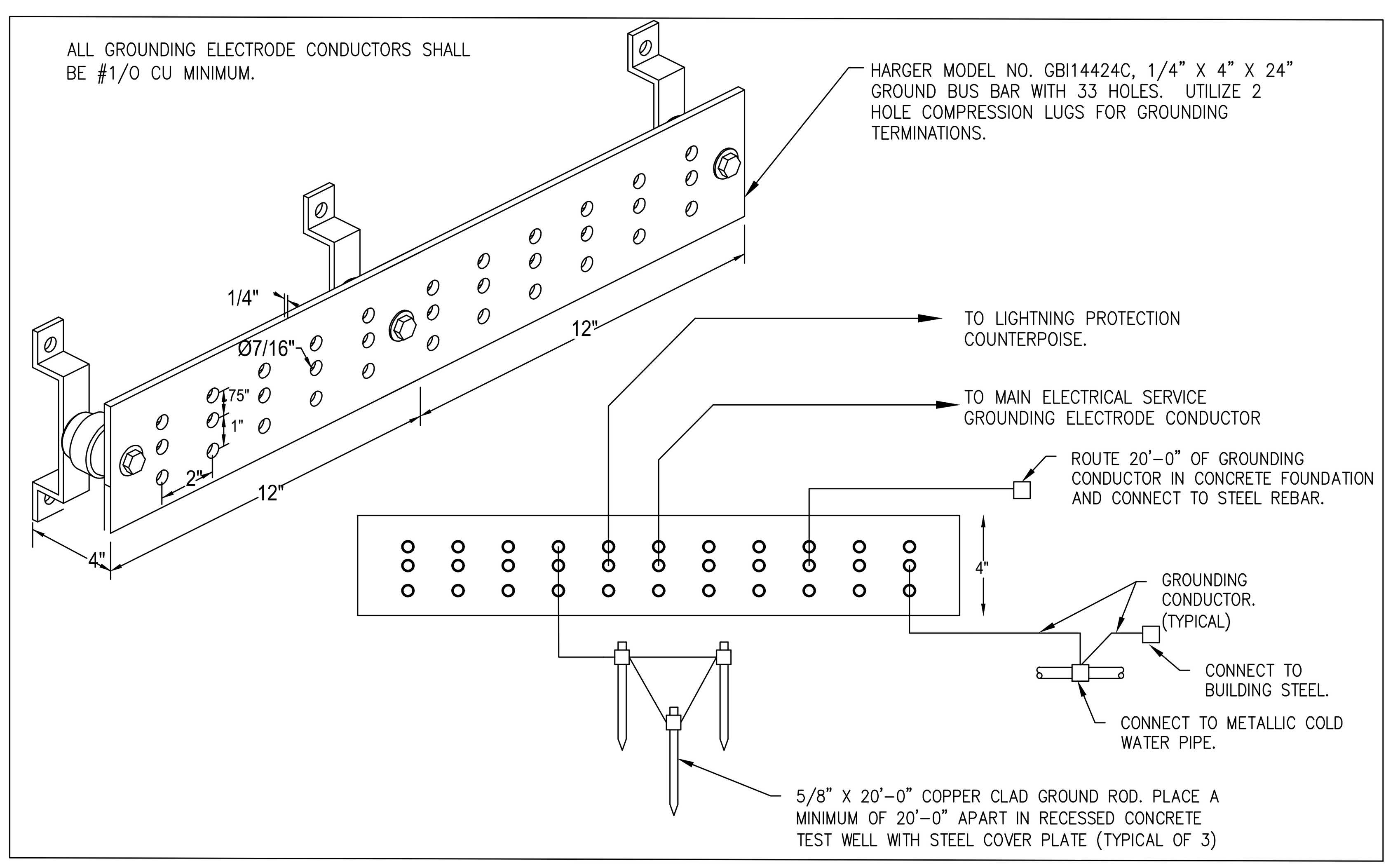


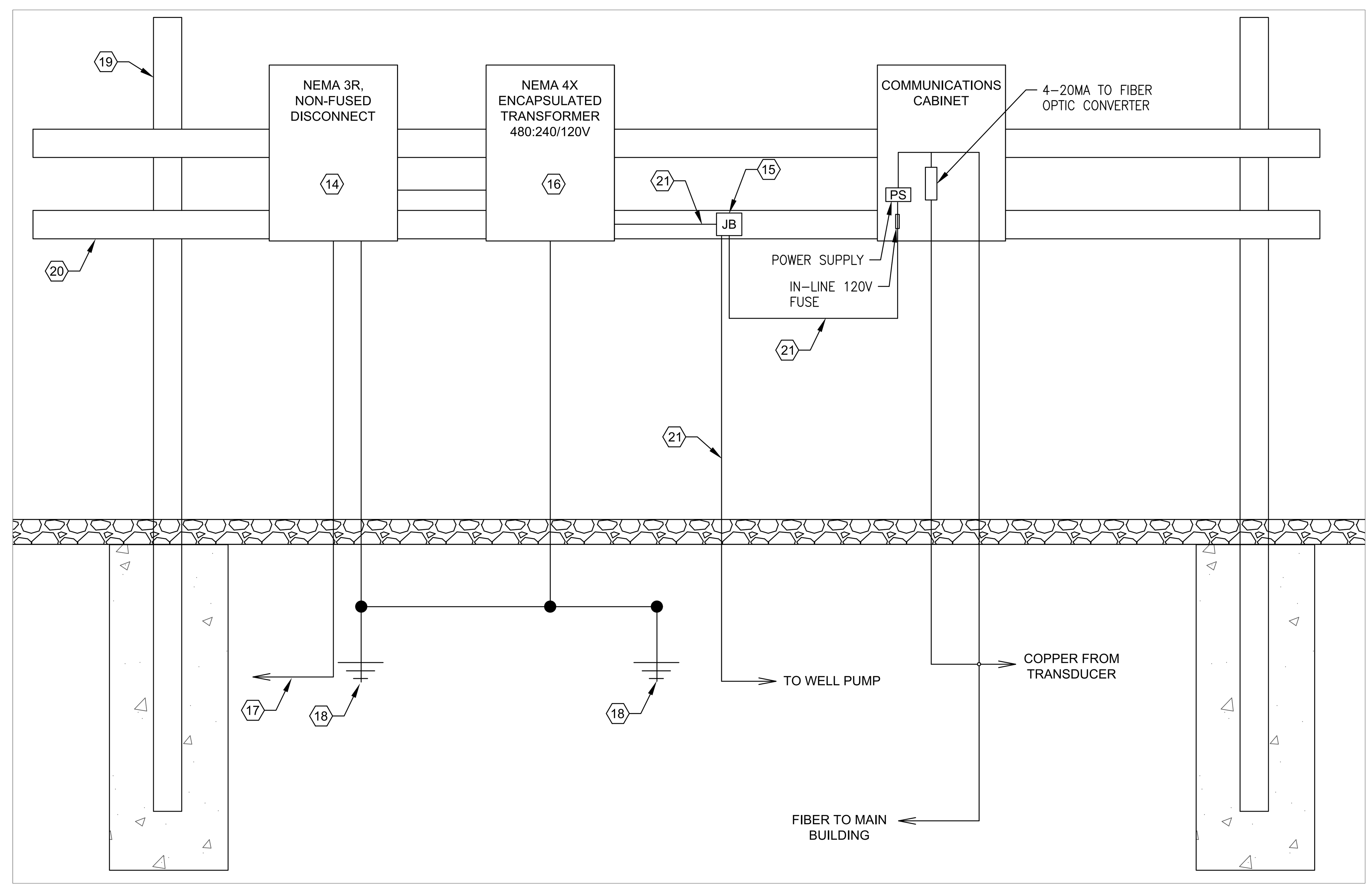
1 POWER RISER DIAGRAM
SCALE: N.T.S.

X	KEYED NOTES:
1.	EXISTING MEDIUM VOLTAGE 400A, 3P SWITCH.
2.	13.2KV:480Y/277V, 3 PHASE 225KVA PAD-MOUNTED TRANSFORMER.
3.	480:240/120V 1 PHASE 15KVA DRY-TYPE TRANSFORMER.
4.	PROVIDE TYPE 1 SERVICE ENTRANCE SPD.
5.	PROVIDE TYPE 2 SECONDARY SERVICE SPD.
6.	PROVIDE #1/0 AWG MAIN BONDING JUMPER FROM NEUTRAL TO GROUND BUS BAR AND BOND TO GROUNDING ELECTRODE SYSTEM AS SHOWN ON DETAIL #2 ON THIS SHEET.
7.	MAIN GROUND BAR 'MGB'. REFER TO DETAIL 2 ON THIS SHEET.
8.	#8 CU GEC.
9.	2-3/C #250 KCMIL 15KV - 6"C.
10.	4#350 KCMIL CU - 4"C.
11.	4#1 CU & 1#6 CU GND - 2"C.
12.	2#8 CU & 1#10 CU GND - 1"C.
13.	2#4 CU & 1#8 CU GND - 1"C.
14.	NEMA3R/600V/30A/2P NON-FUSED HEAVY-DUTY DISCONNECT SWITCH.
15.	4" SQUARE X 2-1/8" DEEP SURFACE MOUNTED WEATHERPROOF JUNCTION BOX.
16.	NEMA4X ENCAPSULATED STEP-DOWN TRANSFORMER 480:240/120V 5KVA. PROVIDE 7.5 KVA FOR A3RB-EW0021.
17.	BRANCH CIRCUIT FROM PANEL 'TTS' REFER TO PANEL SCHEDULE FOR CIRCUIT AND CONDUIT AND CONDUCTOR SIZE.
18.	(2) 5/8 X 10' COPPER CLAD GROUND RODS SPACED A MINIMUM OF 10'-0" APART. BOND WITH #6 CU GEC. BOND UNISTRUT TO GROUND WITH #6 CU.
19.	6" X6" X 10' LONG PRECAST CONCRETE POST SET 3'-0" INTO EARTH WITH A 6" DEEP CONCRETE FOOTER AT BASE OF POSTS.
20.	3/4" UNISTRUT MOUNTED HORIZONTALLY BETWEEN CONCRETE POSTS. PROVIDE PLASTIC END-CAPS ON ALL ENDS OF UNISTRUT.
21.	2#10 CU & 1#10 CU GND - 1"C.

A AMPERE
C CENTER
CU COPPER
GEC GROUNDING ELECTRODE CONDUCTOR
GND GROUND
JB JUNCTION BOX
P PHASE
PS POWER SUPPLY
SPD SURGE PROTECTION DEVICE
V VOLT



2 TYPICAL PANEL GROUNDING
SCALE: N.T.S.



3 EXTRACTION WELL CONTROL PANEL RACK
SCALE: N.T.S.

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

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Filename: M:\500_DELIVERABLES\513_SOUTH REPEATER PUMP IMWP\00_AECOM DRAFT\FIGURES\CAD\DRAWINGS\20240930\E-2_POWER RISER DIAGRAM-LM_REV20240930.DWG

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PROJECT
SOUTH REPEATER BUILDING

NASA, John F. Kennedy Space Center
Merritt Island, Florida

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REGISTRATION
Henryk B. Juszczyk
Florida Professional License No. 58082

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER
60667657

SHEET TITLE
POWER RISER DIAGRAM

SHEET NUMBER
E-2

PANELBOARD: TP (NEW)

BUS AMPS: 400A
MAIN SIZE/TYPE: 300A MCB
VOLTS/PHASE: 480Y/277V, 3PH, 4W
SECTION: 1

FAULT CURRENT: REFER TO ONE-LINE DIAGRAM
AIC RATING: 42000 FULLY RATED
SERVES:
MOUNTING: SURFACE ENCLOSURE: NEMA 1
LOCATION:

PROVIDE EQUIPMENT GROUND BUS
SERVICE ENTRANCE RATED

CKT	DESCRIPTION	CONDUCTOR & CONDUIT					BREAKER			VOLTAMPS/PHASE			VOLTAMPS/PHASE			BREAKER			CONDUCTOR & CONDUIT					DESCRIPTION	CKT
NO.		PH	NEUT	GND	IG	COND	TYP	AMP	POLE	A	B	C	A	B	C	POLE	AMP	TYP	COND	IG	GND	NEUT	PH		NO.
1	(2) 7.5 HP MOTORS	10	--	10	--	3/4"		30	3	9,150			2,107			3	30		3/4"	--	10	--	10	5 HP MOTOR	2
3		10									9,150			2,107									10		4
5		10													2,107								10		6
7	SPARE	--	--	--	--			30	3							3	30			--	--	--	--	SPARE	8
9		--																					--		10
11		--																					--		12
13	SPACE	--	--	--	--				1							1				--	--	--	--	SPACE	14
15	SPACE	--	--	--	--				1							1				--	--	--	--	SPACE	16
17	SPACE	--	--	--	--				1							1				--	--	--	--	SPACE	18
19	SPACE	--	--	--	--				1							1				--	--	--	--	SPACE	20
21	SPACE	--	--	--	--				1							1				--	--	--	--	SPACE	22
23	SPACE	--	--	--	--				1							1				--	--	--	--	SPACE	24
25	SPACE	--	--	--	--				1							1				--	--	--	--	SPACE	26
27	SPACE	--	--	--	--				1							1				--	--	--	--	SPACE	28
29	SPACE	--	--	--	--				1							1				--	--	--	--	SPACE	30
31	SPACE	--	--	--	--				1				27,700			3	100			--	--	--	--	SPARE (Future load) Treatment System	32
33	PANEL LTB	8	--	10	--	1"		40	2		1,100			27,700									--		34
35		8										720			27,700								--		36
37	PANEL TTS	1	1	6	--	1-1/2"		125	3	16,640						3	30		1"	--	10	10	10	SPD	38
39		1									15,015												10		40
41		1										15,485											10		42
							SUBTOTAL			25,790	25,265	16,205	29,807	29,807	29,807	SUBTOTAL									

LOAD	CONN. VA	DF	LOAD	CONN. VA	DF
COOLING		1.00	REFRIGERATION		1.00
HEATING		0	SIGN/DISPLAY		1.25
LIGHTING	400	1.25	KITCHEN		1.00
RECEPTACLES	720	1.0/.5	EXISTING		1.00
MOTORS	63,346	1.00	LARGEST MOTOR	9,115	1.25
WATER HEATER		1.00	SHOW WINDOW		1.25
MISC EQUIP	83,100	1.00	LTG TRACK		1.00

TOTAL PHASE A - VA	55,597	
CONN.AMPS	201	
TOTAL PHASE B - VA	55,072	
CONN. AMPS	199	
TOTAL PHASE C - VA	46,012	
CONN. AMPS	166	**TOTAL DEMAND**
TOTAL PNLBD - VA	156,681	159,060 VA
AMPS	188	191 A

PANELBOARD: TTS (NEW)

BUS AMPS: 125A
MAIN SIZE/TYPE: 125A MCB
VOLTS/PHASE: 480Y/277V, 3PH, 4W
SECTION: 1

FAULT CURRENT: REFER TO ONE-LINE DIAGRAM
AIC RATING: 30000 FULLY RATED
SERVES:
MOUNTING: SURFACE ENCLOSURE: NEMA 1
LOCATION:

PROVIDE EQUIPMENT GROUND BUS

CKT	DESCRIPTION	CONDUCTOR & CONDUIT					BREAKER			VOLTAMPS/PHASE			VOLTAMPS/PHASE			BREAKER			CONDUCTOR & CONDUIT					DESCRIPTION	CKT
NO.		PH	NEUT	GND	IG	COND	TYP	AMP	POLE	A	B	C	A	B	C	POLE	AMP	TYP	COND	IG	GND	NEUT	PH		NO.
1	A3RB-EW0004	8	--	8	--	1"		15	2	1,155			1,155			2	15		1"	--	6	--	6	A3RB-EW0014	2
3		8									1,155			1,155									6		4
5	A3RB-EW0005	10	--	10	--	1"		15	2			1,155			1,155	2	15		1"	--	8	--	8	A3RB-EW0015	6
7		10								1,155			1,155										8		8
9	A3RB-EW0006	6	--	6	--	1"		15	2		1,155			1,155		2	15		1"	--	10	--	10	A3RB-EW0016	10
11		6										1,155			1,155								10		12
13	A3RB-EW0007	4	--	4	--	1"		15	2	1,155			1,155			2	15		1"	--	8	--	8	A3RB-EW0017	14
15		4									1,155			1,155									8		16
17	A3RB-EW0008	4	--	4	--	1"		15	2			1,155			1,155	2	15		1"	--	6	--	6	A3RB-EW0018	18
19		4								1,155			1,155										6		20
21	A3RB-EW0009	3	--	3	--	1"		15	2		1,155			1,155		2	15		1"	--	10	--	10	A3RB-EW0019	22
23		3										1,155			1,155								10		24
25	A3RB-EW0010	3	--	3	--	1"		15	2	1,155			1,155			2	15		1"	--	10	--	10	A3RB-EW0020	26
27		3									1,155			1,155									10		28
29	A3RB-EW0011	3	--	3	--	1"		15	2			1,155			2,780	2	20		1"	--	4	--	4	A3RB-EW0021	30
31		3								1,155			2,780										4		32
33	A3RB-EW0012	4	--	4	--	1"		15	2		1,155			1,155		2	15		1"	--	8	--	8	A3RB-EW0022	34
35		4										1,155			1,155								8		36
37	A3RB-EW0013	4	--	4	--			15	2	1,155						3	30		1"	--	10	10	10	SPD	38
39		4									1,155												10		40
41	SPARE	--	--	--	--			20	1														10		42
							SUBTOTAL			8,085	8,085	6,930	8,555	6,930	8,555	SUBTOTAL									

LOAD	CONN. VA	DF	LOAD	CONN. VA	DF
COOLING		1.00	REFRIGERATION		1.00
HEATING		0	SIGN/DISPLAY		1.25
LIGHTING		1.25	KITCHEN		1.00
RECEPTACLES		1.0/.5	EXISTING		1.00
MOTORS	44,330	1.00	LARGEST MOTOR	2,810	1.25
WATER HEATER		1.00	SHOW WINDOW		1.25
MISC EQUIP		1.00	LTG TRACK		1.00

TOTAL PHASE A - VA	16,640	
CONN.AMPS	60	
TOTAL PHASE B - VA	15,015	
CONN. AMPS	54	
TOTAL PHASE C - VA	15,485	
CONN. AMPS	56	**TOTAL DEMAND**
TOTAL PNLBD - VA	47,140	47,843 VA
AMPS	57	58 A

PANELBOARD: LTB (NEW)

BUS AMPS: 60A
MAIN SIZE/TYPE: 60A MCB
VOLTS/PHASE: 240D/120V, 1PH, 3W
SECTION: 1

FAULT CURRENT: REFER TO ONE-LINE DIAGRAM
AIC RATING: 10000 FULLY RATED
SERVES:
MOUNTING: SURFACE ENCLOSURE: NEMA 1
LOCATION:

PROVIDE EQUIPMENT GROUND BUS

CKT	DESCRIPTION	CONDUCTOR & CONDUIT					BREAKER			VA/PHASE		VA/PHASE		BREAKER			CONDUCTOR & CONDUIT					DESCRIPTION	CKT
NO.		PH	NEUT	GND	IG	COND	TYP	AMP	POLE	A	B	A	B	POLE	AMP	TYP	COND	IG	GND	NEUT	PH		NO.
1	LIGHTING - INTERIOR	12	12	12	--	3/4"		20	1	400		700		1	20		3/4"	--	12	12	12	EXAHUST FAN	2
3	RECEPTACLES - INTERIOR	12	12	12	--	3/4"		20	1		720			1	20			--	--	--	--	SPARE	4
5	SPARE	--	--	--	--			20	1					1	20			--	--	--	--	SPARE	6
7	SPARE	--	--	--	--			20	1					1	20			--	--	--	--	SPARE	8
9	SPARE	--	--	--	--			20	1					1	20			--	--	--	--	SPARE	10
11	SPARE	--	--	--	--			20	1					1	20			--	--	--	--	SPARE	12
13	SPARE	--	--	--	--			20	1					1	20			--	--	--	--	SPARE	14
15	SPARE	--	--	--	--			20	1					1	20			--	--	--	--	SPARE	16
17	SPARE	--	--	--	--			20	1					1	20			--	--	--	--	SPARE	18
19	SPARE	--	--	--	--			20	1					1	20			--	--	--	--	SPARE	20
21	SPARE	--	--	--	--			20	1					1	20			--	--	--	--	SPARE	22
23	SPACE	--	--	--	--				1					1				--	--	--	--	SPACE	24
25	SPACE	--	--	--	--				1					1				--	--	--	--	SPACE	26
27	SPACE	--	--	--	--				1					2	30		1"	--	10	10	10	SPD	28
29	SPACE	--	--	--	--				1												10		30
							SUBTOTAL			400	720	700		SUBTOTAL									

LOAD	CONN. VA	DF	LOAD	CONN. VA	DF
COOLING		1.00	REFRIGERATION		1.00
HEATING		0	DISPLAY CASE		1.25
LIGHTING	400	1.25	KITCHEN		1.00
RECEPTACLES	720	1.0/.5	EXISTING		1.00
MOTORS	700	1.00	LARGEST MOTOR		1.25
WATER HEATER		1.00	SHOW WINDOW		1.25
MISC EQUIP		1.00	LTG TRACK		1.00

TOTAL PHASE A - VA	1,100	
CONN. AMPS	9	
TOTAL PHASE B - VA	720	
CONN. AMPS	6	
TOTAL PNLBD - VA	1,820	
CONN. AMPS	8	**TOTAL DEMAND**
		1,920 VA
		8 A

FAULT CURRENT SCHEDULE

PANEL/EQUIPMENT NAME	FED FROM	AVAILABLE FAULT CURRENT
PANEL 'TP'	XFMR	25,691
PANEL 'TTS'	PANEL 'TP'	24,194
PANEL 'LTB'	PANEL 'TP'	< 10,000

GENERAL NOTES:

AVAILABLE FAULT CURRENT (AFC) IS THE MINIMUM AIC RATING REQUIREMENT OF THE PANEL/CIRCUIT BREAKERS

UTILITY TRANSFORMER IS ASSUMED 250 KVA, 277/480 VOLT, 3 PHASE, WITH 27,972 AIC RATING AT THE SECONDARY LUGS. %Z = 5.06

PROVIDE PLAQUE INDICATING "MAIN SERVICE DISCONNECT", MAXIMUM AVAILABLE FAULT CURRENT, AND CALCULATION DATE OF 07/24/2024, IN ACCORDANCE WITH NEC 110.24.

AECOM

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SOUTH REPEATER BUILDING

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REGISTRATION
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Florida Professional License No. 58082

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

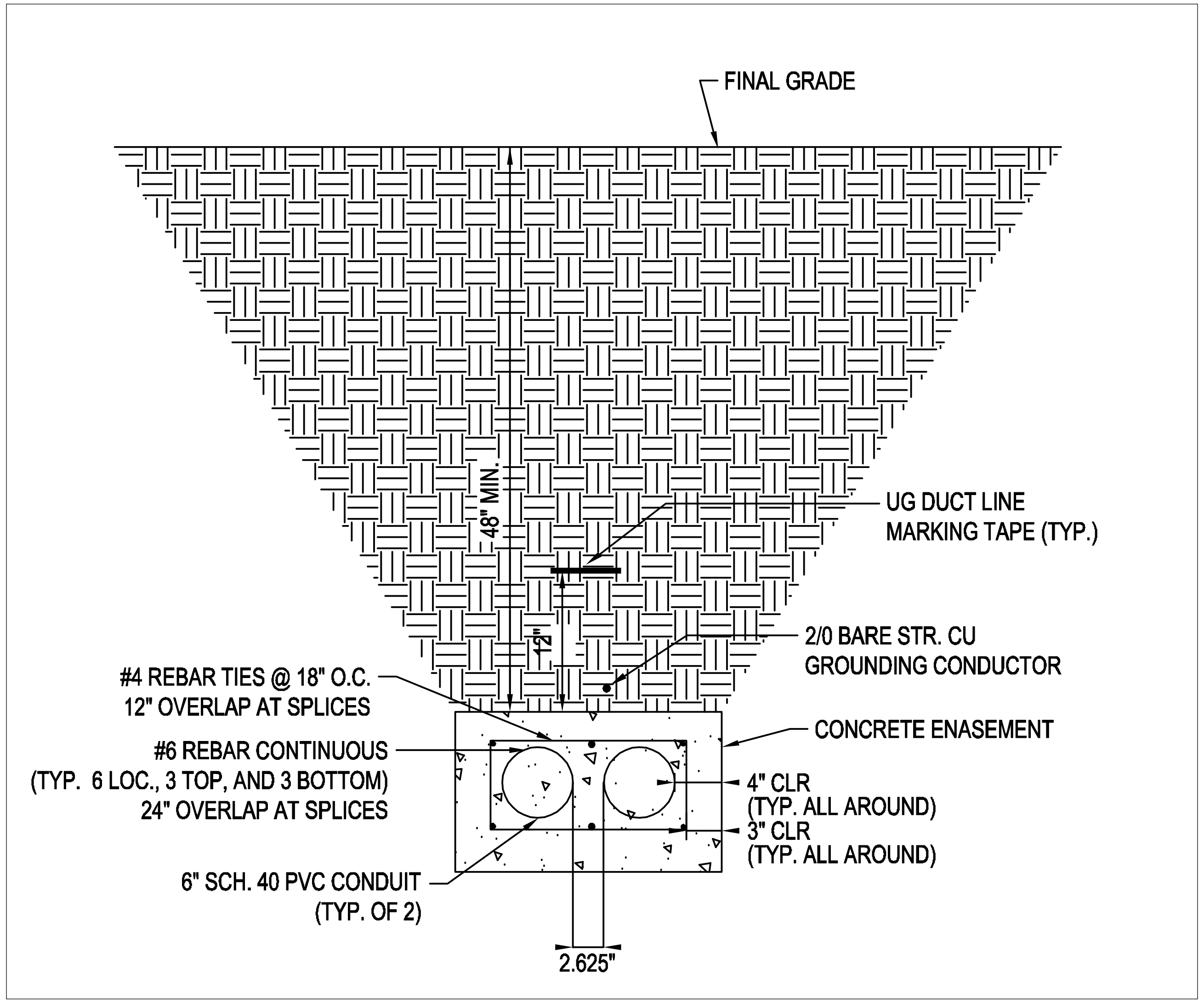
PROJECT NUMBER
60667657

SHEET TITLE
ELECTRICAL SCHEDULES AND FAULT CURRENT TABLE

SHEET NUMBER
E-3

LIGHTNING PROTECTION SYSTEM:

1. LIGHTNING PROTECTION SYSTEM INSTALLATION AND MATERIALS MUST CONFORM TO UL 96, UL 96A, AND NFPA 780 REQUIREMENTS AND MUST BE INSTALLED BY A CERTIFIED INSTALLER WITH A COMMERCIAL THIRD–PARTY INSPECTION COMPANY WHOSE SOLE WORK IS LIGHTNING PROTECTION OR IS A UL LISTED LIGHTNING PROTECTION INSTALLER. THIRD PARTY UL MASTER LABEL CERTIFICATION OF THE LIGHTING PROTECTION SYSTEM WILL BE FURNISHED TO THE OWNER UPON COMPLETION.
2. ALL LIGHTNING PROTECTION CABLES AND DOWN LEADS SHALL BE CONCEALED.
3. ALL LIGHTNING PROTECTION CONDUCTORS ARE TO MAINTAIN A HORIZONTAL OR DOWNWARD PATH. ALL BENDS IN THE CONDUCTOR SHALL HAVE A RADIUS OF 8'' OR GREATER AND SHALL HAVE AN ANGLE BEND OF 90 DEGREES OR GREATER.
4. ADHESIVE USED WITH AIR TERMINALS SHALL BE COMPATIBLE WITH ROOFING MEMBRANE. COORDINATE WITH BUILDING CONTRACTOR.
5. ALL LIGHTNING PROTECTION CONDUCTORS SHALL BE CLASS I ALUMINUM.
6. METAL BODIES WITHIN 6' OF THE LIGHTNING PROTECTION SYSTEM SHALL BE BONDED TO THE LIGHTNING PROTECTION SYSTEM.
7. ALL METALLIC ROOF MOUNTED EQUIPMENT INCLUDING, BUT NOT LIMITED TO, ANTENNA STRUCTURES, HVAC EQUIPMENT, ROOF HATCHES, METALLIC PIPE STACKS, STRUCTURES, AND OTHER METALLIC APPURTENANCES (WHERE APPLICABLE) MUST BE BONDED TO THE LIGHTNING PROTECTION SYSTEM PER NFPA 780.
8. PROVIDE GROUNDING ELECTRODE TO STEEL COLUMNS (WHERE APPLICABLE) IN COMPLIANCE WITH NFPA 780.
9. BI–METALLIC LIGHTNING PROTECTION SYSTEM COMPONENTS SHALL BE USED TO AVOID ELECTROLYTIC CORROSION AS APPLICABLE.
10. UNDERGROUND METALLIC PIPING ENTERING THE BUILDING SHALL BE BONDED TO THE NEAREST DOWN CONDUCTOR OR GROUND ELECTRODE.
11. IF THE METAL THICKNESS OF AN OBJECT IS 3/16'' OR GREATER, AIR TERMINALS MAY BE ELIMINATED IF THE OBJECT IS PROPERLY CONNECTED TO THE SYSTEM.
12. AIR TERMINALS ARE TO BE A MAXIMUM OF 24'' FROM THE ROOF EDGE AND PROJECT A MINIMUM OF 10'' ABOVE THE PROTECTED EDGE. THE SPACING BETWEEN AIR TERMINALS IS NOT TO EXCEED 20'. AIR TERMINALS THAT EXTEND 24'' ABOVE THE PROTECTED EDGE ARE NOT TO EXCEED A SPACING GREATER THAN 25', EXCEPT FOR MID–ROOF AIR TERMINALS (50' MAX SPACING). VERIFY THAT THE SPACING BETWEEN DOWN CONDUCTORS IS IN COMPLIANCE WITH NFPA 780.
13. EXCEPT AS OTHERWISE NOTED, LIGHTING PROTECTION SYSTEM MATERIALS MUST BE BARE ALUMINUM. LIGHTING PROTECTION MATERIALS INSTALLED BELOW GRADE UP TO 10'–0" ABOVE GRADE MUST BE BARE COPPER, COPPER ALLOY, OR BRONZE. PROVIDE BI–METAL FITTINGS FOR MAKING CONNECTIONS BETWEEN DIFFERENT METALS AS REQUIRED TO AVOID CORROSION DUE TO GALVANIC ACTION.
14. MAKE CONNECTIONS BETWEEN LIGHTNING PROTECTION COUNTERPOISE GROUNDING ELECTRODE CONDUCTOR AND GROUND RODS INSIDE TEST WELLS USING MECHANICAL CONNECTORS. MAKE ALL OTHER BELOW GRADE CONNECTIONS VIA EXOTHERMIC WELDING PROCESS.
15. TEST WELLS MUST BE H20 OR HS20 TRAFFIC RATED, ROUND OR RECTANGULAR, PRECAST CONCRETE WITH DUCTILE IRON LID AND NOMINAL INSIDE DIMENSION OR 12" DIAMETER X 24" DEEP IF ROUND, AND 12"W X 12"L X 24"D IF RECTANGULAR. PROVIDE LID WITH CAST "GROUND" LEGEND.
16. GROUND RODS SHALL BE 5/8" X 10'–0" COPPER CLAD AND SHALL BE SPACED NOT LESS THAN 10'–0" APART IN TEST WELLS. DRIVE GROUND RODS UNTIL TOP IS 12" BELOW FINISHED GRADE.
17. PROVIDE A #3/0 SOFT DRAWN BARE STRANDED COPPER LIGHTNING PROTECTION SYSTEM GROUNDING ELECTRODE SYSTEM COUNTERPOISE CONDUCTOR BURIED WITH A MINIMUM OF 30" EARTH COVER. COUNTERPOISE SHALL BE 3'–0" FROM BUILDING.
18. PROVIDE SURGE PROTECTION DEVICES ON ALL COPPER CONDUCTORS ENTERING OR EXISTING THE BUILDING.
19. PROVIDE 1 1/4" SCHEDULE 80 PVC CONDUIT FROM MAIN GROUND BAR STUBBED OUT 2'–0" BEYOND BUILDING PERIMETER FOUNDATION. PROVIDE 3/0 SOFT DRAWN BARE STRANDED COPPER GROUNDING CONDUCTOR IN THIS CONDUIT BETWEEN MAIN GROUND BAR AND BUILDING COUNTERPOISE GROUNDING CONDUCTOR.
20. POWER AND METALLIC COMMUNICATIONS LINES SHALL ENTER THE BUILDING IN SHIELDED CABLES OR METALLIC CONDUIT RUN UNDERGROUND FOR AT LEAST 50'–0" (15M) FROM STRUCTURE.
21. BURIED METALLIC CONDUITS SHALL BE BONDED TO THE GROUND RING ELECTRODE WHERE THEY CROSS.



F MV DUCTBANK TYPE F SECTION
NTS

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PROJECT
SOUTH REPEATER BUILDING
NASA, John F. Kennedy Space Center
Merritt Island, Florida

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NO. 66619

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER
60667657

SHEET TITLE
ELECTRICAL NOTES AND DETAILS

SHEET NUMBER
E-200

11" x 17"

Approved: Checked: Designer: Project Management Initials:

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Filename: M:\500_DELIVERABLES\513_SOUTH REPEATER PUMP IM\WIP\00_AECOM DRAFT\FIGURES\CAD\DRAWINGS\20240930\E-200 ELECTRICAL NOTES_DETAILS.DWG

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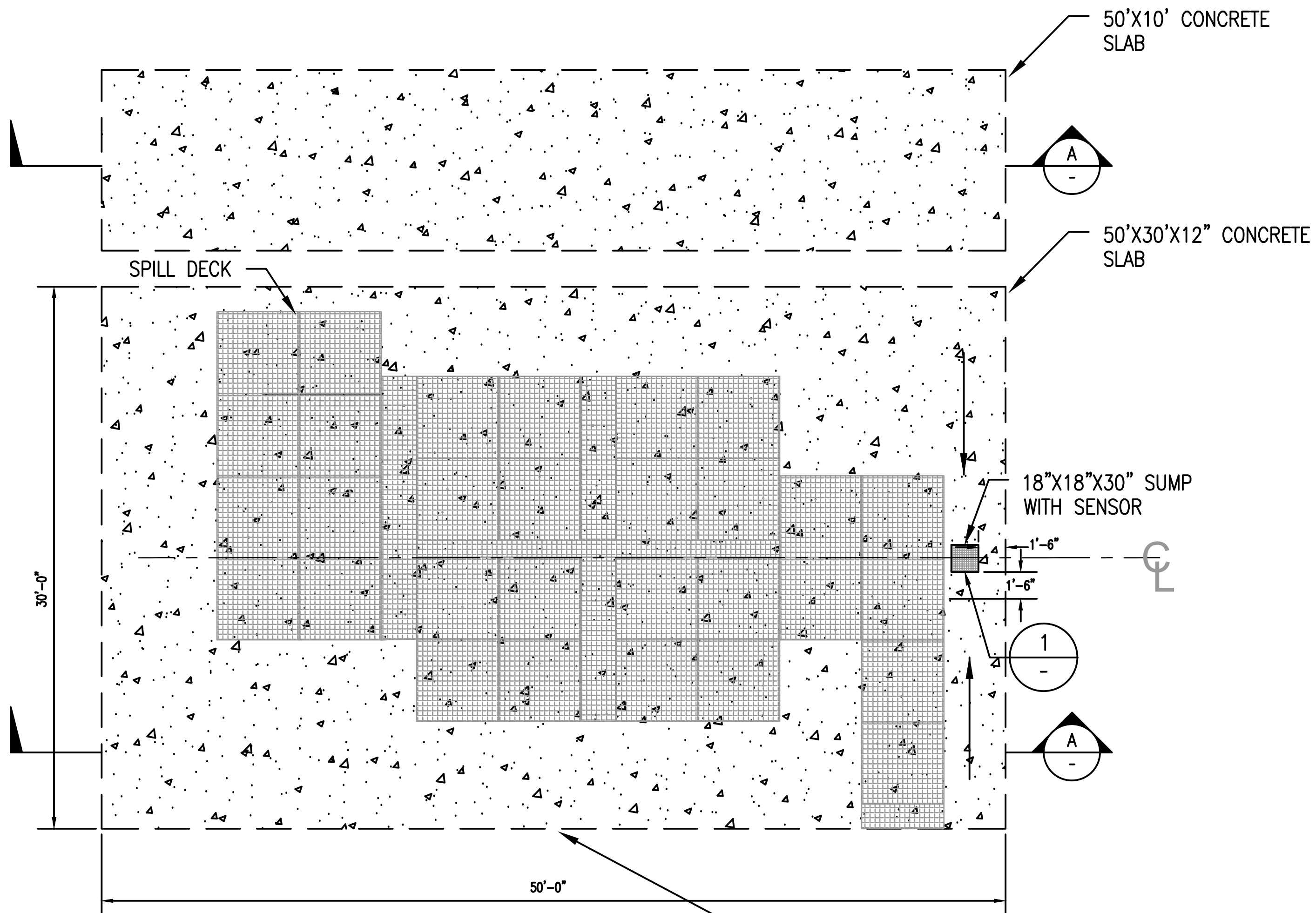
TREATMENT SYSTEM

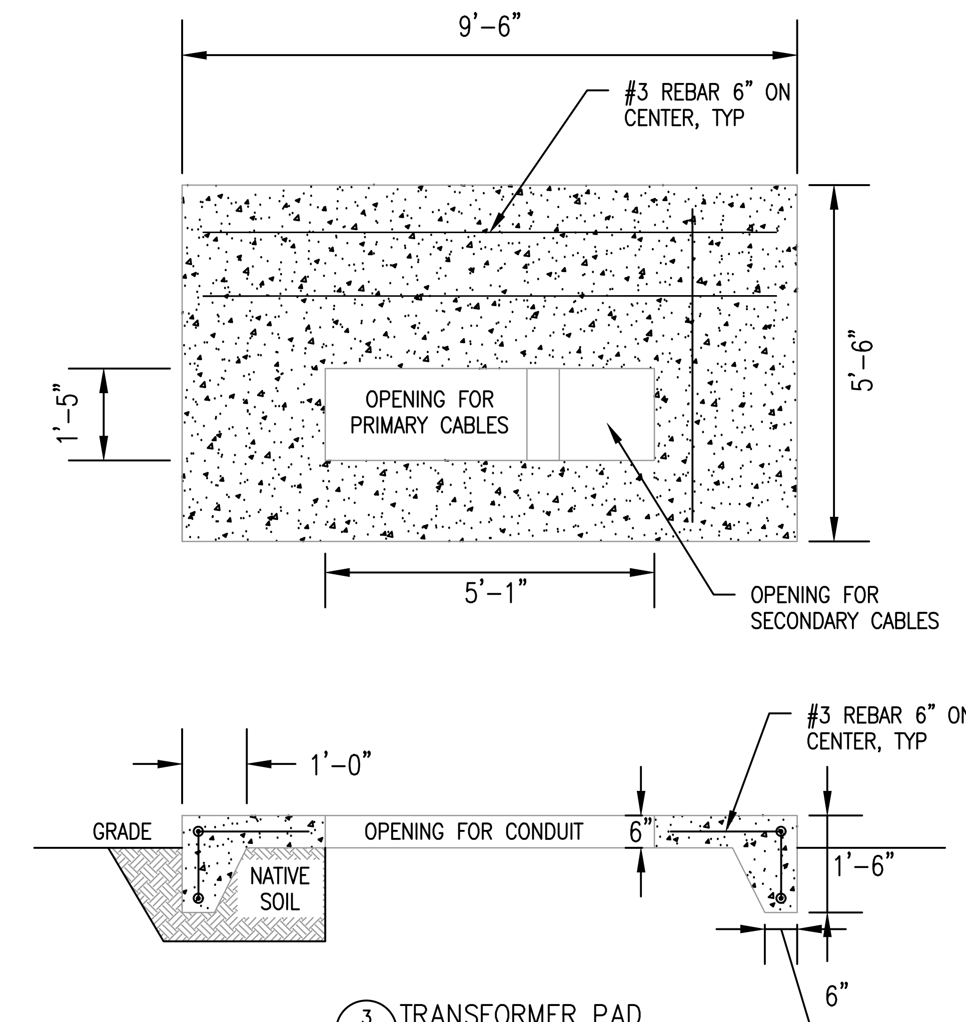
OVERALL PLAN VIEW



1 - INFLUENT TANK AND BUILDING CONCRETE PAD

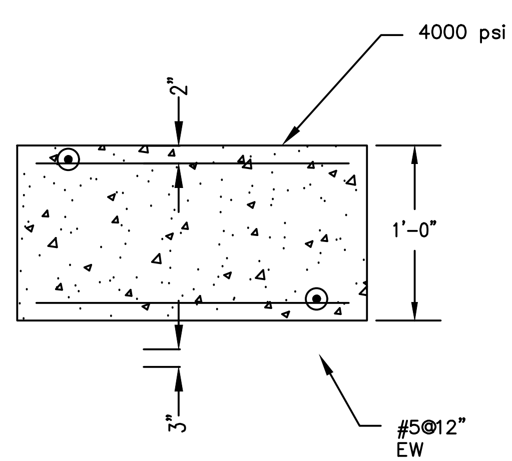
SCALE: 1" = 10'-0"

BUILDING SHALL BE A MINIMUM OF 16-FEET TALL AT THE CENTER AND 14-FEET TALL AT THE EDGES AND HAVE TWO 12' X 14' ROLLUP DOORS ON THE SOUTH SIDE AND A MAN DOOR ON THE WEST SIDE. PRE-FAB STEEL STRUCTURE WITH LIGHTING AND VENTILATION



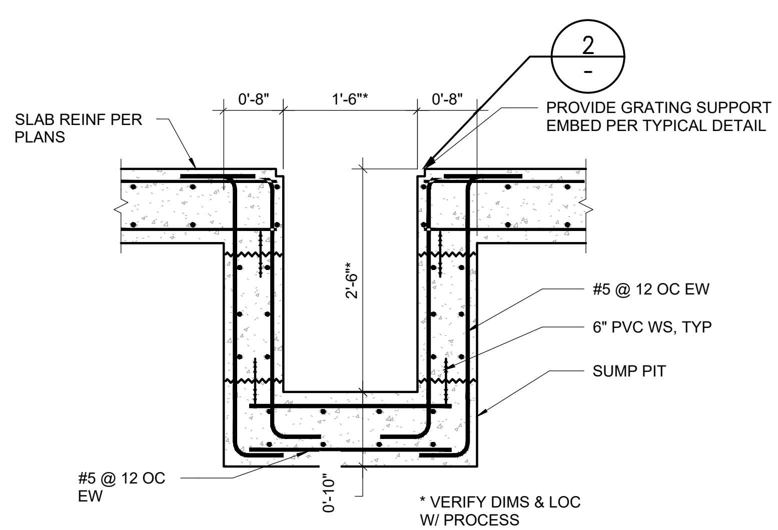
3 C-1 TRANSFORMER PAD

SCALE: N.T.S.



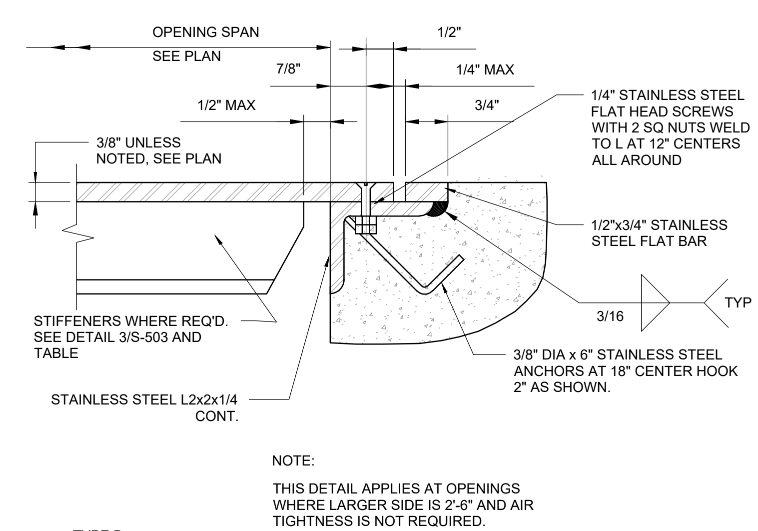
A - INFLUENT TANK AND BUILDING CONCRETE PAD DETAIL

SCALE: 1" = 3'-0"



1 - SUMP DETAIL

SCALE: N.T.S.



2 - GRATE DETAIL

SCALE: N.T.S.

CONCRETE SLAB SLOPE DIRECTION

NOTES:

1. 18"x18" REMOVABLE SECTION OF ALUMINUM GRATING OVER SUMP.
2. SPILL DECK TO BE USED BENEATH ALL EQUIPMENT CONTAINING GROUNDWATER, TO INCLUDE HOSES.
3. THE BUILDING WILL BE UNATTENDED USED ONLY TO STORE THE EQUIPMENT, WITH PERSONNEL ENTERING ONLY FOR MAINTENANCE.
4. SEE G-1 FOR STRUCTURAL NOTES.

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PROJECT

SOUTH REPEATER BUILDING

NASA, John F. Kennedy Space Center
Merritt Island, Florida

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ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

60667657

SHEET TITLE

GAC TREATMENT SYSTEM LAYOUT

SHEET NUMBER

S-1

11" x 17"

Project Management Initials: Designer: Checked: Approved:

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SPECIFICATIONS

CAST–IN–PLACE CONCRETE

1. CAST–IN–PACE CONCRETE WORK SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE CODES AND STANDARDS ACI 301–20 STANDARD SPECIFICATION FOR STRUCTURAL CONCRETE IS HEREBY MADE A PART OF THESE DRAWINGS. ALL CONCRETE CONSTRUCTION SHALL CONFORM TO ACI 301–20 EXCEPT AS EXPLICITLY MODIFIED HEREIN.
2. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH 218, "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE".
3. CONCRETE SHALL HAVE THE MINIMUM COMPRESSIVE STRENGTH:
4. a. 4,000 PSI WITH A MAXIMUM WATER CEMENT RATIO OF 0.56 AND WITH AN ENTRAINED AIR ADMIXTURE CONFORMING TO ASTM C260 FOR ALL CONCRETE EXPOSED TO WEATHER. ENTRAINED AIR SHALL BE 6% +/– 1.5%
5. b. 3,500 PSI WITH A MAXIMUM WATER CEMENT RATIO OF 0.60 AND WITH AN ENTRAINED AIR ADMIXTURE CONFORMING TO ASTM C260 FOR ALL CONCRETE EXPOSED TO WEATHER. ENTRAINED AIR SHALL BE 6% +/– 1.5%
6. REINFORCING SHALL BE ASTM A615, GRADE 60
7. ALL CONCRETE SHALL CONTAIN A WATER REDUCING ADMIXTURE COMPLYING WITH ASTM C494, TYPE A, F, OR G.
8. DO NOT USE CALCIUM CHLORIDE IN ANY CONCRETE
9. LIQUID MEMBRANE CURING COMPOUND MEETING THE REQUIREMENTS OF ASTM C–30B SHALL BE USED ON ALL FORMED SURFACE DESIGNATED TO RECEIVE A "SMOOTH RUBBED FINISH" OR "GROUND CLEANED FINISH"
10. CONCRETE FIELD QUALITY CONTROL:

a. THE SUBCONTRACTOR SHALL EMPLOY A THIRD–PARTY TESTING LABORATORY TO TAKE AND TEST CONCRETE CYLINDERS FOR SLUMP, AIR CONTENT, AND STRENGTH TESTS IN ACCORDANCE WITH ASTM C39.

b. b. A MINIMUM OF 3 CONCRETE CYLINDERS SHALL BE TAKEN FOR EACH 50 CUBIC YARDS OF CONCRETE OR FRACTION THEREOF FOR EACH STRENGTH AND TYPE OF CONCRETE BEING PLACED ON A PARTICULAR DAY.

c. THE CONCRETE TESTS REPORTS SHALL CONTAIN THE FOLLOWING INFORMATION: CONCRETE SUPPLIER, QUANTITY OF CONCRETE REPRESENTED, LOCATION OF ALL SAMPLES COLLECTED, STRENGTH REQUIREMENT IN PSI AT 7–DAYS AND 28–DAYS. LIST OF ALL MATERIALS USED (QUANTITY AND BRAND OR SOURCE), ACTUAL SLUMP, ACTUAL AIR CONTENT PERCENT BY VOLUME, AIR TEMPERATURE, CONCRETE TEMPERATURE, WEATHER, CYLINDER WEIGHT AS RECEIVED, DATE TESTED, TEST RESULTS FOR 7– AND 28–DAY AGE, AND ANY OTHER INFORMATION NECESSARY TO EVALUATE TESTS. TWO COPIES OF THESE REPORTS SHALL BE SENT TO AECOM.

AECOM

PROJECT

SOUTH REPEATER BUILDING

NASA, John F. Kennedy Space Center
Merritt Island, Florida

CLIENT

NASA

John F. Kennedy
Space Center
Merritt Island, Florida

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REGISTRATION

DANIEL M. COUGHLIN
FLORIDA PROFESSIONAL LICENSE
NO. 66619

ISSUE/REVISION

I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

60667657

SHEET TITLE

STRUCTURAL NOTES

SHEET NUMBER

S-200

APPENDIX A

KSCRT MEETING MINUTES – JUNE 2024

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Revision 0 Meeting Minutes for June 28, 2024

Attendees:

1. TJ Touran/FDEP
2. Jason French/FDEP
3. Scott Miller/FDEP
4. Natasha Darre/NASA
5. Deda Johansen/NASA
6. Anne Chrest/NASA
7. Chris Adkison/NASA
8. Mike Deliz/NASA
9. Michelle Moore/NEMCON
10. Mark Speranza/Tetra Tech
11. Scott Anderson/Tetra Tech
12. Debbie Wilson/Tetra Tech
13. Jennifer Buel/Tetra Tech
14. Chris Pike/Tetra Tech
15. Matthew Zenker/AECOM
16. Megan Garcia/AECOM
17. Richard Smith/HG L

2406-M01 Matthew Zenker/AECOM

Per- and Polyfluoroalkyl Substances (PFAS) Site Assessment and Mitigation Hydraulic Containment and Groundwater Treatment System Interim Measures Work Plan (IMWP) South Repeater Building (SWMU #121)

Objective:

The goal of this advanced data package (ADP) is to review current site conditions pilot study results, modeling activities, groundwater treatment system design; review system startup, operation, maintenance, and performance monitoring; and review the system costs and schedule.

Discussion:

The Southern Repeater Building (SWMU #121) site was undeveloped prior to NASA acquisition in 1962. It consists of the South Repeater Building /N6-1118 and the Multiple Object Tracking Radar Tower Facility (MOTR)/N6-1120 (U.S. Space Force Facility 95144). The site is located on the east side of Tel-4 Road. The Kennedy Space Center (KSC) boundary is on Tel-4 Road and extends to the west and southwest, approximately 25 feet from the west edge of the site. There are private, mixed-use (e.g., residential, agricultural) properties to the southwest of the site.

The South Repeater Building is a NASA facility constructed in 1964 with features such as a former well and pump house, electrical manhole #184, septic tank drain field, and floor drains located in the mechanical room tied into the septic system. The MOTR facility is owned by the Cape Canaveral Space Force Station (CCSFS), and was constructed by United States Air Force in 2003. The MOTR features two personnel trailers, a radar tower, and a fire suppression system (water).

The South Repeater Building (formerly called the Area 3 Repeater Building) was identified as Potential Release Location 210 (PRL 210) in 2012 based on suspect presence of fuels and lubricants, polychlorinated biphenyls, and metals. Lead, copper, and carcinogenic polynuclear aromatic hydrocarbons (PAHs) were identified above the Florida Department of Environmental Protection (DEP) Soil Cleanup Target Levels (SCTLs). A soil Interim Measure (IM) was completed in 2020; verification samples indicated all impacted soil was removed. Monitoring well sampling was conducted following the IM that indicated the groundwater was not impacted at concentrations exceeding the FDEP Groundwater Cleanup Target Levels (GCTLs) for metals or PAHs.

The site investigation-derived waste (IDW) from the monitoring well was sampled for Per- and Polyfluoroalkyl Substances (PFAS) in accordance with NASA practice and concentration of PFAS were detected. To investigate the IDW results, an onsite monitoring well was sampled for PFAS (A3RB-MW0002). Results for PFAS were compared to the six U.S. Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) available at that time (detections in red below are exceedances of RSLs):

- Perfluorooctanoic acid (PFOA): 13.7 nanograms per liter (ng/L)
- Perfluorooctanesulfonic acid (PFOS): 1,750 ng/L
- Perfluorobutanesulfonic acid (PFBS): 63.7 ng/L
- Perfluorononanoic acid (PFNA): 2.6 ng/L
- Perfluorohexanesulfonic acid (PFHxS): 1,950 ng/L
- Hexafluoropropylene oxide dimer acid (HFPO-DA): <4 ng/L

Interviews/research had not identified South Repeater Building as a potential PFAS usage or storage location. The KSC fire chief was contacted to ask about any potential fires in the area. The fire chief recalled a brush fire at this location circa 1998, during which an unknown volume of aqueous film-forming foam (AFFF) was used to extinguish the fire. The fire was located to the north-northeast of the South Repeater Building, and did not cross Tel-4 Road. No firefighting equipment was stored in the sandy area to the west.

Following receipt of A3RB-MW0002 PFAS results, diverted drill rig from another site for preliminary Direct Push Technology (DPT) groundwater sampling. Collection of groundwater from three locations was completed in October 2021. Sampling intervals included 6-10’, 21-25’, 31-35’, and 41-45’ below land surface (bls). At the time, compared to the DEP provisional GCTLs (pGCTLs) and the 2016 EPA Lifetime Drinking Water Health Advisory Levels. At the time EPA also had RSLs for PFOA, PFOS, PFBS, PFNA, and PFHxS. NASA initiated PFAS Confirmatory Sampling (CS) activities at that time.

Confirmatory Sampling
Samples were analyzed by EPA Method 537 Modified Department of Defense (DOD) Quality Systems Manual (QSM) 5.3 for 29-compound PFAS list. Groundwater was delineated using the 8 May 2023 EPA RSLs for tap water (hazard quotient (HQ) 0.1). Groundwater was also compared to Florida Department of Environmental Protection (DEP) provisional Groundwater Cleanup Target Levels (pGCTLs) but was not used for delineation purposes. Surface water results were compared to 2 DEP provisional Surface Water Screening Levels (pSWSLs).

CS activities included 182 groundwater samples collected from 34 DPT locations from November 2021 through June 2023. Samples were collected from depths between 4 and 57 feet bls depending on boring location. 37 groundwater samples were collected from 27 monitoring wells during May 2022 & 2023.Eight surface water samples were collected in December 2022 & 2 additional samples in March 2023.

DPT and Monitoring Well Groundwater Results
DPT and monitoring well groundwater results for November 2021 through 2023 show the source area PFOS concentrations are 1,000x RSL. Maximum PFOS concentrations on the Western extent are located within A3RB-MW0016 with a concentration of 133 ng/L. Eastern extent PFOS and PFOA concentrations exceed RSL in the

55 to 59 feet bls interval (DPT0024). Northern extent PFOS concentrations 100x RSL (DPT0031). Southern DPT point slightly exceeded the PFOS RSL (5 ng/L versus 4 ng/L) in the 21 to 25 feet bls interval (DPT0006). Eight out of 27 MW locations had detections greater than DEP GCTLs. Seventeen out of 37 DPT locations had detections greater than DEP GCTLs.

Source area PFOS concentrations are 100x RSL. The northern extent PFOS concentrations are 10x RSL within the 2 to 6, 8 to 12, and 40 to 44 feet bls intervals. PFOA, PFNA, and PFHxS concentrations slightly exceeded their respective RSLs. Eastern extent PFOS and PFOA concentrations slightly exceeded the RSL in the 2 to 6 feet bls interval. Southern extent PFOS and PFHxS concentrations are 100x their respective RSL within the 2 to 6, 8 to 12, and 16 to 20 feet bls intervals. Western extent PFOS concentrations (DPT0046) are 10x the RSL within the 2 to 6, 8 to 12, and 16 to 20 feet bls intervals. Concentrations of PFBA and PFHxA were detected but did not exceed their respective EPA RSLs. Concentrations of HFPO-DA, PFDOA, PFTEA, and PFUNA were not detected in any of the DPT locations.

Site Groundwater Flow

Groundwater elevation measurements from 39 wells including on-site monitoring wells, observation wells, and extraction wells. Groundwater elevations showed hydraulic connectivity between the shallow and intermediate zones, but not the deep zone.

Surface Water

PFOS concentrations exceeded the DEP provisional surface water cleanup target level (pSWSL) in each surface water sample excluding A3RB-SW0004. PFOA was not detected above the pSWSL in any sample collected. Concentrations of 6:2 FTS, PFBS, PFHxS, PFBA, PFHxA, PFPES, and PFPEA were also detected in one or more samples in the South Repeater Building area, but these analytes do not have regulatory standards for surface water.

Pilot Study

A Pilot Study was conducted from December 2023 through February 2024. The purpose of the Pilot Study was to obtain data to support construction and calibration of a groundwater flow model. Three extraction wells were installed along with nine observation wells.

Objectives of the pilot study were to provide information on aquifer characteristics and to aid in future modeling and remedial design activities to mitigate off-Center migration of PFAS compounds.

Specific goals included developing information on characteristics of the surficial aquifer system, specifically transmissivity (T), specific yield (Sy), and hydraulic conductivity (K); obtaining data to support construction and calibration of a groundwater flow model; and, acquiring design parameters necessary for future remedial design activities, specifically radius of influence (r), drawdown (s), flow rates (Q), and pump settings. In addition to gathering data on aquifer hydraulics, water quality samples were collected during the Pilot Study to provide additional data for future groundwater treatment design.

Three extraction wells were installed for the Pilot Study at three different depth intervals. A baseline sampling event was completed prior to the pilot study tests. A 72-hour pump test was completed for each extraction well between January and February 2024. Nine observation wells (A3RB-MW0028 through A3RB-MW0036) and two background wells (A3RB-MW0001 and A3RB-MW0003) were monitored throughout the pump tests to assess groundwater level changes during pumping activities and the recovery period. Pump test results provided estimates of the spatial distribution of hydraulic properties of the Surficial Aquifer System (SAS), guiding the calibration of steady-state and transient models completed following the tests.

A baseline groundwater sampling event was completed on December 14, 2023, for the observation wells and from January 10 – 12, 2024 for the extraction wells. The samples were submitted for analysis by EPA Method 1633 for 40 PFAS compounds. PFAS Results were compared to the EPA RSLs for tap water and DEP pGCTLs and 11 PFAS compounds have EPA RSLs. The groundwater from the three extraction wells was also analyzed for anions (bicarbonate, chloride, and sulfate), cations (calcium, magnesium, sodium, and potassium), iron, total dissolved solids (TDS), total suspended solids (TSS), biochemical oxygen demand (BOD), and hardness as calcium carbonate.

Slug tests were completed using the falling head setup on each extraction and observation well from December 19 – 21, 2023 with additional testing to confirm initial results performed on January 3, 2024. Transducers were configured to record measurements based on detected variations in pressure greater than or equal to 0.001 psi (i.e., slug in, slug out).

Step Tests were completed from January 10 to 12, 2024 using data from the slug tests. Each step test consisted of three 2-hour pumping periods with successively greater pumping rates that spanned the range of pumping rates estimated from the slug tests. Shallowest (10 feet bls) well was tested first, followed by the 25 and 55 feet bls wells, respectively. Manual water level measurements were collected before, during, and after each test to calibrate a future groundwater model by combining it with the transducer data obtained.

Pilot Study Results

The slug and step test data were used to determine the flow rates for the 72-hour pump test. Shallow Interval Pump Test: approximately 12,960 gallons of groundwater were extracted. Shallow interval K values generally agree between the slug, step, and pump tests. Intermediate Interval Pump Test: approximately 43,200 gallons of groundwater were extracted. Intermediate interval K values were lower during slug and step tests than the pump test. Deep Interval Pump Test: approximately 99,360 gallons of water extracted. Deep interval K values were lower during slug and step tests than the pump test.

Based on the Hydraulic Profiling Tool soil investigations completed prior to the pilot study activities the model was divided vertically into five layers, all representing the surficial aquifer system.

- Layer 1 exhibits variable thickness extending from the ground surface to approximately four feet below the water table, which best represents the silty fine sand layer encountered at depth of 5 to 10 feet.
- Layers 2 and 3 are 10 and seven feet thick, respectively, and are parts of the highly permeable layer of shell hash with sand.
- Layer 4 is about three feet thick, representing a lower permeability zone of clayey sand and clay.

- Layer 5 is the deepest highly permeable layer of shell hash and sand just above the confining unit of estuarine clay with variable thicknesses ranging from 8 feet thick to 72 feet thick.

Implemented boundaries include drains and a general head boundary (GHB) on each side of the domain. Ponds and reservoirs were assigned as drains due to shallow groundwater discharge throughout the year. Drain cells enable groundwater discharge to surface water bodies when groundwater exceeds the drain elevation. GHBs were implemented across all five layers of the model. Groundwater mounds at prime recharge areas and flows from these areas eastward toward the Banana River and westward toward the Indian River.

FDEP inquired why the ditch near Dalbora Road was not considered a drain or a sink? The Team will take this into consideration moving forward.

In reference to Slide 44, Deda added that the best information obtained on this was from the owner of the borrow pit stating no pumping was taking place.

Changes from the Pilot Study to Full Scale Implementation

Instead of installing shallow and intermediate interval extraction wells separately, a single extraction well will be installed to collect groundwater from both intervals due to the following:

Groundwater elevation data collected on February 28, 2024, showed the shallow and intermediate intervals are hydraulically connected.

Pump test results from the shallow and intermediate intervals demonstrated that independent pumping from either interval affects the potentiometric surface of the other.

Modeling simulations demonstrated that extraction wells screened throughout the shallow and intermediate intervals will result in satisfactory capture of groundwater within both vertical intervals.

This configuration will require fewer extraction wells and appurtenances, reducing capital and operation and maintenance costs.

The groundwater hydraulic containment system entails pumping groundwater from 13 shallow/intermediate extraction wells screened through model layers 2 and 3, and six deep extraction wells screened through model layer 5. The total groundwater extraction rate is 145 gpm with 105 gpm extracted from the shallow/intermediate wells and 40 gpm extracted from the deep wells. EW0018 will primarily serve as a hydraulic control well; the well would provide capture for the eastern residential properties west of Tel-IV road. It also lessens the load that EW0009 would have to pump. This well adds flexibility to the operation.

Groundwater Treatment System Design

Install a Hydraulic Containment and Groundwater Treatment System with the objective to treat the source area and mitigate PFAS migrations to areas outside of KSC boundaries. The pre-system installation includes marking all well locations, clearing utilities prior to installation, debris clearing activities, and completing a biological survey. Extraction well installations, piping and treatment system installation, system startup and operation and maintenance (O&M) activities will be completed for the first 10 days. O&M Activities after startup will be completed weekly for the first month and twice monthly thereafter. After initial 6 months of operation, twice monthly O&M activities may be changed to monthly, depending on system operation history. Performance monitoring will be completed quarterly for the first year and semi-annually thereafter.

Groundwater Treatment Design

Influent groundwater will be pumped initially to a 21,000-gallon frac tank for removal of sediments.

A duplex pump skid containing two full capacity pumps (one operating and one on standby) will assist in transporting the water through the treatment system. Pumps are capable of flows up to 200 gpm at a total dynamic head of 75 feet. The pumps are supplied with 7.5 horsepower, 480 volts, 3 phase motors, an automatic float control panel, an integrated 40 amp, and fused disconnect.

The water will be pumped from the frac tank to a duplex 6-bag filter housing skid to remove additional sediment. Water then flows into four carbon vessels plumbed in two trains in lead-lag series operation. Each vessel will be pre-loaded with 8,500 pounds of Calgon F-400 carbon media or equivalent (85% capacity).

The treatment system will be placed on a new 12-inch thick, 30-foot x 45-foot concrete pad at the South Repeater Building with secondary containment below pumps, piping, and associated appurtenances. The pad will also have a sump and alarm to notify the operator of any potential spills within the building.

The frac tank will be placed on a new 12-inch thick 50-foot x 10-foot concrete pad.

Groundwater Treatment Sampling and Infiltration Gallery

Groundwater samples for PFAS analysis will be collected after the lead and lag GAC vessels. Samples will be collected every 8 hours for the first day of operation, daily for the first week, weekly for the remainder of the first month, bi-monthly for the remainder of the first quarter, monthly for the remainder of the first year, and quarterly thereafter. Samples will be analyzed via EPA Method 1633 for 40 PFAS compounds.

The treated groundwater will be conveyed from the P&T system to the infiltration gallery located approximately 5,281 feet southeast of the South Repeater Building. The Infiltration Gallery is expected to receive approximately 216,000 gallons of treated groundwater per day. Infiltration gallery will be approximately 4 feet wide, a minimum of 36 inches deep, and 700 feet long. The conveyance piping to the infiltration gallery will be a 5-inch HDPE SDR 11 piping. The infiltration piping within the infiltration gallery will be a 3-inch perforated HDPE SDR 11 piping with a geofabric wrapped around the pipe to keep fines out.

Slide 74 NASA advised that this is currently a disturbed area and will keep all team members informed as it develops.

Equipment Building

The P&T system mechanical equipment will be housed in a 30-foot by 45-foot structure with 15-foot ceiling at the center. The structure will have a 16-foot x 12-foot roll up garage style door on the side to access the carbon vessels for replenishment activities. The building will also have a man door on the end. The structure will house the carbon vessels, bag filtration skid, duplex pump skid, and infiltration gallery transfer pump skid. The building will have lighting and an exhaust system to include venting and a fan. Yearly maintenance for the structure will consist of washing the exterior to prevent mildew and dirt buildup over time. The warranty for this type of structure indicates that the construction material and paint used will last up to 15 years, but it is recommended that the structure be repainted every 7 to 10 years. Monthly maintenance will include inspecting the structure for evidence of corrosion.

System Startup, OM&M Activities, and Performance Monitoring

A site-specific checklist will be completed to document that equipment and instrumentation have been properly installed, secured, and lubricated and that protective covers on rotating equipment are in place. Startup activities are anticipated to take 10 days. Each extraction well will be phased into operation before starting the pumps at the next extraction well. Flow meters at the manifold at the treatment system will be watched to confirm flow from each extraction well. Once each extraction well has been started, the GAC treatment system will be started. The treatment system pump will be started to pump the water through the treatment system. Water samples will be collected from the effluent of the lead and lag GAC vessels for analysis of PFAS via EPA Method 1633. Groundwater elevations from surrounding monitoring wells will be recorded before, during, and after system startup.

After the system startup activities O&M field events will be completed: weekly for the first month, monthly for 12 months, move into quarterly O&M events after the first 12 months.

O&M Activities will include:

- Inspection of the system,
- Confirming electrical and system connections,
- Recording meter and totalizer readings,
- Measuring depth to groundwater in each extraction and monitoring well,
- Routine site maintenance and sample collection as needed, and
- It is expected that the carbon will need to be replaced every 3 to 6 months.

Performance Monitoring will include:

- 16 monitoring wells and 3 staff gauges will be installed; 8 wells installed to a depth of 12 feet bls and 8 installed to a depth of 30 feet bls,
- 28 Monitoring wells will be sampled quarterly for the first year and semi-annually thereafter to monitor the performance of the hydraulic containment and groundwater treatment system,
- Samples will be analyzed for EPA Method 1633 for 40 PFAS compounds,
- Depth to groundwater measurements will be collected during each event.

Schedule

- A total of 50 calendar days for IM IWP preparation, HASP updates, site plan submittal and approval, dig permit submittal and approval, coordination of activities with facility personnel, procurement of subcontractors, and utility locate.
- 5 working days for oversight of utility locate.
- 7 working days for performance monitoring well installation.
- 3 working days for monitoring well and extraction well survey.
- o Staff gauge installation and survey will occur at this time.
- 30 working days for baseline groundwater sampling, obtaining data from the laboratory, and analyzing the data.
- 115 working days for extraction well installation, trenching, extraction well piping installation and infiltration gallery installation.
- 5 working days for the treatment system installation.
- 10 working days for system startup (10 working days with two personnel for system startup and troubleshooting).
- 30 calendar days for system operation (month one).
- 75 days for preparation of Construction Completion Report (CCR) and presentation of the CCR ADP to the KSCRT that includes the first quarter of performance monitoring results. Presentation date is dependent on KSCRT schedule.
- 60 calendar days for NASA CCR review and submittal to FDEP following the presentation.

Chris Pike from Tetra Tech stated all their comments have been adequately addressed in the ADP. An additional thought regarding the infiltration gallery and flooding: any thought to put controls out there to monitor flooding?

NASA responded that this won't be an issue at all. Met with Mick Barth from NASA Construction of Facilities, and pumping 220k gallons a day of water sounds a lot, but Mick assured that these rates would be okay based on historical operations. NASA agreed that using a flooding gauge for the other location was a good idea.

Tetra Tech stated there is nothing in the PMR about sampling the influent/effluent concentrations; would you consider sampling the individual wells to see if PFAS reduces over time? If not capture, it should be. AECOM explained one reason for the deep wells is because we have detections in the intervals and in the samples collected off property. Want to address concerns and that we are not ignoring any levels of contamination in these layers. Tetra Tech understands this approach. Tetra Tech added the level controls with the BFD, you will be able to control the well levels and consider how you would do that and address during operations. This topic was also addressed in the presentation per Tetra Tech.

Tetra Tech made a reference to the removal of the -4.7 feet for the borrow pit areas for baseline and well extract analysis. Removing makes sense to be conservative, but did you consider modifying the boundary conditions to make sure you're evaluating the impacts of the pumping. General head boundaries for the future? AECOM explained they did a lot of simulations trying to adjust the head boundaries, but the main thing that wouldn't work was if we set out to the Indian River, still needed a discrepancy in the general head boundary between east and west. Either the flow direction wasn't right, or gradient wasn't right. Whether we raise up or down a foot, we found we still had to do this. We didn't get good mass in the model and that was the struggle. As far as the data we have that is the best we can do. We can share the simulations to show what we obtained. Those wells that were along Kennedy Parkway on slide 90 are very much lower in the west compared to the east in elevation. There had to be something that was pulling it down.

Tetra Tech like the idea for incorporation of the long surface type feature that is in contact with the groundwater (ditch); like that mentioned and considered in the future as well.

FDEP's Scott Miller inquired on Slide 40, do you have upgradient groundwater divide as just outside the model domain and general head boundary. How you determine the groundwater divide?

AEOMC responded they selected the general location and set the domain in order to give a nice even flow where the model would predict an east to west flow. We don't have groundwater wells in this zone on slide 40. There is potential the recharge area could be further east or west. For the model we had to set something and cast a wider area. Not completely arbitrary. On Merritt Island, the highest elevation runs along the ridge here. If surface water divide you should have a similar groundwater divide. As far as the model is concerned, we just need to know if it is outside of our domain because we did not.

HGL stated that their comments were responded to well in the presentation. Like the idea of surface water long modeling somehow in the ditch and the influence of the ditch would be tremendous, and if we can pull into model somehow, it would be worthwhile.

Both borrow pits to the north might be something to look at, and fairly easy add to the model.

FDEP referring to Slide 53 stated the capture zone looks large. Is the plan to do further delineation to the west and south? After you turn on the system you may capture and clean but is there potential for a detached plume to escape further off site?

NASA responded this is first step and we will be watching this area. No plans at this time to sample off property, but will get surrogate data using DPT to supplement and understanding what we have.

FDEP asked if there are plans to sample more south or west. DPT 34 is the main concern at10x the RSL and we do not know how far it extends. NASA noted that DPT 9, although not clean, came back below pGCTL. FDEP stated it looks to be within the capture zone; if not, it is close to it. FDEP was glad to hear the data point to the west there was below screening levels.

APPENDIX B

HISTORICAL PFAS ASSESSMENT TABLES AND FIGURES

APPENDIX B1

HISTORICAL PFAS ASSESSMENT TABLES AND FIGURES

Table 2-1
Groundwater Elevation Table
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

SHALLOW WELL ID:	A3RB-MW0002		A3RB-MW0003		A3RB-MW0004		A3RB-MW0005		A3RB-MW0010		A3RB-MW0014		A3RB-MW0016		A3RB-MW0020	
Screened Interval (feet bls):	2 - 12		2 - 12		2 - 12		2 - 12		2 - 12		2 - 12		2 - 12		2 - 12	
TOC Elevation (feet NAVD88):	5.55		5.42		4.57		4.62		10.10		6.35		2.27		4.49	
Date:	Depth to Water (feet BTOC)	Water Elevation (feet NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/31/2022	3.37	2.18	3.40	2.02	1.93	2.64	2.78	1.84	8.64	1.46						
5/23/2023	1.71	3.84	0.99	4.43	0.25	4.32	0.97	3.65	7.47	2.63	5.09	1.26	0.97	1.30	0.89	3.60

INTERMEDIATE WELL ID:	A3RB-MW0001		A3RB-MW0006		A3RB-MW0007		A3RB-MW0008		A3RB-MW0009		A3RB-MW0012		A3RB-MW0013		A3RB-MW0015	
Screened Interval (feet bls):	20 - 30		20 - 30		20 - 30		20 - 30		20 - 30		35 - 45		20 - 30		20 - 30	
TOC Elevation (feet NAVD88):	5.3		4.86		5.54		7.44		8.46		6.16		6.35		2.20	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/31/2022	3.32	1.98	3.24	1.62	3.80	1.74	5.88	1.56	7.63	0.83						
5/23/2023	2.07	3.23	1.56	3.30	2.58	2.96	4.65	2.79	6.09	2.37	4.98	1.18	5.17	1.18	1.15	1.05

INTERMEDIATE WELL ID:	A3RB-MW0018		A3RB-MW0019		A3RB-MW0021		A3RB-MW0024		A3RB-MW0025		A3RB-MW0026	
Screened Interval (feet bls):	35 - 45		30 - 40		20 - 30		35 - 45		35 - 45		35 - 45	
TOC Elevation (feet NAVD88):	4.59		4.60		6.30		5.16		6.90		6.99	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/23/2023	1.25	3.34	1.04	3.56	3.15	3.15	2.81	2.35	4.25	2.65	4.24	2.75

DEEP WELL ID:	A3RB-MW0011		A3RB-MW0017		A3RB-MW0022		A3RB-MW0023		A3RB-MW0027	
Screened Interval (feet bls):	54 - 59		54 - 59		54 - 59		54 - 59		54 -59	
TOC Elevation (feet NAVD88):	6.33		4.63		5.33		4.69		5.43	
Date:	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)	Depth to Water (ft BTOC)	Water Elevation (ft NAVD88)
5/23/2023	5.06	1.27	1.28	3.35	2.28	3.05	1.48	3.21	2.51	2.92

Notes:
A3RB = Area 3 Repeater Building
bls = below land surface
BTOC = Below top-of-casing
ft = Feet
MW = Monitoring well
NAVD88 = North American Vertical Datum of 1988
SWMU = Solid Waste Management Unit
TOC = top-of-casing

Table 3-1
Lithology Description
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Depth (ft bls)	Description
South Repeater Building	A3RB-SB0047	0.0 to 5.0	Black silty sand (SM) with organics throughout. Loose
		5.0 to 18.0	Light gray, poorly graded gravel with sand (GP), 30 to 40% shell hash, non-cohesive
		18.0 to 20.0	Gray, poorly graded gravel with sand (GP) with 5% shell, very hard silicified layer
		20.0 to 22.5	Greenish gray, clayey sand (SC) with 5% shell, loose
		22.5 to 24.0	Greenish gray, lean clay (CL), very soft
		24.0 to 31.0	Greenish gray, clayey sand with 30 to 40% clay, loose
		31.0 to 40.0	Gray, poorly graded sand with 15% shell, loose
		40.0 to 55.0	Gray, poorly graded sand, medium dense
		55.0 to 59.0	Greenish gray, clayey sand (SC) with 25 to 35% clay, loose
		59.0 to 64.0	Greenish gray, lean clay (CL) with interbedded shell layers, medium stiff
	A3RB-SB0048	0.0 to 9.5	Very dark grayish brown poorly graded sand (SP), loose
		9.5 to 24.0	Black, poorly graded sand (SP), 5-15% roots and organic materials, loose
		24.0 to 27.0	Gray, poorly graded gravel with sand (GP), Shell hash with 5% clay, dense
		27.0 to 30	Dark gray, poorly graded clayey sand (SC), dense
		30.0 to 42.0	White poorly graded gravel with sand (GP), shell hash, medium dense to very dense
		42.0 to 50.0	Gray / light olive gray, poorly graded sand with 5% shell fragments, medium dense to dense
		53.0 to 61.5	Gray, clayey sand (SC) with 15 to 25% clay with 5% shell fragments, dense
		61.5 to 65.0	Greenish gray, lean clay with sand (CL) with 15 to 25% fine sand with few shell fragments, medium stiff
	A3RB-SB0061	0.0 to 0.5	Light gray, poorly graded sand (SP), loose
		0.5 to 7.50	White poorly graded gravel with sand (GP), shell hash, medium dense to very dense
		7.50 to 10.0	Dark yellowish brown, poorly graded sand (SP) with 5-10% shell fragments, loose
		10.0 to 20.0	Light gray, poorly graded gravel with sand (GP), shell hash, loose
		20.0 to 28.0	Gray, poorly graded silty sand (SM)
		28.0 to 30.0	Gray, clayey sand (SC) with 25 to 35% clay with 5% shell fragments, dense
		30.0 to 38.0	Light gray, poorly graded gravel with sand (GP), shell hash, loose
		38.0 to 49.0	Light gray, poorly graded sand (SP) with 5% shell fragments
		49.0 to 55.0	Gray, silty sand with gravel (SM), 15-25% shell hash, loose
		55.0 to 60.0	Light greenish gray, sandy lean clay (CL) with 5-15% shell fragments, dense

Notes:
A3RB = Area 3 Repeater Building
ft = Feet
ft bls = Feet below land surface
PFAS = Per-and polyfluoroalkyl substances
SWMU = Solid Waste Management Unit

Table 3-2
Soil Sample Rationale
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Depth (ft bls)	Rationale
South Repeater Building	A3RB-SB0047	64	Determine lithology and sample just above confining unit
	A3RB-SB0048	65	Determine lithology and sample just above the confining unit
	A3RB-SB0049	0 to 0.5	Determine if there is a residual source of groundwater contamination west of Tel-4 Road
		0.5 to 2	
	A3RB-SB0050	0 to 0.5	Determine if there is a residual source of groundwater contamination west of Tel-4 Road
		0.5 to 2	
	A3RB-SB0051	0 to 0.5	Determine if there is a residual source of groundwater contamination in source area
		0.5 to 2	
	A3RB-SB0052	0 to 0.5	Determine if there is a residual source of groundwater contamination south of source area
		0.5 to 2	
	A3RB-SB0053	0 to 0.5	Determine if there is a residual source of groundwater contamination in source area
		0.5 to 2	
	A3RB-SB0054	0 to 0.5	Determine if there is a residual source of groundwater contamination in source area
		0.5 to 2	
	A3RB-SB0055	0 to 0.5	Determine if there is a residual source of groundwater contamination in source area
		0.5 to 2	
	A3RB-SB0056	0 to 0.5	Determine if there is a residual source of groundwater contamination in source area
		0.5 to 2	
	A3RB-SB0057	0 to 0.5	Determine if there is a residual source of groundwater contamination in source area
		0.5 to 2	
	A3RB-SB0058	0 to 0.5	Determine if there is a residual source of groundwater contamination west of source area
		0.5 to 2	
	A3RB-SB0059	0 to 0.5	Determine if there is a residual source of groundwater contamination west of source area
		0.5 to 2	
	A3RB-SB0060	0 to 0.5	Determine if there is a residual source of groundwater contamination west of Tel-4 Road
		0.5 to 2	
	A3RB-SB0061	59	Determine lithology and sample just above the confining unit

Notes:
A3RB = Area 3 Repeater Building
ft = Feet
ft bls = Feet below land surface
PFAS = Per-and polyfluoroalkyl substances
SWMU = Solid Waste Management Unit

Table 3-3
DPT Groundwater Sample Rationale
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Depth (ft bls)	Rationale
South Repeater Building	A3RB-DPT0005	6 to 10	Preliminary DPT in response to A3RB-MW0002 results
		21 to 25	
		31 to 35	
		41 to 45	
	A3RB-DPT0006	6 to 10	Preliminary DPT in response to A3RB-MW0002 results
		21 to 25	
		31 to 35	
		41 to 45	
	A3RB-DPT0007	6 to 10	Preliminary DPT in response to A3RB-MW0002 results
		21 to 25	
		31 to 35	
		41 to 45	
	A3RB-DPT0008	2 to 6	Delineate south of A3RB-MW0002-FD
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0009	2 to 6	Delineate southeast of A3RB-MW0002-FD
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0010	2 to 6	Delineate east of A3RB-MW0002-FD
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0011	2 to 6	Delineate east of A3RB-MW0002-FD
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0012	2 to 6	Delineate east of DPT0005
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0013	2 to 6	Delineate south of DPT0007
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0014	2 to 6	Delineate north of DPT0007
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0015	2 to 6	Delineate north of DPT0262
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0016	2 to 6	Delineate south of DPT0262
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	

Table 3-3
DPT Groundwater Sample Rationale
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Depth (ft bls)	Rationale
South Repeater Building	A3RB-DPT0017	2 to 6	Delineate near south boundary
		8 to 12	
		23 to 27	
	A3RB-DPT0018	2 to 6	Delineate near south boundary
		8 to 12	
		23 to 27	
	A3RB-DPT0019	2 to 6	Delineate near south boundary
		8 to 12	
		23 to 27	
	A3RB-DPT0020	2 to 6	Step out east of hot spot
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0021	2 to 6	Step out east of hot spot
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0022	2 to 6	Delineate south of South Repeater Building
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0023	2 to 6	Delineate north of South Repeater Building
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0024	2 to 6	Delineate south of South Repeater Building
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0025	2 to 6	Delineate west of hot spot (west of Tel-4 Road)
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0026	2 to 6	Delineate west of hot spot (west of Tel-4 Road)
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0027	2 to 6	Delineate west of A3RB-MW0009 (west of Tel-4 Road)
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0028	2 to 6	Step out south of A3RB-DPT0005A
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	

Table 3-3
DPT Groundwater Sample Rationale
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Depth (ft bls)	Rationale
South Repeater Building	A3RB-DPT0029	2 to 6	Step out west of A3RB-DPT0019 (west of Tel-4 Road)
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0030	2 to 6	Delineate northwest of South Repeater Building
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0031	2 to 6	Delineate northwest of South Repeater Building
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0032	2 to 6	Delineate northwest of South Repeater Building
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0033	2 to 6	Delineate near south boundary
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0034	2 to 6	Delineate near south boundary
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0035	2 to 6	Delineate near west boundary
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0036	2 to 6	Delineate near south boundary
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0037	2 to 6	Delineate near south boundary
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	

Table 3-3
DPT Groundwater Sample Rationale
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Depth (ft bls)	Rationale
South Repeater Building	A3RB-DPT0038	2 to 6	Delineate north of A3RB-DPT0027
		8 to 12	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0039	2 to 6	Delineate north of A3RB-DPT0027
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0040	2 to 6	Delineate south of Courtenay Parkway South
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	
	A3RB-DPT0041	2 to 6	Delineate near west boundary
		8 to 12	
		16 to 20	
		23 to 27	
		40 to 44	
		55 to 59	

Notes:
A3RB - Area 3 Repeater Building
DPT = Direct Push Technology
ft = Feet
ft bls = Feet below land surface
PFAS = Per-and polyfluoroalkyl substances
SWMU = Solid Waste Management Unit

Table 3-4
Surface Water Sample Rationale
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Rationale
South Repeater Building	A3RB-SW0001	Data from drainage ditches south of South Repeater Building
	A3RB-SW0002	Data from drainage ditches south of South Repeater Building
	A3RB-SW0003	Data from drainage ditches south of South Repeater Building
	A3RB-SW0004	Data from drainage ditches southeast of South Repeater Building
	A3RB-SW0005	Data from drainage ditches west of South Repeater Building/North of D'albora Road
	A3RB-SW0006	Data from drainage ditches west of South Repeater Building/North of D'albora Road
	A3RB-SW0007	Data from drainage ditches west of South Repeater Building/North of D'albora Road
	A3RB-SW0008	Data from drainage ditches west of South Repeater Building/North of D'albora Road
	A3RB-SW0009	Data from retention pond north west of South Repeater Building
	A3RB-SW0010	Data from retention pond north west of South Repeater Building

Notes:
A3RB = Area 3 Repeater Building
PFAS = Per-and polyfluoroalkyl substances
SWMU = Solid Waste Management Unit

Table 3-5
Monitoring Well Sample Rationale
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Depth Interval (ft bls)	Rationale
South Repeater Building	A3RB-MW0001	20.0 - 30.0	Monitor groundwater south of A3RB-MW0002
	A3RB-MW0002	2.0 - 12.0	Continued monitoring of hot spot
	A3RB-MW0003	2.0 - 12.0	Monitor groundwater east of A3RB-MW0002
	A3RB-MW0004	2.0 - 12.0	Monitor groundwater southeast of A3RB-MW0002
	A3RB-MW0005	2.0 - 12.0	Monitor groundwater along south border
	A3RB-MW0006	20.0 - 30.0	Monitor groundwater along south border
	A3RB-MW0007	20.0 - 30.0	Monitor groundwater west of A3RB-MW0002 and east of PFAS-DPT0262
	A3RB-MW0008	20.0 - 30.0	Monitor hot spot detected by PFAS-DPT0262
	A3RB-MW0009	20.0 - 30.0	Monitor groundwater west of PFAS-DPT0262
	A3RB-MW0010	2.0 - 12.0	Monitor groundwater south of PFAS-DPT0262
	A3RB-MW0011	54.0 - 59.0	Monitor groundwater north of N6-1009 Central Industry Assistance Office
	A3RB-MW0012	35.0 - 45.0	Monitor groundwater north of N6-1009 Central Industry Assistance Office
	A3RB-MW0013	20.0 - 30.0	Monitor groundwater north of N6-1009 Central Industry Assistance Office
	A3RB-MW0014	2.0 - 12.0	Monitor groundwater north of N6-1009 Central Industry Assistance Office
	A3RB-MW0015	20.0 - 30.0	Monitor groundwater southwest of N6-1009 Central Industry Assistance Office
	A3RB-MW0016	2.0 - 12.0	Monitor groundwater southwest of N6-1009 Central Industry Assistance Office
	A3RB-MW0017	54.0 - 59.0	Monitor groundwater near PFAS-DPT0209
	A3RB-MW0018	35.0 - 45.0	Monitor groundwater near PFAS-DPT0209
	A3RB-MW0019	30.0 - 40.0	Monitor groundwater near PFAS-DPT0209
	A3RB-MW0020	2.0 - 12.0	Monitor groundwater near PFAS-DPT0209
	A3RB-MW0021	20.0 - 30.0	Monitor groundwater along west border
	A3RB-MW0022	54.0 - 59.0	Monitor groundwater east of A3RB-MW0002
	A3RB-MW0023	54.0 - 59.0	Monitor groundwater southeast of A3RB-MW0002
	A3RB-MW0024	35.0 - 45.0	Monitor groundwater west of PFAS-DPT0262
	A3RB-MW0025	35.0 - 45.0	Monitor hot spot detected by PFAS-DPT0262
	A3RB-MW0026	35.0 - 45.0	Monitor groundwater south of PFAS-DPT0262
	A3RB-MW0027	54.0 - 59.0	Monitor groundwater west of A3RB-MW0002 and east of PFAS-DPT0262

Notes:
A3RB = Area 3 Repeater Building
ft bls = Feet below land surface
PFAS = Per-and polyfluoroalkyl substances
SWMU = Solid Waste Management Unit

Table 4-2
Soil Frequencies of Detection
PFAS Site Assessment and Mitigation

South Repeater Building (SWMU 121)

Location	PFAS	Soil Samples[1]	Detects	Non-Detects	EPA RSL, Residential HQ = 0.1 (mg/kg)	EPA RSL, Industrial HQ = 0.1 (mg/kg)	FDEP pSCTL (mg/kg)	Max Concentration (mg/kg)
South Repeater Building	PFOS	30	20	10	0.013	0.16	1.3	0.0144
	PFOA	30	1	29	0.019	0.25	1.3	0.00071
	PFBS	30	2	28	1.9	25	--	0.0012
	PFNA	30	0	30	0.019	0.25	--	0.00071
	PFHxS	30	10	20	0.13	1.6	--	0.0274
	HFPO-DA	30	0	30	0.023	0.35	--	0.00071

Notes:

[1] Includes two field duplicate samples
EPA = Environmental Protection Agency
FDEP = Florida Department of Environmental Protection
HFPO-DA = hexafluoropropylene oxide dimer acid
HQ = Hazard Quotient
mg/kg = Milligram per Kilogram
PFAS = Per-and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
pSCTL = provisional Soil Cleanup Target Level
RSL = Risk Screening Level
SWMU = Solid Waste Management Unit
-- indicates that a screening value is not available as of September 2023 for that compound.

Table 4-3
DPT Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location ID	Sample Date	Depth Interval (ft bls)	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS
			Analyte	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS
			EPA RSL for tapwater (ng/L)	4	6	601	6	39	6	1800	990	--	--	--	--
			FDEP pGCTL (ng/L)	70	70	--	--	--	--	--	--	--	--	--	--
A3RB-DPT0008	1/19/2022	2 - 6	NM	212	5.3 J	6.6 J	5.5 U	132	11 U	7.7 J	11.4	11 U	11 U	11 U	11 U
A3RB-DPT0008	1/19/2022	2 - 6	FD	201	5.2 J	6.4 J	4.2 U	126	8.3 U	7.5 J	11	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0008	1/19/2022	8 - 12	NM	10.3	4.2 U	4.2 U	4.2 U	10.3	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0008	1/19/2022	23 - 27	NM	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	9.1 U	9.1 U	4.5 U	9.1 U	9.1 U	9.1 U	9.1 U
A3RB-DPT0008	1/19/2022	40 - 44	NM	3.5 J	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0008	1/19/2022	55 - 59	NM	107	3.4 J	4.2 U	4.2 U	54	8.3 U	5.9 J	4.7 J	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0009	1/19/2022	2 - 6	NM	227	27.9	208	5.0 U	3770	10 U	25.5	186	10 U	10 U	10 U	10 U
A3RB-DPT0009	1/19/2022	8 - 12	NM	4.2 U	4.2 U	3.5 J	4.2 U	17.4	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0009	1/19/2022	23 - 27	NM	4.2 U	4.2 U	4.2 U	4.2 U	10.9	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0009	1/19/2022	40 - 44	NM	4.6 J	4.2 U	4.2 U	4.2 U	12.9	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0009	1/19/2022	55 - 59	NM	39.3	4.2 U	4.2 U	4.2 U	141	8.3 U	8.3 U	8.0 J	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0010	1/24/2022	2 - 6	NM	7480	316	439	3.4 J	17200	10 U	60	626	10 U	10 U	10 U	10 U
A3RB-DPT0010	1/24/2022	8 - 12	NM	17.3	4.2 U	2.7 J	4.2 U	38.1	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0010	1/24/2022	8 - 12	FD	15.1	4.2 U	3.1 J	4.2 U	38	8.3 U	8.3 U	2.1 J	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0010	1/24/2022	23 - 27	NM	54.1	4.2 U	3.0 J	4.2 U	64.8	8.3 U	8.3 U	2.9 J	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0010	1/24/2022	40 - 44	NM	5.2 J	4.2 U	4.2 U	4.2 U	9	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0010	1/24/2022	55 - 59	NM	333	9.0 J	25.2	4.5 U	417	9.1 U	9.1 U	13.1	45 U	9.1 U	9.1 U	9.1 U
A3RB-DPT0011	1/24/2022	2 - 6	NM	4.8 J	4.6 U	35.5	4.6 U	145	9.2 U	9.2 U	28	9.2 U	9.2 U	9.2 U	9.2 U
A3RB-DPT0011	1/24/2022	8 - 12	NM	4.2 U	4.2 U	4.2 U	4.2 U	4.0 J	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0011	1/24/2022	23 - 27	NM	14.4	4.2 U	4.2 U	4.2 U	2.2 J	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0011	1/24/2022	40 - 44	NM	10.3	4.2 U	4.2 U	4.2 U	3.0 J	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0011	1/24/2022	55 - 59	NM	47.6	4.2 U	4.2 U	4.2 U	13.4	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0012	1/26/2022	2 - 6	NM	4.2 U	4.2 U	4.2 U	4.2 U	3.5 J	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0012	1/26/2022	8 - 12	NM	7.6 J	2.4 J	4.2 U	4.2 U	14.3	8.3 U	6.7 J	4.5 J	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0012	1/26/2022	23 - 27	NM	2.8 J	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0012	1/26/2022	32 - 36	NM	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0012	1/26/2022	55 - 59	NM	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0013	3/29/2022	2 - 6	NM	21.0 J	13.5 J	22 U	22 U	24.1 J	44 U	62.6 J	22 U	44 U	44 U	44 U	44 U
A3RB-DPT0013	3/29/2022	8 - 12	NM	126	4.5 J	4.0 J	4.4 U	101	8.7 U	4.7 J	5.9 J	8.7 U	8.7 U	8.7 U	8.7 U
A3RB-DPT0013	3/29/2022	23 - 27	NM	27	3.4 J	3.0 J	4.0 U	35.9	8.0 U	8.0 U	3.4 J	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0013	3/29/2022	40 - 44	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0013	3/29/2022	55 - 59	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0014	3/29/2022	2 - 6	NM	21 U	21 U	21 U	21 U	21 U	42 U	42 U	21 U	42 U	42 U	42 U	42 U
A3RB-DPT0014	3/29/2022	8 - 12	NM	47.6	4.5 U	4.5 U	4.5 U	20.1	9.1 U	9.1 U	4.5 U	9.1 U	9.1 U	9.1 U	5.1 J
A3RB-DPT0014	3/29/2022	23 - 27	NM	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	8.7 U	8.7 U	4.4 U	8.7 U	8.7 U	8.7 U	8.7 U
A3RB-DPT0014	3/29/2022	40 - 44	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0014	3/29/2022	55 - 59	NM	6.6 J	4.5 U	4.5 U	4.5 U	4.5 U	9.1 U	9.1 U	4.5 U	9.1 U	9.1 U	9.1 U	9.1 U
A3RB-DPT0015	3/29/2022	2 - 6	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0015	3/29/2022	8 - 12	NM	12.2	4.0 U	4.0 U	4.0 U	3.0 J	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0015	3/30/2022	23 - 27	NM	47.9	4.0 U	4.0 U	4.0 U	26.3	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0015	3/30/2022	40 - 44	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0015	3/30/2022	55 - 59	NM	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	9.5 U	9.5 U	4.8 U	9.5 U	9.5 U	9.5 U	9.5 U
A3RB-DPT0016	3/30/2022	2 - 6	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0016	3/30/2022	2 - 6	FD	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0016	3/30/2022	8 - 12	NM	205	5.7 J	12.6	4.0 U	293	8.0 U	6.0 J	12.2	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0016	3/30/2022	23 - 27	NM	55.8	5.9 J	10.6	4.2 U	141	8.3 U	8.3 U	8.0 J	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0016	3/30/2022	40 - 44	NM	3.4 J	4.2 U	4.2 U	4.2 U	3.6 J	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0016	3/30/2022	55 - 59	NM	21.6	5.0 U	5.0 U	5.0 U	18.7	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U
A3RB-DPT0017	6/10/2022	3 - 6	NM	11.6	3.8 J	4.9 J	4.3 U	8.2 J	43 U	31.2	22 U	8.7 U	8.7 U	43 U	8.7 U
A3RB-DPT0017	6/10/2022	8 - 12	NM	48.9	3.4 J	3.6 J	4.0 U	41.8	8.0 U	7.4 J	4.3 J	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0017	6/10/2022	8 - 12	FD	37	3.0 J	3.4 J	4.5 U	30.7	9.1 U	6.2 J	3.1 J	9.1 U	9.1 U	9.1 U	9.1 U
A3RB-DPT0017	6/13/2022	23 - 27	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0017	3/7/2023	40 - 44	NM	10.7	2.2 U	3.3 J	2.2 U	10.9	4.3 U	5.3 J	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U
A3RB-DPT0017	3/7/2023	55 - 59	NM	2.0 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	3.8 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U
A3RB-DPT0018	6/10/2022	2 - 6	NM	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0018	6/10/2022	8 - 12	NM	164	4.7 J	6.8 J	4.2 U	153	8.3 U	5.9 J	7.1 J	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0018	6/10/2022	23 - 27	NM	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	8.7 U	8.7 U	4.3 U	8.7 U	8.7 U	8.7 U	8.7 U
A3RB-DPT0019	6/10/2022	2 - 6	NM	260	4.6 J	11.1	4.2 U	236	8.3 U	5.8 J	10.6	8.3 U	8.3 U	8.3 U	8.3 U
A3RB-DPT0019	6/10/2022	8 - 12	NM	523	7.1 J	18.6	4.0 U	402	8.0 U	7.0 J	17	8.0 U	8.0 U	8.0 U	8.0 U
A3RB-DPT0019	6/10/2022	23 - 27	NM	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	9.1 U	9.1 U	4.6 U	9.1 U	9.1 U	9.1 U	9.1 U
A3RB-DPT0019	3/9/2023	40 - 44	NM	4.9	2.1 U	11 U	2.1 U	3.0 J	21 U	21 U	2.1 U	21 U	4.3 U	4.3 U	4.3 U
A3RB-DPT0019	3/9/2023	55 - 59	NM	2.3 U	2.3 U	12 U	2.3 U	2.3 U	4.7 U	4.7 U	2.3 U	4.7 U	4.7 U	4.7 U	4.7 U
A3RB-DPT0020	12/12/2022	2 - 6	NM	5.0 U	5.0 U	25 U	5.0 U	28.7	10 U	10.3 J	25 U	10 U	10 U	50 U	10 U
A3RB-DPT0020	12/12/2022	8 - 12	NM	1.9 U	1.9 U	9.3 U	1.9 U	2.0 J	3.7 U	2.3 J	9.3 U	3.7 U	3.7 U	19 U	3.7 U
A3RB-DPT0020	12/12/2022	23 - 27	NM	5.0 U	5.0 U	25 U	5.0 U	5.0 U	10 U	50 U	5.0 U	10 U	10 U	10 U	10 U
A3RB-DPT0020	12/12/2022	40 - 44	NM	5.0 U	5.0 U	25 U	5.0 U	5.0 U	10 U	50 U	5.0 U	10 U	10 U	10 U	10 U
A3RB-DPT0020	12/12/2022	55 - 59	NM	24.6	8.1 J	28 U	5.6 U	29.9	11 U	113	8.2 J	11 U	11 U	11 U	11 U
A3RB-DPT0021	12/12/2022	2 - 6	NM	5.0 U	5.0 U	25 U	5.0 U	7.8 J	10 U	50 U	5.0 U	10 U	10 U	10 U	10 U
A3RB-DPT0021	12/12/2022	8 - 12	NM	2.0 J	1.9 U	19 U	1.9 U	19 U	3.7 U	4.8 J	19 U	37 U	3.7 U	37 U	3.7 U
A3RB-DPT0021	12/12/2022	23 - 27	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U
A3RB-DPT0021	12/12/2022	40 - 44	NM	5.0 U	5.0 U	25 U	5.0 U	5.0 U	10 U	50 U	5.0 U	10 U	10 U	10 U	10 U
A3RB-DPT0021	12/12/2022	40 - 44	FD	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	9.3 U	3.7 U	3.7 U	19 U	3.7 U
A3RB-DPT0021	12/12/2022	55 - 59	NM	10.4	2.9 J	25 U	5.0 U	9.2 J	10 U	7.6 J	5.0 U	10 U	10 U	10 U	10 U
A3RB-DPT0022	12/12/2022	2 - 6	NM	5.0 U	5.0 U	25 U	5.0 U	5.0 U	10 U	6.9 J	25 U	50 U	10 U	50 U	10 U
A3RB-DPT0022	12/13/2022	8 - 12	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	2.6 J	9.3 U	3.7 U	3.7 U	19 U	3.7 U
A3RB-DPT0022	12/13/2022	16 - 20	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U
A3RB-DPT0022	12/13/2022	23 - 27	NM	5.0 U	5.0 U	50 U	5.0 U	5.0 U	10 U	100 U	5.0 U	100 U	10 U	10 U	10 U
A3RB-DPT0022	12/13/2022	40 - 44	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	19 U	3.7 U	3.7 U	3.7 U
A3RB-DPT0022	12/13/2022	55 - 59	NM	3.8 J	3.0 U	15 U	3.0 U	1.8 J	6.1 U	6.8 J	15 U	30 U	6.1 U	30 U	6.1 U
A3RB-DPT0023	12/13/2022	2 - 6	NM	7.8	1.9 J	9.3 U	1.9 U	13.6	3.7 U	7.3 J	2.3 J	19 U	19 U	19 U	3.7 U
A3RB-DPT0023	12/13/2022	8 - 12	NM	993	6.8	11.4	2.1 J	375	3.7 U	5.4 J	13.9	3.7 U	3.7 U	19 U	3.7 U
A3RB-DPT0023	12/13/2022	23 - 27	NM	1.4 J	2.0 U	10 U	2.0 U	2.0 U	4.1 U	20 U	10 U	4.1 U	4.1 U	20 U	4.1 U
A3RB-DPT0023	12/13/2022	40 - 44	NM	23.4	1.9 U	9.6 U	1.9 U	12.5	3.8 U	19 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U
A3RB-DPT0023	12/13/2022	40 - 44	FD	7.7	2.3 U	7.2 U	2.3 U	2.9 J	4.5 U	14 U	2.3 U	4.5 U	4.5 U	4.5 U	4.5 U

Location ID	Sample Date	Depth Interval (ft bls)	Sample Type	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFDOA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTEA	PFTRIA	PFUNA
			EPA RSL for tapwater (ng/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			FDEP pGCTL (ng/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A3RB-DPT0008	1/19/2022	2 - 6	NM	11 U	11 U	11 U	11 U	11 U	5.5 U	5.5 U	5.5 U	3.5 J	3.3 J	5.5 U	5.5 U	8.2 J	6.0 J	5.5 U	5.5 U	5.5 U
A3RB-DPT0008	1/19/2022	2 - 6	FD	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	3.1 J	4.2 U	4.2 U	7.8 J	6.1 J	4.2 U	4.2 U	4.2 U
A3RB-DPT0008	1/19/2022	8 - 12	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0008	1/19/2022	23 - 27	NM	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
A3RB-DPT0008	1/19/2022	40 - 44	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0008	1/19/2022	55 - 59	NM	8.3 U	8.3 U	42 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	2.6 J	2.3 J	4.2 U	4.2 U	4.2 U
A3RB-DPT0009	1/19/2022	2 - 6	NM	10 U	10 U	10 U	10 U	100 U	5.0 U	5.0 U	5.0 U	32.7	27	5.0 U	5.0 U	291	54.1	50 U	5.0 U	5.0 U
A3RB-DPT0009	1/19/2022	8 - 12	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0009	1/19/2022	23 - 27	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0009	1/19/2022	40 - 44	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0009	1/19/2022	55 - 59	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	10.3	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	2 - 6	NM	10 U	10 U	10 U	10 U	500 U	5.0 U	5.0 U	5.0 U	267	113	5.0 U	5.0 U	639	147	5.0 U	5.0 U	5.0 U
A3RB-DPT0010	1/24/2022	8 - 12	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	2.4 J	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	8 - 12	FD	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	2.2 J	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	23 - 27	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	2.9 J	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	40 - 44	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0010	1/24/2022	55 - 59	NM	9.1 U	9.1 U	9.1 U	45 U	45 U	4.5 U	4.5 U	23 U	6.9 J	2.3 J	4.5 U	4.5 U	18.2	3.6 J	4.5 U	23 U	4.5 U
A3RB-DPT0011	1/24/2022	2 - 6	NM	9.2 U	9.2 U	9.2 U	9.2 U	45 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	32.8	7.8 J	4.6 U	4.6 U	4.6 U
A3RB-DPT0011	1/24/2022	8 - 12	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0011	1/24/2022	23 - 27	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0011	1/24/2022	40 - 44	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0011	1/24/2022	55 - 59	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0012	1/26/2022	2 - 6	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0012	1/26/2022	8 - 12	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	3.9 J	4.2 U	4.2 U	4.2 U
A3RB-DPT0012	1/26/2022	23 - 27	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0012	1/26/2022	32 - 36	NM	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0012	1/26/2022	55 - 59	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0013	3/29/2022	2 - 6	NM	44 U	44 U	44 U	44 U	44 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U	22 U
A3RB-DPT0013	3/29/2022	8 - 12	NM	8.7 U	8.7 U	8.7 U	8.7 U	43 U	4.4 U	4.4 U	4.4 U	2.7 J	4.4 U	4.4 U	4.4 U	4.8 J	4.4 U	4.4 U	4.4 U	4.4 U
A3RB-DPT0013	3/29/2022	23 - 27	NM	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	3.1 J	2.2 J	4.0 U	4.0 U	4.0 U
A3RB-DPT0013	3/29/2022	40 - 44	NM	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0013	3/29/2022	55 - 59	NM	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0014	3/29/2022	2 - 6	NM	42 U	42 U	42 U	42 U	42 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U	21 U
A3RB-DPT0014	3/29/2022	8 - 12	NM	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
A3RB-DPT0014	3/29/2022	23 - 27	NM	8.7 U	8.7 U	43 U	43 U	43 U	4.4 U	4.4 U	22 U	4.4 U	4.4 U	4.4 U	22 U	4.4 U	4.4 U	4.4 U	22 U	22 U
A3RB-DPT0014	3/29/2022	40 - 44	NM	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0014	3/29/2022	55 - 59	NM	9.1 U	9.1 U	9.1 U	9.1 U	9.1 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U
A3RB-DPT0015	3/29/2022	2 - 6	NM	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0015	3/29/2022	8 - 12	NM	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0015	3/30/2022	23 - 27	NM	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0015	3/30/2022	40 - 44	NM	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0015	3/30/2022	55 - 59	NM	9.5 U	9.5 U	9.5 U	9.5 U	48 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
A3RB-DPT0016	3/30/2022	2 - 6	NM	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0016	3/30/2022	2 - 6	FD	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0016	3/30/2022	8 - 12	NM	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.9 J	2.5 J	4.0 U	4.0 U	17.4	3.8 J	20 U	4.0 U	4.0 U
A3RB-DPT0016	3/30/2022	23 - 27	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.7 J	2.4 J	4.2 U	4.2 U	11.2	3.3 J	4.2 U	4.2 U	4.2 U
A3RB-DPT0016	3/30/2022	40 - 44	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0016	3/30/2022	55 - 59	NM	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
A3RB-DPT0017	6/10/2022	3 - 6	NM	8.7 U	8.7 U	8.7 U	8.7 U	43 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	4.3 U	22 U	22 U	4.3 U	4.3 U
A3RB-DPT0017	6/10/2022	8 - 12	NM	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	3.8 J	3.5 J	4.0 U	4.0 U	4.0 U
A3RB-DPT0017	6/10/2022	8 - 12	FD	9.1 U	9.1 U	9.1 U	9.1 U	45 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	3.1 J	4.5 U	4.5 U	4.5 U
A3RB-DPT0017	6/13/2022	23 - 27	NM	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0017	3/7/2023	40 - 44	NM	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.7 J	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0017	3/7/2023	55 - 59	NM	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0018	6/10/2022	2 - 6	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	4.2 U	4.2 U
A3RB-DPT0018	6/10/2022	8 - 12	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	2.2 J	4.2 U	4.2 U	4.2 U	7.8 J	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0018	6/10/2022	23 - 27	NM	8.7 U	8.7 U	8.7 U	8.7 U	43 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
A3RB-DPT0019	6/10/2022	2 - 6	NM	8.3 U	8.3 U	8.3 U	8.3 U	42 U	4.2 U	4.2 U	4.2 U	4.1 J	2.6 J	4.2 U	4.2 U	15.5	4.2 U	4.2 U	4.2 U	4.2 U
A3RB-DPT0019	6/10/2022	8 - 12	NM	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	8	4.0 J	4.0 U	4.0 U	26.3	8.2	4.0 U	4.0 U	4.0 U
A3RB-DPT0019	6/10/2022	23 - 27	NM	9.1 U	9.1 U	9.1 U	9.1 U	45 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U	4.6 U
A3RB-DPT0019	3/9/2023	40 - 44	NM	4.3 U	21 U	21 U	21 U	21 U	11 U	11 U	11 U	2.1 U	2.1 U	2.1 U	11 U	11 U	11 U	2.1 U	11 U	11 U
A3RB-DPT0019	3/9/2023	55 - 59	NM	4.7 U	4.7 U	4.7 U	4.7 U	23 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	12 U	2.3 U	2.3 U	2.3 U	2.3 U
A3RB-DPT0020	12/12/2022	2 - 6	NM	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	25 U	25 U	25 U	25 U	5.0 U	5.0 U
A3RB-DPT0020	12/12/2022	8 - 12	NM	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0020	12/12/2022	23 - 27	NM	10 U	10 U	10 U	10 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	5.0 U	5.0 U	5.0 U
A3RB-DPT0020	12/12/2022	40 - 44	NM	10 U	10 U	10 U	10 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	5.0 U	5.0 U	5.0 U
A3RB-DPT0020	12/12/2022	55 - 59	NM	11 U	11 U	11 U	11 U	56 U	5.6 U	5.6 U	5.6 U	5.6 U	5.0 J	5.6 U	28 U	28 U	7.7 J	5.6 U	5.6 U	5.6 U
A3RB-DPT0021	12/12/2022	2 - 6	NM	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	25 U	5.0 U	5.0 U	5.0 U
A3RB-DPT0021	12/12/2022	8 - 12	NM	37 U	37 U	37 U	37 U	37 U	19 U	19 U	19 U	1.9 U	19 U	1.9 U	19 U	19 U	19 U	19 U	19 U	19 U
A3RB-DPT0021	12/12/2022	23 - 27	NM	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0021	12/12/2022	40 - 44	NM	10 U	10 U	10 U	10 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	5.0 U	5.0 U	5.0 U
A3RB-DPT0021	12/12/2022	40 - 44	FD	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0021	12/12/2022	55 - 59	NM	10 U	10 U	10 U	10 U	50 U	5.0 U	3.5 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	5.0 U	5.0 U	5.0 U
A3RB-DPT0022	12/12/2022	2 - 6	NM	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	25 U	5.0 U	25 U	5.0 U	25 U	25 U	25 U	25 U	25 U	5.0 U
A3RB-DPT0022	12/13/2022	8 - 12	NM	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	9.3 U	9.3 U	9.3 U	1.9 U	1.9 U
A3RB-DPT0022	12/13/2022	16 - 20	NM	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0022	12/13/2022	23 - 27	NM	10 U	10 U	100 U	100 U	100 U	50 U	5.0 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	50 U	50 U	5.0 U	50 U	50 U
A3RB-DPT0022	12/13/2022	40 - 44	NM	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	1.9 U
A3RB-DPT0022	12/13/2022	55 - 59	NM	6.1 U	6.1 U	30 U	6.1 U	30 U	15 U	3.0 U	15 U	3.0 U	15 U	3.0 U	15 U	15 U	15 U	15 U	15 U	15 U
A3RB-DPT0023	12/13/2022	2 - 6	NM	3.7 U	3.7 U	3.7 U	3.7 U	19 U	9.3 U	1.9 U	9.3 U	1.9 U	2.3 J	1.9 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U
A3RB-DPT0023	12/13/2022	8 - 12	NM	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	9.3 U	15.6	3.7	1.9 U	9.3 U	25.4	3.8	9.3 U	1.9 U	9.3 U
A3RB-DPT0023	12/13/2022	23 - 27	NM	4.1 U	4.1 U	4.1 U	4.1 U	20 U	10 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
A3RB-DPT0023	12/13/2022	40 - 44	NM	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.6 U	9.6 U	9.6 U	9.6 U	1.9 U	1.9 U
A3RB-DPT0023	12/13/2022	40 - 44	FD	4.5 U	4.5 U	4.5 U	4.5 U	22 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	7.2 U	7.2 U	7.2 U	2.3 U	2.3 U	2.3 U

Table 4-3
DPT Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

			Analyte	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFDOA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTEA	PFTRIA	PFUNA
			EPA RSL for tapwater (ng/L)	4	6	601	6	39	6	1800	990	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			FDEP pGCTL (ng/L)	70	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Location ID	**Sample Date**	**Depth Interval (ft bls)**	**Sample Type**																													
A3RB-DPT0023	12/13/2022	55 - 59	NM	**28.1**	2.0 U	3.9 U	2.0 U	**14.9**	3.9 U	7.8 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	7.8 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	2.0 U	2.0 U
A3RB-DPT0024	12/14/2022	2 - 6	NM	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	**5.1 J**	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U	25 U	5.0 U	5.0 U
A3RB-DPT0024	12/14/2022	8 - 12	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	**4.2 J**	1.9 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	9.3 U	9.3 U	9.3 U	1.9 U
A3RB-DPT0024	12/14/2022	23 - 27	NM	**5.6**	2.0 U	10 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U	10 U	10 U	10 U	10 U	10 U	2.0 U
A3RB-DPT0024	12/14/2022	40 - 44	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0024	12/14/2022	55 - 59	NM	**3.7 J**	2.5 U	13 U	2.5 U	2.5 U	5.0 U	5.0 U	2.5 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	13 U	13 U	2.5 U	2.5 U	2.5 U
A3RB-DPT0025	12/14/2022	2 - 6	NM	1.9 U	1.9 U	**10.9**	1.9 U	**2.3 J**	3.7 U	**7.9**	1.9 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	9.3 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	**2.0 J**	1.9 U	9.3 U	9.3 U	9.3 U
A3RB-DPT0025	12/14/2022	8 - 12	NM	**6.5**	1.9 U	**3.0 J**	1.9 U	**10.9**	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	**2.4 J**	9.3 U	9.3 U	1.9 U	1.9 U
A3RB-DPT0025	12/14/2022	8 - 12	FD	**6.3**	1.9 U	**3.0 J**	1.9 U	**10.6**	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	**2.3 J**	9.3 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0025	12/14/2022	16 - 20	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0025	12/14/2022	23 - 27	NM	**2.3 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	10 U	2.0 U	2.0 U
A3RB-DPT0025	12/14/2022	40 - 44	NM	**3.6 J**	2.5 U	13 U	2.5 U	**1.4 J**	5.0 U	**4.0 J**	2.5 U	25 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	25 U	25 U	13 U	2.5 U	13 U	2.5 U	2.5 U	2.5 U	2.5 U	13 U	13 U	2.5 U	13 U	13 U
A3RB-DPT0025	12/14/2022	55 - 59	NM	2.0 U	2.0 U	10 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	10 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0026	12/15/2022	2 - 6	NM	**5.2**	1.9 U	**9.5**	1.9 U	**20.1**	3.7 U	**11.5**	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	**4.8**	1.9 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0026	12/15/2022	8 - 12	NM	**2.3 J**	1.9 U	**2.4 J**	1.9 U	**8.8**	3.7 U	**3.1 J**	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**1.8 J**	1.9 U	9.3 U	1.9 U	1.9 U
A3RB-DPT0026	12/15/2022	23 - 27	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0026	12/15/2022	40 - 44	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0026	12/15/2022	55 - 59	NM	**3.3 J**	2.6 U	13 U	2.6 U	**1.4 J**	5.3 U	**3.7 J**	2.6 U	26 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	26 U	26 U	26 U	13 U	2.6 U	13 U	2.6 U	2.6 U	2.6 U	2.6 U	13 U	13 U	13 U	13 U	13 U
A3RB-DPT0027	12/14/2022	2 - 6	NM	***745 E***	**7.9**	**12.1 J**	**0.99 J**	**285**	3.7 U	**18.8 J**	**14.8**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**9.2**	**3.5 J**	1.9 U	9.3 U	**14.5 J**	**6.3 J**	1.9 U	1.9 U	1.9 U
A3RB-DPT0027	12/15/2022	2 - 6	FD	***582***	**6.9**	**11.8**	1.9 U	**259**	3.7 U	**19.4**	**14.1**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**7.9**	**3.4 J**	1.9 U	1.9 U	**17.3**	**5.9**	1.9 U	1.9 U	1.9 U
A3RB-DPT0027	12/15/2022	8 - 12	NM	***812***	**7.5**	**23.8**	2.2 U	**487**	4.3 U	**7.3 J**	**20.3**	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	11 U	**12**	**4.1 J**	2.2 U	2.2 U	**37.4**	**6.4**	2.2 U	2.2 U	2.2 U
A3RB-DPT0027	12/20/2022	16 - 20	NM	***107***	**7.8**	**29.2**	2.1 U	**285**	4.3 U	**5.0 J**	**19.3**	4.3 U	4.3 U	21 U	21 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	**6.9**	**5**	2.1 U	11 U	**30**	**6.5**	2.1 U	2.1 U	2.1 U
A3RB-DPT0027	12/20/2022	23 - 27	NM	***142***	**9.7**	**30.2**	2.4 U	**417**	4.9 U	**4.5 J**	**19.2**	24 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	24 U	24 U	24 U	12 U	2.4 U	12 U	**13.6**	**4.3 J**	2.4 U	2.4 U	**35.8**	**5.9**	2.4 U	12 U	12 U
A3RB-DPT0027	12/20/2022	55 - 59	NM	**1.2 J**	2.1 U	10 U	2.1 U	2.1 U	4.2 U	21 U	2.1 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	10 U	10 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0028	12/19/2022	2 - 6	NM	**4.9**	2.4 U	2.4 U	2.4 U	**2.3 J**	4.8 U	**11.1**	**1.2 J**	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U		2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	2.4 U
A3RB-DPT0028	12/19/2022	8 - 12	NM	2.2 U	2.2 U	11 U	2.2 U	2.2 U	4.3 U	22 U	11 U	4.3 U	4.3 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	11 U	2.2 U	2.2 U
A3RB-DPT0028	12/19/2022	16 - 20	NM	2.4 U	2.4 U	12 U	2.4 U	2.4 U	4.8 U	24 U	12 U	4.8 U	4.8 U	24 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	12 U	2.4 U	2.4 U	2.4 U
A3RB-DPT0028	12/19/2022	23 - 27	NM	2.1 U	2.1 U	11 U	2.1 U	2.1 U	4.3 U	21 U	11 U	4.3 U	4.3 U	21 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	11 U	11 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0028	12/19/2022	40 - 44	NM	2.2 U	2.2 U	11 U	2.2 U	2.2 U	4.4 U	22 U	11 U	22 U	4.4 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	2.2 U	2.2 U	11 U	2.2 U	11 U	2.2 U	2.2 U	11 U	11 U	2.2 U	11 U	2.2 U
A3RB-DPT0028	12/19/2022	55 - 59	NM	2.6 U	2.6 U	5.2 U	5.2 U	5.2 U	5.3 U	**6.0 JB**	5.2 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	26 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U
A3RB-DPT0029	12/20/2022	2 - 6	NM	**35**	**5.6**	**10.6**	2.2 U	**48.8**	4.3 U	**43.5**	**4.0 J**	4.3 U	4.3 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	**2.7 J**	2.2 U	11 U	**6.1**	**4.3**	2.2 U	2.2 U	2.2 U
A3RB-DPT0029	12/20/2022	8 - 12	NM	**43**	**1.8 J**	**3.8 J**	2.4 U	**32.9**	4.8 U	**7.3 JB**	**1.9 J**	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	**3.4 J**	**1.2 J**	2.4 U	2.4 U	2.4 U
A3RB-DPT0029	12/20/2022	16 - 20	NM	2.1 U	2.1 U	10 U	2.1 U	2.1 U	4.2 U	21 U	10 U	4.2 U	4.2 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	10 U	10 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0029	12/20/2022	23 - 27	FD	2.3 U	2.3 U	12 U	2.3 U	**1.4 J**	4.7 U	23 U	12 U	4.7 U	4.7 U	23 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	12 U	12 U	12 U	2.3 U	2.3 U
A3RB-DPT0029	12/20/2022	23 - 27	NM	2.3 U	2.3 U	11 U	2.3 U	2.3 U	4.5 U	23 U	11 U	4.5 U	4.5 U	23 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	11 U	11 U	11 U	2.3 U	2.3 U	2.3 U
A3RB-DPT0029	12/20/2022	40 - 44	NM	**7.3**	2.4 U	12 U	2.4 U	**3.1 J**	4.9 U	**3.0 J**	2.4 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	12 U	2.4 U	2.4 U	2.4 U
A3RB-DPT0029	12/20/2022	55 - 59	NM	**4.2 J**	2.3 U	11 U	2.3 U	**2.1 J**	4.5 U	23 U	2.3 U	23 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	11 U	2.3 U	11 U	2.3 U	2.3 U	2.3 U	11 U	11 U	11 U	11 U	11 U	11 U
A3RB-DPT0030	3/6/2023	2 - 6	NM	***82.2***	**3.0 J**	**5.0 J**	4.0 U	**112**	8.0 U	**5.0 J**	**7.5 J**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	**3.2 J**	4.0 U	4.0 U	4.0 U	**2.1 J**	**7.7 J**	4.0 U	4.0 U	4.0 U
A3RB-DPT0030	3/6/2023	8 - 12	NM	**9.0 B**	1.9 U	9.4 U	1.9 U	**8.9**	3.8 U	19 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.4 U	9.4 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0030	3/6/2023	16 - 20	NM	2.1 U	1.9 U	1.9 U	1.9 U	**1.3 J**	3.8 U	3.8 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0030	3/6/2023	23 - 27	NM	**42.1**	**1.1 J**	2.1 U	2.1 U	**9.2**	4.3 U	**7.2 J**	**1.5 J**	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.9 U	2.1 U	2.1 U	2.4 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0030	3/6/2023	40 - 44	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0030	3/6/2023	55 - 59	NM	**1.7 J**	2.1 U	2.1 U	2.1 U	**1.6 J**	4.3 U	4.3 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0031	3/6/2023	2 - 6	NM	***635***	**12.8**	**67.9**	4.0 U	**735**	8.0 U	**13.3 J**	**37.5**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	**23.7**	**6.2 J**	4.0 U	4.0 U	**8.7**	**89.9**	4.0 U	4.0 U	4.0 U
A3RB-DPT0031	3/6/2023	8 - 12	NM	***116***	**2.3 J**	**9.8 J**	2.0 U	**105**	3.9 U	**4.8 J**	**7.0**	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	2.0 U	**4.6**	**1.3 J**	2.0 U	2.0 U	**1.9 J**	**16.3 J**	2.0 U	2.0 U	2.0 U
A3RB-DPT0031	3/6/2023	16 - 20	NM	**5.9**	2.1 U	2.1 U	2.1 U	**4.6**	4.3 U	4.3 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0031	3/6/2023	23 - 27	NM	**62.5**	**1.2 J**	**2.4 J**	2.0 U	**42.4**	3.9 U	20 U	**1.9 J**	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	2.0 U	**1.4 J**	2.0 U	2.0 U	9.8 U	9.8 U	**5.0 J**	2.0 U	2.0 U	2.0 U
A3RB-DPT0031	3/6/2023	40 - 44	NM	***136***	**1.2 J**	**4.2 J**	2.1 U	**47.1**	4.3 U	21 U	**2.2 J**	21 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	4.3 U	21 U	11 U	2.1 U	11 U	**2.1 J**	2.1 U	2.1 U	11 U	11 U	**6.0 J**	2.1 U	11 U	11 U
A3RB-DPT0031	3/6/2023	40 - 44	FD	***148***	**1.1 J**	9.3 U	1.9 U	**51.2**	3.7 U	19 U	**2.2 J**		3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	3.7 U	19 U	9.3 U	1.9 U	9.3 U	**2.4 J**	1.9 U	1.9 U	9.3 U	9.3 U	**5.2 J**	1.9 U	9.3 U	9.3 U
A3RB-DPT0031	3/6/2023	55 - 59	NM	**10.1**	2.1 U	2.1 U	2.1 U	**4.5**	4.3 U	4.3 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
A3RB-DPT0032	3/7/2023	2 - 6	NM	**50.2**	4.0 U	4.0 U	4.0 U	**28.1**	8.0 U	8.0 U	**2.4 J**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0032	3/7/2023	8 - 12	NM	**37.9**	4.0 U	**2.7 J**	4.0 U	**27.1**	8.0 U	**6.2 J**	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0032	3/7/2023	16 - 20	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.0 U	4.0 U	2.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	**2.7 J**	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0032	3/7/2023	23 - 27	NM	**3.5 J**	4.0 U	4.0 U	4.0 U	**6.8 J**	8.0 U	**4.1 J**	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0032	3/7/2023	40 - 44	NM	**10.2**	4.0 U	4.0 U	4.0 U	**4.1 J**	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0032	3/7/2023	55 - 59	NM	**4.7**	2.2 U	2.2 U	2.2 U	**1.6 J**	4.3 U	4.3 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0033	3/8/2023	2 - 6	NM	**66.6**	**5.5**	**5.7**	2.3 U	**47.6**	23 U	**18.3 J**	**2.0 J**	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	23 U	2.3 U	2.3 U	2.3 U	**1.9 J**	**1.6 J**	2.3 U	11 U	**2.0 J**	**4.3 J**	2.3 U	2.3 U	2.3 U
A3RB-DPT0033	3/8/2023	8 - 12	NM	**36.0**	**3.8 J**	**3.4 J**	2.2 U	**20.8**	22 U	**6.9 J**	**2.3 J**	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	**1.6 J**	2.2 U	11 U	**2.1 J**	**2.2 J**	2.2 U	2.2 U	2.2 U
A3RB-DPT0033	3/8/2023	16 - 20	NM	2.2 U	2.2 U	11 U	2.2 U	2.2 U	4.3 U	22 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0033	3/9/2023	23 - 27	NM	2.2 U	2.2 U	11 U	2.2 U	2.2 U	4.3 U	22 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0033	3/9/2023	40 - 44	NM	**6.0**	2.6 U	13 U	2.6 U	**2.6 J**	5.3 U	5.3 U	2.6 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	5.3 U	26 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	13 U	13 U	13 U	13 U	2.6 U	2.6 U
A3RB-DPT0033	3/9/2023	40 - 44	FD	**2.5 J**	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0033	3/9/2023	55 - 59	NM	**7.5**	2.4 U	12 U	2.4 U	**3.2 J**	4.8 U	24 U	2.4 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	2.4 U	2.4 U	2.4 U
A3RB-DPT0034	3/10/2023	2 - 6	NM	***103***	**7.4**	15 U	3.0 U	**132**	6.0 U	**36.9 J**	**9.8**	29 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	29 U	29 U	29 U	15 U	3.0 U	15 U	**7.7**	**2.7 J**	3.0 U	3.0 U	**5.7 J**	**15.8 J**	3.0 U	15 U	15 U
A3RB-DPT0034	3/10/2023	8 - 12	NM	***203***	**7.2**	**18.8 J**	1.9 U	**240**	19 U	**13.6 J**	**13.6**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**8.3**	**3.2 J**	1.9 U	1.9 U	**9.0 J**	**28.6**	1.9 U	1.9 U	1.9 U
A3RB-DPT0034	3/10/2023	23 - 27	NM	**8.0**	**1.6 J**	14 U	2.7 U	**8.0**	5.5 U	27 U	2.7 U	27 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	27 U	27 U	27 U	14 U	2.7 U	14 U	2.7 U	2.7 U	2.7 U	14 U	14 U	**2.0 J**	2.7 U	14 U	14 U
A3RB-DPT0034	3/10/2023	40 - 44	NM	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	11 U	11 U	5.5 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	11 U	55 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
A3RB-DPT0034	3/10/2023	55 - 59	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.1 U	8.1 U	4.0 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
A3RB-DPT0035	3/10/2023	2 - 6	NM	**14.0**	**1.3 J**	**7.1 J**	2.4 U	**17.3**	4.8 U	**28.5**	2.4 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	2.4 U	**2.9 J**	2.4 U	2.4 U	2.4 U	12 U	**6.5**	2.4 U	2.4 U	2.4 U
A3RB-DPT0035	3/10/2023	8 - 12	NM	**23.2**	**1.3 J**	**16.7**	1.9 U	**52.2**	3.7 U	**6.5 J**	**2.8 J**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**2.6 J**	1.9 U	1.9 U	1.9 U	**1.1 J**	**12.7**	1.9 U	1.9 U	1.9 U
A3RB-DPT0035	3/10/2023	8 - 12	FD	**21.1**	**1.3 J**	**15.8**	1.9 U	**49.6**	3.7 U	**6.2 J**	**2.7 J**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**2.5 J**	1.9 U	1.9 U	1.9 U	**1.1 J**	**12.2**	1.9 U	1.9 U	1.9 U
A3RB-DPT0035	3/10/2023	16 - 20	NM	7.7 U	**4.3 J**	**33.9**	7.7 U	**147**	15 U	15 U	**18.3**	77 U	15 U	15 U	15 U	15 U	15 U	15 U	77 U	15 U	7.7 U	7.7 U	7.7 U	7.7 U	**4.0 J**	7.7 U	7.7 U	**6.0 J**	**34.2**	7.7 U	38 U	7.7 U
A3RB-DPT0035	3/13/2023	23 - 27	NM	2.6 U	2.6 U	13 U	2.6 U	2.6 U	5.2 U	25 U	13 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	5.2 U	25 U	2.6 U	2.6 U	13 U	2.6 U	2.6 U	2.6 U	2.6 U	13 U	2.6 U	2.6 U	2.6 U	13 U
A3RB-DPT0035	3/13/2023	40 - 44	NM	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U	1.9 U	9.3 U
A3RB-DPT0035	3/13/2023	55 - 59	NM	4.0 U	4.0 U	20 U	4.0 U	4.0 U	8.1 U	40 U	4.0 U	40 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	8.1 U	40 U	20 U	4.0 U	20 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	20 U	4.0 U	20 U	20 U
A3RB-DPT0036	3/13/2023	2 - 6	NM	**8.2**	**2.3 J**	**11.5 J**	1.9 U	**60.0**	3.7 U	**15.7 J**	**7.7 J**	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	**14.5 J**	**12.4 J**	1.9 U	1.9 U	1.9 U
A3RB-DPT0036	3/13/2023	8 - 12	NM	**12.7**	**2.6 J**	9.3 U	1.9 U	**19.8**	3.7 U	**11.2 J**	9.3 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	9.3 U	9.3 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0036	3/13/2023	16 - 20	NM	3.5 U	3.5 U	17 U	3.5 U	3.5 U	7.0 U	7.0 U	3.5 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	34 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	17 U	17 U	3.5 U	3.5 U	3.5 U
A3RB-DPT0036	3/13/2023	23 - 27	NM	5.2 U	5.2 U	26 U	5.2 U	5.2 U	10 U	53 U	26 U	10 U	10 U	10 U	10 U	10 U	10 U	53 U	53 U	53 U	5.2 U	5.2 U	26 U	5.2 U	5.2 U	5.2 U	5.2 U	26 U	26 U	5.2 U	5.2 U	26 U
A3RB-DPT0036	3/13/2023	40 - 44	NM	3.4 U	3.4 U	17 U	3.4 U	3.4 U	6.8 U	34 U	17 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	6.8 U	34 U	3.4 U	3.4 U	3.4 U	3.4 U	17 U	3.4 U	3.4 U	17 U	17 U	3.4 U	3.4 U	3.4 U
A3RB-DPT0036	3/13/2023	40 - 44	FD	2.0 U	2.0 U	10 U	2.0 U	2.0 U	4.1 U	21 U	10 U	4.1 U	4.1 U	21 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	21 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	10 U	10 U	10 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0036	3/13/2023	55 - 59	NM	4.3 U	4.3 U	22 U	4.3 U	4.3 U	8.6 U	44 U	4.3 U	44 U	8.6 U	8.6 U	8.6 U	8.6 U	8.6 U	44 U	8.6 U	44 U	22 U	4.3 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	22 U	4.3 U	22 U	22 U
A3RB-DPT0037	3/15/2023	2 - 6	NM	**14.2**	**2.1 J**	**10.8 J**	1.9 U	**68.1**	3.7 U	19 U	9.3 U	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**1.4 J**	9.3 U	1.9 U	1.9 U	9.3 U	**9.5 J**	1.9 U	1.9 U	1.9 U
A3RB-DPT0037	3/15/2023	2 - 6	FD	**15.7**	**2.0 J**	**10.1 J**	1.9 U	**66.8**	3.7 U	19 U	9.3 U	19 U	3.7 U	19 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	9.3 U	**1.5 J**	9.3 U	1.9 U	9.3 U	9.3 U	**10 J**	9.3 U	9.3 U	1.9 U

Table 4-3
DPT Groundwater Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

			Analyte	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFDOA	PFHpS	PFHpA	PFNS	PFOSA	PFPES	PFPEA	PFTEA	PFTRIA	PFUNA
			EPA RSL for tapwater (ng/L)	4	6	601	6	39	6	1800	990	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			FDEP pGCTL (ng/L)	70	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Location ID	Sample Date	Depth Interval (ft bls)	Sample Type																													
A3RB-DPT0037	3/15/2023	8 - 12	NM	***70.7***	**4.5 J**	**22.3 J**	2.4 U	**162**	4.8 U	98 U	24 U	4.8 U	4.8 U	4.8 U	4.8 U	49 U	4.8 U	49 U	49 U	49 U	2.4 U	24 U	24 U	**3.8 J**	24 U	2.4 U	24 U	24 U	**18.6 J**	2.4 U	2.4 U	24 U
A3RB-DPT0037	3/15/2023	16 - 20	NM	4.3 U	4.3 U	22 U	4.3 U	**3.9 J**	8.7 U	43 U	4.3 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	8.7 U	43 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	22 U	4.3 U	4.3 U	4.3 U
A3RB-DPT0037	3/15/2023	23 - 27	NM	3.1 U	3.1 U	15 U	3.1 U	3.1 U	6.2 U	30 U	3.1 U	30 U	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	30 U	6.2 U	30 U	15 U	3.1 U	15 U	3.1 U	3.1 U	3.1 U	3.1 U	15 U	15 U	3.1 U	15 U	15 U
A3RB-DPT0037	3/15/2023	40 - 44	NM	1.9 U	1.9 U	9.6 U	1.9 U	1.9 U	3.8 U	19 U	1.9 U	19 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	9.6 U	1.9 U	9.6 U	1.9 U	1.9 U	1.9 U	1.9 U	9.6 U	9.6 U	1.9 U	9.6 U	9.6 U
A3RB-DPT0037	3/15/2023	55 - 59	NM	4.2 U	4.2 U	21 U	4.2 U	4.2 U	8.5 U	42 U	4.2 U	42 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	42 U	21 U	4.2 U	21 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	21 U	4.2 U	21 U	21 U
A3RB-DPT0038	5/2/2023	2 - 6	NM	**47.0**	**3.9 J**	**4.5**	2.1 U	**47.8**	4.3 U	**31.5**	**3.3 J**	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	20 U	2.1 U	2.1 U	2.1 U	**1.4 J**	**2.2 J**	2.1 U	2.0 U	**4.0 J**	**4.8**	2.1 U	2.1 U	2.1 U
A3RB-DPT0038	5/2/2023	8 - 12	NM	***191***	**2.4 J**	**5.8**	1.9 U	**93.3**	3.8 U	**6.0 J**	**4.7**	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	**2.1 J**	**1.4 J**	1.9 U	1.9 U	**2.0 J**	**5.9**	1.9 U	1.9 U	1.9 U
A3RB-DPT0038	5/2/2023	23 - 27	NM	**3.5 J**	**2.3 J**	**11.4**	2.0 U	**65.6**	4.0 U	20 U	**6.9**	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	**2.0 J**	**1.8 J**	2.0 U	2.0 U	**2.2 J**	**10.1**	2.0 U	2.0 U	2.0 U
A3RB-DPT0038	5/2/2023	23 - 27	FD	**2.8 J**	**2.3 J**	**12.7**	2.0 U	**72.2**	4.0 U	20 U	**7.4**	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	**1.9 J**	**2.0 J**	2.0 U	2.0 U	**2.2 J**	**11.4**	2.0 U	2.0 U	2.0 U
A3RB-DPT0038	5/2/2023	40 - 44	NM	**7.6**	**1.3 J**	**3.8 J**	2.4 U	**10.3**	4.8 U	**24.1**	**1.9 J**	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	**1.5 J**	2.4 U	2.4 U	2.4 U
A3RB-DPT0038	5/2/2023	55 - 59	NM	**7.1**	2.2 U	2.2 U	2.2 U	**4.1 J**	4.4 U	**4.2 J**	2.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
A3RB-DPT0039	5/2/2023	2 - 6	NM	**5.5**	**2.8 J**	**2.0 J**	1.9 U	**9.3**	3.8 U	**22.8 J**	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	**1.1 J**	1.9 U	1.9 U	9.6 U	1.9 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0039	5/2/2023	8 - 12	NM	**15.6**	1.9 U	**2.3 J**	1.9 U	**23.4**	3.8 U	19 U	**1.6 J**	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**2.2 J**	1.9 U	1.9 U	1.9 U
A3RB-DPT0039	5/2/2023	16 - 20	NM	**1.1 J**	1.9 U	1.9 U	1.9 U	**2.4 J**	3.8 U	19 U	1.9 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
A3RB-DPT0039	5/2/2023	16 - 20	FD	**1.6 J**	2.0 U	2.0 U	2.0 U	**2.5 J**	4.1 U	20 U	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0039	5/2/2023	23 - 27	NM	**2.4 J**	2.1 U	2.1 U	2.1 U	**8.1**	4.2 U	21 U	**1.0 J**	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	**1.6 J**	2.1 U	2.1 U	2.1 U
A3RB-DPT0039	5/2/2023	40 - 44	NM	**1.8 J**	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	**4.9 J**	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0039	5/2/2023	55 - 59	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	3.9 U	3.9 U	2.0 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0040	5/3/2023	2 - 6	NM	***131***	**2.5 J**	2.0 U	2.0 U	**12.9**	4.0 U	**3.0 J**	**1.1 J**	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0040	5/3/2023	8 - 12	NM	***90.8***	**4.6**	**26.2**	2.2 U	**178**	4.3 U	**12.2 J**	**4.0 J**	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	11 U	2.2 U	11 U	**7.3**	**1.3 J**	2.2 U	2.2 U	**2.0 J**	**27.8**	2.2 U	11 U	11 U
A3RB-DPT0040	5/3/2023	16 - 20	NM	**1.5 J**	2.4 U	12 U	2.4 U	2.4 U	24 U	24 U	2.4 U	24 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	24 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	2.4 U	12 U	2.4 U
A3RB-DPT0040	5/3/2023	23 - 27	NM	**1.6 J**	2.4 U	2.4 U	2.4 U	2.4 U	4.9 U	4.9 U	2.4 U	24 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	24 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U
A3RB-DPT0040	5/3/2023	40 - 44	NM	**3.1 J**	2.2 U	11 U	2.2 U	**3.0 J**	4.4 U	22 U	11 U	22 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	22 U	4.4 U	22 U	11 U	2.2 U	11 U	2.2 U	2.2 U	2.2 U	11 U	11 U	11 U	2.2 U	11 U	11 U
A3RB-DPT0040	5/3/2023	40 - 44	FD	**2.0 J**	2.3 U	12 U	2.3 U	**1.9 J**	4.7 U	23 U	12 U	23 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	12 U	2.3 U	12 U	2.3 U	2.3 U	2.3 U	2.3 U	12 U	12 U	12 U	12 U	12 U
A3RB-DPT0040	5/3/2023	55 - 59	NM	**6.4**	2.4 U	2.4 U	2.4 U	**1.8 J**	4.8 U	23 U	2.4 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	2.4 U	2.4 U
A3RB-DPT0041	5/3/2023	2 - 6	NM	***101***	**8.7**	**1.7 J**	2.2 U	**79.3**	4.3 U	**20.5**	**1.5 J**	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	2.2 U	2.2 U	2.2 U	**31.9**	2.2 U	2.2 U	2.2 U	2.2 U	**2.1 J**	2.2 U	2.2 U	2.2 U
A3RB-DPT0041	5/3/2023	8 - 12	NM	***158***	**15.0**	10 U	2.0 U	**17.4**	4.0 U	**22.0**	**2.1 J**	20 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.4 U	2.0 U	2.0 U	2.0 U	**18.2**	**2.0 J**	2.0 U	10 U	**2.3 J**	10 U	2.0 U	2.0 U	2.0 U
A3RB-DPT0041	5/3/2023	16 - 20	NM	**19.8**	2.2 U	**3.6 J**	2.2 U	**27.4**	4.3 U	22 U	2.2 U	22 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	11 U	**2.3 J**	2.2 U	2.2 U	2.2 U	2.2 U	**4.2 J**	2.2 U	11 U	2.2 U
A3RB-DPT0041	5/3/2023	23 - 27	NM	**13.0**	**1.7 J**	**3.1 J**	2.1 U	**17.6**	4.2 U	21 U	**1.8 J**	21 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	10 U	2.1 U	10 U	**1.1 J**	2.1 U	2.1 U	2.1 U	10 U	**2.9 J**	10 U	10 U	10 U
A3RB-DPT0041	5/3/2023	40 - 44	NM	**28.1**	**2.3 J**	2.3 U	2.3 U	**3.6 J**	4.7 U	23 U	2.3 U	23 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	23 U	12 U	2.3 U	12 U	**2.7 J**	2.3 U	2.3 U	2.3 U	12 U	2.3 U	12 U	12 U	12 U
A3RB-DPT0041	5/3/2023	55 - 59	NM	**3.4 J**	2.2 U	11 U	2.2 U	2.2 U	4.3 U	22 U	11 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	11 U	2.2 U	11 U	2.2 U	2.2 U	2.2 U	11 U	11 U	11 U	11 U	11 U	11 U

Notes:
Results in the table above and the laboratory analytical report are in parts per trillion (nanogram per liter, or ng/L).
Bolded type indicates the compound was detected.
Yellow highlighted cell indicates an exceedance of EPA Regional Screening Level for Tapwater (ng/L) as of May 2023
Yellow highlighted cell with *italics* indicates an exceedance of FDEP provisional Groundwater Cleanup Target Levels (ng/L)
Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.
Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory operating conditions, based on the precision and accuracy results for standards that are run with the sample.
Depth intervals are measured in feet (ft) below land surface (bls).
-- indicates that a screening value is not available as of September 2023 for that compound.

Abbreviations:
A3RB = Area 3 Repeater Building
DPT = Direct Push Technology
EPA = Environmental Protection Agency
FD = Field Duplicate
FDEP = Florida Department of Environmental Protection
J = Estimated value
NM = Normal Sample
PFAS = Per-and polyfluoroalkyl substances
pGCTL = Provisional Groundwater Cleanup Target Level
RSL = Regional Screening Level
SWMU = Solid Waste Management Unit
U = Result was below the laboratory Reporting Limit

PFAS - Compounds
Perflurooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUDS)
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide(PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTEA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)

Table 4-4
Groundwater Frequencies of Detection
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	PFAS	Groundwater Samples[1]	Detects	Non-Detects	EPA RSL for Tapwater HQ = 0.1 (ng/L)	FDEP pGCTLs (ng/L)	Max Concentration (ng/L)
South Repeater Building	PFOS	240	153	87	4	70	7480
	PFOA	240	81	159	6	70	316
	PFBS	240	81	159	601	-	439
	PFNA	240	7	233	6	-	4.9
	PFHxS	240	149	91	39	-	17200
	HFPO-DA	240	0	240	6	-	22
	PFBA	240	84	156	1800	-	62.6
	PFHxA	240	78	162	990	-	626

Notes:
[1]Samples were collected via monitoring well or DPT. Count includes 21 field duplicate samples.
-- indicates that a screening value is not available as of September 2023 for that compound.
DPT = Direct Push Technology
EPA = Environmental Protection Agency
FDEP = Florida Department of Environmental Protection
HFPO-DA = hexafluoropropylene oxide dimer acid
HQ = Hazard Quotient
ng/L = Nanogram per liter
PFAS = Per-and polyfluoroalkyl substances
PFBA = perfluorobutanoic acid
PFBS = perfluorobutanesulfonic acid
PFHxA = perfluorhexanoic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
pGCTL = provisional Groundwater Cleanup Target Level
RSL = Regional Screening Level
SWMU = Solid Waste Management Unit

Table 4-5
Surface Water Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

			Analyte	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS
			FDEP pSWSL (ng/L)	10	500	--	--	--	--	--	--	--	--	--	--	--	--
Location	**Location ID**	**Sample Date**	**Sample Type**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
South Repeater Building	A3RB-SW0001	12/16/2022	NM	**7.6**	2.4 U	12 U	2.4 U	**2.2 J**	4.9 U	24 U	4.9 U	4.9 U	**61.3**	4.9 U	4.9 U	4.9 U	4.9 U
	A3RB-SW0002	12/16/2022	NM	**5.5 J**	3.2 U	16 U	3.2 U	**1.6 J**	6.5 U	32 U	6.5 U	6.5 U	**27.1**	6.5 U	6.5 U	6.5 U	6.5 U
	A3RB-SW0003	12/16/2022	NM	**2.9 J**	**1.1 J**	11 U	2.2 U	**1.3 J**	4.4 U	4.4 U	4.4 U	4.4 U	**19.7**	4.4 U	4.4 U	4.4 U	4.4 U
	A3RB-SW0004	12/16/2022	NM	**3.3 J**	2.4 U	12 U	2.4 U	2.4 U	4.9 U	4.9 U	4.9 U	4.9 U	**9.4 J**	4.9 U	4.9 U	4.9 U	4.9 U
	A3RB-SW0005	12/16/2022	NM	**72.3**	**4.9**	11 U	2.2 U	**64.6**	4.4 U	4.4 U	4.4 U	4.4 U	**16.4**	4.4 U	4.4 U	4.4 U	4.4 U
	A3RB-SW0006	12/16/2022	NM	**49.6**	**5.8**	9.3 U	1.9 U	**15**	3.7 U	3.7 U	3.7 U	3.7 U	**11.4**	3.7 U	3.7 U	3.7 U	3.7 U
	A3RB-SW0007	12/16/2022	NM	**69.7**	**5.5**	9.3 U	1.9 U	**31.5**	3.7 U	3.7 U	3.7 U	3.7 U	**16.9**	3.7 U	3.7 U	3.7 U	3.7 U
	A3RB-SW0007	12/16/2022	FD	**71.6**	**5.4**	**3.5 J**	1.9 U	**31.2**	3.7 U	3.7 U	3.7 U	3.7 U	**11.9**	3.7 U	3.7 U	3.7 U	3.7 U
	A3RB-SW0008	12/16/2022	NM	**86.1**	**5.5**	**7.1**	1.9 U	**78.3**	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U
	A3RB-SW0009	3/15/2023	NM	**661**	**9**	**21.3**	**1.0 J**	**385**	3.7 U	3.7 U	3.7 U	3.7 U	**141**	3.7 U	3.7 U	3.7 U	3.7 U
	A3RB-SW0010	3/15/2023	NM	**562**	**8.9**	**19.9**	1.9 U	**367**	3.7 U	3.7 U	3.7 U	3.7 U	**41**	3.7 U	3.7 U	3.7 U	3.7 U

Notes:
Results in the table above and the laboratory analytical report are in parts per trillion (nanogram per liter, or ng/L).
Bolded type indicates the compound was detected.
Yellow highlighted cell indicates an exceedance of Provisional Surface Water Cleanup Target Levels
Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.
Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory operating conditions, based on the precision and accuracy results for standards that are run with the sample.

-- indicates that a screening value is not available as of September 2023 for that compound.
A3RB = Area 3 Repeater Building
J = Estimated value
FDEP = Florida Department of Environmental Protection
NM = Normal Sample
PFAS = Per-and polyfluoroalkyl substances
pSWSL = Provisional Surface Water Screening Level
SWMU = Solid Waste Management Unit
U = Result was below the laboratory Reporting Limit

PFAS - Compounds
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Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)

PFAS - Compounds
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11CL-PF3OUDS = 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9CL-PF3ONS = 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide(PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTEA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)

Table 4-5
Surface Water Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

			Analyte	**NEFOSA**	**NMFOSA**	**MeFOSA**	**PFDS**	**PFDA**	**PFDOA**	**PFHpS**	**PFHpA**	**PFNS**	**PFOSA**	**PFPES**	**PFPEA**	**PFTEA**	**PFTRIA**	**PFUNA**
			FDEP pSWSL (ng/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Location	**Location ID**	**Sample Date**	**Sample Type**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
South Repeater Building	A3RB-SW0001	12/16/2022	NM	24 U	**10.6**	12 U	2.4 U	12 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	12 U	2.4 U	12 U	12 U
	A3RB-SW0002	12/16/2022	NM	32 U	**10.8 J**	3.2 U	3.2 U	16 U	3.2 U	3.2 U	3.2 U	3.2 U	16 U	16 U	16 U	3.2 U	16 U	3.2 U
	A3RB-SW0003	12/16/2022	NM	22 U	**8.5 J**	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	11 U	**2.2 J**	11 U	2.2 U	2.2 U
	A3RB-SW0004	12/16/2022	NM	24 U	**9.3 J**	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	12 U	12 U	**1.3 J**	12 U	2.4 U	2.4 U
	A3RB-SW0005	12/16/2022	NM	22 U	**8.0 J**	2.2 U	2.2 U	2.2 U	**1.1 J**	**2.1 J**	**4.6**	2.2 U	11 U	11 U	**3.7 J**	2.2 U	2.2 U	2.2 U
	A3RB-SW0006	12/16/2022	NM	19 U	**7.7**	1.9 U	1.9 U	1.9 U	1.9 U	**1.6 J**	**1.9 J**	1.9 U	9.3 U	9.3 U	**2.1 J**	1.9 U	1.9 U	1.9 U
	A3RB-SW0007	12/16/2022	NM	19 U	**8.3**	1.9 U	1.9 U	1.9 U	**0.94 J**	**1.7 J**	**2.9 J**	1.9 U	9.3 U	9.3 U	**2.6 J**	1.9 U	1.9 U	1.9 U
	A3RB-SW0007	12/16/2022	FD	19 U	**8.3**	1.9 U	1.9 U	9.3 U	**0.98 J**	**1.9 J**	**2.9 J**	1.9 U	9.3 U	**2.7 J**	**2.3 J**	9.3 U	9.3 U	1.9 U
	A3RB-SW0008	12/16/2022	NM	19 U	**9.4**	1.9 U	1.9 U	1.9 U	**2.7 J**	**1.8 J**	**5.3**	1.9 U	9.6 U	**8**	**3.1 J**	1.9 U	1.9 U	1.9 U
	A3RB-SW0009	3/15/2023	NM	19 U	**10.1 J**	1.9 U	1.9 U	1.9 U	**13.9 J**	**4.1**	**21**	9.3 U	9.3 U	**38.5**	**8.6 J**	9.3 U	1.9 U	1.9 U
	A3RB-SW0010	3/15/2023	NM	19 U	**10.2**	1.9 U	1.9 U	1.9 U	**14.9 J**	**4**	**20.2**	9.3 U	9.3 U	**35.3**	**9.3 J**	9.3 U	1.9 U	1.9 U

Notes:
Results in the table above and the laboratory analytical report are in parts per trillion (nanogram per liter, or ng/L).
Bolded type indicates the compound was detected.
Yellow highlighted cell indicates an exceedance of Provisional Surface Water Cleanup Target Levels
Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.
Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory __operating conditions, based on the precision and accuracy results for standards that are run with the sample.

-- indicates that a screening value is not available as of September 2023 for that compound.
A3RB = Area 3 Repeater Building
J = Estimated value
FDEP = Florida Department of Environmental Protection
NM = Normal Sample
PFAS = Per-and polyfluoroalkyl substances
pSWSL = Provisional Surface Water Screening Level
SWMU = Solid Waste Management Unit
U = Result was below the laboratory Reporting Limit

PFAS - Compounds
Perflurooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)

PFAS - Compounds
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11CL-PF3OUDS = 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9CL-PF3ONS = 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide(PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTEA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)

Table 4-6
Surface Water Frequencies of Detection
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	PFAS	Surface Water Samples[1]	Detects	Non-Detects	FDEP pSWSL (ng/L)	Max Concentration (ng/L)
South Repeater Building	PFOS	11	11	0	10	661
	PFOA	11	8	3	500	9

Notes:
[1] Count includes one field duplicate sample.
FDEP = Florida Department of Environmental Protection
ng/L = Nanograms per liter
PFAS = Per-and polyfluoroalkyl substances
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
pSWSL = Provisional Surface Water Screening Level
SWMU = Solid Waste Management Unit

Table 4-7
Monitoring Well Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Sample Date	Depth Interval (ft bls)	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFDOA	PFHPS	PFHpA	PFNS	PFOSA	PFPeS	PFPeA	PFTeA	PFTRIA	PFUNA
				EPA RSL for Tapwater (ng/L)	4	6	601	6	39	6	1800	990																					
				FDEP pGCTL (ng/L)	70	70																											
South Repeater Building	A3RB-MW0001	5/31/2022	20.0 - 30.0	NM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-MW0001	5/25/2023	20.0 - 30.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0002	5/31/2022	2.0 - 12.0	NM	***3330***	**20.6**	**30.9**	**4.5 J**	**1550**	8.0 U	**12.6 J**	**50.2**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	**2.2 J**	4.0 U	**26.9**	**8.1**	**20.6**	4.0 U	**62.1**	**15.4**	4.0 U	4.0 U	4.0 U
	A3RB-MW0002	5/23/2023	2.0 - 12.0	NM	***880***	**6.1**	**16.3**	2.1 U	**389**	4.3 U	**3.6 J**	**13.4**	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	20 U	2.1 U	2.1 U	2.1 U	**8.7**	**2.1 J**	2.1 U	10 U	**27.6**	**3.7 J**	2.1 U	2.1 U	2.1 U
	A3RB-MW0003	5/31/2022	2.0 - 12.0	NM	***6290***	***76.8***	**116**	4.0 U	**3720**	8.0 U	**14.6 J**	**127**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	80 U	4.0 U	4.0 U	4.0 U	**78.2**	**24**	4.0 U	4.0 U	**195**	**32.9**	4.0 U	4.0 U	4.0 U
	A3RB-MW0003	5/23/2023	2.0 -12.0	NM	***7150***	***87.2***	**173**	**4.9 J**	**5100**	19 U	**36.4 J**	**175**	19 U	19 U	19 U	19 U	19 U	19 U	19 U	19 U	93 U	9.3 U	9.3 U	9.3 U	**106**	**29.7**	9.3 U	46 U	**283**	**48.4 J**	46 U	9.3 U	9.3 U
	A3RB-MW0004	5/31/2022	2.0 - 12.0	NM	***79.3***	**5.5 J**	**64**	4.0 U	**726**	8.0 U	**12.7 J**	**10.6**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	**9.2**	**3.1 J**	4.0 U	4.0 U	**68.2**	**10.8**	4.0 U	4.0 U	4.0 U
	A3RB-MW0004	5/23/2023	2.0 - 12.0	NM	**45.6**	**3.0 J**	**26.5**	2.0 U	**288**	4.1 U	**6.1 J**	**4.3**	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	19 U	2.0 U	2.0 U	2.0 U	**5.1**	**1.5 J**	2.0 U	9.3 U	**29.0**	**4.0 J**	2.0 U	2.0 U	2.0 U
	A3RB-MW0005	5/31/2022	2.0 - 12.0	NM	**3.4 J**	4.0 U	4.0 U	4.0 U	**3.1 J**	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-MW0005	5/25/2023	2.0 - 12.0	NM	**3.5 J**	1.9 U	**1.2 J**	1.9 U	**5.2**	3.7 U	**8.9**	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0006	5/31/2022	20.0 - 30.0	NM	**2.7 J**	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-MW0006	5/25/2023	20.0 - 30.0	NM	**4.1 J**	2.2 U	2.2 U	2.2 U	**2.1 J**	4.3 U	4.3 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.1 U	2.2 U	2.2 U
	A3RB-MW0007	5/31/2022	20.0 - 30.0	NM	***260***	**3.9 J**	**10.5**	4.0 U	**229**	8.0 U	8.0 U	**12.7**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	**2.8 J**	4.0 U	4.0 U	**3.3 J**	**2.0 J**	4.0 U	4.0 U	**16**	**4.9 J**	4.0 U	4.0 U	4.0 U
	A3RB-MW0007	5/25/2023	20.0 - 30.0	NM	***263***	**3.7**	**8.6**	1.9 U	**251**	3.7 U	**2.4 J**	**9.0**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**4.7**	**1.6 J**	1.9 U	1.9 U	**15.2**	**2.8 J**	1.9 U	1.9 U	1.9 U
	A3RB-MW0008	5/31/2022	20.0 - 30.0	NM	***186***	**2.3 J**	**7.0 J**	4.0 U	**141**	8.0 U	8.0 U	**6.9 J**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	**9.9**	**3.3 J**	20 U	4.0 U	4.0 U
	A3RB-MW0008	5/25/2023	20.0 - 30.0	NM	**156**	**2.0 J**	**6.6**	1.9 U	**120**	3.7 U	3.7 U	**5.8**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**2.3 J**	**1.1 J**	1.9 U	1.9 U	**10.2**	**1.9 J**	1.9 U	1.9 U	1.9 U
	A3RB-MW0009	5/31/2022	20.0 - 30.0	NM	***1500***	**15.5**	**49.1**	4.0 U	**1070**	8.0 U	**11.1 J**	**42.2**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	80 U	4.0 U	4.0 U	4.0 U	**17.1**	**6.6 J**	4.0 U	40 U	**65.6**	**16.8**	4.0 U	4.0 U	4.0 U
	A3RB-MW0009	5/31/2022	20.0 - 30.0	FD	***1110***	**11.6**	**39**	4.0 U	**856**	8.0 U	**9.1 J**	**34.2**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	**14.6**	**5.8 J**	**4.1 J**	4.0 U	**51.1**	**12.9**	4.0 U	4.0 U	4.0 U
	A3RB-MW0009	5/24/2023	20.0 - 30.0	NM	***858***	**9.5**	**33.2**	**1.3 J**	**680**	3.7 U	**7.7**	**28.0**	3.7 U	3.7 U	19 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**12.8**	**4.7**	1.9 U	9.3 U	**44.1**	**9.1 J**	1.9 U	1.9 U	1.9 U
	A3RB-MW0009	5/24/2023	20.0 - 30.0	FD	***795***	**9.4**	**30.9**	**1.2 J**	**633**	3.7 U	**7.0 J**	**26.1**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**14.0**	**4.5**	1.9 U	9.3 U	**49.1**	**8.6 J**	9.3 U	1.9 U	1.9 U
	A3RB-MW0010	5/31/2022	2.0 - 12.0	NM	***331***	**6.5 J**	**14.8**	4.0 U	**429**	8.0 U	**5.8 J**	**15.3**	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	**5.8 J**	**3.2 J**	4.0 U	4.0 U	**22.9**	**5.3 J**	4.0 U	4.0 U	4.0 U
	A3RB-MW0010	5/24/2023	2.0 - 12.0	NM	***174***	**2.1 J**	**3.9**	1.9 U	**85.4**	3.7 U	**3.5 J**	**4.2**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	**2.1 J**	**1.2 J**	1.9 U	1.9 U	**5.9**	**1.7 J**	1.9 U	1.9 U	1.9 U
	A3RB-MW0011	5/24/2023	54.0 - 59.0	NM	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.3 U	22 U	2.2 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	22 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	11 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
	A3RB-MW0012	5/24/2023	35.0 - 45.0	NM	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	4.3 U	21 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	11 U	2.1 U	11 U	2.1 U	2.1 U	2.1 U
	A3RB-MW0013	5/24/2023	20.0 - 30.0	NM	**6.2**	2.1 U	2.1 U	2.1 U	**2.8 J**	4.3 U	21 U	2.1 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	21 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	11 U	2.1 U	2.1 U	2.1 U
	A3RB-MW0014	5/24/2023	2.0 - 12.0	NM	**2.6 J**	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0015	5/24/2023	20.0 - 30.0	NM	**12.2**	**1.3 J**	**3.2 J**	1.9 U	**18.2**	3.7 U	3.7 U	**1.4 J**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	**1.7 J**	1.9 U	1.9 U	9.3 U	**3.1 J**	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0016	5/24/2023	2.0 - 12.0	NM	***133***	**11.0**	**1.3 J**	2.1 U	**12.7**	4.2 U	**8.7**	**1.7 J**	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	21 U	2.1 U	2.1 U	2.1 U	**14.0**	**1.7 J**	2.1 U	2.1 U	2.1 U	**1.5 J**	2.1 U	2.1 U	2.1 U
	A3RB-MW0017	5/23/2023	54.0 - 59.0	NM	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.1 U	4.1 U	2.0 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	4.1 U	20 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	10 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	A3RB-MW0018	5/23/2023	35.0 - 45.0	NM	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	4.5 U	4.5 U	2.3 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	4.5 U	22 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
	A3RB-MW0019	5/23/2023	30.0 - 40.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0019	5/23/2023	30.0 - 40.0	FD	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0020	5/23/2023	2.0 - 12.0	NM	**2.8 J**	**0.99 J**	1.9 U	1.9 U	**1.1 J**	3.7 U	**8.1**	**1.0 J**	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	9.3 U	1.9 U	1.9 U
	A3RB-MW0021	5/23/2023	20.0 - 30.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0022	5/23/2023	54.0 - 59.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0023	5/23/2023	54.0 - 59.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	21 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	10 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0024	5/24/2023	35.0 - 45.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0025	5/24/2023	35.0 - 45.0	NM	**1.3 J**	1.9 U	1.9 U	1.9 U	**2.6 J**	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0025	5/24/2023	35.0 - 45.0	FD	**1.6 J**	1.9 U	1.9 U	1.9 U	**3.0 J**	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0026	5/25/2023	35.0 - 45.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	19 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0027	5/24/2023	54.0 - 59.0	NM	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	9.3 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U

Notes:
Results in the table above and the laboratory analytical report are in parts per trillion (nanogram per liter, or ng/L).
Bolded type indicates the compound was detected.
Yellow highlighted cell indicates an exceedance of EPA Regional Screening Level for Tapwater (ng/L) as of May 2023
Yellow highlighted cell with *italics* indicates an exceedance of FDEP provisional Groundwater Cleanup Target Levels (ng/L)
Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.
Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory operating conditions, based on the precision and accuracy results for standards that are run with the sample.
Depth intervals are measured in feet (ft) below land surface (bls).
-- indicates that a screening value is not available as of September 2023 for that compound.
J = Estimated value
U = Result was below the laboratory Reporting Limit

Abbreviations:
A3RB = Area 3 Repeater Building
EPA = Environmental Protection Agency
FD = Field Duplicate
FDEP = Florida Department of Environmental Protection
NM = Normal Sample
RSL = Regional Screening Level
PFAS = Per-and polyfluoroalkyl substances
pGCTL = provisional Groundwater Cleanup Target Level
SWMU = Solid Waste Management Unit

PFAS - Compounds
Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)

PFAS - Compounds Continued
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11CL-PF3OUDS = 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9CL-PF3ONS = 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHPS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide(PFOSA)
Perfluoropentanesulfonic acid (PFPeS)
Perfluoropentanoic acid (PFPeA)
Perfluorotetradecanoic acid (PFTeA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)

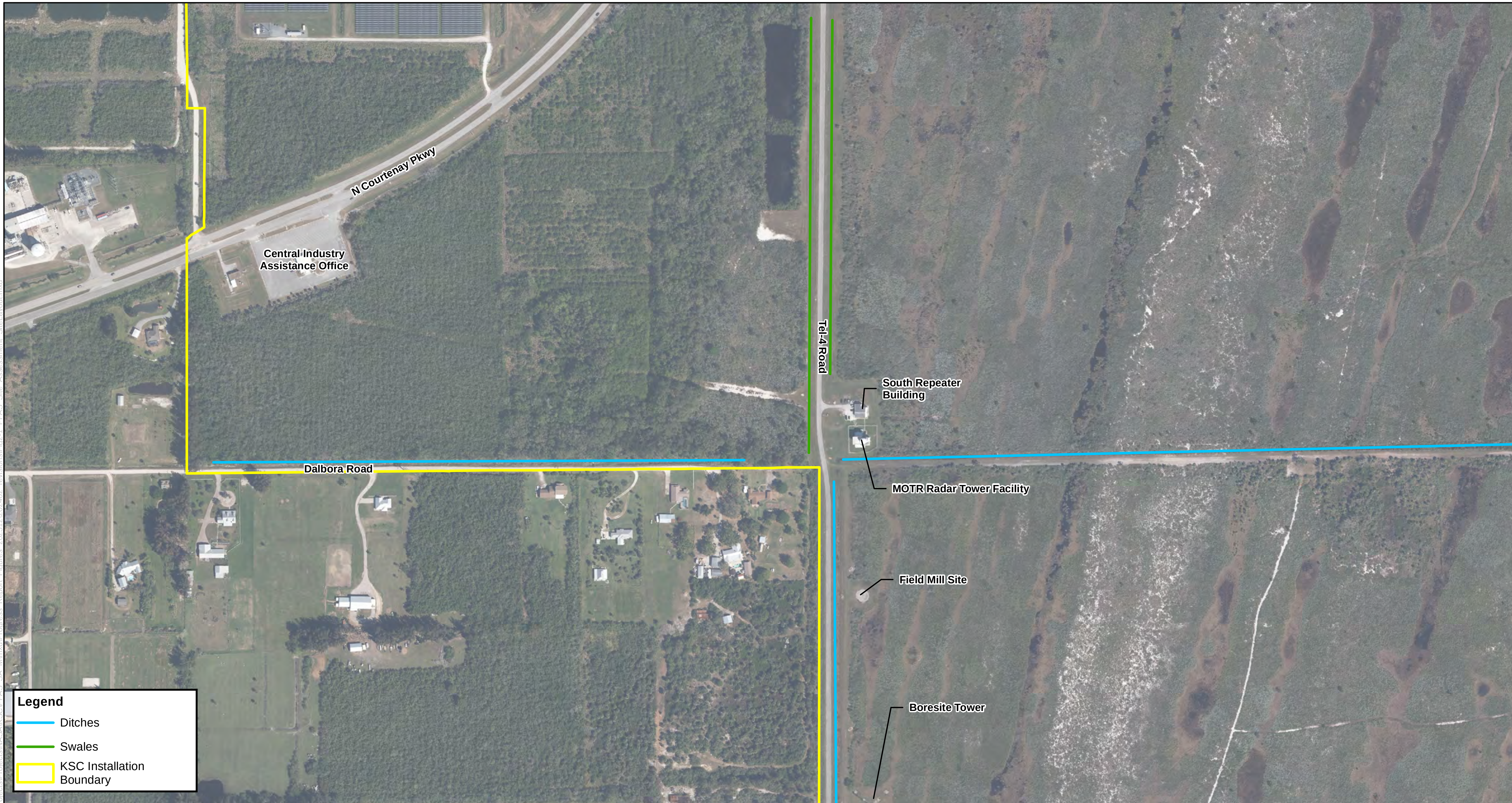
Table 4-8
Field QA/QC Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Location	Location ID	Sample Date	Sample Type	PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFDOA	PFHpS	PFHpA	PFNS	PFOSA	PFPeS	PFPeA	PFTeA	PFTRIA	PFUNA
EPA RSL for Tapwater (ng/L)				**4**	**6**	**600**	**5.9**	**39**	**6**	**1800**	**990**																					
FDEP pGCTL (ng/L)				**70**	**70**																											
	A3RB-EB01-20221216	12/16/2022	EB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	7.4 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-EB01-20221222	12/22/2022	EB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-EB02-20221222	12/22/2022	EB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-EB-20220119	1/19/2022	EB	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
	A3RB-EB-20220124-01	1/24/2022	EB	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
	A3RB-EB-20220330-01	3/30/2022	EB	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	40 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-EB-20220330-02	3/30/2022	EB	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-EB-20220531-01	5/31/2022	EB	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-EB-20220610-01	6/10/2022	EB	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-EB-20220613-01	6/13/2022	EB	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-EB-20221212-01	12/12/2022	EB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	1.9 U	1.9 U
	A3RB-EB-20221213-02	12/13/2022	EB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-EB-20221214-02	12/14/2022	EB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	**2.7 JB**	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-EB-20230523	5/23/2023	EB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-EB-20230524-02	5/24/2023	EB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
South Repeater Building	A3RB-EB-20230524-03	5/24/2023	EB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-FB01-20221216	12/16/2022	FB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	7.4 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-FB01-20221222	12/22/2022	FB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-FB-20220114-01	1/14/2022	FB	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
	A3RB-FB-20220124-01	1/24/2022	FB	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.5 U	8.5 U	4.2 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	8.5 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
	A3RB-FB-20220330-01	3/30/2022	FB	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-FB-20220330-02	3/30/2022	FB	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-FB-20220531-01	5/31/2022	FB	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-FB-20220610-01	6/10/2022	FB	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	8.3 U	8.3 U	4.2 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
	A3RB-FB-20220613-01	6/13/2022	FB	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	8.0 U	8.0 U	4.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	8.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
	A3RB-FB-20221213-01	12/13/2022	FB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	7.4 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	1.9 U	1.9 U
	A3RB-FB-20221213-02	12/13/2022	FB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	1.9 U	1.9 U
	A3RB-FB-20221214-03	12/14/2022	FB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-FB-20221220-04	12/20/2022	FB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-FB-20230523-01	5/23/2023	FB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-FB-20230523-02	5/23/2023	FB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
	A3RB-FB-20230525-03	5/25/2023	FB	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.7 U	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	19 U	3.7 U	19 U	19 U	19 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U

Notes:
Bolded results indicate the presence of an analyte at the specified concentration
Results are presented in nanograms per liter (ng/L).
A3RB = Area 3 Repeater Building
EB = Equipment Blank
EPA = Environmental Protection Agency
FB = Field Blank
FDEP = Florida Department of Environmental Protection
pGCTL = provisional Groundwater Cleanup Target Level
J = Estimated value
ng/L = nanogram per liter
PFAS = Per-and polyfluoroalkyl substances
RSL = Regional Screening Level
SWMU = Solid Waste Management Unit
U = Result was below the laboratory Reporting Limit

PFAS - Compounds
Perfluroctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11CL-PF3OUDS = 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9CL-PF3ONS = 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)

PFAS - Compounds Continued
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide(PFOSA)
Perfluoropentanesulfonic acid (PFPeS)
Perfluoropentanoic acid (PFPeA)
Perfluorotetradecanoic acid (PFTeA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)



MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 400 Feet

0 200 400 800 Feet

N

AECOM

JOHN F. KENNEDY
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: AD | Date Saved: 2/7/2024

FIGURE 2-1
PFAS SITE ASSESSMENT
SITE LAYOUT
SOUTH REPEATER BUILDING

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 125 Feet

0 45 90 180 Feet

N

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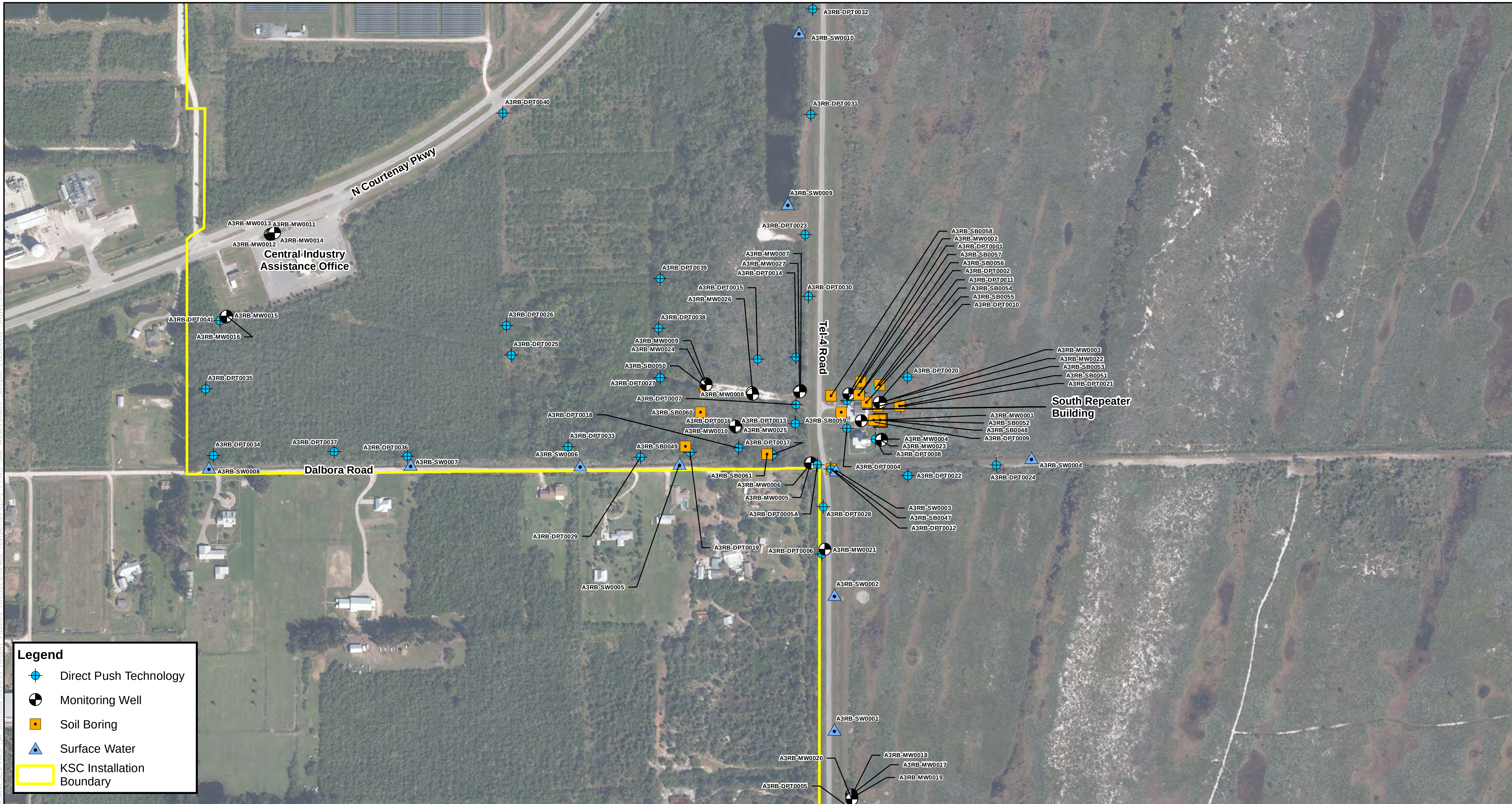
Drawn By: SD / AD | Date Saved: 12/27/2023

FIGURE 2-7
HISTORICAL PFAS SAMPLE LOCATIONS
SOUTH REPEATER BUILDING



MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 400 Feet

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JOHN F. KENNEDY
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Drawn By: AD	Date Saved: 2/5/2024

FIGURE 3-1
PFAS SITE ASSESSMENT
SAMPLE LOCATIONS
SOUTH REPEATER BUILDING

Legend

- MW Location, Sample Result Exceeds 1000x RSL
- MW Location, Sample Result Exceeds 100x RSL
- MW Location, Sample Result Exceeds 10x RSL
- MW Location, Sample Result Exceeds RSL
- MW Location, Sample Result Exceeds but Below MDL
- KSC Installation Boundary
- DPT Location, Sample Result Exceeds 1000x RSL
- DPT Location, Sample Result Exceeds 100x RSL
- DPT Location, Sample Result Exceeds 10x RSL
- DPT Location, Sample Result Exceeds RSL
- DPT Location, Sample Results Below RSL
- DPT Location, Sample Result Exceeds but Below MDL

Groundwater Screening Values (ng/L)		
Analyte	EPA RSL for Tapwater	FDEP pGCTL
PFOS	4	70
PFOA	6	70
PFBS	600	NA
PFNA	5.9	NA
PFHxS	39	NA
HFPO-DA	1.5	NA
PFBA	1800	NA
PFHxA	990	NA

Notes:
1. DPT = Direct Push Technology.
2. E = Indicates value exceeds calibration range.
3. EPA = Environmental Protection Agency.
4. FD = Field Duplicate.
5. FDEP = Florida Department of Environmental Protection
6. J = Estimated concentration.
7. MW = Monitoring Well
8. NM = Normal sample.
9. PFOA = Perfluorooctanoic acid.
10. PFOS = Perfluorooctane sulfonic acid.
11. PFBA = Perfluorobutanoic acid.
12. PFBS = Perfluorobutanesulfonic acid.
13. PFNA = Perfluorononanoic acid.
14. PFHxA = Perfluorohexanoic acid.
15. PFHxS = Perfluorohexanesulfonic acid.
16. pGCTL = provisional Groundwater Cleanup Target Level
17. HFPO-DA = Hexafluoropropylene oxide-dimer acid.
18. RSL = Regional Screening Levels.
19. U = Result was below the laboratory Method Detection Limit.
20. ng/L = Nanogram per liter.
21. Depth is presented in feet below land surface.
22. Depth of monitoring well screen interval is presented in feet below land surface.
23. Groundwater results are presented in ng/L. Units have been converted from values reported in micrograms per liter (µg/L).
24. Groundwater results are compared to pGCTLs set forth in the March 2022 FDEP PFAS Dynamic Plan
25. Groundwater results are compared to Regional Screening Levels (RSLs) set forth in EPA, 2022. Regional Screening Level Resident Tapwater Table (TR=1E-06, HQ=0.1).
26. Results in **bold** are above the MDL.
27. Results in **bold and red** are above a screening value.

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 300 Feet

0 150 300 600
Feet

N

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Drawn By: A. Dudas | Date Saved: 2/22/2024

FIGURE 4-2
PFAS GROUNDWATER SAMPLING RESULTS
SOUTH REPEATER BUILDING

M:\Gisprojects\Projects\NASA\KSC\PFAS_SA_M\mxd\Progress_Report_Figures_202312\Fig4-2_PFAS_AM_GW_Results_A3RB_V5.mxd

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 200 Feet

0 100 200 400 Feet

N

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FIGURE 4-3
PFAS SURFACE WATER SAMPLING RESULTS

Table 5-1
Baseline Groundwater Sampling Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

				Analyte	**PFOS**	**PFOA**	**PFBS**	**PFNA**	**PFHxS**	**HFPO-DA**	**PFBA**	**PFHxA**	**PFDOA**	**PFTeA**	**PFUNA**
				EPA RSL for Tapwater (ng/L)	**4**	**6**	**600**	**5.9**	**39**	**1.5**	**1800**	**990**	**100**	**2000**	**600**
				FDEP pGCTL (ng/L)	**70**	**70**									
Location	**Location ID**	**Sample Date**	**Depth Interval (ft bls)**	**Sample Type**											
South Repeater Building	A3RB-MW0028	12/14/2023	35 - 55	NM	1.8 U	0.92 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.8 U	1.8 U	1.8 U
	A3RB-MW0029	12/14/2023	15 - 25	NM	**30.4**	**1.3 J**	**1.8 J**	2.0 U	**26.4**	2.0 U	**2.1 J**	3.9 U	2.0 U	2.0 U	2.0 U
	A3RB-MW0029	12/14/2023	15 - 25	FD	**31.9**	**1.4 J**	**1.8 J**	2.0 U	**31.5**	2.0 U	**1.6 J**	3.9 U	2.0 U	2.0 U	2.0 U
	A3RB-MW0030	12/14/2023	5 - 10	NM	**15.8**	**1.4 J**	2.2 U	2.2 U	**15.5**	2.2 U	**1.5 J**	**7.5 J**	2.2 U	2.2 U	2.2 U
	A3RB-MW0031	12/14/2023	35 - 55	NM	1.9 U	0.94 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0032	12/14/2023	5 - 7	NM	**14.0**	**7.0**	**5.4**	**1.6 J**	**21.5**	2.2 U	**6.0**	**49.5**	2.2 U	2.2 U	2.2 U
	A3RB-MW0033	12/14/2023	15 - 25	NM	**24.2**	**1.5 J**	**2.6 J**	1.9 U	**28.1**	1.9 U	**1.7 J**	3.8 U	1.9 U	1.9 U	1.9 U
	A3RB-MW0034	12/14/2023	35 - 55	NM	1.8 U	0.92 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.8 U	1.8 U	1.8 U
	A3RB-MW0035	12/14/2023	5 - 10	NM	**15.7**	**3.9**	**2.9 J**	**1.2 J**	**14.4**	1.8 U	**3.9**	**25.9**	1.8 U	1.8 U	1.8 U
	A3RB-MW0036	12/14/2023	15 - 25	NM	**8.0**	**1.1 J**	**1.5 J**	**0.68 J**	**8.3**	1.9 U	**1.5 J**	**3.2 J**	1.9 U	1.9 U	1.9 U
	A3RB-EW0001	1/12/2024	35 - 55	NM	3.7 U	1.9 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	7.4 U	3.7 U	3.7 U	3.7 U
	A3RB-EW0002	1/10/2024	5 - 10	NM	**11.7**	**2.8 J**	**3.8 J**	3.7 U	**14.8**	3.7 U	**3.0 J**	**27.4 J**	3.7 U	3.7 U	3.7 U
	A3RB-EW0003	1/11/2024	15 - 25	NM	**22.9**	**1.6 J**	**2.1 J**	**1.2 J**	**20.9**	3.7 U	**1.9 J**	**4.2 J**	3.7 U	3.7 U	3.7 U

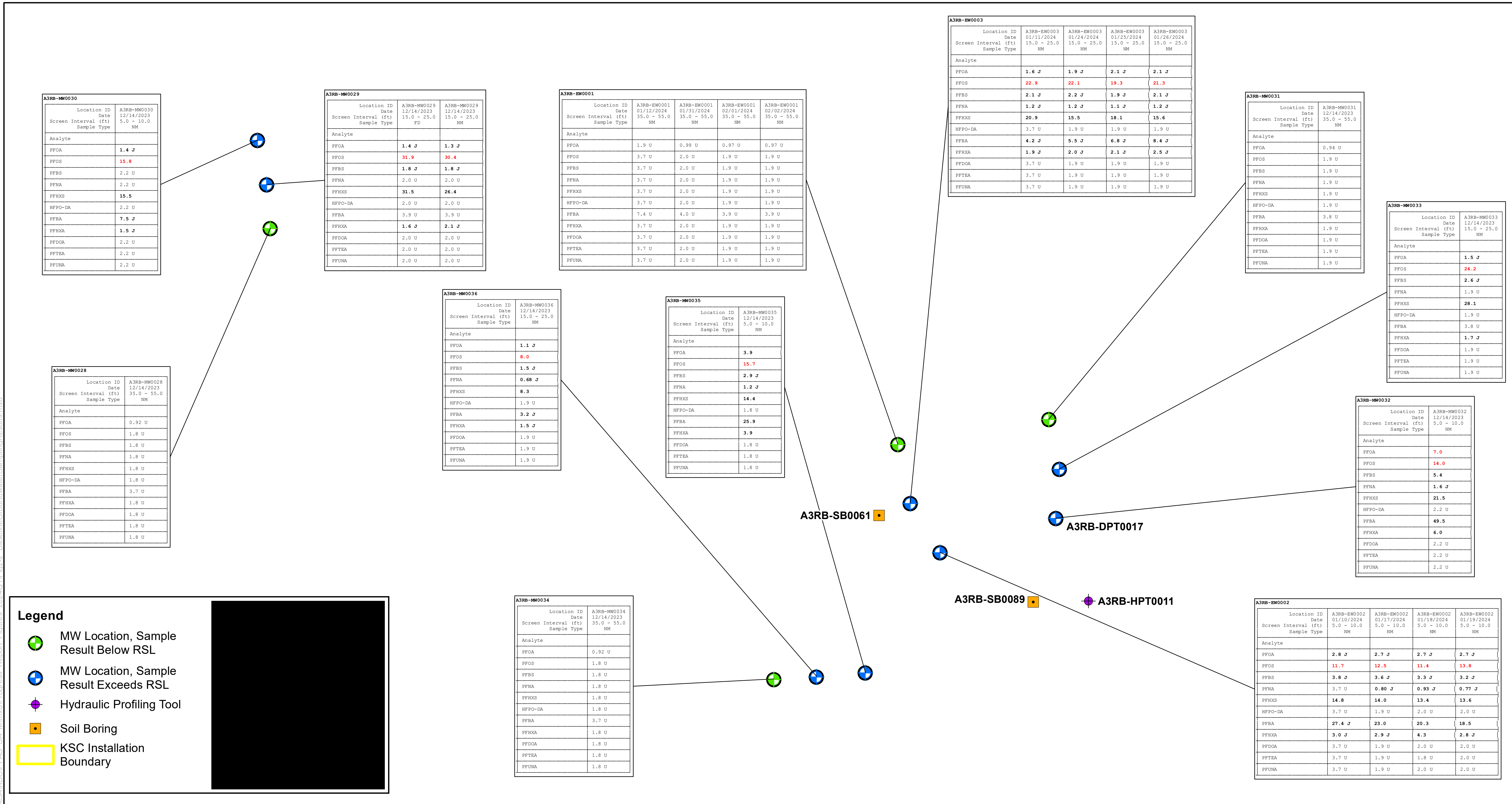
Location ID	**Sample Type**	**11CL-PF3OUDS**	**ADONA**	**4:2FTS**	**6:2FTS**	**8:2FTS**	**9CL-PF3ONS**	**NEFOSA**	**NMFOSA**	**MeFOSA**	**PFDS**	**PFDA**	**PFHPS**	**PFHpA**	**PFNS**	**PFOSA**	**PFPeS**	**PFPeA**	**PFTRIA**
A3RB-MW0028	NM	3.7 U	3.7 U	7.3 U	7.3 U	7.3 U	3.7 U	3.7 U	3.7 U	3.7 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.8 U	1.8 U
A3RB-MW0029	NM	3.9 U	3.9 U	7.8 U	7.8 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	2.0 U	2.0 U	**0.56 J**	2.0 U	2.0 U	2.0 U	**2.0 J**	**1.3 J**	2.0 U
A3RB-MW0029	FD	3.9 U	3.9 U	7.8 U	7.8 U	7.8 U	3.9 U	3.9 U	3.9 U	3.9 U	2.0 U	2.0 U	**0.73 J**	**0.99 J**	2.0 U	2.0 U	**1.9 J**	**1.1 J**	2.0 U
A3RB-MW0030	NM	4.4 U	4.4 U	8.9 U	8.9 U	8.9 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4 U	2.2 U	2.2 U
A3RB-MW0031	NM	3.8 U	3.8 U	7.5 U	7.5 U	7.5 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	3.8 U	1.9 U	1.9 U
A3RB-MW0032	NM	4.4 U	4.4 U	8.8 U	8.8 U	8.8 U	4.4 U	4.4 U	4.4 U	4.4 U	2.2 U	2.2 U	2.2 U	**4.4**	2.2 U	2.2 U	**2.0 J**	**6.8 J**	2.2 U
A3RB-MW0033	NM	3.8 U	3.8 U	7.5 U	7.5 U	7.5 U	3.8 U	3.8 U	3.8 U	3.8 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	**2.1 J**	1.9 U	1.9 U
A3RB-MW0034	NM	3.7 U	3.7 U	7.3 U	7.3 U	7.3 U	3.7 U	3.7 U	3.7 U	3.7 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.8 U	1.8 U
A3RB-MW0035	NM	3.7 U	3.7 U	7.3 U	7.3 U	7.3 U	3.7 U	3.7 U	3.7 U	3.7 U	1.8 U	1.8 U	1.8 U	**2.6 J**	1.8 U	1.8 U	**1.4 J**	**4.0 J**	1.8 U
A3RB-MW0036	NM	3.7 U	3.7 U	7.4 U	7.4 U	7.4 U	3.7 U	3.7 U	3.7 U	3.7 U	1.9 U	1.9 U	1.9 U	**0.61 J**	1.9 U	1.9 U	3.7 U	**1.7 J**	1.9 U
A3RB-EW0001	NM	7.4 U	7.4 U	15 U	15 U	15 U	7.4 U	7.4 U	7.4 U	7.4 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	7.4 U	3.7 U	3.7 U
A3RB-EW0002	NM	7.4 U	7.4 U	15 U	15 U	15 U	7.4 U	7.4 U	7.4 U	7.4 U	3.7 U	3.7 U	3.7 U	**1.9 J**	3.7 U	3.7 U	7.4 U	**5.7 J**	3.7 U
A3RB-EW0003	NM	7.4 U	7.4 U	15 U	15 U	15 U	7.4 U	7.4 U	7.4 U	7.4 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	7.4 U	**3.2 J**	3.7 U

Notes:
Results in the table above and the laboratory analytical report are in parts per trillion (nanogram per liter, or ng/L).
Bolded type indicates the compound was detected.
Yellow highlighted cell indicates an exceedance of EPA Regional Screening Level for Tapwater (ng/L) as of May 2023
Yellow highlighted cell with *italics* indicates an exceedance of FDEP provisional Groundwater Cleanup Target Levels (ng/L)
Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.
Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laborat
operating conditions, based on the precision and accuracy results for standards that are run with the sample.
Depth intervals are measured in feet (ft) below land surface (bls).
-- indicates that a screening value is not available as of September 2023 for that compound.
J = Estimated value
U = Result was below the laboratory Reporting Limit

Abbreviations:
A3RB = Area 3 Repeater Building
EPA = Environmental Protection Agency
FD = Field Duplicate
FDEP = Florida Department of Environmental Protection
NM = Normal Sample
RSL = Regional Screening Level
PFAS = Per-and polyfluoroalkyl substances
pGCTL = provisional Groundwater Cleanup Target Level
SWMU = Solid Waste Management Unit

PFAS - Compounds
Perflurooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)

PFAS - Compounds Continued
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA
11CL-PF3OUDS = 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9CL-PF3ONS = 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHPS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide(PFOSA)
Perfluoropentanesulfonic acid (PFPeS)
Perfluoropentanoic acid (PFPeA)
Perfluorotetradecanoic acid (PFTeA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)



A3RB-MW0030

Location ID	A3RB-MW0030
Date	12/14/2023
Screen Interval (ft)	5.0 - 10.0
Sample Type	NM
Analyte	
PFOA	**1.4 J**
PFOS	**15.8**
PFBS	2.2 U
PFNA	2.2 U
PFHXS	**15.5**
HFPO-DA	2.2 U
PFBA	**7.5 J**
PFHXA	**1.5 J**
PFDOA	2.2 U
PFTEA	2.2 U
PFUNA	2.2 U

A3RB-MW0029

Location ID	A3RB-MW0029	A3RB-MW0029
Date	12/14/2023	12/14/2023
Screen Interval (ft)	15.0 - 25.0	15.0 - 25.0
Sample Type	FD	NM
Analyte		
PFOA	**1.4 J**	**1.3 J**
PFOS	**31.9**	**30.4**
PFBS	**1.8 J**	**1.8 J**
PFNA	2.0 U	2.0 U
PFHXS	**31.5**	**26.4**
HFPO-DA	2.0 U	2.0 U
PFBA	3.9 U	3.9 U
PFHXA	**1.6 J**	**2.1 J**
PFDOA	2.0 U	2.0 U
PFTEA	2.0 U	2.0 U
PFUNA	2.0 U	2.0 U

A3RB-EW0001

Location ID	A3RB-EW0001	A3RB-EW0001	A3RB-EW0001	A3RB-EW0001
Date	01/12/2024	01/31/2024	02/01/2024	02/02/2024
Screen Interval (ft)	35.0 - 55.0	35.0 - 55.0	35.0 - 55.0	35.0 - 55.0
Sample Type	NM	NM	NM	NM
Analyte				
PFOA	1.9 U	0.99 U	0.97 U	0.97 U
PFOS	3.7 U	2.0 U	1.9 U	1.9 U
PFBS	3.7 U	2.0 U	1.9 U	1.9 U
PFNA	3.7 U	2.0 U	1.9 U	1.9 U
PFHXS	3.7 U	2.0 U	1.9 U	1.9 U
HFPO-DA	3.7 U	2.0 U	1.9 U	1.9 U
PFBA	7.4 U	4.0 U	3.9 U	3.9 U
PFHXA	3.7 U	2.0 U	1.9 U	1.9 U
PFDOA	3.7 U	2.0 U	1.9 U	1.9 U
PFTEA	3.7 U	2.0 U	1.9 U	1.9 U
PFUNA	3.7 U	2.0 U	1.9 U	1.9 U

A3RB-EW0003

Location ID	A3RB-EW0003	A3RB-EW0003	A3RB-EW0003	A3RB-EW0003
Date	01/11/2024	01/24/2024	01/25/2024	01/26/2024
Screen Interval (ft)	15.0 - 25.0	15.0 - 25.0	15.0 - 25.0	15.0 - 25.0
Sample Type	NM	NM	NM	NM
Analyte				
PFOA	**1.6 J**	**1.9 J**	**2.1 J**	**2.1 J**
PFOS	**22.9**	**22.1**	**19.3**	**21.3**
PFBS	**2.1 J**	**2.2 J**	**1.9 J**	**2.1 J**
PFNA	**1.2 J**	**1.2 J**	**1.1 J**	**1.2 J**
PFHXS	**20.9**	**15.5**	**18.1**	**15.6**
HFPO-DA	3.7 U	1.9 U	1.9 U	1.9 U
PFBA	**4.2 J**	**5.5 J**	**6.8 J**	**8.4 J**
PFHXA	**1.9 J**	**2.0 J**	**2.1 J**	**2.5 J**
PFDOA	3.7 U	1.9 U	1.9 U	1.9 U
PFTEA	3.7 U	1.9 U	1.9 U	1.9 U
PFUNA	3.7 U	1.9 U	1.9 U	1.9 U

A3RB-MW0031

Location ID	A3RB-MW0031
Date	12/14/2023
Screen Interval (ft)	35.0 - 55.0
Sample Type	NM
Analyte	
PFOA	0.94 U
PFOS	1.9 U
PFBS	1.9 U
PFNA	1.9 U
PFHXS	1.9 U
HFPO-DA	1.9 U
PFBA	3.8 U
PFHXA	1.9 U
PFDOA	1.9 U
PFTEA	1.9 U
PFUNA	1.9 U

A3RB-MW0033

Location ID	A3RB-MW0033
Date	12/14/2023
Screen Interval (ft)	15.0 - 25.0
Sample Type	NM
Analyte	
PFOA	**1.5 J**
PFOS	**24.2**
PFBS	**2.6 J**
PFNA	1.9 U
PFHXS	**28.1**
HFPO-DA	1.9 U
PFBA	3.8 U
PFHXA	**1.7 J**
PFDOA	1.9 U
PFTEA	1.9 U
PFUNA	1.9 U

A3RB-MW0036

Location ID	A3RB-MW0036
Date	12/14/2023
Screen Interval (ft)	15.0 - 25.0
Sample Type	NM
Analyte	
PFOA	**1.1 J**
PFOS	**8.0**
PFBS	**1.5 J**
PFNA	**0.68 J**
PFHXS	**8.3**
HFPO-DA	1.9 U
PFBA	**3.2 J**
PFHXA	**1.5 J**
PFDOA	1.9 U
PFTEA	1.9 U
PFUNA	1.9 U

A3RB-MW0035

Location ID	A3RB-MW0035
Date	12/14/2023
Screen Interval (ft)	5.0 - 10.0
Sample Type	NM
Analyte	
PFOA	**3.9**
PFOS	**15.7**
PFBS	**2.9 J**
PFNA	**1.2 J**
PFHXS	**14.4**
HFPO-DA	1.8 U
PFBA	**25.9**
PFHXA	**3.9**
PFDOA	1.8 U
PFTEA	1.8 U
PFUNA	1.8 U

A3RB-MW0028

Location ID	A3RB-MW0028
Date	12/14/2023
Screen Interval (ft)	35.0 - 55.0
Sample Type	NM
Analyte	
PFOA	0.92 U
PFOS	1.8 U
PFBS	1.8 U
PFNA	1.8 U
PFHXS	1.8 U
HFPO-DA	1.8 U
PFBA	3.7 U
PFHXA	1.8 U
PFDOA	1.8 U
PFTEA	1.8 U
PFUNA	1.8 U

A3RB-MW0032

Location ID	A3RB-MW0032
Date	12/14/2023
Screen Interval (ft)	5.0 - 10.0
Sample Type	NM
Analyte	
PFOA	**7.0**
PFOS	**14.0**
PFBS	**5.4**
PFNA	**1.6 J**
PFHXS	**21.5**
HFPO-DA	2.2 U
PFBA	**49.5**
PFHXA	**6.0**
PFDOA	2.2 U
PFTEA	2.2 U
PFUNA	2.2 U

A3RB-MW0034

Location ID	A3RB-MW0034
Date	12/14/2023
Screen Interval (ft)	35.0 - 55.0
Sample Type	NM
Analyte	
PFOA	0.92 U
PFOS	1.8 U
PFBS	1.8 U
PFNA	1.8 U
PFHXS	1.8 U
HFPO-DA	1.8 U
PFBA	3.7 U
PFHXA	1.8 U
PFDOA	1.8 U
PFTEA	1.8 U
PFUNA	1.8 U

A3RB-EW0002

Location ID	A3RB-EW0002	A3RB-EW0002	A3RB-EW0002	A3RB-EW0002
Date	01/10/2024	01/17/2024	01/18/2024	01/19/2024
Screen Interval (ft)	5.0 - 10.0	5.0 - 10.0	5.0 - 10.0	5.0 - 10.0
Sample Type	NM	NM	NM	NM
Analyte				
PFOA	**2.8 J**	**2.7 J**	**2.7 J**	**2.7 J**
PFOS	**11.7**	**12.5**	**11.4**	**13.8**
PFBS	**3.8 J**	**3.6 J**	**3.3 J**	**3.2 J**
PFNA	3.7 U	**0.80 J**	**0.93 J**	**0.77 J**
PFHXS	**14.8**	**14.0**	**13.4**	**13.6**
HFPO-DA	3.7 U	1.9 U	2.0 U	2.0 U
PFBA	**27.4 J**	**23.0**	**20.3**	**18.5**
PFHXA	**3.0 J**	**2.9 J**	**4.3**	**2.8 J**
PFDOA	3.7 U	1.9 U	2.0 U	2.0 U
PFTEA	3.7 U	1.9 U	1.8 U	2.0 U
PFUNA	3.7 U	1.9 U	2.0 U	2.0 U

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

0 5 10 20
Feet

N

[redacted]

JOHN F. KENNEDY
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: LG | Date Saved: 5/1/2024

FIGURE 5-1
OBSERVATION AND EXTRACTION WELL LOCATIONS AND BASELINE GROUNDWATER SAMPLING RESULTS

APPENDIX B2

SOIL BORING SAMPLE RESULTS

Table 4-1
Soil Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

Analyte					PFOS	PFOA	PFBS	PFNA	PFHxS	HFPO-DA	PFBA	PFHxA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS	8:2FTS	9CL-PF3ONS	NEFOSA
EPA RSL, Residential (mg/kg)					0.013	0.019	1.9	0.019	0.13	0.023	--	--	--	--	--	--	--	--	--
EPA RSL, Industrial (mg/kg)					0.16	0.25	25	0.25	1.6	0.35	--	--	--	--	--	--	--	--	--
FDEP pSCTL for Leachability (mg/kg)					0.007	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--
FDEP pSCTL, Residential (mg/kg)					1.3	1.3	--	--	--	--	--	--	--	--	--	--	--	--	--
Location	**Location ID**	**Sample Date**	**Depth Interval (ft bls)**	**Sample Type**															
South Repeater Building	A3RB-SB0047	1/14/2022	21 - 21	NM	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U
	A3RB-SB0047	1/14/2022	58 - 58	NM	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
	A3RB-SB0048	6/13/2022	61 - 61	NM	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
	A3RB-SB0049	12/22/2022	0 - 0.5	NM	**0.0015**	**0.00057 J**	0.00070 U	0.00070 U	**0.002**	0.00070 U	0.0035 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U
	A3RB-SB0049	12/22/2022	0.5 - 2	NM	**0.0013 J**	0.00070 U	0.00070 U	0.00070 U	**0.0064**	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U
	A3RB-SB0050	12/22/2022	0 - 0.5	NM	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
	A3RB-SB0050	12/22/2022	0.5 - 2	NM	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
	A3RB-SB0050	12/22/2022	0.5 - 2	FD	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
	A3RB-SB0051	12/22/2022	0 - 0.5	NM	**0.0012 J**	0.00070 U	0.00070 U	0.00070 U	**0.00080 J**	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U
	A3RB-SB0051	12/22/2022	0.5 - 2	NM	**0.00061 J**	0.00068 U	0.00068 U	0.00068 U	**0.00057 J**	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U
	A3RB-SB0052	12/22/2022	0 - 0.5	NM	**0.0031**	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
	A3RB-SB0052	12/22/2022	0.5 - 2	NM	**0.0018**	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U
	A3RB-SB0053	12/22/2022	0 - 0.5	NM	**0.005**	0.00060 U	0.00060 U	0.00060 U	**0.0038**	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U
	A3RB-SB0053	12/22/2022	0.5 - 2	NM	**0.0033**	0.00061 U	0.00061 U	0.00061 U	**0.00069 J**	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
	A3RB-SB0054	12/22/2022	0 - 0.5	NM	**0.0015**	0.00052 U	0.00052 U	0.00052 U	**0.00053 J**	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
	A3RB-SB0054	12/22/2022	0.5 - 2	NM	**0.0012**	0.00057 U	0.00057 U	0.00057 U	**0.00035 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
	A3RB-SB0055	12/22/2022	0 - 0.5	NM	**0.00044 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
	A3RB-SB0055	12/22/2022	0.5 - 2	NM	**0.00040 J**	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
	A3RB-SB0056	12/22/2022	0 - 0.5	NM	**0.00047 J**	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.0025 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U
	A3RB-SB0056	12/22/2022	0.5 - 2	NM	**0.00043 J**	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.0026 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
	A3RB-SB0057	12/22/2022	0 - 0.5	NM	**0.0144**	0.00055 U	**0.0012**	0.00055 U	**0.0274**	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	A3RB-SB0057	12/22/2022	0.5 - 2	NM	**0.0061**	0.00060 U	**0.00031 J**	0.00060 U	**0.0091**	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U
	A3RB-SB0058	12/22/2022	0 - 0.5	NM	**0.0011**	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	A3RB-SB0058	12/22/2022	0.5 - 2	NM	**0.0014**	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U
	A3RB-SB0059	12/22/2022	0 - 0.5	NM	**0.00049 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
	A3RB-SB0059	12/22/2022	0.5 - 2	NM	**0.002**	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	A3RB-SB0060	12/22/2022	0 - 0.5	NM	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	A3RB-SB0060	12/22/2022	0 - 0.5	FD	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
	A3RB-SB0060	12/22/2022	0.5 - 2	NM	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
	A3RB-SB0061	3/8/2023	59 - 59	NM	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U

Notes:

Results in the table and the laboratory analytical report are in parts per million (milligram per kilogram, or mg/kg).
Bolded type indicates the compound was detected.
Yellow highlighted cell indicates an exceedance of EPA Regional Screening Levels for Residential setttings (mg/kg)
Depth intervals are measured in feet (ft) below land surface (bls)
Method Detection Limit is the lowest concentration that can be detected if a compound is present at a pre-determined confidence level.
Reporting Limit (also called Practical Quantitation Limit) is the lowest concentration that can be reliably detected during routine laboratory operating conditions, based on the precision and accuracy results for standards that are run with the sample.
-- indicates that a screening value is not available as of September 2023 for that compound.
J = Estimated value
U = Result was below the laboratory Reporting Limit

Abbreviations:

A3RB = Area 3 Repeater Building
EPA = Environmental Protection Agency
FD = Field Duplicate
FDEP - Florida Department of Environmental Protection
ft bls = Feet below land surface
NM = Normal Sample
PFAS = Per-and polyfluoroalkyl substances
pGCTL = Provisional Groundwater Cleanup Target Level
pSCTL = Provisional Soil Cleanup Target Level
RSL = Regional Screening Level
SWMU = Solid Waste Management Unit

PFAS - Compounds

Perflurooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUDS)
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide(PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTEA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)

Table 4-1
Soil Analytical Results
PFAS Site Assessment and Mitigation
South Repeater Building (SWMU 121)

				Analyte	**NMFOSA**	**MeFOSA**	**PFDS**	**PFDA**	**PFDOA**	**PFHpS**	**PFHpA**	**PFNS**	**PFOSA**	**PFPES**	**PFPEA**	**PFTEA**	**PFTRIA**	**PFUNA**
				EPA RSL, Residential (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				EPA RSL, Industrial (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				FDEP pSCTL for Leachability (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				FDEP pSCTL, Residential (mg/kg)	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Location	**Location ID**	**Sample Date**	**Depth Interval (ft bls)**	**Sample Type**														
South Repeater Building	A3RB-SB0047	1/14/2022	21 - 21	NM	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U
	A3RB-SB0047	1/14/2022	58 - 58	NM	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
	A3RB-SB0048	6/13/2022	61 - 61	NM	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
	A3RB-SB0049	12/22/2022	0 - 0.5	NM	**0.00070 J**	0.0035 U	0.00070 U	0.0035 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.0035 U	**0.00053 J**	0.00070 U	0.00070 U	0.0035 U	0.0035 U
	A3RB-SB0049	12/22/2022	0.5 - 2	NM	**0.00055 J**	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	**0.00038 J**	0.00070 U	0.00070 U	0.00070 U	0.00070 U
	A3RB-SB0050	12/22/2022	0 - 0.5	NM	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
	A3RB-SB0050	12/22/2022	0.5 - 2	NM	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
	A3RB-SB0050	12/22/2022	0.5 - 2	FD	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
	A3RB-SB0051	12/22/2022	0 - 0.5	NM	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.0035 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U
	A3RB-SB0051	12/22/2022	0.5 - 2	NM	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U
	A3RB-SB0052	12/22/2022	0 - 0.5	NM	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
	A3RB-SB0052	12/22/2022	0.5 - 2	NM	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U
	A3RB-SB0053	12/22/2022	0 - 0.5	NM	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U
	A3RB-SB0053	12/22/2022	0.5 - 2	NM	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
	A3RB-SB0054	12/22/2022	0 - 0.5	NM	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
	A3RB-SB0054	12/22/2022	0.5 - 2	NM	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
	A3RB-SB0055	12/22/2022	0 - 0.5	NM	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U
	A3RB-SB0055	12/22/2022	0.5 - 2	NM	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U
	A3RB-SB0056	12/22/2022	0 - 0.5	NM	0.00051 U	**0.00034 J**	0.00051 U	0.0025 U	0.00051 U	0.00051 U	0.00051 U	0.00051 U	0.0025 U	0.00051 U	0.00051 U	0.00051 U	0.0025 U	0.00051 U
	A3RB-SB0056	12/22/2022	0.5 - 2	NM	0.00052 U	0.00052 U	0.00052 U	0.0026 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.0026 U	0.00052 U	0.00052 U	0.00052 U	0.0026 U	0.00052 U
	A3RB-SB0057	12/22/2022	0 - 0.5	NM	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	**0.00060 J**	**0.00045 J**	0.00055 U	**0.0027**	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	A3RB-SB0057	12/22/2022	0.5 - 2	NM	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	0.00060 U	**0.00050 J**	**0.00041 J**	0.00060 U	**0.00057 J**	0.00060 U	0.00060 U	0.00060 U	0.00060 U
	A3RB-SB0058	12/22/2022	0 - 0.5	NM	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	A3RB-SB0058	12/22/2022	0.5 - 2	NM	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U
	A3RB-SB0059	12/22/2022	0 - 0.5	NM	0.00057 U	**0.00047 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
	A3RB-SB0059	12/22/2022	0.5 - 2	NM	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	A3RB-SB0060	12/22/2022	0 - 0.5	NM	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
	A3RB-SB0060	12/22/2022	0 - 0.5	FD	0.00057 U	0.0028 U	0.00057 U	0.0028 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.0028 U
	A3RB-SB0060	12/22/2022	0.5 - 2	NM	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
	A3RB-SB0061	3/8/2023	59 - 59	NM	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U

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Perfluorohexanoic acid (PFHxA)
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N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide(PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTEA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)

A3RB-SB0056

Location ID	A3RB-SB0056	A3RB-SB0056
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.00047 J**	**0.00043 J**
PFOA	0.00051 U	0.00052 U
PFBS	0.00051 U	0.00052 U
PFNA	0.00051 U	0.00052 U
PFHXS	0.00051 U	0.00052 U
HFPO-DA	0.00051 U	0.00052 U
PFBA	0.00051 U	0.00052 U
PFHXA	0.00051 U	0.00052 U

A3RB-SB0057

Location ID	A3RB-SB0057	A3RB-SB0057
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.0144**	**0.0061**
PFOA	0.00055 U	0.00060 U
PFBS	**0.0012**	**0.00031 J**
PFNA	0.00055 U	0.00060 U
PFHXS	**0.0274**	**0.0091**
HFPO-DA	0.00055 U	0.00060 U
PFBA	0.00055 U	0.00060 U
PFHXA	**0.00060 J**	**0.00050 J**

A3RB-SB0058

Location ID	A3RB-SB0058	A3RB-SB0058
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.0011**	**0.0014**
PFOA	0.00055 U	0.00056 U
PFBS	0.00055 U	0.00056 U
PFNA	0.00055 U	0.00056 U
PFHXS	0.00055 U	0.00056 U
HFPO-DA	0.00055 U	0.00056 U
PFBA	0.00055 U	0.00056 U
PFHXA	0.00055 U	0.00056 U

A3RB-SB0054

Location ID	A3RB-SB0054	A3RB-SB0054
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.0015**	**0.0012**
PFOA	0.00052 U	0.00057 U
PFBS	0.00052 U	0.00057 U
PFNA	0.00052 U	0.00057 U
PFHXS	**0.00053 J**	**0.00035 J**
HFPO-DA	0.00052 U	0.00057 U
PFBA	0.00052 U	0.00057 U
PFHXA	0.00052 U	0.00057 U

A3RB-SB0050

Location ID	A3RB-SB0050	A3RB-SB0050	A3RB-SB0050
Date	12/22/2022	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2	0.5 - 2
Sample Type	NM	FD	NM
Analyte			
PFOS	0.00054 U	0.00053 U	0.00052 U
PFOA	0.00054 U	0.00053 U	0.00052 U
PFBS	0.00054 U	0.00053 U	0.00052 U
PFNA	0.00054 U	0.00053 U	0.00052 U
PFHXS	0.00054 U	0.00053 U	0.00052 U
HFPO-DA	0.00054 U	0.00053 U	0.00052 U
PFBA	0.00054 U	0.00053 U	0.00052 U
PFHXA	0.00054 U	0.00053 U	0.00052 U

A3RB-SB0060

Location ID	A3RB-SB0060	A3RB-SB0060	A3RB-SB0060
Date	12/22/2022	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0 - 0.5	0.5 - 2
Sample Type	FD	NM	NM
Analyte			
PFOS	0.00057 U	0.00055 U	0.00053 U
PFOA	0.00057 U	0.00055 U	0.00053 U
PFBS	0.00057 U	0.00055 U	0.00053 U
PFNA	0.00057 U	0.00055 U	0.00053 U
PFHXS	0.00057 U	0.00055 U	0.00053 U
HFPO-DA	0.00057 U	0.00055 U	0.00053 U
PFBA	0.00057 U	0.00055 U	0.00053 U
PFHXA	0.00057 U	0.00055 U	0.00053 U

A3RB-SB0055

Location ID	A3RB-SB0055	A3RB-SB0055
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.00044 J**	**0.00040 J**
PFOA	0.00057 U	0.00052 U
PFBS	0.00057 U	0.00052 U
PFNA	0.00057 U	0.00052 U
PFHXS	0.00057 U	0.00052 U
HFPO-DA	0.00057 U	0.00052 U
PFBA	0.00057 U	0.00052 U
PFHXA	0.00057 U	0.00052 U

A3RB-SB0049

Location ID	A3RB-SB0049	A3RB-SB0049
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.0015**	**0.0013 J**
PFOA	**0.00057 J**	0.00070 U
PFBS	0.00070 U	0.00070 U
PFNA	0.00070 U	0.00070 U
PFHXS	**0.0020**	**0.0064**
HFPO-DA	0.00070 U	0.00070 U
PFBA	**0.00070 J**	**0.00055 J**
PFHXA	0.00070 U	0.00070 U

A3RB-SB0051

Location ID	A3RB-SB0051	A3RB-SB0051
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.0012 J**	**0.00061 J**
PFOA	0.00070 U	0.00068 U
PFBS	0.00070 U	0.00068 U
PFNA	0.00070 U	0.00068 U
PFHXS	**0.00080 J**	**0.00057 J**
HFPO-DA	0.00070 U	0.00068 U
PFBA	0.00070 U	0.00068 U
PFHXA	0.00070 U	0.00068 U

A3RB-SB0059

Location ID	A3RB-SB0059	A3RB-SB0059
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.00049 J**	**0.0020**
PFOA	0.00057 U	0.00055 U
PFBS	0.00057 U	0.00055 U
PFNA	0.00057 U	0.00055 U
PFHXS	0.00057 U	0.00055 U
HFPO-DA	0.00057 U	0.00055 U
PFBA	0.00057 U	0.00055 U
PFHXA	0.00057 U	0.00055 U

A3RB-SB0053

Location ID	A3RB-SB0053	A3RB-SB0053
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.0050**	**0.0033**
PFOA	0.00060 U	0.00061 U
PFBS	0.00060 U	0.00061 U
PFNA	0.00060 U	0.00061 U
PFHXS	**0.0038**	**0.00069 J**
HFPO-DA	0.00060 U	0.00061 U
PFBA	0.00060 U	0.00061 U
PFHXA	0.00060 U	0.00061 U

A3RB-SB0061

Location ID	A3RB-SB0061
Date	03/08/2023
Depth Interval (ft)	59 - 59
Sample Type	NM
Analyte	
PFOS	0.00070 U
PFOA	0.00070 U
PFBS	0.00070 U
PFNA	0.00070 U
PFHXS	0.00070 U
HFPO-DA	0.00070 U
PFBA	0.00070 U
PFHXA	0.00070 U

A3RB-SB0052

Location ID	A3RB-SB0052	A3RB-SB0052
Date	12/22/2022	12/22/2022
Depth Interval (ft)	0 - 0.5	0.5 - 2
Sample Type	NM	NM
Analyte		
PFOS	**0.0031**	**0.0018**
PFOA	0.00061 U	0.00060 U
PFBS	0.00061 U	0.00060 U
PFNA	0.00061 U	0.00060 U
PFHXS	0.00061 U	0.00060 U
HFPO-DA	0.00061 U	0.00060 U
PFBA	0.00061 U	0.00060 U
PFHXA	0.00061 U	0.00060 U

A3RB-SB0048

Location ID	A3RB-SB0048
Date	06/13/2022
Depth Interval (ft)	61 - 61
Sample Type	NM
Analyte	
PFOS	0.00057 U
PFOA	0.00057 U
PFBS	0.00057 U
PFNA	0.00057 U
PFHXS	0.00057 U
HFPO-DA	0.00057 U
PFBA	0.00057 U
PFHXA	0.00057 U

A3RB-SB0047

Location ID	A3RB-SB0047	A3RB-SB0047
Date	01/14/2022	01/14/2022
Depth Interval (ft)	21 - 21	58 - 58
Sample Type	NM	NM
Analyte		
PFOS	0.00071 U	0.00061 U
PFOA	0.00071 U	0.00061 U
PFBS	0.00071 U	0.00061 U
PFNA	0.00071 U	0.00061 U
PFHXS	0.00071 U	0.00061 U
HFPO-DA	0.00071 U	0.00061 U
PFBA	0.00071 U	0.00061 U
PFHXA	0.00071 U	0.00061 U

Legend

- SB Location, Sample Result Exceeds RSL
- SB Location, Sample Result Below RSL
- KSC Installation Boundary

Soil Screening Values (mg/kg)		
	Residential	Industrial
PFOS	0.013	0.16
PFOA	0.019	0.25
PFBS	1.9	25
PFNA	0.019	0.25
PFHxS	0.13	1.6
HFPO-DA	0.023	0.35
PFBA	NA	NA
PFHxA	NA	NA

Notes:
1, EPA = Environmental Protection Agency.
2. FD = Field Duplicate.
3. J = Estimated concentration.
4. NM = Normal sample.
5. PFOA = Perfluorooctanoic acid.
6. PFOS = Perfluorooctane sulfonic acid.
7. PFBS = Perfluorobutanesulfonic acid.
8. PFNA = Perfluorononanoic acid.
9. PFHxS = Perfluorohexanesulfonic acid.
10. HFPO-DA = Hexafluoropropylene oxide-dimer acid.
11. RSL = Regional Screening Levels.
12. SB = Soil Boring.
13. U = Result was below the laboratory Method Detection Limit.
14. mg/kg = Milligram per kilogram.
15. Depth is presented in feet below land surface.
16. Results in **bold** are above the MDL.
17. Results in **bold and red** are above a screening value.
18. Soil results are compared to Regional Screening Levels (RSLs) set forth in EPA, 2022. Regional Screening Level Resident Soil Table (HQ = 0.1).
19. Soil results are presented in mg/kg.
20. NA = Not Applicable

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901
-Scale
1 Inch = 125 Feet

0 62.5 125 250 Feet

N

[redacted]

JOHN F. KENNEDY
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: LG/AD
Date Saved: 2/5/2024

FIGURE 4-1
PFAS SOIL SAMPLING RESULTS
SOUTH REPEATER BUILDING

Table 3-2
Soil Analytical Results

Location ID	Sample ID	Sample Type	Sample Date	Depth Interval (feet)	PFOS	PFOA	PFBS	PFNA	PFHXS	HFPO-DA	PFBA	PFHXA	PFDOA	PFTEA	PFUNA	11CL-PF3OUDS	ADONA	4:2FTS	6:2FTS
				EPA RSL (mg/kg)	0.013	0.019	1.9	0.019	0.13	0.023	7.8	3.2	0.32	6.3	1.9				
				FDEP Provisional Residential pSCTL (mg/kg)	1.3	1.3													
				FDEP Provisional Leachability pSCTL (mg/kg)	0.007	0.002													
A3RB-SB0062	A3RB-SB0062-004.0-20231107	NM	11/7/2023	4-4	**0.0052**	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
A3RB-SB0062	A3RB-SB0062-007.0-20231107	NM	11/7/2023	7-7	**0.0013 J**	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U
A3RB-SB0062	A3RB-SB0062-043.0-20231107	NM	11/7/2023	43-43	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U
A3RB-SB0062	A3RB-SB0062-053.0-20231107	NM	11/7/2023	53-53	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U
A3RB-SB0063	A3RB-SB0063-013.0-20231108	NM	11/8/2023	13-13	**0.00043 J**	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U
A3RB-SB0064	A3RB-SB0064-027.0-20231108	NM	11/8/2023	27-27	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
A3RB-SB0065	A3RB-SB0065-007.0-20231108	NM	11/8/2023	7-7	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
A3RB-SB0066	A3RB-SB0066-023.0-20231108	NM	11/8/2023	23-23	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
A3RB-SB0067	A3RB-SB0067-047.0-20231108	NM	11/8/2023	47-47	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U
A3RB-SB0084	A3RB-SB0084-017.0-20231108	NM	11/8/2023	17-17	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U
A3RB-SB0085	A3RB-SB0085-025.0-20231108	NM	11/8/2023	25-25	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
A3RB-SB0086	A3RB-SB0086-013.0-20231108	NM	11/8/2023	13-13	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U
A3RB-SB0086	A3RB-SB0086-020.0-20231108	NM	11/8/2023	20-20	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
A3RB-SB0087	A3RB-SB0087-023.0-20231109	NM	11/9/2023	23-23	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U
A3RB-SB0087	A3RB-SB0087-027.0-20231109	NM	11/9/2023	27-27	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U
A3RB-SB0088	A3RB-SB0088-017.0-20231109	NM	11/9/2023	17-17	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
A3RB-SB0089	A3RB-SB0089-017.0-20231109	NM	11/9/2023	17-17	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
A3RB-SB0089	A3RB-SB0089-027.0-20231109	NM	11/9/2023	27-27	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U
A3RB-SB0090	A3RB-SB0090-013.0-20231109	NM	11/9/2023	13-13	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U
A3RB-SB0091	A3RB-SB0091-013.0-20231110	NM	11/10/2023	13-13	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U
A3RB-SB0098	A3RB-SB0098-000.5-20240102	NM	1/2/2024	0-0.5	**0.0034**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
A3RB-SB0098	A3RB-SB0098-001.0-20240102	NM	1/2/2024	0.5-1.0	**0.0026**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
A3RB-SB0099	A3RB-SB0099-000.5-20240102	NM	1/2/2024	0-0.5	**0.0052**	0.00054 U	0.00054 U	0.00054 U	**0.0011**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	**0.00062 J**	0.00054 U	0.00054 U	0.00054 U	0.00054 U
A3RB-SB0099	A3RB-SB0099-001.0-20240102	NM	1/2/2024	0.5-1.0	**0.006**	0.00058 U	0.00058 U	0.00058 U	**0.00081 J**	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	**0.00032 J**	0.00058 U	0.00058 U	0.00058 U	0.00058 U
A3RB-FD02	A3RB-FD-20240102-02	FD	1/2/2024	0.5-1.0	**0.0052**	0.00057 U	0.00057 U	0.00057 U	**0.00081 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	**0.00040 J**	0.00057 U	0.00057 U	0.00057 U	0.00057 U
A3RB-SB0100	A3RB-SB0100-000.5-20240102	NM	1/2/2024	0-0.5	**0.0015**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
A3RB-SB0100	A3RB-SB0100-001.0-20240102	NM	1/2/2024	0.5-1.0	**0.00095 J**	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
A3RB-SB0101	A3RB-SB0101-000.5-20240102	NM	1/2/2024	0-0.5	**0.0031**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
A3RB-FD03	A3RB-FD-20240102-03	FD	1/2/2024	0-0.5	**0.0019**	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
A3RB-SB0101	A3RB-SB0101-001.0-20240102	NM	1/2/2024	0.5-1.0	**0.0016**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U

Notes:
Bolded results indicate the presence of an analyte at the specified concentration
Florida DEP pSCTLs = Florida Department of Environmental Protection provisional Soil Cleanup Target Levels
A3RB = Area 3 Repeater Building
FD = Field Duplicate
J = Estimated value
ND = Non-Detect
NM = Normal Sample
RSL = Regional Screening Level
U = Result was below the laboratory Reporting Detection Limit

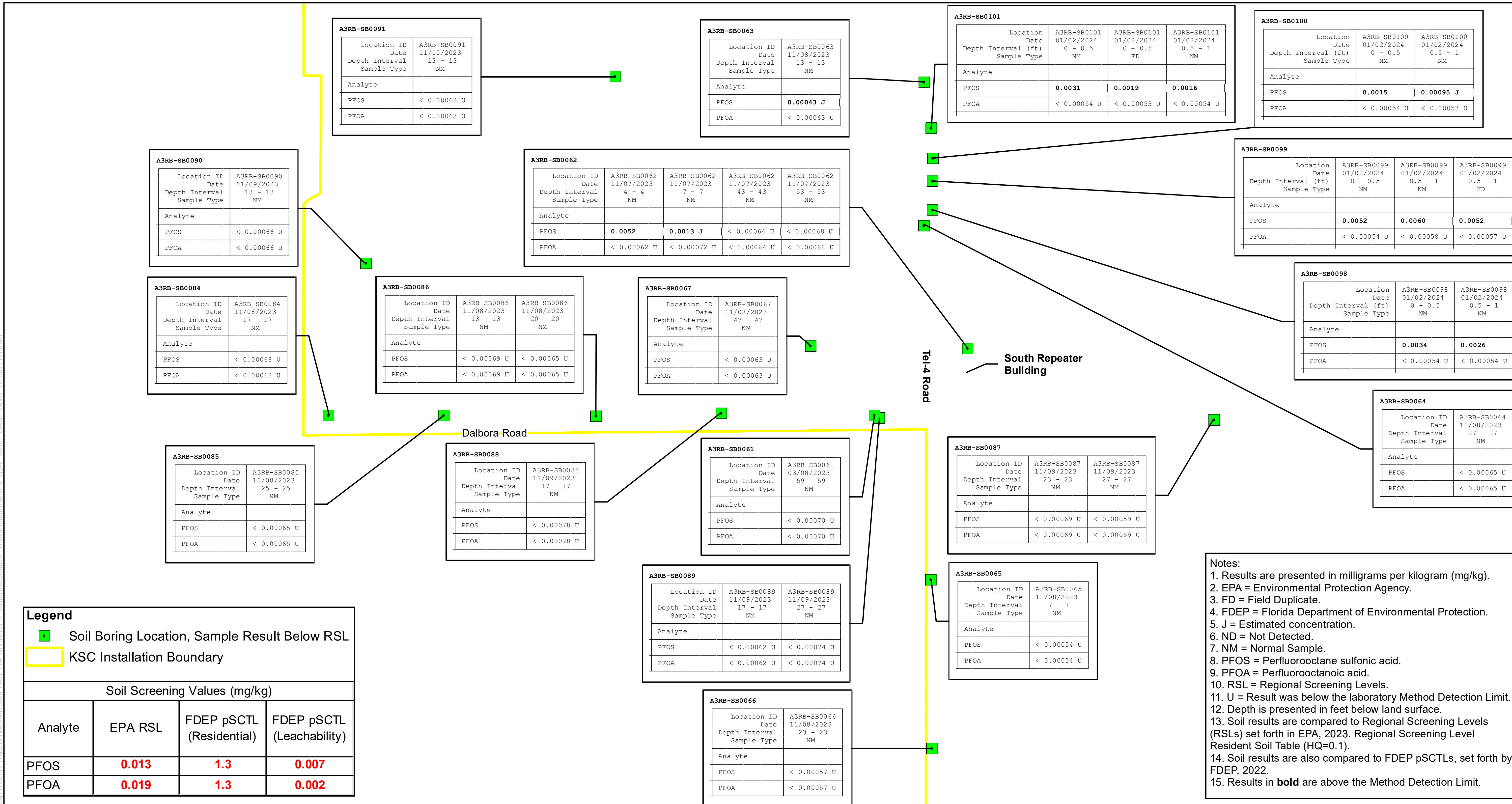
PFAS - Compounds
Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUDS)
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide (PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTEA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)

Table 3-2
Soil Analytical Results

				Analyte	8:2FTS	9CL-PF3ONS	NEFOSA	NMFOSA	MeFOSA	PFDS	PFDA	PFHPS	PFHPA	PFNS	PFOSA	PFPES	PFPEA	PFTRIA	PFOS + PFOA
				EPA RSL (mg/kg)															
				FDEP Provisional Residential pSCTL (mg/kg)															
				FDEP Provisional Leachability pSCTL (mg/kg)															
Location ID	Sample ID	Sample Type	Sample Date	Depth Interval (feet)															
A3RB-SB0062	A3RB-SB0062-004.0-20231107	NM	11/7/2023	4-4	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.0031 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.0031 U	0.00062 U	0.00062 U	0.00062 U	**0.0052**
A3RB-SB0062	A3RB-SB0062-007.0-20231107	NM	11/7/2023	7-7	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.0036 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	**0.0013**
A3RB-SB0062	A3RB-SB0062-043.0-20231107	NM	11/7/2023	43-43	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.0032 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	0.00064 U	ND
A3RB-SB0062	A3RB-SB0062-053.0-20231107	NM	11/7/2023	53-53	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.0034 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	ND
A3RB-SB0063	A3RB-SB0063-013.0-20231108	NM	11/8/2023	13-13	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.0031 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	**0.00043**
A3RB-SB0064	A3RB-SB0064-027.0-20231108	NM	11/8/2023	27-27	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0032 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	ND
A3RB-SB0065	A3RB-SB0065-007.0-20231108	NM	11/8/2023	7-7	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.0027 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	ND
A3RB-SB0066	A3RB-SB0066-023.0-20231108	NM	11/8/2023	23-23	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	ND
A3RB-SB0067	A3RB-SB0067-047.0-20231108	NM	11/8/2023	47-47	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	ND
A3RB-SB0084	A3RB-SB0084-017.0-20231108	NM	11/8/2023	17-17	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	ND
A3RB-SB0085	A3RB-SB0085-025.0-20231108	NM	11/8/2023	25-25	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0032 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	ND
A3RB-SB0086	A3RB-SB0086-013.0-20231108	NM	11/8/2023	13-13	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.0035 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	ND
A3RB-SB0086	A3RB-SB0086-020.0-20231108	NM	11/8/2023	20-20	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0033 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	ND
A3RB-SB0087	A3RB-SB0087-023.0-20231109	NM	11/9/2023	23-23	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.0034 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	0.00069 U	ND
A3RB-SB0087	A3RB-SB0087-027.0-20231109	NM	11/9/2023	27-27	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.0029 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	ND
A3RB-SB0088	A3RB-SB0088-017.0-20231109	NM	11/9/2023	17-17	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.0039 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	ND
A3RB-SB0089	A3RB-SB0089-017.0-20231109	NM	11/9/2023	17-17	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	ND
A3RB-SB0089	A3RB-SB0089-027.0-20231109	NM	11/9/2023	27-27	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.0037 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	ND
A3RB-SB0090	A3RB-SB0090-013.0-20231109	NM	11/9/2023	13-13	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	ND
A3RB-SB0091	A3RB-SB0091-013.0-20231110	NM	11/10/2023	13-13	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	ND
A3RB-SB0098	A3RB-SB0098-000.5-20240102	NM	1/2/2024	0-0.5	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.0027 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	ND
A3RB-SB0098	A3RB-SB0098-001.0-20240102	NM	1/2/2024	0.5-1.0	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	ND
A3RB-SB0099	A3RB-SB0099-000.5-20240102	NM	1/2/2024	0-0.5	0.00054 U	0.00054 U	0.00054 U	0.00054 U	**0.0017**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	**0.00053 J**	**0.00028 J**	0.00054 U	0.00054 U	0.00054 U	ND
A3RB-SB0099	A3RB-SB0099-001.0-20240102	NM	1/2/2024	0.5-1.0	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	**0.0028**	0.00058 U	0.00058 U	0.00058 U	**0.0010 J**	**0.00030 J**	0.00058 U	0.00058 U	0.00058 U	ND
A3RB-FD02	A3RB-FD-20240102-02	FD	1/2/2024	0.5-1.0	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	**0.0037**	0.00057 U	0.00057 U	0.00057 U	**0.00078 J**	**0.00031 J**	0.00057 U	0.00057 U	0.00057 U	ND
A3RB-SB0100	A3RB-SB0100-000.5-20240102	NM	1/2/2024	0-0.5	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	ND
A3RB-SB0100	A3RB-SB0100-001.0-20240102	NM	1/2/2024	0.5-1.0	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.0027 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	ND
A3RB-SB0101	A3RB-SB0101-000.5-20240102	NM	1/2/2024	0-0.5	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	ND
A3RB-FD03	A3RB-FD-20240102-03	FD	1/2/2024	0-0.5	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.0027 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	ND
A3RB-SB0101	A3RB-SB0101-001.0-20240102	NM	1/2/2024	0.5-1.0	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.0027 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	ND

Notes:
Bolded results indicate the presence of an analyte at the specified concentration
Florida DEP pSCTLs = Florida Department of Environmental Protection provisional Soil Cleanup Target Levels
A3RB = Area 3 Repeater Building
FD = Field Duplicate
J = Estimated value
ND = Non-Detect
NM = Normal Sample
RSL = Regional Screening Level
U = Result was below the laboratory Reporting Detection Limit

PFAS - Compounds
Perfluorooctanesulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorononanoic acid (PFNA)
Perfluorohexanesufonic acid (PFHxS)
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Perfluorobutanoic acid (PFBA)
Perfluorohexanoic acid (PFHxA)
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUDS)
4,8-Dioxa-3H-Perfluorononanoic acid (ADONA)
4:2 Fluorotelomer sulfonate (4:2FTS)
6:2 Fluorotelomer sulfonate (6:2FTS)
8:2 Fluorotelomer sulfonate (8:2FTS)
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9CL-PF3ONS)
N-Ethylperfluorooctane sulfonamidoacetate (NEFOSA)
N-Methylperfluoroactane sulfonamidoacetate (NMFOSA)
N-Methylperfluorooctane-sulfonamide (MeFOSA)
Perfluorodecanesulfonic acid (PFDS)
Perfluorodecanoic acid (PFDA)
Perfluorododecanoic acid (PFDOA)
Perfluoroheptanesulfonic acid (PFHpS)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanesulfonic acid (PFNS)
Perfluorooctane sulfonamide (PFOSA)
Perfluoropentanesulfonic acid (PFPES)
Perfluoropentanoic acid (PFPEA)
Perfluorotetradecanoic acid (PFTEA)
Perfluorotridecanoic acid (PFTRIA)
Perfluoroundecanoic acid (PFUNA)



Legend

Soil Boring Location, Sample Result Below RSL

KSC Installation Boundary

Soil Screening Values (mg/kg)			
Analyte	EPA RSL	FDEP pSCTL (Residential)	FDEP pSCTL (Leachability)
PFOS	0.013	1.3	0.007
PFOA	0.019	1.3	0.002

Notes:
1. Results are presented in milligrams per kilogram (mg/kg).
2. EPA = Environmental Protection Agency.
3. FD = Field Duplicate.
4. FDEP = Florida Department of Environmental Protection.
5. J = Estimated concentration.
6. ND = Not Detected.
7. NM = Normal Sample.
8. PFOS = Perfluorooctane sulfonic acid.
9. PFOA = Perfluorooctanoic acid.
10. RSL = Regional Screening Levels.
11. U = Result was below the laboratory Method Detection Limit.
12. Depth is presented in feet below land surface.
13. Soil results are compared to Regional Screening Levels (RSLs) set forth in EPA, 2023. Regional Screening Level Resident Soil Table (HQ=0.1).
14. Soil results are also compared to FDEP pSCTLs, set forth by FDEP, 2022.
15. Results in **bold** are above the Method Detection Limit.

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

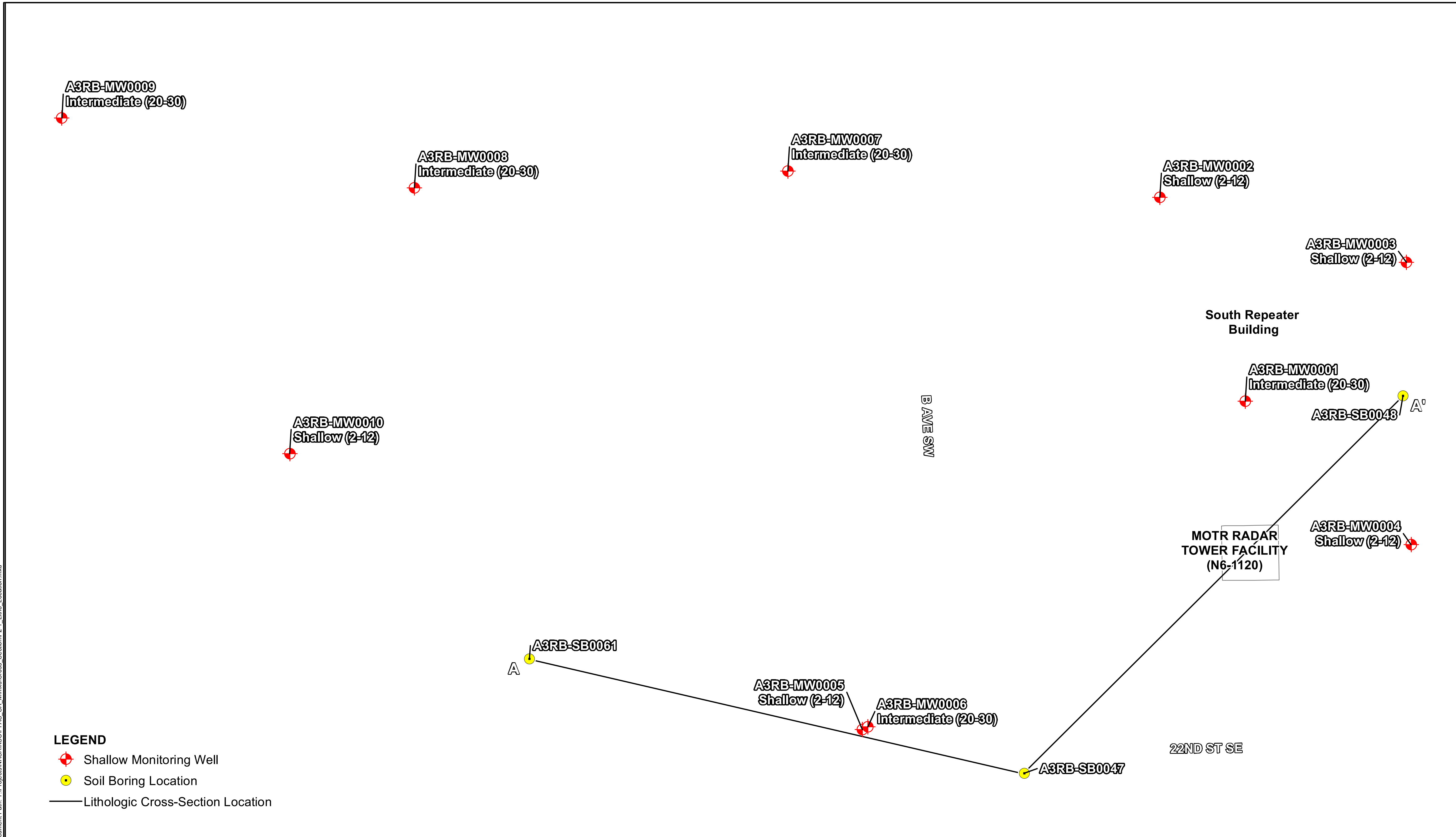
JOHN F. KENNEDY SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: DA | Date Saved: 10/9/2024

FIGURE 3-2
SOIL SAMPLING RESULTS
SOUTH REPEATER BUILDING

APPENDIX B3

LITHOLOGIC CROSS SECTION



Document Path: Y:\Projects\NASA\KSC\PFAS_SA_M\mxd\Cross_Section\F2-1_Litho_Location.mxd

[redacted]

Notes:
1. bls = Below land surface
2. Aerial Source: FDOT 2018
3. Groundwater Countour Interval = 0.5 feet
4. Vertical Datum is NAVD88 (US foot)

0 40 80 Feet

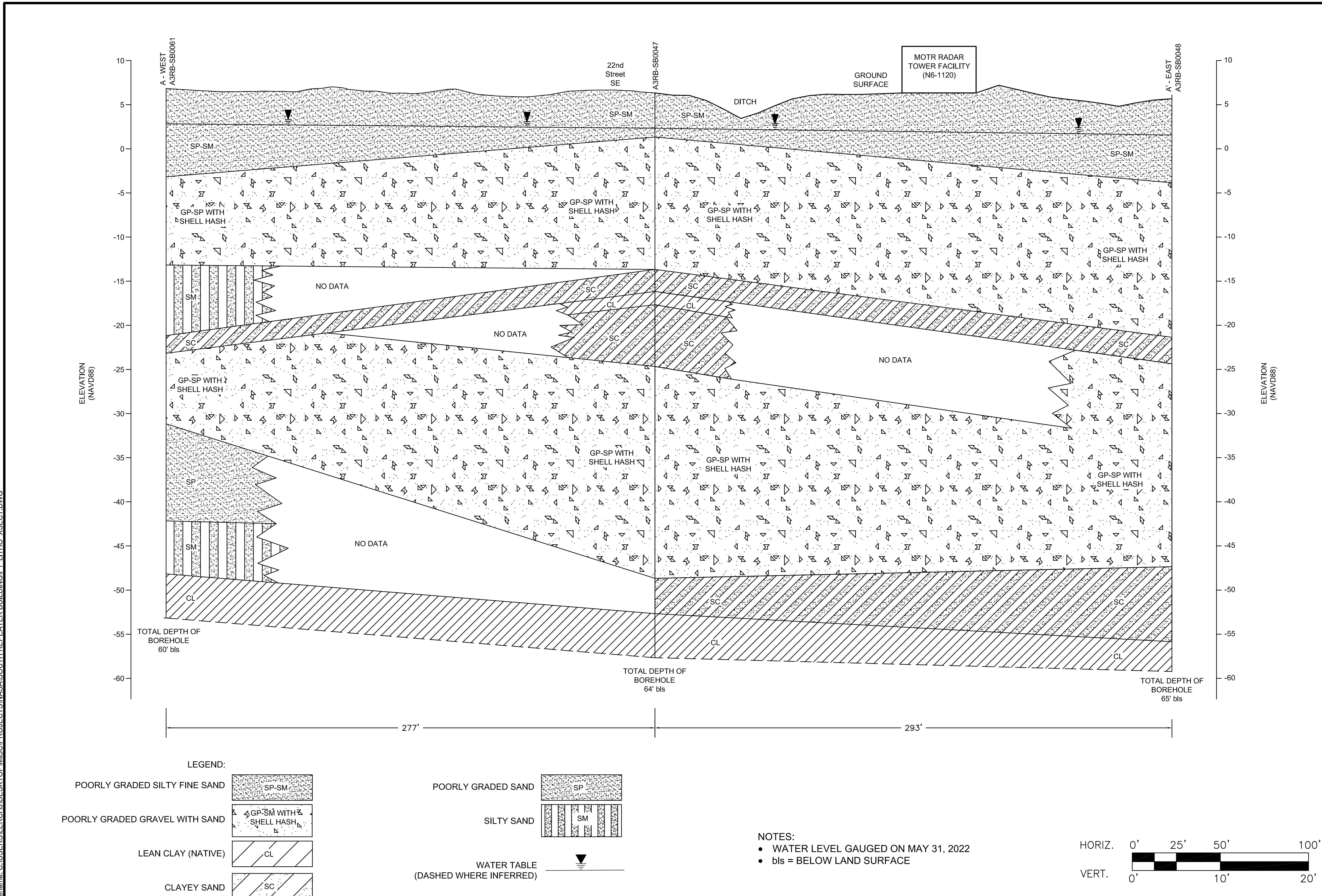
N

Source
Orthoimagery from Brevard County, 2018.

JOHN F. KENNEDY
SPACE CENTER
MERRITT ISLAND, FLORIDA

DATE: 4/5/2023 | DRWN: SD

FIGURE 2-1
LITHOLOGIC CROSS-SECTION LOCATION



Last saved by: LERCHJ(2023-03-30) Last Plotted: 2023-04-03
Filename: C:\USERS\LERCHJ\DESKTOP\MISC\PROJECTS\NASA\SOUTH REPEATER BUILDING\F1 LITHO XSECT.DWG

Project Management Initials: Designer:MEB Checked:____ Approved:____ ANSI B 11" x 17"

AECOM

Figure: 2-2

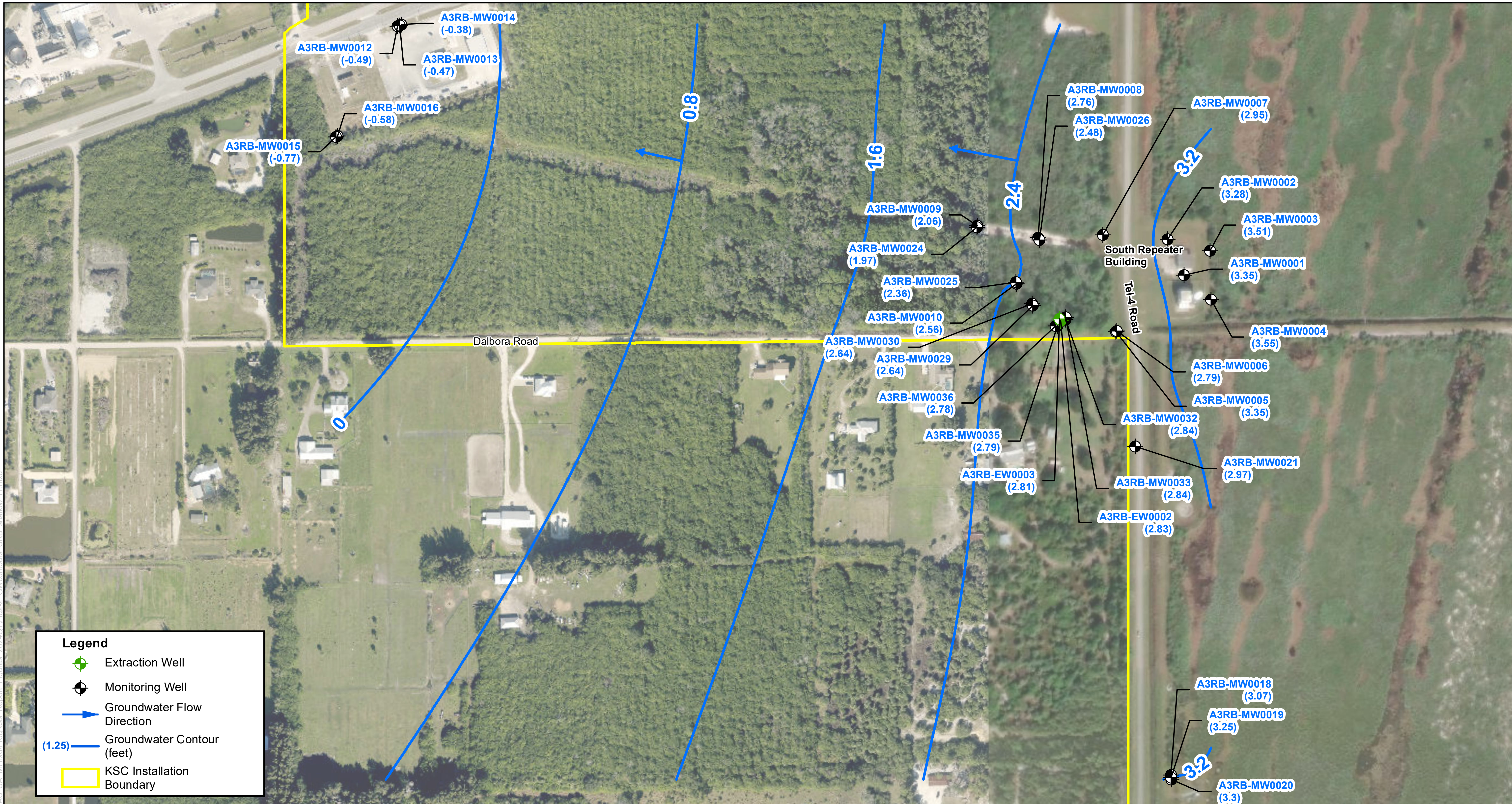
LITHOLOGICAL CROSS SECTION

SOUTH REPEATER BUILDING
KENNEDY SPACE CENTER, FLORIDA

Date: 2023-03-30

APPENDIX B4

GROUNDWATER FLOW DIRECTIONS FROM PILOT STUDY COMPLETION REPORT



MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

0 150 300 600
Feet

N

AECOM

JOHN F. KENNEDY
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: LG | Date Saved: 4/15/2024

FIGURE 5-2
SHALLOW-INTERMEDIATE GROUNDWATER FLOW DIRECTION
FEBRUARY 2024
SOUTH REPEATER BUILDING

MAPPING NOTES:
-Basemap Source
Orthoimagery from Brevard County, 2018.
-Projection
Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901

0 150 300 600 Feet

N

AECOM

JOHN F. KENNEDY
SPACE CENTER
MERRITT ISLAND, FLORIDA

Drawn By: LG | Date Saved: 4/15/2024

FIGURE 5-3
DEEP GROUNDWATER FLOW DIRECTION
FEBRUARY 2024
SOUTH REPEATER BUILDING

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APPENDIX C

MODELING ACTIVITIES

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APPENDIX C

Table of Contents

Figures

Tables

Attachment 1

Numerical Model Description

1. Modeling Objectives

This section describes activities performed to develop a numerical model for groundwater flow at the South Repeater Building located at the John F. Kennedy Space Center (KSC), Florida (referred to as "the Site"). The objective of the model is to assist in the design of a hydraulic containment system that can mitigate off-Center migration of PFAS compounds in groundwater. The groundwater flow model was developed for the uppermost hydrological unit at the Site, called the Surficial Aquifer System (SAS), an unconfined aquifer situated above the Hawthorn Formation (NASA, 2003). The groundwater model was specifically developed for the upper 50 feet of the SAS, which is above a locally continuous estuarine clay layer (AECOM, 2021).

The numerical model was developed based on the Site's conceptual model (Figure 1) and subsequently calibrated using measured head (i.e., groundwater elevation; the terms ‘head’ and ‘groundwater elevation’ are used interchangeably throughout this document) and drawdown observations during aquifer tests. Following development, the model was employed to create predictive simulations to select key design parameters (e.g., well locations, screened intervals, pumping rates) of a PFAS hydraulic containment system.

2. Code Selection

The MODFLOW-USG code (Panday et al., 2017) was selected for simulating groundwater flow conditions in the SAS below the Site (marked in Figure 1). MODFLOW-USG, a version of MODFLOW tailored for unstructured grids, accommodates various grid types, including structured and unstructured formats, with the capability of local grid refinements. This flexibility enables enhanced resolution around areas of interest such as drains and wells, and improved representation of hydro-stratigraphic units through sub-discretization of individual layers. MODFLOW-USG also includes a Connected Linear Network (CLN) process for simulating multi-node wells, surface streams, and possible fractures.

The MODPATH package was utilized to track particles at specific locations, depicting the capture of the PFAS plume within the remediation system. MODPATH serves as an effective tool for simulating particle movement within the aquifer and evaluating the efficacy of the proposed remediation strategy by aiding in optimizing the placement and operation of wells to capture the plume. The user interface program package, Groundwater Vistas Version 8 (Rumbaugh & Rumbaugh, 2020), was used to define input parameters, run the codes, and post-process the results. ArcGIS (ESRI, 2011), MATLAB, and Python were also employed for pre- and post-processing of the input data and model results.

3. Modeling Strategy

The numerical modeling process involved a series of steps to represent groundwater flow within the study area, including the development and calibration of the groundwater flow model, and predictive flow simulations incorporating particle tracking and different pumping scenarios. The calibration process was executed using the Parameter Estimation (PEST) software package (Doherty & Hunt, 2010) to optimize model parameters and improve accuracy in representing current groundwater flow conditions.

Initially, a two-dimensional (2-D) steady-state groundwater flow model was developed and calibrated to approximately match measured potentiometric surface values taken on February 16, 2024. The upgradient head boundary and a uniform hydraulic conductivity (K) for the entire domain were adjusted in the initial calibration until an acceptable match was achieved between the simulated and observed potentiometric surface values. Subsequently, the 2-D model was converted to a three-dimensional (3-D) model with five model layers to provide vertical resolution and a 3-D model domain (Figure 2).

The next step was to convert the 3-D steady-state model into a transient flow model. Transient drawdown measurements collected between January 16, 2024 through February 2, 2024during pump test activities, were used as transient calibration targets. The calibration process included adjusting flow model parameters with PEST to capture the spatial and temporal variability in groundwater conditions.

Following calibration of the groundwater flow, predictive groundwater flow simulations were conducted to simulate well capture zones for different pumping scenarios by simulating each scenario for 20 years into the future. The particle tracking technique was utilized to support the selection of the location of extraction wells by viewing the predicted plume capture areas.

4. Model Extent and Discretization

The groundwater model domain covers 3.7 square miles in Township 23S, Range 36E, with a length of 2.43 miles from east to west and a width of 1.52 miles from north to south (Figure 1). The model grid is aligned with the predominant groundwater flow direction which extends from east to west. The model domain encompasses a portion of the SAS. Topographical information used in the model, represented by a digital elevation model (DEM), as well as watershed boundaries and surface water features, were obtained from the National Hydrography Dataset (NHD) (USGS, 2023). Depth to the confining layer of estuarine clay was extracted from three soil borings, hydraulic profiling tool (HPT) borings, and five gamma logs located inside or within the vicinity of the domain (Figure 1). The gamma log data for KSC were obtained from the Hydrogeologic Information System database provided by the St. Johns River Water Management District (SJRWMD, 2020). The depth to the estuarine clay layer values were interpolated across the total area of the domain, and a surface file was developed to define the bottom of the SAS.

The model base-grid consisted of 61 rows and 98 columns with a uniform grid size of 40 meters (m) by 40 m. Quadtree mesh refinement was employed to create a finer rectangular grid around the extraction and monitoring/observation wells. Consequently, the cell size of the refined model grid varies, ranging from 40 m by 40 m near the model domain boundaries to 1.25 m by 1.25 m around the wells, as depicted in Figure 2. Altogether, the model contained 166,150 active grid cells.

Vertically, the model was divided into five layers, representing the upper portion of the SAS (Figure 2). The vertical discretization was selected to represent both the site-specific subsurface stratigraphy and screened intervals of extraction wells. Layer 1 exhibits variable thickness, extending from the ground surface to approximately 4 feet below the simulated water table, which best represents the silty fine sand layer encountered at thicknesses of 5 to 10 feet below land surface (bls). Layers 2 and 3 are 10 and 7 feet thick, respectively, and are parts of the highly permeable layer of poorly graded gravel with sand. Underlying layer 3, layer 4 is about 3 feet thick, representing a lower permeability zone of clayey sand and clay. Layer 5 is the lowest highly permeable layer of poorly graded gravel and sand just above the confining unit of estuarine clay, with variable thickness ranging from 8 feet thick around the southeast of the Site to about 72 feet in the north of the domain.

5. Transient Model Setup

The transient groundwater model setup involved defining stress periods based on the pump test study completed at the Site (Table 1), covering the period from January 15, 2024 to February 2, 2024 for the calibration period. This period was subdivided into seven stress periods to represent the respective operation of the extraction wells (shallow, intermediate, and deep) for the pump test analysis, including four days of no pumping after each pumping event. The stress period setup is outlined in Table 1The first stress period was added before pumping started to establish the initial conditions for the flow model. For predictive simulations of different remediation pumping scenarios, the calibrated transient model was modified to incorporate a stress period of 20 years. All boundary conditions in the predictive simulation remained unchanged, consistent with those of the calibrated model, except for removing the pump test extraction wells and adding extraction wells for the hydraulic containment system.

Table 1. Pump Test Schedule Summary and MODFLOW-USG Stress Periods

Stress Period	Start	End	Duration (days)	Extraction Well	Pumping Rate (gpm)	Recharge Rate (ft/d)
1	1/15/2024	1/16/2024	1	No Pumping	0	2.17×10^{-3}
2	1/16/2024	1/18/2024	3	EW0002 (shallow)	3	2.59×10^{-3}
3	1/19/2024	1/22/2024	4	No Pumping	0	6.25×10^{-5}
4	1/23/2024	1/25/2024	3	EW0003 (intermediate)	10	8.33×10^{-5}
5	1/26/2024	1/29/2024	4	No Pumping	0	5.00×10^{-5}
6	1/30/2024	2/1/2024	3	EW0001 (deep)	23	0.00
7	2/2/2024	2/5/2024	4	No Pumping	0	1.30×10^{-3}
Total Calibration Duration (days)			21			

Notes: gpm: gallons per minute, ft/d = feet per day

6. Model Properties and Boundary Conditions

Recharge is one of the groundwater properties within the model referring to the fraction of precipitation that infiltrates and reaches the water table. Recharge to the SAS, within the Site, primarily originates from direct infiltration of precipitation (NASA, 2003). Recharge was assumed to account for approximately 20% of the average daily rainfall across the entire domain, with values recorded during the pump test. The total recharge rate for each stress period is provided in Table 1.

The implemented boundary conditions included drains, wells, and General Head Boundary (GHB) surrounding all sides of the domain, as depicted in Figure 3. Existing surface water bodies at the Site, including ponds and reservoirs, were sourced from the NHD. These ponds and reservoirs were assigned as drains in the numerical model due to shallow groundwater discharge occurring throughout most of the year (NASA, 2010). Drain cells enable groundwater discharge to these surface water bodies when the groundwater elevation exceeds the drain elevation, which is typically the case at the Site. Drain cells only allow water to exit the model. The elevations assigned to these drain cells correspond to the ground surface elevation at the locations of ponds and reservoirs, obtained from the DEM acquired from the NHD.

A GHB was implemented along the eastern upgradient, western downgradient, and northern and southern boundaries across all five layers of the model. The upgradient GHB is located near a primary groundwater recharge area (Figure 1). Groundwater mounds at the prime recharge areas and flows from these recharge areas eastward toward the Banana River, Mosquito Lagoon, and the Atlantic Ocean and westward toward the Indian River (NASA, 2010). The head value of the upgradient GHB was calibrated during the calibration process. The downgradient GHB head value was set to match the average reported Indian River Stage (Haulover Canal USGS Gauging Station, 2024), which was -0.6 feet below mean sea level (msl).

6.1 Extraction, Monitoring, and Observation Wells

Groundwater head and drawdown measurements from 36 monitoring/observation wells were utilized in steady-state and transient model calibration. Figure 3 illustrates the locations of the extraction and monitoring/observation wells, and a summary of their development is provided in Table 2.

Three extraction wells were installed as part of the pilot study work plan for the Site (AECOM, 2023) and a three-day pump test was completed for each extraction well between January 16, 2024 and February 1, 2024. The shallow extraction well (EW0002) was positioned above the first gravel unit (Layer 1) to an approximate depth of 10 feet below land surface (bls) to capture the shallow, silty fine sand layer, based on nearby groundwater sample location results (AECOM, 2023). The other intermediate and deep wells were installed to depths of 25 and 55 feet bls, respectively, corresponding with permeable layers of gravel with sand (EW0003 in Layer 2 and EW0001 in Layer 5). Three 72-hour pump tests were conducted with the extraction wells (pumping schedules detailed in Table 1), to assess groundwater level changes due to pumping and recovery. Nine observation wells (A3RB-MW00028 to A3RB-MW00036) and two background monitoring wells (A3RB-MW0001 and A3RB-MW0003) were sampled throughout the test period. The background monitoring wells were selected far enough from the pilot study area to avoid influence from the pump tests. Pump test results provided estimates of the spatial distribution of hydraulic properties of the aquifer, guiding the calibration of steady-state and transient models. The average K values, based on pump test analysis, ranged from 11.24 to 27.54 feet per day (ft/d) in the shallow depth intervals, 12.66 to 14.58 ft/d in the intermediate depth intervals, and 79.2 to 104.4 ft/d in the deep depth intervals.

Table 2. Extraction, Monitoring, and Observation Wells

Wells	Easting	Northing	Model Screen Layer	Type
A3RB-EW0001	231715.63	459270.77	5	Deep
A3RB-EW0002	231717.32	459266.43	1	Shallow
A3RB-EW0003	231716.13	459268.41	2	Intermediate
A3RB-MW0001	231835.76	459310.20	3	Intermediate
A3RB-MW0002	231819.85	459344.73	1	Shallow
A3RB-MW0003	231860.88	459333.91	1	Shallow
A3RB-MW0004	231861.67	459286.91	1	Shallow
A3RB-MW0005	231770.32	459256.15	1	Shallow
A3RB-MW0006	231771.21	459256.58	3	Intermediate
A3RB-MW0007	231757.92	459349.12	3	Intermediate
A3RB-MW0008	231695.74	459346.28	3	Intermediate
A3RB-MW0009	231637.03	459357.93	3	Intermediate
A3RB-MW0010	231674.98	459302.06	1	Shallow
A3RB-MW0011	231078.24	459549.07	5	Deep
A3RB-MW0012	231080.04	459549.62	5	Deep
A3RB-MW0013	231081.93	459550.32	3	Intermediate
A3RB-MW0014	231083.67	459550.99	1	Shallow
A3RB-MW0015	231020.76	459443.12	3	Intermediate
A3RB-MW0016	231022.37	459444.16	1	Shallow
A3RB-MW0017	231823.18	458831.42	5	Deep
A3RB-MW0018	231823.36	458829.86	5	Deep
A3RB-MW0019	231823.45	458827.61	5	Deep
A3RB-MW0020	231823.57	458825.78	1	Shallow
A3RB-MW0021	231788.85	459145.66	3	Intermediate
A3RB-MW0022	231858.87	459333.88	5	Deep
A3RB-MW0023	231861.52	459285.51	5	Deep
A3RB-MW0024	231636.91	459356.31	5	Deep
A3RB-MW0025	231674.43	459303.52	5	Deep
A3RB-MW0026	231696.77	459344.24	5	Deep
A3RB-MW0027	231756.58	459347.35	5	Deep
A3RB-MW0028	231690.51	459279.42	5	Deep
A3RB-MW0029	231690.36	459281.17	2	Intermediate
A3RB-MW0030	231689.99	459282.95	1	Shallow
A3RB-MW0031	231721.69	459271.77	5	Deep
A3RB-MW0032	231721.96	459267.80	1	Shallow
A3RB-MW0033	231722.11	459269.77	2	Intermediate
A3RB-MW0034	231710.67	459261.36	5	Deep
A3RB-MW0035	231714.33	459261.62	1	Shallow

Wells	Easting	Northing	Model Screen Layer	Type
A3RB-MW0036	231712.38	459261.46	2	Intermediate

7. Groundwater Flow Model Calibration

7.1 Approach

The model calibration process involved adjusting the model input parameters until achieving a reasonable match between simulated values and calibration targets. Targets represent the observed values or data that the model aimed to match during calibration. Automated model calibration was conducted using PEST (Doherty & Hunt, 2010). During calibration, the model was executed with initial parameter values, and the simulated results are compared to observed data (groundwater levels and drawdowns in the pilot study). PEST then iteratively adjusted the model parameters to minimize the discrepancy between simulated and observed values (i.e., the objective function). The calibration process utilized a zonally constant approach in PEST, resulting in uniform values for the entire calibrated zone. A specialized version of PEST, Beo-HP (Doherty et al., 2010), was employed to manage multiple calibration simulations, enabling efficient execution of numerous PEST runs over a network.

7.2 Steady-State Model

Initially, the steady-state model was calibrated by incorporating groundwater elevations (head) measured at 39 monitoring/observation wells (A3RB-MW0001 to A3RB-MW00036) on February 16, 2024. These head observations were taken after conducting the pump test study, with no additional pumping considered at the Site. The calibrated model input parameters included hydraulic conductivity, anisotropy ratio (horizontal conductivity to vertical conductivity, i.e., K_h/K_v), recharge, upgradient GHB reference-head and conductance values, and the drain stage at the three borrow pits (highlighted in Figure 3). Each layer was assigned a unique hydraulic conductivity value, representing homogeneous hydrogeology within each layer. The steady-state model calibration helped with calibrating the upgradient GHB head value and the drain stage at the three borrow pits, which were the closest drains to the downgradient head boundary. The drain stage for the remaining ponds and reservoirs was set equal to the ground surface elevation and was not included in the calibration process.

7.3 Transient Model

The transient model was calibrated by incorporating groundwater drawdown values measured at 11 monitoring wells between January 16, 2024 and February 1, 2024. The calibrated upgradient GHB head, conductance, and the drain stage values from the steady-state model were integrated into the transient model. Additionally, the transient model calibration was qualitatively evaluated by comparing simulated transient water levels to observed monitoring well hydrographs obtained from the pump test. During the transient model calibration, hydraulic conductivity in each layer and the anisotropy ratio (K_h/K_v) were recalibrated. Specific yield (S_y) and specific storage (S_s) were also calibrated parameters in the transient model. Recharge for the transient model was not a calibrated parameter and was set to 20% of the daily rainfall recorded during the pump test, as shown in Table 1. Typically, less weight is assigned to measurements from extraction wells when optimizing the objective function due to the potential influence of well efficiency factors, which can lead to higher drawdowns that may not accurately reflect field conditions. The ratio of weights for measurements from monitoring wells to those from extraction wells contributing to the objective function was 10 to 1.

MODFLOW-USG flow model parameters for both steady-state and transient models are provided in Table 3.

Table 3. MODFLOW-USG Calibrated Flow Parameters

Flow Parameters	Value	Model
Hydraulic Conductivity (ft/d)	Layer 1: 40.0 Layer 2: 30.0 Layer 3: 150.0 Layer 4: 10.0 Layer 5: 61.06	Steady-State & Transient
Vertical Anisotropy Ratio (K_h/K_v)	Layer 1: 1.0 Layer 2: 1.0 Layer 3: 1.0 Layer 4: 1.5 Layer 5: 19.5	Steady-State & Transient
Specific Storage (Ss) (1/ft)	Layers 1, 2, and 3: 3.5×10^{-6} Layers 4 and 5: 1.0×10^{-8}	Transient
Specific Yield (Sy)	Layer 1, 2, and 3: 0.2 Layer 4 and 5: 0.02	Transient
Head in Upgradient GHB (ft)	6.94	Steady-State
Recharge (ft/d)	1.8×10^{-4}	Steady-State
Drain Stage (ft, msl)	-4.7	Steady-State

Notes: msl = mean sea level, ft/d = feet per day

8. Groundwater Flow Model Calibration Results

8.1 Steady-State Model

The steady-state model calibration resulted in an upgradient GHB head of 6.94 feet amsl and a drain stage of -4.7 ft for the three borrow pits. These calibrated values were used as fixed parameters in the transient model. The steady-state recharge was calibrated as 1.8×10^{-4} (ft/day). Initially, hydraulic conductivity and anisotropy ratios were calibrated based on head targets in the steady-state model. Later, these parameters were recalibrated during transient model calibration.

A scatter plot of measured versus simulated heads is presented in Figure 4. Overall, the distribution of simulated versus measured heads closely aligned with the ideal-fit line, indicating a close match (where all residuals would equal zero). The data were evenly distributed on both sides of the ideal-fit line, suggesting that the model is not biased either high or low overall in terms of positive or negative residuals.

Model calibration statistics, provided in Table 4, indicated an average absolute residual of 0.24 feet, a residual mean of -0.14 feet, and a scaled Root Mean Square Error (RMSE) of 6.94% over the total range of head targets, which was approximately 4.32 feet. While there is no specific standard statistical metric for adequate calibration (Anderson & Woessner, 1992), a scaled RMSE below 10% is generally considered low and indicative of a well-calibrated groundwater flow model suitable for use in predictive simulations.

8.2 Transient Model

The final calibration results for hydraulic conductivity, anisotropy ratios, S_y, and S_s are provided in Table 3. The range of calibrated hydraulic conductivity values was comparable to the measured K values obtained from pump test analysis (explained in section 6.1). The minimum K value of 10 ft/d was found for layer 4, which is a thin layer (~3 feet thick) acting as a semi-confining layer between the deep and shallow/intermediate depths. The measured drawdown values in the shallow, intermediate, and deep wells, along with the primary calibration results, suggested that a separate zone of S_s and S_y for layers 4 and 5 better represents deep layers acting independently from the layers above during pumping. The calibrated S_y and S_s for the deep layers were approximately one and two orders of magnitude smaller than the S_y and S_s in shallow and intermediate layers, respectively, as shown in Table 3. The effective porosity was set equal to S_y values in each layer.

A scatter plot of measured versus simulated drawdown is illustrated in Figure 4. Model calibration statistics, provided in Table 4, indicate an average absolute residual of 0.12 feet, a residual mean of 0.001 feet, and a RMSE of 9.68% over the total range of drawdown targets, approximately 1.86 feet. The final calibrated model head contours in the transient model are shown in Figure 5. Groundwater flow direction is predominantly from east to west, with head contours forming around the ponds and reservoirs (Figure 5). The stage elevations of some of the ponds and reservoirs were observed to be below the regional water table, where groundwater discharges to them, consistent with the conceptual model.

Table 4. Flow Model Calibration Statistics

Calibration Statistic	Steady-State (Head data)	Transient (Drawdown Data)
Residual Mean (ft)	-0.14	0.001
Absolute Residual Mean (ft)	0.24	0.12
Residual Standard Deviation (ft)	0.27	0.18
Sum of Squares (ft^2)	3.56	72.60
Root Mean Square Error (ft)	0.30	0.18
Minimum Residual (ft)	-0.36	-1.14
Maximum Residual (ft)	0.71	1.08
Number of Observations	39	2200
Range in Observations (ft)	4.32	1.86
Scaled Residual Standard Deviation	6.20%	9.80%
Scaled Absolute Residual Mean	5.50%	6.70%
Scaled Root Mean Square Error	**6.94%**	**9.68%**

Notes: % = percent, ft = feet, ft^2 = squared feet.

The drawdown hydrographs for the extraction and monitoring wells during the pump test, presented in Figure 6, demonstrate reasonable model-simulated transient flow conditions and other hydrologic features, including drains and the operation of the pump test extraction wells. Transient drawdown values observed in monitoring wells indicated that when the deep extraction well (A3RB-EX0001) was pumping at the highest rate of 23 gallons per minute (gpm), the deep monitoring wells (A3RB-MW00028, A3RB-MW00031, and A3RB-MW00034) experienced approximately 1.5 feet of drawdown, while the intermediate and shallow monitoring wells had less than 0.6 feet of drawdown. The lower impact of deep extraction well pumping on shallow and intermediate layers is attributed to the semi-confining thin layer (layer 4) between them, which has a hydraulic conductivity (K) of 10 ft/d, at least three times lower than the rest of the domain, as well as a high anisotropy ratio (K_h/K_v) of 19.5 in layer 5 (Table 3).

The simulated flow model, mass balance for the transient model is presented in Table 5. The overall model mass balance error was less than 0.001%, within the acceptable range for a transient groundwater flow model (ASTM International, 2016). Under current site conditions, the major source of water into the domain was storage and the GHBs, accounting for approximately 72% and 22% of the total net inflow, respectively. Outflows from the model primarily occured through the drains (86% of total outflow) and GHBs (13% of total outflow). The simulated water balance aligned reasonably with the Site conceptual model.

Table 5. Model Flow Mass Balance

Source/Sink	Inflows (ft^3)	Percent Inflow	Outflows (ft^3)	Percent Outflow
Storage	1,692,554.45	71.89	6,976.99	0.30
GHB	510,267.94	21.67	295,754.26	12.56
Wells	0	0.00	20,790.00	0.88
Drain	0	0.00	2,030,830.63	86.26
Recharge	151,505.47	6.44	0.00	0.00

Source/Sink	Inflows (ft^3)	Percent Inflow	Outflows (ft^3)	Percent Outflow
Total	2,354,327.86	100.00	2,354,351.88	100.00
Mass Balance Error		**0.001%**		

Note: ft^3 = cubic feet

9. Predictive Results/Pumping Scenario

To optimize the capture of the PFAS-impacted groundwater across each depth interval within the SAS, predictive simulations were conducted to determine the most effective configuration for extraction well placement. Using the calibrated transient model, a simulation period spanning 20 years was employed to explore various pumping scenarios. Throughout these simulations, the stage elevation of the three borrow pits was increased to zero feet, making it more representative of the drain stage throughout the year. All other boundary conditions, including GHBs and the remaining drains, remained consistent with those of the calibrated transient model. Recharge from precipitation in the predictive simulations was set at 20% of the average annual precipitation at the Site. Of the approximate 55 inches of precipitation annually, approximately 75% is claimed by evapotranspiration. The remainder is accounted for by runoff, base flow, and recharge of the SAS (NASA, 2010). The average recharge rate within the model was established at 0.03 inches per day (in/d), equivalent to 2.5×10^{-3} ft/d. The focus areas for the placement of extraction wells were west of Tel-4 Road and south of D'albora Road within the KSC property boundary (highlighted in Figure 7), where PFAS contamination is predominantly moving to the west.

9.1 Particle Tracking and Optimum Well Design

A Particle Tracking package was utilized to compare the capture zones of wells in different pumping scenarios, aiding in the comparison and selection of various extraction well configurations. Two methods of particle tracking were employed for this analysis. Reverse tracking involved distribution of particles around the extraction wells at each layer, tracing their pathways backward in time. This method was used to assess the potential capture zones of the extraction wells. Forward particle tracking, on the other hand, was used to trace particles forward in time, assessing whether particles distributed at the edge of the plume footprint were successfully captured. This method provided insights into the effectiveness of the extraction wells in capturing migrating groundwater impact fronts. Integrating the results of both reverse and forward tracking analyses helped with identifying the most effective well configurations for capturing the PFAS-impacted groundwater across each depth interval within the aquifer. Scenarios using six to 24, shallow and/or deep extraction wells were modeled to obtain the optimum extraction well configurations. Attachment 1 provides figures of a steady-state forward particle tracking model and three of the reverse particle tracking scenarios modeled prior to obtaining the final extraction well locations and depths.

Figure 7 demonstrates the final design of the extraction wells, detailing the optimal number of wells, locations, and spacing necessary to achieve the desired hydraulic capture of the areas around the South Repeater Building. Table 6 provides the coordinates and construction information for the extraction wells. The groundwater hydraulic containment process entails pumping from 13 shallow/intermediate wells screened through layers 2 and 3, along with 6 deep wells screened through layer 5 (Table 6). The total groundwater extraction rate would be 145 gpm with 105 gpm extracted from the shallow/intermediate extraction wells and 45 gpm extracted from the deep extraction wells.

Figure 8a depicts the extent of the capture zone around the extraction wells, as determined by reverse particle tracking. As shown in Figure 8a, the wells primarily captured flow from the upgradient east and southern boundaries. The westernmost wells, EX6' and EX7, were specifically designed to pump at 10 gpm each from shallow and intermediate depths, extending the capture zone toward west beyond the KSC boundary. Additionally, two wells, EX-B1 and EX-B2, located around the South Repeater Building, pump at 10 gpm each from both shallow and deep wells, while two other wells, EX-N2 and EX-N3, located to the north of the South Repeater Building, pump at 30 gpm from layers 2 and 3, and 10 gpm from layer 5, respectively, effectively capturing contaminants at the source zone.

Figure 8b demonstrates the forward particle tracking process, where particles were initially placed around the observed edge of groundwater PFAS impacts toward the south and west of the KSC boundary (particles starting locations are indicated by black lines in Figure 8b). Approximately 85% of the distributed particles were captured by the extraction wells, as indicated by the red path lines. The remaining particles were captured by nearby ponds and reservoirs, shown by the purple lines. The simulated head contours at the end of the simulations formed around the ponds and reservoirs, resulting in groundwater flow toward these features. Consequently, some particles were captured by the ponds and reservoirs, particularly those located in the southwestern part of this area, where the head gradient created by the ponds was greater than that of the wells.

Table 6. Pumping Wells Development Summary

Wells	Easting	Northing	Top Layer of Screen	Bottom Layer of Screen	Rate (cfd)	Rate (gpm)	Type
EX1	231577	459251	2	3	962.5	5	Shallow/Intermediate
EX2	231737	459251	2	3	962.5	5	Shallow/Intermediate
EX3	231417	459251	2	3	962.5	5	Shallow/Intermediate
EX4	231257	459251	2	3	962.5	5	Shallow/Intermediate
EX5	231097	459251	2	3	962.5	5	Shallow/Intermediate
EX6	230987	459251	5	5	962.5	5	Deep
EX6'	230987	459251	2	3	1925	10	Shallow/Intermediate
EX7	230987	459411	2	3	1925	10	Shallow/Intermediate
EX8	231097	459411	2	3	962.5	5	Shallow/Intermediate
EX9	231257	459411	5	5	962.5	5	Deep
EX10	231417	459411	2	3	962.5	5	Shallow/Intermediate
EX11	231577	459411	2	3	962.5	5	Shallow/Intermediate
EX12	231737	459411	5	5	962.5	5	Deep
EX13	231797	459101	2	3	962.5	5	Shallow/Intermediate
EX14	231796	458940	5	5	962.5	5	Deep
EX-B1	231828	459344	2	3	1925	10	Shallow/Intermediate
EX-B2	231828	459344	5	5	1925	10	Deep
EX-N2	231787	459563	2	3	5775	30	Shallow/Intermediate
EX-N3	231786	459546	5	5	1925	10	Deep
				Total	27912.5	145	

Notes: cfd = cubic feet per day, gpm = gallons per minute

References

AECOM. (2021). *Conceptual Site Model Report. Center-Wide Per- and Polyfluoroalkyl Substances Potential Release Location 237*. Kennedy Space Center, Florida.

AECOM. (2023). *South Repeater Building (Swmu 121), Pilot Study Work Plan, Kennedy Space Center, Florida* (pp. 1–152).

Anderson, M., & Woessner, W. (1992). *Applied Groundwater Modeling—Simulation of Flow and Advective Transport*. Academic Press, Inc.

ASTM International. (2016). *Standard Guide for Conducting a Sensitivity Analysis for a Groundwater Flow Model Application*. D.

Doherty, J. E., & Hunt, R. J. (2010). *Approaches to highly parameterized inversion—A guide to using PEST for groundwater-model calibration: U.S. Geological Survey Scientific Investigations Report*. 5169, 59.

Doherty, J. E., Hunt, R. J., & Tonkin, M. J. (2010). *Approaches to Highly Parameterized Inversion: A Guide to Using PEST for Model-Parameter and Predictive-Uncertainty Analysis* (pp. 1–82).

ESRI, E. A. (2011). Release 10. *Redlands, CA: Environmental Systems Research Institute*, *437*, 438.

Haulover Canal USGS Gauging Station. (2024). *Stream water level elevation above NAVD 1988, in feet*. https://waterdata.usgs.gov/monitoring-location/02248380/#parameterCode=63160&period=P365D&showMedian=false

NASA. (2003). *Environmental Setting Reference Manual* (KSC FORM 16-12 (REV. 7/92); pp. 1–191). John F. Kennedy Space Center.

NASA. (2010). *Environmental Resources Document* (KSC-PLN-1911, REVISION E; pp. 1–354). John F. Kennedy Space Center.

Panday, S., Langevin, C. D., Niswonger, R. G., Ibaraki, M., & Hughes, J. D. (2017). *MODFLOW-USG: An Unstructured Grid Version of MODFLOW for Simulating Groundwater Flow and Tightly Coupled Processes Using a Control Volume Finite-Difference Formulation*. U.S. Geological Survey Software Release.

Rumbaugh, J., & Rumbaugh, D. (2020). *Groundwater Vistas, Version 8*. Environmental Simulations, Inc.

SJRWMD. (2020). *Hydrogeologic Information System. St. Johns River Water Management District*. http://webapub.sjrwmd.com/webdataexplorer/

USGS. (2023). *National Hydrography Dataset*. https://search.library.wisc.edu/catalog/9910061259502121

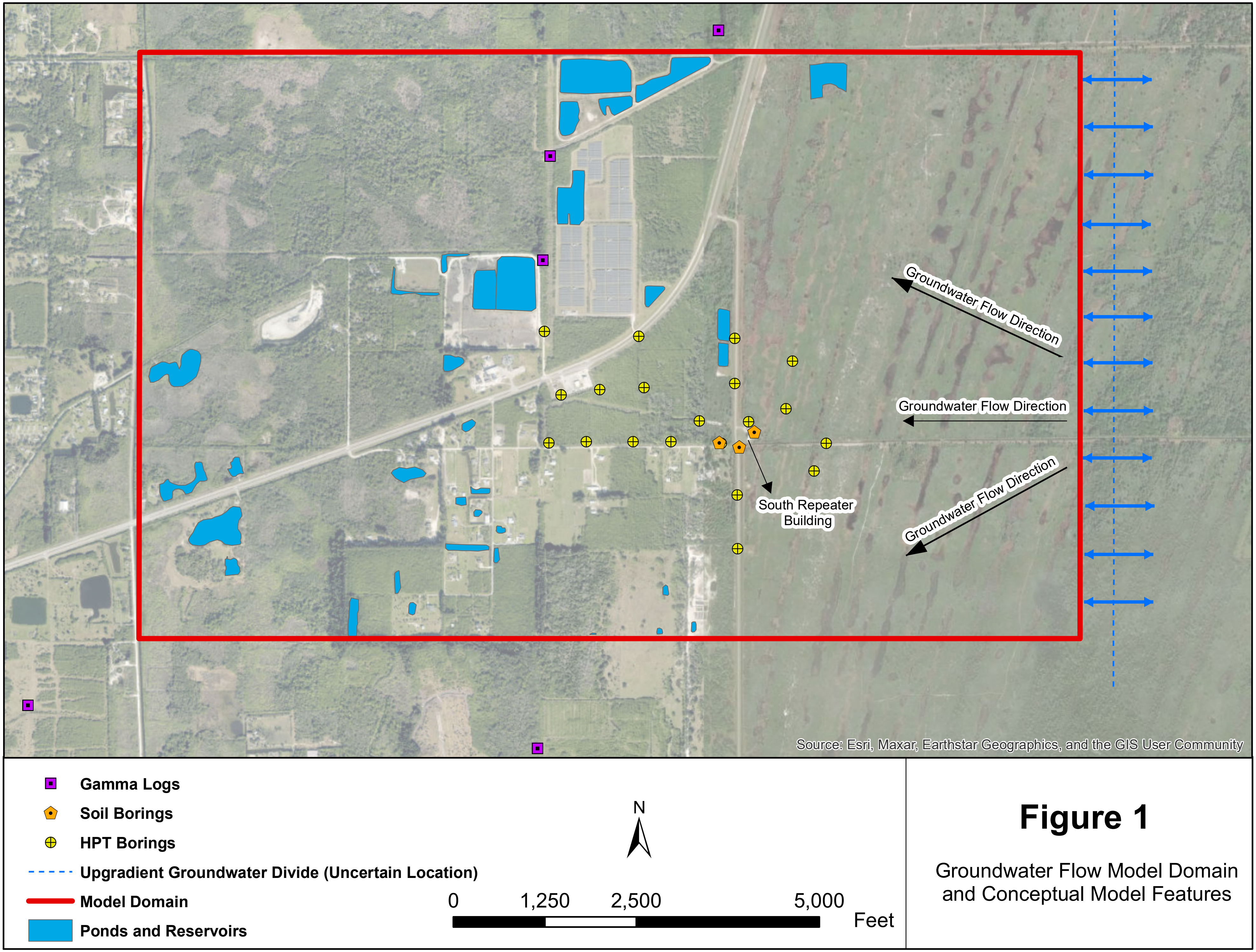
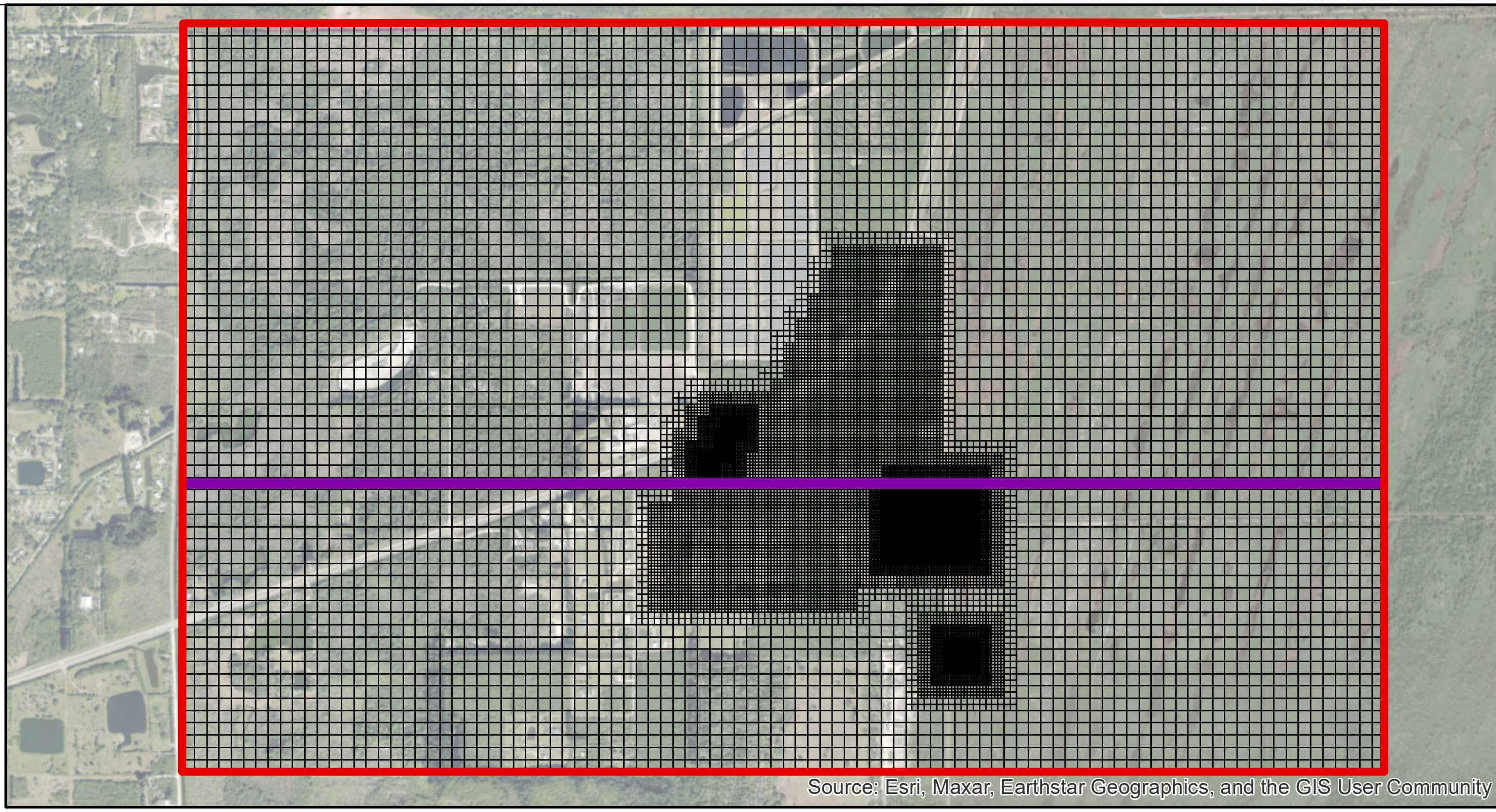
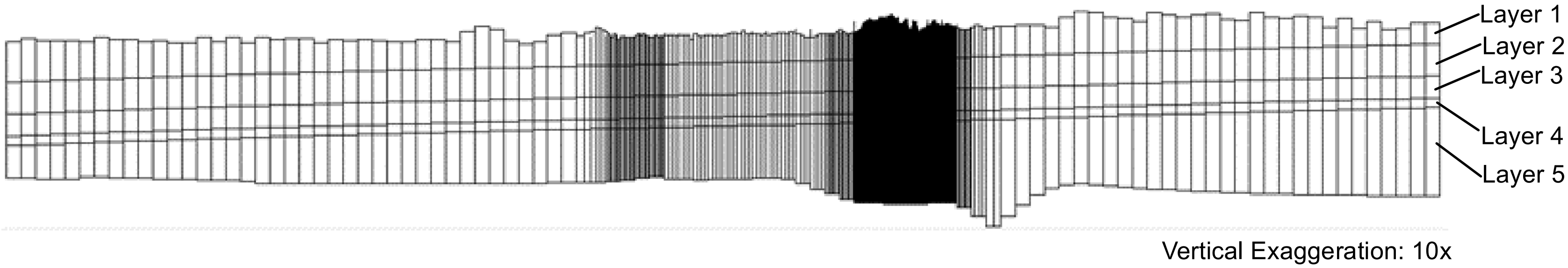


Figure 1

Groundwater Flow Model Domain and Conceptual Model Features





Model Domain

Model Grids

Cross Section Location

N

0 1,500 3,000 6,000 Feet

Figure 2

Numerical Model Discretization and Cross-Section

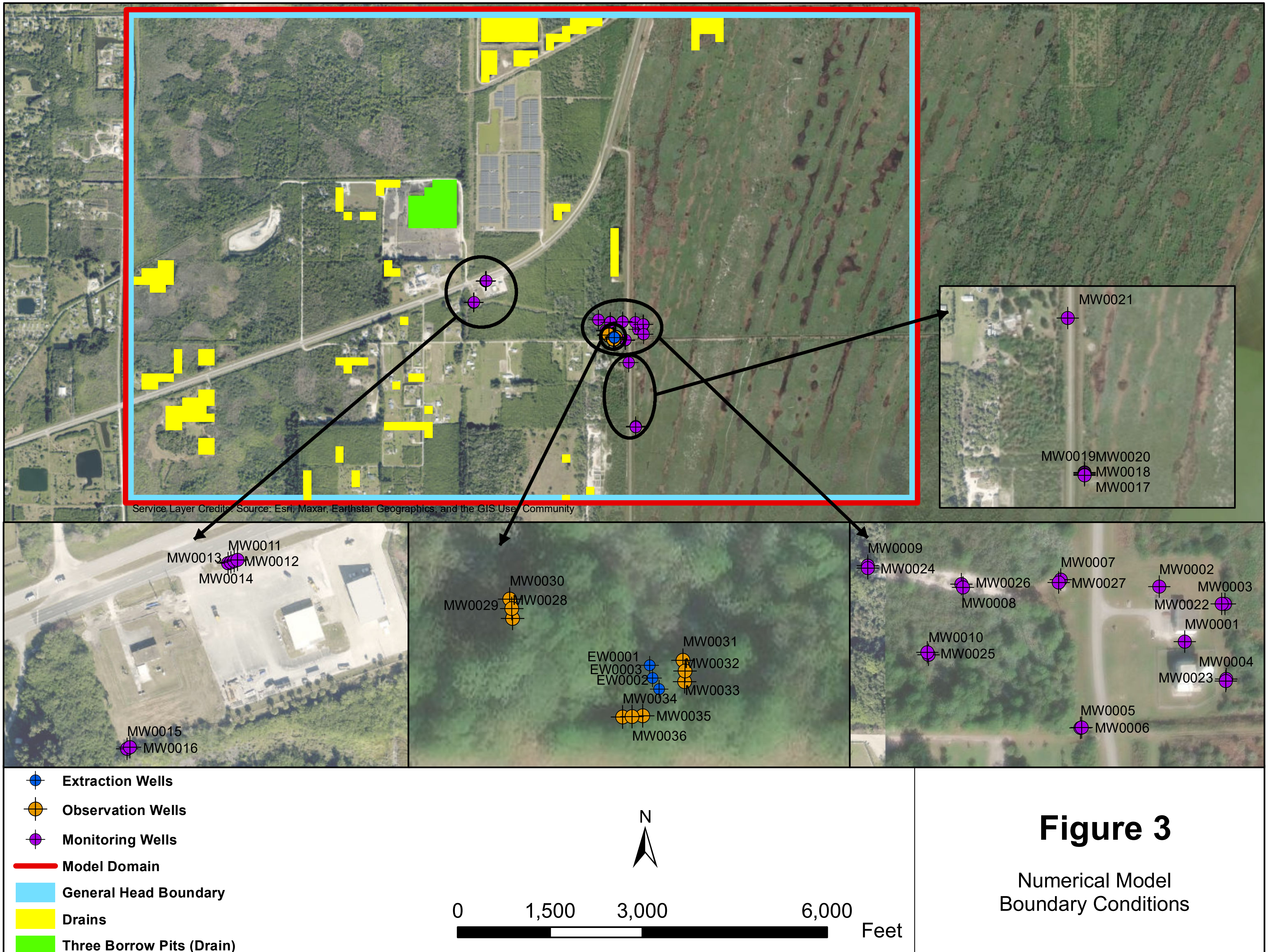
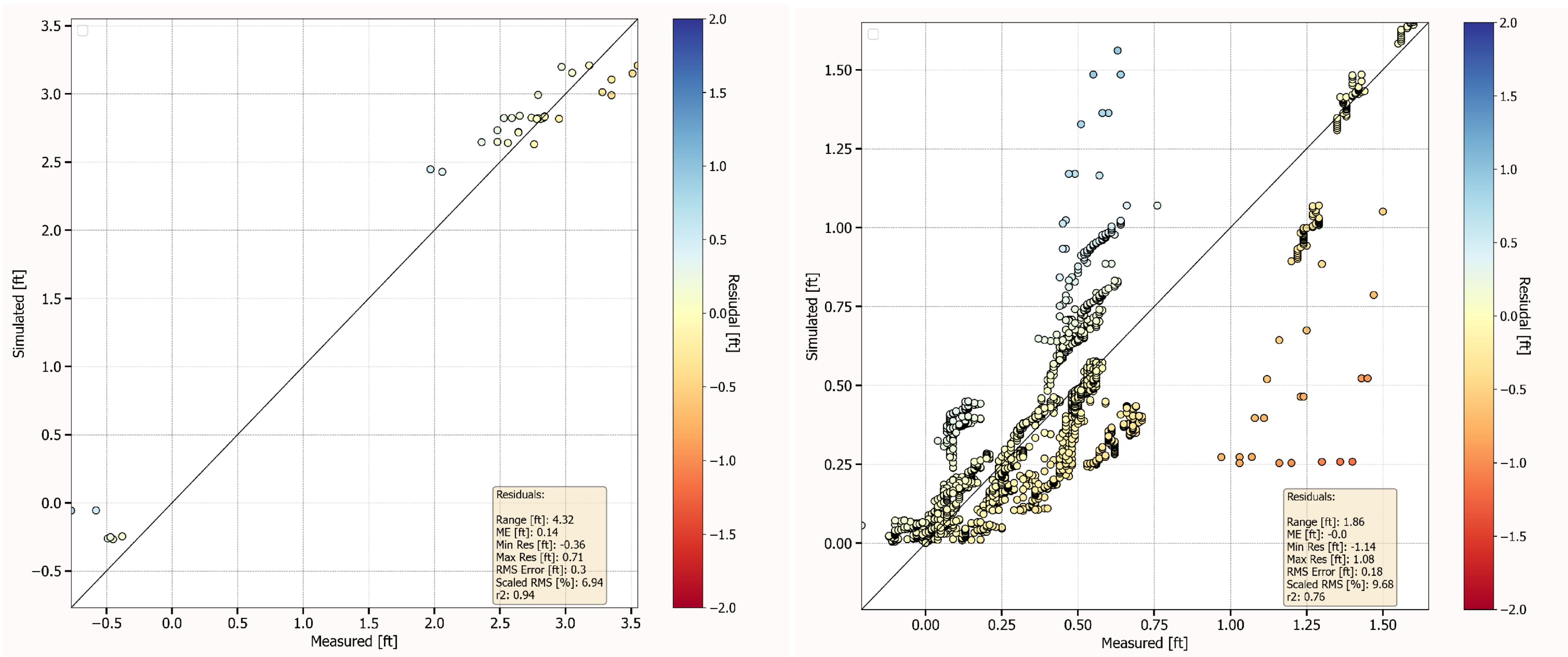


Figure 3

Numerical Model Boundary Conditions



Range: Range of Head Observations
ME: Residual Mean
Min Res: Minimum Residual
Max Res: Maximum Residual
RMS Error: Root Mean Square Error
Scaled RMS [%]: Scaled Root Mean Square
r2: R-squared or Coefficient of Determination

Figure 4

Left: Simulated vs. Observed Hydraulic Head in Steady-State Model
Right: Simulated vs. Observed Drawdown in Transient Model

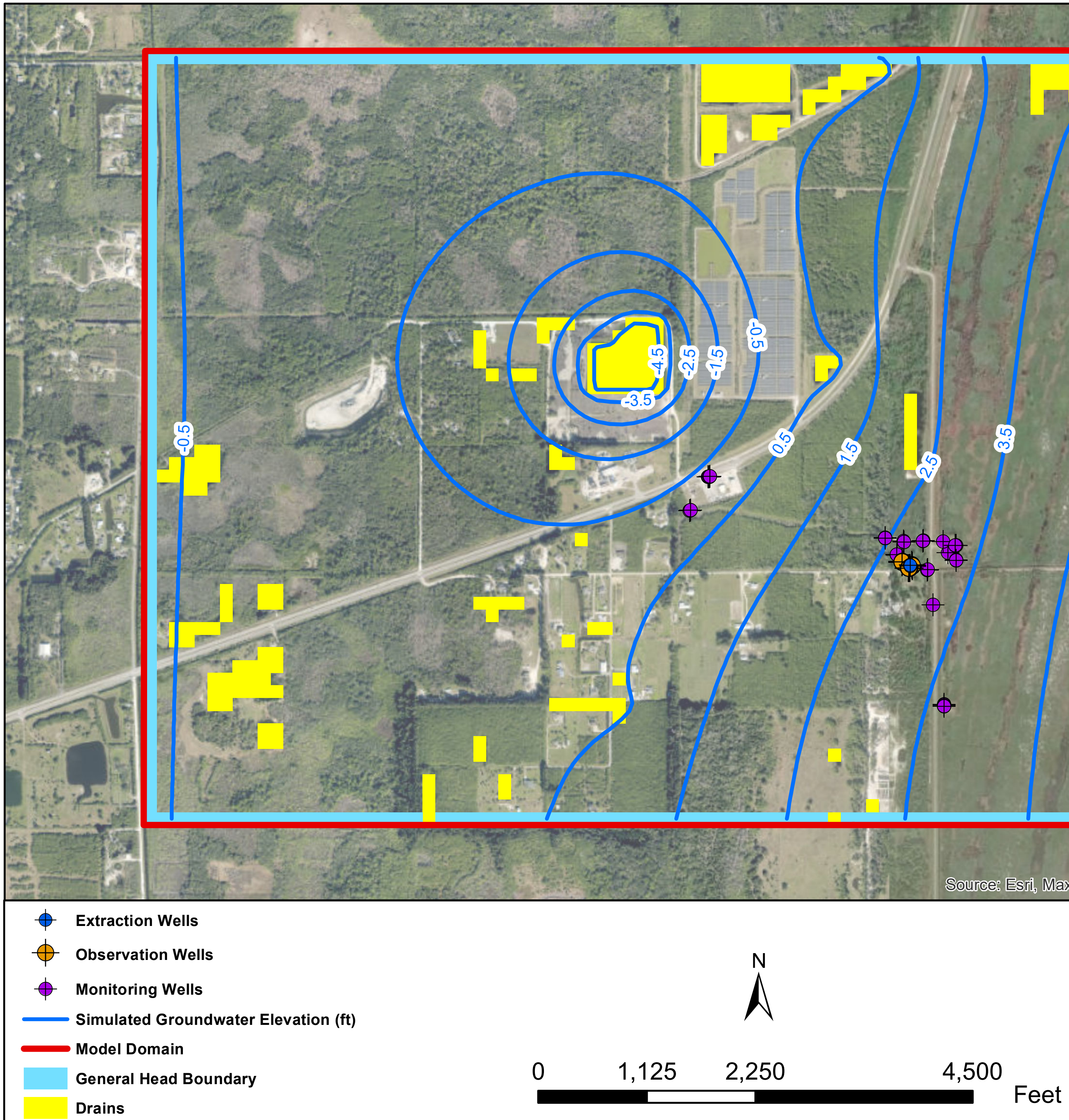


Figure 5

Simulated Groundwater Elevation Contours in Transient Model

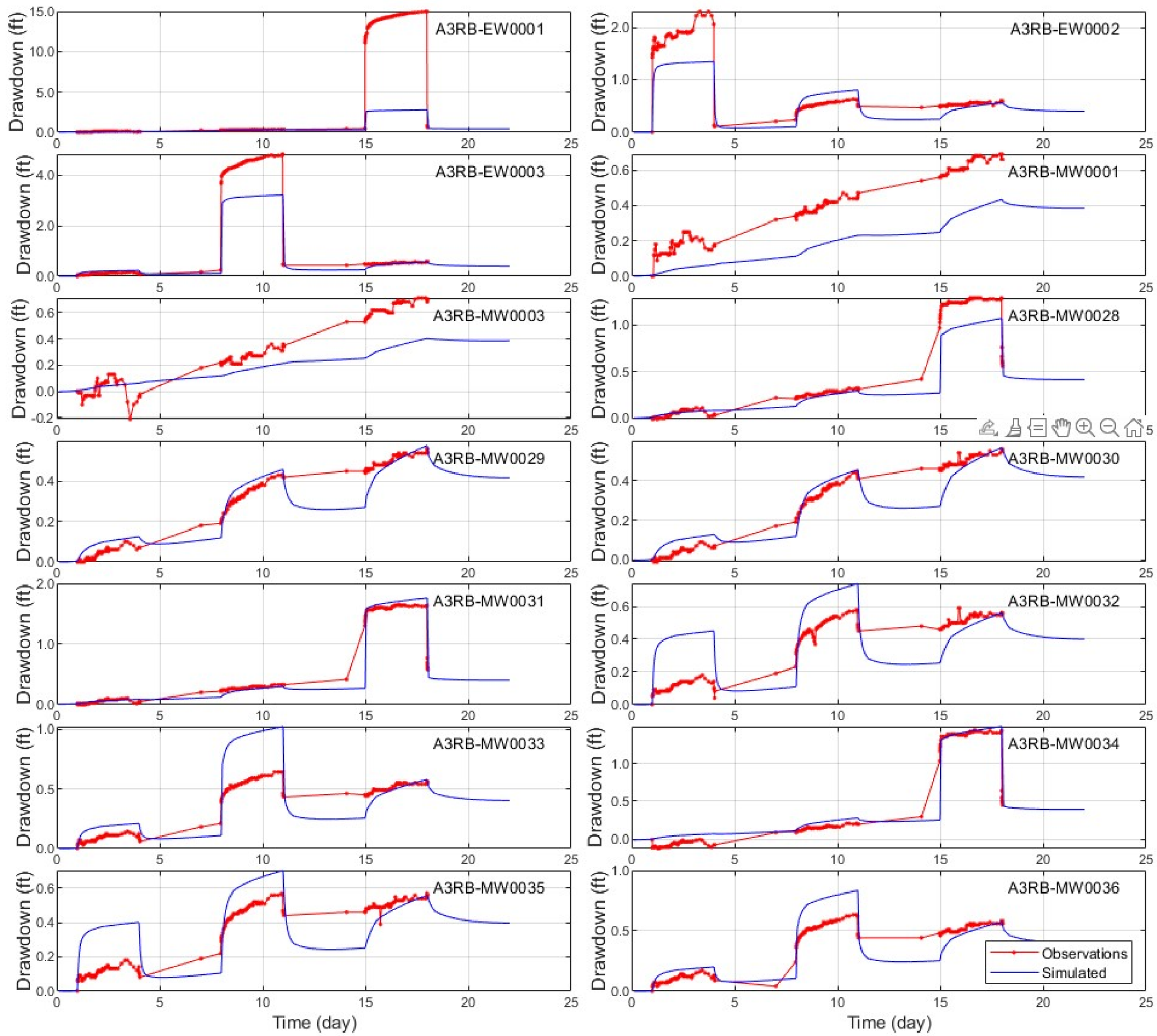


Figure 6

Simulated vs. Observed Hydrographs

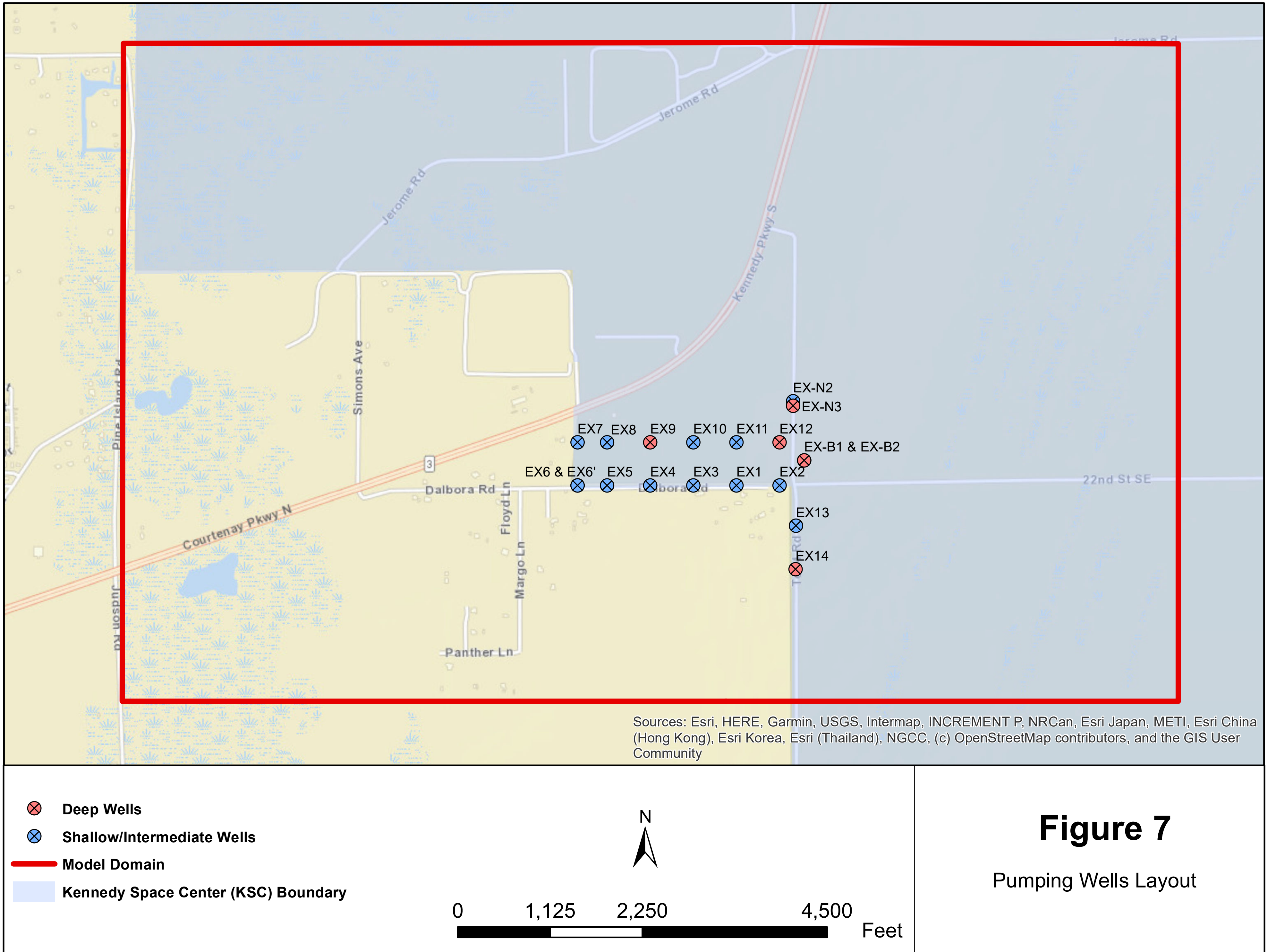
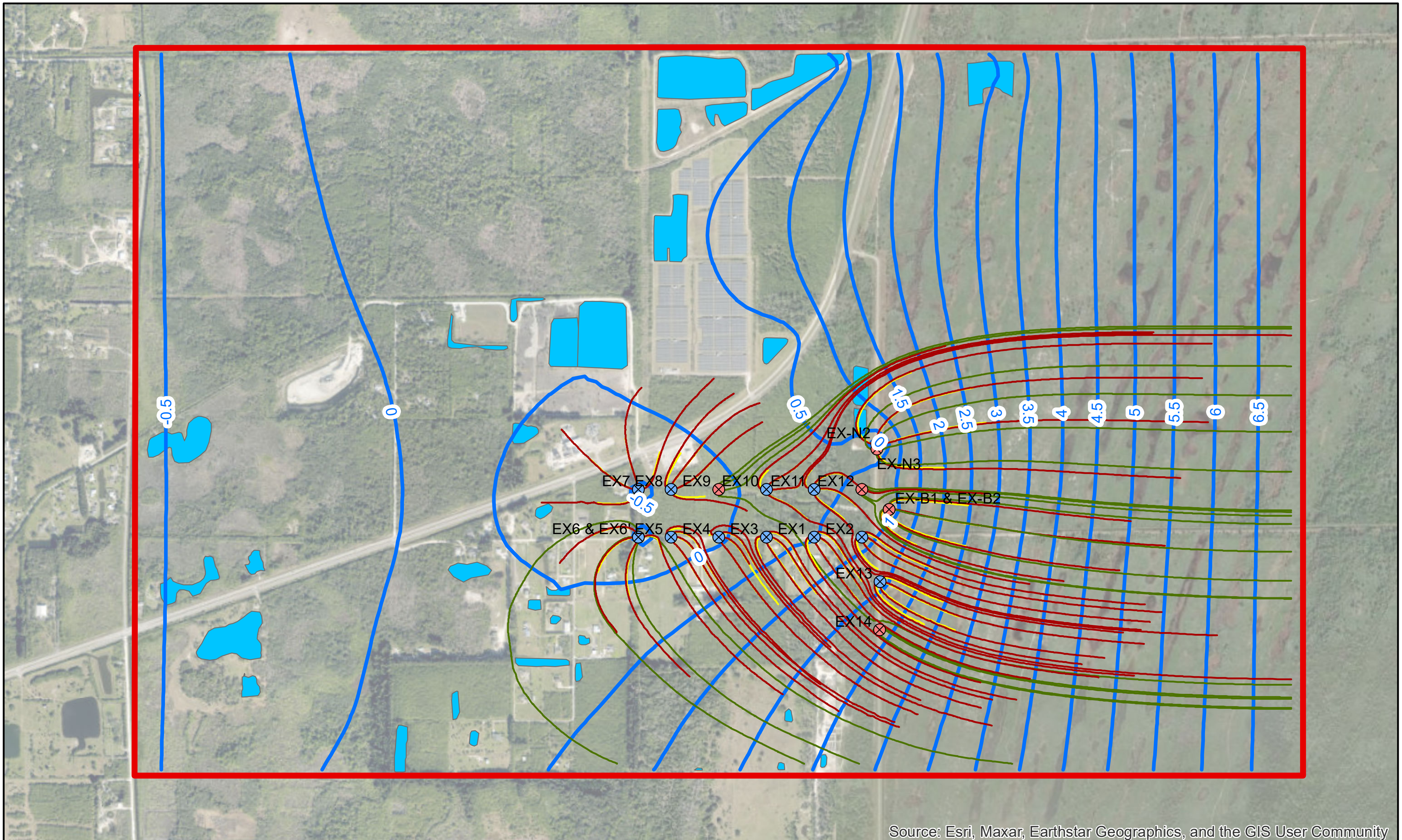


Figure 7

Pumping Wells Layout



Deep Wells
Shallow/Intermediate Wells
Simulated Groundwater Elevation (ft)
Model Domain
Ponds and Reservoirs

20 Year Pathline

Layer 2 Capture Zone
Layer 3 Capture Zone
Layer 5 Capture Zone

N

0 1,125 2,250 4,500 Feet

Figure 8a

Wells Capture Zone
at the End of 20 Years
(Reverse Particle Tracking)

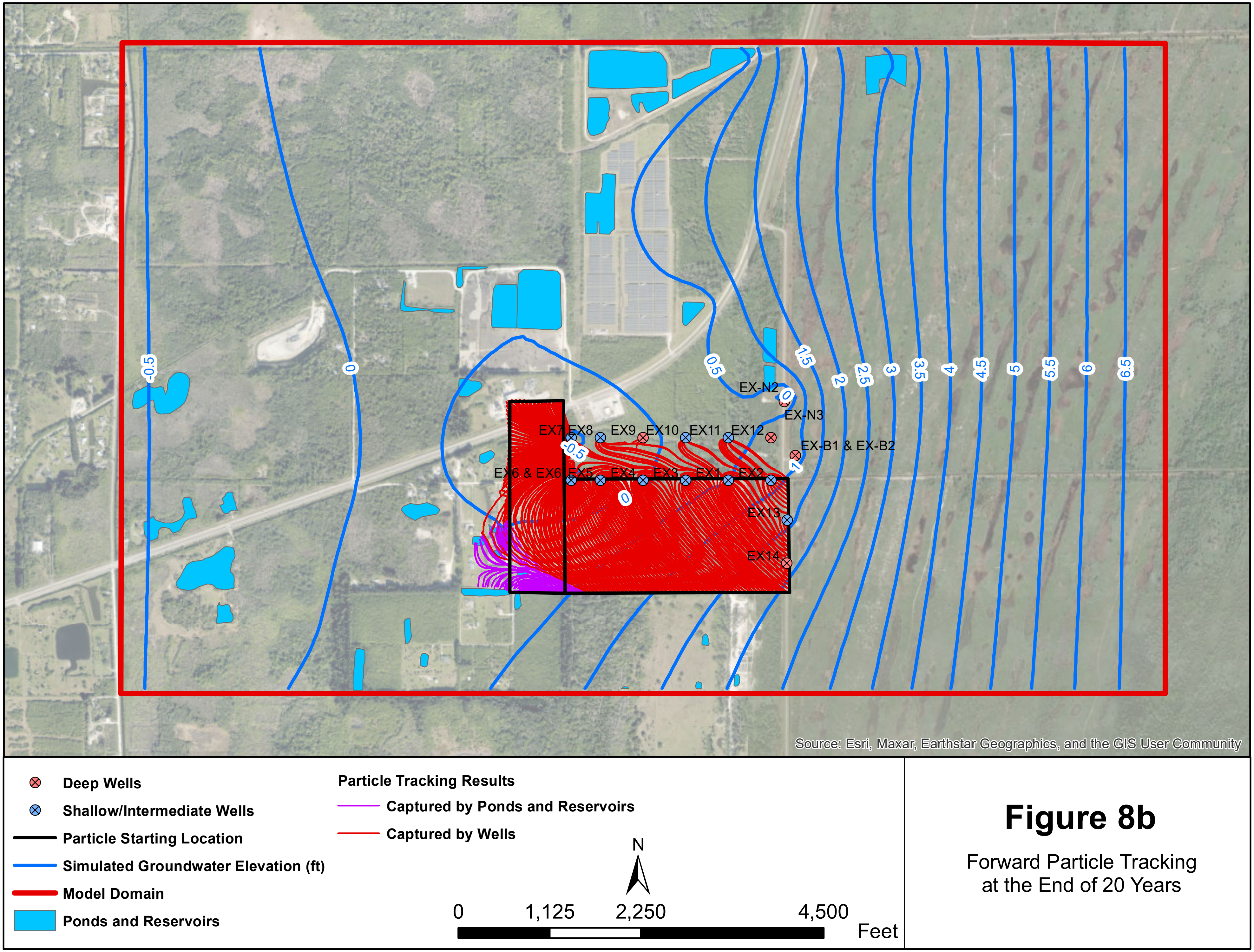


Figure 8b

Forward Particle Tracking at the End of 20 Years

Attachment 1

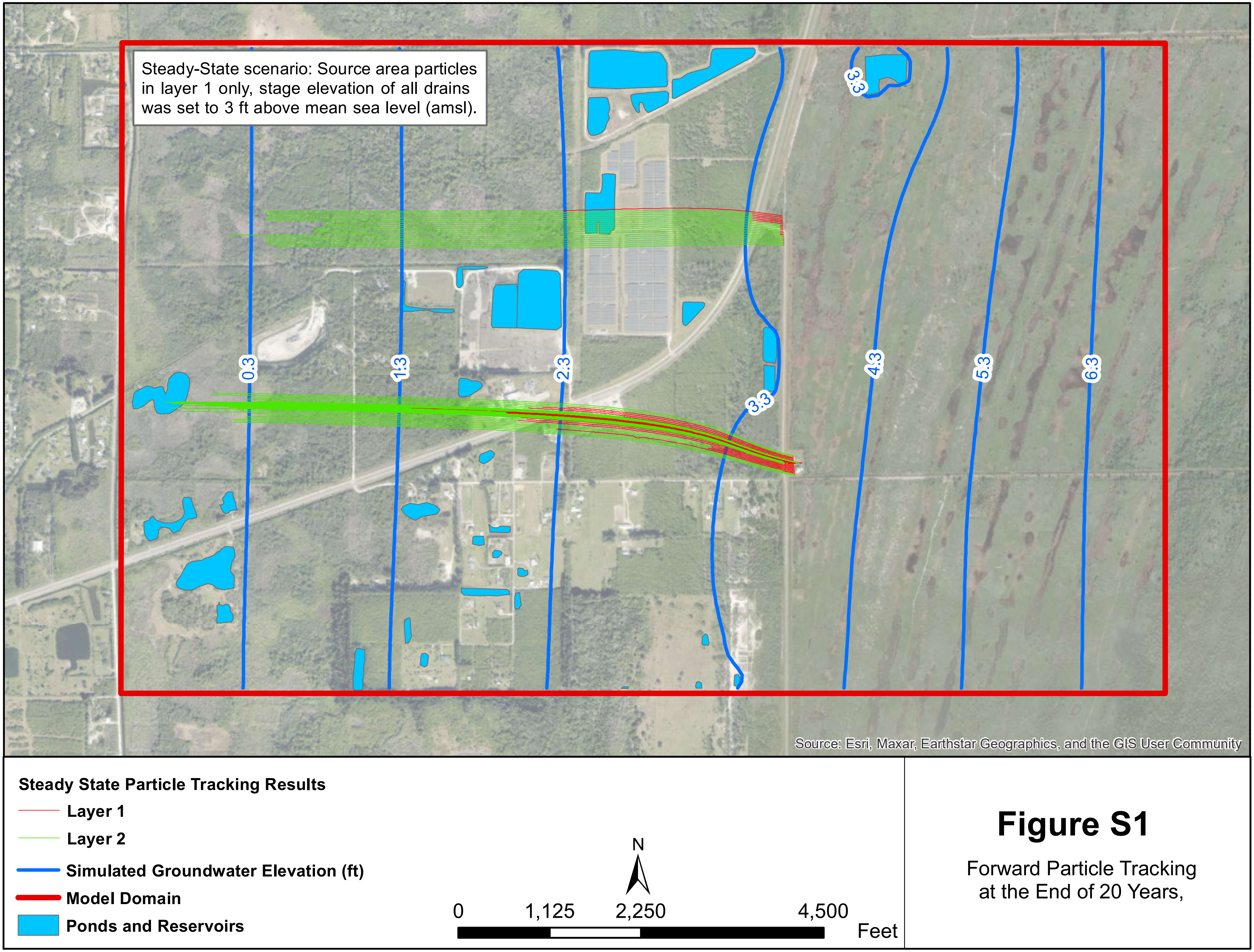
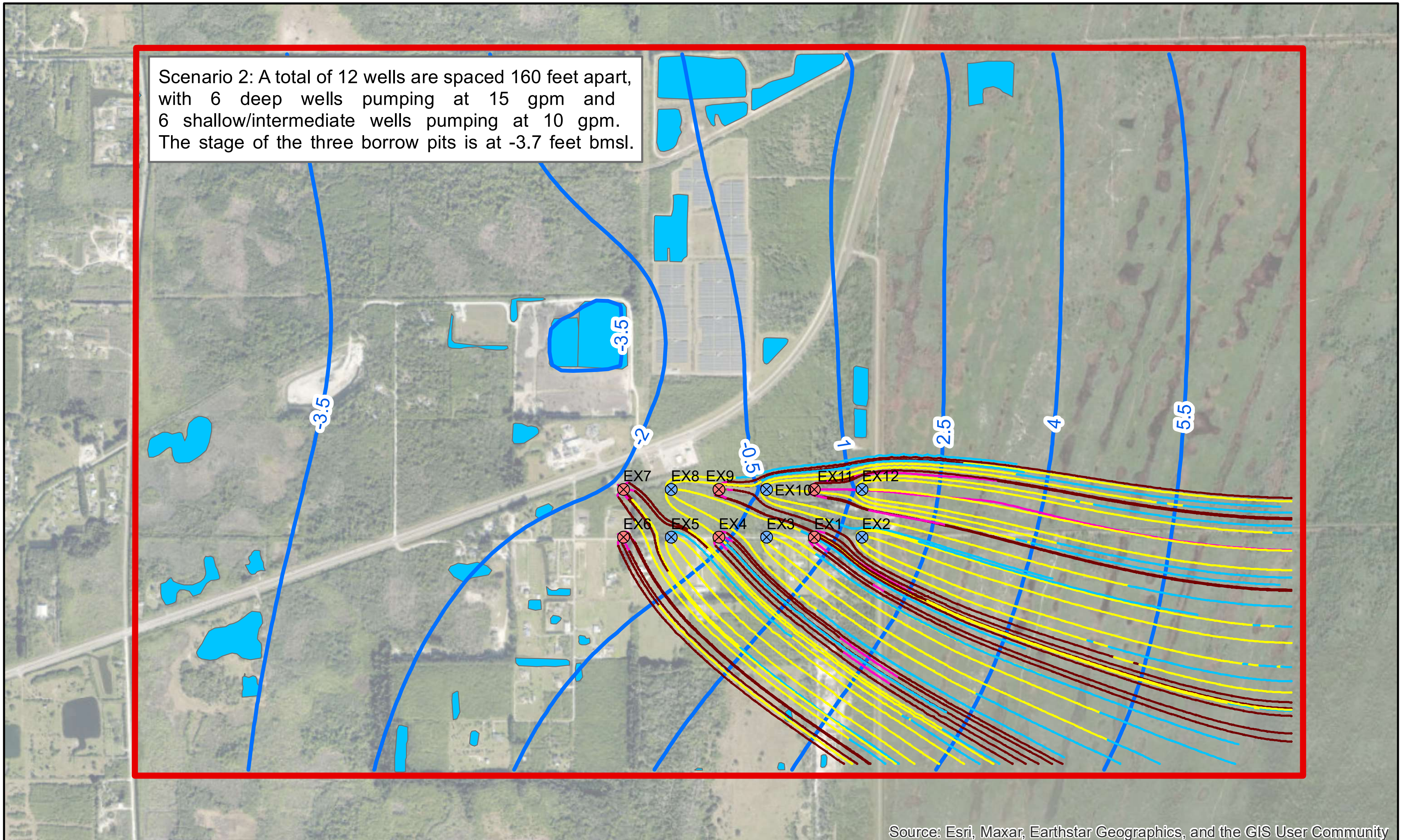


Figure S1

Forward Particle Tracking at the End of 20 Years,

Attachment 1



Deep Wells

Shallow/Intermediate Wells

Simulated Groundwater Elevation (ft)

Model Domain

Ponds and Reservoirs

20 Year Pathline

Layer 1 Capture Zone

Layer 2 Capture Zone

Layer 3 Capture Zone

Layer 4 Capture Zone

Layer 5 Capture Zone

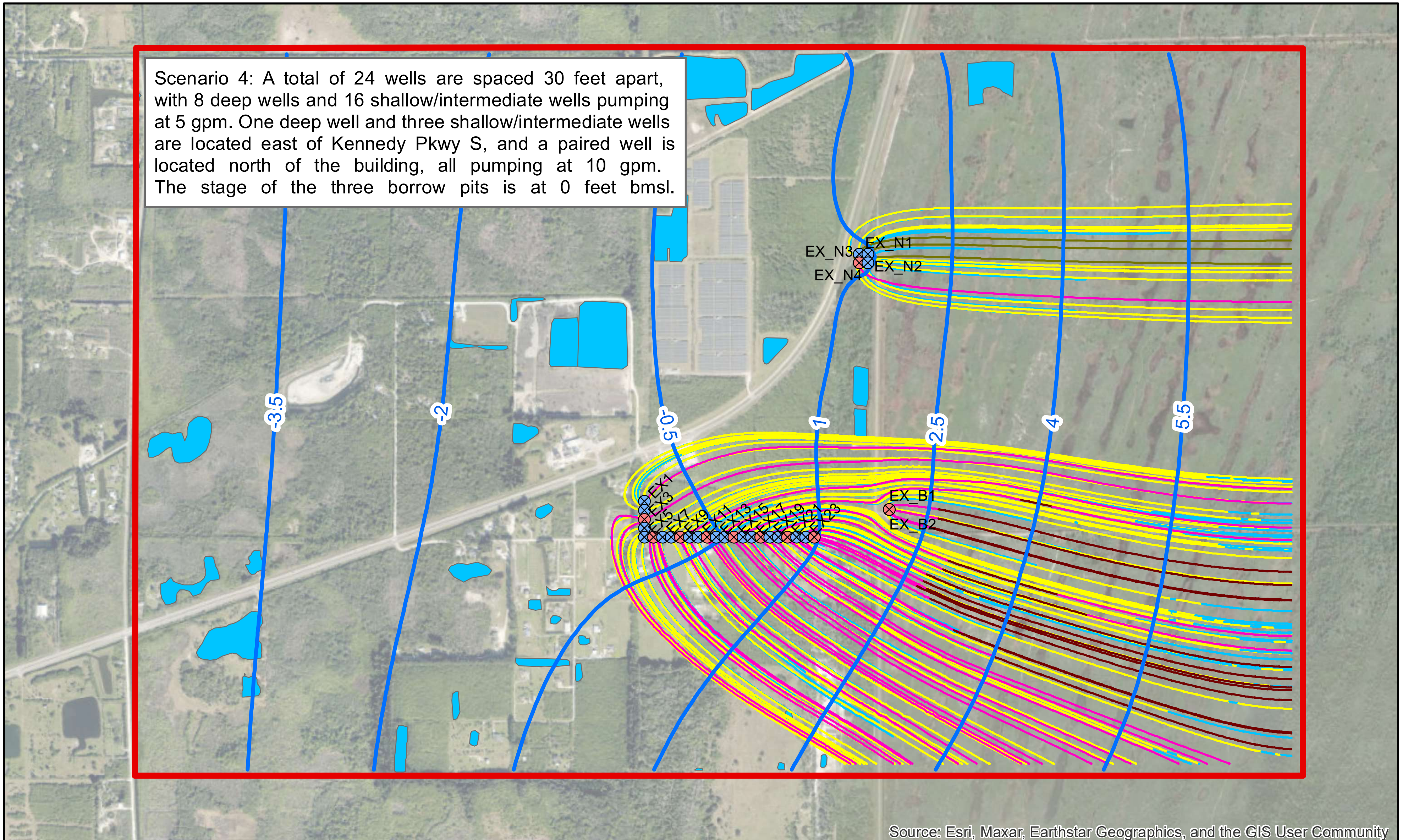
N

0 1,100 2,200 4,400 Feet

Figure S2

Wells Capture Zone
at the End of 20 Years
(Reverse Particle Tracking)

Attachment 1



Deep Wells

Shallow/Intermediate Wells

Simulated Groundwater Elevation (ft)

Model Domain

Ponds and Reservoirs

20 Year Pathline

Layer 1 Capture Zone

Layer 2 Capture Zone

Layer 3 Capture Zone

Layer 4 Capture Zone

Layer 5 Capture Zone

N

0 1,050 2,100 4,200 Feet

Figure S3

Wells Capture Zone
at the End of 20 Years
(Reverse Particle Tracking)

Attachment 1

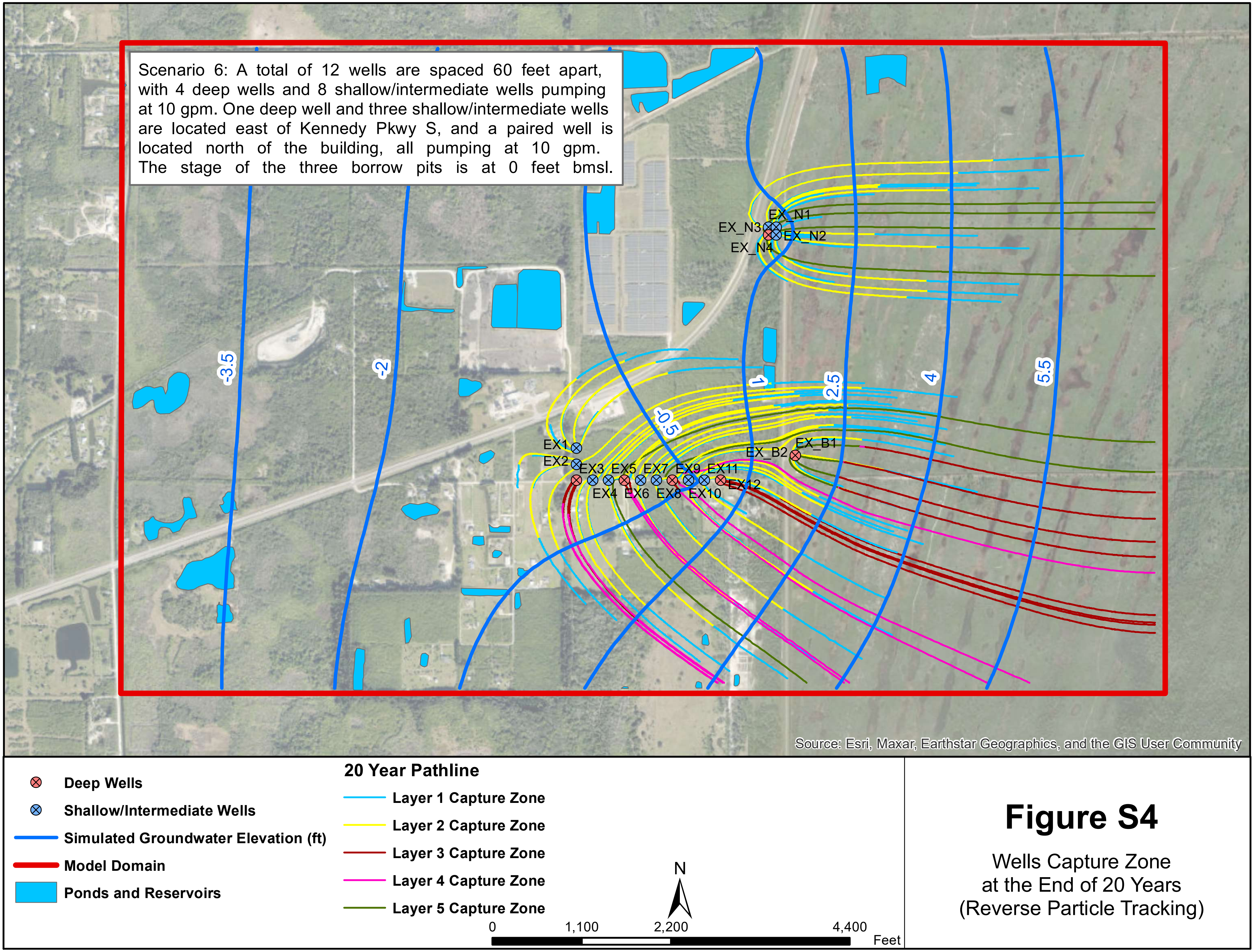


Figure S4

Wells Capture Zone at the End of 20 Years (Reverse Particle Tracking)

APPENDIX D

CALCULATIONS

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Calculating Pressure Loss - Equivalent Pipe Length Method

The 'K' factor of a fitting may be calculated from the 'Equivalent length' (in m or ft.) if the friction factor and the Internal diameter (in m or ft.) are known.
The 'Equivalent length' and 'Internal diameter' must be in the same units to calculate the 'K' factor.
K = (EL * ff) / i.d.where:EL= Equivalent length of pipe (in m or ft)ff = Friction factori.d. = Internal Diameter of the pipe (in m or ft, same as for EL)

Project: NASA
Date: 26-Oct
Piping Material: PVC Schedule 40

Equivalent Length of Component
Pressure Loss

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0021	1.5	30.0	6.3	tee, line flow	5.6	0.0	0.0				
				tee, branch flow	9.9	1.0	9.9				
				globe valve	42.0	1.0	42.0				
				swing check valve	15.0	1.0	15.0				
				90 deg Elbow	7.4	5.0	37.0				
				45 deg Elbow	2.1	0.0	0.0				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	832.4	857.4				
SUM 1							962.4	60.263	60.263		
									60.3		Grundfos model
								TOTAL	79.9 FT		22SQ10-160

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0014	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0				
& EW0006				tee, branch flow	5.3	0.0	0.0				
				globe valve	24.0	0.0	0.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbows	4.4	8.0	35.2				
				45 deg Elbow	0.9	0.0	0.0				
				flow meter	1.1	0.0	0.0				
				Straight Pipe	1.0	1400.0	1400.0				
SUM 1							1444.0	58.254	58.254		
									58.3		Grundfos model
								TOTAL	77.9 FT		5SQ05-90

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0022	1.0	10.0	3.2	tee, line flow	3.2	0.0	0.0				
				tee, branch flow	6.6	1.0	6.6				
				globe valve	29.0	1.0	29.0				
				swing check valve	11.0	1.0	11.0				
				90 deg Elbow	5.2	4.0	20.8				
				45 deg Elbow	1.3	0.0	0.0				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	832.4	832.4				
SUM 1							900.9	28.739	28.739		
									28.7		Grundfos model
								TOTAL	78.3 FT		15SQ05-70

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0015	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0				
& EW0004				tee, branch flow	5.3	1.0	5.3				
				globe valve	24.0	1.0	24.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbows	4.4	6.0	26.4				
				45 deg Elbow	0.9	2.0	1.8				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	795.4	795.4				
SUM 1							862.8	34.807	34.807		
									34.8		Grundfos model
								TOTAL	54.4 FT		5SQ05-90

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0011	1.0	10.0	3.2	tee, line flow	3.2	0.0	0.0				
				tee, branch flow	6.6	0.0	0.0				
				globe valve	29.0	1.0	29.0				
				swing check valve	11.0	1.0	11.0				
				90 deg Elbow	5.2	6.0	31.2				
				45 deg Elbow	1.3	2.0	2.6				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	3046.0	3046.0				
SUM 1							3120.9	99.559	99.559		
									99.6		Grundfos model
								TOTAL	119.2 FT		10SQ05-110

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0012	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0				
& EW0008				tee, branch flow	5.3	1.0	5.3				
				globe valve	24.0	1.0	24.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbow	4.4	10.0	44.0				
				45 deg Elbow	0.9	2.0	1.8				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	2564.9	2564.9				
SUM 1							2649.9	106.901	106.901		
									106.9		Grundfos model
								TOTAL	126.5 FT		5SQ05-140

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0009	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0				
				tee, branch flow	5.3	1.0	5.3				
				globe valve	24.0	1.0	24.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbows	4.4	9.0	39.6				
				45 deg Elbow	0.9	2.0	1.8				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	2940.0	2940.0				
SUM 1							3020.6	121.857	121.857		
									121.9		Grundfos model
								TOTAL	171.5 FT		5SQ05-140

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0010	1.0	10.0	3.2	tee, line flow	3.2	0.0	0.0				
				tee, branch flow	6.6	1.0	6.6				
				globe valve	29.0	1.0	29.0				
				swing check valve	11.0	1.0	11.0				
				90 deg Elbows	5.2	9.0	46.8				
				adapter	1.3	1.0	1.3				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	2940.0	2940.0				
SUM 1							3035.8	97.146	97.146		
									97.1		Grundfos model
								TOTAL	116.7 FT		10SQ05-160

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0007	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0				
				tee, branch flow	5.3	1.0	5.3				
				globe valve	24.0	1.0	24.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbow	4.4	10.0	44.0				
				45 deg Elbow	0.9	2.0	1.8				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	2077.0	2077.0				
SUM 1							2162.0	87.220	87.220		
									87.2		Grundfos model
								TOTAL	106.8	FT	5SQ05-140

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0018	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0				
				tee, branch flow	5.3	1.0	5.3				
				globe valve	24.0	1.0	24.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbow	4.4	3.0	13.2				
				45 deg Elbow	0.9	2.0	1.8				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	1145.0	1145.0				
SUM 1							1199.2	48.378	48.378		
									48.4		Grundfos model
								TOTAL	98.0	FT	5SQ05-90

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0017	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0				
				tee, branch flow	5.3	1.0	5.3				
				globe valve	24.0	1.0	24.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbow	4.4	3.0	13.2				
				45 deg Elbow	0.9	2.0	1.8				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	618.0	618.0				
SUM 1							672.2	27.118	27.118		
									27.1		Grundfos model
								TOTAL	46.7	FT	5SQ05-140

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0016	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0				
				tee, branch flow	5.3	1.0	5.3				
				globe valve	24.0	1.0	24.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbow	4.4	6.0	26.4				
				45 deg Elbow	0.9	2.0	1.8				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	528.0	528.0				
SUM 1							595.4	24.020	24.020		
									24.0		Grundfos model
								TOTAL	73.6	FT	5SQ05-90

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0019	1.0	10.0	3.2	tee, line flow	2.4	0.0	0.0				
				tee, branch flow	5.3	1.0	5.3				
				globe valve	24.0	1.0	24.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbow	4.4	5.0	22.0				
				45 deg Elbow	0.9	0.0	0.0				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	386.0	386.0				
SUM 1							447.2	14.266	14.266		
									14.3		Grundfos model
								TOTAL	33.9	FT	15SQ05-70

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)	
EW0005	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0				
				tee, branch flow	5.3	1.0	5.3				
				globe valve	24.0	1.0	24.0				
				swing check valve	8.8	1.0	8.8				
				90 deg Elbow	4.4	6.0	26.4				
				45 deg Elbow	0.9	2.0	1.8				
				flow meter	1.1	1.0	1.1				
				Straight Pipe	1.0	513.0	513.0				
SUM 1							580.4	23.415	23.415		
									23.4		Grundfos model
								TOTAL	43.0	FT	5SQ05-140

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)
EW0020	1.0	10.0	3.2	tee, line flow	2.4	0.0	0.0			
				tee, branch flow	5.3	1.0	5.3			
				globe valve	24.0	1.0	24.0			
				swing check valve	8.8	1.0	8.8			
				90 deg Elbow	4.4	5.0	22.0			
				45 deg Elbow	0.9	0.0	0.0			
				flow meter	1.1	1.0	1.1			
				Straight Pipe	1.0	386.0	386.0			
SUM 1							447.2	14.266	14.266	
									14.3	
								TOTAL	63.9	FT

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)
EW0013	3/4	5.0	4.0	tee, line flow	2.4	0.0	0.0			
				tee, branch flow	5.3	1.0	5.3			
				globe valve	24.0	1.0	24.0			
				swing check valve	8.8	1.0	8.8			
				90 deg Elbow	4.4	6.0	26.4			
				45 deg Elbow	0.9	2.0	1.8			
				flow meter	1.1	1.0	1.1			
				Straight Pipe	1.0	2077.0	2077.0			
SUM 1							2144.4	86.510	86.510	
									86.5	
								TOTAL	136.1	FT

Equivalent Pipe Length Method

The equivalent length method (The Le/D method) allows the user to describe the pressure loss through an elbow or a fitting as a length of straight pipe.

This method is based on the observation that the major losses are also proportional to the velocity head (v2/2g).

The Le/D method simply increases the multiplying factor in the Darcy-Weisbach equation (i.e., f.L/D) by a length of straight pipe (i.e., Le) which would give rise to a pressure loss equivalent to the losses in the fittings, hence the name "equivalent length". The multiplying factor, therefore, becomes f(L+Le)/D and the equation for calculation of pressure loss of the system is, therefore: Therefore the tabulation of equivalent length data is relatively easy. Some typical equivalent lengths are shown in the table.

Equivalent Length of Straight Pipe for Valves and Fittings (feet)												
Screwed Fittings		Pipe Size										
		1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
Elbows	Regular 90 deg	2.3	3.1	3.6	4.4	5.2	6.6	7.4	8.5	9.3	11.0	13.0
	Long radius 90 deg	1.5	2.0	2.2	2.3	2.7	3.2	3.4	3.6	3.6	4.0	4.6
	Regular 45 deg	0.3	0.5	0.7	0.9	1.3	1.7	2.1	2.7	3.2	4.0	5.5
Tees	Line flow	0.8	1.2	1.7	2.4	3.2	4.6	5.6	7.7	9.3	12.0	17.0
	Branch flow	2.4	3.5	4.2	5.3	6.6	8.7	9.9	12.0	13.0	17.0	21.0
Return Bends	Regular 180 deg	2.3	3.1	3.6	4.4	5.2	6.6	7.4	8.5	9.3	11.0	13.0
Valves	Globe	21.0	22.0	22.0	24.0	29.0	37.0	42.0	54.0	62.0	79.0	110.0
	Gate	0.3	0.5	0.6	0.7	0.8	1.1	1.2	1.5	1.7	1.9	2.5
	Angle	12.8	15.0	15.0	15.0	17.0	18.0	18.0	18.0	18.0	18.0	18.0
	Swing Check	7.2	7.3	8.0	8.8	11.0	13.0	15.0	19.0	22.0	27.0	38.0
Strainer			4.6	5.0	6.6	7.7	18.0	20.0	27.0	29.0	34.0	42.0

The Engineering ToolBox

Static Head Loss

	32'-well	53'-well	
Water Table =	8	8	feet
Drawdown =	5	20	feet
Water =	10	40	feet
Frac tank =	9.6	9.6	feet
Total static head (TSH) =	19.6	49.6	feet

Depth	Well ID	Flow (gpm)	Head (ft)
S/I	A3RB-EW0004	5	54
S/I	A3RB-EW0005	5	43
S/I	A3RB-EW0006	5	78
S/I	A3RB-EW0007	5	107
S/I	A3RB-EW0008	5	127
D	A3RB-EW0009	5	171
S/I	A3RB-EW0010	10	117
S/I	A3RB-EW0011	10	119
S/I	A3RB-EW0012	5	127
D	A3RB-EW0013	5	136
S/I	A3RB-EW0014	5	78
S/I	A3RB-EW0015	5	54
D	A3RB-EW0016	5	74
S/I	A3RB-EW0017	5	47
D	A3RB-EW0018	5	98
S/I	A3RB-EW0019	10	34
D	A3RB-EW0020	10	64
S/I	A3RB-EW0021	30	80
D	A3RB-EW0022	10	78

					Electrical Data								Branch Circuits			Electrical @ Pump		
Well ID	Easting	Northing	Flow Rate (gpm)	Pump Make/ Model[1]	Voltage (V)	HP (HP)	Power (kW)	Current (A)	Service Factor	Max Load (A)	Max Load (kVA)	Distance (FT)	Phase Cond. Size CU	EG Cond. Size CU	Conduit Size (Sch 80 PVC) (QTY =1)	Heavy-Duty Primary Safety Switch	NEMA 4X Encap. Step-Down XFMR	Heavy-Duty Secondary Safety Switch
A3RB-EW0004	231577	459251	5	5SQ05-90	240	0.939	1.0	5.2	1.85	9.62	2.31	965	2#8	1#8	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0005	231737	459251	5	5SQ05-140	240	0.939	1.0	5.2	1.85	9.62	2.31	440	2#10	1#10	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0006	231417	459251	5	5SQ05-90	240	0.939	1.0	5.2	1.85	9.62	2.31	1490	2#6	1#6	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0007	231257	459251	5	5SQ05-140	240	0.939	1.0	5.2	1.85	9.62	2.31	2015	2#4	1#4	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0008	231097	459251	5	5SQ05-140	240	0.939	1.0	5.2	1.85	9.62	2.31	2540	2#4	1#4	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0009	230987	459251	5	5SQ05-140	240	0.939	1.0	5.2	1.85	9.62	2.31	2910	2#3	2#3	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0010	230987	459251	10	10SQE05-160	240	0.939	1.0	5.2	1.85	9.62	2.31	2910	2#3	1#3	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0011	230987	459411	10	10SQE05-110	240	0.939	1.0	5.2	1.85	9.62	2.31	2860	2#3	1#3	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0012	231097	459411	5	5SQ05-140	240	0.939	1.0	5.2	1.85	9.62	2.31	2490	2#4	1#4	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0013	231257	459411	5	5SQ05-140	240	0.939	1.0	5.2	1.85	9.62	2.31	1965	2#4	1#4	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0014	231417	459411	5	5SQ05-90	240	0.939	1.0	5.2	1.85	9.62	2.31	1440	2#6	1#6	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0015	231577	459411	5	5SQ05-90	240	0.939	1.0	5.2	1.85	9.62	2.31	915	2#8	1#8	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0016	231737	459411	5	5SQ05-90	240	0.939	1.0	5.2	1.85	9.62	2.31	390	2#10	1#10	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0017	231797	459101	5	15SQE05-70	240	0.939	1.0	5.2	1.85	9.62	2.31	900	2#8	1#8	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0018	231796	458940	5	5SQ05-90	240	0.939	1.0	5.2	1.85	9.62	2.31	1440	2#6	1#6	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0019	231828	459344	10	15SQE05-70	240	0.939	1.0	5.2	1.85	9.62	2.31	100	2#10	1#10	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0020	231828	459344	10	15SQE05-70	240	0.939	1.0	5.2	1.85	9.62	2.31	100	2#10	1#10	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0021	231757	460201	30	22SQ10-160	240	2.08	2.1	11.2	2.07	23.18	5.56	780	2#4	1#4	1"	N3R/600V/30/2/NF	(7.5kVA) 480:240/120V	N3R/250V/30/2/NP
A3RB-EW0022	231727	460171	10	15SQE05-70	240	0.939	1.0	5.2	1.85	9.62	2.31	750	2#8	1#8	1"	N3R/600V/30/2/NF	(5kVA) 480:240/120V	N3R/250V/30/2/NP

Safety Switch Nema Rating/Voltage/Size/No. of Poles/Fuse Size

Fuse Size (NF=Non-Fused; NP=Fuse to Nameplate Data)

	Voltage (V)			Current (A)		Max Load (A)	Max Load (kVA)	Est. Distance (FT)	Phase Cond. Size CU	EG Cond. Size CU	Conduit Size (Sch 80 PVC)
Liquid filled transformer to NEMA3R, 480Y/277V, 300A MCB, 42-Space, Panel 'TP'	480/277			300.0		156.71	130.22	50	4#350	---	4"
Panel 'TP' to NEMA3R, 480/277V, 125A MCB, 42-Space, Sub-Panel 'TTS'	480/278			125.0		100	83.10	50	4#1	1#6	2"

Rip Rap Calculations

DESIGN PROCEDURE STEPS

Document the pipe diameter (inches) and discharge (cfs) of the pipe when in full flow condition.

1. Based on the tailwater depth immediately below the pipe outlet classify the tailwater condition as either
   a. Minimum Tailwater Condition (Figure 1a) where the tailwater depth is less than half the diameter of the pipe at the discharge point.
   b. Maximum Tailwater Condition (Figure 1b) where the tailwater depth is equal or greater than half the diameter of the pipe at the discharge point.
2. Select Figure 1a or Figure 1b for the appropriate tailwater condition. Determine the
   a. Median Riprap Diameter, D_{50} (Ft)
      i. Go to the selected figure and select the full pipe discharge (cfs) on the x-axis, extend a vertical line to the pipe diameter in the lower set of curves. Then read horizontally to the y-axis on the right and determine the Median Riprap Diameter, D_{50}.
   b. Minimum Apron Length, La (Ft)
      i. Extend the vertical line (discussed in 2ai) to the pipe diameter in the upper set of curves in the figure until it intersects the pipe diameter. Then read horizontally to the y-axis on the left and determine the Minimum Apron Length, La.

1/4

Note: [A] The figures provided are generated from equations found in the U.S. Army Corps of Engineers *Erosion and Riprap Requirements at Culvert and Storm-Drain Outlets*, Bohan, J. P. Research Report H-70-2, 1970.

3. Calculate the Apron Width, W (Ft)
   a. Calculate the apron width by adding three times the pipe diameter (Do) to the apron length, La. W = (3 x Do(ft)) + La(ft) when minimum tailwater conditions prevail and the outlet is
      i. discharging into a flat channel or area or
      ii. discharging into a defined channel wider than the apron width (W).
   b. Calculate the apron width by adding three times the pipe diameter (Do) to 0.4 times the apron length, La. W = (3 x Do(ft)) + (La(ft) x 0.4) when maximum tailwater conditions are met and the pipe outlet is discharging into an area wider than the apron width.
   c. If the above conditions cannot be met and the outlet discharges into a channel narrower than the required apron width, then at a minimum, continuously line the channel one foot (1.0') above the design flow elevation or to the top of bank, whichever is less, and downstream to length of 1.2 x (La).

Culvert Diameter: 5 inch = 0.417 feet

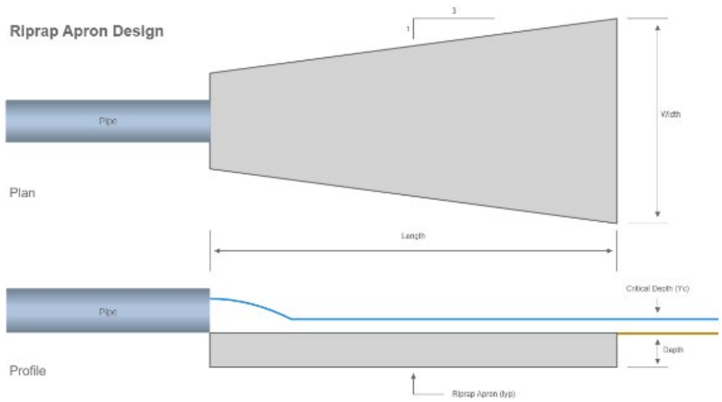
Width = (3 x 0.417) + (7 x 0.4) = 4.051 feet

Length: 7 feet with larger 4 inch stone size, Graph indicates 10 feet for 0.5 diameter stone so length was adjusted to 7 feet for a better fit to the area

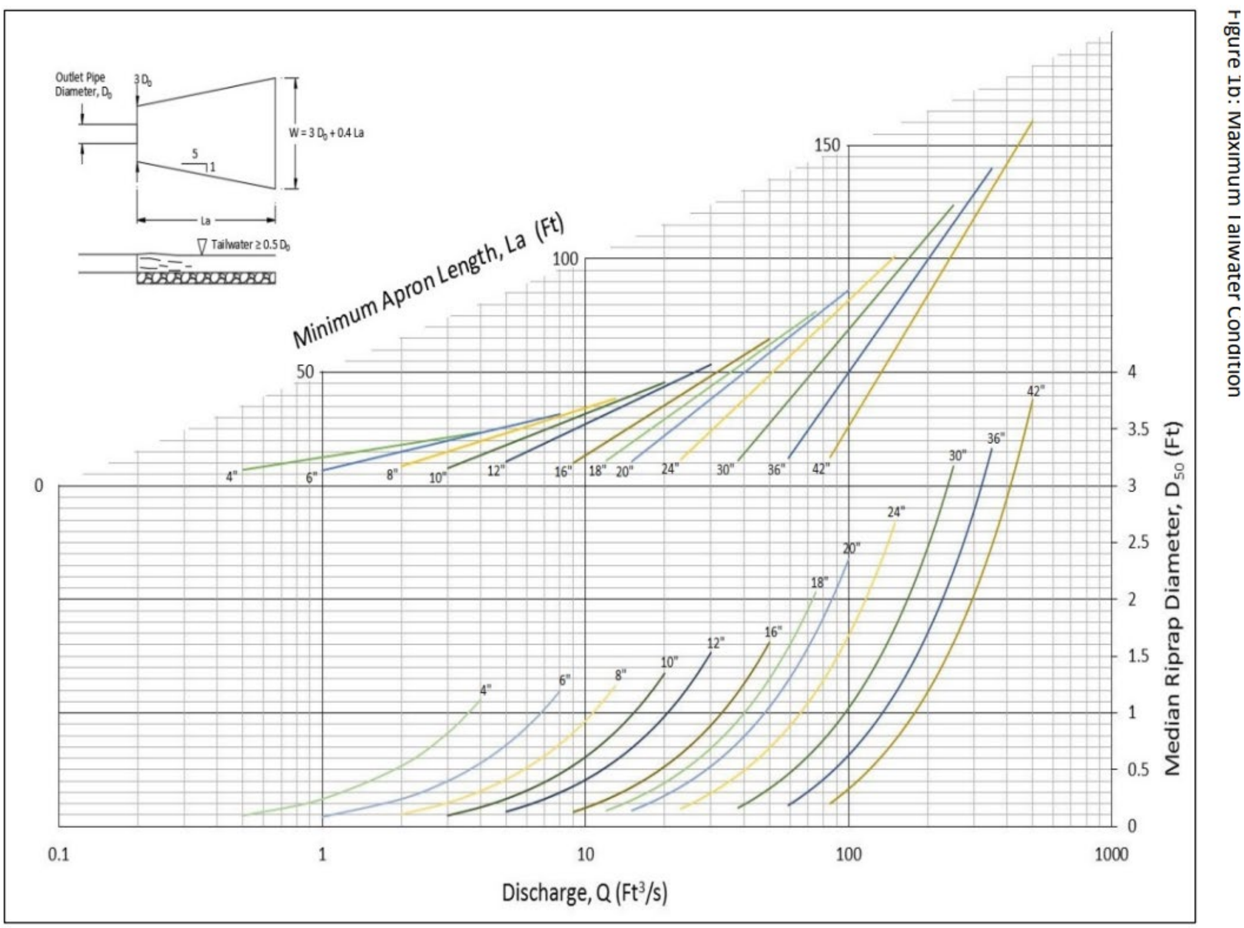
For this culvert diameter size it is recommended to have a max depth of 6 inches

Rip Rap Calculations

https://efotg.sc.egov.usda.gov/api/CPSFile/12159/000_WV_ENGT_Design_Note_RipRap-Lined_Outlet_Protection_2018



Plan & Profile of Riprap Apron



Rip Rap Calculations

APPENDIX E

INFILTRATION GALLERY SIZING CALCULATIONS

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Infiltration Gallery Calculations

Flow from System	150	gpm	
D_{trench}	1.75	feet	
Typical trench width	4	feet	
D_{wt}	1.5975	feet bls	PFAS-MW031
Site Hydraulic conductivity	49.20	feet/day	

Gradient = i $\quad i = \frac{D_{wt} + d_{trench}}{78(K^{0.05})}$

K_{sat} = saturated hydraulic conductivity (feet/day)
D_{wt} = depth from the base of the infiltration trench to the water table (feet)
D_{trench} = depth of water in the trench (feet)

f=0.5Ki

f =specific discharge or infiltration rate of water through a unit cross-section of the infiltration
K =hydraulic conductivity
i =gradient for ponds and trenches at sites with shallow water tables

Infiltration rate reduction - trenches for high potential for biofauling = 0.6

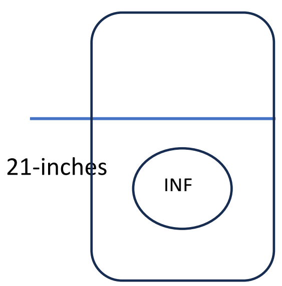
f_{cor} = (CF)f

CF =correction factor for siltation and biofouling
f ='uncorrected' infiltration rate

36"

Depth of Trench (D_{Trench}) feet	Depth to water table (D_{wt}) feet	Hydraulic Conductivity (K) feet/day	Hydraulic Gradient (i)	Infiltration Rate (f) inches/hour	Correction Factor (CF)	Adjusted Infiltration rate (f_{adj}) inches/hour
1.75	1.5975	49.20333333	0.03532045	0.868941995	0.8	0.695153596

6
1.227178 0.062683
95.71988



Wetted length of proposed trench	7.5	ft
Length of proposed trench	2800	ft
Length of each trench leg	700	ft
Surface area of trench	21000	ft^2

Maximum flow rate from trench	1216.519	ft^3/hr		
	9099.561	gallons/hr		
	151.6593	gpm	> 150 gpm	yes

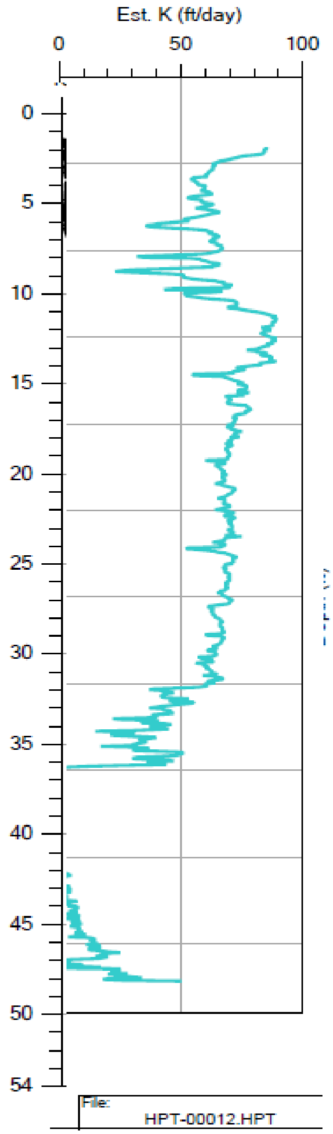
Calculating Pressure Loss - Equivalent Pipe Length Method

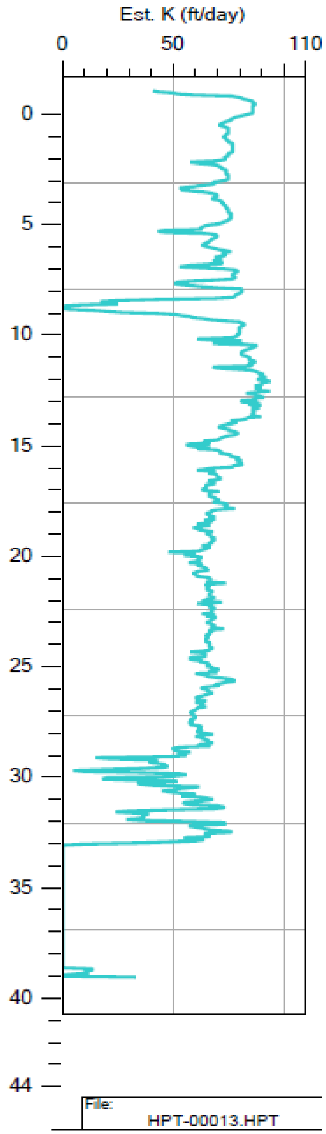
Project: NASA
Date: 26-Oct
Piping Material: PVC Schedule 40

Equivalent Length of Component Pressure Loss

Section	Pipe Size (inches)	Flow (gal/min)	Pressure Loss (ft/100ft)	System Components	Equivalent Length of Component (ft)	No. Components	Equivalent Length (ft)	Section Pressure Loss (ftH20)	Total Pressure Loss - Path 1 (ftH2O)	Total Pressure Loss - Path 2 (ftH2O)
Inf Gallery	4	150.0	1.9	tee, line flow	5.6	0.0	0.0			
From eff pump				tee, branch flow	9.9	1.0	9.9			
to 5"x3"x3"				globe valve	42.0	1.0	42.0			
tee				swing check valve	15.0	0.0	0.0			
				90 deg Elbow	7.4	4.0	29.6			
				45 deg Elbow	2.1	0.0	0.0			
				flow meter	1.1	0.0	0.0			
				Straight Pipe	1.0	5575.0	5600.0			
SUM 1							5681.5	105.408	105.408	
Inf Gallery	3	75.0	1.4	tee, line flow	5.6	0.0	0.0			
From 5"x3"x3"				tee, branch flow	9.9	3.0	29.7			
tee to leg 1				globe valve	42.0	0.0	0.0			
and 2 of gallery				swing check valve	15.0	0.0	0.0			
				90 deg Elbow	7.4	1.0	7.4			
				45 deg Elbow	2.1	0.0	0.0			
				flow meter	1.1	0.0	0.0			
				Straight Pipe	1.0	460.0	460.0			
SUM 2							497.1	7.127	7.127	
Inf Gallery	3.0	37.5	0.4	tee, line flow	5.6	0.0	0.0			
from tee at				tee, branch flow	9.9	2.0	19.8			
leg 1 and leg 2				globe valve	42.0	0.0	0.0			
to end of				swing check valve	15.0	0.0	0.0			
leg 1				90 deg Elbow	7.4	0.0	0.0			
				45 deg Elbow	2.1	0.0	0.0			
				flow meter	1.1	0.0	0.0			
				Straight Pipe	1.0	740.0	740.0			
SUM 1							759.8	3.018	3.018	
								Total Friction Loss (ft)	115.6	
								TOTAL (Static+Friction)	116.6 FT	

The 'K' factor of a fitting may be calculated from the 'Equivalent length' (in m or ft.) if the friction factor and the Internal diameter (in m or ft.) are known.
The 'Equivalent length' and 'Internal diameter' must be in the same units to calculate the 'K' factor.
K = (EL * ff) / i.d.where:EL= Equivalent length of pipe (in m or ft)ff = Friction factori.d. = Internal Diameter of the pipe (in m or ft, same as for EL)


Est. K (ft/day)
0 50 100
0 5 10 15 20 25 30 35 40 45 50 54
File:
HPT-00012.HPT


Est. K (ft/day)
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0 5 10 15 20 25 30 35 40 44
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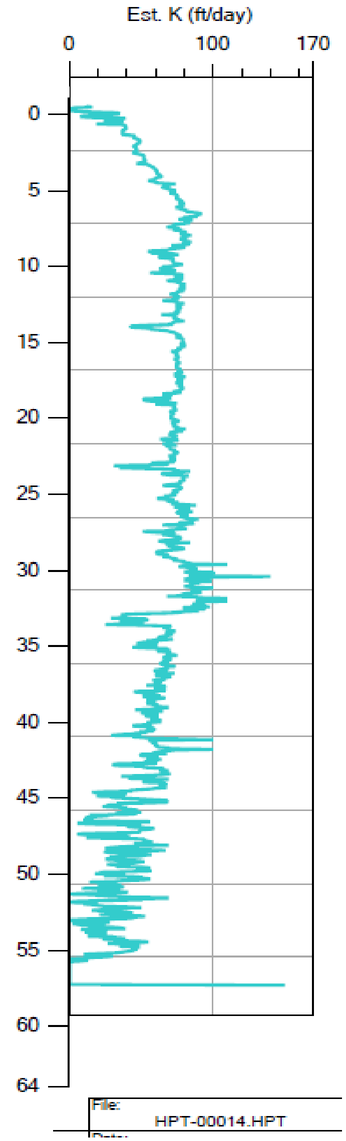
HPT-00013.HPT


Est. K (ft/day)
0 100 170
0 5 10 15 20 25 30 35 40 45 50 55 60 64
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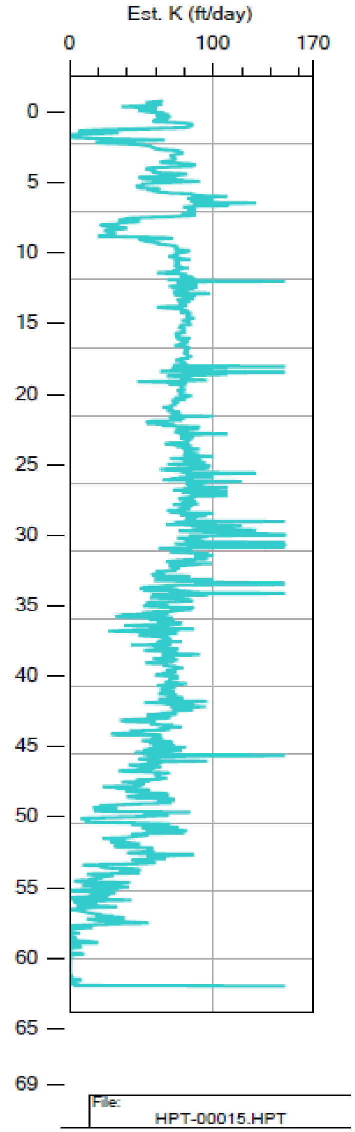
HPT-00014.HPT


Est. K (ft/day)
0 100 170
0 5 10 15 20 25 30 35 40 45 50 55 60 65 69
File:
HPT-00015.HPT

Shallow interval K values generally agree between the pump test and slug tests (30.22 ft/d)

Flow Parameters	Value	Model
Hydraulic Conductivity (ft/d)	Layer 1: 40.0 Layer 2: 30.0 Layer 3: 150.0 Layer 4: 10.0 Layer 5: 61.06	Steady-State & Transient
Vertical Anisotropy Ratio (K_h/K_v)	Layer 1: 1.0 Layer 2: 1.0 Layer 3: 1.0 Layer 4: 1.5 Layer 5: 19.5	Steady-State & Transient
Specific Storage (Ss) (1/ft)	Layers 1, 2, and 3: 3.5×10^{-6} Layers 4 and 5: 1.0×10^{-8}	Transient
Specific Yield (Sy)	Layer 1, 2, and 3: 0.2 Layer 4 and 5: 0.02	Transient
Head in Upgradient GHB (ft)	6.94	Steady-State
Recharge (ft/d)	1.8×10^{-4}	Steady-State
Drain Stage (ft, msl)	-4.7	Steady-State

	k at ~2'
40	Model
30.22	aquifer tests
80	HPT 12
80	HPT 13
25	HPT 14
40	HPT 15
49.20333	Average

-
-

APPENDIX F

PERMITTING

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Avoid Verbal Orders

TO: SI-E2/Deda Johansen **DATE: 07/29/2024**
FROM: SI-E3/Environmental Management Branch
SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 12950**

1. PROJECT INFORMATION

Project Title: Per- and Polyfluoroalkyl Substances (PFAS) Assessment and Mitigation

Project Lead: Megan Garcia, AECOM Technical Services, 407-488-7726

Project No.: 80KSC019D0010/80KSC021F009_KSC South (REV D)

Project Description:

07/23/2024 Update: Installation of temporary groundwater sampling locations utilizing a DPT rig to a total depth of 60 feet. Locations are marked with a blue box on the figure. This is part of the per- and polyfluoroalkyl substances assessment project.

10/03/2023 Update: Site investigation involving the installation of 10 groundwater monitoring wells to a total depth of 23 feet and 3 soil borings to a total depth of 60 feet utilizing a Sonic Drill Rig. An additional 12 injection wells and 2 piezometer wells will be installed to a total depth of 30 feet utilizing a Direct Push Technology (DPT) rig. Activities also include groundwater and soil sampling for the purpose of confirming the presence of per- and polyfluoroalkyl substances (PFAS). See attached figures that illustrate wells and sample locations. Select locations may require clearing vegetation for access. This project is also located near the South Repeater Building under REC 12477.

Original Project Description: Center-wide assessment involving direct-push technology (DPT) groundwater sampling to a depth of 45 ft below land surface (bls), soil cores to a depth of 80 ft bls, concrete sampling, soil sampling to a depth of 2 ft bls, and surface water sampling for the purpose of confirming existence of per- and polyflouroalkyl substances (PFAS) at previously identified locations of concern (LOCs). Monitor well installation will occur based on results of above sampling. Please see attached figure for sampling locations at the Area 3 Repeater Building/South Repeater Building site. Land clearing will occur at the locations outlined in red for additional future sampling.

EPR 21647 (10/02/2023) - Installation of 9 groundwater monitoring wells and 3 extraction wells to a total depth of 55 feet utilizing a sonic drill rig. Locations are marked with a blue box on the figure and will be marked with a stake in the field. Activities are part of the per- and polyfluoroalkyl substances (PFAS) assessment. Work is currently under REC 12477. Assessment for KSC North (SLF and VAB areas) was covered under REC 11596.

EPB Reviewer: LPH **Facility No.:** N6-1118/South Repeater Building; M6-0486/Base Support Building

2. NEPA DETERMINATIONS

- ☑ **a. Categorical Exclusions per 14 CFR Part 1216.304(d)**
- ☐ **b. Environmental Assessment (EA) Required**
- ☐ **c. Environmental Impact Statement (EIS) Required**
- ☐ **d. Existing FONSI or ROD**
- ☐ **e. Centerwide EIS**
- ☐ **f. AF Project on KSC/813**
- ☐ **g. NASA Project on CCAFS/813**

3. ENVIRONMENTAL REQUIREMENTS

a. Non-Permit Requirements ☑ **YES** ☐ **NO**

b. Permit Requirements ☑ **YES** ☐ **NO**

****************************ORIGINAL REC (11597) ISSUED 11/29/2021*******************************

**************REC 12024 UPDATED 11/02/2022 Expanded sampling area, new RPM and biological survey POC, added SWMUs #097 and #121, PRL #147 and #213, and well statement***********

*************REC UPDATED 09/20/2023 New DPT locations, additional biosurvey POC, revised concrete washout statement************

*****REC 12477 UPDATED 10/11/2023 Added M6-0486, changed project lead, added SWMU #014 and #116*****

*******REC 12517 UPDATED 07/29/2024 New DPT locations (EPR 22136), updated NEPA/CatEx POC**********

Avoid Verbal Orders

TO: SI-E2/Deda Johansen **DATE: 07/29/2024**
FROM: SI-E3/Environmental Management Branch
SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 12950**

2.a.1. CATEGORICAL EXCLUSION (CATEX): This project is categorically excluded (CATEX) from further NEPA review as defined in 14 CFR 1216.304(d)(2)(i) Routine maintenance, minor construction or rehabilitation, minor demolition, minor modification, minor repair, and continuing or altered operations at, or of, existing NASA or NASA-funded or -approved facilities and equipment, such as buildings, roads, grounds, utilities, communication systems, and ground support systems, such as space tracking and data systems. For additional information, please contact James Brooks of the NASA Environmental Management Branch (SI-E3, 321-867-9081).

3.a.1. SOLID WASTE MANAGEMENT UNIT (SWMU)/POTENTIAL RELEASE (PRL) SITE: The proposed project is within SWMU #121 and PRL #210, "South Repeater Building". This area is being investigated by the NASA Remediation Group under Remediation Project Manager (RPM) Deda Johansen (SI-E2, 867-5352) of the Environmental Assurance Branch. The sampling locations have been extended to now include areas in PRL #213 South Water Pump Station (RPM Chris Adkison, SI-E2, 321-427-6997). Contact the NASA RPMs for further guidance regarding handling of soil and/or groundwater at these locations.

All workers involved in subsurface/dewatering work must be notified (HAZCOM) of the potential for contamination present and it is recommended that an Industrial Hygienist be consulted for determination of required personal protective equipment (PPE). Handle potentially contaminated soils or groundwater in accordance with site work plan. Utilize PPE as required by Health and Safety Plan.

This project may also include work within the boundary of PRL #147 Citrus Grove Discharge Pumps (N-1) and SWMU #097 Agricultural Sheds (Sheds5 and 6). These sites have been deemed No Further Action sites and therefore this project may proceed as proposed.

10/11/2023 Update: The proposed assessment is also in SWMU #014 M&O Building, RPM Natasha Darre (867-6987) with a LUCIP for swale soil and groundwater It is also in SWMU #116 KSC Industrial Area (RPM Deda Johansen, 867-5352) with land use controls to prevent contact with or discharge of potentially contaminated groundwater.

3.a.2. HAZARDOUS/NON-HAZARDOUS WASTE: All hazardous and non-hazardous wastes generated during the interim measure must be properly containerized, stored, labeled, manifested, shipped, and disposed of in full regulatory compliance. Hazardous wastes generated by this activity must be manifested, shipped, and disposed of under either the remediation contractor's or NASA's Environmental Protection Agency (EPA) identification number. The contractor shall maintain copies of waste management records and manifests onsite and make them available for review by NASA upon request.

If wastes are managed, controlled and disposed of using the NASA EPA identification number, the KSC Waste Management requirements outlined in KNPR 8500.1 must be followed. A Process Waste Questionnaire (PWQ), KSC Form 26-551 along with any supporting documentation (MSDS, product formulation, lab analyses) must be submitted to the NEMCON Waste Management Office for each waste stream generated. That office will then generate a Technical Response Package (TRP) which will give direction on proper handling, storage, and disposal of the waste stream. Please contact NEMCON Waste Management Services at 867-8642 if assistance is required.

The remediation contractor is responsible for any spills, releases, or other environmental contamination that occurs as a result of the proposed activities. A KSC Pollution Incident Report (PIR) Form (KSC Form 21-555) must be completed and submitted to the NASA Environmental Assurance Branch within three (3) working days of the incident.

It is also requested that the remediation contractor remove all excess grout from around the DPT bore holes after it dries and dispose of it properly.

3.a.3. THREATENED AND ENDANGERED SPECIES: This project has the potential to affect protected and/or threatened and endangered species which may include the Florida Scrub-jay and gopher tortoise. Measures must be taken to minimize impacts to their habitat. A biological survey will be required to identify potential impacts prior to disturbances. Please contact Russ Lowers at 321-759-6022 or Aleena Hess at 440-413-9439 14 days prior to beginning work to schedule a biological survey.

Avoid Verbal Orders

TO: SI-E2/Deda Johansen **DATE: 07/29/2024**
FROM: SI-E3/Environmental Management Branch
SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 12950**

This project is in an area that could support Scrub-jay nesting and will also result in the clearing of areas that are identified as Scrub jay habitat. If clearing or sampling is to occur during the nesting season of March through June, a nesting survey will be required. No site clearing shall occur if nesting scrub-jays are present on-site or in the immediate project vicinity.

Any project elements that limit prescribed fire, and/or vegetation clearing that results in soil disturbance, shall require compensation for impacts to Scrub-jay habitat. Due to MINWR prescribed burning, no PVC well casings should be installed above ground in the area west of the road. Well casings should be metal and fire proof. Clearing of paths will not require mitigation if the work is limited to above-ground cutting, resulting in minimal soil disturbance.

3.a.4. CONCRETE WASHOUT: Water used to rinse out concrete trucks and other equipment used for concrete work must not be allowed to discharge to surface waters. Concrete washout water shall be diverted to a leakproof container for appropriate disposal. Contact Doug Durham (SI-E2, 867-8429) with any question on this requirement.

Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes. After drying/settling, the residue may be disposed of at the Diverted Aggregate Reclamation and Collection Yard (DARCY). Clean, unstained, unpainted concrete residue is accepted at the DARCY without any sampling and analysis. Contact Alexander Garcia (SI-E2, 867-8448) with any questions on this requirement.

3.a.5. WETLANDS AND SURFACE WATER PROTECTION: Best management practices (BMPs) are to be implemented during the proposed survey line clearing activity. Care must be taken to avoid disturbance to wetlands or surface waters known to be on site. BMPs shall ensure no rutting, filling or other disturbances to the soils, or discharge of fill/sediments into surface waters. Wetland stabilization mats must be used as necessary to prevent rutting of the soil. When the work is complete, the wetlands shall retain similar function and value as before the survey line clearing. Every effort should be made to perform work in wetland areas during dry periods. If BMPs are not sufficient to eliminate permanent impacts to wetlands and/or surface waters, permits will be required.

3.b.1. EXCAVATION PERMIT: A KSC Excavation Permit will be required for any digging proposed by this project. Please contact the Utility Locate/Excavation Permit Request Customer Helpline at 867-2406 or go to website at http://epr.ksc.nasa.gov/Home/ for an underground utility scan and dig permit. NOTE: If a trench or pit is to be left open all day or overnight, the trench/pit must be checked for trapped animals at the beginning and end of each work shift. If an animal is observed trapped, contact Russ Lowers (NEM-022, 321-759-6022) or the Duty Office (861-5050, email KSC-BOSS-DutyOffice@mail.nasa.gov) to arrange removal/release. Do not handle the animal(s).

If any archaeological material (e.g., artifacts and/or cultural features or human remains) is found, work must stop immediately, and the discovery reported to the KSC Cultural Resources Manager (CRM). For questions or to report a discovery, contact Katherine Zeringue (SI-E3) at 867-8454.

3.b.2. ENVIRONMENTAL RESOURCE PERMIT (ERP): Wetland permits from the St. Johns River Water Management District (SJRWMD) or Florida Department of Environmental Protection (FDEP) may be required for the proposed activity if permanent impacts to wetlands occur. The project proponent shall prepare all permit applications and pay any application fees. Application forms with supporting material such as maps and engineering drawings must be submitted to the EMB (Jeff Collins, SI-E3, 861-6554) for review and NASA signature. No work can be performed until the permit process is completed.

3.b.3. WATER WELL: Installation or abandonment of a water well requires use of a licensed contractor, a KSC dig permit, and registration of the well with St. Johns River Water Management District (SJRWMD). Dependent on water use, wells may require a Florida Department of Health (FDOH) operating permit. Contact Doug Durham (SI-E2, 867-8429) for details.

Avoid Verbal Orders

TO: SI-E2/Deda Johansen **DATE: 07/29/2024**
FROM: SI-E3/Environmental Management Branch
SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 12950**

No other environmental issues were identified based upon the information provided in the KSC Environmental Checklist. This Record of Environmental Consideration (REC) does not relinquish the project lead from obtaining and complying with any other internal NASA permits or directives necessary to ensure all organizations potentially impacted by this project are notified and concur with the proposed project.

Due to potential changes in regulations, permit requirements and environmental conditions, statements in this REC are valid for 6 months, and subject to review after this period. It is the responsibility of the project lead to submit current project information for a REC update prior to project commencement if REC is older than 6 months; and also to notify the Environmental Management Branch (SI-E3) if the scope of the project changes at any time after the REC is issued.

D. Johansen/SI-E2
cc:
J. Gootee/AECOM
C. Bekins/AECOM
M. Garcia/AECOM
J. Collins/SI-E3
R. Lowers/NEM-022
A. Hess/NEM-022
B. Follett/AECOM

4. Upon evaluation of the subject project, the above determinations have been made and identified. Contact the Environmental Management Branch (SI-E3) at 867-9081 for re-evaluation should there be any modifications to the scope of work.

07/29/2024 14:55

James Brooks **Date**

Avoid Verbal Orders

TO: SI-E2/Deda Johansen **DATE: 10/03/2024**
FROM: SI-E3/Environmental Management Branch
SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 13039**

1. PROJECT INFORMATION

Project Title: Per- and Polyfluoroalkyl Substances (PFAS) Assessment and Mitigation

Project Lead: Megan Garcia, AECOM Technical Services, 407-488-7726

Project No.: 80KSC019D0010/80KSC021F009_KSC South (REV E)_10-1

Project Description:

10/1/24 Update: Site-wide work to aid in the design and installation of a remediation groundwater treatment system within the vicinity of the South Repeater Building (N6-1118). Activities include land clearing; sonic drilling activities for monitoring well and extraction well installation; trenching to install underground piping and placement of groundwater remediation system equipment, including electrical connections. See attached Drawing C-1 for new concrete pad, new building construction, and transformer installation locations. Trenching locations are provided in Drawing C-4. Activities also include groundwater and soil sampling for the purpose of confirming the presence of per- and polyfluoroalkyl substances (PFAS). See attached figures that illustrate wells and sample locations. Select locations may require clearing vegetation for access.

07/23/2024 Update: Installation of temporary groundwater sampling locations utilizing a DPT rig to a total depth of 60 feet. Locations are marked with a blue box on the figure. This is part of the per- and polyfluoroalkyl substances assessment project.

10/03/2023 Update: Site investigation involving the installation of 10 groundwater monitoring wells to a total depth of 23 feet and 3 soil borings to a total depth of 60 feet utilizing a Sonic Drill Rig. An additional 12 injection wells and 2 piezometer wells will be installed to a total depth of 30 feet utilizing a Direct Push Technology (DPT) rig. Activities also include groundwater and soil sampling for the purpose of confirming the presence of per- and polyfluoroalkyl substances (PFAS). See attached figures that illustrate wells and sample locations. Select locations may require clearing vegetation for access. This project is also located near the South Repeater Building under REC 12477.

Original Project Description: Center-wide assessment involving direct-push technology (DPT) groundwater sampling to a depth of 45 ft below land surface (bls), soil cores to a depth of 80 ft bls, concrete sampling, soil sampling to a depth of 2 ft bls, and surface water sampling for the purpose of confirming existence of per- and polyflouroalkyl substances (PFAS) at previously identified locations of concern (LOCs). Monitor well installation will occur based on results of above sampling. Please see attached figure for sampling locations at the Area 3 Repeater Building/South Repeater Building site. Land clearing will occur at the locations outlined in red for additional future sampling.

EPR 21647 (10/02/2023) - Installation of 9 groundwater monitoring wells and 3 extraction wells to a total depth of 55 feet utilizing a sonic drill rig. Locations are marked with a blue box on the figure and will be marked with a stake in the field. Activities are part of the per- and polyfluoroalkyl substances (PFAS) assessment. Work is currently under REC 12477. Assessment for KSC North (SLF and VAB areas) was covered under REC 11596.

EPB Reviewer: LPH **Facility No.:** N6-1118/South Repeater Building; M6-0486/Base Support Building

2. NEPA DETERMINATIONS

- ☑ **a. Categorical Exclusions per 14 CFR Part 1216.304(d)**
- ☐ **b. Environmental Assessment (EA) Required**
- ☐ **c. Environmental Impact Statement (EIS) Required**
- ☐ **d. Existing FONSI or ROD**
- ☐ **e. Centerwide EIS**
- ☐ **f. AF Project on KSC/813**
- ☐ **g. NASA Project on CCAFS/813**

3. ENVIRONMENTAL REQUIREMENTS

a. Non-Permit Requirements	☑ **YES**	☐ **NO**
b. Permit Requirements	☑ **YES**	☐ **NO**

Avoid Verbal Orders

TO: SI-E2/Deda Johansen **DATE: 10/03/2024**

FROM: SI-E3/Environmental Management Branch

SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 13039**

**************************ORIGINAL REC (11597) ISSUED 11/29/2021*****************************

**************REC 12024 UPDATED 11/02/2022 Expanded sampling area, new RPM and biological survey POC, added SWMUs #097 and #121, PRL #147 and #213, and well statement***********

*************REC UPDATED 09/20/2023 New DPT locations, additional biosurvey POC, revised concrete washout statement************

***********REC 12477 UPDATED 10/11/2023 Added M6-0486, changed project lead, added SWMU #014 and #116***************

************REC 12517 UPDATED 07/29/2024 New DPT locations (EPR 22136), updated NEPA/CatEx POC************

**********REC 12950 UPDATED 10/3/2025 Additional scope of work (see project description), added paint, erosion control, NPDES, SPCC, generator, exterior lighting, and stormwater permitting statements******************

2.a.1. CATEGORICAL EXCLUSION (CATEX): This project is categorically excluded (CATEX) from further NEPA review as defined in 14 CFR 1216.304(d)(2)(i) Routine maintenance, minor construction or rehabilitation, minor demolition, minor modification, minor repair, and continuing or altered operations at, or of, existing NASA or NASA-funded or -approved facilities and equipment, such as buildings, roads, grounds, utilities, communication systems, and ground support systems, such as space tracking and data systems. For additional information, please contact James Brooks of the NASA Environmental Management Branch (SI-E3, 321-867-9081).

3.a.1. SOLID WASTE MANAGEMENT UNIT (SWMU)/POTENTIAL RELEASE (PRL) SITE: The proposed project is within SWMU #121 and PRL #210, "South Repeater Building". This area is being investigated by the NASA Remediation Group under Remediation Project Manager (RPM) Deda Johansen (SI-E2, 867-5352) of the Environmental Assurance Branch. The sampling locations have been extended to now include areas in PRL #213 South Water Pump Station (RPM Chris Adkison, SI-E2, 321-427-6997). Contact the NASA RPMs for further guidance regarding handling of soil and/or groundwater at these locations.

All workers involved in subsurface/dewatering work must be notified (HAZCOM) of the potential for contamination present and it is recommended that an Industrial Hygienist be consulted for determination of required personal protective equipment (PPE). Handle potentially contaminated soils or groundwater in accordance with site work plan. Utilize PPE as required by Health and Safety Plan.

This project may also include work within the boundary of PRL #147 Citrus Grove Discharge Pumps (N-1) and SWMU #097 Agricultural Sheds (Sheds5 and 6). These sites have been deemed No Further Action sites and therefore this project may proceed as proposed.

10/11/2023 Update: The proposed assessment is also in SWMU #014 M&O Building, RPM Natasha Darre (867-6987) with a LUCIP for swale soil and groundwater It is also in SWMU #116 KSC Industrial Area (RPM Deda Johansen, 867-5352) with land use controls to prevent contact with or discharge of potentially contaminated groundwater.

3.a.2. HAZARDOUS/NON-HAZARDOUS WASTE: All hazardous and non-hazardous wastes generated during the interim measure must be properly containerized, stored, labeled, manifested, shipped, and disposed of in full regulatory compliance. Hazardous wastes generated by this activity must be manifested, shipped, and disposed of under either the remediation contractor's or NASA's Environmental Protection Agency (EPA) identification number. The contractor shall maintain copies of waste management records and manifests onsite and make them available for review by NASA upon request.

If wastes are managed, controlled and disposed of using the NASA EPA identification number, the KSC Waste Management requirements outlined in KNPR 8500.1 must be followed. A Process Waste Questionnaire (PWQ), KSC Form 26-551 along with any supporting documentation (MSDS, product formulation, lab analyses) must be submitted to the NEMCON Waste Management Office for each waste stream generated. That office will then generate a Technical Response Package (TRP) which will give direction on proper handling, storage, and disposal of the waste stream. Please contact NEMCON Waste Management Services at 867-8642 if assistance is required.
The remediation contractor is responsible for any spills, releases, or other environmental contamination that occurs as a result of the proposed activities. A KSC Pollution Incident Report (PIR) Form (KSC Form 21-555) must be completed and submitted to the NASA Environmental Assurance Branch within three (3) working days of the incident.

It is also requested that the remediation contractor remove all excess grout from around the DPT bore holes after it dries and dispose of it properly.

3.a.3. THREATENED AND ENDANGERED SPECIES: This project has the potential to affect protected and/or threatened and endangered species which may include the Florida Scrub-jay and gopher tortoise. Measures must be taken to minimize impacts to their habitat. A biological survey will be required to identify potential impacts prior to disturbances. Please contact Russ Lowers at 321-759-6022 or Aleena Hess at 440-413-9439 14 days prior to beginning work to schedule a biological survey.

This project is in an area that could support Scrub-jay nesting and will also result in the clearing of areas that are identified as Scrub jay habitat. If clearing or sampling is to occur during the nesting season of March through June, a nesting survey will be required. No site clearing shall occur if nesting scrub-jays are present on-site or in the immediate project vicinity.

Any project elements that limit prescribed fire, and/or vegetation clearing that results in soil disturbance, shall require compensation for impacts to Scrub-jay habitat. Due to MINWR prescribed burning, no PVC well casings should be installed above ground in the area west of the road. Well casings should be metal and fire proof. Clearing of paths will not require mitigation if the work is limited to above-ground cutting, resulting in minimal soil disturbance.

3.a.4. CONCRETE WASHOUT: Water used to rinse out concrete trucks and other equipment used for concrete work must not be allowed to discharge to surface waters. Concrete washout water shall be diverted to a leakproof container for appropriate disposal. Contact Doug Durham (SI-E2, 867-8429) with any question on this requirement.

Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes. After drying/settling, the residue may be disposed of at the Diverted Aggregate Reclamation and Collection Yard (DARCY). Clean, unstained, unpainted concrete residue is accepted at the DARCY without any sampling and analysis. Contact Alexander Garcia (SI-E2, 867-8448) with any questions on this requirement.

3.a.5. WETLANDS AND SURFACE WATER PROTECTION: Best management practices (BMPs) are to be implemented during the proposed survey line clearing activity. Care must be taken to avoid disturbance to wetlands or surface waters known to be on site. BMPs shall ensure no rutting, filling or other disturbances to the soils, or discharge of fill/sediments into surface waters. Wetland stabilization mats must be used as necessary to prevent rutting of the soil. When the work is complete, the wetlands shall retain similar function and value as before the survey line clearing. Every effort should be made to perform work in wetland areas during dry periods. If BMPs are not sufficient to eliminate permanent impacts to wetlands and/or surface waters, permits will be required.

3.a.6. HAZARDOUS AND CONTROLLED WASTE (PAINT): This project will involve the application of paint coatings. All practical precautions must be taken to eliminate the possibility of a release of material or waste (primers/paints) into the environment from the paint surface preparation and painting operation. Paint chips, rust, debris, blast media, wastewater, etc. generated during preparation of surfaces will be contained and disposed of according to waste management guidelines given in Item 3.a.2. Please contact NEMCON Waste Management Services at 867-8642 for assistance. There are special handling and waste management requirements for inorganic zinc (IOZ) coatings. When placed in a sealed container, IOZ paint can produce hydrogen and other gases from chemical reactions that occur during the curing process. The gas production builds pressure in the container and can cause the container to bulge and/or rupture thus creating a safety hazard. To meet environmental requirements and mitigate safety concerns, users of IOZ paint must physically separate IOZ paint related waste streams from other waste streams at the job site and manage their IOZ paint related waste streams according to the three categories below:

1) Leftover or unusable IOZ paint

Leftover or unusable IOZ paint must be stored in the original product containers supplied by the manufacturer with a loosely secured lid. Original product containers must then be placed into a larger closed drum or container that meets hazardous waste storage requirements and prevents any possible release to the environment. The larger closed drum or container must have a 5 psi pressure relief vent to avoid potential safety hazards. Cleaning solvents may NOT be placed into these containers.

2) Spent cleaning solvents

Waste cleaning solvent containers must have 5 psi pressure relief vents to avoid potential safety hazards

3) Solids from IOZ paint mixing and painting operations

Includes rags, brushes, rollers, empty cans, empty buckets, liners, stirring sticks, personal protective equipment, masking paper/tape, and any other waste materials that have contacted IOZ paint - Solid waste containers must have 5 psi pressure relief vents to avoid potential safety hazards - Empty paint cans and buckets can be disposed as unregulated waste provided that all paint is wiped out of them. The spent rags/wipes used to wipe paint out of the cans or buckets shall be managed as waste under this category. Contractors are responsible for contacting the KSC Waste Management Office (867-8642) to arrange pickups of leftover/unusable paints, and to remove solvent or regulated paint waste when the containers are full. Contact Al Gibson (SI-E2, 861-0863) if you have any questions.

3.a.7. SPILL PREVENTION, CONTROL, AND COUNTERMEASURES (SPCC) PLAN: The Kennedy Space Center SPCC Plan documents the procedures for the prevention, response, control, and reporting of spills of oil at KSC. This plan serves as a guide for KSC personnel and organizations to ensure that all measures are taken to prevent and contain spills and leaks of oil in accordance with all applicable state and federal regulations. An SPCC Site Specific Plan may need to be developed if a new tank is installed. Oil storage includes all containers (including assets prior to turnover to the government) with the exception of motive power containers, which are equal to or greater than 55 gallons. Petroleum tanks associated with generators and having a capacity greater than or equal to 55 gallons must also meet SPCC regulatory requirements. The plan must be reviewed and signed/sealed by a P.E. For additional clarification of the SPCC rules, contact Jeff Bobersky (SI-E2, 861-6035). FOR TRANSFORMER REPLACEMENT: ct Jeff Bobersky (SI-E2, 861-6035).

3.a.8. EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPs): Precautions must be made to eliminate or reduce to the greatest extent possible any discharge of sediments outside established project boundaries. This can be accomplished by initiating proactive erosion control BMPs. Installation and maintenance of appropriate erosion/sediment control devices (such as wattles, turbidity screens, silt fences, inlet protectors, floating turbidity booms, etc.) must be completed prior to initial land disturbance where the possibility of sediment discharge could impact surrounding stormwater conveyances and other surface waters. The BMPs must be maintained so they remain functional until such time that the newly exposed soils are stabilized with sod or natural vegetation.

3.a.9. EXTERIOR LIGHTING: The installation/modification and use of any lighting that is visible from the exterior of a facility or structure must be in compliance with the requirements in the KSC Lighting Operations Plan (KSC-PLN-1210, Rev. A) and requirements of the US Fish and Wildlife Service Biological Opinion for KSC regarding dark skies and artificial lighting. Submit the manufacturers cut sheet data and spectral power distribution graphs for the actual lighting to be installed for review by the NASA Environmental Management Branch (EMB). Safety and hazardous operations can apply for a waiver to allow for use of non-compliant lighting; however, justification must be provided to the EMB. Development of a lighting operations manual (LOM) that meets these criteria is required for all new structures or facilities. Please contact Jeff Collins (SI-E3, 861-6554) for additional information, and for guidance on development of a LOM or for a copy of the referenced documents.

3.b.1. EXCAVATION PERMIT: A KSC Excavation Permit will be required for any digging proposed by this project. Please contact the Utility Locate/Excavation Permit Request Customer Helpline at 867-2406 or go to website at http://epr.ksc.nasa.gov/Home/ for an underground utility scan and dig permit. NOTE: If a trench or pit is to be left open all day or overnight, the trench/pit must be checked for trapped animals at the beginning and end of each work shift. If an animal is observed trapped, contact Russ Lowers (NEM-022, 321-759-6022) or the Duty Office (861-5050, email KSC-BOSS-DutyOffice@mail.nasa.gov) to arrange removal/release. Do not handle the animal(s).

If any archaeological material (e.g., artifacts and/or cultural features or human remains) is found, work must stop immediately, and the discovery reported to the KSC Cultural Resources Manager (CRM). For questions or to report a discovery, contact Katherine Zeringue (SI-E3) at 867-8454.

3.b.2. ENVIRONMENTAL RESOURCE PERMIT (ERP): Wetland permits from the St. Johns River Water Management District (SJRWMD) or Florida Department of Environmental Protection (FDEP) may be required for the proposed activity if permanent impacts to wetlands occur. The project proponent shall prepare all permit applications and pay any application fees. Application forms with supporting material such as maps and engineering drawings must be submitted to the EMB (Jeff Collins, SI-E3, 861-6554) for review and NASA signature. No work can be performed until the permit process is completed.

3.b.3. WATER WELL: Installation or abandonment of a water well requires use of a licensed contractor, a KSC dig permit, and registration of the well with St. Johns River Water Management District (SJRWMD). Dependent on water use, wells may require a Florida Department of Health (FDOH) operating permit. Contact Doug Durham (SI-E2, 867-8429) for details.

3.b.4. FDEP NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) CONSTRUCTION ACTIVITY PERMIT: This project may require an NPDES Phase II construction permit. If 1 acre or more of land will be disturbed, a NPDES Construction Activity Permit from the Florida Department of Environmental Protection (FDEP) is required under F.A.C. 62-621.300(4), Notice of Intent to Use Generic Permit for Stormwater Discharge from Large (If over 5 Acres) and Small (1 Acre To 5 Acres) Construction Activities http://www.dep.state.fl.us/water/stormwater/npdes/forms/cgp_noi.pdf. This includes construction activity which will disturb less than one acre of land area that is part of a larger common plan of development that will ultimately disturb equal to or greater than one acre of land. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site. A condition of this permit is to provide a Stormwater Pollution Prevention Plan (SWPPP) detailing erosion and turbidity controls for the site. Information on completing the permit application and development of the SWPPP can be obtained by contacting Doug Durham (SI-E2, 867-8429).

3.b.5. ENVIRONMENTAL RESOURCE PERMIT (ERP) -STORMWATER: An ERP stormwater permit may be required for changes (increase or decrease) in ground cover, stormwater flow patterns, or impervious area. Application forms with supporting material including maps and engineering drawings must be submitted to the Environmental Assurance Branch (Doug Durham,SI-E2, 867-8429) by the 90% Design Review phase for review and NASA signatures. It is the responsibility of the project proponent to submit the application to the regulatory agencies and pay the application fee. No work can be performed until the permit process is completed. Please contact Doug Durham for more information.

Avoid Verbal Orders

TO: SI-E2/Deda Johansen **DATE: 10/03/2024**
FROM: SI-E3/Environmental Management Branch
SUBJECT: KSC Record of Environmental Consideration (REC) **REC #: 13039**

3.b.6. TRANSFORMERS/GENERATORS: The temporary operation of portable generators during construction is allowed and is not considered a stationary source of air emissions. New generators proposed for permanent use at the facility, and associated air emissions must be reviewed for determination of construction permit and RICE (Reciprocating Internal Combustion Engine) NESHAP (National Emission Standards for Hazardous Air Pollutants) requirements. If a new transformer or generator with a maximum capacity of fuel/oil equal to or greater than 55 gallons is to be installed, it is also subject to SPCC rules. Please contact Zach Hall (SI-E2, 867-5178) for more information.

No other environmental issues were identified based upon the information provided in the KSC Environmental Checklist. This Record of Environmental Consideration (REC) does not relinquish the project lead from obtaining and complying with any other internal NASA permits or directives necessary to ensure all organizations potentially impacted by this project are notified and concur with the proposed project.

Due to potential changes in regulations, permit requirements and environmental conditions, statements in this REC are valid for 6 months, and subject to review after this period. It is the responsibility of the project lead to submit current project information for a REC update prior to project commencement if REC is older than 6 months; and also to notify the Environmental Management Branch (SI-E3) if the scope of the project changes at any time after the REC is issued.

D. Johansen/SI-E2
cc:
C. Bekins/AECOM
M. Garcia/AECOM
J. Collins/SI-E3
R. Lowers/NEM-022
B. Follett/AECOM
A. Hess/NEM-022
D. Durham/SI-E2

4. Upon evaluation of the subject project, the above determinations have been made and identified. Contact the Environmental Management Branch (SI-E3) at 867-9081 for re-evaluation should there be any modifications to the scope of work.

Jeffrey R. Collins

10/03/2024 15:03

Jeffrey Collins **Date**

APPENDIX G

MAINTENANCE OF TRAFFIC

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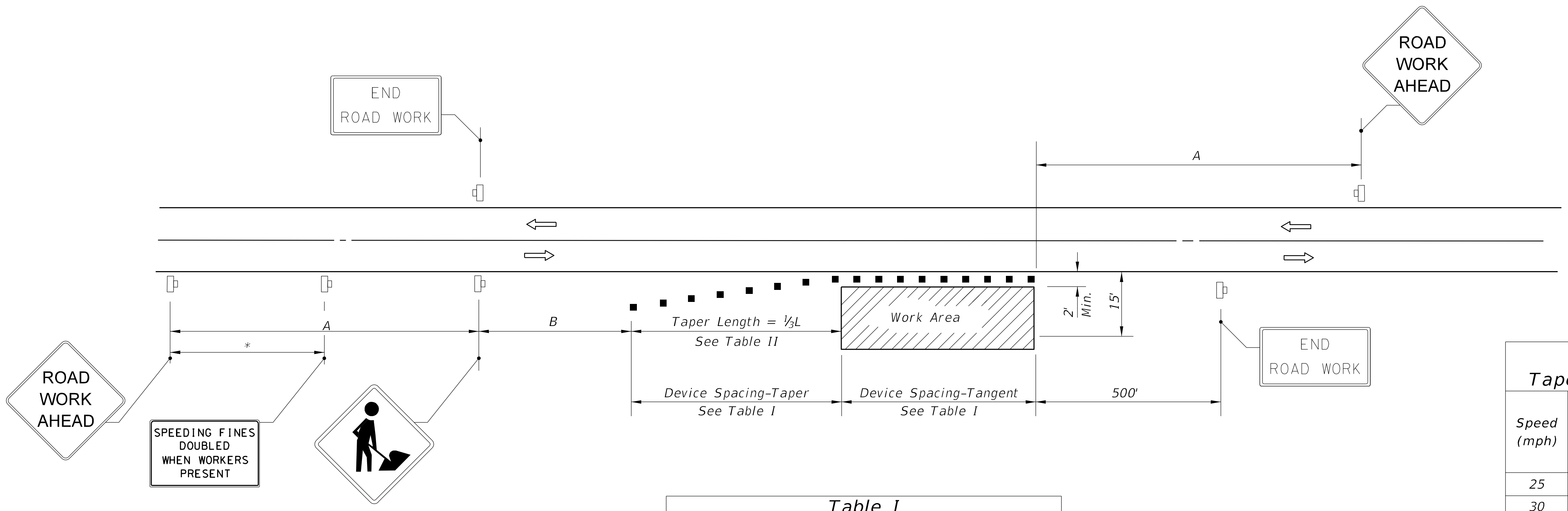

Table I
Device Spacing

Speed (mph)	Max. Distance Between Devices (ft.)			
	Cones or Tubular Markers		Type I or Type II Barricades or Vertical Panels or Drums	
	Taper	Tangent	Taper	Tangent
25	25	50	25	50
30 to 45	25	50	30	50
50 to 70	25	50	50	100

Table II
Taper Length - Shoulder

Speed (mph)	1/3L (ft) 8' Shldr.	10' Shldr.	12' Shldr.	Notes
25	28	35	42	$L=\frac{WS^2}{60}$
30	40	50	60	
35	55	68	82	
40	72	90	107	
45	120	150	180	L=WS
50	133	167	200	
55	147	183	220	
60	160	200	240	
65	173	217	260	
70	187	233	280	

8' minimum shoulder width

1/3L = Length of shoulder taper in feet

W = Width of total shoulder in feet (combined paved and unpaved width)

S = Posted speed limit (mph)

DISTANCE BETWEEN SIGNS

Speed	Spacing (ft.) A	B
40 mph or less	200	200
45 mph	350	350
50 mph or greater	500	500

*Midway between signs.

SYMBOLS

Work Area

Channelizing Device (See Index 102-600)

Work Zone Sign

Lane Identification + Direction of Traffic

GENERAL NOTES

1. When four or more work vehicles enter the through traffic lanes in a one hour period or less (excluding establishing and terminating the work area), the advanced FLAGGER sign shall be substituted for the WORKERS sign. For location of flaggers and FLAGGER signs, see Index 102-603.
2. SHOULDER WORK sign may be used as an alternate to the WORKER symbol sign only on the side where the shoulder work is being performed.
3. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed in accordance with other applicable TCZ Indexes.
4. For general TCZ requirements and additional information, refer to Index 102-600.

DURATION NOTES

1. Signs and channelizing devices may be omitted if all of the following conditions are met:
   a. Work operations are 60 minutes or less.
   b. Vehicles in the work area have high-intensity, rotating, flashing, oscillating, or strobe lights operating.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA CLOSER THAN 15' BUT NOT CLOSER THAN 2' TO THE EDGE OF TRAVEL WAY.

Kennedy NASA Procedural Requirements

Effective Date: **September 14, 2020**

Expiration Date: **September 14, 2025**

Responsible Office: **Safety and Mission Assurance**

KSC Construction Contractor Safety and Health Practices Procedural Requirements

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National Aeronautics and Space Administration

John F. Kennedy Space Center

Change Log

Date	Revision	Description
11/24/09	Basic	The primary purpose of this document is to make available to NASA/KSC construction contractors requirements regarding Safety, Health, and Fire Prevention including project Safety and Health Plans, workplace safety compliance to 29 CFR 1926 (Safety and Health Regulations for the Construction Industry) and 29 CFR 1910 (Safety and Health Regulations for General Industry), National Consensus Standards, and NASA/KSC Safety Program and Policies. Some of the requirements presented herein are repeated in this KNPR for convenience and appear in other requirements documents. Revisions of this KNPR will reflect changes to these requirements in other documents.
8/12/10	A	The primary goals for Revision A are to: a. Address comments requesting additional clarification on some of the requirements from the Basic revision of the document (changed throughout document). b. Ensure the information contained in this document, KNPR 8715.3, and KSC-UG-2814 (KSC Construction Contractor Safety and Health Practices User Guide) correspond with each other (changed throughout document). c. Made grammatical changes/corrections, updated formatting and numbering of some sections and forms, and corrected / inserted hyperlinks throughout. Where content was not changed, this process was not noted in this Revision History (changed throughout document). Section P.1 Purpose: Clarified purpose by removing summary of safety information and provided for reference purposes only. Performed re-write of paragraph “b” and clarified paragraph “c”. Section P.4 Applicable Documents: Added: I. KNPR 8500.1, KSC Environmental Requirements; m. KNPR 8715.2, Comprehensive Emergency Management Plan (CEMP); updated r. IEEE C2 National Electrical Safety Code Section 1.3 Responsibilities: Added paragraph “b & c” identifying the expectations of KSC contractor employees to comply with KSC safety and health policies / requirements / procedures, and to perform all work in a safe and healthful manner. Section 2.1.e. NOTE: Changed supervisor to contractor’s authorized representative.

		Section 2.2 Contractor Employee Training: Clarified information to allow updates without having go through the full plan update approval process. Section 2.3 Accident / Incident (Mishap / Close Call) Reporting: added new paragraph "b" about having means to initiate emergency notification; updated paragraph "e" to change property damage amount to $500,000; added two notes after paragraph "j" clarifying investigation authority for mishaps; added new paragraph "k" identifying contractor responsibility to cooperate with any Government mishap / close call investigation. Section 2.4.2 Wind Policy: Established method for an Alternate Wind Advisory Plan. Section 2.6 Construction Site Safety: Updated paragraph "i and j" clarifying use of cell phones and texting devices on work sites. Section 2.8 Drinking Water: Clarified requirements. Section 2.10 First Aid and Medical: Removed requirement to comply with physician direction. Not an enforceable item per contract. Section 2.11 Hazard Communications: Modified paragraph "a" to remove redundant information with paragraph "b". Section 2.16 Job Hazard Analysis (JHA): Added NOTE covering review and updating process for JHAs. Section 3.1 Confined Space Entry: Modified paragraph "b" to add information on electrical power systems in enclosed spaces. Section 3.2 Cranes and Lifting Operations: Paragraph "a" added 29 CFR 1926 (OSHA) requirements; paragraph "w" added Reference to UG-2814 and KSC Form 50-101 for lift planning; paragraph "x" added refer to 29 CFR 1926.550(g) for requirements; added NOTE to reference OSHA regulations and requirements for hoisting of personnel by crane; paragraph "y(2) added reference to FAA Advisory Circular AC 70/7460-1K. Section 3.3.6 Additional Demolition Requirements: Added paragraph "d" requirement for Florida Department of Environmental Protection (FDEP) a "Notice of Asbestos Renovation and Demolition Form" [DEP Form 62-257.900(1)]. Section 3.5 Electrical Safety: Reorganized sections to better clarify requirements; added new 3.5.1 Electrical JHAs; added new note after paragraph "c(3)" systems de-energized by personnel

		other than from the contractor; updated 3.5.1.d. Elements (of JHA) to add as applicable to paragraph "(9) and (10)"; updated 3.5.4b to include employees crossing the NFPA 70E prohibited approach boundary; updated paragraph "d" to clarify exceptions for energized work; 3.5.5.1a added in close proximity to the work. Section 3.11.1 Asbestos Containing Material (ACM): Added NOTE after 3.11.1e.(2) to clarify that the information provided are estimated values and provided for operations and maintenance (O&M) planning purposes only; added NOTE after 3.11.2a. to clarify requirement for toxic metals plan; Section 3.12: Changed section title to Hearing Loss Prevention and Hazardous Noise. Section 3.14 Industrial Hygiene: Removed paragraph for written procedures. Actions needed are covered in JHAs. Section 3.20.2 Respirator Selection and Exposure Monitoring: updated section title; updated paragraph "a" and added "b" to clarify exposure pre-assessment and monitoring. Section 3.22 Scaffolding: Added new paragraph "a" to reference requirements of Subpart L of 29 CFR 1926. Section 3.24.1 General Requirements for Elevating Work Platforms (EWP): Updated paragraph "g" and added "h" to correspond with the fall protection requirements of KNPR 8715.3. Section 3.24.3 Work Practices: Clarified section on requirements for fall protection when moving from or to an aerial work platform. Appendix A Definitions: Added numbering; clarified definitions for Hazardous Chemical or Material and Hazardous Operation/Work Activity. Appendix B Acronyms: Added PAWS (Pager and Area Warning System) and TAWS (Tornado Area Warning System).
12/7/11	A-1	An Interim Change Policy was signed by the Safety and Mission Assurance Director on December 7, 2011. The Interim Policy provides a change to Section 2.16, which required that all Job Hazard Analyses (JHAs) be provided to the project contracting officer for review and acceptance as appendices to the Site-Specific Safety and Health Plan. This change rescinds this requirement and instead places the JHA development, content review, and approval responsibility on the employer and jobsite controlling authority.
7/28/15	A-2	This document has been administratively changed to extend expiration date pending review and rewrite. A Change Log was added to capture all changes.
10/6/15	A-3	Additional extension to allow for Center-wide review and finalization of the document.

12/17/15	A-4	Extension processed due to extensive rewrite, internal S&MA reorganization, and key personnel shifts. Revised KNPR will need coordination with Engineering and Spaceport Integration and Services.
4/14/16	A-5	Due to a SA realignment and a change in management, there has been a refocus to rewrite this KNPR. This document is going through a major overhaul and requirements scrub. Also, in an effort to reduce our document footprint we intend to incorporate KSC-UG-2814, KSC Construction Contractor Safety and Health Practices User Guide into the KNPR 8715.7 rewrite. Once a draft is completed there are several review/comment cycles prior to finalizing.
08/29/2016	B	Kennedy NASA Procedural Requirements (KNPR) 8715.7 went through a major rewrite. Improvements include: KSC-UG-2814 was incorporated into the rewrite, KSC forms and permits have been updated. KSC-UG-2814 will be retired. Construction contractors must comply with the Occupational Safety and Health Administration (OSHA) 29 CFR 1926, therefore specific OSHA 1926 requirements has been removed. The Lifting section has been aligned with the NASA Lifting Standard.
9/14/2020	C	Kennedy NASA Procedural Requirements (KNPR) 8715.7 went through a major rewrite. Improvements include; adding clarifying language, revisions, and requirements to several sections within the KNPR, KSC Forms and Permits have been updated. Hyperlinks have also been updated. The requirements set forth by the NASA Lifting Standard were identified as too restrictive on construction contractors and several requirements were removed or altered.

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PREFACE

P.1 Purpose

a. The safety and health of all persons involved in any type of work at the National Aeronautics and Space Administration's (NASA) John F. Kennedy Space Center (KSC) is paramount. Safety is the freedom from conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or harm to the environment. NASA's safety priority is to protect the public, NASA workforce, high-value equipment and property, and the environment.

b. This document establishes safety and health procedural requirements that serve as a framework to define the parameters for performing construction work at KSC in a safe and healthful manner. It is a living document subject to change. It should be emphasized, however, that all contractor employees have the responsibility to ensure their safety and that of others who may be impacted by their actions.

c. This document is a compilation of safety information, requirements, and regulations that NASA construction contractors shall follow when conducting work on NASA property located on KSC and Cape Canaveral Air Force Station (CCAFS). Information and requirements identified within are not intended to cover all the safety requirements of the Occupational Safety and Health Administration (OSHA) and other consensus standards and regulations. The references to OSHA herein have been provided for convenience and do not constitute a complete list of all applicable OSHA regulations. This KNPR does not relieve contractors of their obligations under OSHA regulations or any other applicable local, State, or Federal laws and regulations.

P.2 Applicability

a. This Kennedy NASA Procedural Requirements (KNPR) document is applicable to NASA KSC Civil Servants and to NASA KSC contractors (including subcontractors, service providers, and construction contractors) as specified in their contracts.

b. In this directive, mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended, but not required, "will" denotes expected outcome, and "are/is" denotes descriptive material.

c. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

P.3 Authority

a. 29 CFR Part 1910, Occupational Safety and Health Standards for General Industry

b. 29 CFR Part 1926, Occupational Safety and Health Standards for Construction Industry

c. KNPD 8700.1, Safety and Mission Assurance Policy Directive

P.4 Applicable Documents and Forms

a. NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping

b. KNPR 1600.1, KSC SECURITY PROCEDURAL REQUIREMENTS

c. KNPR 1860.1, KSC Ionizing Radiation Protection Program

d. KNPR 1860.2, KSC Non-Ionizing Radiation Protection Program

e. KNPR 8500.1, KSC Environmental Requirements

f. KNPR 8715.3-1, KSC Safety Procedural Requirements, Volume 1: Safety Procedural Requirements for Civil Servants/NASA Contractors

g. NASA-STD-8719.11, Safety Standard for Fire Protection

h. KSC-STD-S-0033, KSC Fall Protection Standard

i. KSC-STD-Z-0008C, Standard for Design of Ground Life Support Systems and Equipment

j. KDP-F-3645, NASA Direct Construction Contractor Mishap Report

k. KDP-KSC-P-3006, Tropical Storm and Hurricane Preparation, Response, and Recovery

l. KSC-PLN-1904, Trailer/Equipment Tiedown Plan for the Kennedy Space Center

m. KSC FORM 2-271, HOT WORK PERMIT

n. KSC FORM 2-272, TAR KETTLE/TORCHDOWN HOT WORK PERMIT

o. KSC FORM 8-313NS, CHEMICAL INVENTORY FOR CONSTRUCTION PROJECTS AT KENNEDY SPACE CENTER

p. KSC FORM 20-165, TAG, DANGER – DO NOT USE OR OPERATE

q. KSC FORM 20-195, LOCKOUT/TAGOUT TAG

r. KSC FORM 20-195A, LOCKOUT/TAGOUT TAG IDENTIFIER

s. KSC FORM 26-311, REQUEST FOR UTILITY OUTAGE

t. KSC FORM 26-312, SAMPLE UTILITY LOCATE/EXCAVATION PERMIT REQUEST

u. KSC FORM 26-400NS, WORK PERMIT

v. KSC FORM 28-750NS, CONFINED SPACE HAZARD EVALUATION REQUEST

w. KSC FORM 28-915, LOCKOUT LOCK AND LOCKOUT TAG INVENTORY RECORD

x. KSC FORM 28-1230A, ASBESTOS ABATEMENT PRE-WORK INSPECTION CHECKLIST

y. KSC FORM 28-1231A, ASBESTOS ABATEMENT CLEARANCE INSPECTION CHECKLIST

z. KSC FORM 50-101, LIFT PLAN FOR CONSTRUCTION CONTRACTORS

aa. KSC FORM 50-103, ENERGIZED ELECTRICAL WORK ANALYSIS & AUTHORIZATION PERMIT bb. ANSI/SAIA A92-2, A92.3, A92.5, and A92.6: Elevating Work Platform Standards

cc. IEEE C2 National Electrical Safety Code

dd. NFPA 70, National Electric Code

ee. NFPA 70E, Standard for Electrical Safety in the Workplace

P.5 Measurement/Verification

Compliance with the requirements contained in this KNPR will be verified through normal surveillance, audit, and assessment activities performed by the NASA S&MA organization. NASA safety personnel or their designees have the right to enter any NASA/KSC-controlled facility to monitor operations in order to accomplish this verification. These safety personnel are subject to safety practices and reasonable security requirements.

P.6 Cancellation

This document cancels KNPR 8715.7, Rev. B, KSC Construction Contractors Safety and Health Practices Procedural Requirements.

original digitally signed by Ms. Kunz 7/23/2020

Jennifer C. Kunz
Director, Safety and Mission Assurance

Distribution: TechDoc Library

CHAPTER 1: GENERAL INFORMATION

1.1 Goals

This requirements document assists NASA/KSC construction contractors in providing their employees and associate subcontractors with a safe and healthful work environment while not introducing hazards that may adversely affect personnel and property.

1.2 Objective

This requirement document contains safety and health information and requirements applicable to construction contractors performing work under construction contracts awarded and administered by the NASA/KSC Procurement Office. Environmental issues and regulatory requirements are referenced in KNPR 8500.1, KSC Environmental Requirements.

1.3 Responsibilities

a. Contractors shall ensure the safety and health requirements identified in this document and their Site-Specific Safety and Health Plan (SSSP) are observed by all contractor and subcontractor employees on the job site.

b. KSC contractor employees shall comply with KSC safety and health policies, requirements, and procedures and perform all work in a safe and healthful manner. When unsafe or unhealthful conditions or acts pose a danger to personnel or property, all employees have the right and obligation to stop work or refuse to perform work they feel is unsafe or unhealthful. Employees will work with their supervision to determine how the work can be performed in a safe and healthful manner.

c. Open, non-retaliatory communications are essential to improving and maintaining KSC's safety and health program. Reprisal or disciplinary action against an employee who initiates a safety concern will not be tolerated.

d. Violations of KSC safety and health policies, requirements or procedures by construction contractor employees could result in being barred from the Center.

1.4 Terminology

Throughout this document, the terms “contractor” and “construction contractor” are used synonymously and denote the responsible organization for identifying and performing safety and health requirements. These terms include all prime and subcontractor employees.

CHAPTER 2: SITE-SPECIFIC SAFETY AND HEALTH (GENERAL REQUIREMENTS)

2.1 General Requirements

a. The contractor shall develop a Site-Specific Safety and Health Plan (SSSP) which addresses the policies, procedures, and techniques that will be used to ensure the safety and occupational health of the contractor's workforce on the awarded contract.

b. Contractor SSSP shall address all sections of this KNPR applicable to their construction site.

Note: The preferred SSSP Template is available in Appendix C, and an SSSP Requirements Checklist is available in Appendix D. While the requirements listed in Appendix D must be addressed, the template in Appendix C is an example. Strict adherence to this format and style is not mandatory.

c. The contractor shall address how they will protect their employees, KSC employees, the public, and NASA equipment and property, and the environment.

Note: Corporate safety and health plans (program) can be used in the development of the SSSP, but as standalone documents, they may not fulfill the requirements of a site-specific plan.

d. The contractor's site supervisor shall be responsible for ensuring employees abide by all applicable regulatory and NASA/KSC safety and health requirements identified in the accepted SSSP and best practices as defined by national consensus standards.

e. The contractor's authorized representative shall inform and request approval from the Contracting Officer (CO) for any proposed updates or changes to the contractor's approved SSSP.

f. The contractor shall provide the proposed SSSP to the NASA CO for acceptance prior to commencement of any site work. The CO will review SSSP in consultation with Institutional Safety, Environmental Office, Industrial Hygiene Office, and KSC Fire Services.

g. NASA Safety shall be given at least ten business days to complete the initial review of SSSPs and any alterations.

h. The SSSP shall include an appendix identifying site-specific hazards and the appropriate mitigations (e.g., confined space, maintenance of traffic, fall protection).

Note: The areas contained in Chapter 3, Site-Specific Safety and Health Plan (Project-Specific Requirements) are additional areas that will be addressed as required based on the specifics and applicability to the work to be performed by the contract.

i. NASA Safety shall monitor and evaluate the safety of the contractor's construction operations and advise the project CO and Contracting Officer's Representative (COR).

j. Any recommendations provided to the contractor by NASA Safety shall be considered advisory only and do not relieve the contractor from any safety, liability, or contract compliance obligations.

k. The contractor shall permit NASA Safety to inspect job sites to verify compliance to safety and health requirements.

Note: Noncompliance to safety and health requirements uncovered by the NASA Safety are identified to the contractor's site supervisor, documented, and provided to the project CO and the COR, as needed.

l. Contractors shall verify existing configurations to identify areas posing hazards to personnel or property prior to the start of work.

m. The CO may issue a "Stop Work Order" when a contractor fails to follow safety procedures, creates or allows imminent danger situations to occur, or accumulates multiple safety noncompliances.

Note: A "stop work order" differs from "stop work authority" which can be invoked by any employee on KSC when any activity poses an imminent danger to personnel. See definitions in Appendix A for additional clarification.

n. NASA Safety shall hold a Nuts and Bolts after the SSSP has been accepted by the CO but prior to the start of work.

2.2 Contractor Employee Safety and Health Training

a. All contractor personnel engaged in job site activities shall receive the required safety and health training prior to initiation of the respective work activities.

b. All construction contractors shall watch the KSC's Construction Contractor General Hazards Familiarization safety video (KSC-QF111KSC) and submit a record verifying employee completion to the CO and NASA Safety prior to the initiation of the respective work activities.

c. The contractor shall identify in their SSSP employees who will serve in special roles such as site supervisor, competent person, qualified person, and heavy equipment operator.

d. The contractor shall ensure, prior to starting work, that all employee safety & health training required by the SSSP, NASA, and OSHA standards has been accomplished, is current, and proper documentation has been provided to the CO and NASA Safety.

e. Contractors shall ensure that the safety and health trainer is knowledgeable through relevant education and experience to conduct training in the area(s) being taught.

f. Employee Training records and certifications shall include the employee name, date of training, type of training received, expiration dates of training and be signed by a company official (manager) and provided as an appendix to the SSSP.

2.3 Accident/Incident (Mishap/Close Call) Reporting

a. In the event of a mishap, the contractor shall take immediate action to prevent further injury to personnel and damage to any property.

b. The contractor shall maintain the capability to initiate emergency notification from each job location.

Note 1: This requirement may be met by providing a phone, cell phone, or hand-held radio to another location where phone notification can be initiated. Use of a runner for emergency notification from a job location does not meet this requirement.

Note 2: In the event of a serious accident/incident, immediately call 911, (321) 867-7911 (cell phone on KSC), or (321) 853-0911 (cell phone on CCAFS). Ambulances are on call 24 hours/day; 7 days/week on KSC and CCAFS.

Note 3: It is recommended that a 911 call be made for any mishap, even when there is no apparent injury (e.g., a piece of heavy equipment is damaged but the operator appears uninjured). The 911 call begins the notification process and minimizes the potential risk of further incidents or injury.

c. After initiating emergency notification, the contractor site supervisor shall take action (or give support to NASA response personnel) to secure the site, limit unnecessary access, and preserve evidence until the site is released by the Incident Commander, KSC Security, NASA Safety, or the mishap board chairperson.

d. The contractor shall ensure all potential incident witnesses and equipment involved remain at the worksite until released by the NASA Safety Investigator.

e. The contractor shall submit a KDP-F-3645, Direct Construction Contractor Mishap Report (Appendix R) by e-mail to NASA Safety, COR and CO within 4 hours of a Type C or Type D Mishap/Close Call and within 1 hour of a Type A Mishap, Type B Mishap, High-Visibility Mishap, or High-Visibility Close Call.

Note: Initial notification/report for mishaps and close calls should, at a minimum, include all available information relating to the time of the incident, the location, a description of the event, the organization(s) involved in the event, and a preliminary worst case estimate of the injuries/illness or the direct cost estimate of the damage resulting from the event.

f. The contractor shall cooperate with any Government mishap/close call investigations.

g. Contractors shall provide NASA Safety the company's Safety Statistic Record (SSR).

2.4 Weather Policy

2.4.1 General

a. Weather warnings are announced over the KSC Center-wide Paging and Area Warning System (PAWS). For tornado sightings, KSC will activate the Center-wide Tornado Area Warning System (TAWS) and make announcements over the public address system.

b. Contractors performing work outdoors shall have a means of receiving the KSC weather alerts. The following website may be used to register for KSC weather alerts from the 45th Space Wing. https://nasaksc.onthealert.com/Terms/Index/?ReturnUrl=%2f

Note: Contractors can receive these alerts by email or text message received on a cell phone.

2.4.2 Wind Policy

a. The contractor shall comply with wind advisories and warnings issued by the 45th Space Wing Weather Office unless an Alternate Wind Advisory Plan is approved as part of the contractor's SSSP.

b. Contractors performing outdoor work shall adhere to the wind restrictions stated in Table A or manufacturer requirements, whichever are more restrictive.

Table A: WIND LIMITATIONS TABLE

Steady State	**Gusts**	**Limitations**
18 knots (20.7 mph)	22 knots (25 mph)	No erection of, or work on floats, spiders, and/or scaffolding. Adhere to Original Equipment Manufacturer's requirements regarding aerial lifts and scissor lifts.
30 knots (34.5 mph)	35 knots (40.3 mph)	No work on facility roofs, structure tops, unprotected areas, or outside hand rails (materials on roofs are secured or removed).
35 knots (40.3 mph)	40 knots (46 mph)	Contractor Supervisors will immediately conduct a walk down of their area for unsecured items.
40 knots (46 mph) and above	45 knots (51.7 mph) and above	Immediate actions will be taken to secure at ground level all loose or unanchored items, equipment, supplies, and materials.

Note: The 45th Space Wing Weather Office issues advisories for winds less than 35 knots, warnings for winds equal to or greater than 35 knots, and watches and warnings for winds equal to or greater than 50 knots.

d. An Alternate Wind Advisory plan shall include:

(1) An on-site weather team that includes the contractor's on-site supervisor, the project construction inspector, and the project CO or COR.

(2) Methods (minimum of two to corroborate wind readings) used to accurately determine wind speeds in the vicinity of the construction worksite in lieu of the Center wind advisories and warnings.

(3) Method and source used to record wind readings every 15 minutes.

Note: Wind readings should be performed during a Center-designated wind advisory or warning.

2.4.3 Lightning Restrictions

a. A Phase I Lightning Watch indicates that conditions are favorable for lightning to occur in a Lightning Hazard Notification Area (LHNA) within 30 minutes. A Phase I Lightning Watch is intended to provide personnel sufficient lead-time to secure their operations before the forecasted lightning begins.

Note: KSC has four LHNAs: Haulover (0.75 nautical mile radius), Shuttle Landing Facility (1.75 nmi radius), Launch Complex 39 Area (1.75 nmi radius), and Industrial Area (1.75 nmi radius). Outside of these areas, lightning announcements may not be received in time to *take appropriate action. In this case, the SSSP lightning safety plan should include more detailed information regarding the detection and communication of the lightning hazard.*

b. Phase II Lightning Warning indicates that lightning was observed or is forecasted to occur within 5 nautical miles of an LHNA.

c. The SSSP shall address the following lightning safety provisions, at minimum:

(1) Determination that the construction site is within an LHNA.

(2) Lightning safety plans for operations that occur outside of the LHNA.

(3) Lightning safety plans for operations that require more lead time than Phase II Lightning Warning provides.

Note: These are operations in which personnel may require additional time to secure equipment or to seek shelter before the lightning hazard is present. In these cases, consideration should be given to seeking shelter upon notification of a Phase I Lightning Watch.

d. Upon notification of a Phase I Lightning Watch, task leaders and personnel shall prepare to safely halt any operations that may be affected if a Phase II Lightning Warning is announced (i.e., be prepared to safely halt operations that expose personnel to lightning hazards or that are required to be halted if a Phase II Lightning Warning is announced).

e. Upon notification of a Phase II Lightning Warning, personnel shall:

(1) Safely halt and secure ongoing operations which could expose equipment or personnel to the lightning hazard.

(2) Seek shelter to protect themselves from the dangers of lightning.

Note: Appropriate lightning shelters include buildings that are protected against lightning, large unprotected buildings, and fully enclosed metal vehicles. Trees, open structures such as picnic pavilions, or small buildings/structures are not an appropriate shelter.

(3) Not remain on or access roofs or open top levels of structures.

(4) Cease electrical systems work and maintenance which could pose a risk to personnel due to the lightning hazard.

(5) Safely halt or do not commence crane operations for the duration of the Phase II Lightning Warning.

f. During Phase I Lightning Watch, it shall be permissible for outdoor and all electrical system work to continue provided the operations can be terminated immediately upon notification of Phase II Lightning Warning.

g. During Phase I Lightning Watch, task leaders and personnel shall prepare to safely halt any operations that may be affected if a Phase II Lightning Warning is announced (i.e., be prepared to halt safely operations that expose personnel to lightning hazards or that are required to be halted if a Phase II Lightning Warning is announced).

h. During Phase II Lightning Warning:

(1) Employees shall act to protect themselves from the dangers of lightning upon being notified of a Phase II Lightning Warning

(2) Personnel access to roofs or open top levels of structures shall be prohibited.

(3) Electrical systems work and maintenance (indoors and outdoors) and any other operation requiring personnel to put themselves at risk of lightning exposure shall be prohibited.

2.4.4 Tornado Notification

a. During a Tornado Watch, the contractor's site supervisor shall ensure all construction site workers have a plan to protect their employees when a Tornado Warning is issued.

> *Note: Tornado Watches are issued as an alert that conditions are favorable for the development of tornadoes in and close to the watch area. These watches are issued with information concerning the watch area and the length of time they are in effect.*

b. During a Tornado Warning, personnel shall take cover immediately in approved structures.

> *Note: Tornado Warnings are issued to warn that a tornado has been sighted by storm spotters or has been indicated by radar. These warnings are issued with information concerning where the tornado is presently located and what communities are in the anticipated path of the tornado.*

2.4.5 Hurricane Condition (HURCON) Policy

During the Atlantic Hurricane Season (June 1 through November 30), Florida is subject to extreme destruction associated with hurricanes. During the Atlantic Hurricane Season, contractors shall:

a. Prepare their site by securing structures and loose objects, performing the necessary housekeeping, and preparing for evacuation when Hurricane Condition IV is declared (arrival of sustained winds of 50 knots/58 mph or greater within 72 hours).

b. Evacuate the worksite when directed by the CO and leave KSC when Hurricane Condition III is declared (arrival of sustained winds of 50 knots/58 mph or greater within 48 hours).

c. Tie down trailers and equipment with anchorage that complies with KSC-PLN-1904, Trailer/Equipment Tiedown Plan for the Kennedy Space Center.

d. Follow KDP-KSC-P-3006, Tropical Storm and Hurricane Preparation, Response, and Recovery

2.5 Clothing

a. Contractor employees conducting work on NASA construction contracts shall wear proper clothing suitable for the task and hazard level of work, including, at a minimum, long pants, shirt with sleeves (no tank tops), and shoes appropriate for the type of work to be performed. Overly loose fitting, torn, or ragged clothing is not acceptable.

b. Safety shoes or boots that comply with 29 CFR 1910.136 shall be worn when there is a potential for injury to the feet.

Note: It is a recommendation on all construction sites that all employees wear safety toe shoes or boots. See also section 3.17, Personal Protective Equipment (PPE).

c. Arc rated/flame resistant shall be worn by employees performing tasks that have the potential to expose the employee to arc flash, flash fires, or burns (see also section 3.5 concerning electrical work PPE).

2.6 Construction Site Safety

a. The contractor shall ensure the safety of all personnel, regardless of organization, while within the boundaries of the worksite, including:

(1) Control of personnel on site.

(2) Ensuring the use of required PPE.

(3) Ensuring the observation of any special conditions and restrictions while on site.

(4) Establishing when and to whom the site is off limits.

b. The contractor shall ensure a site supervisor or alternate site supervisor is onsite at all times during construction.

c. The site supervisor or alternate site supervisor while performing supervisory tasks shall not perform other labor type duties unless the position is designated in the contract as a “Working Superintendent.”

d. The contractor shall permit only designated employees who are qualified by training or experience to operate equipment and machinery.

e. The site supervisor shall develop means of communication to disseminate safety related information throughout the worksite (e.g., handheld radios, bulletin boards).

f. The site supervisor shall have a means of communication to contact emergency services at all times.

g. Emergency numbers shall be posted at the worksite in a location where all employees have access.

h. Personnel shall not use cell phones/texting devices while operating equipment (to include tools, machinery, and heavy equipment) or driving vehicles (hands free only in vehicles).

i. Necessary business calls or replying to pages or telephone calls shall be accomplished only from a safe location (designated break area or area free from hazards) while at the jobsite.

j. The contractor shall implement policies to encourage employees to submit suggestions or report issues regarding site and facility safety and health to the project assigned safety specialist or by calling the Center Safety Office at (321) 867-SAFE (7233).

k. All contractors shall instruct employees that safety suggestions, violations, or issues can be reported anonymously to their employer or the Center Safety Office without fear of retaliation or retribution.

l. Contractor employees who are performing work in or transitioning through a construction site controlled by another contractor shall comply with the safety and health requirements of that worksite.

m. Contractor employees working in the vicinity of or transitioning through an area where KSC operations are in progress shall comply with the safety and health requirements and direction of the NASA controlling authority of the area.

Note: Workers should be alert to walking surface conditions and immediately inform the appropriate personnel when a hazard is observed.

n. Contractor site supervisors shall:

(1) Ensure employees are aware of their responsibility to report any injury to their supervisor immediately.

(2) Follow the requirements for Accident/Incident (Mishap/Close Call) Reporting by submitting KDP-F-3645.

2.7 Controlled Areas

Posted or controlled areas shall not be entered, nor will the integrity of any installed protective system (e.g., guardrails, safety signs, warning lights) be rendered inoperable, without proper written approval from the CO and agreement by the facility manager and the Center Safety Office.

2.8 Evacuation (Facility or Area)

a. The contractor shall assign a point-of-contact (POC) for work conducted inside a facility prior to starting work.

b. The contractor shall obtain a copy of the facility emergency evacuation procedures from the facility manager, CO, or NASA Safety representative.

c. The POC shall ensure all contractor employees are briefed on evacuation and marshalling areas the first day of work.

d. Should evacuation of any area be necessary for reasons other than tornadoes, contractor employees shall follow the facility evacuation procedures and meet the POC at the marshalling area or at least 200 feet from the hazard.

e. The POC shall account for all employees and report the head count to the on-scene commander as soon as possible.

f. POCs shall notify the on-scene commander immediately if any employee is not accounted for.

g. Contractor Employees shall not return to work inside or within 200 feet of the facility until the on-scene commander gives the “ALL CLEAR.”

2.9 First Aid and Medical

a. The contractor shall make provisions for prompt medical attention in case of employee injury prior to starting work.

(1) Personnel should report an emergency by dialing 911, (321) 867-7911 (cell phone on KSC) or (321) 853-0911 (cell phone on CCAFS).

(2) For non-emergency, walk-in medical care, personnel should report to the KSC Occupational Health Facility (OHF) located at the corner of 2nd St. SE and C Ave. SE during normal office hours. After hours or on weekends, call (321) 867-7911 (the KSC 911 Number). Emergency Medical Services (EMS) personnel will evaluate for first aid or transport to nearest medical facility.

b. All emergency contact telephone numbers shall be posted at the job site in an area accessible and conspicuous to all personnel.

c. First Aid Program

(1) The contractor's first aid program shall be designed to reflect the known and anticipated risks of the specific work environment.

(2) The contractor shall have a person(s) adequately trained to render first aid.

(3) A contractor employee, trained in first aid, shall be present at the worksite any time work is being performed.

(4) First aid supplies shall be readily available and in sufficient quantities at the job site.

2.10 Hazard Communications

a. External Reference: 29 CFR 1926.59 provides OSHA regulations concerning Hazard Communications.

b. The SSSP shall describe the contractor's approach to provide training to workers regarding the details of the hazard communication program, the labeling system used at the worksite, and the location of and access to Safety Data Sheets (SDS).

> *Note: OSHA requires that if employees receive job instructions in a language other than English, then the training and information to be conveyed under the Hazard Communications standard will also need to be conducted in the applicable foreign language.*

c. The contractor shall ensure that each container of hazardous materials or chemicals and any secondary container (e.g., bottle, tank, vessel) in the workplace is properly labeled [i.e., Hazardous Materials Identification System (HMIS)], tagged, or marked with the appropriate hazard warnings.

> *Note: Labeling and SDSs provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.*

d. The contractor shall ensure the labels or other forms of warning are legible, in English, and prominently displayed on the container or readily available in the work area throughout each work shift.

e. The contractor shall not remove or deface existing labels on incoming hazardous material and chemical containers unless the container is immediately relabeled with the required information.

f. The contractor shall submit to the CO a copy of every SDS for any potentially hazardous material or chemical brought on-site for use on this contract.

g. Prior to the time of delivery of the materials and chemicals to the site, the contractor shall provide to the CO a complete and accurate list accompanied by the applicable SDS of all materials and chemicals listed on the Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know Act (EPCRA) and Section 112(r) of the Clean Air Act that are stored on-site or used in the execution of this contract, regardless of the quantity.

h. The list accompanied by the applicable SDS of all materials and chemicals listed on the Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know Act (EPCRA) and Section 112(r) of the Clean Air Act stored on-site or used in the execution of this contract, regardless of the quantity, shall be updated and resubmitted to the CO on a monthly basis.

i. All inventory reporting shall be completed on the Chemical Inventory for Construction Projects at Kennedy Space Center, KSC Form 8-313NS.

j. Appropriate labels and SDS shall be provided for all chemical shipments.

2.11 Heat Stress

a. If applicable, the contractor's SSSP shall address how to protect employees from heat stress, heat exhaustion, and heat stroke. The contractor may reference the KSC Environmental Health Services – Heat Stress Index.

Note: Heat advisory warnings are issued through the KSC Duty Office in the same manner as other weather watches and warnings.

b. The contractor shall ensure employees are trained on the signs and symptoms of heat stress injuries and appropriate actions to take in the case of a heat stress injury.

c. The site supervisor should ensure all contractor employees on site take breaks as necessary to prevent heat-related illnesses.

2.12 Housekeeping

a. External Reference: 29 CFR 1926.25 provides OSHA regulations concerning Housekeeping.

b. Good housekeeping practices shall be observed at all times.

c. Only approved, marked containers shall be used for disposal of wastes in accordance with applicable regulations.

d. The work area shall be maintained in a manner that minimizes hazards and allows employees to safely work.

e. Routine clean-up of the jobsite shall be done daily at the end of each shift.

f. During the course of construction, any and all impalement hazards onto and into which employees could fall shall be guarded to eliminate the hazard.

g. Combustible scrap and debris shall be removed from work areas at least daily during the course of construction.

h. At the completion of construction, the contractor shall clean up the construction area of all excess construction debris and return to grade level all above surface protrusions which are not permanent fixtures.

2.13 Inspections (Contractor Worksite)

a. The contractor shall perform a daily inspection of the job site, materials, and equipment to identify existing or potential hazards.

b. The inspection shall be accomplished by a competent person (General) (see definition in Appendix A) designated by the contractor.

c. The contractor shall document the completion of the worksite inspection at least weekly.

2.14 Inspections (KSC Safety Representatives)

The job site shall be subject to inspection by KSC Safety and Health personnel at any time. KSC construction safety specialists perform site visits of all NASA/KSC Construction project sites.

Note: KSC construction safety specialists document site inspections and safety and health violations/noncompliances in the construction safety database. The contractor's site supervisor works with the KSC construction safety specialists, the COR, or CO (depending on severity) to implement corrective action(s). For serious, willful, or repeat findings, a Notice of Safety Violation (NOSV) may be issued. The NOSV requires a formal response from the contractor.

2.15 Job Hazard Analysis (JHA)

The JHA is a technique that focuses on job tasks as a way to identify and mitigate hazards before they result in injury to personnel or damage to property. The JHA process focuses on the relationship between the worker, the task, the tools, and the work environment. The goal is to identify all uncontrolled hazards, then take the steps/actions to eliminate or reduce the hazards to an acceptable risk level. The terms "Job Hazard Analysis (JHA)," "Job Safety Analysis (JSA)," and Activity Hazard Analysis (AHA)," are synonymous.

a. Prior to the start of work, the contractor Site Supervisor shall verify that each job hazard analysis is complete and effectively eliminates or mitigates known job hazards.

b. A copy of all JHAs for the work being performed shall be available at the job site for NASA CO and Safety review.

c. A signature page with signatures of all employees performing the applicable work acknowledging that they have reviewed the JHA and will adhere to all stipulated hazard mitigations shall be maintained with the corresponding JHA.

Note: JHAs are living documents and should be reviewed, updated, and discussed with employees when changes occur in work tasks, alternate equipment is being used, or when alternate methods of performing the task are being considered, such as using aerial lifts in place of scaffolding.

d. The JHA shall include the following elements:

(1) Task (Activity) Description: Specify the work to be performed such as operating machinery, equipment, and powered hand tools.

(2) Hazard Description: Using the listed tasks, identify the hazards from the work to be performed (e.g., flying debris, dust, wood chips, or metal shaving getting into the eyes).

(3) Hazard Controls: The preventative measures taken to eliminate or mitigate the hazard to an acceptable risk level [e.g., know and utilize the manufacturer's operating, maintenance, and safety procedures and use personal protective equipment (PPE) as required].

e. Reference section 3.5, Electrical Safety, for additional requirements regarding JHAs for energized electrical work.

2.16 Pre-task Meetings

a. Prior to the start of each work day or when a task changes during hazardous operations (e.g., confined space entry, dive operations, lifting operations), the contractor shall conduct a pre-task meeting and communicate all job related safety issues with all employees involved.

b. Where a task involves a confined space entry, completion of the required pre-task meeting shall be noted on the confined space entry permit.

c. At a minimum, the following topics shall be covered in the pre-task meeting:

(1) Work tasks planned for the day to include sequence and hazard management.

(2) Weather issues that could affect work.

(3) PPE required for the work tasks.

(4) Safety hazard awareness (from JHA).

2.17 Safety Meetings

a. The contractor shall conduct and document weekly safety meetings for all employees.

b. The weekly safety meeting shall discuss safety and health related issues as well as any incidents (and subsequent corrective actions taken) that have occurred at the site.

c. The first weekly safety meeting shall occur the first work day prior to the start of work.

d. If during performance of the contract, a break of more than five work days occurs, the site supervisor shall conduct a safety meeting the first day back to work.

e. Documentation of safety meetings shall include a short summary of the items covered, the date and location of the meeting, the name and signature of the person conducting the meeting, and a roster of attendees.

f. Documentation of these safety meetings shall be kept at the construction site for review.

2.18 Safety Systems – (Permanently Installed)

a. The contractor shall protect and not invalidate the integrity of any installed safety systems or personnel safety devices (e.g., firefighting equipment and sensing devices, fire alarm centers, fire water supply, guardrails, safety chains, warning lights, safety signs) without prior approval from the CO.

b. Prior to temporarily removing or invalidating any permanently installed safety devices or equipment, the contractor shall obtain CO approval and implement a CO-approved alternate means of protection.

2.19 Sanitary Conditions and Facilities

a. External Reference: 29 CFR Part 1926.51 provides OSHA regulations concerning Sanitary Conditions and Facilities.

2.20 Temporary Structures, Trailers, and Work Areas

a. All temporary structures and trailers shall be clearly marked with the contractor's name and an emergency phone number.

b. Trailers parking locations shall be pre-approved by the CO and the facility manager.

c. Trailers shall be tied down when stationary for a period in excess of two weeks.

d. A Utility Locate/Excavation Permit Request, (KSC Form 26-312) shall be submitted through the project CO and approved prior to tying down any trailer or temporary structure.

Note: A sample Locate/Excavation Permit Request form is available in Appendix H.

e. All NASA Construction sites with or without temporary structures shall be marked by clear and visible signage with the following information:

(1) Company name of the contractor (XXXXXX Construction, Inc).

(2) Contractor Site Supervisor’s name and contact phone number.

(3) Contractor Safety Supervisor’s name and contact phone number.

(4) NASA/KSC Project CO name and contact phone number.

(5) NASA/KSC COR name and phone number.

(6) NASA/KSC Safety (321) 867-SAFE (7233).

(7) Contract Number.

2.21 Vehicle Operations

The contractor shall adhere to permit requirements, restrictions, and conditions for overweight, oversized, or slow moving vehicles as identified in the traffic restrictions section of their contract and KNPR 1600.1, KSC Security Procedural Requirements.

Note: Movement of oversized or slow moving vehicles is prohibited on KSC roadways between the hours of 0600-0900 and 1500-1800 unless coordinated with the Protective Services Office.

CHAPTER 3: SITE SPECIFIC SAFETY AND HEALTH PLAN (PROJECT-SPECIFIC REQUIREMENTS)

The SSSP should only contain the sections in Chapter 3 necessary to perform the awarded construction project.

3.1 Confined Space Entry

a. External Reference: 29 CFR 1926 Subpart AA provides OSHA regulations concerning Confined Space.

b. The SSSP for each contractor required to work in a confined space shall include an OSHA-compliant Confined Space Entry Program (Plan) that implements 29 CFR 1926 Subpart AA Confined Spaces in Construction.

c. The SSSP for each contractor required to work in telecommunications manholes or on electrical power systems in enclosed spaces shall include the process they will use to meet the provisions of CFR 1910.268(o) and 1910.269(e).

d. Contractor's qualified safety professional shall coordinate with the CO to complete a confined space hazard evaluation request KSC Form 28-750NS (see Appendix E) in accordance with KNPR 1840.19 that identifies hazardous conditions (present or introduced) and entry requirements for all confined spaces for each task requiring a confined space entry permit.

e. The contractor shall notify and obtain approval from the Power Coordinator (321-867-7300) and from Communications Control (321-867-4141) prior to performing any work in electrical or communications manholes.

f. The contractor shall coordinate all confined space entry work with KSC Environmental Health, KSC Fire Services, and any resident government or contractor organization whose employees have access to the worksite, as identified by the CO or COR.

g. External References: In accordance with 29 CFR Part 1926.1203(h) and 1926.1204(k), where the contractor acts as a controlling employer with operational control over the permit space during multiple employer entry, the SSSP shall incorporate procedures to coordinate entry operations (e.g., hazardous operation/work activity, required PPE, employee training, rescue, emergency services, all other aspects of the entry) with each entrant's employer.

> *Note: The contractor may perform atmospheric testing or use the government-provided services including environmental health monitoring and consultation support for the testing of atmospheres in confined spaces. To request government-provided atmospheric testing for confined space entry, a minimum 24 hour advance scheduling is required through the Medical and Environmental Health Services duty office at 867-2400.*

h. Standing water shall be pumped out of the confined space prior to any entry evaluation.

i. 29 CFR Part 1926.1205(c), provides OSHA regulations concerning the confined space permit being maintained on site and be available to contractor and government personnel, and the pre-task meeting required by section 2.18, Pre-task Meetings, and shall be noted on the approved confined space entry permit.

3.2 Cranes and Lifting Operations

a. External References: 29 CFR Part 1926 Subpart CC provides the OSHA regulatory requirements, and the ASME B30 series provides the standards, for all crane and lifting equipment operations.

b. Daily and periodic formal (monthly and annually) equipment inspection shall be conducted, the results documented and made available on the job site.

c. Cranes shall be inspected by a competent person (cranes)

d. The following documentation shall be available at the job site when lifting equipment is operational:

(1) Operator certification

(2) Inspection documentation

Note: A load test may be requested if the annual inspection shows a discrepancy that could affect the lifting capacity of the crane.

e. A Pre-Task Briefing shall be performed and documented prior to commencing crane operations that includes, at a minimum:

(1) What task is to be performed.

(2) How (the methods) the task will be performed.

(3) Where each crew member will be positioned.

(4) What task each crew member will perform.

(5) The site supervisor in charge of the operation.

f. The working area around any lifting operation shall be controlled to limit personnel to include only those persons considered essential to the lifting operation.

g. If the controlled area cannot be maintained, the lifting operation shall be stopped immediately.

h. The site supervisor shall ensure:

(1) All personnel involved are instructed in the proper positioning, rigging, and moving to be done.

(2) The crane has met all its maintenance, test, and inspection requirements, is to be operated within its rated capacity, and the operator is properly certified.

(3) The vicinity of the lift is controlled, and the operator remains at the controls the entire time the load is suspended.

(4) The crane operator and signalmen have communications with each other, and if communications are lost, the lifting operation is immediately stopped.

(5) All personnel within the controlled lifting area are wearing the appropriate personal protective equipment (e.g., hardhat, safety shoes, gloves).

(6) A pre-task briefing is performed, and all personnel are knowledgeable of the operation to be performed, tasks to be done, route to be traveled, and safety considerations.

(7) No part of the crane or load passes within the designated minimum safe approach distance of an electrical power line unless the line is de-energized and visibly grounded on both sides of the area of possible contact.

(8) The effects of weather conditions, including wind, on lift safety are addressed.

i. All crane operations shall comply with the NASA/KSC Weather Policy requirements in this document, in addition to the crane manufacturer's requirements.

j. A lift plan (KSC Form 50-101) (see Appendix F) shall be submitted for review and acceptance to the CO in consultation with the KSC Lifting Devices and Equipment Manager (LDEM) and Center Safety Office for all crane operations involving critical lifts (as defined in Appendix A of this document).

k. Cranes shall not be used to hoist employees on a personnel platform unless approved in advance by the CO in consultation with the KSC LDEM and NASA Safety. Refer to 29 CFR 1926 for specific requirements.

l. Cranes left outdoors shall be secured by the operator when operations are complete.

m. External References: 14 CFR Part 77 and FAA Advisory Circular 70/7460-1 provides the requirements for Crane operations and the appropriate marking and lighting of crane structures within navigable airspace.

3.3 Demolition

External Reference: 29 CFR 1926 Subpart T provides OSHA regulations concerning Demolition.

3.3.1 Engineering Survey

a. The contractor shall submit an engineering survey to the CO for review.

b. 29 CFR 1926 Subpart T provides details on what an engineering survey entails.

3.3.2 Demolitions Involving Hazardous Materials

a. External References: 29 CFR 1926.62 and 29 CFR 1926 Subpart Z, provides OSHA regulations concerning demolition activities involving hazardous materials (e.g. silica, mold, or toxic).

b. An approved plan for the safe handling and containment of hazardous materials shall be in place prior to the start of demolition (see section 3.11, Hazardous Substances, for additional plan requirements).

c. The hazardous materials plan shall be submitted to the CO, COR, NASA Safety, Industrial Hygiene, and Environmental Office for approval prior to the initiation of the respective work activities.

d. The plan for handling/containment of all hazardous materials shall be fully compliant with applicable Federal, State of Florida, NASA, and other authorized regulatory agencies' current standards.

3.3.3 Continuing Site Inspections

a. Inspections by the contractor's designated competent person (general) shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, or walls, or loosened material.

b. No employee shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

3.3.4 Additional Demolition Requirements

a. Any structural member being dismembered shall not be overstressed.

b. No workers shall be permitted in any area which can be adversely affected by demolition operations when balling or clamming is being performed.

c. Only those workers required for the performance of the operation shall be permitted in this area.

d. If any load-bearing structure is to be demolished, regardless of whether or not asbestos is present, the contractor shall submit to the Florida Department of Environmental Protection (FDEP) a "Notice of Asbestos Renovation or Demolition Form" [DEP Form 62-257.900(1)].

3.4 Dive Operations (Commercial)

This section applies to diving and related support operations conducted in connection with all types of work and employment.

a. External References: 29 CFR 1910 Subpart T and 29 CFR 1926 Subpart Y provides OSHA regulations concerning Dive Operations (Commercial).

b. Each dive team member shall have the experience or training necessary to perform assigned tasks in a safe and healthy manner, including sufficient expertise with applicable tools, knowledge of equipment, and systems relevant to assigned tasks and techniques pertaining to the assigned diving mode, diving operations, and emergency procedures.

c. The site superintendent or designated person-in-charge shall be at the dive location in charge of all aspects of the diving operation affecting the safety and health of dive team members.

d. Use of electrical tools, equipment, or explosives shall be done in accordance with all applicable Federal, state, and local regulations.

3.5 Electrical Safety

a. External References: 29 CFR 1926, Subpart K, provides the OSHA regulatory requirements and National Fire Protection NFPA 70, National Electric Code (NEC), NFPA 70E, Standard for Electrical Safety in the Workplace, and contract referenced documents provides the standards, for electrical safety.

b. Contractors performing work on or near any electrical system shall provide a written program for such work as part of its SSSP.

c. Training certifications and other relevant documentation shall be submitted for review and approval by the CO and NASA Safety.

d. Designated qualified electrical persons shall be identified as part of the SSSP prior to the initiation of the respective work activities.

e. The written program shall be consistent with the requirements of 29 CFR 1910 Subpart S and 1926 Subpart K.

f. The program shall include applicable hazard analyses/risk assessments and associated approach boundaries and spaces (e.g., arc flash, limited, restricted) and PPE.

g. Contractors performing work on or near Electric Power Generation, Transmission, and Distribution [such as Orsino Substation, C-5 Substation, the Emergency Power Plant, and overhead and underground 15 kilovolt (kV) power distribution systems] shall provide a written program for such work as part of their SSSP that is compliant with the requirements of 29 CFR 1910.269; 29 CFR 1910.332 through 29 CFR 1910.334; and IEEE C2 (National Electrical Safety Code).

h. Circuits shall be placed in an electrically safe condition by de-energizing, applying lockout/tagout, and verifying lack of voltage using suitable test equipment prior to grounding or performing any work on electrical conductors or electrical circuits.

> *Note: Exceptions to this requirement are covered in section 3.5.4 Exposure to Energized Parts.*

3.5.1 Electrical JHAs

a. The contractor’s written electrical safety program shall include JHAs covering all anticipated or known work to be performed in hazardous locations or on or near energized parts including “routine” tasks not requiring an energized work permit by NFPA 70E.

b. Additional JHAs shall be submitted during the course of the work as required by the CO or COR.

c. Each JHA shall be specific to a particular task and its associated hazards, taking into account at a minimum the following areas:

(1) Power switching or operating electrical equipment.

(2) Means and methods of controlling hazardous energy.

(3) Voltage checks to determine equipment is de-energized (usually associated with an outage).

(5) Where systems are de-energized by personnel other than those employed by the contractor, the contractor is responsible for application of individual lockout/tag-out and verifying lack of voltage while wearing the proper PPE and utilizing proper instruments.

(6) Voltage/current checks or troubleshooting.

(7) Energized equipment access.

(8) Hot work (e.g., breaker racking, fuse replacement).

(9) Manhole, vault, or equipment entry with energized cables present. Approximately 10-weeks prior to planned manhole entries, the contractor's qualified safety professional shall coordinate with the CO to complete a confined space hazard evaluation request KSC Form 28-750NS in accordance with KNPR 1840.19 for each task requiring a confined space entry permit.

(10) Means employed to restrict the access of unqualified persons from the work area.

d. Each JHA shall contain the following elements:

(1) Date of the analysis.

(2) Description of the activity.

(3) General work steps (in sequence).

(4) Potential hazards for each step.

(5) Controls for each hazard (such as PPE, lockout/tag-out, administrative, and access restrictions)

(6) Detailed list of all PPE, special tools, and safety equipment required including required calibrations, certifications, and inspections.

(7) List of all training provided for qualified personnel. A separate list of all qualified personnel shall also be provided.

(8) Lighting survey to ensure adequate lighting (in addition to flash lights) is available for the task, particularly for spaces not normally illuminated such as vaults and manholes.

(9) Approach boundaries as determined by the shock risk assessment/hazard analysis (as applicable).

(10) Arc-flash boundaries as determined by the arc-flash risk assessment/hazard analysis (as applicable).

Note: A Sample JHA is available in Appendix G.

3.5.2 Electrical System Outage Work Permits

a. All necessary outages that affect utility systems, such as electrical, water, fire detection and protection systems, and air handling systems, require an electrical system outage work permit. Work shall be scheduled so as to minimize outages.

b. Request for utility outage permits shall be made in writing to the CO at least 14 working days in advance of the time required.

c. The request shall state the system involved, area involved, approximate time of outage, and the nature of the work.

> *Note: Submittal of a contractor's outage request does not constitute automatic approval. Due to the nature of the operations at KSC, the contractor may not know until the day before the requested date if the outage will take place as scheduled. All outages will normally take place outside normal work hours.*

d. When high and medium voltage circuits or equipment is de-energized by KSC's Base Operations Support Services (BOSS), the contractor shall obtain a work permit (KSC Form 26-311) from the BOSS through the project CO.

e. The contractor shall lockout/tag-out the required circuits.

f. After lockout/tag-out is complete, the contractor shall verify lack of voltage using suitable test equipment and proper PPE prior to grounding or performing any work on such circuit(s) or equipment.

g. When working in manholes or vaults containing energized medium voltage cables, the contractor shall request that protective relays supplying all such cables be set to trip with no delay.

h. The contractor shall obtain a work permit (KSC Form 26-400 NS) from BOSS through the project CO indicating that all such relays are set with instantaneous trip "maintenance" settings prior to entering or working in any manhole or vault with energized medium voltage cables.

3.5.3 Testing of Electrical Parts and Equipment Prior to Employee Exposure

a. A qualified electrical person shall use test equipment to determine the circuit elements and electrical parts of equipment to which employees will be exposed.

b. The qualified person shall also verify that the circuit elements and equipment parts are de-energized after the circuit(s) is locked and tagged out.

c. The test shall determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage back feed even though specific parts of the circuit have been de-energized and presumed to be safe.

d. The test equipment shall be checked for proper operation immediately before and after the absence of voltage check on an energized circuit.

e. Prior to reenergizing equipment, a qualified electrical person shall conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices were removed so that the circuits and equipment can be safely re-energized.

3.5.4 Exposure to Energized Parts

a. Energized parts to which an employee might be exposed shall be placed in an electrically safe work condition before any employee works on or approaches them unless the contractor can demonstrate that de-energizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations.

b. If energized parts are not placed in an electrically safe work condition (e.g., due to increased or additional hazards or infeasibility), or if a task involves an employee crossing the NFPA 70E prohibited approach boundary, the work to be performed shall be considered energized electrical work and be performed under a written Energized Electrical Work Analysis & Authorization Permit (KSC Form 50-103) (exception, items c and d below).

c. Upon considering the capacity of the source and any overcurrent protection between the energy source and the worker, if there is no increased exposure to electrical burns or explosion due to electrical arcs, it shall be permissible for personnel to work with energized parts that operate at less than 50 volts to ground without de-energizing the parts.

d. Work performed on or near live parts by qualified electrical persons related to tasks to include testing, troubleshooting, and voltage measuring, is permitted without an energized electrical work permit, provided appropriate safe work practices and personal protective equipment are used.

> *Note: The repairing, replacing, or removing of any energized exposed components during these tasks is considered energized work, not troubleshooting or testing.*

e. A two-person buddy system shall be used when performing work on or near exposed energized parts.

f. The site supervisor shall conduct an energized work pre-work briefing and document it using page four of KSC Form 50-103 prior to starting work.

3.5.5 Energized Electrical Work Analysis and Authorization Permit Contents

a. An Energized Electrical Work Analysis and Authorization Permit (KSC Form 50-103) shall include, at a minimum the following information:

(1) A description of the circuit and equipment to be worked on and their location.

(2) Justification for why the work must be performed in an energized condition.

(3) A description of the safe work practices to be employed.

(4) Results of the shock hazard analysis and determination of shock protection boundaries.

(5) Results of the flash hazard analysis and determination of flash protection boundaries.

(6) The personal protective equipment to safely perform the assigned task.

(7) Means employed to restrict the access of unqualified persons from the work area.

(8) Evidence of completion of a job briefing, including a discussion of job-specific hazards.

(9) Energized work approval, with signatures of authorizing or responsible contractor management personnel (e.g., superintendent, safety officer, owner).

b. The Energized Electrical Work Analysis and Authorization Permit (KSC Form 50-103) shall be submitted for review and acceptance to the CO in consultation with a NASA Electrical Subject Matter Expert and NASA Safety.

3.5.5.1 Working in Close Proximity to Energized Parts

a. If the exposed parts are not de-energized, additional safety-related work practices shall be implemented to protect employees against direct contact with energized circuit part with any portion of the body or indirectly through some other conductive object.

b. Work practices shall be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electric conductors or circuit parts.

3.5.5.2 Shock Hazard Analyses/Risk Assessment

a. A shock hazard analysis shall be performed by a qualified electrical person to determine voltage exposure, boundary requirements, and the personal protective equipment necessary in order to minimize the possibility of electric shock.

> *Note: The Government will provide available information on applied system voltage, upstream circuit protective device settings, cabling distances and sizes, and available fault current as required to support the shock hazard*/risk assessment *and flash hazard analyses*/risk assessment*.*

b. Results of the shock hazard analysis/risk assessment shall be provided to the CO and the Center Safety Office for review.

3.5.5.3 Arc Flash Hazard Analyses/Risk Assessment and Arc Flash PPE

a. An Arc flash hazard analysis/risk assessment shall be completed by a qualified electrical person to protect personnel from arc flash injury.

b. Results of the arc flash analysis/risk assessment shall be provided to the CO and reviewed by the CO and the Center Safety Office.

c. The analysis/risk assessment shall determine the arc flash protection boundary and the personal protective equipment that personnel within the arc flash protection boundary use.

d. Personnel working with, on, or around energized circuits shall wear appropriate arc flash personal protective equipment as required by NFPA Code 70E.

3.5.6 Temporary Power/Wiring

a. Ground fault circuit interrupters (GFCIs) shall be utilized on all temporary power.

b. Extension devices shall be UL-Listed.

c. Electrical extension devices for 120 VAC shall be three wire grounded, "Dead Front" type with adequate current carrying capacity, but in no case less than 14 AWG and used in conjunction with GFCIs.

d. Temporary electrical wiring required during construction and major repairs shall be installed by a qualified electrician and protected with circuit breaker or fuses.

e. Temporary wiring and extension cords shall be protected against mechanical damage and, when damaged or spliced, removed from service.

f. Extension cords run through doorways, windows, or similar openings shall be protected from damage.

g. In areas where vehicles might run over the extension device, a protective cover/bridging device with brightly colored cones designating the hazard shall be used to reduce the possibility of damage to the extension device.

h. Equipment power cords, extension cords, and other electrical cabling should be used in a manner that does not create a tripping hazard. If such placement is unavoidable, a protective cover or equivalent shall be placed over the cable and marked in such a manner as to alert personnel to the tripping hazard (e.g., black/yellow safety tape, brightly colored cones).

i. Electrical extension devices shall not be used in combination (i.e., “piggybacked”) where one extension device is plugged into another.

Note: The use of a single GFCI pigtail is excluded from this requirement.

j. When using extension cords in combination with GFCI pigtails, the maximum rated load applied shall not exceed the rating of the GFCI pigtail.

3.6 Equipment

a. The contractor shall submit a list of all specialty or heavy equipment (contractor-owned, leased, or rented) proposed for use on the contract, including but not limited to forklifts, lulls, cranes, earth moving equipment, and other powered industrial trucks.

b. Operators of equipment shall be trained to use the equipment.

c. Documentation of training shall be submitted in accordance with the training and applicable equipment section of this document.

d. The contractor shall perform daily equipment inspections and as recommended by the manufacturer.

e. Tools, materials, or equipment not in compliance with applicable regulatory requirements shall not be used.

f. Defective equipment shall be removed from service or tagged out using KSC Form 20-165 (or a contractor equivalent tag) to render them inoperable.

3.7 Excavation

External Reference: 29 CFR 1926 Subpart P provides OSHA regulations concerning Excavation.

3.7.1 Dig Permits

a. Anytime digging is performed for any reason and to any depth, an approved Utility Locate/Excavation Permit Request (KSC Form 26-312NS) shall be obtained.

Note: A sample Locate/Excavation Permit Request form is available in Appendix H.

b. Permits are coordinated through the project CO and shall remain on site for review for the duration of the permit.

c. Any deviations from the approved excavation shall be approved in advance and submitted to the CO in writing.

d. Contractors shall adhere to the excavation permit category and conditions.

3.7.2 Special Requirements to Hand-Dig Excavations in Specific Situations

a. The contractor shall hand dig all excavations within 24 inches in all directions of a marked located utility line.

b. The contractor shall also hand dig a pilot trench when called for on the Dig Permit for all underground utility work along the centerline of new trenches and down to the bottom elevation of the new utility.

c. Machine excavation shall proceed only after it is determined that all existing utilities have been identified and protected.

3.7.3 Protection of Personnel during Excavations

a. A record of daily inspections shall be maintained at the job site.

b. In accordance with 29 CFR 1926, Subpart P, Appendix B, Soil on KSC is classified as type C.

3.8 Fall Protection

a. External References: 29 CFR 1926 Subpart M provides OSHA regulations concerning Fall Protection.

b. The requirements in KSC-STD-S-0033, KSC Fall Protection Standard, shall be met.

c. As required by contract, contractors working at KSC shall submit a Site Specific Fall Protection Plan that addresses project specific fall hazards, fall protection methods, and rescue.

Note 1: This Plan will become a part of the contractor's overall project SSSP, which addresses the contractor's approach to implementing the requirements of this standard and all applicable Occupational Safety and Health Administration (OSHA) regulations.

Note 2: A sample Site Specific Fall Protection Plan is available in Appendix I.

3.9 Fire Safety

a. Contractors are responsible for on-site fire prevention and protection while in the process of executing contracts on KSC and satellite installations. Fire prevention and protection policies contained within have been established in accordance with NASA directives, OSHA Code of Federal Regulations, and NFPA Fire Codes.

b. The contractor shall brief their employees on fire prevention and protection responsibilities.

Note: Construction sites will be inspected periodically by KSC fire inspectors to ensure compliance with fire prevention measures. The CO will be notified of any areas found to be substandard.

3.9.1 Handling and Storage of Flammable Liquids

a. Elevated fuel storage tanks shall be:

(1) Grounded/Bonded.

(2) Free of leaks (hose, nozzles, and valves).

(3) Equipped with "No Smoking within 50 feet" signs.

(4) Located at least 50 feet from buildings and combustibles.

(5) Posted with proper placards/labels.

b. Small containers of fuel shall be stored in Underwriters Laboratories or Factory Mutual and NFPA 30 approved (listed) Flammable Storage Cabinets labeled "Flammable - Keep Fire Away."

c. Flammables and any other volatile material shall be removed from worksites at the end of each day and stored in an area previously approved by the CO and the KSC Fire Prevention Office or removed from the installation.

d. Flammables and any other volatile material shall not be stored or left overnight in any building, facility, or structure.

e. All hazardous material spills shall be reported immediately by calling 911, (321) 867-7911 (cell phone on KSC), (321) 853-0911 (cell phone on CCAFS), the CO/COR, Environmental Point of Contact (EPOC), and NASA Safety.

f. Stored containers shall be sealed or covered.

g. Leaking containers shall be removed from the storage area or taken to a safe location outside the building and the contents transferred to an undamaged container.

h. Wiping rags, drop cloths, paint brushes, and rollers shall be stored in covered metal containers at the end of each working day.

i. All sources of ignition shall be eliminated and the area well ventilated when floor finishes containing combustible or flammable liquids are used.

3.9.2 Smoking

a. The contractor shall not allow smoking in any facilities or on roofs of facilities on KSC.

b. The contractor shall allow smoking only in designated areas that are approved by the KSC Fire Prevention Office.

c. Designated smoking areas shall be designated by conspicuous and legible signs and be equipped with an adequate number of readily available, metal containers with self-closing cover devices for disposal of smoking material.

d. Each metal container shall have stenciled on it “SMOKING MATERIAL ONLY.”

e. All cigarette lighting items (e.g., lighters, matches) shall be surrendered to the Gate Security Guard or at entry control points in areas where smoking or flame producing devices are forbidden.

f. At the end of every shift of duty day, all collected smoking material shall be completely extinguished, saturated with water, and removed for disposal in dumpsters.

g. All spark-producing device shall comply with NASA-STD-8719.11, Safety Standard for Fire Protection.

3.9.3 Fuel Powered Equipment

a. Fuel powered equipment (e.g., air compressors, hoists, pumps) shall be located so that exhaust stacks are well away from combustible material and facility air intakes.

b. Refueling shall not be conducted while engine is running or hot.

c. Equipment shall be free of fuel and oil leaks.

d. Fuel-powered equipment shall not be used inside buildings or facilities or under facility overhangs.

3.9.4 Fire Hydrants Adjacent to Construction Sites

a. Fire hydrants shall only be used with the approval of the KSC Assistant Chief of Fire Protection at 321-861-4684.

b. Fire hydrants shall not be blocked.

c. A minimum clearance of 25 feet shall be maintained at all times.

d. After obtaining approval from the KSC Assistant Chief of Fire Protection and prior to use, the contractor shall place a three-way valve on hydrants used to support construction activities.

e. At the end of the workday, hoses shall be disconnected from the fire hydrant and the caps replaced.

f. Fire hydrants shall only be opened with a hydrant wrench.

3.9.5 Fire Protection and Prevention

a. External Reference: 29 CFR 1926 Subpart F provides OSHA regulations concerning Fire Protection and Prevention.

b. A fire extinguisher belonging to a facility shall not be considered adequate fire protection in lieu of a contractor-provided fire extinguisher for all hot work operations.

c. Fire extinguishers and other firefighting equipment shall be visible and accessible at all times.

d. Contractor personnel shall be trained on classification of fires, fire extinguishers, and their uses.

e. The contractor shall have CO approval prior to tampering with, disturbing, or modifying the fire alarm detection and suppression systems unless specifically identified in the contract that work is to be performed on these systems.

f. The use of temporary heaters compliant with National Fire Codes shall be coordinated with the Fire Inspector.

g. Access to portable fire extinguishers and fire detection/suppression devices shall be kept clear and unobstructed at all times.

Note: The KSC Fire Prevention Office is available for assistance in any matters pertaining to good fire safety practices. They can be reached at 861-4684 Monday through Friday from 0700 to 1530 hours. After 1530 hours, and on weekends, for questions about fire safety call 861-8718 or 867-4103.

3.9.6 Blocking Facility Access

Any road or access to facilities that will be blocked due to construction or digging shall be reported to the BOSS Consolidated Control Center (867-7627) at least 24 hours before actual work begins.

3.10 Hand and Power Tools

a. External references: 29 CFR 1926 Subpart I and the applicable ANSI standard provide requirements for Hand and Power Tools design, use and maintenance.

b. Hand and power tools shall not be modified from the Original Equipment Manufacturer's (OEM) design/requirements unless authorized by the manufacturer.

c. Extension cords used for portable power tools shall be ground fault (GFCI) protected unless the cord is plugged into a ground fault protected outlet.

d. Power tools shall be disconnected at the end of each workday.

e. Requirements for Tools Using Loads (Ammunition)

(1) Loads (ammunition) shall be stored in locked metal containers (limited to 1000 rounds unless stored in an approved explosive storage area).

(2) Only the quantity necessary for the specific job shall be taken to the job site.

(3) Loads (as with all explosive materials) shall be kept away from heat sources.

(4) Loads shall remain in the personal control of the authorized operator.

(5) Loads shall never be left unattended at the job site.

(6) Each authorized operator shall keep positive control on all loads until unused portions are returned to the locked containers in the storage area.

(7) There shall be a standard means of identifying the powder levels of loads used.

3.11 Hazardous Materials

3.11.1 Asbestos Containing Material

a. External References: Asbestos Containing Material (ACM) compliance is provided in 29 CFR 1926 Subpart Z, National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 61 Subpart M, the Florida Administrative Code (FAC) requirements FAC 62-257, and the Florida Statute (F.S.) 469 Asbestos Abatement, and F.S. 376.60 Asbestos Removal Program Inspection and Notification Fee.

b. The contractor shall provide a written Asbestos Management and Abatement Implementation plan, approved by the CO, Industrial Hygiene, EPOC, and NASA Safety, prior to the commencement of work, as an appendix to the SSSP.

c. The contractor shall:

(1) Verify the information provided is accurate and complete.

(2) Notify the CO/COR if any undocumented ACM or suspected ACM is encountered.

Note: Information provided on material quantities and room dimensions is based on estimated values determined by the facility directorate at the time the survey was performed. Survey data is based on non-destructive inspection/sample basis; additional materials may be present/discovered during facility renovations. Any KSC inspection data provided is for operations and maintenance (O&M) planning purposes only.

d. The contractor shall coordinate any asbestos management and abatement with designated KSC Environmental Health, Industrial Hygiene, and Fire Services personnel and any resident government or contractor organization whose employees may have access to the work location.

3.11.1.1 Placards, Signs, and Other Notices

In addition to posting requirements identified in 29 CFR 1926.1101, the notice shall identify the type of work in progress, Project Identification Number, and provide the name and phone number of the CO for project information and for notification in the event of an emergency.

3.11.1.2 Asbestos Abatement Requirements

If more than 260 linear feet, 160 square feet, or 35 cubic feet of ACM or presumed asbestos containing material (PACM) is to be removed, or any load-bearing structure is to be demolished regardless of whether or not asbestos is present, the contractor shall submit to the Florida Department of Environmental Protection (FDEP) a “Notice of Asbestos Renovation or Demolition Form” [DEP Form 62-257.900(1)].

3.11.1.3 Project Monitoring

Monitoring records shall be maintained at the worksite and be available for inspection.

3.11.1.4 Pre-Work Asbestos Abatement Inspection

a. Asbestos abatement work shall not begin until a workplace inspection involving the establishment of regulated areas related to asbestos abatement has been conducted.

b. Pre-work asbestos abatement inspections shall be requested by contacting the Medical and Environmental Health Services duty office at 867-2400.

c. Abatement work shall be permitted to proceed upon successful completion of the inspection KSC Form 28-1230A; Pre-work Inspection (view a sample form in Appendix J).

3.11.1.5 Final Asbestos Abatement Clearance Inspection

a. A Final Asbestos Abatement Clearance Inspection will be completed prior to the opening of a regulated area for normal occupancy following an asbestos abatement activity.

b. The contractor shall request the Final Asbestos Abatement Clearance Inspection at least 24 hours in advance by contacting the Medical and Environmental Health Services duty office at 867-2400.

c. A regulated area shall not be opened until a NASA EH Office representative successfully completes a Final Clearance Inspection by completing KSC Form 28-1231A; Post Work Inspection (view a sample form in Appendix K).

3.11.2 Steel Structure Maintenance or Demolition (Abrasive Blasting/Surface Preparation/Spray Painting)

a. When performing work involving toxic metals regulated under 29 CFR 1926 Subpart Z, the contractor shall provide a written Toxic Metals Safety and Health Plan as an appendix to the SSSP.

> *Note: This requirement is applicable, absent a valid negative exposure assessment or other objective data, to any work on steel structures that involves abrasive blasting, surface preparation, spray painting, welding, cutting, or other hot work involving coated metal surfaces that contain regulated metals.*

b. The Toxic Metals Safety and Health Plan shall:

(1) Be approved by the CO, Industrial Hygiene, EPOC, and NASA Safety prior to the commencement of work.

(2) Be specific to the structure(s) defined in the contract statement of work.

(3) Identify regulated work areas, where required.

(4) Describe the contractor’s hygiene practices and worksite availability of change rooms, showers, and hand washing facilities and lunch room facilities.

(5) Address the contractor’s approach to contain and control dusts, fumes, and other airborne or waterborne emissions from the worksite.

(6) Describe the contractor’s exposure monitoring plan.

c. Prior to the commencement of any spray painting or abrasive blasting operations, the contractor shall take precautions to protect all personnel and government hardware from contamination or damage during sandblasting and painting operations.

Note: The CO is the approving authority for the method of protection.

d. Power tools used for surface preparation shall be equipped with dust collection shrouds or other attachments exhausted through a high efficiency particulate air (HEPA) filtered vacuum system.

e. At no time shall workers be allowed to leave the worksite wearing contaminated clothing or equipment (e.g., shoes, coveralls, head gear).

f. Contractor is responsible to ensure all contaminated clothing and equipment shall be prevented from reaching the worker's home or vehicle.

3.11.2.1 Project Monitoring

a. Each contractor performing regulated work is responsible for ensuring project monitoring is in accordance with the applicable requirements of 29 CFR 1926.62 and 29 CFR 1926 Subpart Z.

b. Monitoring records shall be maintained at the worksite and be available for government inspection.

3.11.2.2 Pre-work Inspection

a. Where work requires the establishment of a regulated area, work shall not begin until the government conducts a pre-work inspection of the regulated area and any associated containments related to the work.

b. Pre-work inspection shall be requested by contacting the Medical and Environmental Health Services duty office at 867-2400.

3.11.3 Silica

a. When work includes concrete cutting, crushing, or other operations that mechanically abrade concrete and mortar, the SSSP shall address the contractor’s approach, use of engineering and work practice controls, and use of respiratory protection to prevent employee exposure to silica dust.

b. Each contractor shall ensure project monitoring to demonstrate exposure compliance with the requirements of 29 CFR 1926.55, Appendix A and 29 CFR 1962.57.

c. Monitoring records shall be maintained at the worksite and be available for government inspection.

d. The contractor shall establish a controlled work area whenever unprotected personnel may be exposed to airborne silica dust that can reasonably be expected to be in excess of applicable exposure limits.

e. Silica plans shall be submitted to and approved by the CO, Industrial Hygiene, EPOC, and NASA Safety prior to the initiation of the respective work activities.

f. The controlled work area shall have warning signs that read:

WARNING
CRYSTALLINE SILICA WORK AREA
RESPIRATORY PROTECTION REQUIRED
NO SMOKING, DRINKING, OR EATING

3.12 Hearing Loss Prevention and Hazardous Noise

a. When work includes employee exposure that exceeds the limits in the tables below, the SSSP shall address the contractors approach to complying with the requirements of 29 CFR 1926.52.

b. Employee noise exposures shall be managed through implementation of engineering, work practice, or PPE to the following exposure limits:

TABLE B-1: NOISE EXPOSURE LIMITS[1]

DURATION		EXPOSURE LEVEL[2]
(hours)	(minutes)	dBA
16	960	82
8	480	85
4	240	88
2	120	91
1	60	94
0.5	30	97
0.25	15	100
0.125 or less	7.5 or less	103

[1] Using:
Exchange Rate = 3 dB
Lower Threshold = 80 dB,
$T=480/2^{(L-85)/3}$ where T=time in min. and L=exposure level
Meter set to slow response

[2] The exposure noted for each sound level for the duration noted is equivalent to 100% of the allowed noise dose. The Action Level is any exposure equivalent to 50% of the exposure duration in this Table.

TABLE B-2: NOISE EXPOSURE LIMITS FOR IMPACT OR IMPULSIVE NOISE

Sound Level **Decibels (dB)***	**PERMITTED NUMBER OF IMPULSES OR IMPACTS PER DAY (imp/day)**
>130	none
130	100
120	1,000
110	10,000
**Decibels peak sound pressure level measured with a Type I/II sound level meter with peak hold feature using Z, C-weighting, or linear scale at fast response.*	

c. Hearing Protection Devices

(1) External Reference: 29 CFR 1910.95 and 29 CFR 1926.101 provide OSHA regulations concerning hearing protection.

(2) Such equipment will be issued for the exclusive use of each employee and not be traded or shared.

(3) Personnel shall wear hearing protection whenever engineering and administrative controls do not reduce employee noise exposure below the Action Level.

(4) All persons working within a posted hazardous noise area, without regard to their exposure duration, shall wear hearing protection when noise is present.

(5) All employees operating equipment with sound levels exceeding levels exceeding 85 decibels (acoustic) (dBA) shall use hearing protection.

(6) Hearing protectors shall attenuate the employee's noise exposure to a level below the noise exposure limit of 85 dBA 8-hr time weighted average (TWA).

(7) A combination of both earmuffs and plugs shall be used where noise levels equal or exceed 100 dBA 8-hr TWA and any exposure equal to or greater than 105 dBA.

d. The contractor shall affix appropriate warning signs on the perimeter and control area entry point for workers and surrounding area employees who may pass near the worksite when noise levels reach the action level greater than 82 dBA.

e. External Reference: 29 CFR 1910.145 provides OSHA regulations concerning Warning signs, decals, and “Specifications for accident prevention signs and tags.”

3.13 Hot Work Permits

a. NASA-STD 8719.11, Safety Standard for Fire Protection, requirements for flame/spark producing devices and welding shall be met.

b. Contractor shall obtain a KSC Form 2-271, Hot Work, New Construction, Demolition Permit when using a non-flame heat producing devices used within 10 feet of flammable, combustible, or explosive materials.

c. KSC Hot Work Permit(s) shall be obtained from Kennedy Fire Services prior to any:

(1) Hot work for demolition, modification or new construction that includes welding, cutting, burning, open flame and heat producing operations, soldering, heat sealing, or any spark producing operation (e.g., grinding). Complete KSC Form 2-271 (see sample form in Appendix L).

(2) Hot work for roof construction or repair using “tar kettle” or “torchdown” operations. Complete KSC Form 2-272 (see sample form in Appendix M).

d. The CO shall facilitate obtaining the hot work permit.

e. The contractor shall comply with all requirements identified on the hot work permit.

Note: The Fire Inspector who issues the permit will perform an on-site inspection and briefing prior to issuing the permit and will inspect the site periodically to ensure hot work requirements are being met and prior to any permit renewal.

f. The contractor shall comply with all requirements identified on the permit and have the permit posted in a visible and accessible area on the job site to employees and inspectors for the duration of operations it was issued for.

g. All combustible material shall be cleared from the hot work area.

h. Fire resistant guards, curtains, or shields shall be used as required.

i. All combustibles (e.g., trash, debris, wood) shall be removed daily.

j. All flammable liquids and propane cylinders shall be removed from roofs at the end of each work day.

k. Flammable gas containers shall be of the approved safety type with spark arresting screen in filler neck, cap, and vent cap intact and an attached HMIS label with correct information.

l. A fire watch shall monitor all areas where hot work has been performed for the minimum time specified in the permit after hot work is stopped. This includes breaks, lunch, and end of shift.

m. The fire watch (where applicable by permit) shall be familiar with fire watch duties and be trained to operate the approved fire extinguishers.

n. The permit shall identify the type and number of fire extinguishers required for the type of work and size of the area of work being performed.

3.14 Industrial Hygiene

a. In addition to meeting all OSHA regulations involving Industrial Hygiene, the contractor shall comply with KNPR 1840.19, KSC Industrial Hygiene Program.

b. The contractor shall provide employees with an environment in which occupational health hazards are identified, evaluated, and eliminated or controlled in such a manner that personnel do not suffer adverse health effects as a result of their employment.

c. Additionally, the contractor shall ensure:

(1) Workplace inspections are conducted and operations/procedures are reviewed to identify hazardous materials and physical agents.

(2) SDS for materials used in the workplace are reviewed to identify health hazards, symptoms of exposure, and requirements for safe use of the material.

(3) Employees are aware of hazardous materials and physical agents in the work area, understand the requirements for safe work with these materials and agents, and know what actions to take in an emergency (e.g., chemical spill or release).

3.15 Ladders and Stairways

External Reference: 29 CFR 1926, Subpart X provides OSHA regulations concerning Ladders and Stairways.

3.15.1 Ladders

a. The contractor shall ensure that each employee using ladders is trained on recognizing the fall hazards, proper placement, use and construction of, maximum intended load, and the standards of 29 CFR 1926 Subpart X, as applicable.

b. The contractor shall inspect ladders daily prior to use.

c. Employees working on ladders shall:

(1) Maintain three points of contact at all times (i.e., one hand and two feet, two hands and one foot). Always face the ladder when performing all work.

(2) Maintain the stability of the ladder by avoiding overreaching.

(3) Keep the belt buckle or the centerline of the body between the rails.

(4) Ensure the balance of the ladder by refraining from placing one foot on an adjacent surface while the other foot is on the ladder.

(5) Ensure material, equipment, and tools are not carried by hand while ascending or descending a ladder.

d. Stepladders shall be used in the fully opened and locked position.

e. Ladders shall have appropriate identification and warning labels per the manufacturer.

3.15.2 Stairs

a. OSHA regulation 29 CFR 1910.25 provides requirements regarding stairs.

b. Stairs shall be provided for access to office trailers or other transportable work locations.

c. Stairway platforms shall be no less than the width of a stairway and a minimum of 30 inches in length measured in the direction of travel.

d. Standard railings and mid-rails shall be provided on the open sides of all exposed stairways and stair platforms.

e. Handrails and mid-rails shall be provided on at least one side of closed stairways preferably on the right side descending.

3.16 Lockout/Tagout (Control of Hazardous Energy)

Lockout/Tagout (LOTO) is the process of configuring equipment in a temporary condition in which the unexpected release of energy is prevented from endangering personnel performing servicing or maintenance tasks. A safe energy state shall be established in accordance with the applicable standard for the scope of work.

3.16.1 LOTO Devices

OSHA requires the use of tags as warning devices to alert personnel of the LOTO status, but tags do not provide physical restraint to prevent a device from being activated. Physical restraint is provided by locks. OSHA requires the use of locks in all LOTO situations where it is physically possible to attach a lock.

a. When conducting LOTO processes at KSC, and it is not physically possible to attach a lock to a device being locked out, a procedure shall be written to explain why it is not physically possible to apply a lock and to define how the hazards will be isolated in the absence of a lock.

b. Each authorized employee shall be issued locks, tags, multiple lock hasps, or other LOTO devices as deemed necessary, either individually or in a kit form (e.g., centralized locker) by his or her supervisor or designee.

c. Locks shall be identified using KSC Form 20-195a (Lockout Identifiers) (see sample form in Appendix N).

d. Only KSC Form 20-195 (see sample tag in Appendix O) shall be used as the LOTO tag.

e. Only authorized employees trained in LOTO shall be permitted to apply KSC Form 20-195.

f. KSC Form 20-195 shall not be used for any other purpose other than LOTO.

g. In addition to attaching KSC Form 20-195 to the lock, KSC Form 20-195a shall also be attached directly to the lock as a unique identifier (see sample tags in Appendix O and N).

3.16.2 LOTO Procedures

Refer to this section in KSC-UG-8715.3, KSC Safety User's Guide, for additional guidance/suggestions on this topic.

3.16.3 Group LOTO

a. OSHA regulations 29 CFR 1910.147 concerning Group Lockout/Tagout (Control of Hazardous Energy) shall be met.

b. Each authorized employee shall affix a personal lockout and tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work and remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

3.16.4 LOTO Device Removal

In situations where the authorized employee is not available to remove LOTO devices, it shall be permissible to remove the LOTO device under the direction of the authorized employee's supervision, provided that all of the following conditions are met:

a. At least one attempt is made to contact the authorized person who applied the device(s), verifying that the authorized employee who applied the device is not at the facility.

b. The authorized employee's supervisor and another authorized employee must be present.

c. A determination is made that it is safe to start the equipment/machinery prior to removing the LOTO device.

3.16.5 LOTO Training

3.16.5.1 General Requirements for Affected and Authorized Employees

a. Training shall be conducted and documented for all Affected and Authorized employees.

b. Employees shall receive initial training or instruction in LOTO to ensure that the purpose and function of the LOTO (energy control) program are understood.

c. The employer shall ensure employees acquire the knowledge and skills required for the safe application, usage, and removal of the energy controls.

d. Employees shall be trained in LOTO requirements in accordance with their assigned (or designated) level of responsibility.

e. The employer shall certify that employee training has been accomplished and that employee training is current.

f. The certification shall contain each employee's name and dates of training.

g. A written/electronic test shall be completed as part of the training/certification.

h. External Reference: As required by NFPA 70E Section 110.2, retrain employees in LOTO requirements at least every 3 years.

3.16.5.2 Training Requirements for Authorized Employees

a. Authorized Employee training shall be in accordance with 29 CFR 1910.147(c)(7)(i)(A).

3.16.5.3 Training Requirements for Affected Employees

Affected employees are those who operate or use the equipment being serviced or maintained or others in the area where equipment is locked or tagged out. Training for affected employees shall ensure that these employees are able to:

a. Recognize when LOTO procedures are being implemented.

b. Understand the purpose of LOTO procedures and the importance of not attempting to startup or use equipment/machinery that has been locked or tagged out.

3.16.6 Recordkeeping/Documentation

a. Each construction contractor shall maintain inventory records of locks and tags.

b. Inventory lock records shall include:

(1) Number of locks on hand.

(2) Locks including their serial number issued to the employee using them.

(3) Issued person's name.

(4) Lock numbers lost or destroyed.

Note: Completing KSC Form 28-915 NS, Lockout Lock and Lockout Tag Inventory Record, meets these requirements. NASA organizations should use this form. Contractors may utilize this or other forms provided that the data elements required above are addressed. See Appendix P for a sample form.

c. Tag control records shall include:

(1) Numbers of tags received (lot numbers).

(2) Tag numbers issued to employees.

(3) Tags issued to specific shops or facilities (if applicable).

(4) Numbers of tags lost or destroyed.

Note: Completing KSC Form 28-915 NS, Lockout Lock and Lockout Tag Inventory Record, meets these requirements. NASA organizations should use this form. Contractors may utilize this or other forms provided that the data elements required above are addressed. See Appendix P for a sample form.

d. Contractor will provide an inventory of used and unused NASA LOTO tags to their NASA Safety representative prior to the punch-list walk-down

3.17 Personal Protective Equipment (PPE)

Personal Protective Equipment requirements applicable to contractors are located in KNPR 8715.5, KSC Personal Protective Equipment (PPE) Procedural Requirements. In addition to these requirements, the following also apply.

a. The contractor shall take all necessary precautions to protect employees and provide at contractor expense any personnel protective devices and safety equipment required.

b. The contractor shall ensure that any PPE required (including employee-owned PPE) is provided, used, and maintained in a compliant condition.

c. The contractor shall document that all employees have received and understood the PPE training provided.

d. Contractor employees shall wear approved hard hats as required by the SSSP.

(1) ANSI/ISEA Z89.1 (Latest Revision) Class G or E hardhats shall be used.

(2) ANSI/ISEA Z89.1 (Latest Revision) Class C hardhats shall not be used on construction sites at KSC.

e. Approved industrial type safety glasses with side shields meeting the requirements of ANSI/ISEA Z87.1 (Latest Revision) shall be worn by contractor personnel if eye injuries may result from the task being performed.

f. When there is a potential crush hazard to the feet, safety type shoes shall be worn.

Note: It is recommended that all employees wear safety-toed shoes or boots. Safety toe work shoes may be required depending on the type of work being performed.

g. Arc rated/flame resistant clothing shall be worn for designated tasks that present a potential for arc flash, flash fire, or explosion.

3.18 Process Safety Management

a. Contractors working in areas covered by the OSHA Process Safety Management (PSM) Standard shall schedule an employee awareness briefing on PSM through the CO and ensure all employees attend prior to starting work.

b. The contractor shall ensure all employees are informed of the known potential fire, explosion, or toxic release hazards associated with a facility in which the contractor is performing work prior to starting work.

c. The contractor shall ensure all employees are briefed on the applicable provisions of the facility emergency action plan by conducting a facility safety briefing prior to commencement of work.

d. The contractor shall ensure that any new employees brought to the job site receive facility safety training prior to entering process areas.

e. The contractor shall ensure that employees follow the safety rules of the facility including all safe work practices.

f. The contractor shall inform the project CO, COR, and assigned Safety Specialist of any unique hazards to the facility presented by the contractor's work, or of facility hazards found during the contractor’s work.

3.19 Radiation Protection

a. External References: 29 CFR 1926.53 and 1926.54 provide OSHA regulations concerning Radiation Protection.

b. Radiation Protection requirements shall apply if the contract involves the use of ionizing or non-ionizing radiation producing equipment, devices, materials, or operations such as radiographic projectors, lasers, radio frequency (RF)/microwave transmitters, X-ray fluorescence (XRF) detection systems, or radioactive materials.

c. The contractor shall provide physical restraining barriers to protect surrounding area personnel from the emission of any radiation (e.g., weld testing, weld x-rays), preclude access to restricted areas by unauthorized personnel, and post the appropriate radiation hazard warning signs.

d. The contractor shall comply with KNPR 1860.1, KSC Ionizing Radiation Protection Program, KNPR 1860.2, KSC Non-Ionizing Radiation Protection Program, and applicable Federal, state, and local regulations for these types of activities performed.

3.20 Respiratory Protection

External References: 29 CFR 1926 Subpart E and 29 CFR 1910.134 provides OSHA regulations concerning Respiratory Protection.

3.20.1 Respiratory Protection Plan

a. This section shall apply to all contracts involving asbestos abatement, abrasive blasting, painting, and other work where hazardous atmospheres can be anticipated.

b. Contractors whose work requires the use of respiratory protection PPE shall provide a written plan for such work as part of its SSSP.

c. The respiratory protection plan shall be submitted for review and approval by the CO, Industrial Hygiene, EPOC, and NASA Safety.

d. The plan shall list all of the required respiratory protection PPE that will be used for the contracted work and the basis for its selection.

e. The respiratory protection plan shall be maintained by the contractor at the worksite for the duration of the contracted work.

3.20.2 Respirator Selection and Exposure Monitoring

a. Each contractor performing work that requires use of respiratory protection PPE shall perform a pre-work exposure assessment to determine appropriate respirator selection and identify that PPE in its site-specific respiratory protection plan.

b. The contractor's site-specific respiratory protection plan shall describe the contractor's exposure monitoring approach to demonstrate the proper selection of respiratory PPE.

c. Monitoring records shall be maintained at the worksite and be available for government inspection.

3.20.3 Breathing Air

a. The contractor shall take precautions to ensure that connectors used in contractor-supplied breathing air systems are incompatible with connectors present on either KSC gas systems or on contractor supplied systems that are used to supply non-respirable gases.

Note: KSC-STD-Z-0008, Standard for Design of Ground Life Support Systems and Equipment, establishes requirements for connectors to be used in KSC facility breathing air and non-respirable gas systems. Facility breathing air systems located at KSC/CCAFS are to use a Hansen 3/8 inch quick disconnect as a breathing air distribution interface. KSC facility non-respirable gas systems are to use ¼ inch quick disconnects for gas distribution interfaces. Although most facility systems were designed in accordance with this standard, there are nonconforming locations at KSC.

b. The contractor shall be permitted to use KSC facility breathing air systems if available.

Note: The breathing air test and the safety inspection can be coordinated through the CO, and will be at no cost to the contractor.

c. The contractor shall perform a Pre-Work Site Inspection to identify coupling types in use at the work location before mobilizing or using any breathing air equipment.

d. The contractor shall also submit a written certification to show the contractor's breathing air system has been recently inspected and meets Grade D breathing air standards.

Note: Alternately, the contractor may arrange for on-site testing of contractor-supplied breathing air by the Government at least five days prior to start of work.

e. The contractor shall also provide a worksite evaluation for NASA Safety to review before using any breathing air system.

f. The contractor shall tag or label connector ends of all lines and flexible hoses of contractor-provided breathing air or non-respirable gas distribution systems with tags or labels that clearly identify the contents of the lines or hoses.

g. The contractor shall provide a description of the steps taken to comply with these requirements in their SSSP submittal.

3.21 Rollover Protection for Mobile Equipment

a. Rollover protection devices and seatbelts shall be in place on all special purpose equipment at all times.

Note: Equipment includes crawler and rubber-tired tractors with or without attachments (e.g. such as front end loaders, blades, self-propelled earth movers, including pan scrapers, bottom dumps, side dumps, rollers, utility vehicles, golf carts, graders).

b. Special purpose equipment without rollover protection devices shall not be allowed on the construction site.

Note: Special purpose equipment may be exempted from seatbelts if allowed by the manufacturer's requirements.

c. Seatbelts shall be utilized anytime the equipment is in operation.

3.22 Scaffolding

a. External Reference: 29 CFR 1926 Subpart L provides OSHA regulations concerning Scaffolding. KSC-STD-S-0033 provides KSC requirements concerning fall protection and scaffolding.

b. The contractor shall designate a competent person (scaffolding) for the erection and inspection of any scaffolding systems used on the contract.

c. If protection systems cannot be used, a qualified person shall develop a fall protection plan.

d. Scaffold platforms where the potential for a fall of four feet or greater exists shall be protected by the use of fall protection systems (guardrails, fall arrest, fall restraint).

> *Note 1: A competent person in scaffolding is one who is capable of identifying existing and predictable hazards as it relates to scaffolding in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.*
>
> *Note 2: A qualified person in scaffolding is a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.*

e. Scaffold users shall confirm that a competent person (scaffolding) has inspected the scaffolding during that work shift before they access the scaffolding.

f. The inspection shall be documented and available to employees that access the scaffold.

> *Note: A recommended documentation process includes a tag attached to the scaffold that shows the inspector's name and date/time of each inspection.*

g. Guardrails and toe boards shall be installed on all open sides and ends of platforms more than four feet above the ground or floor.

h. All planking used on scaffolds shall be <u>scaffold grade</u>, or equivalent.

i. Scaffolds that are not rolling tower-type scaffolds shall not be moved while employees are on them.

j. Moving rolling tower type scaffold while employees are on them shall be permitted only when all of the following conditions are met:

(1) The maximum scaffold height does not exceed twice the minimum base width/length.

(2) The surface on which the scaffold is being moved is within three degrees of level and free of pits, holes, and obstructions.

(3) Employees on scaffold have been made aware of the move.

(4) Forces will be applied at points below five feet above the base of the structure.

(5) No portion of the employee on the scaffold extends outward beyond the wheels, casters, or other supports.

k. Minimum clearance from power lines for any scaffold component shall be:

(1) Insulated Lines less than 300 volts: 3 feet

(2) Insulated or non-insulated lines less than 50 kV: 10 feet

(3) Insulated or non-insulated lines greater than 50 kV: 10 feet + 4” for each kV > 50 kV

l. Ladders or any makeshift device such as a box or barrel shall not be used to increase the working level height of employees on the scaffold.

m. All work shall be accomplished from the scaffold deck.

n. No employee shall climb the outside framework or cross braces of a scaffold.

o. All scaffold access shall be by ladder, walkway, ramp, or stairs.

p. No material shall be stored on scaffold decks.

q. Material staged on the scaffold deck for immediate installation or use that is not installed or used shall be removed from the scaffold when work is stopped for the day.

r. Contractors shall ensure employees who perform work (scaffold user) while on a scaffold are trained in accordance with the requirements identified in 29 CFR 1926.454.

s. Documentation of employee scaffold user training shall be provided as part of the contractor’s SSSP submittal.

3.23 Steel Erection

a. External Reference: 29 CFR 1926 Subpart R provides OSHA regulations concerning Steel Erection.

Note: In accordance with section 3.8, steel erection work will comply with KSC-STD-S-0033, KSC Fall Protection Standard.

b. The contractor shall have a Site Specific Steel Erection Plan that includes a complete final copy of specifications and drawings issued for construction by the design Professional Engineer (PE).

Note: A Preconstruction conference and site inspection should be conducted between the erector, contractor, project engineer, and any additional personnel needed to develop and review the site-specific steel erection plan.

c. Prior to commencement of steel erection the contractor shall ensure the following written notifications have been received:

(1) Concrete footings, piers and walls, and the mortar in masonry piers and wall as attained, on the basis of an appropriate ASTM standard test method of field cured samples either 75 percent of the intended minimum compressive design strength of sufficient strength to support the loads imposed during steel erection.

(2) Any repairs, replacements, and modification of the anchor bolts shall be conducted in accordance with 29 CFR Subpart R Steel Erection 1926.755(b).

3.24 Elevating and Rotating Work Platforms

External Reference: 29 CFR 1926 Subpart L, Appendix C, provides OSHA regulations concerning Elevating and Rotating Work Platforms.

3.24.1 General Requirements for Elevating Work Platforms

a. “Field Modification” of aerial lifts for uses other than those intended shall be permitted only after the modification has been certified in writing by the manufacturer or by a nationally recognized testing laboratory in accordance with all applicable provisions of ANSI/SAIA A92-2, A92.3, A92.5, and A92.6.

Note: If a request to evaluate a “field modification” is submitted to the manufacturer and a response is not received within a reasonable time period, a Professional Engineer may be assigned to evaluate the unit and calculate a process to modify the unit, adding the necessary fall protection devices necessary to safely use the lift.

b. Boom and basket load limits specified by the manufacturer shall not be exceeded.

c. Electrical tests performed on high voltage bucket trucks shall be made in conformance with the requirements of ANSI/SAIA A92-2.

d. If lift equipment is modified, as outlined above, all welding shall conform to the Automotive Welding Society (AWS) Standards.

e. When operating aerial lifts under, over, by, or near energized electric power lines, the operator shall not approach closer than the restricted approach boundary as defined in NFPA 70E, Table 130.2(C).

f. A personal fall restraint or arrest system shall be required for all employees in any lift.

g. An energy-absorbing length-adjustable lanyard or personal fall limiter (PFL) and a full body harness shall be used.

h. The lanyard or PFL shall be connected to an approved anchor point in the basket and adjusted in length in such a manner that it reduces the possibility of the worker falling over the guardrails yet permits the work to be accomplished.

3.24.2 Operations

a. Lift controls shall be tested each day prior to use to determine that such controls are in safe working condition.

b. Fall protection equipment shall only be used by personnel that have been properly trained.

c. Fall protection equipment shall be inspected prior to each use.

d. Attaching fall arrest or positioning lanyards to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted.

e. The brakes shall be set and outriggers, when required, be positioned on pads or a solid surface.

f. Wheel chocks shall be installed before using an aerial lift on an incline.

g. Aerial platforms shall not be operated in any manner on grades, side slopes, or ramps exceeding those for which the aerial platform is rated by the manufacturer.

h. An aerial lift truck shall not be moved when the boom is elevated in a working position with employees in the basket.

i. Articulating Boom and Extensible Boom Platform Operation

(1) Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have operational platform (upper) and lower controls.

(2) Upper controls shall be in or beside the platform within easy reach of the operator.

(3) Lower controls shall provide for overriding the upper controls.

(4) Controls shall be plainly marked as to their function.

(5) Lower level controls shall not be operated unless permission has been obtained from the employee in the lift, except in case of emergency.

3.24.3 Work Practices

a. Employees shall keep all parts of the body inside the platform during raising, lowering, and positioning.

Note: This provision does not apply to an occupant of the platform performing the duties of a signal person.

b. Employees shall always stand firmly on the floor of the basket and not sit or climb on the edge or railings of the basket or use planks, ladders, or other devices to gain additional elevation or for a work position.

c. If the employee must exit the lift, the employee shall use the double lanyard system.

d. To use the double lanyard system, the employee(s) exiting the lift shall:

(1) Remain tied in the lift with one lanyard.

(2) Attach the second lanyard to a fixed anchorage on the structure.

(3) Disconnect the first lanyard from the lift and climb out.

(4) Not exit the lift if not properly secured.

(5) Reverse the process upon re-entry to the lift.

(6) Maintain 100% fall protection throughout the process.

e. The employee shall exit the lift by use of a gate and not exit the lift by climbing on or over the railing.

f. Employees shall be permitted to use the lift as a fall protection tie-off point when performing work outside the lift ONLY when the lift is equipped with original equipment manufacturer (OEM) external fall protection anchorage and the manufacturer intended the lift to be used in this manner.

3.24.4 Inspection and Maintenance

a. Elevating and rotating work platforms shall be inspected daily and not be placed in service if the inspection shows any condition adversely affecting the safety of the vehicle.

b. If the contractor is working more than one shift per day, inspections shall be done at the start of each shift.

c. The following items shall be inspected:

(1) Operating controls and associated mechanisms for conditions interfering with proper operation.

(2) Visual and audible safety devices for malfunction.

(3) Hydraulic or pneumatic systems for observable deterioration or excessive leakage.

(4) Fiberglass and other insulating components for visible damage or contamination.

(5) Operational and instructional markings for missing or illegible text...

(6) The aerial device electrical systems for malfunction, signs of excessive deterioration, dirt and moisture accumulation.

(7) Visual inspection of bolts, pins, and other fasteners for loose, deformed, or missing fasteners and other locking devices.

d. Any suspected items shall be carefully examined or tested and a determination made by a qualified person as to whether they constitute a safety hazard.

e. All unsafe items shall be replaced or repaired before use.

f. Elevating and rotating work platforms that are used on an around the clock basis shall be examined after each shift.

g. If defects are found, they shall be immediately reported and corrected.

h. Inspections shall be documented, signed, and kept with the equipment at the worksite.

i. If operators change during the same shift, they shall review the inspection document and initial it if the status of the vehicle did not change.

3.24.5 Training Requirements

a. Employees shall receive formal training in elevated work platforms before being allowed to operate any aerial lift as defined by this procedure.

b. Employees shall receive formal training in fall protection equipment before operating in an aerial lift.

c. Training documentation shall be submitted for NASA Safety review/approval prior to the initiation of the respective work activities.

d. All training documentation shall be submitted with sufficient review time in accordance with KNPR 8715.7 2.1 (f) (Note).

3.25 Welding and Cutting Operations

a. Only employees properly trained and certified to operate welding and torch equipment shall operate such equipment.

b. All welding and cutting operations shall be in accordance with KSC Fire Prevention Procedures for Contractors and the National Fire Protection Association 51B.

c. A KSC Hot Work Permit(s) shall be obtained from Kennedy Fire Services prior to any hot work for demolition, modification, or new construction that includes welding, cutting, burning, open flame and heat producing operations, soldering, heat sealing, or any spark producing operation (e.g., grinding). (KSC Form 2-271)

d. The contractor shall ensure flammable materials are at least 50 feet and combustibles 35 feet from welding operation. Exceptions are only authorized when approved by the KSC Fire Inspector when:

(1) The flammable and combustible materials cannot be relocated.

(2) The work cannot be accomplished by any other means.

(3) The flammable and combustible materials are protected by the use of welding blankets or other fire inspector approved methods.

e. Welding and cutting operations shall not be conducted in the vicinity of flammable liquids, gases, vapors, or oxygen enriched atmospheres.

f Prior to any torch cutting or welding on any painted surface, the coating shall be removed a minimum of 4 inches in each direction from the cut/weld point or the OSHA standard 29 CFR 1926.62 and 29 CFR 1926.354 PPE requirements must be met.

g. Only approved equipment (e.g., torches, regulators, pressure reducing valves, acetylene generators, gas hoses, electrical cables) shall be acquired and used for hot work operations.

h. All work shall be properly shielded from observation of the bare arc by adjacent or passing personnel.

i. Arc welders shall conduct inspections daily before beginning operations to ensure their equipment is clear of defects and safe to use. Report any defects to supervision.

j. All portable cylinders used for storage and transportation of compressed gasses shall be constructed and maintained in accordance with the regulations of the U.S. Department of Transportation (DOT).

k. Labeling or marking of Cylinders used in Welding

(1) Cylinders shall be legibly marked with either the chemical or trade name of the gas contained.

(2) Cylinder labeling or marking shall be by means which is not easily removed.

(3) When practical the marking shall be on the shoulder of the cylinder.

l. Compressed gas cylinders shall be equipped with valves and connections that comply with ANSI requirements.

m. Cylinder valves shall be closed before moving cylinders, when work is finished, and when empty.

n. Acetylene is flammable and highly explosive when mixed with air. As such, it shall be handled and stored safely as follows:

(1) Acetylene shall be stored in a vertical position.

(2) Never use acetylene at a pressure higher than 15 psig.

(3) Where cylinders have been lying in a horizontal position, they shall stand in an upright position for at least two hours prior to use.

o. Cylinders shall be placed in storage when there is no reasonable anticipation of use within a 24 hour period.

p. Cylinders in use or transport shall be stored in an upright position and secured by chain or bracket that prevents falling. The preferred method is an approved welding cart.

q. When transporting cylinders by a crane or derrick, a cradle, boat, or suitable platform shall be used.

r. Slings, chokers, ropes, or electric magnets shall not be used for this purpose.

s. Valve protection caps shall always be in place when not in use or inter connected.

t. Cylinders shall not be dropped, struck, handled roughly, or permitted to strike each other violently.

u. Valve caps shall be used to protect valves from damage.

v. Valve caps shall not be used as a lifting device (ANSI Z49.1 10.8.3.7).

w. Valve protection caps shall be installed before moving the cylinder unless the cylinder is secured on a special truck.

3.26 Working Over or Near Water

a. External Reference: 29 CFR 1926.106 provides OSHA regulations concerning Working Over or Near Water.

b. A serviceable United States Coast Guard (USCG)-approved life vest or buoyant work vest shall be worn by all employees required to work within six feet of an unprotected edge that is over water.

3.27 Work Zone Maintenance of Traffic (MOT)

a. Where work is accomplished on or within 15 feet of the roadway, a work zone safety Maintenance of Traffic (MOT) plan shall be developed as a part of the contractor's SSSP by an individual trained to the advanced or intermediate MOT level.

b. The MOT plan shall be developed and implemented in accordance with the most current Florida Department of Transportation (FDOT) standards.

> *Note: In lieu of an engineered plan, pre-designed plans found in FDOT Design Standard for Traffic Control through Work Zones, Index 600, may be used.*

c. MOT's shall be submitted to the CO and NASA Safety as part of the SSSP or as the need for such a plan arises.

d. All employees working within 15 feet of a roadway or street shall wear reflective vests compliant with ANSI/ISEA 107 – 2015 Class 2 High-Visibility Safety Apparel. Class 3 is required for flaggers performing work at night.

e. The contractor site supervisor managing traffic control set up shall be trained to the intermediate or advanced MOT level.

f. The Intermediate or Advanced trained MOT person shall verify or ensure the control zone is correctly set up prior to the start of each day's work.

g. Only trained flagmen shall be used to control traffic through work zones.

h. The flagman shall have no other duties assigned while the traffic control zone is established.

i. The verification of training shall be submitted in the training section of the contractor's SSSP.

APPENDIX A: DEFINITIONS

Acetylene: At 70° F and atmospheric pressure, pure acetylene is a colorless, odorless, gas. The commercial grade of acetylene, generated from calcium carbide, has a distinctive garlic odor.

Low pressure – at or below 1 psig

High pressure – above 1 psig, but not exceeding 15 psig

Action Level: The concentration or level at which the use of control measures becomes mandatory. The Action Level is used when variations of measured air contaminant levels can exceed the regulated level. Unless otherwise mandated by a specific regulatory or consensus standard, the "action level" is set at one-half of the exposure limit of the hazardous material.

Adverse Weather: Winds in excess of 50 knots, heavy rain or hail, or the potential for lightning within 5 nautical miles that could affect the area within 30 minutes.

Anchorage (Anchor Point): A secure point of attachment for lifelines, lanyards, or deceleration devices. It shall be capable of supporting 5000 pounds per person or designed by a qualified person with a safety factor of 2.

Approved: Listed and approved by Underwriters Laboratories, Inc., Factory Mutual Engineering Corporation, The Bureau of Mines, National Institute for Occupational Safety and Health (NIOSH), ANSI, NFPA, or other nationally recognized agencies which list, approve, test, or develop specifications for equipment to meet Fire Protection, Health, or Safety requirements or acceptable to the authority having jurisdiction.

Asbestos Containing Material (ACM): Any material that contains greater than one percent asbestos by volume.

Authority Having Jurisdiction: The NASA organization/directorate, office, or individual responsible for approving equipment, an installation, or a procedure.

Brazing: A process where metals are soldered together by heating the metal to temperatures above 800° F and using a nonferrous filler metal having a lower melting point to join the metals together.

Close Call: An event in which there is no injury or only minor injury requiring first aid and/or no equipment or property damage, or minor equipment or property damage of less than $20,000, or no injury or only minor injury requiring first aid, but which possesses a potential to cause a mishap.

Competent Person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them.

Compressed Gas Cylinder: A container specifically designed for compressed gases. High pressure cylinder means those approved for service pressure of 900 psig or greater. Low pressure cylinders are those marked with a service pressure of less than 900 psig.

Confined Space: A space that is large enough and configured so that a worker can bodily enter and perform assigned work, and has limited or restricted means of entry or exit, (for example: tanks, vessels, storage bins, vaults, pits and spaces that may have limited entry), and is not designed for continuous human occupancy.

Connector: A device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabineer, or it may be an integral component part of the system, such as a buckle or D-ring sewn into a body belt, body harness, or snap hook spliced or sewn to a lanyard or self-retracting lanyard.

Contracting Officer: A person with the authority to enter into, administer, and terminate contracts and make related determinations and findings.

Contracting Officer's Representative (COR): An individual, including a contracting officer's technical representative (COTR), designated and authorized in writing by the contracting officer to perform specific technical or administrative functions.

Critical Lift: Lifts where failure/loss of control presents an elevated risk of serious injury, loss of life, or loss of one-of-a-kind articles, high dollar items or major facility components whose loss would have serious programmatic or institutional impact. Critical lifts also include lifting of personnel with a crane, lifts exceeding 75 percent of the rated capacity of the crane, and lifts involving more than one crane.

Crystalline Silica: Crystalline silica is a basic component of soil, sand, granite, and many other minerals. Quartz is the most common form of crystalline silica. Cristobalite and tridymite are two other forms of crystalline silica. All three forms may become respirable size particles when workers chip, cut, drill, or grind objects that contain crystalline silica.

Daisy Chaining: *(Electrical Extension Devices)* Plugging one or more electrical devices into another. (**Piggybacking:** *(Electrical Extension Devices)*

Deceleration Device: Any mechanism, such as a rope grab, rip stitch lanyard, specially woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

Excavation: Any man made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Exposure: The process by which a chemical or physical agent enters the body through any route of entry including inhalation, ingestion, or absorption through the skin. Potential for exposure exists where air contaminants are present or where hazardous materials can come into contact with the skin.

Facility: The buildings, containers, or equipment that contains or supports a process.

Failure: Load refusal, breakage, or separation of components.

Fall Arrest System: A system designed to stop one or more persons from striking a lower level or obstructions if a fall occurs. Fall arrest systems require the use of a full body harness, a connecting means, a suitable anchorage, planned rescue procedures, and proper training of all users.

Fire Watch: A person designated to monitor the area around a welder, normally outside an authorized welding shop, to watch for fires resulting from welding, cutting, or torch use operations.

Flammable Gas: Any substance that exists in the gaseous stage at normal atmospheric temperature and pressure. It is capable of being ignited and rapidly oxidized when mixed with the proper portions of air.

Flammable Liquid: Any liquid having a flashpoint below 100 deg. F. (37.8 deg. C.), except any mixture having components with flashpoints of 100 deg. F. (37.8 deg. C.) or higher, the total of which make up 99 percent or more of the total volume of the mixture. Flammable liquids are identified as Class I liquids.

Fuel Gas: Gases such as acetylene, natural gas, hydrogen, propane, methylacetylene propadiene, synthetic fuels, and hydrocarbons are usually used with oxygen to produce heating.

Hazardous Chemical or Material: Any solid, liquid, or gaseous material which meets the hazard reporting requirements of 29CFR 1910.1200. These includes commodities that, under foreseeable conditions, are toxic, carcinogenic, cryogenic, explosive, flammable, pyrophoric, water-reactive, corrosive, an oxidizer, a compressed gas, a combustible liquid, or are chemically unstable.

Hazardous Operation/Work Activity: Any operation or other work activity that, without implementation of proper mitigations, has a high potential to result in loss of life, serious injury to personnel or public, or damage to property due to the material or equipment involved or the nature of the operation/activity itself.

Health Hazard: A health hazard is a chemical or physical agent where it is established that acute or chronic injury or illness may occur in exposed employees, based upon statistically significant evidence in at least one study conducted in accordance with scientific principles.

Hoist (Hoisting): All crane or derrick functions such as lowering, lifting, swinging, booming in and out or up and down, or suspending a personnel platform.

Hole: A gap or void 2 inches or more, (5.1 cm) in its least dimension in a floor, roof, or other walking/working surface.

Hot Work: A work activity that by its nature creates an open source of ignition that is capable of initiating fires or explosions, e.g., electrical or gas welding, cutting, brazing, grinding, or similar flame or spark producing operations.

Hot Work Permit: KSC Welding and Burn Permit issued through KSC Fire Protection Services for operations at KSC

Imminent Danger: An impending or threatening situation which if left uncorrected is likely result in serious injury or property damage.

In Storage: OSHA interprets oxygen/acetylene cylinders to be in storage when it is reasonably anticipated that gas will not be drawn from the cylinder within 24 hours (overnight hours included). "Reasonably anticipated" is based on whether specific welding or cutting work is planned or scheduled within a 24 hour period from the last use.

Industrial Hygiene: The profession devoted to the prevention of occupational illness or disease associated with exposures to hazardous materials and physical agents.

Infeasible: It is impossible to perform the construction work using a conventional fall protection system (i.e. guardrail system or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

Live Parts (Electrical): Energized conductive components.

Lockout/Tagout (LOTO): The process of configuring equipment in a temporary condition in which the release of energy is prevented from endangering personnel performing servicing or maintenance. The placement of a lock/tag on the energy isolating device in accordance with the established procedure, indicating that the energy isolating device shall not be operated until removal of the lock/tag in the accordance with the established procedure.

Maximum Intended Load: The total load of all persons, equipment, tools, materials, transmitted loads, and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.

Mishap: An undesired and unexpected event that results in injury requiring more than first aid, occupational illness to personnel, or damage to property of at least $20,000. Reference NPR 8621.1, for defined levels of NASA mishaps.

Noncompliance: A violation of an OSHA Standard or a provision of this document.

Nuts and Bolts: Pre work meeting to discuss safety, environmental, and operational concerns/aspects of a construction project before field work begins.

Opening: A gap or void 30 inches or more high and 18 inches or more wide, in a wall or partition, through which employees can fall to a lower level. A gap 12 inches or more in its least dimension in a floor, roof or other walking/working surface. Skylights and smoke domes are classified as holes when they do not meet strength requirements (capable of supporting without failure twice the weight of employees, equipment and materials that may be imposed on the cover at any one time).

Platform: A work surface elevated above lower levels. Platforms can be constructed using individual wood planks, fabricated planks, fabricated decks, and fabricated platforms.

Qualified Operator: a person knowledgeable of the equipment's/machine's operations, operations manual, limitations, restrictions, and safety requirements

Qualified Person: A person who, by possession of a recognized degree, licensing (electrical), certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.

Rated Load: The static weight the basic equipment can safely support or lift.

Rescue: Fire Services rescue personnel.

Roofing Work: The hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

Safety: The freedom from conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or harm to the environment**.**

Safety Data Sheet (SDS): Technical information on chemical products published by the chemical manufacturer, formulator, or importer. The SDS contains product name, ingredients, toxicity, physical and chemical characteristics, fire and explosion data, health hazard information, and emergency and disposal procedures.

Serious Accident/Incident: Accident/incident resulting in an injury or illness requiring prompt medical treatment or in situations such as fires, facility or government property damage (estimated at $20,000 or more), hazardous material or chemical spills, threatening behavior or workplace violence, explosions, bomb threats or a wild animal sighting that poses an immediate threat to any employee.

Steel Erection: Construction, alteration or repair of steel buildings, bridges and other structures, including the installation of metal decking and all planking used during the process of erection. Steel erection activities include hoisting, laying out, placing, connecting, welding, burning, guying, bracing, bolting, plumbing and rigging structural steel, steel joists and metal buildings; installing metal decking, curtain walls, window walls, siding systems, miscellaneous metals, ornamental iron and similar materials; and moving point to point while performing these activities.

Stop Work Authority (Safety): Authority provided to all employees at KSC to stop work or work tasks that pose an imminent danger to the employee(s) performing the work or others in the area. The authority is limited to the location where the imminent danger is present.

Stop Work Order (Safety): A directive from the Contracting Officer to cease part or all jobsite work for not following safety and health procedures, imminent danger situation or conditions, accumulation of safety violations, etc.

Toe Board: A low protective barrier that prevents material and equipment from falling to lower levels and provides protection from falls for personnel.

Unprotected Sides and Edges: Any side or edge (except at entrances to points of access) of walking/working surface (e.g., floor, roof, ramp, or runway) where there is no wall or guardrail system at least 39 inches high.

Violation: An omission or commission, a condition, or a situation that is in conflict with the procedures, standards and the requirements of safety and health standards.

Violation (Repeat): Occurring more than once; usually after it being previously identified; may be classified as minor or serious

Violation (Willful): A violation committed with an intentional disregard of, or plain indifference to, the requirements of OSHA or this document.

Voluntary Protection Program (VPP): VPP is a cooperative effort between OSHA, employers, employees, and unions that rewards exemplary safety and health programs which go beyond federal law requirements.

Walking/Working Surface: Any surface, whether horizontal or vertical on which an employee walks or works, including but not limited to floors, ramps, bridges, runways, formwork and concrete reinforcing steel. Does not include ladders, vehicles, or trailers on which employees must be located to perform their work duties.

Welder or Welding Operator: As used herein are intended to designate any certified operator of electric or oxyfuel gas welding or cutting equipment, or allied processes.

Welding, Electric: The process in which electrical energy is converted into heat for welding (i.e. arc welding and resistance welding)

Welding, Gas: A group of welding processes wherein fusion is produced by heating with a gas flame, with or without the application of pressure or filler materials.

Work Area: The portion of a walking/working surface where job duties are being performed.

APPENDIX B: ACRONYMS

ACM	Asbestos Containing Material
AHA	Activity Hazard Analysis
ANSI	American National Standard Institute
ASTM	American Society for Testing and Materials
AWS	Automotive Welding Society
BOSS	Base Operations Support Services
CCAFS	Cape Canaveral Air Force Station
CFR	Code of Federal Regulation
CMU	Concrete Masonry Unit
CO	Contracting Officer
CoF	KSC Construction of Facilities
COR	Contracting Officer Representative
dB	decibels
dBA	decibels (acoustic)
DEP	[Florida] Department of Environmental Protection
DOT	United States Department of Transportation
EH	Environmental Health
EMS	Emergency Medical Services
EPCRA	Emergency Planning and Community Right-to-Know Act
EPOC	Environmental Point of Contact
FAA	Federal Aviation Administration
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
F.S.	Florida Statute
GFCI	Ground Fault Circuit Interrupter
HEPA	High Efficiency Particulate Air
HMIS	Hazardous Materials Identification Sheet
IEEE	Institute of Electrical and Electronics Engineers
ISEA	International Safety Equipment Association
JHA	Job Hazard Analysis
JSA	Job Safety Analysis
KDP	Kennedy Documented Procedures

KNPR	Kennedy NASA Procedural Requirement
KSC	John F. Kennedy Space Center
kV	Kilovolt
LDEM	Lifting Devices and Equipment Manager
LHNA	Lightning Hazard Notification Area
LOTO	Lockout Tagout
MOT	Maintenance of Traffic
mph	miles per hour
NASA	National Aeronautics and Space Administration
NEC	National Electric Code
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
nm	nautical mile
NOSV	Notice of Safety Violation
NPR	NASA Procedural Requirement
OHF	Occupational Health Facility
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
PACM	Presumed Asbestos Containing Material
PAWS	Pager and Area Warning System
PCN	Project Control Number
PE	Professional Engineer
PMI	Preventative Maintenance Inspection
POC	Point-of-Contact
PPE	Personal Protective Equipment
psig	pounds per square inch gauge
PSM	Process Safety Management
RF	Radio Frequency
SAIA	Scaffold and Access Industry Association
SDS	Safety Data Sheet
SSR	Safety Statistics Record
SSSP	Site-Specific Safety and Health Plan
TAWS	Tornado Area Warning System
TWA	Time Weighted Average

UG	User Guide
USCG	United States Coast Guard
XRF	X-Ray Fluorescence
VPP	Voluntary Protection Program

APPENDIX C: SSSP (TEMPLATE)

The following template will provide guidance during the development of the SSSP.

Note: <u>Bold and *italicized*</u> words found in this example document denote areas the contractor needs to replace with the specific requested information. For sections that do not apply to the contract, the contractor may leave the section headings, delete the content, and insert "Not Applicable."

Site-Specific Safety and Health Plan (SSSP) for project:

____

Project Title

______________________ - ______________________

PCN **Contract Number**

____

Company Name

The following listed Official is <<*Company's Name*>> authority for approval of this SSSP for the above listed project.

____

Name of Company Official **Title** **Signature**

Table of Contents

Safety and Health Sections

Project-Specific Safety and Health Sections

***NOTE*: The contractor should list here any enclosures/appendices that the plan calls for (this may include training certifications, JHAs, fall protection plans, demolition plans, etc.). These appendixes are contractor specific so no example formats are provided in the following example document.**

Safety and Health Sections

1. General Project/Safety and Health Information

<<Company Name>> SSSP is a detailed plan of safety and health information, requirements, and regulations that ***<<Company Name>>*** will follow while conducting all work under NASA/KSC Procurement Office contract ***<<Project Title>>*** located in ***<<building name or number>>***.

a. The work this SSSP covers includes *<<describe here the general scope and statement of work to be performed on the project>>.*

b. This plan is written to address the safety and health aspects of this project's work requirements. Our Corporate Safety and Health plan and program, along with Federal, NASA/KSC, state, and local specific safety and health requirements were used in developing this plan.

c. This plan applies to all construction contractor personnel performing working on the site. ***<<Company Name's and their designated site supervisor employee name>>*** will be responsible for ensuring all employees follow all applicable safety and health regulatory requirements to include this SSSP.

d. All work under this contract will be performed safely so as not to create a hazard to personnel health or property (NASA and contractor). All work will be conducted in accordance with NASA and KSC provisions contained in the contract, all applicable sections of OSHA regulations, and other applicable local, state, and federal laws. ***<<Company Name>>*** will implement safe working practices and furnish equipment to assure a safe working environment.

e. ***<<Company Name>>*** will ensure employee compliance with this SSSP.

f. <***<Company Name>>*** intends to hire the following sub-contractors to perform the work identified on this project. This list includes additional sub-contractors hired by our project sub-contractors. This list will be updated when any new sub-contractor(s) are identified and hired.

<u>Sub Tier Seller Name</u>	<u>Type Work Performed</u>
1. *<<Company A>>*	*Demolition of Existing Facility*
2. <<Company B>>	*Concrete and Masonry*
3. <<Company C>>	*Electrical*
4. <<Company D>>	*Fire Systems*

<u>Definitions:</u>

The contractor may include a section here that defines key terms within the plan to clarify items for their employees.

2. Voluntary Protection Program

a. ***<<Company Name>>*** understands that Kennedy Space Center has implemented a comprehensive safety and health management system and is recognized by the Occupational Health and Safety Administration (OSHA) as a "Voluntary Protection Program (VPP) Star Worksite." Our company further understands that the VPP program promotes effective worksite-based safety and health by encouraging employers and employees to reduce the number of occupational safety and health hazards at their places of employment.

b. Though our company is not required by contract to be VPP certified we will:

(1) Follow the safety and health requirements of our host organization.

(2) Ensure employees are trained that they can report safety and health issues without fear of retaliation and that they can report anonymously.

(3) Support and comply with NASA/KSC contractor oversight program.

(4) Identify, correct, and track uncontrolled hazards on our jobsites in a timely manner.

(5) Comply with NASA/KSC in resolving any non-compliant work practices.

3. Contractor Employee Training

a. All ***<<Company Name>>*** and employees engaged in jobsite activities will have received the required training that allows them to be safe during work activities. Personnel will not perform any work activity on the jobsite until they have received the training required for their job responsibilities and activities.

b. ***<<Company Name>>*** has enclosed a list of employees that will be performing work on the site (*see* ***<<appendix # >>***). The list certifies that the employees have received all required training, and a documented copy of the list will be updated before new employees or sub-contractors begin performing work on the jobsite.

(1) The list will contain the names, date of training, type of training received, and expiration dates of training and training certification of special role employees such as the site supervisor, competent persons, qualified persons, and heavy equipment operators, applicable to this contract.

c. ***<<Site Supervisor's Name>>*** will ensure that new site employees' training is verified prior to the employees being allowed to work on the site and that all safety and health training is accomplished by the organization employees or an outside company qualified to train.

d. ***<<Company Name>>*** plans to use temporary employees on this project. The site supervisor will ensure these employees are trained or verify and certify (document) that they have been trained in basic OSHA and this SSSP requirements for the tasks that they will be performing at the jobsite. ***<<Include this paragraph as applicable>>***

4. Accident/Incident (Mishap/Close Call) Reporting

a. In the event of a serious injury, employees will immediately notify the site supervisor and call 911 or (321) 867-7911 (cell phone on KSC) or (321) 853-0911 (cell phone on CCAFS). Ambulances are on call 24 hrs./day; 7 days/week on both KSC and Cape Canaveral Air Force Station (CCAFS).

b. The site supervisor will report severe mishap incidents (property damage greater than $500,000 or personnel injury/illness equivalent requiring inpatient hospital care or permanent or partial disability) within 1 hour to the Center Institutional Safety Office (321) 867-SAFE, the project CO, and COR by telephone or in person.

c. Less severe mishap or close call incidents (potential for or actual property damage greater than $20,000 or personnel injury/illness equivalent to or exceeds a nonfatal OSHA-recordable occupational injury and does not meet the criteria of a more severe mishap identified above) will be reported to the Center Institutional Safety Office, CO, and COR within 4 hours of the event (or by 7:30 AM the next workday for incidents occurring during shifts other than first shift) by telephone (321) 867-SAFE or in person.

d. Initial mishap or close call notification/report includes all available information such as:

(1) The time and location of the incident

(2) A detailed incident description

(3) The number of persons involved and associated organization(s)

(4) Preliminary worst case estimate of the injuries and direct cost estimate

(5) Causal factors, if known

(6) Corrective/hazard mitigation actions taken

e. In the event of an accident or mishap, the site supervisor will ensure immediate action is taken to secure potentially dangerous conditions (e.g., disconnect electrical power, secure machinery) in order to protect employees. The scene of an accident or mishap will be secured and remain intact until released by KSC Safety, KSC Security, and the Contracting Officer (CO) or the COR.

f. The site supervisor will ensure all potential incident witnesses and affected equipment remains until released by the appropriate NASA authority.

g. The site supervisor will submit to the COR, CO and KSC Institutional Safety Office (SA-E2) a KSC Incident Report, KDP-F-3645 by hand, e-mail, or fax (321) 867-1120 within 4 hours of the mishap/close call. If the report is submitted by non-secure means all personal identification of the employee injured will be removed (name, social security number, etc.).

h. ***<<Company Name>>*** will notify their company president/top-level management or program manager of all incidents that are deemed immediately dangerous to the life and health of their employees.

i. ***<<Company Name>>*** will investigate less severe mishap or close call incidents (unless directed otherwise by the NASA Safety Office) in order to determine the root cause and furnish the CO with a written report within 30 days of the mishap or close call by completing page 2 of the KSC Incident Report (KDP-F-3645, NASA Direct Construction Contractor Mishap Report) which will include the investigation findings and proposed or completed corrective actions.

j. ***<<Company Name>>*** understands that NASA may appoint an observer or investigating authority for any incident.

k. ***<<Company Name>> will*** (in accordance with the requirements of our contract) cooperate with any Government incident investigation.

l. ***<<Company Name>>*** will perform trend analysis of their mishaps/close calls to identify potential reoccurring safety issues and share the analysis results with all worksite employees.

5. Weather Policy

a. ***<<Company Name>>*** will ensure employees on the jobsite are protected from adverse weather conditions. That includes winds in excess of 35 knots, heavy rain/hail, tornados, or the potential for lightning within 5 nautical miles that could affect the area within 30 minutes.

b. The site supervisor will have a means emergency communication and of receiving the KSC weather advisories and warning alerts at all times during work performance. ***<<Company Name>>*** will receive these alerts from a weather warning pager or text message received on a cell phone. These actions are coordinated through the project CO.

c. The site supervisor will alert employees of adverse weather conditions and heat stress advisories in the area. The site supervisor will take appropriate action to protect employees when alerted.

d. ***<<Company Name>>*** will adhere to the work restrictions based upon the table below.

WIND LIMITATIONS TABLE

Steady State	Gusts	Limitations
17.38 knots (20mph)	22 knots (25 mph)	No erection of, or work on floats, spiders, and/or scaffolding
30 knots (34.5 mph)	35 knots (40.3 mph)	No work on facility roofs, structure tops, unprotected areas, or outside hand rails (materials on roofs are secured or removed).
35 knots (40.3 mph)	40 knots (46 mph)	Contractor Supervisors will immediately conduct a walk down of their area for unsecured items.
40 knots (46 mph) and above	45 knots (51.7 mph) and above	Immediate actions will be taken to secure at ground level all loose or unanchored items, equipment, supplies, and materials.

e. The contractor will comply with wind advisories and warnings issued by the 45^{th} Space Wing Weather Office unless an Alternate Wind Advisory Plan is approved as part of the contractor's SSSP. An approved alternate wind plan must contain the following elements

f. Upon notification of a KSC announced Adverse Wind Condition or if wind conditions on the jobsite appear to exceed safe working conditions, the project weather team will determine site specific weather/wind work restrictions.

g. The **<<Project Name>>** project weather team consists of the following personnel:

(1) <<Name of contractor onsite Supervisor>>

(2) <<Name of project BOSS Construction Inspector>>

(3) <<Project CO or COR>>

h. The On-Site Weather Team will evaluate wind conditions by use of the following resources:

(1) The 45th Space Wing weather forecaster (321-853-8484)

(2) Calibrated onsite anemometers. Anemometers will only be used by trained personnel.

(3) Visually check wind socks (if available)

i. Two of the first three methods identified above (minimum of two to corroborate wind readings) will be used to accurately determine wind speeds in the vicinity of the construction worksite

j. Winds will be monitored on a continuous bases and updates recorded in writing hourly at a minimum during a Center wide wind advisory/warning.

Lightning Restrictions

a. A Phase I Lightning Watch indicates that conditions are favorable for lightning to occur in indicated areas within 30 minutes. A Phase I Lightning Watch is intended to provide personnel sufficient lead-time to secure their operations before the forecasted lightning begins. During Phase I Lightning Warnings, task leaders and personnel will prepare to safely halt any operations that may be affected if a Phase II Lightning Warning is announced (i.e., be prepared to safely halt operations that expose personnel to lightning hazards or that are required to be halted if a Phase II Lightning Warning is announced).

b. Phase II Lightning Warning indicates that lightning was observed or is forecasted to occur within 5 nautical miles. Individuals will act to protect themselves from the dangers of lightning upon being notified of a Phase II Lightning Warning. Personnel access to roofs or top levels of structures is prohibited. Electrical systems maintenance and any other operation requiring personnel risk of lightning exposure are prohibited.

Tornado Notification

a. Tornado Watch: Conditions exist for a tornado. Prepare for a tornado warning.

b. Tornado Warning: Tornado has been sighted. Personnel will take cover immediately in approved structures.

Hurricane Condition (HURCON) Policy

a. During the Atlantic Hurricane Season (June 1 through November 30) Florida is subject to extreme destruction associated with hurricanes. ***<<Company Name>>*** and our employees will comply with instructions from the CO and follow the NASA/KSC Hurricane Policy.

b. Hurricane Condition III: Hurricane is forecasted to make landfall or impact the immediate area within 48 hours. Prepare site by securing structures and loose objects. Perform the necessary housekeeping. Prepare for evacuation.

c. Hurricane Condition II: Hurricane is forecasted to make landfall or impact the immediate area within 24 hrs. Evacuate site when directed by the CO and leave KSC.

d. ***<<Company Name>>*** will tie down trailers and equipment with anchorage that complies with KSC-PLN-1904, Trailer/Equipment Tiedown Plan for the Kennedy Space Center.

6. Clothing

a. All employees conducting work on this project will wear appropriate clothing. Appropriate clothing consists of at minimum long pants, short (at least four inches in length) or long-sleeved shirt (no tank tops), and a style of shoe determined by the type of work being performed. Overly loose fitting, torn, or ragged clothing will not be acceptable.

b. The site supervisor will check daily that workers have the proper clothing suitable for tasks and hazard level of work being performed.

c. Fire retardant clothing will be worn for designated tasks that present a potential for arc flash, flash fire, or explosion to minimize the effects of arc flash, flash fires, and burns from contacting hot equipment and material. This is also addressed in the sections for electrical and welding work.

7. Construction Site Safety

a. The site supervisor will ensure the safety of all personnel from all organizations while within the boundaries of the worksite. This is to include control of who is on site, what PPE, special conditions, and restrictions will be observed while on site.

b. The designated site supervisor(s) for the jobsite is (are) ***<<List name(s) of employee(s)>>***. A site supervisor will be on site at all times during construction. If the site supervisor cannot remain at the site, a designated authorized representative with the responsibilities, accountability, and authority of the absent supervisor will be identified. If such an individual is not designated, all construction work will be halted until the site supervisor returns.

c. The site supervisor or authorized representative while performing supervisory tasks will not perform other labor type duties (i.e., laborer or equipment operator).

d. ***<<Company Name>>*** will permit only those employees designated qualified to operate equipment and machinery. A qualified operator is one being knowledgeable of the equipment's/machine's operations, operations manual, limitations, restrictions, and safety requirements.

e. Personnel will not use cell phones/texting devices while operating equipment (to include hand tools, machinery and heavy equipment) or driving vehicles (hands free only in vehicles). Necessary business calls or replying to pages or telephone calls may be accomplished only from a safe location (designated break area or area free from hazards) while at the jobsite.

f. All employees are encouraged to submit suggestions or report issues regarding site and facility safety and health to the project site supervisor, the NASA/KSC assigned Safety Specialist, or by calling the KSC Institutional Safety Office (SA-E2) at (321) 867-SAFE (7233) without fear of retribution.

g. Employees that are performing work in or transitioning through a construction site controlled by another contractor will comply with the safety and health requirements of that worksite and apply common sense to avoid injuries. In addition when working in the vicinity of or transitioning through an area where KSC operations are in progress, employees will comply with the safety and health requirements and direction of the NASA controlling authority of the area.

h. The site supervisor will maintain at all times a means of communication to contact emergency services and emergency numbers will be posted at the worksite in a location where all employees have access. The site supervisor will develop a means of communication to disseminate information throughout the worksite (handheld radios, bulletin boards, etc.).

8. Controlled Areas

Employees will not enter posted controlled areas, nor will the integrity of any installed protective system (e.g., guardrails, safety signs, warning lights) be rendered inoperable, without proper written approval from the CO in consultation with the appropriate facility management and the KSC Institutional Safety Office (SA-E2).

9. Sanitation Conditions and Facilities

a. External Reference: 29 CFR 1926.51 provides OSHA regulations concerning the Sanitation Conditions and Facilities.

10. Evacuation (Facility or Area)

a. For all work conducted inside a facility, ***<<Company Name>>*** will assign a point of contact (POC) prior to the beginning of work. Should evacuation of any area be necessary for reasons other than tornadoes, employees will follow the facility evacuation procedures and meet the POC at the marshalling area or at least 200 feet from the hazard. The site supervisor or designated POC will ensure accountability of employees. The POC will brief employees on evacuation and marshalling areas on the first day work begins.

b. The project supervisor or designated POC will notify the KSC on scene Commander if all employees are not accounted for. Employees will not return to work inside or within 200 feet of the facility until the on-scene commander gives the “ALL CLEAR”.

11. First Aid and Medical

a. Prior to starting work, ***<<Company Name>>*** will make provisions for prompt medical attention in case of employee injury. Emergencies will be reported by dialing 911, (321) 867-7911 (cell phone on KSC) or (321) 853-0911 (cell phone on CCAFS).

b. All emergency contact telephone numbers will be posted at the jobsite in an area accessible and conspicuous to all personnel.

c. For non-emergency, walk-in medical care, personnel may report to the KSC Occupational Health Facility (OHF) located at the corner of 2nd St. SE and C Ave. SE during normal office hours (0700 – 1600 hrs.). After hours or on weekends, call the numbers listed in “11a” above. Emergency Medical Services (EMS) personnel evaluate for first aid or transport to nearest medical facility.

d. The site supervisor(s) will:

(1) Ensure employees know to report any injury to their supervisor immediately.

(2) Ensure employees report to the nearest Occupational Health Facility (OHF) facility immediately during clinic hours and after hours or on weekends call the numbers listed in “11a” above and EMS will evaluate for first aid or transport to nearest medical facility if necessary.

(3) Follow the requirements for KSC Accident/Incident (Mishap/Close Call) Reporting.

(4) Ensure any employee that is transported off base after hours report to the OHF the next duty day the OHF is open and comply with all follow-up visits.

(5) Ensure the employee is compliant with restrictions as ordered by the physician.

e. ***<<Company Name>>*** has developed a first aid program for the worksite. The first aid program is designed to reflect the known and anticipated risks of the specific work environment. Adequately trained person(s) are available to render first aid. First aid training includes instruction in general and workplace hazard specific knowledge and skills. First aid supplies are available in adequate quantities and are readily accessible.

12. Hazard Communications

The contractor describes in this section their approach to implementing the requirements of the OSHA Hazard Communication standard (29 CFR 1910.1200) for the work to be performed at the KSC worksite. The description needs to include:

a. Employee Training

b. List of Hazardous Materials to be used on the KSC worksite

c. Submittal of Safety Data Sheets

13. Heat Stress

The contractor describes here their heat stress prevention policy. The description needs to include:

a. Use of KSC-issued weather warning pagers.

b. Training and education in the hazard, risk factors, effects of heat stress including signs and symptoms and the actions that should be taken, and prevention methods.

c. Approach to providing potable water, work breaks and other accommodations for preventing heat related illness.

14. Housekeeping

a. External Reference: 29 CFR 1910.25 provides OSHA regulations concerning Housekeeping.

15. Inspections (Worksite by Contractor)

a. The <<**Name of Contractor onsite Representative>>** will conduct or ensure a daily inspection of the jobsite, materials, and equipment is conducted to identify existing or potential hazards.

b. The inspection will be accomplished by the designated competent person (general). At least weekly, the site supervisor will document the completion of this inspection.

c. The worksite inspection will be accomplished by a competent person (general) is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them.

16. Inspections (NASA Safety Representatives)

a. ***<<Company Name>>*** understands the jobsite is subject to inspection by KSC Safety and Health personnel at any time.

b. ***<<Company Name>>*** also understands that safety violations will be documented. The site supervisor will work with KSC Construction Safety Specialists, the CO designated representative, and CO (depending on severity) to implement corrective action(s).

17. Job Hazard Analysis (JHA)

a. Prior to the start of work, the ***<<Company Name>>*** will perform a job hazard analysis of the work to be performed. The completed JHA will be provided to KSC Institutional Safety Office (SA-E2) through the CO as an appendix to this SSSP prior to the work occurring.

b. A JHA is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. ***<<Company Name>>*** goal is to identify all uncontrolled hazards, then take the steps/actions to eliminate or reduce the hazards to an acceptable risk level.

c. <***<Company Name>>*** JHA(s) contains each of the sections identified below:

(1) Task (Activity) Description: Specify the work to be performed such as operating machinery, equipment, and powered hand tools.

(2) Hazard Description: Using the tasks listed, identify the hazards related to the work being performed such as flying debris, dust, wood chips, metal shavings getting into the eyes).

(3) Hazard Controls: The preventive measures taken to eliminate or mitigate the hazard to an acceptable operational level for example know and utilize the manufacturer's operating, maintenance, and safety procedures and use personal protective equipment (PPE) as required, such as ear protection, goggles, face shield, safety shoes, and work gloves.

d. JHAs are living documents and will be reviewed, updated, and discussed with employees when changes occur in work tasks, alternate equipment is being used, or when alternate methods of performing the task are being considered such as using aerial lifts in place of scaffolding.

18. Maximum Work Hour Policy

<<Company Name>> will comply with NASA/KSC employee work hour limits.

a. No employee will work in excess of 12 consecutive hours in any one day. A minimum of 8 hours off time will be allotted between work shifts.

b. No employee will work in excess of 60 hours in any one work week.

c. No employee will work more than 7 consecutive days without one full day off.

d. No employee will work in excess of 240 hours during any 4 consecutive work weeks or 2500 hours in any rolling 12 month period.

e. A written request for exceptions to the above policy will be submitted for approval to the CO in consultation with KSC Institutional Safety Office (SA-E2).

19. Pre-task Meetings

Prior to the start of each work day, when a task changes during operations, prior to any hazardous task, or prior to any confined space entry, ***<<Company Name>>*** will conduct a pre-task (toolbox) meeting and communicate all job related safety issues with all employees involved. Where a task involves a confined space entry, completion of this meeting will be noted on the confined space entry permit. This meeting at a minimum will cover:

a. Work tasks planned for the day to include sequence and hazard management.

b. Weather issues that could affect that day’s work.

c. PPE required for that day’s work task(s).

d. Safety hazard awareness (from JHA).

20. Safety Meetings

a. The site supervisor will conduct and document weekly safety meetings for all employees at the jobsite. The meeting will discuss safety and health related issues as well as any incidents (and subsequent corrective actions taken) that have occurred at the site.

b. The first meeting will occur prior to beginning work on the first day on the job. Also, if during performance of the contract, a break of more than five working days occurs, the site supervisor will conduct a safety meeting on the first day back on the job.

c. The documentation of safety meetings will include a short summary of the items covered, the date and location of the meeting, the name and signature of the person conducting the meeting, and a roster of attendees. Documentation of these safety meetings will be kept at the construction site for review.

21. Safety Systems – (Permanently Installed)

a. ***<<Company Name>>*** will protect and in no way invalidate the integrity of any installed safety systems or personnel safety devices such as firefighting equipment and sensing devices, fire alarm centers, fire water supply, guard rails, safety chains, warning lights, and safety signs. Prior CO approval will be obtained when access to device-guarded systems is required.

b. In the event ***<<Company Name>>*** or NASA/KSC makes a determination (with CO approval) that it is necessary to temporarily remove or invalidate any personnel safety devices in order to accomplish a task, alternate means of protection prior to removing or invalidating any permanently installed safety devices or equipment will be developed, in place, and approved prior to any work occurs.

Project-Specific Safety and Health Section

22. Temporary Structures, Trailers, and Work Areas

a. All temporary structures and trailers will be clearly marked with our company's name and an emergency contact phone number. Trailers will be pre-approved by the KSC CO and the Facility Manager for parking locations and tied down if stationary for a period in excess of two weeks. A dig permit will be requested and approved prior to tying down any trailer or temporary structure.

b. ***<<Company Name>>*** worksite for this project will be clearly marked by a posted sign(s) with the following information. This information will be posted in an area visible to both contractor and NASA/KSC employees.

(1) Company Name

(2) Contractor Site Supervisor's name and contact phone number

(3) Contractor Safety Supervisor's name and contact phone number (if applicable)

(4) NASA/KSC Project Contracting Officer's (CO) name and contact phone number

(5) NASA/KSC Contract Officer Representative's name and phone number

(6) NASA/KSC Safety phone number (321-867-SAFE)

23. Vehicle Operations

a. ***<<Company Name>>*** will adhere to permit requirements, restrictions, and conditions for overweight, oversized, or slow moving vehicles as identified in contract clause JC-6, Traffic Restrictions, and in KNPR 1600.1, KSC Security Procedural Requirements.

b. ***<<Company Name>>*** will adhere to the prohibition of movement of oversized or slow moving vehicles on KSC roadways between the hours of 0600-0900 and 1500-1800, Monday through Friday.

c. The remainder of the SSSP should only contain the following areas applicable to the work performed on this project.

24. Confined Space Entry

a. <***<Company Name>>*** work on this project requires entry into and work in confined spaces. ***<<Company Name>>*** has enclosed an OSHA Compliant Confined Space Entry Program (Plan) that implements the applicable requirements of (29 CFR 1910.146, 1910.268, and 1910.269), KNPR 1840.19, KSC Industrial Hygiene Program, KNPR 1820.4, KSC Respiratory Protection Program and KNPR 8715.3, KSC Safety Procedural Requirements as ***<<appendix # >>*** to the project SSSP.

b. If the contract requires work in telecommunications manholes, identify here how your company will comply with the provisions of 29 CFR 1910.268(o) and 1910.269(e)

c. If the contract requires work in electrical or communications manholes, the following statement will be included in the plan

<<Company Name>> will notify and obtain approval from the Power Coordinator (321-867-7300) and from Communications Control (321-867-4141) respectively prior to performing any work.

d. As a part of its Confined Space Entry Plan, the contractor will describe its approach to implementing the requirements of the OSHA Permit-Entry Confined Space regulation. The plan will address:

(1) Employee training

(2) Site plan showing locations of confined spaces under scope of contracted work

(3) Pre-entry hazard assessment and entry requirements

(4) Approach to use of Government-provided services for atmospheric testing, or alternatively, the contractor’s approach to performing atmospheric testing for confined space entry.

(5) Approach to coordinating confined space entry work with KSC Environmental Health, Fire Services, Power Coordinator, and Communications Control.

(6) Where the contractor will act as a controlling employer with operational control over the permit space during multiple employer entry, describe your approach to coordinate entry operations (for example, hazardous operations, required PPE, employee training, rescue, emergency services, and all other aspects of the entry) with each entrant’s employer.

e. ***Company Name>>*** will perform their ***<<own atmospheric testing>> OR <<use the Government provided services including environmental health monitoring and consultation>> (identify which will be used)*** support for testing of atmospheres in confined spaces.

f. ***<<Company Name>>*** will ensure all water is pumped out of the confined space prior to entry checks.

25. Cranes and Lifting Operations

a. ***<<Company Name>>*** will conduct all crane and lifting equipment operations and maintenance in compliance with manufacturer's recommendations, Subpart CC of 29 CFR 1926, applicable ASME standards, and NASA-STD-8719.9, NASA Lifting Standard

b. <***<Company Name>>*** list of certified and trained mobile cranes and other lifting equipment personnel and the equipment they will be utilizing is as follows:

<<Employee>>	*<<Equipment Employee is Certified to Operate>>*
<<Employee>>	*<<Equipment Employee is Certified to Operate>>*
<<Employee>>	*<<Equipment Employee is Certified to Operate>>*
<<Employee>>	*<<Equipment Employee is Certified to Operate>>*

c. ***<<Company Name>>*** riggers are trained and certified in their discipline are trained in applicable crane or lifting equipment operation procedures.

d. All cranes and lifting equipment are certified for operational use by ***<<list appropriate authorizing agency>>.***

e. An operator will man the controls of any lifting device while a load is suspended or when the equipment is operational.

f. No personnel will perform work or be located under a suspended load at any time.

g. A daily, monthly, and annual equipment inspection is conducted and results documented and available at the jobsite. Cranes will be inspected by a competent person (cranes). These inspections will follow manufacturer's suggestions and include at a minimum the areas listed in chapter 5.4 of NASA-STD-8719.9.

h. ***<<Company Name>>*** maintains a documented system to track crane problems or discrepancies. Prior to an operation, the crane operator will review any previously noted problems or discrepancies to determine possible impact on the planned activity.

i. ***<<Company Name>>*** maintains the following documentation on the jobsite anytime a piece of lifting equipment is operational: Operator certification, equipment certification, inspection, and load test documentation.

j. A pre-task briefing will be performed and documented prior to commencing crane operations. The briefing will include at a minimum:

(1) An overview of the task to be performed.

(2) The methods used to accomplish the task.

(3) Who each member of the crew is and where they will be positioned.

(4) What task each member of the crew will perform.

(5) Who is in charge of the operation.

k. The working area around any lifting operation will be controlled by ***<<list means of control>>***. Only personnel essential to the lifting operation will be inside the controlled area. If the controlled area cannot be maintained, the lifting operation will be discontinued.

l. The site supervisor will be in overall charge of lifting operation on the jobsite and will ensure all personnel involved are instructed in the proper positioning, rigging, and moving to be done.

m. This person will ensure:

(1) The crane has met all its maintenance, test, and inspection requirements and is to be operated within its rated capacity and the operator is properly certified.

(2) The vicinity of the lift is controlled and the operator remains at the controls the entire time the load is suspended.

(3) The crane operator and signalmen have communications with each other. If communications are lost, the lifting operation will be immediately stopped.

(4) All personnel within the controlled lifting area are wearing the appropriate personal protective equipment (e.g., hardhat, safety shoes, and gloves).

(5) A pre-task briefing was performed and all personnel are knowledgeable of the operation to be performed, tasks to be done, route to be traveled, and safety considerations.

(6) At no time will any part of the crane or load pass within the designated minimum safe approach distance of an electrical power line unless the line is de-energized and visibly grounded on both sides of the area of possible contact.

n. All crane operations will comply with the NASA/KSC Adverse Weather requirements and this plan. When moving cranes, adhere to the crane manufacturers wind limits for both operations and positioning.

o. A written lift plan will be submitted and approved by the CO in consultation with the KSC Lifting Devices and Equipment Manager (LDEM) and KSC Institutional Safety Office (SA-E2) for all crane operations involving critical lifts, as defined in Appendix F of KNPR 8715.7.

p. Cranes will not be used to hoist employees on a personnel platform unless approved in advance by the CO in consultation with the KSC LDEM and Center Safety Office.

q. Cranes left outdoors will be secured by the operator when operations are complete. Cranes of any height will be lowered during the hours of darkness. If this is not feasible, the crane will be lit in accordance with Federal Aviation Administration (FAA) regulations.

<u>26. Demolition</u>

a. ***<<Company Name>>*** will conduct all demolition operations in compliance with Subpart T to 29 CFR 1926.

b ***<<Company Name >>*** *will submit a demolition engineering survey to the CO for review'*.

c. The demolition activities involve hazardous materials, such as silica, mold, or toxic substances regulated under 29 CFR 1926 Subpart Z ***<<list specific materials involved and remove the rest>>***. A plan for safe handling and containment of those hazardous materials will be approved and in place prior to beginning of the demolition ***(see also section 3.11, Hazardous Substances of this example document for specific additional plan requirements).*** The plan for handling/containment of all hazardous materials will be in full compliance with applicable Federal, State of Florida, NASA, and other authorized regulatory agencies current standards.

d. During demolition, continuing inspections by a competent person (general) will be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, or walls, or loosened material. No employee will be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

e. If materials are to be dropped more than 20 feet to any point lying outside the exterior walls of the building, an enclosed chute of wood, or equivalent material, will be used. 29 CFR 1926.852 provides construction requirements for Chutes

f. Walkways or ladders will be provided for employees to safely reach or leave any scaffold or wall.

g. Any structural member being dismembered will not be overstressed.

h. No workers will be permitted in any area which can be adversely affected by demolition operations when balling or clamming is being performed. Only those workers necessary for the performance of the operations will be permitted in this area at any other time.

i. A Florida Department of Environmental Protection (FDEP) “Notice of Asbestos Renovation and Demolition Form” [DEP Form 62-257.900(1)] will be completed and submitted to the CO prior to demolition of any load-bearing structure regardless of whether or not asbestos is present.

27. Dive Operations (Commercial)

a. This section applies to diving and related support operations conducted in connection with this project. ***<<Company Name>>*** will conduct dive operations in accordance with 29 CFR 1910.401 through 440.

b. Contractor’s SSSP will address dive safety plan for any diving operations that is identified in their contract.

c. Each dive team member has the experience and training necessary to perform assigned tasks in a safe and healthful manner, the use of tools, equipment, and systems relevant to assigned tasks, techniques of the assigned diving mode, diving operations and emergency procedures.

Requirements to complete prior to Diving

a. A standby diver will be available whenever a diver is in the water.

Procedures to be followed during-Dive Operations

28. Electrical Safety

a. All electrical work will be performed in accordance with the current edition of the National Electric Code (NEC), National Fire Protection Association (NFPA), OSHA, and contract referenced documents.

<<The SSSP will include a project-specific electrical work job hazard analysis performed by a qualified safety professional.

Contractors performing work on or near Electric Power Generation, Transmission, and Distribution (such as Orsino Substation, C-5 Substation, the Emergency Power Plant, and overhead and underground 15 kilovolt (kV) power distribution systems) will provide a written program for such work as part of their SSSP that is consistent with the requirements of 29 CFR 1910.269; 29 CFR 1910.332 through 29 CFR 1910.334; and IEEE C2 (National Electrical Safety Code).

The electrical safety program specifically addresses the Article 130 requirements for any energized electrical work to be performed by written work permit only. This will include applicable hazard analyses and associated approach boundary and personal protective equipment (PPE) determinations. >>

The written electrical safety program will include JHAs covering all anticipated or known work to be performed in hazardous locations or on or near energized parts including “routine” tasks not requiring an energized work permit by NFPA 70E.

b. Circuits will be placed in an electrically safe condition by de-energizing, applying lockout/tagout, and verifying lack of voltage using suitable test equipment prior to grounding or performing any work on electrical conductors or electrical circuits.

c. ***<<Company Name>>*** will complete and have approved an electrical system outage work permit for all required outages during the prosecution of work that affects utility systems, such as electrical, water, fire detection and protection systems, and air handling systems will require an electrical system outage work permit. Work will be scheduled to hold outages to a minimum. Request for utility outage permits will be made in writing to the CO at least 14 working days in advance of the time required. The request will include the system involved, area involved, approximate time of outage, and the nature of the work involved.

NOTE: Submittal of an outage request does not approve the outage or mean it will take place. Due to the nature of the operations at KSC, ***<<Company Name>>*** may not know until the day before the requested date if the outage will take place as scheduled. All outages will take place outside regular working hours.

d. Energized parts to which an employee might be exposed will be put into an electrically safe work condition before an employee works on or near them. ***<<Company Name>>*** will only request an exception when it can be demonstrated that de-energizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations.

e. If energized parts are not placed in an electrically safe work condition (i.e., due to increased or additional hazards or infeasibility), or a task involves an employee crossing the NFPA 70E prohibited approach boundary, the work to be performed will be considered energized electrical work and will be performed under a written Energized Electrical Work Analysis & Authorization Permit Energized Electrical Work Permit only. Energized parts that operate at less than 50 volts to ground need not be de-energized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.

f. If the exposed energized circuits are not de-energized, additional safety related work practices are to be implemented to protect employees who may be exposed to the electrical hazards involved. These work practices are documented in the project electrical JHA and specify actions that will protect employees against contact with energized circuit directly with any part of their body or indirectly through some other conductive object.

g. ***<<Company Name>>*** qualified person (electrical) will conduct a shock hazard analysis to determine the voltage to which personnel will be exposed, boundary requirements, and the personal protective equipment necessary in order to minimize the possibility of electric shock to personnel. Results of the shock hazard analysis are included in this SSSP and will be used to complete the electrical JHA.

h. <***<Company Name>>*** qualified person (electrical) will conduct a flash hazard analysis in order to protect personnel from the possibility of being injured by an arc flash. The analysis will determine the flash protection boundary and the personal protective equipment that people within the flash protection boundary will use. Personnel working with, on, or around energized circuits will wear appropriate arc flash personal protective equipment as required by NFPA code 70E.

i. For energized work, the site supervisor will conduct a pre-work briefing and document what was covered and the employees who received the prior to starting work.

j. Work performed on or near live parts by qualified persons (electrical) related to tasks such as testing, troubleshooting, and voltage measuring will be permitted to be performed without an energized electrical work permit, provided appropriate safe work practices and personal protective equipment are used.

k. The qualified electrical person will use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and will verify that the circuit elements and equipment parts are de-energized. The test will also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed even though specific parts of the circuit have been de-energized and presumed to be safe. If the circuit to be tested is over 600 volts, nominal, the test equipment will be checked for proper operation immediately before and after this test.

l. Prior to reenergizing equipment, the qualified electrical person will conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed, so that the circuits and equipment can be safely energized.

m. Ground fault circuit interrupters (GFCIs) will be utilized on all temporary power and all extension cords will be heavy duty rated and used in conjunction with GFCIs.

n. Temporary electrical wiring required during construction and major repairs will be installed by a qualified electrician and protected with a circuit breaker or fuses.

o. Temporary wiring and extension cords will be protected from damage, and if damaged or spliced removed from service.

29. Equipment

a. The list below represents <<Company Name>> list of all specialty or heavy equipment (contractor owned, leased, rented, etc.) proposed for use on the contract. Examples of items on the list are forklifts, lulls, cranes, earth moving equipment, and other power industrial trucks.

1. <<List Equipment Here>>

2. <<List Equipment Here>>

3. <<List Equipment Here>>

b. All operators of equipment are trained. Documentation of training is submitted in accordance with the training and applicable equipment section of this document.

c. <***<Company Name>>*** will ensure equipment has daily and manufacturer's recommended inspections performed.

d. The use of any tool, material, or equipment which is not in compliance with applicable regulatory requirements will be prohibited on the site. Defective equipment will be removed from service and tagged out using KSC Form 20-165 or an equivalent tag to render them inoperable.

30. Excavation

a. All excavation work will conform to the requirements set forth in 29 CFR 1926 Subpart P.

b. ***<<Company Name>>*** will obtain an approved Utility Locate/Excavation Permit Request (KSC Form 26-312) anytime any ground is dug into for any reason at any depth. Permits will remain on site for review for the duration of the permit. Any deviations from the approved excavation routing will be approved in advance. Adherence to excavation permit conditions is mandatory.

c. Workers will hand dig all excavations within 24 inches in all directions of a marked located utility line. Workers will also hand dig a pilot trench when called for on the dig permit for all underground utility work along the centerline of new trenches and down to the elevation of the bottom of the new utility.

d. The pilot trench will be carefully opened to determine the existence and location, if any, of existing active underground utilities which will be protected and kept in service. Machine excavation may proceed only after it is assured that the pilot trench has satisfactorily located and protected all such existing utilities.

e. A record of daily inspections will be maintained at the jobsite.

Note: All soil on KSC and CCAFS is classified as Type C.

f. If any obstructions, interferences, or unforeseen conditions are encountered (e.g., concrete thrust blocks, direct buried cable below grade, or unidentified utilities), excavations will cease and the Project Construction Inspector and CO will be notified.

g. A thrust block is a configured piece of concrete located underground at water and sewer utility piping to prevent movement from line pressure fluctuations. When excavating soil at locations known to contain buried water or sewer lines, DO NOT remove any buried concrete without prior approval.

31. Fall Protection

Elements required in a site-specific fall protection plan are contained in Appendix I Sample Site-Specific Fall Protection Plan

32. Fire Protection and Prevention

Address here the requirements found in section 3.0 of this document: KSC Fire Prevention for Contractors Handbook.

33. Hand and Power Tools

a. All portable power tools, whether company-furnished or employee-owned, will be maintained in a safe condition and will meet all applicable ANSI Standards (for design and use).

b. Extension cords used for portable power tools will be ground fault (GFCI) protected unless the cord is plugged into a ground fault protected outlet.

c. Powder actuated tools will only be operated by employees who have been trained to operate these tools and verified by the Site supervisor(s) as trained. ***<<Identify here the standard means of identifying the powder levels of loads used. >>***

d. Loads (ammunition) will be stored in locked metal containers (limited to 1000 rounds unless stored in an approved explosive storage area), and only the quantity necessary for the specific job will be taken to the jobsite. Keep all explosive materials away from heat sources.

e. Ammunition will remain in the personal control of the authorized operator. It will never be left unattended at the jobsite. Each authorized operator is personally responsible to keep positive control on all ammunition until unused portions are returned to the locked containers in the storage area. Do not leave ammunition in vehicles for extended periods of time.

34. Hazardous Substances

Asbestos Containing Material (ACM):

The contractor will provide a written asbestos management and abatement implementation plan as an attachment to the SSSP.

As a part of its asbestos abatement plan, the contractor will describe their approach to implementing the requirements of 29 CFR 1926.1101, National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 61 Subpart M, the Florida Administrative Code (FAC) requirements FAC 62-257, and the Florida Statute (F.S.) 469 Asbestos Abatement and F.S. 376.60 Asbestos Removal Program Inspection and Notification Fee. The plan will at a minimum address:

a. The scope of work to be performed, including work locations, and site plans showing containments, regulated areas, safety placards/notices and sign locations.

b. Verification of all required asbestos work licensing.

c. Method(s) of handling, packaging, labeling, and disposing of ACM.

d. Pre-work hazard assessment and description of engineering controls, work practices, and selection of PPE.

e. Employee training.

f. Plan for project and employee exposure monitoring.

g. Approach to coordinating abatement planning with KSC Environmental Health, Fire Services, and any resident government or contractor organization.

h. Approach to coordinating pre-work containment inspections and post abatement clearance with KSC Environmental Health.

Steel Structure Maintenance (Abrasive Blasting/Surface Preparation/Spray Painting):

The contractor will provide a written Toxic Metal Health and Safety plan as an attachment to the SSSP.

As a part of its Toxic Metal Health and Safety plan, the contractor will describe its approach to implementing the requirements of 29 CFR 1926 Subpart Z, as applicable. The plan will address:

a. Employee training.

b. The scope of work to be performed, including work locations and site plans, showing containments, regulated areas, safety placards/notices and sign locations.

c. Pre-work hazard assessment and description of engineering controls, work practices, and selection of PPE. Include negative hazard assessments and objective data for exemption from monitoring requirements, if applicable.

d. Plan for project and employee exposure monitoring as well as contamination (emissions) control measures (i.e., protecting government personnel/equipment or doffing of protective clothing).

e. Approach to coordinating pre-work containment inspection with KSC Environmental Health.

Concrete and Masonry Work Involving Exposure to Silica Dusts

When work requirements have a potential for producing silica dust from drilling, grinding or mechanically abrading concrete and mortar, the contractor will describe its approach to manage silica dust exposure hazards as a part of its SSSP. The description will at a minimum include:

a. The scope of work to be performed, including work locations, site plans, and controlled work areas, safety placards/notices and sign locations.

b. Pre-work hazard assessment and description of engineering controls, work practices, and selection of PPE.

c. Plan for project and employee exposure monitoring.

35. Hearing Loss Prevention and Hazardous Noise

When work requirements have a potential for exposure to hazardous noise, the contractor will describe its approach to manage noise exposure hazards as a part of its SSSP. The description will at a minimum include:

a. Approach to implementing the requirements of the OSHA noise standard and KSC noise exposure limits of KNPR 1820.3.

b. Employee training and education regarding noise hazards and protection measures.

c. The scope of work to be performed, including noise hazard sources, safety placards/notices and sign locations.

d. Pre-work hazard assessment and description of engineering controls, work practices, and selection of PPE.

e. Plan for project and employee exposure monitoring. >>

f. If high noise may impact resident workers, describe plans to eliminate or minimize the effects on these adjacent workers.

36. Hot Work Permits

a. <***<Company Name>>*** will obtain a KSC Hot Work Permit(s) from Kennedy Fire Services prior to any:

(1) Hot work for demolition, modification, or new construction that includes welding, cutting, burning, open flame and heat producing operations, soldering, heat sealing, or any spark producing operation (e.g., grinding). (KSC Form 2-271)

(2) Hot work for roof construction or repair using “tar kettle” or “torch down” operations (KSC Form 2-272).

b. ***<<Company Name>>*** will work with the project CO to obtain all applicable hot work permits.

c. ***<<Company Name>>*** understands that the Fire Inspector who issues the permit will perform an onsite inspection and briefing prior to issuing the permit and will inspect the site periodically to ensure hot work requirements are being met and prior to any permit renewal.

d. ***<<Company Name>>*** will comply with all requirements identified on the permit and have the permit posted in a visible and accessible area on the jobsite to employees and inspectors for the duration of operations for which it was issued.

e. All combustible material will be cleared from the hot work area. Fire resistant guards, curtains, or shields will be used where appropriate.

f. All combustibles (trash, debris, wood, etc.) will be removed daily.

g. All flammable liquids and propane cylinders will be removed from roofs at the end of each work day.

h. Flammable gas containers will be of the approved safety type with spark arresting screen in filler neck, cap and vent cap intact, and an attached HMIS label with correct information.

i. The fire watch (where applicable by permit) will be familiar with fire watch duties and will be trained to operate the approved fire extinguishers.

j. A fire watch will monitor all areas where hot work has been performed for the minimum time specified in the permit after hot work is stopped. This includes breaks, lunch, and end of shift.

k. ***<<Company Name>>*** will maintain onsite the type and number of fire extinguishers identified in the permit that is required for the type of work and size of the area of work being performed.

37. Industrial Hygiene

a. *<<Describe your approach that provides employees with an environment in which occupational health hazards are identified, evaluated, and eliminated or controlled in such a manner that personnel do not suffer adverse health effects as a result of their employment. The description will include at a minimum:*

(1) Method(s) used to conduct workplace inspections and review of operations/procedures to identify hazardous material and physical agents.

(2) Method(s) to ensure SDS for materials used in the workplace are reviewed to identify health hazards, symptoms of exposure, and requirements for safe use of the material.

*(3) Method(s) to e*nsure contractor employees are aware of hazardous materials and physical agents that may cause injury or illness in the work area, understand the requirements for safe work with these materials and agents, and know what actions to take in an emergency (e.g., chemical spill or release).

b. Personnel exposures to chemical or physical agents will at all times be restricted to levels below regulated exposure limits and as low as reasonably achievable.

38. Ladders and Stairways

a. ***<<Company Name>>*** will ensure that each employee using ladders is trained on recognizing the fall hazards, proper placement, use and construction of, maximum intended load and the standards of 29 CFR 1926.1052 and 1053 as applicable (see training certifications).

b. Ladders

(1) Ladders will be inspected daily and prior to each use and any found to have structural defects will be “tagged out” and remove from the jobsite.

(2) Employees working on ladders will always maintain three points of contact with the ladder, (e.g., one hand and two feet, two hands and one foot). Employees also will keep the belt buckle or the centerline of the body between the rails and will not overreach, put one foot on the ladder and the other on an adjacent surface or object, or carry material, equipment, or tools by hand up or down a ladder.

(3) When selecting ladders, the job application will always be considered, (e.g., use fiberglass ladders for electrical work, minimum Type I ladders for heavy duty work).

(4) Ensure stepladders are used in the fully opened and locked position and that personnel do not stand, sit, or work on or above the last two steps from the top of a stepladder.

c. Stairs

(1) Stairs will be provided for access to office trailers or other transportable work locations.

(2) All treads will be slip resistant and the nosing will be of non-slip finish.

39. Lockout/Tagout (Control of Hazardous Energy)

a. ***<<Company Name>>*** will perform all Lockout/Tagout (LOTO) actions in accordance with 29 CFR 1910.147 and KNPR 8715.3, Volume 1.

b. ***<<Company Name>>*** will evaluate the system or equipment and develop written LOTO procedures performing work requiring LOTO on NASA systems/equipment. The lockout procedures shall include at a minimum:

(2) Notification of all affected personnel who work in the area where LOTO is in effect that power is being removed.

(3) Specific procedural steps in sequential order for shutting down the system/equipment energy sources (energy isolation device). An orderly shutdown must be utilized to avoid any increase in hazards to employees as a result of the energy termination.

(4) Identify all the LOTO devices that will be used energy isolation device where they will be applied ensuring all isolation (de-energized) from the relevant energy source(s).

(5) Identify the employee(s) that will affix the LOTO devices for each energy isolating device.

c. The written LOTO procedure(s) will be coordinated with the project CO and KSC Institutional Safety Office (SA-E2) prior to any work being done.

d. Equipment capable of being locked out will be locked out prior to performing maintenance or any other activity potentially putting personnel at risk.

e. If equipment lockout cannot be accomplished, the actions identified in the Electrical Safety section of this document apply.

f. <***<Company Name>>*** will coordinate all facility outages through the project CO.

g. When LOTO is required for more than one employee working on a system or equipment, each employee will place a lock and tag (multiple lockout device) on the equipment. When the work is completed, locks and tags will be removed and the equipment re-energized in accordance with the written lockout/tagout procedure.

h. <***<Company Name>>*** will use KSC Form 20-195, KSC Lockout/Tagout Tag to control hazardous energy. The tags will be obtained from the project Safety Specialist. This tag is the only tag authorized for lockout/tagout on KSC. The lockout locks used by ***<<Company Name>>*** will only be used for that purpose.

i. <***<Company Name>>*** will be responsible for providing any additional equipment (multiple lockout devices, valve covers, chain lengths, etc.) or any other compliant device for lockout of a hazardous energy source.

j. <***<Company Name>>*** will document tag use on the Lockout Lock and Lockout Tag Inventory Record (KSC Form 28-915). These forms are available from the Safety Specialist assigned to the contract.

k. A LOTO Control Record will be used to document use of tags. Tags will be used only once then destroyed. At the end of the contract work, ***<<Company Name>>*** will return any unused tags and a copy of the completed LOTO Control Record to the project Safety Specialist.

l. No employee will affix or remove the LOTO device of another employee. A LOTO lock and tag will only be removed by the authorized employee that installed it. However, when circumstances dictate no other alternative, the following procedures will be followed and documented by the site supervisor:

(1) The site supervisor or a member of management will be the minimum level authorized to remove a subordinate's LOTO lock and tag. The site supervisor or manager removing the LOTO lock and tag will personally ensure the energizing of the system does not pose a hazard to other employees.

(2) Determine the location of the authorized employee that installed the LOTO lock and tag. Call that employee, at home if necessary. Explain the seriousness of the requirement to remove their LOTO lock and tag. If possible, have the authorized employee return to the jobsite and remove the device.

(3) If the employee can be contacted but is unable to return to the jobsite, notify the employee of the intent and rationale to forcibly remove their LOTO lock and tag. If the employee cannot be contacted, they <u>will</u> be informed of the lock removal <u>immediately</u> upon returning to work for the next scheduled shift.

(4) Follow the documented procedure sequence of steps for removal of a LOTO lock and tag that the authorized employee that installed it would have used.

(5) The authorized employee's supervisor that forcibly removed the lock will sign the LOTO log acknowledging the actions taken to remove the LOTO lock and tag. Additionally, the log will be annotated that energy has been restored to the system.

m. The following will be accomplished before beginning a lockout/tagout operation:

(1) Ensure a pre-operations briefing has been performed and the required closeout documentation has been completed and documented.

(2) Ensure all personnel are familiar with the worksite. Conduct a dry run walk through, as necessary.

(3) The presence of a tag on a system or component does not in itself guarantee the equipment is de-energized, but indicates only that the tagged disconnect is not to be operated or reconnected to the energy source. Before performing any work, on electrical systems, employees will use an appropriate test instrument to ensure the circuit is de-energized.

(4) Under no circumstances will a Danger "Do Not Operate" Lockout/Tagout tag be left on normally operating systems or equipment. All tags and locks will be removed prior to restoring power to any systems or equipment. Equipment in test will remain tagged out until ready for return to service.

(5) Tags will be completely filled out using a permanent marker. All entries will be legible.

(6) Prior to installing or removing a Danger "Do Not Operate" Lockout/Tagout tag across an interface of another government/contractor organization, approval will be received from the organization having responsibility for the interface.

n. ***<<Company Name>>*** will ensure employees are trained in and aware of lockout/tagout requirements as set forth in applicable OSHA standards, KNPR 8715.3, and this document.

Documentation of employee lockout/tagout training is provided (see Training Certification section).

o. ***<<Company Name>>*** will ensure specific procedures and notification requirements are conducted with the Base Operations Support Services Contractor (BOSS) when work includes Electrical Power Transmission/Distribution System Switches. These system switches will not be operated or LOTO performed without specific authorization by the BOSS Power Coordinator.

40. Personal Protective Equipment (PPE)

a. ***<<Company Name>>*** will take all necessary precautions to protect employees and will provide at employer's expense any personnel protective devices and safety equipment required.

b. ***<<Company Name>>*** will assess the worksite to determine if hazards are present which would necessitate the use of PPE. Hard hats, eye protection, safety shoes, respiratory protection, hearing protection, etc. will be used as required.

c. PPE will be used only when other health hazard controls, such as engineering controls, have been shown to be infeasible or inadequate in eliminating or controlling the health hazard.

d. ***<<Company Name>>*** will verify the required written job hazard analysis(or analyses) has/have been performed and that any PPE identified as required based on the analysis is listed.

e. ***<<Company Name>>*** is responsible to ensure that any PPE required is provided, used, and maintained in a sanitary and reliable condition. This includes any employee-owned PPE.

f. Personal Protective Equipment will be stored in a manner to prevent PPE from damage, dust, sunlight, chemical contamination, or extreme temperatures.

g. ***<<Company Name>>*** will ensure that all employees on the job have been trained in the appropriate use of any required personal protective equipment.

h. ***<<Company Name>>*** will document that all employees have received and understood the PPE training provided.

i. Employees will wear approved hard hats as required in the performance of their work. Type G (replaced type A) or E (replaced type B) hardhats as applicable will be used. Type C hardhats will not be used on construction sites at KSC.

k. ***<<Company Name>>*** highly recommends that all employees wear safety toed shoes or boots. Safety toe work shoes may be required depending on the type of work being performed. When there is a potential for injury to the feet, safety type shoes will be worn.

l. Gloves or other acceptable protection appropriate to the task being performed will be worn anytime there is a potential for hand injury. Personnel who perform tasks with knives will wear a non-cut glove (e.g., Kevlar type).

m. Gloves will not be worn around revolving, rotating, or moving tools or equipment where the glove fabric/material might become caught in the movement of tool blades, discs, or mechanical parts.

n. Fire retardant clothing will be worn for designated tasks that present a potential for arc flash, flash fire, or explosion.

o. When welding, a welding hood with a number 10-12 lens will be worn. Welders on site will wear a hardhat beneath their welding hoods.

41. Process Safety Management

a. <***<Company Name>>*** employees, when working in areas covered by the OSHA Process Safety Management (PSM) Standard, will receive an employee awareness briefing on PSM prior to any work occurring.

b. ***<<Company Name>>*** will inform all employees of the known potential fire, explosion, or toxic release hazards associated with a facility in which the contract work is to be performed.

c. ***<<Company Name>>*** employees will be briefed on the applicable provisions of the facility emergency action plan. This will be accomplished by a facility safety briefing prior to the commencement of work.

d. ***<<Company Name>>*** will ensure that any new employees brought to the jobsite receive facility safety training prior to entering designated process areas.

e. The project supervisor will ensure that all employees follow the safety rules of the facility including all safe work practices.

f. The project supervisor will inform the project CO, and assigned Safety Specialist of any unique hazards to the facility presented by the contractor's work, or of facility hazards found during the contractor’s work.

42. Radiation Protection

<<Describe your approach to complying with the requirements of KNPR 1860.1 or 1860.2, as applicable. As a part of your description, include:

a. A list of sources of ionizing and non-ionizing radiation.

b. Coordination of source Use/Authorizations with the KSC Radiation Safety Officer.

c. Implementation of safe use requirements described in applicable Use/Authorizations.

NOTE: This is applicable if the contract involves the use of ionizing or non-ionizing radiation producing equipment, devices, materials, or operations such as radiographic projectors, lasers, radiofrequency (RF)/microwave transmitters, XRF (X-ray fluorescent) detection systems, or radioactive materials. Contractors not involved in these activities should enter “N/A” under this section heading. >>

43. Respiratory Protection

<<Describe your approach to complying with the requirements of the OSHA respiratory protection program, 29 CFR 1910.134.

a. Include a <u>pre-exposure</u> assessment of hazardous operations or processes that require use of respiratory protection PPE and how selected the respirators are to be used.

b. Define exposure monitoring plan in accordance with the applicable requirements of 29 CFR 1926.1000 and demonstrate the proper selection of respiratory PPE.

c. Identify that records will be maintained at the worksite and will be available for government inspection.

d. Define plans for use of KSC facility breathing air systems (d. through g., as applicable).

e. Define approach for ensuring that connectors used in contractor-supplied breathing air systems are incompatible with connectors present on either KSC gas systems or on contractor supplied systems that are used to supply non-respirable gases.

f. Include written certifications to show the contractor-provided breathing air system have been recently inspected and meet Grade D breathing air standards. Alternately, discuss approach for on-site testing of contractor-supplied breathing air by the Government.

g. Explain approach to tag or label connector ends of all lines and flexible hoses of contractor-provided breathing air or non-respirable gas distribution systems. The tags or labels will clearly identify the contents of the lines or hose. >>

<u>44. Rollover Protection for Mobile Equipment</u>

a. Special purpose equipment without rollover protection devices will not be allowed on the construction site.

b. Seatbelts will be utilized on any equipment that is in operation to include when in transit from one location to another on or off KSC.

<u>45. Scaffolding</u>

a. External Reference: 29 CFR 1926 Subpart L provides OSHA regulations for scaffold assembly, operations, inspections, and disassembly.

b. ***<<Employee Name>>*** is ***<<Company Name>>***'s designated competent person (scaffolding) for the erection and inspection of any scaffolding systems on this project.

c. Scaffolding inspection will be documented and available to employees that access the scaffold. ***<<A recommended documentation process includes a tag attached to the scaffold that shows the inspector's name and date/time of each inspection. >>***

d. No material will be stored on scaffold decks. Material staged on the scaffold deck for immediate installation or use that is not installed or used will be removed from the scaffold when work is stopped for the day.

e. Documentation of employee scaffold user training is provided as part of the safety training section of this document.

46. Steel Erection

The contractor will have a Steel Erection Plan that includes a complete final copy of specifications and drawings issued for construction by the design PE and a preconstruction conference and site inspection held between the erector and the contractor and others such as the project engineer and fabricator to develop and review the site-specific erection plan.

a. A Steel Erection Plan will include site lay out drawings detailing at a minimum:

(1) Access roads into and through the jobsite for safe delivery and movement of cranes, derricks, trucks, and other necessary equipment, the material to be erected methods for vehicular and pedestrian control.

(2) A firm, properly graded, drained area, readily accessible to the work, with adequate space for safe storage of materials and safe operation of the erector's equipment.

b. A Steel Erection Plan will additionally include the following elements:

(1) Material deliveries, staging, storage.

(2) Coordination with other trades and construction activities.

(3) Crane and derrick selection and placement.

(4) Site prep and path for overhead loads.

(5) A pre-plan of all overhead hoisting and operations.

(6) Critical lift plans including rigging supplies and equipment.

(7) An erection sequence including guying, bracing, bridging, anchor rod and anchor bolt mods, columns and beams (including joists and purlins), connections, decking, ornamental and miscellaneous iron.

(8) A description of the fall protection procedures that will be used in compliance with 29CFR 1926.761.

(9) Special procedures for hazardous non-routine tasks.

(10) A certification for each employee who has received training for performing steel erection operations as required by 29CFR 1926.761.

(11) A list of qualified and competent persons.

(12) A description of procedures that will be utilized in the event of rescue or emergency response.

(13) A list of the designated qualified and competent persons in steel erection.

(14) A description of procedures that will be utilized in the event of rescue or emergency response.

47. Elevating and Rotating Work Platforms

a. General Requirements for Elevating Work Platforms (EWP) (***include only applicable parts)***

(2) If a request to evaluate a “field modification” is submitted to the manufacturer and a response is not received within a reasonable time period, a Professional Engineer will be assigned to evaluate the unit and calculate a process to modify the unit, adding the necessary fall protection devices necessary to safely use the lift.

a. Operations
b. Work Practices

b. Inspection and Maintenance

(3) Where elevating and rotating work platforms are used daily on more than one shift, they will be examined at the beginning of each shift and if defects are found they will be immediately reported and corrected.

a. Training and certification records will be available upon request

48. Welding and Cutting Operations

a. Only employees properly trained and certified to operate welding and torch equipment will operate such equipment.

b. A KSC Hot Work Permit(s) will be obtained from Kennedy Fire Services prior to any hot work for demolition, modification, or new construction that includes welding, cutting, burning, open flame and heat producing operations, soldering, heat sealing, or any spark producing operation (e.g., grinding). (KSC Form 2-271)

c. Cylinders will be legibly marked with either the chemical or trade name of the gas contained. Cylinder labeling/marking will be on the shoulder of the cylinder (***or list other means if this is not practical)*** and marked by a means which is not easily removed.

49. Working over or Near Water

50. Work Zone Maintenance of Traffic (MOT)

a. Work on this project will include work that will be accomplished on or within 15 feet of the roadway. A work zone safety Management of Traffic (MOT) plan is in accordance with pre-designed plans found in FDOT Design Standard for Traffic Control through Work Zones; Index 600. All MOT planning and implementation will be done in accordance with Florida Department of Transportation standards.

b. All employees working within 15 feet of a roadway or street will wear reflective vests compliant with ANSI/ISEA 107 – 2004 Class 2 High-Visibility Safety Apparel. Class 3 is required for flaggers performing work at night.

c. ***<<Company Name>>*** person managing traffic control set up is trained to the intermediate or advanced MOT level. The Intermediate/Advanced trained MOT person will verify/ensure the control zone is correctly set up prior to the start of each work day.

d. Training certification is included in the training section of this SSSP.

APPENDIX D: SSSP SECTION REQUIREMENTS CHECKLIST

SITE-SPECIFIC SAFETY & HEALTH PLAN REQUIREMENTS CHECKLIST (MANDATORY)	YES	NO
General Information	X	
Voluntary Protection Program Policy	X	
Contractor Employee Training	X	
Accident/Incident (Mishap/Class Call) Reporting	X	
Weather Policy	X	
Clothing	X	
Construction Site Safety	X	
Controlled Areas	X	
Drinking Water	X	
Evacuation (Facility or Area)	X	
First Aid & Medical	X	
Hazard Communications	X	
Heat Stress	X	
Housekeeping	X	
Inspections (Contractor Worksite)	X	
Inspections (KSC Safety Representative)	X	
Job Hazard Analysis	X	
Maximum Work Hour Policy	X	
Pre-Task Meetings	X	
Safety Meetings	X	
Safety Systems (Permanently Installed)	X	
Sanitary Condition and Facilities	X	
Temporary Structures, Trailers and Work Areas	X	
Vehicle Operations	X	

SITE-SPECIFIC SAFETY & HEALTH PLAN REQUIREMENTS CHECKLIST (PROJECT SPECIFIC)	YES	NO
Confined Space Entry (Permit Required and Non-Permitted)		
Cranes and Lifting Operations		
Demolition		
Dive Operations		
Electrical Safety		
Equipment		
Excavation		
Fall Protection		
Fire Protection and Prevention		
Hand and Power Tools		
Hazardous Substances (Working With or Removing)		
Hearing Loss Prevention and Hazardous Noise		
Hot Work Permits (ID Type:)		
Industrial Hygiene		
Ladders and Stairways		
Lockout/Tagout (Control of Hazardous Energy)		
Personal Protective Equipment (PPE)		
Process Safety Management		
Radiation Protection		
Respiratory Protection		
Rollover Protection for Mobile Equipment		
Scaffolding		
Steel Erection		
Elevating and Rotating Work Platforms		
Welding and Cutting Operations		
Working Over or Near Water		
Work Zone Maintenance of Traffic (MOT)		

APPENDIX E: SAMPLE KSC FORM 28-750NS, CONFINED SPACE HAZARD EVALUATION REQUEST

KSC/CCAFS Confined Space Hazard Evaluation Request

Complete this request and submit to MESC Work Control using Submit by Email button below or send to IHA-022
Call 867-2400 for assistance

Space Identification

Space Name	Type	Facility Number	Facility Name

Has this space been evaluated before? ☐Yes ☐No ☐Unknown If yes, identify report number and date or attach the report.	Location/Area

Organizations

Controlling Organization	Controlling POC / Mail Code	Controlling POC Phone Number
Requesting Organization	Requesting POC / Mail Code	Requesting POC Phone Number
Entering Organization	Entering POC / Mail Code	Entering POC Phone Number

Space Description

Function/Use	General Description (including approximate size and shape)

Entry Control Method	Entry Configuration ☐Horizontal ☐Vertical	Entry Point Size and Number

Entry Tasks

List and briefly describe the anticipated work performed within the space (entry tasks)

Possible Hazards

Hazards of the space and of the work within or near the space. Check boxes where applicable

Potential Hazards	Space	Work
Engulfment		
Entrapment		
Atmospheric		
Low/high Oxygen		
Flammable gas/Vapor		
Toxic gas/Vapor		
Welding fumes		
Dust/Fibers		
Comments		

Potential Hazards	Space	Work
Materials		
Flammable		
Corrosive/Reactive		
Radioactive/Ionizing		
Sludge/Residue		
Comments		

Potential Hazards	Space	Work
Physical/Configuration		
Poor lighting		
Electric shock/Arc flash		
Work at heights/Fall		
Noise		
Sharp objects		
High pressure gas		
Equip Auto Start-up		
Hot environment		
Mechanical action		
Weather		

Prepared by	Organzation	Phone	Date

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SAMPLE KSC FORM 16-287, CONFINED SPACE ENTRY PERMIT AUTHORIZATION

KSC/CCAFS Confined Space Entry Permit/Authorization
Assessment form for all confined space entries

Entry Permit No.

Entry Permit Action	Date / Times
Start	
Auto-Expiration	
Cancellation with Entry Supervisor initials	

√ *Follow company procedure for final disposition of this documentation*

Rescue and Emergencies
- ☐ Call 911 or (cellular) 867-7911 for emergencies
- ☐ Call 861-8718 or 853-9253 to advise FS of entry
- ☐ Required at confined space
- ☐ Other Rescue Service

911 or 867-7911 (cellular)

Confined Space Information — Space Name:
Facility:
CS POC Org: — Type Space:
Controlling Contractor:
Description:

Entry Information — Entering Org: — Phone:
Purpose of entry:
Attendant(s):
Authorized Entrant(s):
(use Entry Log on back of posted hardcopy as needed)

Hazards of Space & Entry
(Check hazard & identify source/contributor)
Previous Content:
☐ Hot Work: Type
☐ Inside space ☐ Outside space

Potential Hazards	Contributor / Source
☐ Engulfment	
☐ Entrapment	
Atmospheric	
☐ O_2 Deficiency / Enrichment	
☐ Flammable	
☐ Toxic	
☐ Dust / Fibers	
Materials	
☐ Flammable	
☐ Corrosive / Reactive	
☐ Radioactive	
☐ Biological	
☐ Sludge / Residue	

Potential Hazards (Cont.)	Contributor / Source
Physical / Configuration	
☐ Poor lighting	
☐ Poor communication	
☐ Noise	
☐ Hot / Cold; Surf / Environment	
☐ Slip / Trip	
☐ Protrusions / Sharp objects	
☐ Working at heights	
☐ Falling Objects	
☐ Electric shock / Arc flash	
☐ Equip. start-up / Mechanical action	
☐ High pressure gas	
☐ Restricted movement	
☐ Weather	

SAMPLE

Atmospheric Conditions	Time				Test By:
Parameter	Limits	Conc.	Conc.	Conc.	Equipment / Cal Due
Oxygen	19.5 - 23.5%				
LFL	10%				
CO	25 ppm				
H_2S	1 ppm				

Industrial Hygiene Signature (if applicable): — Name / Phone:

Additional Atmospheric Monitoring Requirements	Details
☐ Continuous	
☐ Periodic	
☐ Ventilation changes	
☐ Method of detecting hazards	
☐ Re-entry each	
☐ If change suspected (All data to be attached)	

Comments:

Hazard Controls / PPE *(Check entry requirements and methods to control/eliminate the identified hazard. Fill-in if applicable and as needed)*

Ventilation
- ☐ Mechanical temporary
  - ☐ Electric
  - ☐ Engine / Fuel
- ☐ Natural
- ☐ Fixed ventilation
- ☐ Flow ______
- ☐ ______

Respiratory Protection
- ☐ Cartridge ______
  - ☐ Half-Face (NPR)
  - ☐ Full-Face (NPR/PAPR)
- ☐ SCBA
- ☐ Airline (SAR)
- ☐ Dust Mask
- ☐ ______

Lighting
- ☐ Portable light, area
- ☐ Permanent light
- ☐ Natural light
- ☐ Flashlight
- ☐ Lightstick, corded
- ☐ Exterior light

Other PPE
- ☐ Garment, ______
- ☐ Boots, ______
- ☐ Welding hood
- ☐ Gloves, ______
- ☐ Eye protection
- ☐ Hearing protection
- ☐ Arc flash protection

Rescue / Fall Protection
- ☐ Verbal Comm, ______
- ☐ Signal Comm, ______
- ☐ Body harness
- ☐ Anchor point
- ☐ Tripod, available
- ☐ Wristlet; ☐ Anklet
- ☐ ______

Entry / Exit
- ☐ Access ladder
- ☐ Body harness / Entry tripod
- ☐ Raised platform
- ☐ Barriers
- ☐ Pre-task briefing

Isolation / LOTO system / method
- ☐ Electrical
- ☐ Pneumatic
- ☐ Piping
- ☐ Mechanical
- ☐ Hydraulic

Other Entry Requirements:

CS Classification *(General / Initial)*	OSHA Standard
☐ Permit Space	*1910.146*
☐ Permit Space	*1926.1200*
☐ Non-Permit Space	*1910.146*
☐ Telecom Manhole/Vault	*1910.268*
☐ Electrical Manhole/Vault	*1910.269*
☐	

Other CS Standards
- ☐ KNPR 1840.19 *Industrial Hygiene Programs*
- ☐ KNPR 8715.7 *Construction Contractor S&H*
- ☐ AFOSH 91-25 *Confined Spaces*

Entry Class. / Reclassification
- ☐ PRCS entry
- ☐ APPS entry
- ☐ Temp NP entry
- ☐ N-PS entry
- ☐ TOCS entry
- ☐ EPCS entry
- ☐ ______

Note:
- All OSHA standards apply to organizations performing work at Spaceport. Omission of standards on this form does not imply inapplicability to workers and their work conditions.
- This permit is void / canceled if conditions change to an extent that the hazards are no longer adequately controlled, at the time of the stated expiration at the end of the permitted task, or otherwise canceled by the entry supervisor.
- Any problems encountered during an entry must be noted on, or attached to the permit, and reported to your safety and health office.
- All entrants, attendants and entry supervisors must follow the confined space entry procedures of their employer.

Other OSHA Standards Applied to Entry:
☐ 29 CFR 1910.147 Lock-out/Tag-out ☐ 29 CFR 1910.134 Respiratory Protection ☐ 29 CFR 1910.252 Welding ☐

Safety Signature (if applicable): — Authorizing Entry Supervisor Signature:
Name / Phone: — Entry Supervisor Name(s) / Phone:

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SAMPLE KSC FORM 16-287, CONFINED SPACE ENTRY LOG

Confined Space Entry Log

appended to KSC/CCAFS Confined Space Entry Permit/Authorization

...for tracking assignment changes and Attendant use in tracking Authorized Entrants.

- **Required Use for Permit Spaces with entries following**
  - **Permit Confined Space entry (29 CFR 1910.146 or 29 CFR 1926.1200) or**
  - **Alternate Procedures Permit Space entry (29 CFR 1910.146)**
- *Best Practice Use for Confined Spaces with entries following*
  - *Telecommunications (29 CFR 1910.268)*
  - *Electrical Manholes and Vaults (29 CFR 1910.269)*

Confined Space Entry Start & End Record:

Space Identification	Entry Date	Entry Start Time	Entry Supervisor (initials)	Entry End Time	Entry Supervisor (initials)

Entry Supervisor Record *record all changes of Entry Supervisor*

Name	Phone	Assignment Start Time	Assignment End Time

Attendant Record *record all changes of Attendant*

Name	Assignment Start Time	Assignment End Time

Authorized Entrant Record *record all entries and exits for accurate knowledge of current entrants.*

Name	In time	Out time	In time	Out time	In time	Out time	In time	Out time

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APPENDIX F: SAMPLE KSC FORM 50-101, LIFT PLAN

Kennedy Space Center Lift Plan for Construction Contractors

This document is for use by construction contractors performing work for Kennedy Space Center. It is recommended for all lifts and will satisfy the lift planning requirements in accordance with OSHA and NASA regulations. A lift plan is mandatory when: 1) lifting personnel with a crane, 2) the load exceeds 75% of the crane's capacity in a given configuration, 3) the lift requires more than one crane. For further assistance, please contact the KSC Institutional Safety Office at 867-SAFE.

1. Company Name	Name and Signature of Person Preparing this Lift Plan	2. Date

3. Project Name and Job Location

4. Load Description

5. Crane Description - Type, Manufacturer, Model Number (multiple crane lifts require separate plan for each crane)

6. Lift Description (attach diagram of lift and load placement)

Load			**Crane** (continued)		
7. Load Condition (describe)			27. Radius at Set-down		ft
8. Known Center of Gravity? (attach diagram)			28. Capacity at minimum boom angle / maximum radius (attach copy of actual load chart used)		lbs
9. Source of Load Weight (attach a copy of drawings, calculations, bill of lading, etc.)			29. Maximum load on crane FOR THIS LIFT (Gross Load from Block 20)		lbs
10. Load Weight Empty		lbs	30. Percentage of the crane's rated capacity in this configuration		%
11. Weight of Load Contents / Fluids		lbs	**Jib / Fly**		
12. Weight of Auxillary Block		lbs	31. Erected ___ Stowed ___ Stored ___		
13. Weight of Main Block		lbs	32. If jib / fly is used: Length = ___ Angle = ___		
14. Weight of Lifting Beam (See Block 50)		lbs	33. Rated capacity of jib / fly from chart =		
15. Weight of Slings / Shackles / Other Rigging (See Blocks 42 thru 52)		lbs	34. Weight of Jib if installed but not in use		lbs
16. Deduction for Jib / Fly (if applicable) (See Block 34)		lbs	**Crane Setup / Other Considerations**		
17. Weight of Hoist Rope (if applicable)		lbs	35. Soil conditions / level / underground hazards / crane mat required?		
18. Weight of Axillary Head / Rope (if applicable)		lbs	36. Outriggers (full / partial) / pads / matting / on rubber? ☐Yes ☐No		
19. Additional Deductions (list if applicable)		lbs	37. Buildings, equipment, or structure to lift / swing over?		
20. Gross Load (Add Block 10 thru 19)		**lbs**	38. Travel required? ☐Yes ☐No		
Crane			39. Working quadrants / swing restrictions?		
21. Boom Configuration			40. High voltage / electrical hazards / other hazards?		
22. Boom Length		ft	41. Other Considerations? (head room, winds, taglines, traffic, etc.) Add to Block 6		
23. Counterweight		lbs	**Rigging**		
24. Boom angle at Pick-up		°	42. Slings (number, size, type)		
25. Radius at Pick-up		ft	43. Slings rated capacity per configuration (see Block 45)		
26. Boom angle at Set-down		°	44. Total Weight of slings		lbs

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Rigging (continued)			**Required Attachments**	
45. Hitch (vertical, basket, choker) Sling Configuration Angle		°	53. Load placement diagram showing location of pick & final place points	☐
46. Shackles (number, size)			54. Rigging diagram with sling angles, expected loads, and load CG	☐
			55. Photocopy of actual load charts used to calculate crane capacity	☐
47. Shackles rated capacity			56. Rigging certifications	☐
			57. Rigging load limit charts (Safe Working Load Limit)	☐
48. Total Weight of Shackles		lbs	58. Crane certification (Annual/Daily Checklist)	☐
49. Spreader Beam / Other rigging required? (type, size, capacity)			59. Operators certification	☐
			60. Rigger qualification document(s)	☐
50. Weight of Spreader Beam / Other Rigging		lbs	61. Narrative of lift procedures (See item 6)	☐
51. Connection to Load Capacity Each (lugs, bollards, pad eyes, none)			62. Source of load weight (See Items 8 & 9)	☐
			63. Others	
52. Total Weight of all rigging (Add lines 44, 48, 50 and 51)		lbs		

I certify that all information contained herein has been reviewed for accuracy and correctness.

Submitting Official Signature	**Name and Title**	**Date**

Instructions for Kennedy Space Center Lift Plan for Construction Contractors

1. Name of contractor performing the lift. Include name of person preparing this lift plan.
2. Date lift plan was prepared.
3. Project name and actual location of lift.
4. Describe the load and any special considerations.
5. Self-explanatory.
6. Brief description of pickup and placement of load. Attach diagrams as necessary.
7. Describe the load and any special considerations (e.g., dry, solid, filled with liquid, empty, stable, unstable, etc.).
8. Is the load's center of gravity known? If so where is it documented? Attach diagram. **(On Lift Plan Worksheet)**
9. Document the source of load weight (e.g., drawings, calculations, bill of lading, etc.).

10. - 18. Self-explanatory. **(On Lift Plan Worksheet)**

19. List all additional deductions and weights.
20. Add Block 10 through Block 19. **(On Lift Plan Worksheet)**
21. Describe boom configuration. Refer to manufacturer's terminology.

22. - 27. Self explanatory. **(On Lift Plan Worksheet)**

28. Crane's rated capacity at minimum boom angle / maximum radius. Figure worst case between pick and place.
29. Copy Gross Load from Block #20.
30. Block #29 divided by Block #28.
31. Check to indicate jib / fly erected, stowed, or stored off the crane.
32. If the Jib is used, enter the length of the boom in feet and the angle in degrees. **(On Lift Plan Worksheet)**
33. List the Jib capacity from the Fly from chart.
34. The weight of the jib if it is installed on the boom but is not being used during the lift. **(On Lift Plan Worksheet)**
35. Describe site, soil, stability conditions and any underground hazards or concerns.
36. Describe outrigger setup and required matting if applicable. **(On Lift Plan Worksheet)**
37. Describe considerations for buildings, structures, or equipment which will be under the load during the lift.
38. Describe crane travel with load on the hook if required.
39. Describe planned crane working quadrant(s) and any swing restrictions.
40. Describe any electrical hazards or concerns in close proximity to the crane.
41. Describe other considerations of note such as restricted head room, use of taglines, reduced wind limitations, traffic control, etc.
42. Describe slings to be used.
43. In the planned configuration, list the maximum rated capacity the sling can lift in lbs. **(On Lift Plan Worksheet)**
44. The weight of the sling to be used.
45. The type of hitch to be used and its sling configuration angle (choker, vertical, basket). **(On Lift Plan Worksheet)**
46. Describe shackles to be used, number and size.
47. The maximum rated capacity each shackle can lift in lbs.
48. The total weight of all shackles used.
49. List Spreader beam / other rigging used. State type, size, and capacity.
50. Self explanatory.
51. Self explanatory. **(On Lift Plan Worksheet)**
52. The total weight of all rigging that will be used.

53. - 63. Self explanatory.

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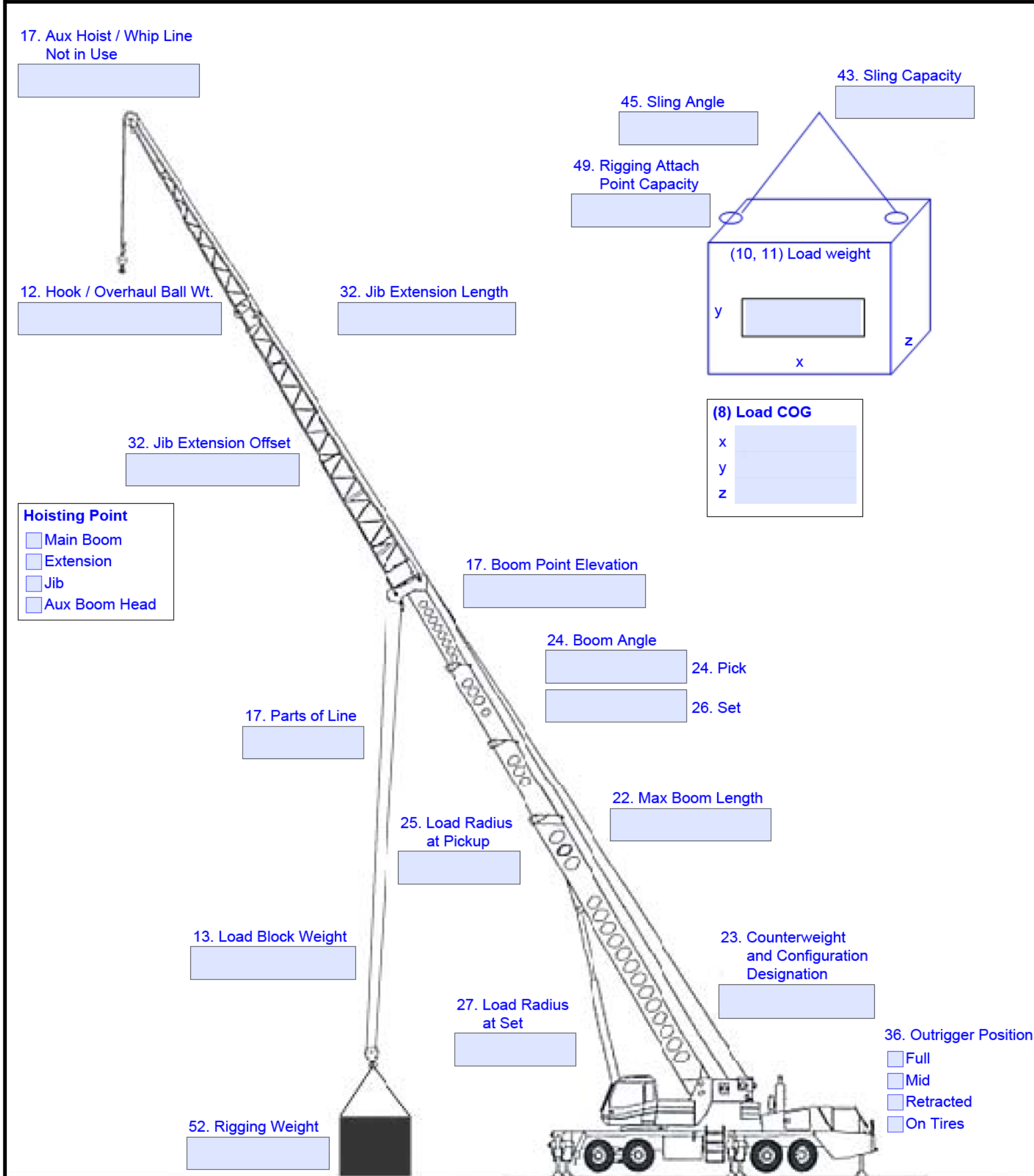
Lift Planning Worksheet



Refer to operator's manual and all notes and warnings for crane-specific information

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APPENDIX G: SAMPLE JHA

Company: Company X **Project Name: Refurbish HQ Building** **Contract Number: NNK1012345A**		**Work Process:** **General Construction Operations Work**
Task	**Hazard Description**	**Preventive Control Measures**
Operating machinery, equipment, and powered hand tools.	• Unqualified or untrained operators.	• Only qualified and authorized personnel operate equipment. Know and utilize the manufacturer's operating, maintenance, and safety procedures.
	• Flying debris, dust, wood chips, or metal shavings getting into the eyes.	• Conduct visual check of equipment and examine all powered tools for proper safeguards (e.g., blade guards, shields, or stops). Use PPE as required (e.g., ear protection, goggles, face shield, safety shoes, work gloves).
	• Loose clothing pulled into moving parts.	• Do not wear loose clothing, neck ties, etc.
	• Electrical shock hazards	• Check electrical cords for three prongs to ensure there is a ground. Use Lockout/Tagout (LOTO) as required. Keep cords and hoses away from heat, oil, and sharp edges. Do not allow doors to shut on cords or hoses. Never carry a power tool by the cord or yank the cord to disconnect it from the power receptacle. Tag all damaged tools as "Danger – Do Not Use or Operate".
	• Motion hazards (e.g., rotating devices, cutting, or shearing blades).	• Keep fingers and hands away from pinch point areas. Ensure work area has adequate spacing and lighting.
	• Injury from slips, trips, falls, and dropped materials (e.g., water, oil, or dust).	• Maintain proper footing and balance while operating machinery. • Clean work place, equipment, and tools
Working with sharp cutting objects, blades/knives, tools, etc.	• Cuts, lacerations, amputations, and punctures.	• Ensure cutting blade surfaces are maintained. Maintain correct posture/position while cutting. Cut out and away from the user's body. Stow sharp/pointed tools in properly when not in use.

Using liquid fueled equipment.	• Inhaling toxic fuel vapors. • Fire or explosion. • Fuel spilled onto clothing, body, or eyes.	• Have adequate ventilation to prevent fume build up • Allow equipment to properly cool before re-fueling. Use approved fuel containers for stowing and service. Use grounding/bonding when required. • Where fuel may splash/drip during transfer, wear chemical splash goggles. Ensure a shower/eyewash station is readily available.
Working with or near noisy machinery or equipment	• Noise induced hearing loss or tinnitus (ringing)	• Conduct noise survey. Place sound barrier before using equipment. Use reduced noise equipment. Maintain equipment noise control features. Wear the proper PPE when operating the machinery.
Pneumatic tools using compressed air.	• Eye injury, lacerations, punctures, and amputations.	• Ensure trained personnel use the equipment. Follow manufacturer's instructions when operating equipment. Use the manufacturer's recommended air pressure. Wear required eye protection.
Power up and power down operations.	• Injury due to movement of equipment, electrical malfunction, improper operation, or cuts, burns, etc. from tools during operation.	• Ensure equipment is mounted and secured properly. Inspect wiring, controls, and avoid moving parts or sharp edges on equipment or tools. Follow manufacturer's instructions when operating equipment.
Welding and cutting using portable gas units. Includes brazing, oxy/acetylene, etc.	• Exposure of oxygen cylinders and fittings to oil or grease, creating a fire or explosion hazard. • Pointing welding/cutting torches at a concrete surface causing flying fragments of concrete. • Inhalation of toxic fumes or vapors from welding metals or alloys. • Fires, explosions, severe eye and skin burns, and injuries from welding operation in the proximity of combustible solids, dust, gases, air, and chemicals.	• Never use grease, cleaning solvents, or other flammable material on an oxygen valve, regulator or piping. Ensure hoses are visually checked for wear, oil/grease before use. • Follow manufacturer's procedures with respect to the sequence of operations in lighting, adjusting, and turning off torch flame. • Identify and use required PPE. • Shut off gas and oxygen when not in use. Open valves slowly. Ensure proper ventilation. Purge hoses only in open spaces away from ignition sources. When welding/brazing a cylinder, ensure it is free of all gases, oils, flammables. Do not use flame within 50 feet of flammables. Receive a hot work permit. Use PPE to minimize skin burns; e.g., pants that will cover tops of

		boots, flame resistant gloves, apron, leggings, certified welding/cutting goggles/face helmet. If required, ensure respirator is used.
Operation using portable electric welding units.	• Electrical shock. • Inhalation of toxic fumes or vapors from welding metals or alloys. • Fires, explosions, severe eye and skin burns, and other injuries from welding operation that is in proximity of combustible solids, dust, gases, air, and chemicals.	• Ensure circuits are de-energized and components are grounded. Inspect switches, power cables, electrode holders for damage. • Wear certified welding and cutting goggles or face helmet as required. If required, ensure proper respirator is provided. • Use PPE to minimize skin burns, e.g., steel-toed boots, pants which cover tops of boots, flame resistant gloves, apron, and leggings. Inspect area for tripping hazards. Only a certified welder is authorized to use equipment and perform task. Assure that personnel are adequately trained and good housekeeping is practiced
Materials handling (manual) and moving.	• Personnel injuries due to load handling. • Load Variables: load distribution, weight, size, shape, shift of the load in the container, and center of gravity. • Work Place Layout: degree of movement required, obstacles, distances moved, and direction of movement • Individual Physical Variables: strength, mobility, fatigue, and motor functions. Pre-existing injuries - strains, sprains, hernias, fractures, and bruises.	• Wear all required PPE properly (e.g., safety shoes/boots, leather work gloves). • Perform pre-inspection of item to be handled to determine number of persons required to assist. Consider size/shape of object being lifted. • When using a hand truck, and secure all items • Perform inspection of area for environmental hazards such as slipping and tripping hazards. • Execute proper lifting techniques. • Train employees on personal limitations.
Crane Operations: load testing, inspection and certification.	• Unknown conditions allowing the crane to fail causing injury to personnel and damage to property.	• Verify load test data on crane and that the required preventive maintenance inspections (PMI) have been conducted. Conduct “Daily” inspection of crane and components prior to lift; giving special attention to the hook, hoist rope, sheaves, rope guides, and cable winding on drum. Verify the certification of the crane operator, riggers and flagman.

Inspect slings, spreader bars, shackles, and all other rigging to be used.	• Rigging failure if damaged, not certified, or misused. Slips, trips, and back strain potential for personnel inspecting the rigging.	• Verify/document load test dates on and visually inspect all rigging. Assure that rigging selected matches rigging identified. If inspection requires moving the rigging, use proper lifting techniques and use additional persons when needed.
Relocating or transporting the portable crane.	• Electrocution from overhead power lines and equipment damage from overhead bridges, etc.	• Ensure security vehicles and equipment are clear of route; front, side, and rear. Secure required permits to convoy before move date. Front and rear escorts with security to provide safe traffic control along convoy streets and traffic light intersections. The route of travel shall be cleared before date of convoy, e.g., clearance of all electrical, phone, cables, and traffic signals/wires. Convoy will have electric company traveling with it to raise/reposition wires and signals on the approved route and it will not exceed maximum approved speed.
Crane lifting operations.	• Injury or equipment damage due to falling/dropped material or collision with equipment or personnel. Electrocution and equipment damage from overhead power lines, etc.	• Perform operations per procedure; ensure proper field of view is adequate or have crew with radio communications directing the crane operation. Ensure warning lights are operational, load is properly positioned, and personnel are cleared from area. Be aware of the crane parameters and the space restrictions in the lift path. For portable cranes, ensure the outriggers are fully extended on a stable surface.
Working outdoors	• Can result in heat related illnesses such as heat syncope, heat exhaustion and heat stroke.	• hydration before and during work activities, water supply near workers, work breaks depending on conditions, effort, and other risk factors.
Working at night or where no or limited natural light is present.	• Unsafe or incorrect action from reduced light. Evacuation or escape challenges.	• Provide adequate area lighting or supplemental lighting that may include task lighting to provide safe escape and adequate illumination for visual task.

Areas of Emphasis:

1. Analyze task and understand technical requirements for selection of proper tools, materials, and placement of operating equipment.
2. Always follow the manufacturer's instructions when operating equipment.
3. Preventive Maintenance Inspections (PMI) will be accomplished on all operated equipment in the performance of work.
4. Ensure the proper selection of protective gloves for use with solvents/chemicals; for determination of respiratory protective equipment when an inhalation hazard exists; for assessment of ergonomic hazards; assessment of noise hazards; and assessment of heat stress hazards.

5. Ensure updates of JHA when any new equipment, operations, or processes are to be performed that are not already described in this JHA.

Contractor Site Superintendent Review & Approval: ______________________________	**Date:** ____________________
Contractor Site Safety Officer Review & Approval: ______________________________	**Date:** ____________________

APPENDIX H: SAMPLE KSC FORM 26-312, SAMPLE UTILITY LOCATE/EXCAVATION PERMIT REQUEST

Utility Locate / Excavation Permit Request

1. Date	2. Master Planning Site Plan Number	3. Project (PCN) No.	4. Work Order Number	5. Check One ☐ Permit to Dig ☐ Locate Only / No Digging
6. Requester's Name **(REQUIRED)**	7. Email **(REQUIRED)**	8. Phone Number **(REQUIRED)**	9. Fax Number **(REQUIRED)**	
10. Requester's Company **(REQUIRED)**		11. Mail Code / Address		
12. Technical Contact **(REQUIRED)**	13. Email **(REQUIRED)**	14. Phone Number **(REQUIRED)**	15. Fax Number **(REQUIRED)**	
16. KSC NASA Contact Name **(REQUIRED)**		17. Email **(REQUIRED)**	18. Phone Number **(REQUIRED)**	
19. Building Number **(REQUIRED)**	20. Grid Number **(REQUIRED)**	21. Secondary Location (Building Number / Additional Info.) **(REQUIRED)**		
22. Estimated Start Date (REQUIRED)		23. Estimated End Date (REQUIRED)		
24. Emergency request justification *(if required)*				
25. Reason for permit / Statement of work **(REQUIRED)**				

MAP / SKETCH, WITH AREA TO BE LOCATED / EXCAVATED CLEARLY MARKED, IS ATTACHED (REQUIRED)

See next page for completion and process instructions.

KSC FORM 26-312 NS 01/16 (1.1) PREVIOUS EDITIONS ARE OBSOLETE. Validate prior to use.

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Instructions

Please complete as many fields as possible.

NOTE: ALL FIELDS INDICATING "(REQUIRED)" MUST PROVIDE INFORMATION.

Block 1	Date submitted.
Block 2-4	Provide related Site Plan, PCN or Work Order Numbers.
Block 5	Check one. If you are NOT going to dig, but need an underground utility locate, check "Locate Only".
Block 6-18	Enter the name, email address, phone, fax number, company name, and address of the person who will be receiving this permit including KSC NASA Contact for Project.
Block 19-20	Enter the building number where work will be performed (or closest building number).
Block 21	Enter additional information as necessary.
Block 22	Enter the date excavation is expected to begin.
Block 23	Enter the date excavation is expected to be complete. Permit will be closed on this date. End date may not be longer than one year from the start date.
Block 24	If excavation is of an emergency nature and requires priority, enter justification.
Block 25	Enter a description of why this permit is being requested, i.e., what work will be performed and why.

REQUIRED: ATTACH A MAP/SKETCH WITH AREA TO BE LOCATED/EXCAVATED CLEARLY MARKED.

1. Email, fax or hand-carry this request, along with a map, drawing or sketch to the Excavation Permit Request (EPR) Administrator using the contact information below.
2. You may contact the EPR Administrator using the contact information below if you have any questions on the dig permit process.
3. <u>The Excavator is required to contact BOTH authorities to schedule utility locates:</u>
   1) Locator support for KSC managed utilities: Ryan Ostarly 321-289-2372 or Jeff McDowell 321-749-4840
   2) Locator support for City Gas owned natural gas line: Sunshine One-Call at 800-432-4770 or 811 (cell).
   For Natural Gas locate, it is recommended that you create an account and request at www.online811.com
4. <u>The Excavator is required to obtain signature of KSC Excavation Permit Inspector (EPI) only:</u>
   You must schedule a KSC Excavation Permit Inspector (EPI) to meet with you on site for the KSC utility locate and to obtain the required signature from the KSC EPI on this permit. Requester should notify the EPR Administrator when excavation is complete.
5. Permits may be extended for up to one year by calling the EPR Administrator, but all permits will be closed upon expiration unless notified.

EPR Administrator

Location	**KSC OSB I, K6-1096, Room 2113 N1**
Mail Code	**ISC-4325**
Phone	**(321) 867-2406**
Fax	**(321) 867-1175**
Email	**KSC-ISC-DIGPERMIT@mail.nasa.gov**

Emergency requests will be processed on a real time basis
through the ISC Duty Office 861-5050, Fax (861-1627)
or Email - KSC-ISC-DutyOffice@mail.nasa.gov

KSC FORM 26-312 NS 01/16 (1.1) PREVIOUS EDITIONS ARE OBSOLETE. Validate prior to use.

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Instruction Page 1 of 1

APPENDIX I. SAMPLE SITE SPECIFIC FALL PROTECTION PLAN

1. General

a. ***COMPANY NAME*** shall identify and mitigate all work-related fall hazards and has established methods to protect the employees from those fall hazards.

b. Fall protection is required at all times within six (6) feet of an unprotected edge with a fall hazard of four (4) feet or more. Where required, full body harnesses meeting OSHA and ANSI/ASSE requirements shall be used.

c. ***COMPANY NAME*** shall have a Fall Protection Program Administrator (FPPA) or team, name competent person(s) (fall protection), and use a qualified person(s) (fall protection), as required, by the applicable NASA regulations and OSHA Standards. On this project, these designated persons are:

(1) Fall Protection Program Administrator: ***EMPLOYEE NAME***

(2) Fall protection competent person(s): ***EMPLOYEE NAME(S)***

(3) Fall protection qualified person(s): ***EMPLOYEE NAME(S)***

d. The FPPA shall identify the competent and qualified persons listed above.

2. Training

a. All employees working at elevations shall receive training in recognition of fall hazards, hazard mitigation, and the proper use and inspection of fall protection equipment from a competent person (fall protection).

b. The employee training, described above, shall be certified in writing by the employer.

c. The latest certification documentation shall be maintained by the employer and include the name of the employee, the date of the training, areas trained in, and the signature of the training instructor and/or the employer.

d. The designated competent person (fall protection), conducting training, shall be qualified in the following areas:

(1) The nature of fall hazards in the work area.

(2) The correct procedures for installing, inspecting, and disassembling fall protection systems.

(3) The use and operation of fall protection systems to be used.

(4) Each employee's role in the safety monitoring system, if this system is to be used.

(5) The limitations on the use of mechanical equipment on low-slope roofing jobs.

(6) The correct procedures for the handling and storage of equipment and materials and installation of overhead protection.

(7) Each employee's role in this fall protection plan.

(8) The OSHA fall protection standard.

e. If ***COMPANY NAME*** verifies and accepts training provided by another employer, the certification shall indicate the date ***COMPANY NAME*** determined the prior training was adequate rather than the date the training was performed.

3. Retraining of Employees

a. Employees suspected of not having the understanding or skills required shall be retrained.

b. Other circumstances that require retraining include:

(1) Changes in the workplace that make earlier training obsolete.

(2) Changes in the types of fall protection systems used.

(3) Observed inadequacies in an employee's use or understanding of fall protection systems.

4. Fall Protection Equipment

a. All new fall protection equipment shall meet the applicable ANSI/ASSE Z359 code at the time of purchase. (5)

b. Fall protection equipment shall be used according to manufacturer instructions. Only a qualified person may change the instructions, and those changes shall be documented prior to use and maintained until the equipment is removed. (5)

c. Equipment not designed for fall protection use shall not be used without prior approval of a qualified person, documented, and be labeled "For Fall Protection Use Only."(5)

d. Fall protection equipment shall meet all OSHA, applicable ANSI/ASSE, and manufacturer requirements for use, and be properly stored when not in use.

e. All fall protection equipment shall be inspected by the user before each use and detailed inspected by a competent person (fall protection) annually in accordance with applicable regulatory standards or per manufacturer's recommendations, whichever is more stringent.

f. Detailed inspections of fall protection equipment shall be documented and meet the following criteria:

(1) All fall protective equipment to include safety harnesses, drop lines, lifelines, fall arrest Self-retracting lanyards, as well as positioning lanyards, ladder safety climb, and rigid rail sleeves (e.g., skates, rope grabs) shall be inspected to the manufacturer's or approved engineering specifications.

(2) All equipment shall have a manufacturer's serial number on it (e.g., tag, webbing) or it shall be serialized by using a method not destructive to the equipment.

(3) Maintenance servicing shall only be completed by the manufacturer's approved service technician, trained to repair and service their equipment.

(4) A documented equipment tracking system that uses the method identified from 4.f (2) above shall be used.

(5) Any fall protection equipment that is missing an inspection tag or is past due for annual inspection shall be immediately removed from service.

5. List of Attachments

a. List of identified fall hazards.

b. List of all protection methods to be used to protect employees from the identified fall hazards.

c. List of controls, limitations, constraints, and procedures to be used with the fall protection methods.

d. Site specific fall rescue plan

e. List of employees trained and authorized to work in areas where fall protection is required.

f. Written certification of fall protection training for each employee.

g. A signature page where every employee authorized to work under the plan signs to indicate that they have read and understood the plan.

APPENDIX J: SAMPLE KSC FORM 28-1230A, ASBESTOS ABATEMENT PRE-WORK INSPECTION CHECKLIST

ENVIRONMENTAL HEALTH
Asbestos Abatement Pre-Work Inspection Checklist

ADMINISTRATIVE DATA

Facility #:	Facility Name:		IH Task:
Requester:	Mail Code:	POC:	POC Phone:
Project / WON #:	Abatement Contractor:		
Site/Location:			

SAMPLE

VISUAL INSPECTION DATA	Satisfactory YES	NO	N/A
1. Access control barriers and signs properly posted	☐	☐	☐
2. Critical barriers installed / sealed ☐ Floors, walls & ceilings ☐ Edges, vents & penetrations sealed & water tight ☐ Entry/egress curtains, flaps, airlocks ☐ Glovebags sealed/smoke tested	☐	☐	☐
3. Negative air pressure units operating ☐ -0.02" obtained ☐ Pressure monitors / alarms working ☐ Neg pressure glovebag	☐	☐	☐
4. HVAC system isolation adequate ☐ Shut down and sealed off ☐ AHU/ducts isolated	☐	☐	☐
5. Electrical hazards de-energized, and locked out / tagged out	☐	☐	☐
6. Showers/decontamination systems adequate ☐ Hot water, soap, towels available ☐ Waste water filtered & drained into sanitary sewer	☐	☐	☐
7. Adequate materials, supplies and tools on site ☐ Waste containers / bags ☐ HEPA Vacuum ☐ Airless sprayer	☐	☐	☐
8. Personal protective equipment available for use ☐ NIOSH approved respirators ☐ Disposable coveralls, gloves, & work boots	☐	☐	☐
9. Contractor supervisor / competent person Name and Company: ____________	☐	☐	☐
ENVIRONMENTAL COMPLIANCE	**YES**	**NO**	**N/A**
10. Quantity ACBM planned for removal ______ SF ______ LF ______ CF	☐	☐	☐
11. FDEP notification required (RACM > 160SF, 260LF or 35CF) If YES, indicate method of document verification below ☐ Copy provided on site by Abatement Contractor ☐ Copy on file with EH&S Program Office	☐	☐	☐
PRE-WORK INSPECTION RECOMMENDATIONS	**YES**	**NO**	**N/A**
12. IH concurrence to proceed Date: ______ IH: ____________	☐	☐	☐

Comment:

KSC FORM 28-1230A NS (10/10)

APPENDIX K: SAMPLE KSC FORM 28-1231A, ASBESTOS ABATEMENT CLEARANCE INSPECTION CHECKLIST

ENVIRONMENTAL HEALTH
Asbestos Abatement Clearance Inspection Checklist

ADMINISTRATIVE DATA

Facility #:	Facility Name:		IH Task:
Requester:	Mail Code:	POC:	POC Phone:
Project #:	Abatement Contractor:		
Site/Location:			

VISUAL INSPECTION DATA	YES	NO	N/A
1. All Visible Dust, Debris, or Residue Removed from Work Area?	☐	☐	☐
☐ Floors and drains			
☐ Walls, windows, doors			
☐ HVAC or other mechanical equipment			
☐ HVAC ducts			
☐ Pipes, valves, or fittings			
☐ Lights and/or overhead fixtures			
☐ Decon area, showers, equipment load out areas			
☐ Other surfaces, tools, or equipment			
2. ACM Waste Properly Removed from Site?	☐	☐	☐
☐ Waste containers properly labeled			
☐ Waste materials wet			
☐ Waste container exterior surfaces clean			

SAMPLE

CERTIFICATION OF CLEANLINESS / RE-OCCUPANCY	YES	NO	N/A
3. Satisfactory Visual Inspection (per ASTM-E1368 Guidelines)?	☐	☐	☐
4. Clearance Air Samples Satisfactory (<0.01 f/cc via NIOSH Method 7400)?	☐	☐	☐

CLEARANCE INSPECTION RECOMMENDATIONS	YES	NO	N/A
5. Concurrence to Remove Critical Barriers? **By:** ______ **Date:** ______	☐	☐	☐
6. Concurrence to Remove Access Controls/Reoccupy Area? **By:** ______ **Date:** ______	☐	☐	☐

Comment :

KSC FORM 28-1231A NS (10/10)

APPENDIX L: SAMPLE KSC FORM 2-271, HOT WORK PERMIT

Hot Work Permit

Permit Shall Not Exceed 30 Days

Company Name	Permit Number	Date / Time Permit Issued	Date Permit Expires
Facility Number / Area			
Supervisor / Operator's Name (See Note #1)	Phone Number	☐Welding ☐Grinding ☐Torch ☐CAD ☐Other	
Supervisor / Operator's Signature		Permit Authorizing Individual	Name and Phone Number

On-site inspection required by Permit Authorizing Individual before issuing permit.

SAMPLE

Item		Yes	N/A
1.	Operator affirms they are properly trained to operate hot work equipment.		
2.	Operator affirms hot work equipment has been inspected and is in safe operating condition.		
3.	Operator shall maintain good housekeeping practices throughout operation.		
4.	Fire Extinguishers shall comply with NFPA 10. Extinguishers shall be inspected daily prior to hot work, located within 20 feet of hot work site, and their use is understood. Type: ☐10 lbs. ABC ☐1 1/2 gal. water ☐15 lbs. CO^2 ☐Other ______		
5.	Flammable liquids and gases shall be relocated a minimum distance 50 feet from hot work. If impractical to relocate, ensure they are safely protected or do not perform hot work.		
6.	Combustible m[illegible]s shall be relocated a minimu[illegible]istance of 35 [illegible] from [illegible]. If imp[illegible]ical to relocat[illegible] [illegible]y are safely protecte[illegible] or do n[illegible]t perform h[illegible]ork.		
7.	Operator shall [illegible]re all hazardou[illegible] du[illegible] lint, and o[illegible] [illegible]osits a[illegible] r[illegible]oved.		
8.	Operator shall visua[illegible] [illegible]pect an[illegible] ensur[illegible] hat all er[illegible]losu[illegible]s, c[illegible]ase[illegible] ducts, [illegible]lls, floor open[illegible]s and adjacent [illegible]eas have been safely protected.		
9.	Operator shall [illegible]sure [illegible] equi[illegible]ent, contai[illegible]s, pi[illegible]s, hose[illegible] have [illegible]ids dr[illegible]d, pressure [illegible], [illegible]pors [illegible], [illegible] valves shut off, etc.		
10.	Operator shall provide the appropriate safety barriers and warning signs as required.		
11.	Operator shall ensure detection systems (including HVAC) are safed, covered, or protected before hot work begins; and systems shall be restored to service daily.		
12.	Fire suppression systems shall remain operational (unless otherwise permitted).		
13.	No hot work in explosive or oxygen enriched atmospheres. Perform air sampling as required.		
14.	All fire watch personnel shall read and understand the requirements of this permit. Fire watch personnel shall be present throughout the hot work operation and 30 minutes after completion. If evacuation is required, report hot work operations to Fire Incident Commander.		
15.	All Hot Work shall stop 24 hours before scheduled launch and not resume until 8 hours after launch.		
16.	**For New Construction or Demolition:** A pre-task briefing shall be conducted at the beginning of any hot work task. Hot work operators and fire watches shall be present and the contents of this permit and potential hazards shall be addressed.		

In the event of FIRE OR EMERGENCY call 911 or cell phone - 321-867-7911.
For permit renewal call the Duty Office at 861-5050.

Additional Comments

(Note #1): If Operator cannot complete work, all new operators shall read and initial next to appropriate boxes and sign this checklist below, indicating full understanding of safety procedures and requirements.

Alternate Operator Signature	Date	Alternate Operator Signature	Date

Code References: *NFPA 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations, NFPA 101 Life Safety Code, NFPA 1 Uniform Fire Code, OSHA 1910.252, OSH 1926.352. NASA-STD-8719.11 Safety Standard Fire Protection.*

KSC FORM 2-271 09/12 (1.0) PREVIOUS EDITIONS ARE OBSOLETE. Validate prior to use.

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APPENDIX M: SAMPLE KSC FORM 2-272, TAR KETTLE OPERATION HOT WORK PERMIT

Tar Kettle Operations
Hot Work Permit

Organization/Company Name	Permit Number	Date/time of permit issue	Date/time permit expires
Facility/Area			
Supervisor/Operator's Name	Phone Number	Contractor Site Safety Agent	Contractor Site Safety Agent
Supervisor/Operator's Signature		Permit Authorizing Individual	Name and Phone Number

		Y	N	N/A
1.	On-site inspection by Permit Authorizing Individual before tar kettle permit is issued.	☐	☐	☐
2.	Supervisor or Site Safety shall perform a DAILY SITE WALK DOWN to ensure personnel are complying with fire guidelines and regulations, and shall ensure the following:			
	a. All fire extinguishers inspected daily prior to start of any tar kettle.	☐	☐	☐
	b. Inspect tar kettle area and roof sites daily following guidelines of hot work permit..	☐	☐	☐
	c. Insure fire watch has been assigned and briefed.	☐	☐	☐
3.	Operator affirms area shall be CLEANED AFTER EACH SHIFT (ground and roof areas).	☐	☐	☐
4.	Tar kettle shall be operated in a controlled area. The area shall be identified by the USE OF BARRIERS. NO SMOKING in operational area.	☐	☐	☐
5.	Tar kettle shall be placed no less than 20 feet from the structure. A noncombustible sturdy barrier 8 feet high & 4 feet beyond each side of kettle is required if closer than 20 feet.	☐	☐	☐
6.	LPG tank or tanks shall be placed NO LESS THAN 20 ft. from structure and secured.	☐	☐	☐
7.	LPG tank or tanks shall be placed NO LESS THAN 20 ft. from TAR KETTLE and secured.	☐	☐	☐
8.	Operator affirms all connections have been checked prior to start up of the tar kettle.	☐	☐	☐
9.	Operator affirms all piping are in compliance with applicable codes.	☐	☐	☐
10.	Tar kettles SHALL NOT BLOCK EXITS, means of egress, gates, roadways or entrances, without AHJ approval.	☐	☐	☐
11.	NO flammables within 50 ft. (except LPG tanks), or combustibles within 35 ft. of tar kettle.	☐	☐	☐
12.	STORAGE of stock shall be maintained no less than 50 feet from the tar kettle/burner equipment. One days working stock is permitted no less than 10 feet of the tar kettle.	☐	☐	☐
13.	The tar kettle shall be MANNED AT ALL TIMES while in use and for 30 minutes after the burner has been shut down.	☐	☐	☐
14.	Operator affirms tar kettle shall be SHUT DOWN while refueling.	☐	☐	☐
15.	MINIMUM OF THREE (3) 20 lbs. multipurpose fire extinguishers shall be provided. Two extinguishers shall be placed within 25 feet of tar kettle, minimum of one extinguisher shall be placed on the roof.	☐	☐	☐
16.	Operator affirms all skimmed material shall be placed on a NONCOMBUSTIBLE SURFACE and material shall be broken-up to prevent heat buildup.	☐	☐	☐
17.	Supervisor or Site Safety shall ensure personnel working on roof are aware of requirements, and shall be briefed daily on how to EVACUATE THE ROOF DURING AN EMERGENCY.	☐	☐	☐
18.	**In the event of FIRE OR EMERGENCY call 911 or cell phone - #321-867-7911.**			

Additional Comments

Code References: NFPA 241 *Standard for Safeguarding Construction, Alteration, and Demolition Operations,* NFPA 101 *Life Safety Code,* NFPA 51B *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work.*

KSC FORM 2-272 NS 04/10 (1.0) PREVIOUS EDITIONS ARE OBSOLETE. Validate prior to use.

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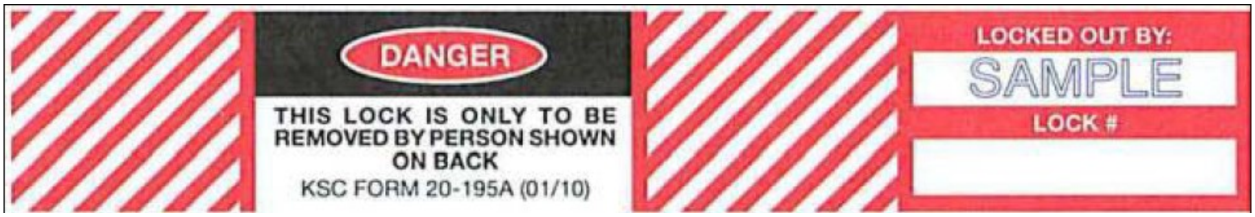
APPENDIX N: SAMPLE KSC FORM 20-195A, LOCKOUT/TAGOUT TAG IDENTIFIER



DANGER

THIS LOCK IS ONLY TO BE REMOVED BY PERSON SHOWN ON BACK

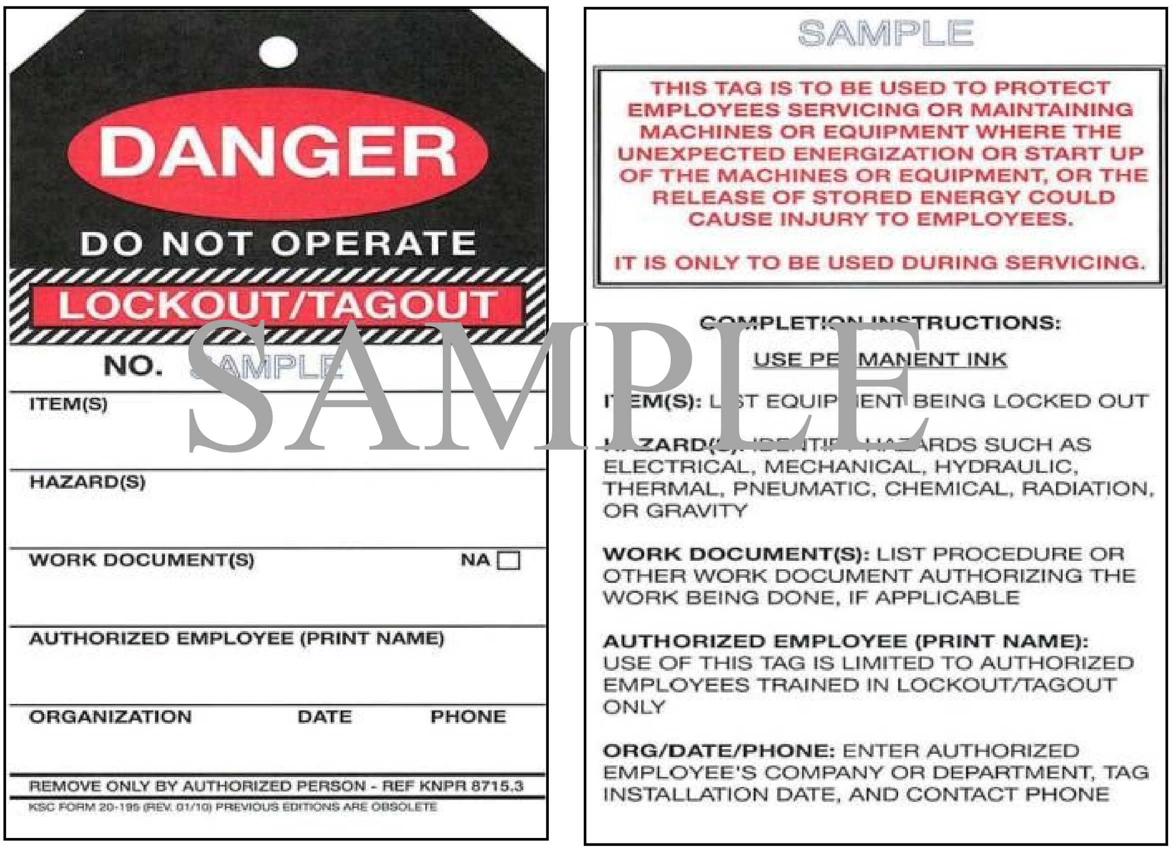
KSC FORM 20-195A (01/10)

LOCKED OUT BY:

SAMPLE

LOCK #

APPENDIX O: SAMPLE KSC FORM 20-195, LOCKOUT/TAGOUT TAG



DANGER

DO NOT OPERATE

LOCKOUT/TAGOUT

NO. SAMPLE

ITEM(S)

HAZARD(S)

WORK DOCUMENT(S) NA ☐

AUTHORIZED EMPLOYEE (PRINT NAME)

ORGANIZATION DATE PHONE

REMOVE ONLY BY AUTHORIZED PERSON - REF KNPR 8715.3

KSC FORM 20-195 (REV. 01/10) PREVIOUS EDITIONS ARE OBSOLETE

SAMPLE

THIS TAG IS TO BE USED TO PROTECT EMPLOYEES SERVICING OR MAINTAINING MACHINES OR EQUIPMENT WHERE THE UNEXPECTED ENERGIZATION OR START UP OF THE MACHINES OR EQUIPMENT, OR THE RELEASE OF STORED ENERGY COULD CAUSE INJURY TO EMPLOYEES.

IT IS ONLY TO BE USED DURING SERVICING.

COMPLETION INSTRUCTIONS:

USE PERMANENT INK

ITEM(S): LIST EQUIPMENT BEING LOCKED OUT

HAZARD(S): IDENTIFY HAZARDS SUCH AS ELECTRICAL, MECHANICAL, HYDRAULIC, THERMAL, PNEUMATIC, CHEMICAL, RADIATION, OR GRAVITY

WORK DOCUMENT(S): LIST PROCEDURE OR OTHER WORK DOCUMENT AUTHORIZING THE WORK BEING DONE, IF APPLICABLE

AUTHORIZED EMPLOYEE (PRINT NAME): USE OF THIS TAG IS LIMITED TO AUTHORIZED EMPLOYEES TRAINED IN LOCKOUT/TAGOUT ONLY

ORG/DATE/PHONE: ENTER AUTHORIZED EMPLOYEE'S COMPANY OR DEPARTMENT, TAG INSTALLATION DATE, AND CONTACT PHONE

APPENDIX P: KSC FORM 28-915 NS, LOCKOUT LOCK AND LOCKOUT TAG INVENTORY RECORD

Lockout / Tagout
Control Record
(for KSC Form 20-195)

Tag Numbers Received	Tag Numbers Issued Out	Tags Issued to (Name & Shop / Facility)	Tag Numbers Lost or Destroyed

KSC FORM 28-915 NS 07/02 (1.0) PREVIOUS EDITIONS ARE OBSOLETE. Validate prior to use.

Submit by Email

NRRS 8/103
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APPENDIX Q: SAMPLE KSC FORM SSR-001, SAFETY STATISTICS RECORD

Safety Statistics Record		Month and Year	Rev (add Revision Number, if submitting updates)
Company	Contract Number	Number of Personnel (Full and Part Time)	

Section I. Injury/Illness Summary	Month	Fiscal Year	Section I. NMIS Case Numbers
A. Number of Work-hours Worked			
B. Number of Days Away Cases			
C. Days Away From Work Injury Illness Rate			
D. Number of Days Away			
E. Days Away Severity Rate			
F. Number of OSHA Recordable Other Cases			
G. Number of Restricted Duty Cases			
H. Number of First Aid Cases			
Section II. Motor Vehicle Accident Summary			**Section II. NMIS Case Numbers**
A. Number of Miles Driven			
B. Number of Reportable Motor Vehicle Accidents			
C. Vehicle Accident Frequency			
D. Estimated Damage Costs ($XX.X K)			
E. Final Damage Costs ($XX.X K)			
Section III. Property Damage Summary			**Section III. NMIS Case Numbers**
A. Number of Property Damage Mishaps			
B. Estimated Damage Costs ($XX.X K)			
C. Final Damage Costs ($XX.X K)			
Section IV. Natural Phenomenon and Weather Conditions Damage Summary			**Section IV. NMIS Case Numbers**
A. Number of Natural Phenomenon and Weather Condition Mishaps			
Section V. Close Call Summary			**Section V. NMIS Case Numbers**
A. Number of Close Calls			
B. Record Close Call NMIS case numbers here			
Section VI. Comments			

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INSTRUCTIONS FOR COMPLETING THE SAFETY STATISTICS RECORD

The Safety Statistics Record (SSR) is submitted monthly to the appropriate contractor interfaces no later than the 15th day of the following month that is being reported.

Number of Personnel (Full and Part Time) - Enter the total number of persons (contractor and major subcontractors) working any element of the contract.

Section I. Injury/Illness Summary

A. Number of Work-hours Worked - Enter the total monthly work-hours worked and update the fiscal year total. Work-hours consist of all persons (contractor and major subcontractors) working any element of the contract, including full-time and part-time employees.

B. Number of Days Away Cases - Enter the number of all Days Away cases incurred during the month and update the fiscal year total. For new Days Away cases from previous months, update the fiscal year total. For new Days Away cases from previous fiscal years, update the year-end SSR (September YYYY) and submit when updates occur. Days Away is defined in 29 CFR 1904.

C. Days Away From Work Injury Illness Rate - The monthly and fiscal year Days Away From Work Injury Illness rate is calculated by: [(Number of Days Away cases X 200,000) ÷ work hours].

D. Number of Days Away - Enter the number of all Days Away incurred for the month and update the fiscal year total. Days Away shall include days from new injury/illness cases occurring during the month and from cases where the injury/illness occurred in a previous month but the employee incurred additional days away in the present month. For days away from previous fiscal years, update the year-end SSR (September YYYY) and submit whenever updates occur.

E. Days Away Severity Rate - The monthly and fiscal year days away severity rate is calculated by: [(Number of days away X 200,000) ÷ work hours].

F. Number of OSHA Recordable Other Cases - Enter the number of monthly OSHA Recordable Other cases and update the fiscal year total. OSHA Recordable Other is defined in 29 CFR 1904.

G Number of Restricted Duty Cases - Enter the number of monthly Restricted Duty cases and update the fiscal year total. Restricted duty is defined in 29 CFR 1904.

H. Number of First Aid Cases - Enter the number of monthly First Aid Cases and update the fiscal year total. Ref. NPR 8621.1.

Section II. Motor Vehicle Accident Summary

A. Number of Miles Driven - Enter the monthly GSA/Government vehicle miles driven and update the fiscal year total.

B. Number of Reportable Motor Vehicle Accidents - Enter the number of monthly GSA/Government vehicle accidents which damage cost is equal to or greater than twenty thousand dollars and update the fiscal year total. For damage cases from previous fiscal years, update the year-end SSR (September YYYY) and submit whenever updates occur.

C. Motor Vehicle Accident Rate - The monthly and fiscal year Motor Vehicle Accident Rate is calculated by [(number of vehicle accidents X 1,000,000) ÷ miles driven].

D. Estimated Damage Cost - Enter the total monthly vehicle estimate damage cost and update the fiscal year total.

E. Final Damage Cost - Enter the total monthly vehicle final damage cost and update the fiscal year total.

Section III. Property Damage Summary

A. Number of Property Damage Mishaps - Enter the number of monthly property damage mishaps incurred (mishaps cost equal to or greater than twenty thousand dollars) and update the fiscal year total.

B. Estimated Damage Cost - Enter the total monthly estimated property damage cost and update the fiscal year total.

C. Final Damage Cost - Enter the total monthly final property damage cost and update the fiscal year total.

Section IV. Natural Phenomenon and Weather Condition Damage Summary

A. Number of Natural Phenomenon and Weather Condition Cases - Enter the number of monthly cases caused by natural phenomenon and weather condition and update the fiscal year total. Reference NPR 8621.1 for definition.

Section V. Close Call Summary

A. Number of Close Calls - Enter the number of monthly close calls and update the fiscal year total. Ref. NPR 8621.1.

Section VI. Comments - Enter comments that would clarify any reported information. NASA organizations shall report the number of NASA aircraft flight hours and any aircraft damage in this section.

Notes

1. All reportable mishaps shall have their NMIS case number recorded in the column to the right of each section. Each vehicle and property damage NMIS case shall have their damage amounts recorded in either the Estimated Damage Cost or the Final Damage Cost section.
2. For all vehicle and property estimated damage cases, once final damage cost have been assessed, reduce the SSR fiscal year estimated damage cost by the original estimated cost and increase the SSR fiscal year final damage cost by the final damage cost.
3. Injuries and lost time days resulting from participation in recreational activities while on-duty shall be included in the appropriate sections of this report.
4. Injury/illness lost days shall be reported for a maximum of 180 days away from work. You are not required to keep track of the number of calendar days away from work if the injury or illness resulted in more than 180 calendar days away from work.

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APPENDIX R: SAMPLE KDP-F-3645, NASA DIRECT CONSTRUCTION CONTRACTOR MISHAP REPORT

NASA Direct Construction Contractor Mishap Report

NOTE: Fill In All Known Blocks And Submit Within Four Hours

INCIDENT DETAILS

1. DATE OF INCIDENT
2. TIME OF INCIDENT
3. GENERAL LOCATION *(Building, Area, Facility, etc.)*
4. EXACT LOCATION *(street, floor, room, etc.)*
5. RESPONSIBLE ORGANIZATION
6. CONTRACT NUMBER
7. ORG. FILE NUMBER
8. ORGANIZATION POINT OF CONTACT
9. MAIL CODE
10. PHONE
11. MISSION AFFECTED, IF KNOWN
12. PROGRAM IMPACT, IF KNOWN (Describe impact in terms of delay, cost adjustment, etc.)
13. INCIDENT DESCRIPTION *(Do not use actual names, include in the description the sequence of events, extent of injury or property damage, cause, etc., if known.)*

IMPACT SUMMARY

14. CHECK ALL OUTCOMES FROM THIS EVENT THAT ARE KNOWN FACTS *(Do not check any box that indicates any future potential or outcome.)*

☐ FATALITY
☐ PERMANENT DISABILITY
HARDWARE
☐ 3 OR MORE PEOPLE HOSPITALIZED
☐ 1 OR 2 PEOPLE HOSPITALIZED
☐ LOSS OF CONSCIOUSNESS
☐ FULL LOST WORKDAY(S)
☐ RESTRICTED WORKDAY(S)
☐ MEDICATION OR MEDICAL TREATMENT ADMINISTERED
☐ INJURY OR ILLNESS
☐ FIRST AID ONLY WAS ADMINISTERED
☐ CLOSE CALL
☐ SERIOUS DAMAGE TO AIRCRAFT OR SPACE HARDWARE
☐ SERIOUS DAMAGE TO FLIGHT OR GROUND SUPPORT
☐ UNEXPECTED DAMAGE DUE TO TEST FAILURE
☐ DAMAGE ESTIMATE OVER $1,000,000
☐ DAMAGE ESTIMATE BETWEEN $250K AND $1M
☐ DAMAGE ESTIMATE BETWEEN $25K AND $250K
☐ DAMAGE ESTIMATE BETWEEN $1K AND $25K
☐ DAMAGE ESTIMATE UNDER $1K
☐ AFFECTED PRIMARY OBJECTIVE(S) OF MISSION
☐ SIGNIFICANT PROGRAM IMPACT
☐ HIGH VISIBILITY *(internal or external to NASA)*

15. LEVEL OF POTENTIAL FOR THIS EVENT OR CLOSE CALL *(Using reasonable judgment, check the boxes which you believe have a HIGH probability of occurring under similar conditions.)*

☐ FATALITY
☐ PERMANENT DISABILITY
☐ 3 OR MORE PEOPLE HOSPITALIZED
☐ FULL LOST WORKDAY(S)
☐ POTENTIAL DAMAGE ESTIMATE OVER $250,000
☐ POTENTIAL DAMAGE ESTIMATE UNDER $250,000
☐ SERIOUS DAMAGE TO AIRCRAFT OR SPACE HARDWARE
☐ SERIOUS DAMAGE TO FLIGHT OR GROUND SUPPORT HARDWARE
☐ UNEXPECTED DAMAGE DUE TO TEST FAILURE
☐ AFFECT PRIMARY OBJECTIVE(S) OF MISSION
☐ SIGNIFICANT PROGRAM IMPACT)
☐ HIGH VISIBILITY *(internal or external to NASA)*

PERSON INVOLVED IN INJURY OR ILLNESS

16. NAME *(Last, First MI)*
17. ORGANIZATION
18. CONTRACT NUMBER
19. JOB TITLE/OCCUPATION
20. SUPERVISOR'S NAME *(Full Name)*
21. SUPERVISOR'S ORGANIZATION
22. SUPERVISOR'S MAIL CODE
23. SUPERVISOR'S PHONE
24. AGE
25. SEX ☐ Male ☐ Female
26. SHIFT WORKED ☐ 1st ☐ 2nd ☐ 3rd
27. CONTINUOUS DUTY HOURS
28. YEARS OF EXPERIENCE ☐ Under 1 ☐ Under 5 ☐ Under 10 ☐ Over 10
29. INJURY OR ILLNESS ☐ INJURY ☐ ILLNESS
30. FROM PRE-EXISTING ☐ YES ☐ NO
31. FATALITY?
32. DATE OF DEATH
33. PERMANENT DISABILITY?
34. # OF FULL LOST WORKDAYS
35. # OF RESTRICTED WORKDAYS
36. INJURY TYPE(S) *(e.g., Abrasion, Burn, Concussion, Laceration, etc.)*
37. AFFECTED BODY PART(S) OR BODY SYSTEM(S)
38. BRIEF MEDICAL DIAGNOSIS
39. MEDICAL TREATMENT ADMINISTERED

☐ TREATMENT OF INFECTION
☐ APPLICATION OF ANTISEPTIC
☐ 2ND OR 3RD DEGREE BURN(S)
☐ CUT AWAY DEAD SKIN
☐ POSITIVE X-RAY DIAGNOSIS
☐ APPLICATION OF SUTURES
☐ USE OF BUTTERFLY ADHESIVE
☐ REMOVAL OF FOREIGN OBJECT(S
☐ USE OF HEAT THERAPY
☐ ADMISSION TO HOSPITAL FOR MORE THAN OBSERVATION
☐ REMOVAL OF OBJECT IN WOUND
☐ USE OF PRESCRIPTION MEDICATION
☐ HOT OR COLD SOAKING/COMPRESS THERAPY
☐ USE OF WHIRLPOOL BATH THERAPY
☐ FIRST AID ONLY

40. OTHER MEDICAL TREATMENT ADMINISTERED

EQUIPMENT/PROPERTY DAMAGED

41. CLASS OF EQUIPMENT/PROPERTY DAMAGED

☐ FLIGHT HARDWARE
☐ GROUND SUPPORT EQUIPMENT
☐ FACILITY
☐ PRESSURE VESSEL
☐ MOTOR VEHICLE
☐ AIRCRAFT
☐ OTHER

42. ESTIMATED COST OF ALL DAMAGED ITEMS

☐ OVER $1,000,000
☐ BETWEEN $250K AND $1M
☐ BETWEEN $25K AND $250K
☐ BETWEEN $1K AND $25K
☐ UNDER $1,000

43. # OF ITEMS DAMAGED
43. SPECIFIC ITEM(S) DAMAGED

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INCIDENT REPORT SUBMITTER

44. SUBMITTED BY *(Full Name)*	45. ORGANIZATION	46. MAIL CODE	47. PHONE	48. DATE	49. TIME

INCIDENT CAUSES

50. WHAT WAS THE ROOT (DIRECT) CAUSE	51. WHAT OBJECTS OR SUBSTANCES WERE INVOLVED	52. WHAT ACTIVITIES OR UNSAFE ACTS WERE IN PROGRESS

CONTRIBUTING FACTORS

53. CONTRIBUTING FACTORS (*Summarize any factors that contributed to the occurrence of the incident*)

INITIAL CORRECTIVE ACTION

54. **INITIAL** ACTION TAKEN *(Summarize the initial action(s) taken to prevent reoccurrence of the incident)*

55. DATE INITIATED	56. DATE COMPLETED	57. PERSON TAKING ACTION *(Full Name)*	58. ORGANIZATION	59. MAIL CODE	60. PHONE

PLANNED CORRECTIVE ACTION

61. **PLANNED** ACTION TO BE TAKEN *(Summarize any planned action to be taken to prevent reoccurrence of the incident.)*

62. EST. START DATE	63. EST. COMPL.	64. PERSON TAKING ACTION *(Full Name)*	65. ORGANIZATION	66. MAIL CODE	67. PHONE

68. **PLANNED** ACTION TO BE TAKEN *(Summarize any additional planned action(s) to be taken to prevent reoccurrence of the incident.)*

69. EST. START DATE	70. EST. COMPL.	71. PERSON TAKING ACTION *(Full Name)*	72. ORGANIZATION	73. MAIL CODE	74. PHONE

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Instructions

Complete the initial written report for mishaps and close calls and submit to the CO, COTR and KSC Institutional Safety within four hours of the incident occurrence. A completed investigation and final report shall be submitted within ten working days of the incident unless an extension through Institutional Safety has been requested. Retain a copy for your own files.

DETAILS

1. DATE OF INCIDENT – Enter date of the incident in MM/DD/YYYY format. Example: 6/1/2001.
2. TIME OF INCIDENT – Enter time of incident using 24-hour clock. Example: 09:30 for 9:30AM/14:15 for 2:15 PM.
3. GENERAL LOCATION – Identify the building, area, or facility where the incident occurred.
4. EXACT LOCATION – Describe the exact location of the incident. Example: Third floor, far west corridor.
5. RESPONSIBLE ORGANIZATION – Enter complete name of organization that is reporting the incident.
6. CONTRACT NUMBER – When the organization is a contractor, enter the contract number.
7. ORGANIZATION FILE NUMBER – Assign file number using your organization's unique four-character code, the mishap number (sequential) using four digits, and the fiscal year using two digits. Example: EGB1-0001-89.

8 - 10. ORGANIZATION POINT OF CONTACT, MAIL CODE, PHONE – Identify person to contact at the organization.

11. MISSION AFFECTED – Enter the name or number of the mission, program, or project affected by the mishap. Examples: STS-32; Delta 181.
12. PROGRAM IMPACT – Describe the effect on the mission, program, or project in terms of delay or significant cost adjustment. Example: Two-week launch delay.
13. INCIDENT DESCRIPTION – Describe the event including information about the extent of damage and/or injury, conditions that led to the mishap, and cause if known at this time. Specify location of facility where medical treatment was provided. DO NOT include names of persons or personal medical information.

IMPACT SUMMARY

14. ACTUAL OUTCOMES – Mark every checkbox that represents current facts about the incident.
15. LEVEL OF POTENTIAL – Mark every checkbox that represents likely outcomes for the incident.

PERSONNEL INVOLVED IN INJURY OR ILLNESS

16. NAME – Indicated the name of the injured individual.
17. ORGANIZATION – Identify the organization of the injured individual.
18. CONTRACT NUMBER – When the organization is a contractor, enter the contract number.
19. JOB TITLE/OCCUPATION – Describe the job position of the injured individual. Example: Technician

20-23. SUPERVISOR'S NAME, ORGANIZATION, MAIL CODE, & PHONE – Provide identifying information about the supervisor of the injured individual.

24. AGE – Indicate the age of the injured individual.
25. SEX – Indicate the gender of the injured individual.
26. SHIFT WORKED – Indicate the work shift of injured individual.
27. CONTINUOUS DUTY HOURS - Self-explanatory.
28. YEARS OF EXPERIENCE – Indicate the years experience of the injured individual.
29. INJURY OR ILLNESS – Symptoms acquired in 1 work shift = injury, greater than 1 work shift = illness.
30. FROM PRE-EXISTING – Indicate if the injury is associated with a pre-existing injury or condition.
31. FATALITY? – Did the incident result in a fatality ?
32. DATE OF DEATH – If the incident resulted in a fatality, indicate date of death.
33. PERMANENT DISABILITY? – Did the incident result in a permanent disability to the injured individual ?
34. # OF FULL LOST WORKDAYS – If the injury resulted in time lost from work, indicate how many days.
35. # OF RESTRICTED WORKDAYS - If the injury resulted in work restrictions, indicate how many days.
36. INJURY TYPE(S) – Indicate the type of injury to the individual (Abrasion, Burn, Strain/Sprain etc.
37. AFFECTED BODY PART(S) or BODY SYSTEM(S) – Indicate what body part(s) were affected by the incident.
38. BRIEF MEDICAL DIAGNOSIS – Indicate the initial medical diagnosis of the injured individual.
39. MEDICAL TREATMENT ADMINISTERED – Mark each box that represents treatment administered to the injured individual. Mark the checkbox for "First Aid Only" if only First Aid treatment was administered to the individual.
40. MEDICAL TREATMENT ADMINISTERED – Describe any treatment not included in box #39.

EQUIPMENT/PROPERTY DAMAGE

41. CLASS OF EQUIPMENT/PROPERTY DAMAGED – Mark every checkbox that represents the type of damaged.
42. ESTIMATED COST OF ALL DAMAGED ITEMS – Mark one checkbox that represents the initially estimated cost of the damage including labor costs. Provide Final Cost in follow-up report.
43. # OF ITEMS DAMAGED – Indicate the number of items damaged in the incident.
43. SPECIFIC ITEM(S) DAMAGED – Identify or describe the damaged items from box #41.
Example: If the class indicated in box #41 is Flight Hardware, then the specific item could be "Orbiter/Avionics."

INCIDENT REPORT SUBMITTER

44-47. SUBMITTED BY, ORGANIZATION, MAIL CODE, & PHONE – Provide identifying information about the person filling in this form.
48-49. DATE & TIME – Enter the date and time when the form is filled in.

INCIDENT CAUSES

50. ROOT CAUSE – Indicate the root (direct) cause of the incident (see Attachment A for list).
51. OBJECTS OR SUBSTANCES INVOLVED – indicate what objects or substances were involved in the incident.
52. ACTIVITIES OR UNSAFE ACTS IN PROGRESS – Indicate any activities or unsafe acts that involved in the incident.

CONTRIBUTING FACTORS

53. CONTRIBUTING FACTORS – Indicate any factors that contributed to the occurrence of the incident. (see Attachment A for list)

INITIAL CORRECTIVE ACTION

54. INITIAL ACTION TAKEN – Indicate what initial steps have been taken to prevent the reoccurrence of the incident.
55. DATE INITIATED – Indicate the date the corrective action was initiated.
56. DATE COMPLETED – Indicate the date the corrective action was completed.
57-60. PERSON TAKING ACTION, ORGANIZATION, MAIL CODE, & PHONE - Provide identifying information about the person taking the initial corrective action.

PLANNED CORRECTIVE ACTION

61. PLANNED ACTION TO BE TAKEN – Indicate any planned actions to prevent the reoccurrence of the incident.
62. ESTIMATED START DATE – Indicate the estimated start date for any planned corrective actions.
63. ESTIMATED COMPLETION – Indicate the estimated completion date for any planned corrective actions.
64-67. PERSON TAKING ACTION, ORGANIZATION, MAIL CODE, & PHONE – Provide identifying information about the person performing the planned corrective action.
68. PLANNED ACTION TO BE TAKEN – Indicate any planned actions to prevent the reoccurrence of the incident.
69. ESTIMATED START DATE – Indicate the estimated start date for any planned corrective actions.
70. ESTIMATED COMPLETION – Indicate the estimated completion date for any planned corrective actions.
71-74. PERSON TAKING ACTION, ORGANIZATION, MAIL CODE, & PHONE – Provide identifying information about the person performing the planned corrective action.

NASA Direct Construction Contractor Mishap Report
Attachment A: Root Cause and Contributing Factor List

COMMUNICATION: General
COMMUNICATION: Paging Warning Inadequate
COMMUNICATION: Problem Reporting/Tracking Inadequate
COMMUNICATION: Schedule Conflict
COMMUNICATION: Task Coordination/Planning Inadequate
COMMUNICATION: Task Supervision Inadequate
COMMUNICATION: Test Team Briefing Inadequate
ELECTRIC COMPONENT: Energized Machinery
ELECTRIC COMPONENT: Fuse/Substation/Bus Panel
ELECTRIC COMPONENT: Power Line/electrical Wiring
ENVIRONMENTAL/MATERIAL CONTROL: Confined Spaces
ENVIRONMENTAL/MATERIAL CONTROL: General Air Contamination
ENVIRONMENTAL/MATERIAL CONTROL: Skin Exposure To Materials
EQUIPMENT FAILURE: Design Deficiency
EQUIPMENT FAILURE: General
EQUIPMENT FAILURE: Maintenance
EQUIPMENT FAILURE: Material Defects
EQUIPMENT FAILURE: Material Failure
ERGONOMIC INJURY: Carpal Tunnel Syndrome
FIRE/EXPLOSION: Chemical Change
FIRE/EXPLOSION: Fuel/Oxidizer Near Ignition Source
FIRE/EXPLOSION: General
FIRE/EXPLOSION: High Heat Source
FIRE/EXPLOSION: Pressure Release/Implosion
HANDLING: Design Deficiency
HANDLING: Deviation from Procedure
HANDLING: General
HAZARDOUS OPERATION: Arrangement
HAZARDOUS OPERATION: Deviation from Procedure
HAZARDOUS OPERATION: General
HAZARDOUS OPERATION: Improper Clothing
HAZARDOUS OPERATION: Improper Guarding
HAZARDOUS OPERATION: Improper Illumination
HAZARDOUS OPERATION: Improper Protection
HAZARDOUS OPERATION: Improper Ventilation
HAZARDOUS OPERATION: Unsafe Equipment
HUMAN FACTORS: Distraction
HUMAN FACTORS: Fatigue
HUMAN FACTORS: General

NASA Direct Construction Contractor Mishap Report
Appendix A: Root Cause and Contributing Factor List

HUMAN FACTORS: Lack of Attention
HUMAN FACTORS: Lack of Authority
HUMAN FACTORS: Lack of Experience
HUMAN FACTORS: Misjudgment of Conditions
HUMAN FACTORS: Safety Violation
HUMAN FACTORS: Working Environment
MACHINERY: Machine Welders
MACHINERY: Metal Grinding/Finishing
MACHINERY: Metal Shaping/Forming/Assembly
MACHINERY: Non-metal Grinding/Finishing
MACHINERY: Non-metal Shaping/Forming/Assembly
MANUAL ARC & GAS WELDER, CUTTER, OR BRAZER
MANUALLY ASSEMBLED/DISASSEMBLED: Clamps
MANUALLY ASSEMBLED/DISASSEMBLED: Connectors
MANUALLY ASSEMBLED/DISASSEMBLED: Fasteners
MANUALLY ASSEMBLED/DISASSEMBLED: Other Parts
MATERIAL HANDLING: Crane/Hoist/Conveyor/Transfer Line
MATERIAL HANDLING: Manual Material Handling
MATERIAL HANDLING: Power Material Handling Vehicle
NATURAL PHENOMENON: Earthquake
NATURAL PHENOMENON: General
NATURAL PHENOMENON: Hail
NATURAL PHENOMENON: Lightning
NATURAL PHENOMENON: Rain
NATURAL PHENOMENON: Wind
ORGANIZATIONAL DEFICIENCY: Expired Certification
ORGANIZATIONAL DEFICIENCY: General
ORGANIZATIONAL DEFICIENCY: Lack of Certification
ORGANIZATIONAL DEFICIENCY: Lack of Training
OTHER: Other
PERSONNEL CARRIERS: Highway Vehicle
PERSONNEL CARRIERS: Mobile Work Platform
PERSONNEL CARRIERS: Support Vehicle
PORTABLE TOOLS: Non-powered
PORTABLE TOOLS: Powered
PROCEDURE: General
PROCEDURE: Procedure Deficiency
PROCEDURE: Requirements Inadequate
PROCEDURE: Technical Data Deficiency

NASA Direct Construction Contractor Mishap Report
Appendix A: Root Cause and Contributing Factor List

TOXIC MATERIAL: Design Deficiency
TOXIC MATERIAL: General
TOXIC MATERIAL: Improper Handling
WALKING WORK SURFACE: Elevated Surfaces
WALKING WORK SURFACE: Floor And Wall Opening
WALKING WORK SURFACE: Floor Surface
WALKING WORK SURFACE: Ladders
WALKING WORK SURFACE: Stairs

APPENDIX H

SITEWISE™

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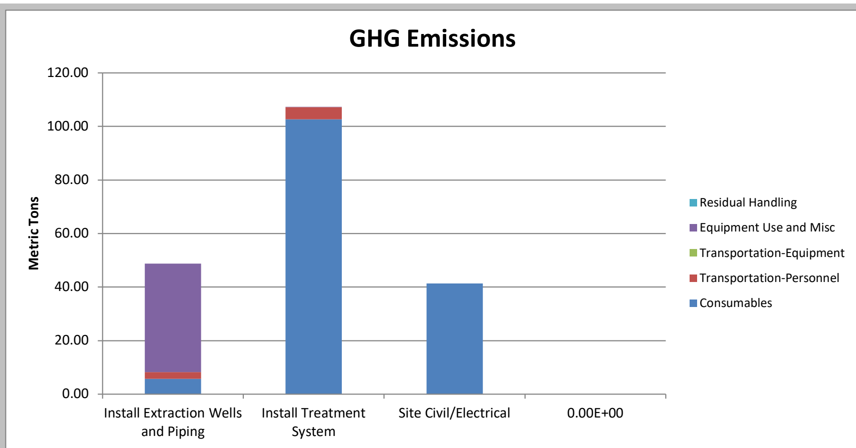
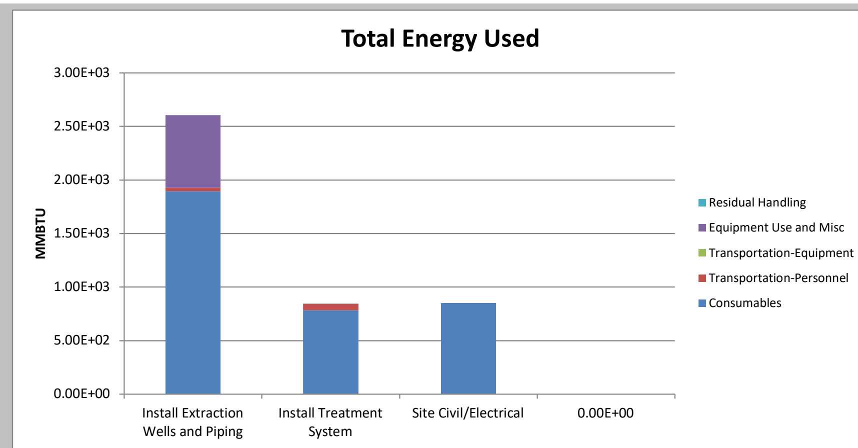
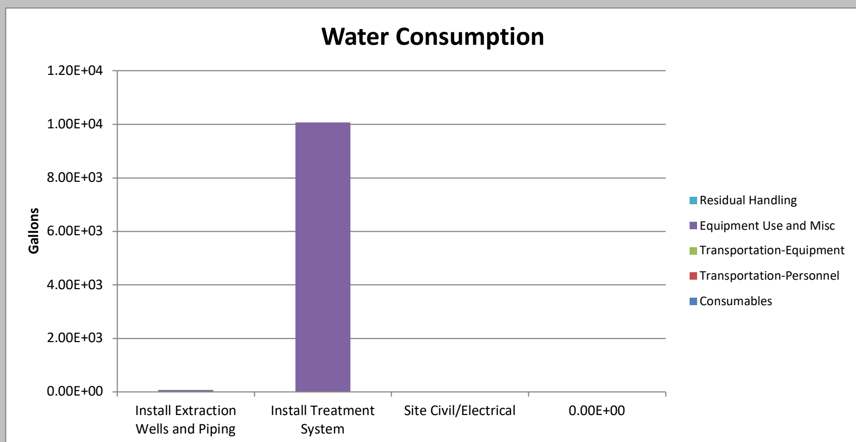
Sustainable Remediation - Environmental Footprint Summary

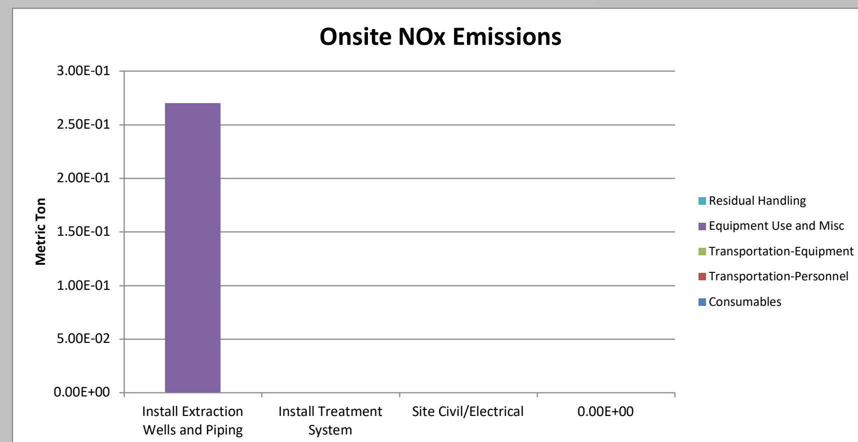
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton		
Install Extraction Wells and Piping	Consumables	5.75	1.9E+03	NA	NA	NA	NA	NA	1.1E-02	1.7E-02	2.4E-03	NA	NA
	Transportation-Personnel	2.43	3.1E+01	NA	NA	NA	NA	NA	8.3E-04	1.9E-05	8.9E-05	3.9E-05	3.1E-03
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	40.57	6.8E+02	7.9E+01	1.6E-01	2.7E-01	5.5E-02	2.5E-02	3.0E-01	7.2E-02	3.0E-02	5.0E-04	1.3E-01
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	48.75	2.61E+03	7.94E+01	1.56E-01	2.70E-01	5.55E-02	2.50E-02	3.13E-01	8.90E-02	3.23E-02	5.40E-04	1.29E-01
Install Treatment System	Consumables	102.72	7.8E+02	NA	NA	NA	NA	NA	6.6E-02	1.2E-01	2.1E-02	NA	NA
	Transportation-Personnel	4.53	6.1E+01	NA	NA	NA	NA	NA	1.6E-03	5.9E-05	1.6E-04	7.4E-05	5.9E-03
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.11	1.6E+00	1.0E+04	1.3E-01	0.0E+00	0.0E+00	0.0E+00	1.4E-04	1.8E-04	1.5E-04	7.4E-06	1.9E-03
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	107.36	8.44E+02	1.01E+04	1.34E-01	0.00E+00	0.00E+00	0.00E+00	6.74E-02	1.20E-01	2.15E-02	8.09E-05	7.80E-03
Site Civil/Electrical	Consumables	41.41	8.5E+02	NA	NA	NA	NA	NA	8.0E-02	1.3E-01	1.9E-02	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E-07	2.7E-04
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	41.41	8.52E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.99E-02	1.29E-01	1.86E-02	8.04E-07	2.72E-04
0	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		**2.0E+02**	**4.3E+03**	**1.0E+04**	**2.9E-01**	**2.7E-01**	**5.5E-02**	**2.5E-02**	**4.6E-01**	**3.4E-01**	**7.2E-02**	**6.2E-04**	**1.4E-01**

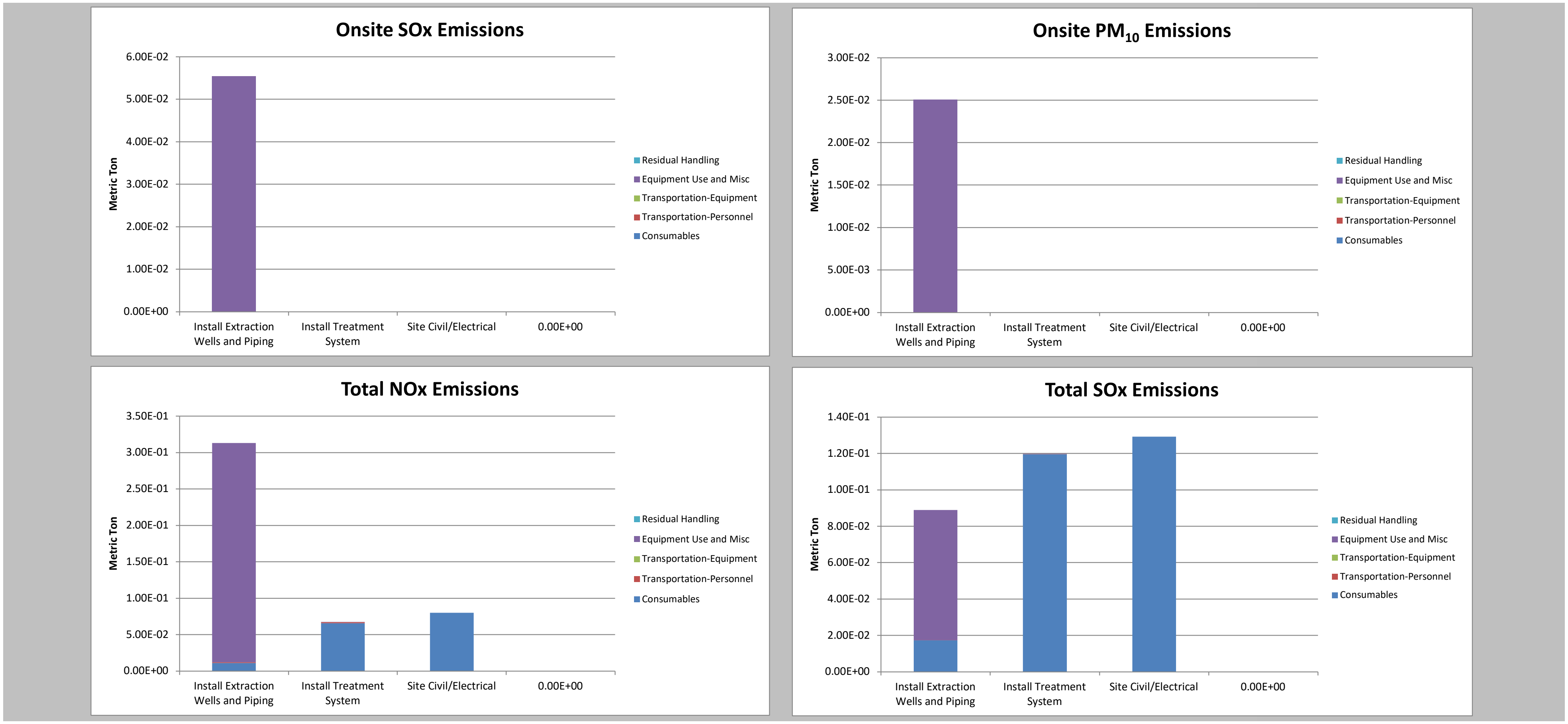
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent electricity from renewable sources	Total Cost with Footprint Reduction
	tons	tons	cubic yards	$		%	
Install Extraction Wells	0.0E+00	0.0E+00	0.0E+00	0	1.0E+00	2.3%	$0
Install Treatment System	0.0E+00	0.0E+00	0.0E+00	0	6.2E-02	2.3%	
Site Civil/Electrical	0.0E+00	0.0E+00	0.0E+00	0	2.2E-03	0.0%	
0	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00	0.0%	
Total	**0.0E+00**	**0.0E+00**	**0.0E+00**	**$0**	**1.1E+00**	**1.1%**	


GHG Emissions
Metric Tons
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

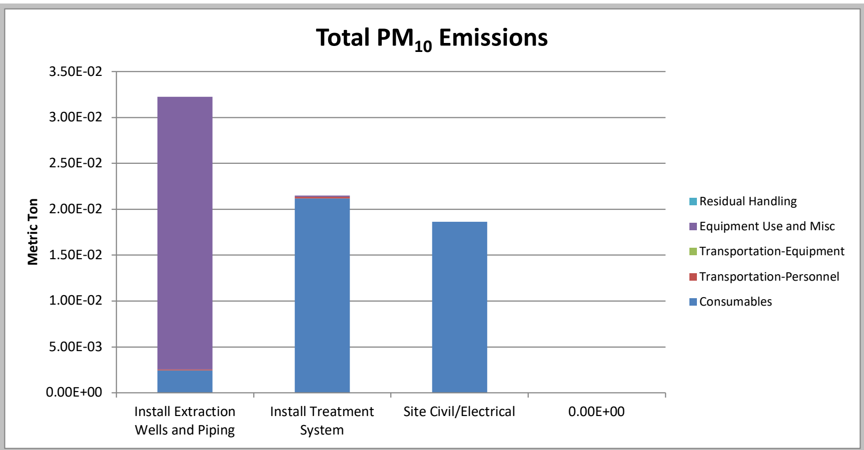

Total Energy Used
MMBTU
3.00E+03
2.50E+03
2.00E+03
1.50E+03
1.00E+03
5.00E+02
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Water Consumption
Gallons
1.20E+04
1.00E+04
8.00E+03
6.00E+03
4.00E+03
2.00E+03
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

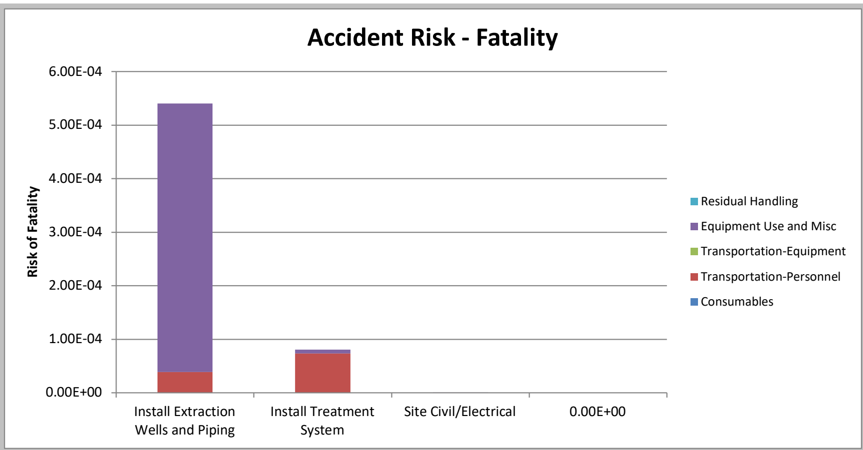

Onsite NOx Emissions
Metric Ton
3.00E-01
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables



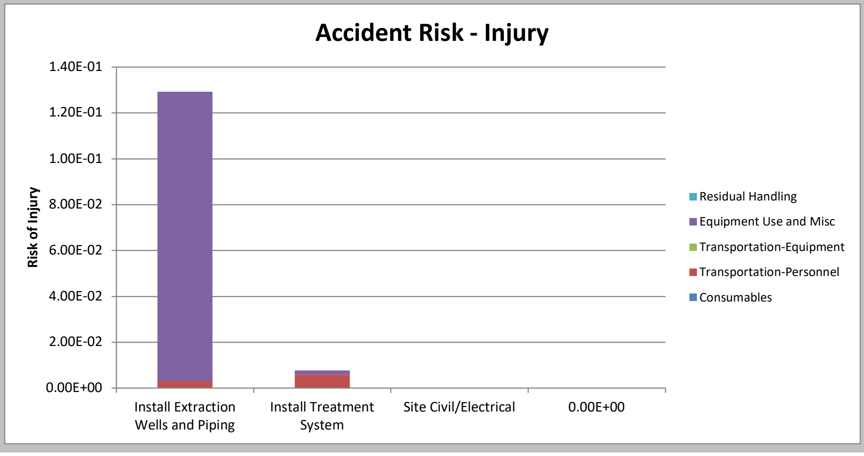
Onsite SOx Emissions
Metric Ton
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables
Onsite PM_{10} Emissions
Metric Ton
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables
Total NOx Emissions
Metric Ton
3.50E-01
3.00E-01
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables
Total SOx Emissions
Metric Ton
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables



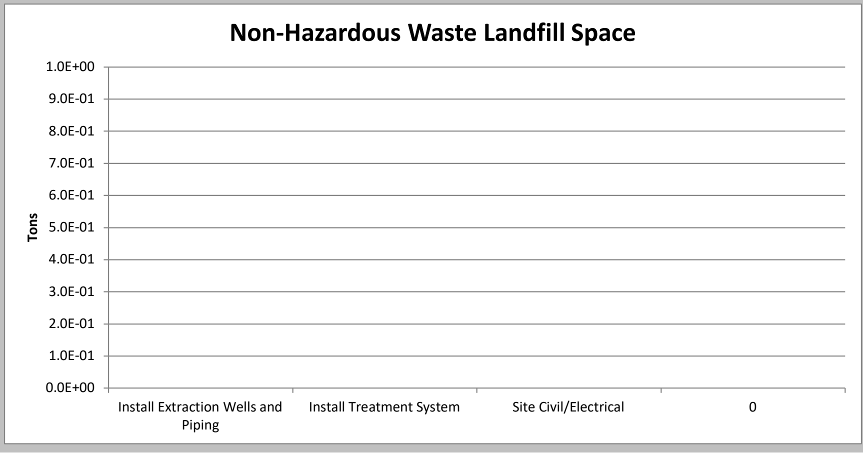
Total PM10 Emissions
Metric Ton
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables



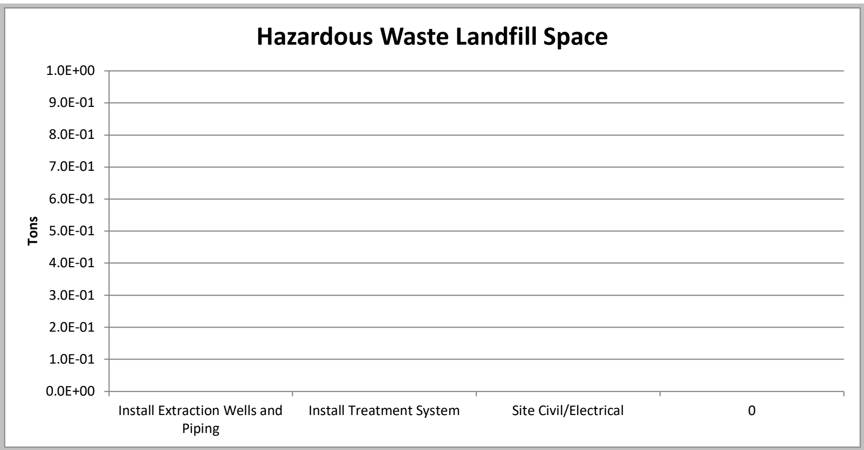
Accident Risk - Fatality
Risk of Fatality
6.00E-04
5.00E-04
4.00E-04
3.00E-04
2.00E-04
1.00E-04
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

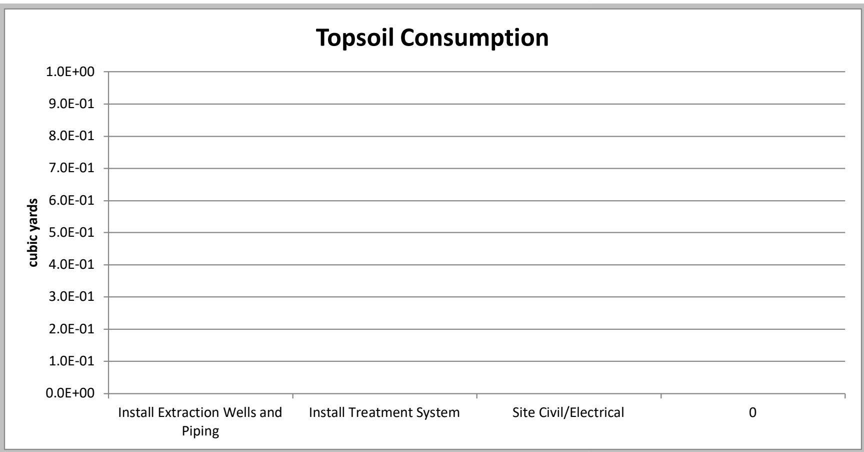


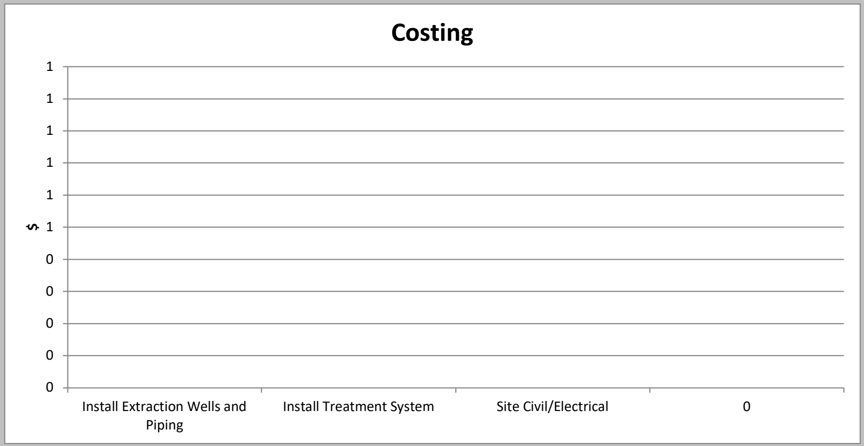
Accident Risk - Injury
Risk of Injury
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0.00E+00
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

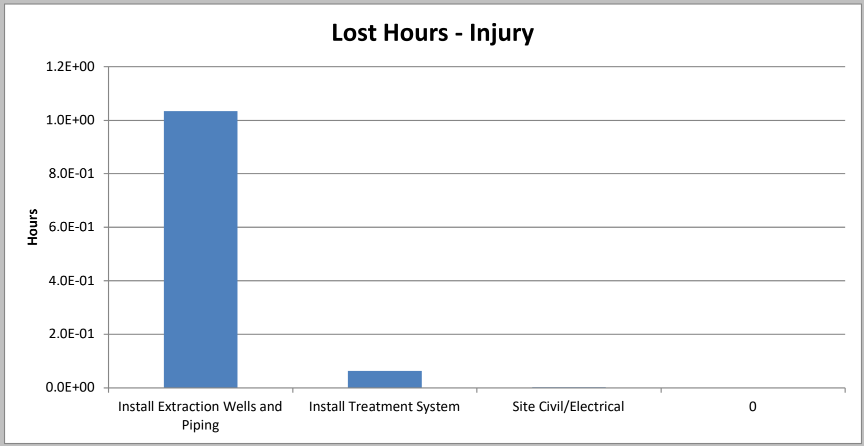


Non-Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0


Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0


Topsoil Consumption
cubic yards
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0


Costing
$
1
1
1
1
1
1
0
0
0
0
0
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0


Lost Hours - Injury
Hours
1.2E+00
1.0E+00
8.0E-01
6.0E-01
4.0E-01
2.0E-01
0.0E+00
Install Extraction Wells and Piping
Install Treatment System
Site Civil/Electrical
0

Sustainable Remediation Summary - Install Extraction Wells and Piping

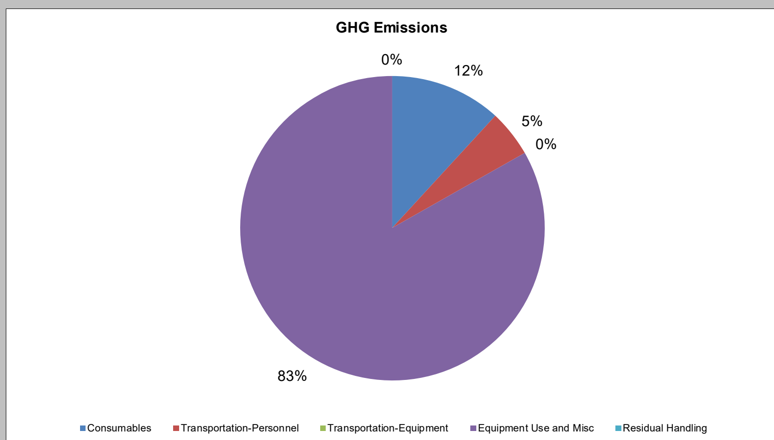
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	5.75	11.8	1.9E+03	72.7	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.1E-02	3.6	1.7E-02	19.5	2.4E-03	7.6	NA	NA	NA	NA
Transportation-Personnel	2.43	5.0	3.1E+01	1.2	NA	NA	NA	NA	NA	-	NA	-	NA	-	8.3E-04	0.3	1.9E-05	0.0	8.9E-05	0.3	3.9E-05	7.2	3.1E-03	2.4
Transportation-Equipment	0.00	-	0.0E+00	-	NA	NA	NA	NA	NA	-	NA	-	NA	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-
Equipment Use and Misc	40.57	83.2	6.8E+02	26.1	7.9E+01	100.0	1.6E-01	100.0	2.7E-01	100.0	5.5E-02	100.0	2.5E-02	100.0	3.0E-01	96.2	7.2E-02	80.5	3.0E-02	92.2	5.0E-04	92.8	1.3E-01	97.6
Residual Handling	0.00	-	0.0E+00	-	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-
Total	48.75	100.0	2.61E+03	100.0	7.94E+01	100.0	1.56E-01	100.0	2.70E-01	100.0	5.55E-02	100.0	2.50E-02	100.0	3.13E-01	100.0	8.90E-02	100.0	3.23E-02	100.0	5.40E-04	100.0	1.29E-01	100.0

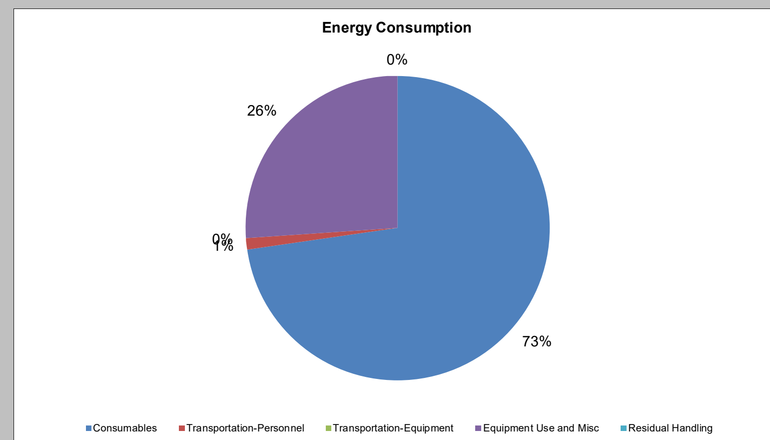
Additional Sustainability Metrics

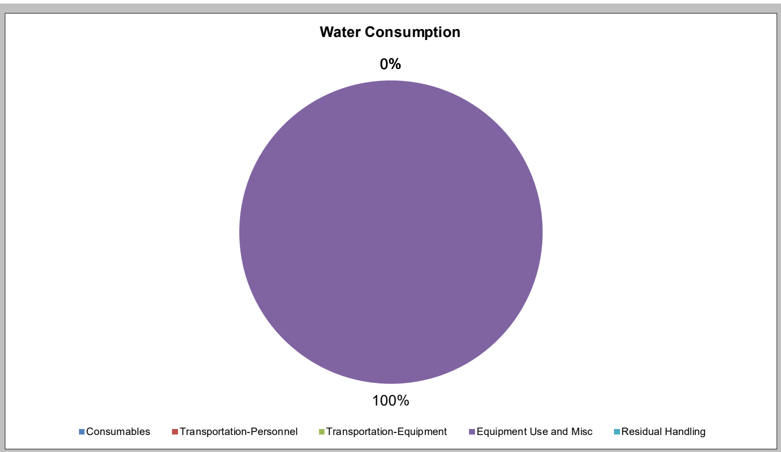
Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd^3)	0.0
Cost of Phase ($)	0.0
Lost Hours - Injury	1.0

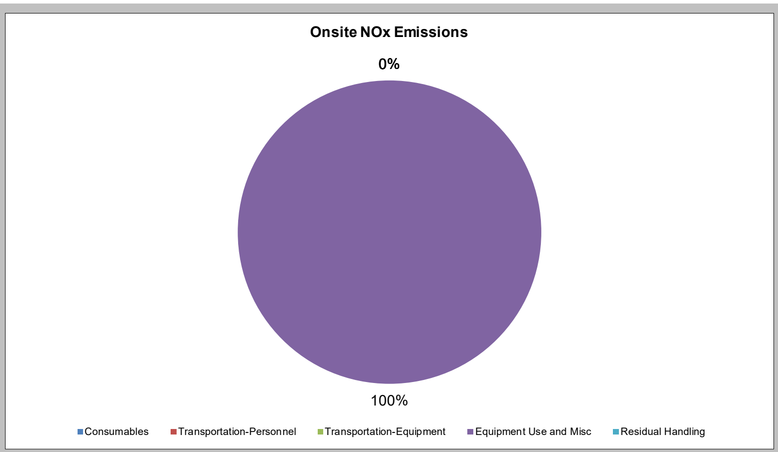
Footprint Reduction

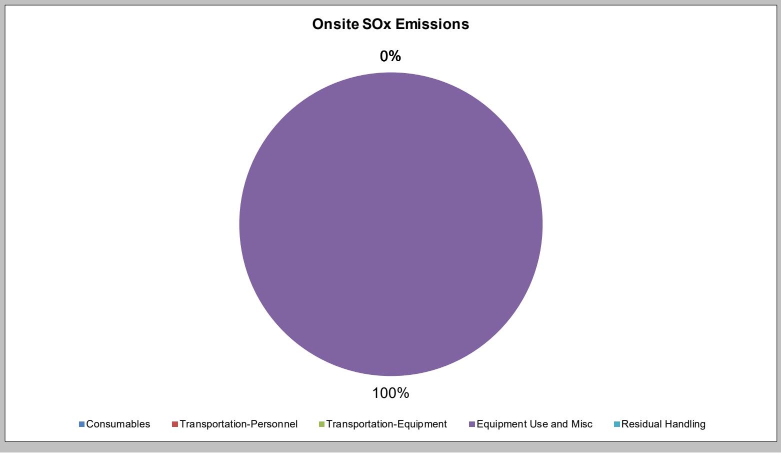
Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	2.3%
Landfill gas reduction (metric ton CO_2 e)	0.00E+00
GHG emissions (metric ton CO2 e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00

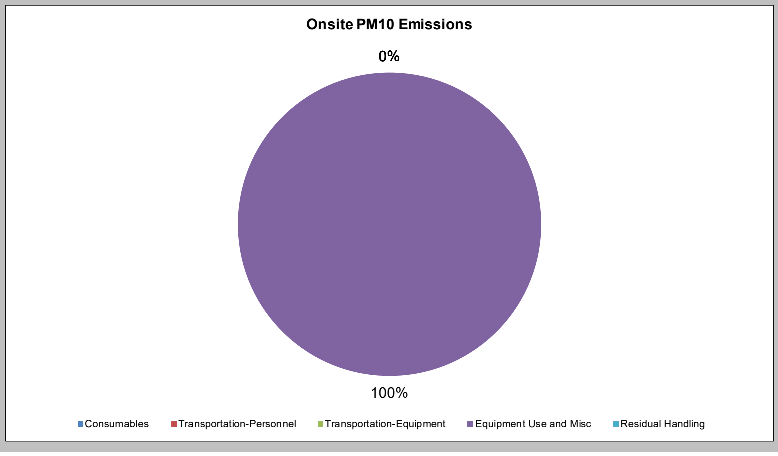


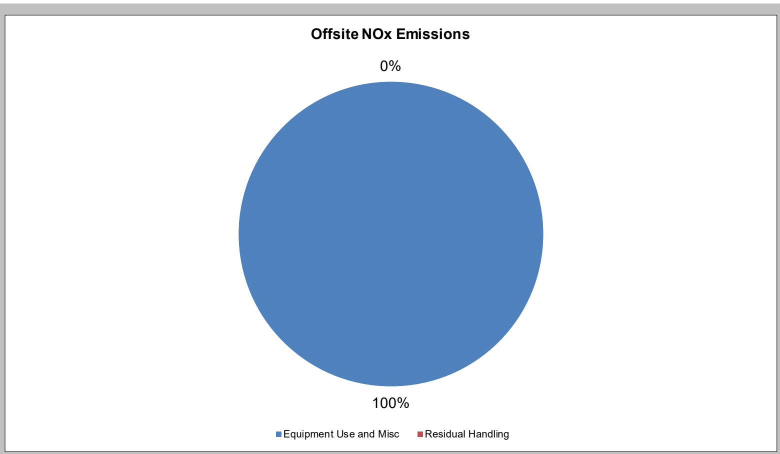


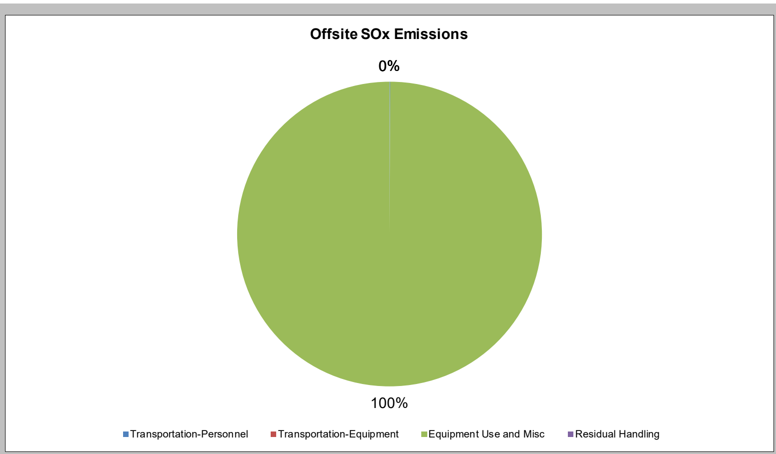

Water Consumption
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

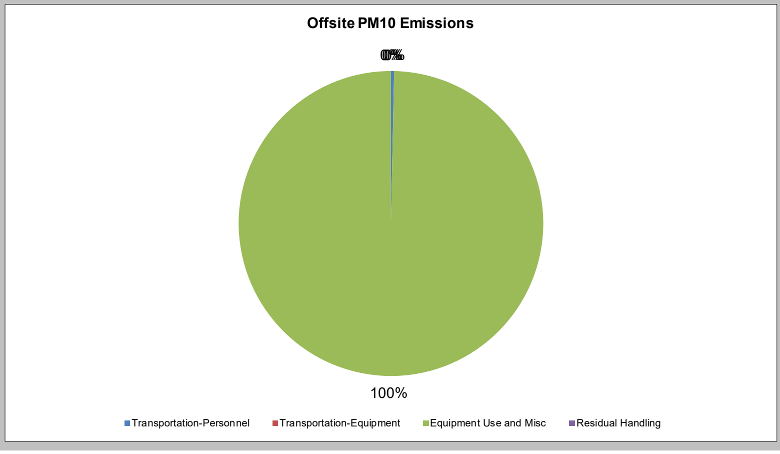

Onsite NOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

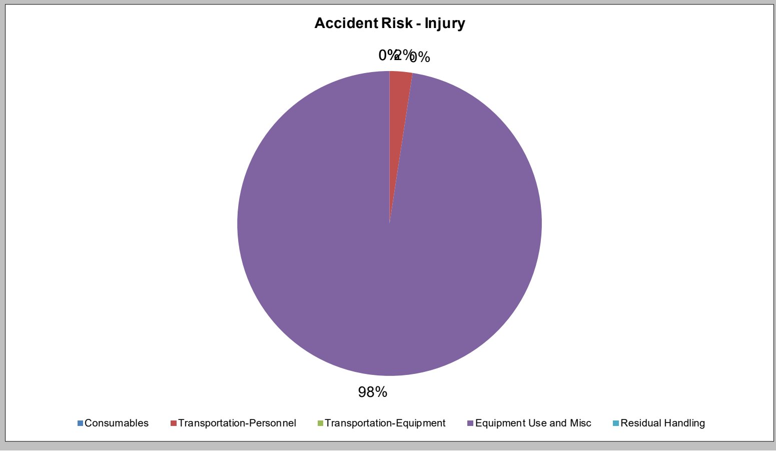

Onsite SOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

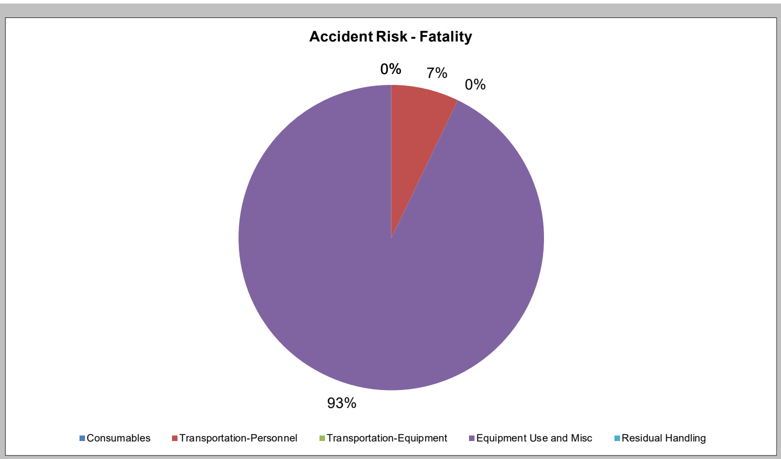

Onsite PM10 Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite NOx Emissions
0%
100%
Equipment Use and Misc
Residual Handling


Offsite SOx Emissions
0%
100%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite PM10 Emissions
100%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Injury
0%
2%
0%
98%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Fatality
0%
7%
0%
93%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

Sustainable Remediation Summary - Install Treatment Systen

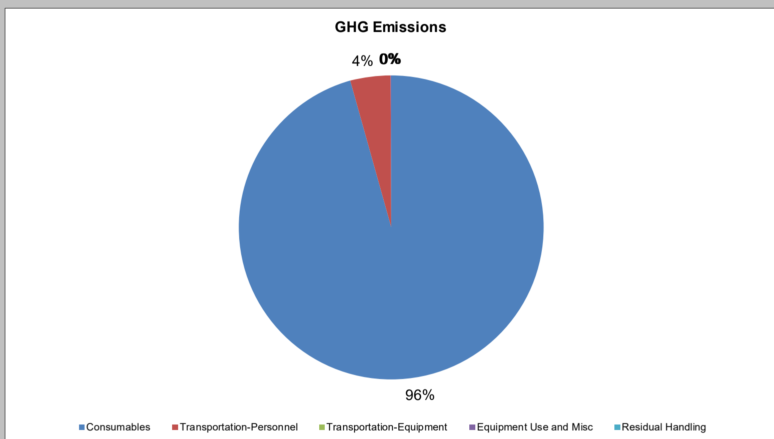
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	102.72	95.7	7.8E+02	92.6	NA	NA	NA	NA	NA	-	NA	-	NA	-	6.6E-02	97.5	1.2E-01	99.8	2.1E-02	98.6	NA	NA	NA	NA
Transportation-Personnel	4.53	4.2	6.1E+01	7.2	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.6E-03	2.3	5.9E-05	0.0	1.6E-04	0.8	7.4E-05	90.9	5.9E-03	75.8
Transportation-Equipment	0.00	-	0.0E+00	-	NA	NA	NA	NA	NA	-	NA	-	NA	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-
Equipment Use and Misc	0.11	0.1	1.6E+00	0.2	1.0E+04	100.0	1.3E-01	100.0	0.0E+00	-	0.0E+00	-	0.0E+00	-	1.4E-04	0.2	1.8E-04	0.2	1.5E-04	0.7	7.4E-06	9.1	1.9E-03	24.2
Residual Handling	0.00	-	0.0E+00	-	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-
Total	107.36	100.0	8.44E+02	100.0	1.01E+04	100.0	1.34E-01	100.0	0.00E+00	0.0	0.00E+00	0.0	0.00E+00	0.0	6.74E-02	100.0	1.20E-01	100.0	2.15E-02	100.0	8.09E-05	100.0	7.80E-03	100.0

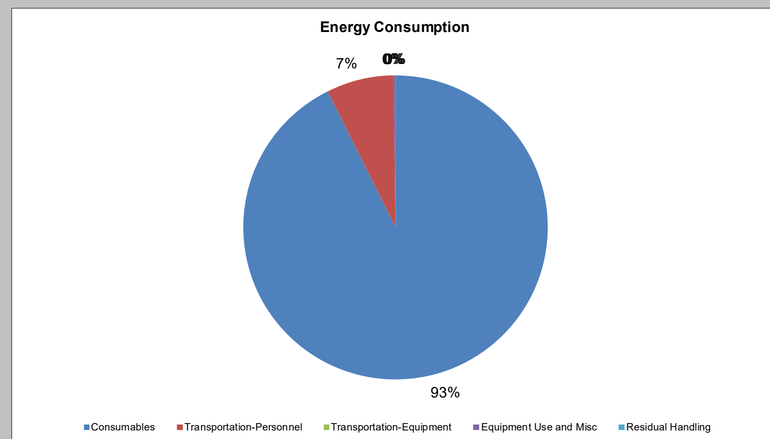
Additional Sustainability Metrics

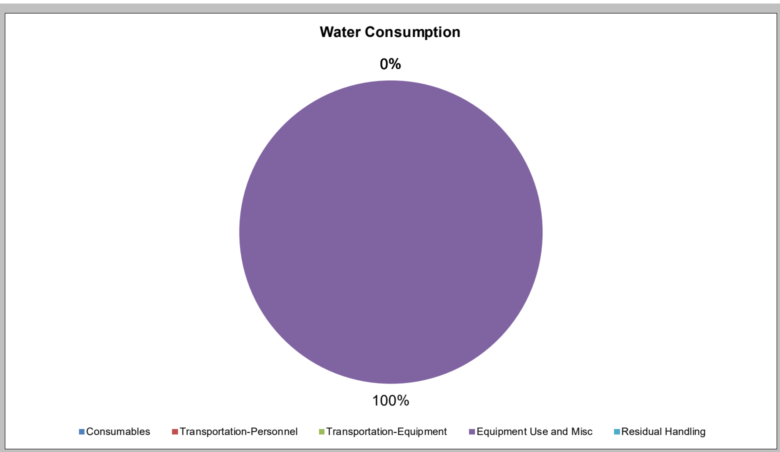
Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd^3)	0.0
Cost of Phase ($)	0.0
Lost Hours - Injury	0.1

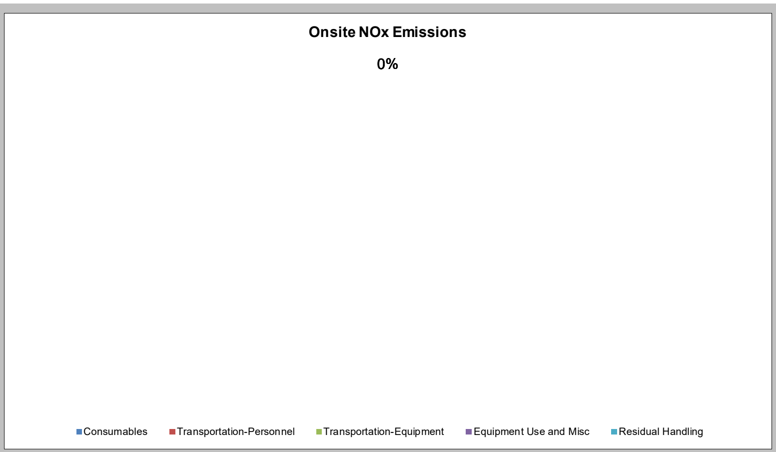
Footprint Reduction

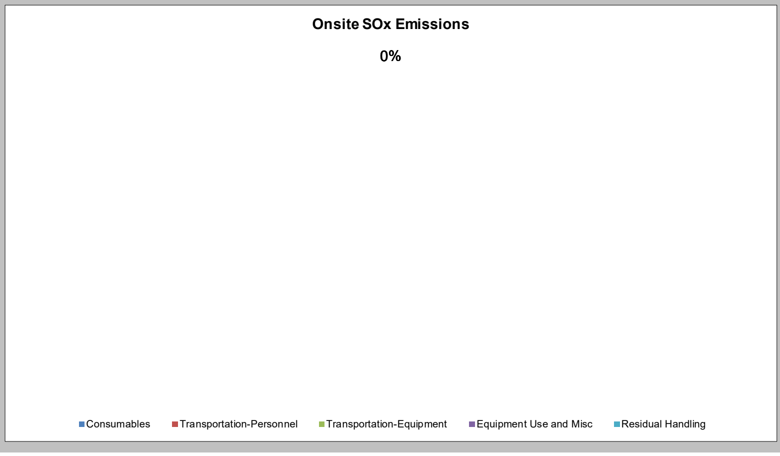
Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	2.3%
Landfill gas reduction (metric ton CO_2 e)	0.00E+00
GHG emissions (metric ton CO2 e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00

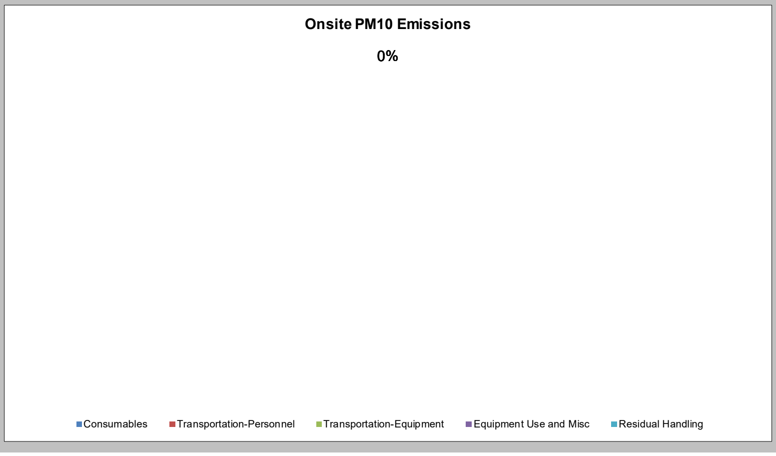


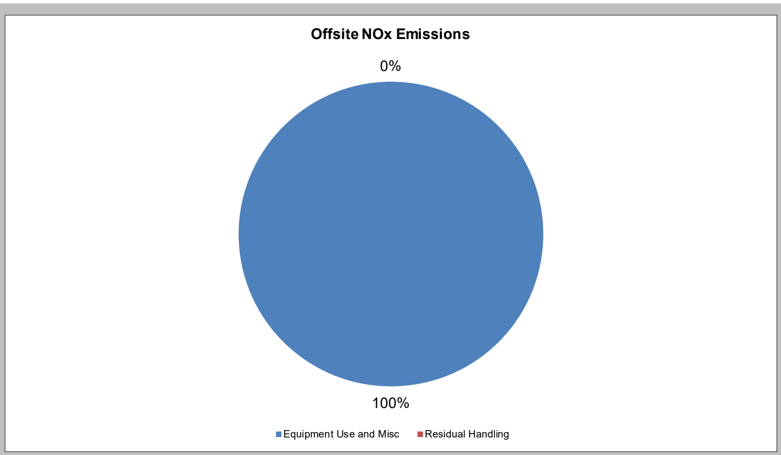


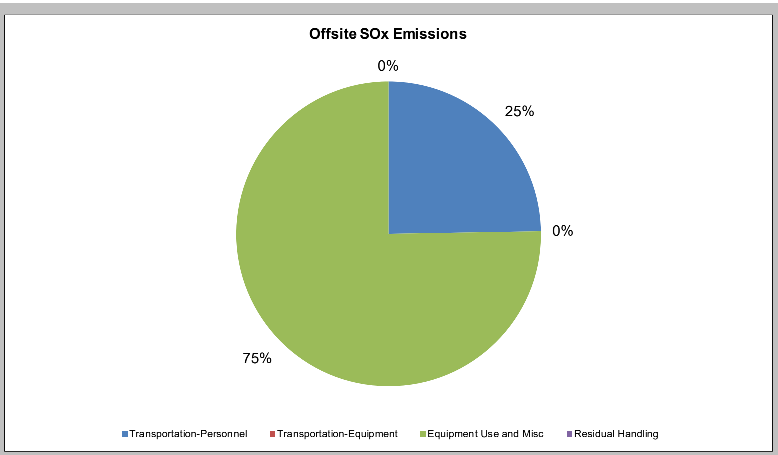

Water Consumption
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

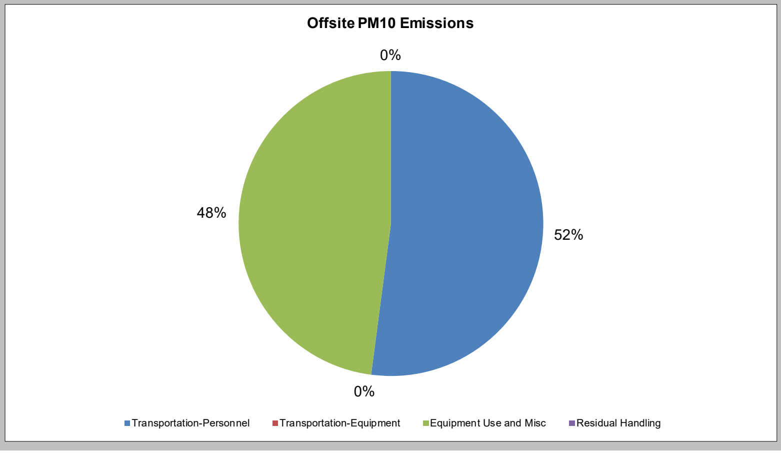

Onsite NOx Emissions
0%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

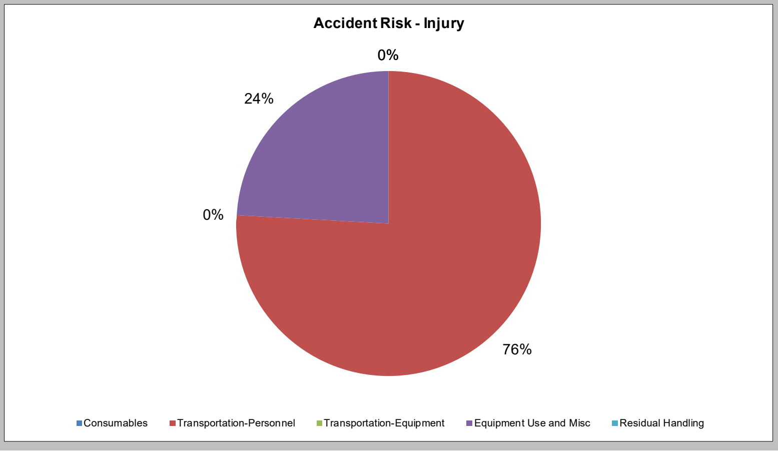

Onsite SOx Emissions
0%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

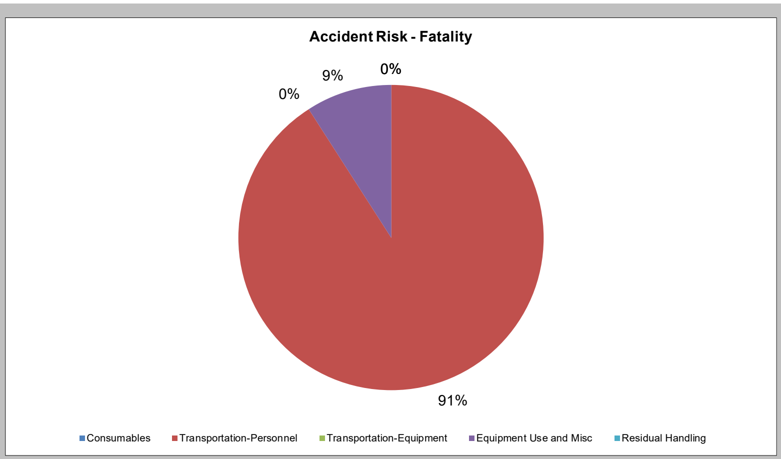

Onsite PM10 Emissions
0%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite NOx Emissions
0%
100%
Equipment Use and Misc
Residual Handling


Offsite SOx Emissions
0%
25%
0%
75%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite PM10 Emissions
0%
48%
52%
0%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Injury
0%
24%
0%
76%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling



Accident Risk - Fatality
0%
9%
0%
91%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

Sustainable Remediation Summary - Site Civil/Electrical

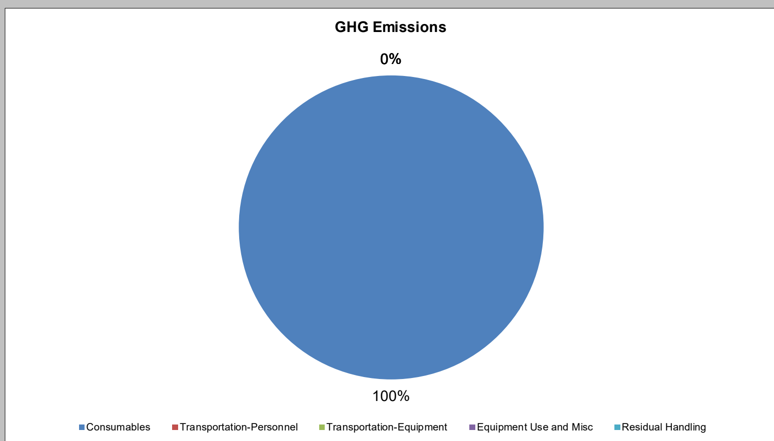
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	41.41	100.0	8.5E+02	100.0	NA	NA	NA	NA	NA	-	NA	-	NA	-	8.0E-02	100.0	1.3E-01	100.0	1.9E-02	100.0	NA	NA	NA	NA
Transportation-Personnel	0.00	-	0.0E+00	-	NA	NA	NA	NA	NA	-	NA	-	NA	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-
Transportation-Equipment	0.00	-	0.0E+00	-	NA	NA	NA	NA	NA	-	NA	-	NA	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-
Equipment Use and Misc	0.00	-	0.0E+00	-	0.0E+00	0.0	0.0E+00	0.0	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	8.0E-07	100.0	2.7E-04	100.0
Residual Handling	0.00	-	0.0E+00	-	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-
Total	41.41	100.0	8.52E+02	100.0	0.00E+00	0.0	0.00E+00	0.0	0.00E+00	0.0	0.00E+00	0.0	0.00E+00	0.0	7.99E-02	100.0	1.29E-01	100.0	1.86E-02	100.0	8.04E-07	100.0	2.72E-04	100.0

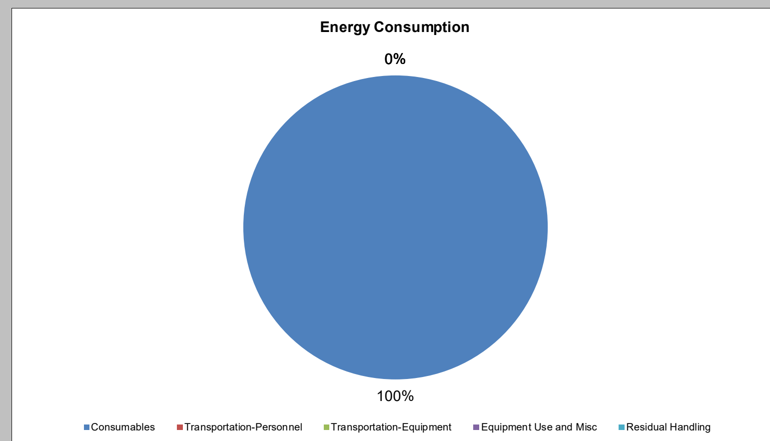
Additional Sustainability Metrics

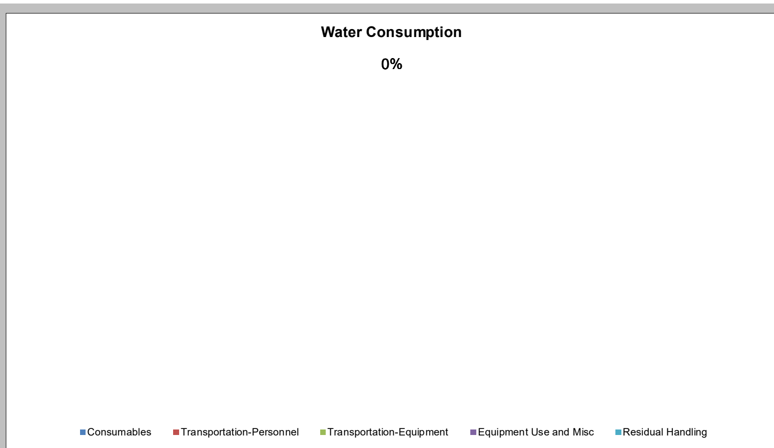
Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd^3)	0.0
Cost of Phase ($)	0.0
Lost Hours - Injury	0.0

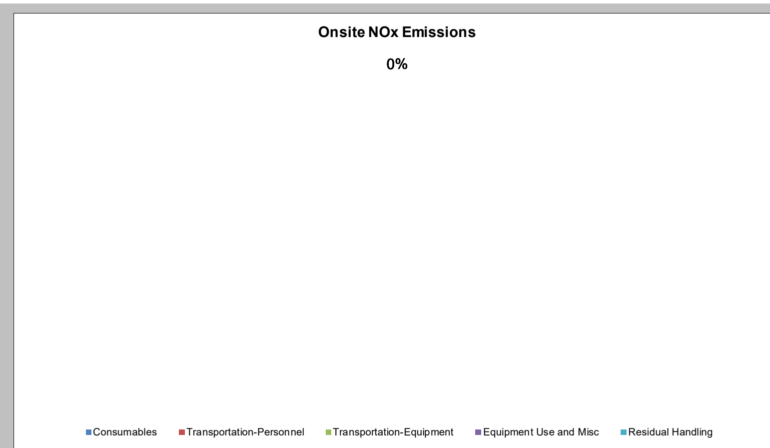
Footprint Reduction

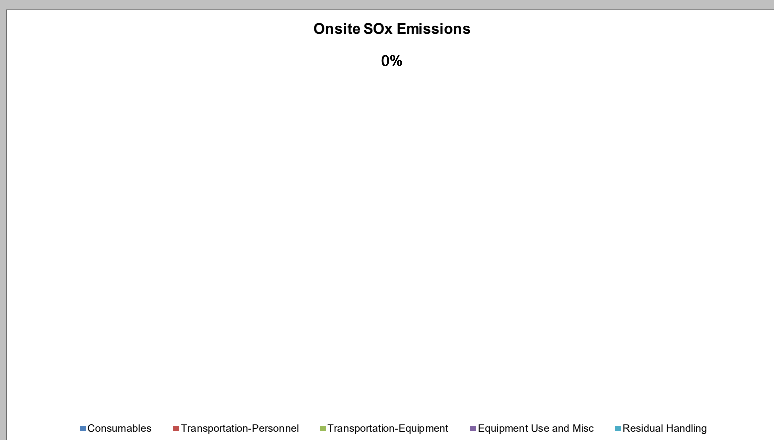
Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	0.0%
Landfill gas reduction (metric ton CO_2 e)	0.00E+00
GHG emissions (metric ton CO2 e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00

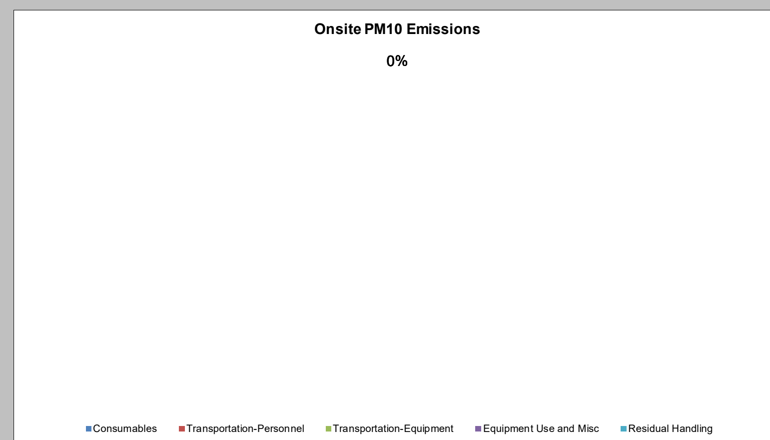


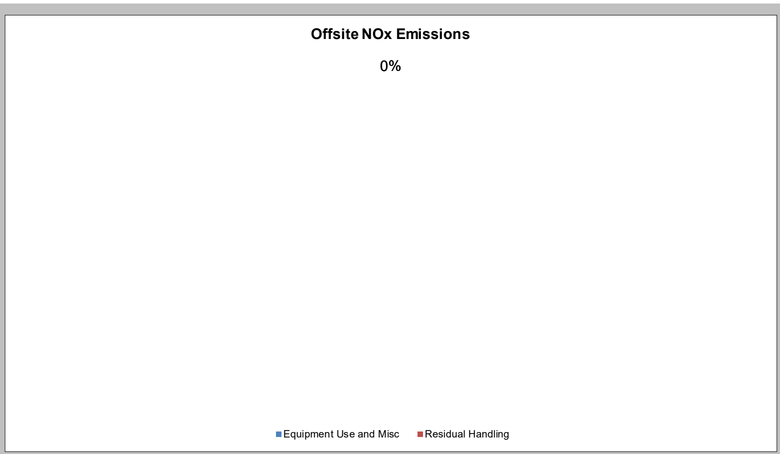


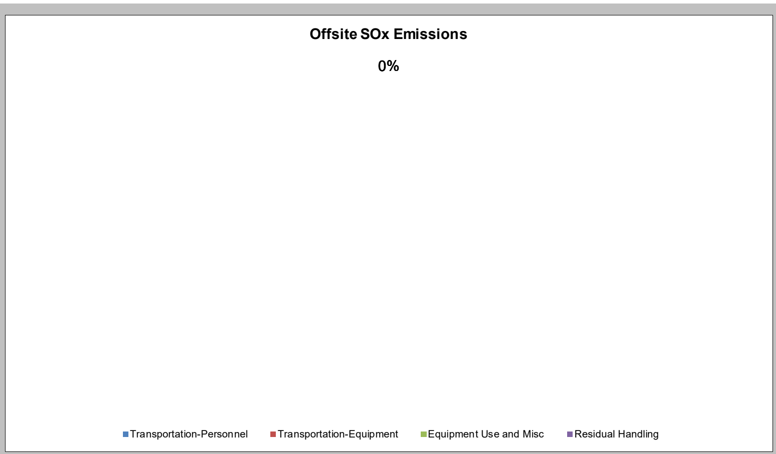

Water Consumption
0%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

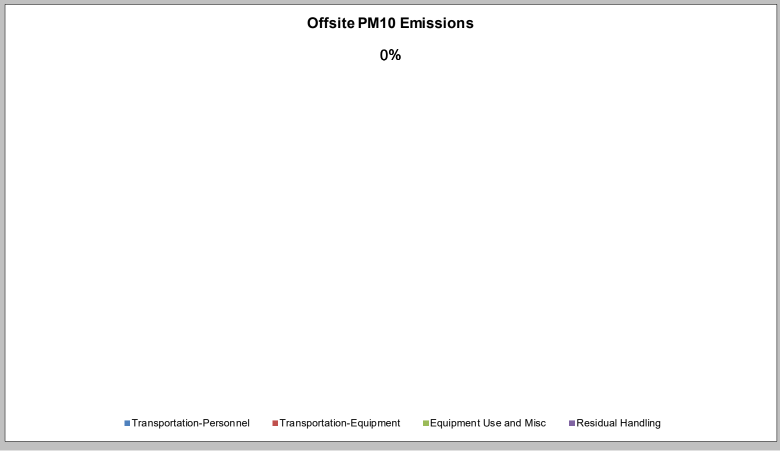

Onsite NOx Emissions
0%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

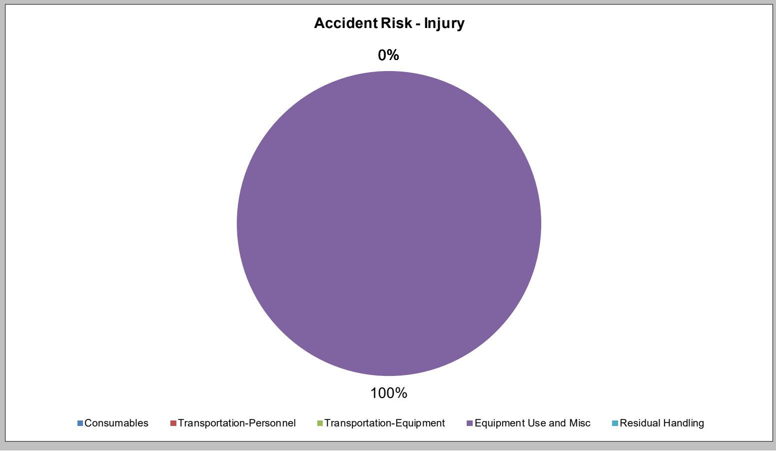

Onsite SOx Emissions
0%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

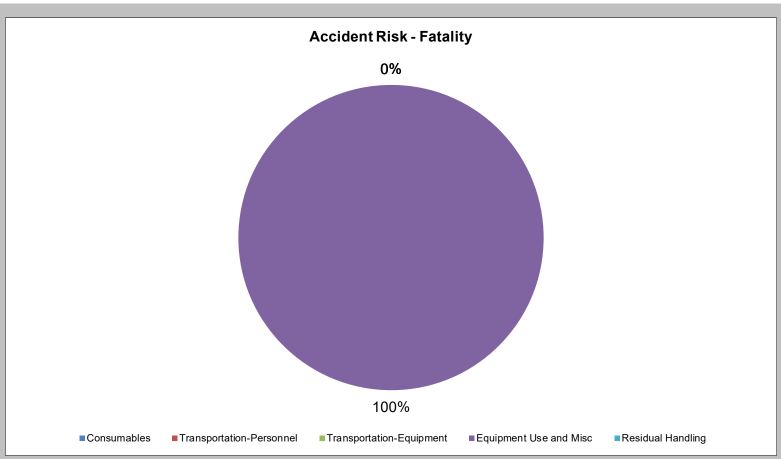

Onsite PM10 Emissions
0%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite NOx Emissions
0%
Equipment Use and Misc
Residual Handling


Offsite SOx Emissions
0%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite PM10 Emissions
0%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Injury
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Fatality
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

APPENDIX I

COSTS

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Estimated Costs to Implement - Hydraulic Containment and Groundwater Treatment System
South Repeater Building

Item	Description	Quantity	Unit	Unit Cost	Total Cost	Estimate Basis
Capital Costs						
Site Preparation						
Site Preparation and Mobilization	Miscellaneous site preparation	1	EACH	$ 6,000	$ 6,000	Engineering Estimate
GPR Survey	Ground penetrating radar (GPR) survey - 1 day (well, trench, and treatment system locations)	1	EACH	$ 5,562	$ 5,562	Quote from The Winter Construction Company, LLC (7/2024)
Extraction Well Locations and GPR Survey Oversight	Mark extraction well locations and oversight of GPR survey to clear/revise monitoring well and trench locations	1	EACH	$ 1,800	$ 1,800	Engineering Estimate
				Subtotal	$ 13,362	
Extraction / Monitoring Well Installation						
Mobilization/Demobilization	Mob/demob of monitoring well and extraction well installation equipment plus setup and breakdown	2	DAY	$ 3,000	$ 6,000	Quote from Preferred Drilling Solutions, Inc. (7/2024)
Extraction Well Installation - Sonic	Installation and development of 19 extraction wells using Sonic drilling. Estimated 12 days.	1	EACH	$ 129,523	$ 129,523	Quote from Preferred Drilling Solutions, Inc. (7/2024)
Monitoring Well Installation - Sonic	Installation and development of 16 monitoring wells using Sonic drilling. Estimated 8 days.	1	EACH	$ 65,730	$ 65,730	Quote from Preferred Drilling Solutions, Inc. (7/2024)
Well Survey	Survey for extraction and monitoring wells. Installation of staff gauges. Estimated 10 days.	1	EACH	$ 40,400	$ 40,400	Quote from FGS Surveyors (7/2024)
Extraction Well Vaults	Purchase and installation of well vaults	19	EACH	$ 11,997	$ 227,943	Quote from The Winter Construction Company, LLC (7/2024)
Electrical	Electrical Panel Racks & Wiring at each well vault	19	EACH	$ 21,285	$ 404,415	Quote from Petroleum Resources and Development (8/2024)
Remediation Management/Oversight	Oversight and management of well installation and survey	30	DAY	$ 2,000	$ 60,000	Engineering Estimate
Remediation Management/Oversight	Oversight and management of well vaults, pumps, transducers, and junction boxes	10	DAY	$ 2,000	$ 20,000	Engineering Estimate
				Subtotal	$ 954,011	
Piping and Trenching Installation						
Site Preparation and Restoration	Site preparation activities, including mob/demob, pre-construction conditions survey, and chain-link fence installation and replacement, and site restoration	1	EACH	$ 492,650	$ 492,650	Quote from The Winter Construction Company, LLC (7/2024)
Trenching, Piping, and Wiring Installation	Includes trenching and installation of conveyance piping and horizontal directional drilling	1	EACH	$ 450,053	$ 450,053	Quote from The Winter Construction Company, LLC (7/2024)
Remediation Management/Oversight	Oversight, management, and reporting costs of construction activities	175	DAY	$ 3,337	$ 583,975	Engineering Estimate
				Subtotal	$ 1,526,678	
Baseline/Startup Sampling						
Baseline/Startup Groundwater Sampling - Labor	Labor costs for the collection and analysis of baseline groundwater samples for PFAS	1	EACH	$ 12,220	$ 12,220	Engineering Estimate
Baseline/Startup Groundwater Sampling - Laboratory Analysis	Laboratory analysis costs for the collection and analysis of baseline groundwater samples for PFAS	119	SAMPLE	$ 385	$ 45,815	SGS Quote (8/2024)
				Subtotal	$ 58,035	
PFAS Treatment System Installation						
Land Clearing	Clearing of land required prior to installation of treatment system and associated conduit	1	EACH	$ 50,739	$ 50,739	Quote from The Winter Construction Company, LLC (7/2024)
Concrete Slab Installations	Construction of 3 concrete slabs for PFAS Treatment System, Frac Tank, and Transformer	1	EACH	$ 113,793	$ 113,793	Quote from The Winter Construction Company, LLC (7/2024)
Mobilization/Demobilization	Mob/demob of treatment system equipment plus setup and breakdown	1	EACH	$ 5,000	$ 5,000	Quote from Product Recovery Management (7/2024)
GAC Treatment System Purchase and Installation	Price of installation for treatment system, including equipment sales and startup assistance by technician	1	EACH	$ 965,900	$ 965,900	Quote from Product Recovery Management (7/2024)
Influent Manifold Construction and Piping	Influent Manifold Construction and Piping costs	1	EACH	$ 77,920	$ 77,920	Quote from The Winter Construction Company, LLC (7/2024)
Transfer Pump/Tank - Infiltration Gallery	Purchase and Installation of Transfer Pump to run from Treatment System to Infiltration Gallery and transfer/storage tank	1	EACH	$ 38,182	$ 38,182	Quote from The Winter Construction Company, LLC (7/2024)
Communication Wiring - Infiltration Gallery	Communications wiring from Infiltration Gallery to Treatment System	1	EACH	$ 41,035	$ 41,035	Quote from Petroleum Resources and Development (8/2024)
Treatment System Building	Purchase, transportation, and installation of building to house treatment system	1	EACH	$ 174,087	$ 174,087	Quote from The Winter Construction Company, LLC (7/2024)
Spare Parts	Purchase of spare parts for treatment system	1	EACH	$ 118,837	$ 118,837	Quote from Newterra Corporation (7/2024)
Electrical Work	Includes medium voltage and pulling wire in trenches	1	EACH	$ 331,145	$ 331,145	Quote from Petroleum Resources and Development (8/2024)
Electrician	Installation of electrical connections and bonding by licensed electrician	1	EACH	$ 16,000	$ 16,000	Quote from Petroleum Resources and Development (8/2024)
Treatment Building Electrical Work	Purchase and installation of electrical wiring, conduit, and communication wiring inside treatment building	1	EACH	$ 386,300	$ 386,300	Quote from Petroleum Resources and Development (8/2024)

Remediation Management/Oversight	Oversight and management of electrical work	136	DAY	$ 1,214	$ 165,104	Engineering Estimate
Remediation Management/Oversight	Oversight and management of PFAS system installation	10	DAY	$ 2,392	$ 23,920	Engineering Estimate
				Subtotal	$ 2,507,962	
Engineering Design, Management, and Reporting Costs						
Project Engineering/Management Support	Project coordination, health and safety, meetings, telephone conferences, progress reports, administrative support, permits	240	HOUR	$ 150	$ 36,000	Engineering Estimate
Implementation Work Plan	Development of Implementation Work Plan	1	EACH	$ 35,917	$ 35,917	Engineering Estimate
Site Safety and Health Plan	Development of Site Safety and Health Plan	1	EACH	$ 7,050	$ 7,050	Engineering Estimate
Construction Completion Report	Development of Construction Completion Report	1	EACH	$ 41,874	$ 41,874	Engineering Estimate
Advanced Data Package (ADP)	ADP preparation and presentation	1	EACH	$ 15,000	$ 15,000	Engineering Estimate
Data Management and Evaluation	Labor cost estimate for data management and evaluation	1	EACH	$ 30,000	$ 30,000	Engineering Estimate
				Subtotal	$ 165,841	
				Total Capital Cost	**$ 5,225,889**	
Post-Implementation Costs (Year 1)						
O&M - Year 1 (weekly for the first month and monthly for the first year)	Operation and Maintenance cost of PFAS Treatment System during the first year of treatment	30	DAY	$ 600	$ 18,000	Engineering Estimate
System Influent & Effluent Sampling (5 samples each event) - Labor	Collection and analysis of effluent water samples from system for PFAS (Every 8 hours for the first day, daily for the first week, weekly for the remainder of the first month, monthly for the remainder of the first quarter, and monthly for the remainder of the first year)	24	DAY	$ 600	$ 14,400	Engineering Estimate
System Influent & Effluent Sampling (5 samples each event) - Laboratory Analysis	Collection and analysis of effluent water samples from system for PFAS (Every 8 hours for the first day, daily for the first week, weekly for the remainder of the first month, monthly for the remainder of the first quarter, and monthly for the remainder of the first year)	104	SAMPLE	$ 385	$ 40,040	SGS Quote (8/2024)
Quarterly Performance Monitoring Groundwater Sampling - Labor	Labor costs for the quarterly collection and analysis of groundwater samples from from 28 on-site monitoring wells and 11 extraction wells	18	DAY	$ 600	$ 10,800	Engineering Estimate
Quarterly Performance Monitoring Groundwater Sampling - Laboratory Analysis	Quarterly laboratory analysis of groundwater samples from from 28 on-site monitoring wells and 11 extraction wells for PFAS, nitrate, and phosphorus	159	SAMPLE	$ 385	$ 61,215	SGS Quote (8/2024)
Carbon Replenishment (quarterly, full amount)	Quarterly replenishment of 34,000 pounds of Calgon F-400 carbon media for treatment system	4	EACH	$ 56,000	$ 224,000	Quote from Newterra Corporation (7/2024)
Reporting (Annual Report)/Data Evaluation	Document results of implementation and semi-annual performance monitoring (Annual Interim Measures Report)	1	EACH	$ 38,000	$ 38,000	Engineering Estimate
ADP	ADP preparation and presentation of results of implementation (Annual Interim Measures Report)	1	EACH	$ 15,000	$ 15,000	Engineering Estimate
				Subtotal	$ 421,455	
				Total Post-Implementation Annual Cost (Year 1)	**$ 421,455**	
Post-Implementation Costs (Following Year 1)						
O&M - After Year 1 (Quarterly)	Operation and Maintenance cost of PFAS Treatment System after Year 1	8	DAY	$ 600	$ 4,800	Engineering Estimate
Monthly System Influent & Effluent Sampling (5 samples each event) - Labor	Monthly collection and analysis of influent & effluent water samples from system for PFAS	12	DAY	$ 600	$ 7,200	Engineering Estimate
Monthly System Influent & Effluent Sampling (5 samples each event) - Laboratory Analysis	Monthly collection and analysis of effluent water samples from system for PFAS	60	SAMPLE	$ 385	$ 23,100	SGS Quote (8/2024)
Performance Monitoring Groundwater Sampling - Labor	Labor costs for the quarterly collection and analysis of groundwater samples from from 28 on-site monitoring wells and 11 extraction wells	24	DAY	$ 600	$ 14,400	Engineering Estimate
Performance Monitoring Groundwater Sampling - Laboratory Analysis	Quarterly laboratory analysis of groundwater samples from from 28 on-site monitoring wells and 11 extraction wells for PFAS, nitrate, and phosphorus	206	SAMPLE	$ 385	$ 79,310	SGS Quote (8/2024)
Carbon Replenishment (quarterly, full amount)	Quarterly replenishment of 34,000 pounds of Calgon F-400 carbon media for treatment system	4	EACH	$ 56,000	$ 224,000	Quote from Newterra Corporation (7/2024)
Reporting (Annual Report)/Data Evaluation	Document results of implementation and semi-annual performance monitoring (Annual Interim Measures Report)	1	EACH	$ 38,000	$ 38,000	Engineering Estimate
ADP	ADP preparation and presentation of results of implementation (Annual Interim Measures Report)	1	EACH	$ 15,000	$ 15,000	Engineering Estimate
				Subtotal	$ 405,810	
				Total Post-Implementation Annual Cost (Following Year 1)	**$ 405,810**	
				Total Remediation Cost (Capital and 3 Years of Monitoring)	**$ 6,458,964**	
				Total Remediation Cost (Capital and 5 Years of Monitoring)	**$ 7,270,584**	

Notes:

1-1-DCE = 1,1-dichloroethene
ADP = Advance Data Package
CCR = Construction Completion Report
cDCE = cis-1,2-dichloroethene
CVOC = chlorinated volatile organic compound
DPT = direct push technology
GPR = Ground Penetrating Radar
HASP = Health and Safety Plan
IMWP = Interim Measures Work Plan
ISCR = in situ chemical reduction
LB = pound
NASA = National Aeronautics and Space Administration
TCE = trichloroethene
tDCE = trans-1,2-dichloroethene
TDS = total dissolved solids
TOC = total organic carbon
TRPH = total recoverable petroleum hydrocarbons
TX = Texas
UIC = underground injection control
VC = vinyl chloride

APPENDIX J

CHECKLISTS

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Commissioning and Startup Checklist

Site: South Repeater Building, SWMU 121

Personnel:			
Weather:			
	Yes/No	**Date(s) Performed**	**Comments**
Subsurface			
Extraction wells installed and developed	Yes / No		
Submersible pumps and transducers set as designed and secured	Yes / No		
Performance monitoring wells installed and developed	Yes / No		
Well heads assembled and installed correctly	Yes / No		
Trenches installed as specified	Yes / No		
Groundwater piping installed and leak testing performed	Yes / No		
Power and communication conduit and wiring installed	Yes / No		
Check valves installed and operation verified	Yes / No		
Valves accessible and operational	Yes / No		
Piping clearly labeled and valves tagged	Yes / No		
Concrete Pads			
Confirm building concrete pad installed per specifications and drawings	Yes / No		
Confirm influent tank concrete pad installed per specifications and drawings	Yes / No		
Confirm transformer concrete pad installed per specifications and drawings	Yes / No		
Influent Manifold			
Manifold vault installed with hinge-assist lids	Yes / No		
Flow meters and check valves installed correctly	Yes / No		
Manifold above grade piping installed, sized correctly, and secured	Yes / No		
Pressure gauge and air release valve installed correctly	Yes / No		
Influent Tank			
Tank, valves, and fittings installed per drawings	Yes / No		
3-tier float installed	Yes / No		
Equipment Building			
Treatment system building built to specifications	Yes / No		
Lighting, louvers, and spill containment installed	Yes / No		
Sump float installed	Yes / No		
Lightning protection installed per specifications	Yes / No		
GAC Treatment System			
GAC vessels installed and secured	Yes / No		
Bag filters installed and secured	Yes / No		
Treatment system pumps installed and secured	Yes / No		
Piping, fittings, valves and gauges installed correctly	Yes / No		
GAC loaded into vessels	Yes / No		
Electrical Transformer			
Transformer installed and passed required testing	Yes / No		
Electrical/Controls/Instrumentation			
Panels and disconnects installed (all UL labeled)	Yes / No		
Grounding installed and inspected	Yes / No		
Lighting/Exhaust Fan/Thermostats functional	Yes / No		
Lockouts/covers/panels in place	Yes / No		
Influent tank, building sump, and infiltration gallery sump floats functional	Yes / No		
Disconnects in sight of unit being controlled	Yes / No		
Controls/Alarms/Interlocks functional and calibrated	Yes / No		
Power connected to on-line monitoring instruments	Yes / No		
PLC installed and tested - programming completed	Yes / No		
Effluent Discharge			
Infiltration gallery effluent pump and tank installed and secured	Yes / No / NA		
Influent gallery constructed per specifications and drawings	Yes / No / NA		
Infiltration gallery stilling well and float installed	Yes / No / NA		
DMMA rip-rap apron installed per specifications and drawings	Yes / No / NA		
DMMA effluent pipe flapper valve installed and functional	Yes / No / NA		

Commissioning and Startup Checklist

Site: South Repeater Building, SWMU 121

Personnel:			
Weather:			
	Yes/No	**Date(s) Performed**	**Comments**
Pre-Startup			
Review HASP and system O&M manual	Yes / No		
Verify that ALL commissioning activities above have been completed	Yes / No		
Verify that filter elements are installed	Yes / No		
Ensure that ALL baseline samples and measurements have been collected	Yes / No		
Energize system	Yes / No		
Confirm control panels are functional	Yes / No		
Verify rotating equipment operation/rotation through manual bump override	Yes / No		
Calibrate all dedicated and portable instruments	Yes / No		
Treatment System Startup			
Place manual influent manifold valves into their appropriate positions	Yes / No		
Place manual system valves into their appropriate positions	Yes / No		
Place manual effluent valves into their appropriate positions	Yes / No		
Verify electrical disconnects are in energized position	Yes / No		
Ensure all alarm conditions are cleared	Yes / No		
Start submersible pumps one at a time	Yes / No		
Confirm flow rates at influent manifold and adjust as necessary	Yes / No		
Verify operating flows and pressures	Yes / No		
Start treatment system	Yes / No		
Verify operating amperages for motors are within spec	Yes / No		
Verify system of sequence of operation and operating parameters	Yes / No		
Inspect lines for leaks at operating conditions	Yes / No		
Confirm effluent pump is operating properly	Yes / No / NA		
Once flow reaches infiltration gallery/DMMA confirm no leaks and operating properly	Yes / No		
General			
Operators have been properly trained	Yes / No		
Other			
Collect Samples as indicated in the IMWP and/or IWP	Yes / No		
Complete O&M checklist upon completion of shakedown/start-up	Yes / No		

Additional Notes:

Signature:	**Date:**

South Repeater Building - Kennedy Space Center - Merritt Island, FL
PFAS Treatment System
Operation and Maintenance Log
Project Number: TBD

Date:	
Personnel:	
Arrival Time:	
Departure Time:	
Weather Conditions:	

Checklist:	
	Check blower filter
	Clean sight tube
	Clear vegetation around monitoring well clusters
	Pick up trash in and around compounds
	Weed eat/roundup around compounds where necessary
	Clear vegetation back from pier
	Picture of Flow Totalizer Meter

CONTROL PANEL	
Alarms/Signals since last O&M event? (Y/N)	
Total Gallons	

SYSTEM PARAMETERS		
Train 1: Granular Activated Carbon (GAC) Lead Vessel	Influent Pressure (psi)	
	Effluent Pressure (psi)	
	Sample Time	
Train 1: Granular Activated Carbon (GAC) Lag Vessel	Influent Pressure (psi)	
	Effluent Pressure (psi)	
	Sample Time	
Train 2: Granular Activated Carbon (GAC) Lead Vessel	Influent Pressure (psi)	
	Effluent Pressure (psi)	
	Sample Time	
Train 2: Granular Activated Carbon (GAC) Lag Vessel	Influent Pressure (psi)	
	Effluent Pressure (psi)	
	Sample Time	

SYSTEM READINGS		
Treatment System Pump 1		
Treatment System Pump 2		
6-Bag Filter 1		
6-Bag Filter 2		
Effluent Pump		

EFFLUENT FLOW METER READINGS		
Effluent Flow Meter 1	Flow (gal/min)	
	Totalizer Reading (gal)	
Effluent Flow Meter 2	Flow (gal/min)	
	Totalizer Reading (gal)	

EXTRACTION WELL FIELD READINGS				MONITORING WELL FIELD READINGS		
Well ID	Flow (gal/min)	Hour Meter Reading (hours)	Totalizer Reading (gal)	Well ID	DTW	Sample Time

NOTES
"+" = Pressure; "-" = Vacuum