Final

Landfill Area 3
Supplemental Remedial Investigation Work Plan
Former Lee Field Naval Air Station
Green Cove Springs, Florida

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Table of Contents

Page

List of Tables iii
List of Figures iii
List of Acronyms iv
1.0 Project Description 1-1
1.1 Introduction 1-1
1.2 Purpose and Objective 1-1
1.3 Scope of Work 1-1
1.4 Work Plan Organization 1-2
2.0 Site Background and Existing Conditions 2-1
2.1 Site Description 2-1
2.2 Summary of Previous Investigations 2-2
3.0 Supplemental Remedial Investigation Activities 3-1
3.1 Surface Water and Sediment Sampling 3-1
3.2 Surface and Subsurface Soil Sampling 3-1
3.3 Monitoring Well Installation and Development 3-1
3.4 Groundwater Sampling 3-2
3.5 Sample Preservation, Packaging, and Shipping 3-2
3.6 Sample Analysis 3-3
3.7 Investigation-Derived Waste Management and Disposal 3-3
3.8 Land Surveying 3-3
4.0 Field Sampling Plan 4-1
4.1 Data Collection Strategy 4-1
4.2 Data Uses and Quality Control Sampling 4-1
4.3 Rationale for Selection of Sample Analyses 4-2
4.4 Sampling and Analysis Requirements 4-3
4.5 Sampling and Field Procedures 4-3
4.6 Equipment Rinsate Sampling 4-3
4.7 QC Sampling 4-3
4.8 Decontamination of Equipment and Supplies 4-4
4.9 Sample Custody and Tracking Procedures 4-4
4.10 Documentation 4-4

Table of Contents *(Continued)*

Page

4.11 Sample Analysis 4-4
4.12 Data Management 4-4
5.0 Site Safety and Health Plan 5-1
6.0 References 6-1

List of Tables

Table	Title	Follows Tab
3-1	Planned Sample Summary	
3-2	Sample Containers, Preservation, and Holding Times	

List of Figures

Figure	*Title*	*Follows Tab*
1-1	Site Location Map	
2-1	Groundwater Detections Exceeding GCTLs	
2-2	Organic Compounds Detected in Soil	
3-1	Proposed Soil Boring, Monitoring Well, Surface Water, and Sediment Sample Locations	

List of Acronyms

APP	accident prevention plan
bgs	below ground surface
BHHRA	baseline human health risk assessment
COC	constituent of concern
COPC	constituent of potential concern
COPEC	constituent of potential ecological concern
DOD	Department of Defense
DPT	direct push technology
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
F.A.C	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
GCTL	groundwater cleanup target level
ID	inside diameter
IDW	investigation-derived waste
LFNAS	former Lee Field Naval Air Station
OD	outside diameter
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PVC	polyvinyl chloride
QC	quality control
RI	remedial investigation
SAP	sampling and analysis plan
SCTL	soil cleanup target level
Shaw	Shaw Environmental & Infrastructure, Inc.
SHP	safety and health plan
SI	site investigation
SLERA	screening level ecological risk assessment
SOP	Standard Operating Procedures
SQAG	sediment quality assessment guideline
SVOC	semi-volatile organic compound
SWCTL	surface water cleanup target level
TAL	target analyte list
TDS	total dissolved solids

List of Acronyms (Continued)

TPMC	TerranearPMC, LLC
TRPH	total recoverable petroleum hydrocarbon
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound

1.0 Project Description

1.1 Introduction

The U.S. Army Corps of Engineers (USACE) has authorized Terranear PMC, LLC (TPMC) to conduct site investigations and remedial action at the former Lee Field Naval Air Station (LFNAS), Green Cove Springs, Florida. This effort will be conducted as Task Order CS01 under Contract No. W912HN-09-D-0018, issued by the USACE to TPMC. Government project management and technical oversight will be provided by the USACE.

TPMC has teamed with Shaw Environmental & Infrastructure, Inc. (Shaw) for the preparation of the work plan and conduct of a supplemental remedial investigation (RI) for the former Landfill Area 3 at the LFNAS (Figure 1-1).

1.2 Purpose and Objective

The objective of this supplemental RI is to define the nature and extent of sediment, soil, surface water, and groundwater contamination at the former Landfill Area 3. The investigation activities described in this work plan will be conducted in compliance with the requirements of Florida Administrative Code (F.A.C.) Chapter 62-780, Contaminated Site Cleanup Criteria. This work will provide a supplement to RI activities conducted from September 2000 through July 2005 by Shaw. The proposed scope of work addresses comments provided by the Florida Department of Environmental Protection (FDEP) during their review of the *Final Remedial Investigation Report, Landfill Areas 1 and 3* (Shaw, 2004a).

In addition, the proposed RI effort will collect site-specific characterization information to support the evaluation of the potential close-out of Landfill Area 3 in accordance with the *Guidance for Disturbance and Use of Old Closed Landfills or Waste Disposal Areas in Florida, Version 2.0 Final* (FDEP, 2009) and groundwater zone of discharge requirements specified at F.A.C. Chapters 62-522.200 through 62.522.400.

1.3 Scope of Work

The scope of work necessary to achieve the project objective consists of the following:

- Drill eight (8) soil borings for lateral and vertical delineation of soil contamination, collecting an estimated four soil samples per boring at the

following depth intervals: 0 – 6-inches below ground surface (bgs), 6-inches - 2 feet bgs, 2 - 4 feet bgs, and 4 - 6 feet bgs or until groundwater is encountered. Soil samples will be analyzed for copper and polynuclear aromatic hydrocarbons (PAHs).

- Collect filtered and unfiltered surface water samples from two (2) locations and analyze for: PAHs, target analyte list (TAL) metals, and hexavalent chromium. The two unfiltered samples will also be analyzed for alkalinity and hardness.

- Collect sediment samples from two (2) locations and analyze for copper and PAHs. The sediment samples will be collocated with the surface water samples described in the previous bullet.

- Install and develop one shallow well to 15 feet bgs with a 10 foot screened interval; and install and develop one deep well with a maximum depth of 45 feet bgs with a 5 foot screened interval.

- Re-develop the ten (10) existing monitoring wells.

- Measure water levels in the ten (10) existing monitoring wells, two (2) new wells, and three (3) piezometers prior to the groundwater sampling event.

- Collect groundwater samples from the ten (10) existing monitoring wells and two (2) newly installed wells. Groundwater samples will be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), including PAHs, pesticides, polychlorinated biphenyls (PCBs), total recoverable petroleum hydrocarbons (TRPH), TAL metals, dioxins/furans, anions (chloride, sulfate, nitrate, phosphate, and fluoride), alkalinity, total dissolved solids (TDS), and total suspended solids (TSS).

- Water quality parameters measured during the groundwater sampling event: pH, temperature, conductivity, dissolved oxygen, turbidity, salinity, and oxidation-reduction potential.

- Waste characterization sampling of any investigation-derived waste (IDW).

- IDW transportation and disposal.

1.4 Work Plan Organization

The RI work plan is organized as follows: Chapter 1.0 Project Description, Chapter 2.0 Site Background and Existing Conditions, Chapter 3.0 Remedial Investigation Activities, Chapter 4.0 Field Sampling Plan, Chapter 5.0 Site Safety and Health Plan, and Chapter 6.0 References.

2.0 Site Background and Existing Conditions

The LFNAS occupies approximately 1,560 acres along the St. Johns River in Clay County, Florida, within the city of Green Cove Springs. The facility is relatively flat with very low relief. Elevations range from mean sea level at the St. Johns River to approximately 25 feet above sea level in the central portion of the airfield. Three Mile Swamp occupies the southwestern portion of the facility and has a mean elevation of approximately 10 feet above mean sea level. The area known as Lee Field was initially developed by the U.S. Department of Defense (DOD) in 1940 and was used as a pilot training base during World War II. The installation contained extensive docking facilities (with access to the St. Johns River), a railroad system, multiple aircraft runways, and supporting structures. Following the war, the facility was used as a Naval Station to mothball shallow draft fleet ships. In 1963, the ownership of Lee Field was transferred from the DOD to the City of Green Cove Springs. In 1965, the City of Green Cove Springs sold the property to J Louis Reynolds who began developing Lee Field into an industrial park (Reynolds Industrial Park). In 1981 Clay County Port, Inc. acquired the Industrial park property and continued site development. Businesses currently or formerly operating at Reynolds Industrial Park include a railroad refurbisher, truck driver training school, aircraft maintenance facility, brake testing facility, fiberglass pipe manufacturing facility, and an airstrip for small planes (USACE, 1999).

2.1 Site Description

Landfill Area 3 covers approximately 4 acres of land at the southern edge of the LFNAS property. The landfill is bounded on the north, west, and east by a thick cover of trees. Three Mile Swamp lies approximately 400 feet east and northeast of the landfill. The southern edge of Landfill Area 3 is bordered by a dirt access road that connects CR 209 with Wildwood Road and then a wooded area. Farther west past the wooded area is CR 209. The remnants of 6-inch-by-6-inch wooden posts from a previous boundary fence are located around the perimeter of the landfill (Figure 1-1).

Currently, the landfill is heavily wooded with trees and undergrowth. Prior to the end of 2001, the eastern edge of Landfill Area 3 was cleared of larger timber from the bend in the access road to the northeast. The removal of timber in these areas has provided more sunlight, which allowed the growth of grasses and thick scrub vegetation.

Portions of the landfill where this has occurred are now nearly impenetrable, as is the northeast corner of the landfill where cutting debris has been piled.

Overall, the landfill area is relatively flat; however, three mounded areas are located within the estimated boundaries of Landfill Area 3. Two of the mounds are located near monitoring well LF3W-5-86. The third mound is located just west of well LF3MW04. The mounds are approximately 3 to 5 feet high, and their origin is unknown. Scattered debris, including bottles, cans, and miscellaneous metal items, is observed at the surface from the south-central portion of the landfill to the east and northeast. From the surface, there are no other indications that a landfill is present. It is likely that the scattered debris observed at the surface today is the result of random post-DOD disposal.

Historical LFNAS records indicate that the area known as Landfill Area 3 was referred to as a “Sanitary Land Fill” on a map dated 1957. The area was reportedly used to dispose of domestic waste, refuse, and medical waste. No other details concerning historical use of the site were available. A review of historical aerial photographs first indicated landfill-related activity at Landfill Area 3 in 1951. Prior to that time, aerial photographs indicate activity adjacent to the future landfill as early as 1944. From approximately 1944 to 1948, a disturbed area was observed southeast of the future Landfill Area 3, later determined to be clearing preparations for the construction of a radar station. Activity at the landfill continued through at least 1958. The next available aerial photo (1969) indicates some disturbance and what appears to be additional debris. Additional disposal may have occurred at the site after the Navy relinquished control of the base in 1963, but this could not be confirmed. No other activity was observed at Landfill Area 3 after approximately 1969.

2.2 Summary of Previous Investigations

Five investigations were conducted at Landfill Area 3 prior to the comprehensive RI conducted in the area. A description of these activities is not included in this work plan, but is discussed in detail in the RI report (Shaw, 2004a).

The RI for Landfill Area 3 was conducted from September 2000 to October 2002 (Shaw, 2004a). The RI consisted of a historical records search, historical aerial photograph review, test pit excavation, piezometer and monitoring well installation, surface and subsurface soil sampling, sediment and surface water sampling, groundwater sample

collection, comparison of Landfill Area 3 data to established background soil and groundwater concentrations, completion of a Baseline Human Health Risk Assessment (BHHRA), and completion of a Screening Level Ecological Risk Assessment (SLERA).

In addition to the aerial photo review, a total of 25 excavated test pits were used to determine the approximate landfill boundaries. Debris was encountered in four test pits at depths ranging from the ground surface to approximately 7 feet bgs. Subsurface debris encountered included gas masks, cartridges, glass, trash cans, mufflers, and other miscellaneous debris. In addition, 25 permanent bar hole probes were installed around the landfill perimeter and have been monitored for landfill gas, with none detected. Surface emissions monitoring for methane has also been conducted, with no detections.

During the RI, groundwater samples were collected by direct-push technology (DPT) from six piezometer locations. The piezometers were placed on the perimeter of the landfill to determine the groundwater flow direction and to collect groundwater screening samples. Concentrations of chlorinated hydrocarbons in excess of groundwater cleanup target levels (GCTLs) were detected at depth in one piezometer (LF3PZ02). During a Phase II investigation, additional groundwater samples were collected by DPT to define the extent of chlorinated hydrocarbons detected previously. The Phase II sampling indicated that the contaminant plume is localized. Two of the piezometers were converted to permanent monitoring wells. In addition, four shallow monitoring wells and two double-cased deep monitoring wells were installed. Groundwater samples were collected from all existing wells (Figure 2-1). Analysis of groundwater samples from the monitoring wells indicated concentrations of chlorinated hydrocarbons in excess of the GCTLs in well LF3MW06, which replaced destroyed piezometer LF3PZ02. Piezometer LF3PZ02 was destroyed (by land clearing operations) after it was initially sampled. Five inorganics were detected at concentrations that exceeded GCTLs (Shaw, 2004a) (Figure 2-1).

Surface soil samples were collected from 20 locations within and outside the presumed landfill boundary (Figure 2-2). Concentrations of PAHs exceeding the lower of the residential soil cleanup target levels (SCTLs) or leachability standards based on groundwater were detected in surface soil at LF3SS02, LF3SB05, and LF3SS11. Methylene chloride was detected in the surface soil at SS01 and at SS07 through SS12. Surface water samples LF3SW01, LF3SW02, and LF3SW03 contained SVOCs and

various metals, including aluminum, beryllium, iron, silver, and mercury. Sediment samples LF3SD02 and LF3SD03 contained concentrations of PCBs exceeding sediment quality assessment guidelines (SQAGs) (Figure 2-2).

Subsurface soil samples were collected from locations coinciding with eight of the surface samples, outside or near the perimeter of the landfill boundary. The results indicate concentrations of detectable VOCs, SVOCs, inorganics, and TRPH, but not in excess of background and residential or leachability-based SCTLs (Figure 2-2).

Sediment samples were collected from four locations within Landfill Area 3. Sample LF3SD03 contained concentrations of five PAHs, PCBs (Arochlor 1260), and mercury that exceed the SQAGs. The other three samples also exceed the SQAGs for PCBs.

Surface water samples were collocated with the sediment samples and analyzed for the same parameters. The SVOC bis(2-ethylhexyl)phthalate is present in three of the surface water samples at concentrations exceeding the surface water cleanup target level (SWCTL). Seven inorganics were detected above the SWCTLs in LF3SW03.

Exceedances for inorganics were compared to background concentrations established during the background chemical data study (Shaw, 2004b). The data sets were subjected to statistical tests; if necessary, geochemical evaluations were performed to determine if the elevated metals concentrations in the site samples were naturally occurring. Site-to-background comparison for soil (surface and subsurface) indicated anomalously high concentrations of cadmium, copper, lead, mercury, nickel, silver, and zinc in specific site samples, which may reflect contamination. Anomalously high arsenic and iron concentrations were detected in one sediment sample and may contain a component of contamination. Evaluation of the surface water data indicated that the metals detections were either within the background range or naturally occurring. Barium, chromium, iron, nickel, and manganese concentrations in specific groundwater samples were anomalously high and may reflect contamination. Iron in one groundwater sample may have been elevated because of reductive dissolution as a secondary effect of the organic contamination.

The BHHRA identified copper, mercury, and two PAHs as constituents of potential concern (COPCs) for surface soil at Landfill Area 3. The COPCs for total soil are identical to those for surface soil, with higher concentrations in the surface soil.

Constituents of concern (COCs) identified in soil include Arochlor 1254 and 1260, dieldrin, and several PAHs. No COPCs were identified for the sediment because all detections were well below the SQAGs. For surface water, only TRPH was selected as a COPC. The groundwater evaluation identified the following COPCs: iron, manganese, bis(2-ethylhexyl)phthalate, chlorobenzene, vinyl chloride, and TRPH. COCs for groundwater include the compounds identified as COPCs, except iron, which was excluded.

The SLERA identified 13 constituents of potential ecological concern (COPECs) (8 inorganics and 5 PAHs) for surface soil, 13 COPECs (11 inorganics, 1 VOC, and 1 SVOC) for surface water, and 8 COPECs (1 inorganic compound, 1 VOC, 4 PAHs, 1 SVOC, and 1 PCB) for sediment. Based on further evaluation, the following compounds and associated media warrant further investigation/ evaluation to determine their potential ecological risk: sediment (iron and Arochlor 1260). None of the compounds identified as COPECs for the soil and surface water were deemed a potential ecological risk (Shaw, 2004a).

Groundwater samples were collected from the 10 existing monitoring wells in January 2005 and July 2005 as part of the semiannual monitoring events at Landfill Area 3. A discussion of the results is included in the second monitoring report (Shaw, 2005).

3.0 Supplemental Remedial Investigation Activities

As part of previous investigative activities at LFNAS, an installation-wide sampling and analysis plan (SAP) was developed (Shaw, 2004c) to describe a wide range of environmental sampling procedures expected to be required for current and future investigations at LFNAS. The procedures in this SAP were developed to fully comply with all applicable FDEP Standard Operating Procedures (SOPs). All investigation methodologies required in the Landfill Area 3 work plan will be guided by the installation-wide SAP (Shaw, 2004c).

3.1 Surface Water and Sediment Sampling

To investigate the extent of contaminant migration from Landfill Area 3, two (2) sediment samples (LF3SD05 and LF3SD06) will be collected in the vicinity of previous sediment sampling locations LF3SD02 and LF3SD03 (Figure 3-1). Sediment samples will be analyzed for copper and PAHs. In addition, two (2) surface water samples (LF3SW05 and LF3SW06) will be collocated with the sediment sampling locations. Filtered and unfiltered surface water samples will be analyzed for PAHs, TAL metals, and hexavalent chromium. Analysis for alkalinity and hardness will be conducted for the unfiltered surface water samples. Procedures for sediment and surface water sampling are described in the LFNAS SAP (Shaw, 2004c).

3.2 Surface and Subsurface Soil Sampling

To investigate the extent of contamination at Landfill Area 3, eight (8) soil borings will be drilled for lateral and vertical delineation of soil contamination (LF3SB09 – LF3SB16) (Figure 3-1). An estimated four (4) soil samples will be collected at each boring. Soil samples will be collected at four depths: 0 – 6- inches bgs, 6- inches - 2 feet bgs, 2 - 4 fee bgs, and 4 - 6 feet bgs, or until groundwater is encountered. All soil samples will be analyzed for copper and PAHs. Procedures for soil sampling are described in the LFNAS SAP (Shaw, 2004c).

3.3 Monitoring Well Installation and Development

One shallow monitoring well (LF3MW07) will be installed between a direct-push groundwater sampling location (LF3DP05) and monitoring well LF3MW05. One deep monitoring well (LF3DW03) will be installed south of monitoring well LF3MW06 (Figure 3-1). The new shallow monitoring well will be installed via DPT to a total depth of 12 feet bgs and will consist of 1-inch inside diameter (ID) by 2.5-inch outside diameter (OD)

polyvinyl chloride (PVC) with a pre-packed 10 foot screen. The deep monitoring well (LF3DW03) will be installed via truck mounted hollow stem auger drill rig to an approximate total depth of 45 ft bgs. A 4-inch diameter surface casing will be set approximately 40 feet bgs and will be grouted into place to prevent water from the surficial zone from reaching the lower zone. After setting the surface casing, a 1-inch ID by 2.5-inch OD PVC pre-packed well with 5 foot screen will be set to a total depth of 45 ft bgs (40' – 45' screened interval). All newly installed monitoring wells will consist of above-grade completions, with protective casings, 2' by 2' pads, and four (4) protective bollards at each well.

All drilling, lithological sampling and logging, and well installation procedures will follow those established in the installation-wide SAP (Shaw, 2004c).

The ten previously existing monitoring wells will be re-developed prior to sampling, because these wells were last sampled in July 2005. Each newly installed monitoring well will be developed no sooner than 48 hours or longer than 7 days after installation. All development procedures will follow those established in the SAP (Shaw, 2004c).

3.4 Groundwater Sampling

Groundwater samples will be collected from the two (2) newly installed monitoring wells and ten (10) existing monitoring wells. All groundwater sampling will follow procedures outlined in Section 6.1.3 of the SAP (Shaw, 2004c). The following water quality parameters will be measured during groundwater sampling: pH, temperature, conductivity, dissolved oxygen, turbidity, salinity, and oxidation-reduction potential. Groundwater samples will be analyzed for VOCs, SVOCs, including PAHs, pesticides, PCBs, TRPH, TAL metals (total and dissolved), anions (chloride, sulfate, nitrate, phosphate, and fluoride), alkalinity, TDS, and TSS. Procedures for sediment and surface water sampling are described in the LFNAS SAP (Shaw, 2004c).

3.5 Sample Packaging, Preservation, and Disposal

Containers, preservation methods, and holding times for the proposed analysis at the LFNAS are provided in Table 6-2 of the SAP. Completed analysis requests/chain-of-custody will be secured and included with each shipment of coolers to:

Accutest Laboratories
4405 Vineland Road, Suite C-15
Orlando, Florida 32811
Contact: Sue Bell
Telephone: (407) 425-6700

3.6 Sample Analysis

Table 3-1 presents a summary of proposed groundwater samples with pre-planned sample designations and quality control (QC) samples. The laboratory will provide sampling containers and preservatives in accordance with Table 3-2.

All samples, will be analyzed off-site by Accutest Laboratories using the prescribed EPA methods and will meet the QC requirements described in the document entitled *Engineering and Design, Chemical Data Quality Management for Hazardous Waste Remedial Activities,* ER 1110-1-263, April 30, 1998 (USACE, 1998). Detailed procedures are outlined in Chapter 7.0, Analytical Program, in the SAP (Shaw, 2004c).

The data quality objectives (DQO) process provides a quantitative basis for designing a rigorous, defensible, and cost-effective data collection and management program. The complete DQO process is outlined in detail in Chapter 3.0, Project Quality Assurance Objectives, in the SAP (Shaw, 2004c).

3.7 Investigation-Derived Waste Management and Shipping

The IDW expected to be generated during the groundwater investigation will include minor soil cuttings, groundwater from well development and purging, decontamination fluids, and used personal protective equipment. IDW will be disposed of within 90 days of the receipt of applicable sample data. Management of IDW will be performed in accordance with the SAP (Shaw, 2004c).

3.8 Land Surveying

All surface water, sediment, soil sampling, and new well locations will be surveyed by a Florida licensed professional surveyor to determine horizontal coordinates referenced to the Florida State Plane Coordinate System. Ground surface and top of casing elevations will be surveyed to the nearest 0.01 foot and referenced to the 1983 North American Vertical Datum. The surveys will be conducted in accordance with Section 5.6 of the SAP (Shaw, 2004c).

4.0 Field Sampling Plan

The LFNAS installation-wide SAP (Shaw, 2004c) was prepared in accordance with the USACE SAP and USACE EM-200-1-3 (USACE, 2001). While specific references are made here to the installation-wide SAP, work will be performed under the guidance of the USACE SAP and in accordance with FDEP SOPs.

4.1 Data Collection Strategy

Data collected as part of the Landfill Area 3 investigation will be used to identify contaminants in soil and groundwater. Field sampling will consist of:

- Eight (8) soil borings for lateral and vertical delineation of soil contamination with an estimated four (4) samples collected from each boring at the following intervals: 0-6 inches bgs, 6 inches - 2 feet bgs, 2 - 4 feet bgs, and 4 - 6 feet bgs or until groundwater is encountered. A total of 32 soil samples analyzed for copper and PAHs.

- Two (2) filtered and two (2) unfiltered surface water samples analyzed for PAHs, TAL metals, hexavalent chromium. The two unfiltered samples will be analyzed for alkalinity and hardness.

- Two sediment samples will be analyzed for copper and PAHs.

- Twelve (12) groundwater samples will be analyzed for VOCs, SVOCs including PAHs, pesticides, PCBs, TRPH, TAL metals (total and dissolved), anions (chloride, sulfate, nitrate, phosphate, and fluoride), alkalinity, TDS, and TSS.

- QC samples anticipated to include 1 QC duplicate, 1 QC sample rinsate, and 1 QC matrix spike/matrix spike duplicate sample.

4.2 Data Uses and Quality Control Sampling

Data collected as part of the Landfill 3 Area RI will be used to determine the current nature and extent of soil and groundwater contamination at Landfill Area 3 in accordance with Chapter 62-780, F.A.C. Data will also be collected for waste disposal characterization of soil, purge water, and equipment rinsate water.

The decision-making process associated with the DQO process is provided in Section 3.5 of the SAP, and a decision diagram for this process is provided as Figure 3-1 of the SAP (Shaw, 2004c).

Analytical data for groundwater samples will meet the defined decision statements developed by the DQO process. To ensure that the data meet these objectives, QC samples will be collected during the field activities. All QC sampling will follow the requirements and procedures provided in Section 6.1.6 of the SAP (Shaw, 2004c) and as described in the following text.

All samples collected during the groundwater investigation will be sent for off-site analysis to a procured fixed-base laboratory. The fixed-base analytical laboratory will be responsible for analyzing the QC samples and for conforming to the laboratory procedures presented in Chapter 7.0 of the SAP (Shaw, 2004c). This program provides the methods and procedures that will assess the precision, accuracy, and completeness of the data. Field duplicate samples equal to approximately 10 percent of the number of field samples (or a minimum of one sample) will be sent for QC analysis. Field duplicate samples will not be collected and analyzed for samples collected for disposal purposes.

All data collected as part of the groundwater investigation will be stored in an electronic database for management and reporting. The specifics of the data management plan are provided in Chapter 8.0 of the SAP (Shaw, 2004c).

Table 3-1 presents the list and number of samples to be collected and the analyses to be performed for all samples collected during the investigation. The rationale for selection of sample analyses and sampling approach, in addition to the procedures that will be used during the contamination assessment, are discussed in the following sections.

4.3 Rationale for Selection of Sample Analyses

Soil will be analyzed for copper and PAHs as the previous RI indicated that those are the COCs in site soils.

Filtered and unfiltered surface water will be collected and analyzed for PAHs, TAL metals, and hexavalent chromium as they have been identified as the COCs in the site surface water.

Sediment will be analyzed for copper and PAHS as they have been identified in site sediments.

Groundwater will be analyzed for VOCs, SVOCs, including PAHs, pesticides, PCBs, TRPH and TAL metals (total and dissolved) as they have been identified as the COCs in site groundwater. Other parameters such as alkalinity, anions, TDS, and TSS will be used to assist in determining if a COC is naturally occurring or contaminant-related. If groundwater contamination is present, these parameters may be used to support natural attenuation monitoring or remedial design. Analytical methods for waste characterization samples were chosen to meet waste disposal requirements.

4.4 Sampling and Analysis Requirements

The purpose of the sampling program is to collect representative soil and groundwater samples. The samples will be utilized for assessment and disposal characterization. A summary of contamination assessment field activities to be performed, including the number of field samples to be collected and analyses to be performed, is presented in Table 3-1.

4.5 Sampling and Field Procedures

Chapter 6.0 of the SAP (Shaw, 2004c) provides detailed instructions for sample collection and data acquisition activities that will be used during the Landfill Area 3 RI.

4.6 Equipment Rinsate Sampling

Procedures for collecting rinsate samples are provided in Chapter 6.0 of the SAP (Shaw, 2004c).

4.7 QC Sampling

To ensure the reliability of field sampling procedures and materials, field QC samples will be collected or prepared as appropriate for each medium sampled, each sample shipment, and/or each sampling event according to Section 4.2 and Table 3-1 of the SAP (Shaw, 2004c). The field activities will be considered one event unless field

personnel leave the site for more than 72 hours during the course of the investigation. Section 6.1.6 of the SAP (Shaw, 2004c) provides specific information regarding QC samples and their frequencies of collection.

4.8 Decontamination of Equipment and Supplies

Decontamination of sampling equipment will be performed in accordance with Section 6.1.7 of the SAP (Shaw, 2004c) to maintain the integrity of the samples collected during the field investigation. All decontamination water will be collected in a portable holding container (e.g., 55-gallon drum) for waste characterization sampling.

4.9 Sample Custody and Tracking Procedures

Sample custody is a vital aspect of the environmental investigation. Samples must be traceable from the time of sample collection. All sample custody and tracking procedures, including laboratory notification, field custody procedures, identification, and shipping, will be performed as specified in Section 6.2 of the SAP (Shaw, 2004c).

4.10 Documentation

All field activities shall be documented in an official logbook or field activity daily log to maintain a record of the progress of the field work and to allow the reconstruction of events that occur during the RI. Field documentation forms to be used during the RI, in addition to the official logbook, include: field activity daily log, sample collection log, and analysis request/chain-of-custody record. The procedures for identifying and documenting samples collected during the RI are presented in Section 6.3 of the SAP (Shaw, 2004c).

4.11 Sample Analysis

A summary of the samples to be submitted for laboratory analysis and their analyses is presented in Table 3-1. Off-site analyses will be performed by a fixed-base laboratory using approved methods, which will meet the requirements described in the referenced methods and the SAP (Shaw, 2004c).

4.12 Data Management

The data management process includes all aspects of data review and data validation. All data associated with the RI will undergo several evaluations in the laboratory and by

TPMC/Shaw personnel prior to release to an end data user. General data management procedures will follow the guidance provided in Chapter 8.0 of the SAP (Shaw, 2004c) and in this section of the Work Plan.

- ***Data Packages.*** Laboratory data packages will undergo internal review by the analyst and a peer or supervisor review prior to submittal to TPMC/Shaw. The project chemist will review the data and compare it to the planned objectives in the work plan and to QC sample data to evaluate the validity of the results.

- ***Data Validation.*** A thorough evaluation of the data will be conducted to determine whether the project objectives have been met. Specific issues to be addressed include precision, accuracy, and representativeness, such as duplicate results, matrix spike/matrix spike duplicate, and blank sample results. An evaluation of completeness will be performed and data deficiencies will be identified and rectified or documented for the report. An overall assessment will be made with respect to the decision statements identified by the DQO process to determine that the data meet the objectives.

Data validation is based on the QC acceptance criteria specified in Table 7-3 of the SAP (Shaw, 2004c) and followed the QC guidance outlined in *Test Methods for Evaluation of Solid Waste* (U.S. Environmental Protection Agency [EPA], 1986). These guidelines mimic the most current editions of *EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (EPA, 2008) and *EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (EPA, 2010) for data obtained outside the EPA's contract laboratory program. Following completion of the data validation, the validator compiles the data review notes and assembles them into a standardized data validation report format. The project chemist or a designee reviews all data and assesses the usability of the data based on the validation effort findings.

5.0 Site Safety and Health Plan

All work at the site performed by TPMC/Shaw or its subcontractors will be performed in accordance with the Accident Prevention Plan (APP) and Site Safety and Health Plan (SHP) Appendix (TPMC/Shaw, 2009). The APP/SHP Appendix complies with applicable Occupational Safety and Health Administration, EPA, and USACE regulations. This plan follows the guidelines established in the following:

- *Standard Operating Safety Guidelines*
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (National Institute of Occupational Safety and Health 86-116)
- 29 Code of Federal Regulations 1910.120, U.S. Department of Labor/Occupational Safety and Health Administration
- 29 CFR 1926.65, U.S. Department of Labor/Occupational Safety and Health Administration
- Safety and Health Elements for Hazardous, Toxic, and Radioactive Waste and OWE Documents (USACE CER 385-1-92, Appendix B [18 March 1994]).

The contents of the APP/SHP Appendix are also consistent with TPMC/Shaw corporate safety and health policies and procedures.

6.0 References

Florida Department of Environmental Protection (FDEP), 2009, ***Guidance for Disturbance and Use of Old Closed Landfills or Waste Disposal Areas in Florida, Version 2.0 Final***, June.

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U.S. Environmental Protection Agency (EPA), 2008, ***Contract Laboratory Program National Functional Guidelines for Organic Superfund Data Review,*** USEPA-540-R-08-01, June.

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TABLES

Table 3-1
Planned Sample Summary
Supplemental Remedial Investigation Landfill Area 3
Former Lee Field Naval Air Station

Matrix	Location	Sample Depth (ft bgs)	Sample Designation	QC Sample Designations		Analytical Suite
				Field Duplicate	MS/MSD	
Landfill Area 3 Monitoring Wells						
Groundwater	LF3MW01	TBD	LF3MW01-GW-AC3025-REG			VOCs, SVOCs with PAHs, TRPH, pesticides, PCBs, TAL Metals (total and dissolved), anions (chloride, sulfate, nitrate, phosphate, and fluoride), alkalinity, total and dissolved solids, and total suspended solids
Groundwater	LF3MW02	TBD	LF3MW02-GW-AC3026-REG			
Groundwater	LF3MW03	TBD	LF3MW03-GW-AC3027-REG			
Groundwater	LF3MW04	TBD	LF3MW04-GW-AC3028-REG			
Groundwater	LF3MW05	TBD	LF3MW05-GW-AC3029-REG			
Groundwater	LF3MW06	TBD	LF3MW06-GW-AC3030-REG			
Groundwater	LF3MW07	TBD	LF3MW07-GW-AC3031-REG			
Groundwater	LF3W-4-86	TBD	LF3W-4-86-GW-AC3032-REG			
Groundwater	LF3W-5-86	TBD	LF3W-5-86-GW-AC3033-REG			
Groundwater	LF3DW01	TBD	LF3DW01-GW-AC3034-REG	LF3DW01-GW-AC3035-FD	LF3DW01-GW-AC3034-MS LF3DW01-GW-AC3034-MSD	
Groundwater	LF3DW02	TBD	LF3DW02-GW-AC3036-REG			
Groundwater	LF3DW03	TBD	LF3DW03-GW-AC3037-REG			
Landfill Area 3 Surface Water / Sediment						
Surface Water	LF3SW05	TBD	LF3SW05-SW-AC2007-REG			Unfiltered - TAL Metals, hexavalent chromium, alkalinity, hardness, and PAHs; Filtered - TAL Metals, hexavalent chromium, and PAHs
Surface Water	LF3SW06	TBD	LF3SW06-SW-AC2008-REG			
Sediment	LF3SD05	TBD	LF3SD05-SD-AC2009-REG			Copper and PAHs
Sediment	LF3SD06	TBD	LF3SD06-SD-AC2010-REG	LF3SD06-SD-AC2011-FD	LF3SD06-SD-AC2010-MS LF3SD06-SD-AC2010-MSD	
Landfill Area 3 Soil						
Soil	LF3SB09	0-6"	LF3SB09-SO-AC0036-REG	LF3SB09-SO-AC0037-FD	LF3SB09-SO-AC0036-MS LF3SB09-SO-AC0036-MSD	Copper and PAHs
		6"-2'	LF3SB09-SO-AC0038-REG			
		2'-4'	LF3SB09-SO-AC0039-REG			
		4'-6'	LF3SB09-SO-AC0040-REG			
Soil	LF3SB10	0-6"	LF3SB10-SO-AC0041-REG			
		6"-2'	LF3SB10-SO-AC0042-REG			
		2'-4'	LF3SB10-SO-AC0043-REG			
		4'-6'	LF3SB10-SO-AC0044-REG			

Table 3-1
Planned Sample Summary
Supplemental Remedial Investigation Landfill Area 3
Former Lee Field Naval Air Station

Matrix	Location	Sample Depth (ft bgs)	Sample Designation	QC Sample Designations		Analytical Suite
				Field Duplicate	MS/MSD	
Soil	LF3SB11	0-6"	LF3SB11-SO-AC0045-REG			Copper and PAHs
		6"-2'	LF3SB11-SO-AC0046-REG	LF3SB11-SO-AC0047-FD		
		2'-4'	LF3SB11-SO-AC0048-REG			
		4'-6'	LF3SB11-SO-AC0049-REG			
Soil	LF3SB12	0-6"	LF3SB12-SO-AC0050-REG			
		6"-2'	LF3SB12-SO-AC0051-REG			
		2'-4'	LF3SB12-SO-AC0052-REG			
		4'-6'	LF3SB12-SO-AC0053-REG			
Soil	LF3SB13	0-6"	LF3SB13-SO-AC0054-REG			
		6"-2'	LF3SB13-SO-AC0055-REG			
		2'-4'	LF3SB13-SO-AC0056-REG			
		4'-6'	LF3SB13-SO-AC0057-REG			
Soil	LF3SB14	0-6"	LF3SB14-SO-AC0058-REG			
		6"-2'	LF3SB14-SO-AC0059-REG			
		2'-4'	LF3SB14-SO-AC0060-REG	LF3SB14-SO-AC0061-FD	LF3SB14-SO-AC0060-MS LF3SB14-SO-AC0060-MSD	
		4'-6'	LF3SB14-SO-AC0062-REG			
Soil	LF3SB15	0-6"	LF3SB15-SO-AC0063-REG			
		6"-2'	LF3SB15-SO-AC0064-REG			
		2'-4'	LF3SB15-SO-AC0065-REG			
		4'-6'	LF3SB15-SO-AC0066-REG			
Soil	LF3SB16	0-6"	LF3SB16-SO-AC0067-REG			
		6"-2'	LF3SB16-SO-AC0068-REG			
		2'-4'	LF3SB16-SO-AC0069-REG			
		4'-6'	LF3SB16-SO-AC0070-REG			

TRPH – Total recoverable petroleum hydrocarbon
PAH – Polycyclic aromatic hydrocarbon
PCB – Polychlorinated biphenyl
TDS – Total dissolved solids
TSS – Total suspended solids

Table 3-2
Sample Containers, Preservation, and Holding Times
Supplemental Remedial Investigation Landfill Area 3
Former Lee Field Naval Air Station

Matrix	Parameter	Analytical Method	Total Samples	Sample Container(s)	Preservation Requirements	Holding Time
Landfill Area 3 Monitoring Wells						
Groundwater	VOCs	SW846 8260B	15	3x40mL VOA Vials	HCl, Cool to 4° C	14 days
Groundwater	SVOCs	SW846 8270C	15	2x1L Amber Glass	Cool to 4° C	7 days to extraction/40 days to analysis
Groundwater	TRPH	FL-PRO	15	2x1L Amber Glass	HCL,Cool to 4° C	7 days to extraction/40 days to analysis
Groundwater	TAL Metals filtered	SW846 6010B/7470	15	1x500mL Plastic	HNO3, Cool to 4° C	6 mos/mercury 28 days
Groundwater	Anions	EPA 300	15	1x1L plastic	Cool to 4° C	48 hour to 28 day depending on request
Groundwater	Alkalinity	EPA 310.1	15	*	Cool to 4° C	14 days
Groundwater	TDS/TSS	EPA 160.1/160.2	15	*	Cool to 4° C	7 days
Groundwater	PAHs (8270 LL)	SW846 8270-LL	15	2x1L Amber Glass	Cool to 4° C	7 days to extraction/40 days to analysis
Groundwater	PCBs	8082	15	2x1L Amber Glass	Cool to 4° C	7 days to extraction/40 days to analysis
Groundwater	Pesticides	8081A	15	2x1L Amber Glass	Cool to 4° C	7 days to extraction/40 days to analysis
Landfill Area 3 Surface Water						
filtered:						
Surface Water	TAL Metals	SW846 6010B/7470	2	1x500mL Plastic	HNO3, Cool to 4° C	6 mos/mercury 28 days
Surface Water	Hexavalent Chromium	7196A	2	1x1L plastic	Cool to 4° C	24 hours
Surface Water	PAHs (8270 LL)	SW846 8270-LL	2	2x1L Amber Glass	Cool to 4° C	7 days to extraction/40 days to analysis
unfiltered:						
Surface Water	TAL Metals	SW846 6010B/7470	2	1x500mL Plastic	HNO3, Cool to 4° C	6 mos/mercury 28 days
Surface Water	Hexavalent Chromium	7196A	2	1x1L plastic	Cool to 4° C	24 hours
Surface Water	PAHs (8270 LL)	SW846 8270-LL	2	2x1L Amber Glass	Cool to 4° C	7 days to extraction/40 days to analysis
Surface Water	Alkalinity	EPA 310.1	2	**	Cool to 4° C	14 days
Surface Water	Hardness	130.2	2	***	HNO3, Cool to 4° C	6 mos
Landfill Area 3 Sediment						
Sediment	PAHs (8270 LL)	SW846 8270-LL	5	1x4oz. CWM	Cool to 4° C	14 days to extraction/40 days to analysis
Sediment	Copper	6010B/7000	5	****	Cool to 4° C	6 mos/mercury 28 days
Landfill Area 3 Soil Borings						
Soil	PAHs (8270 LL)	8270-LL	39	1x4oz. CWM	Cool to 4° C	14 days to extraction/40 days to analysis
Soil	Copper	6010B/7000	39	****	HNO3, Cool to 4° C	6 mos/mercury 28 days

HCL – Hydrochloric acid
H_2SO_4 – Sulfuric acid
HNO_3 – Nitric acid
TAL – Target analyte list
VOC – Volatile organic compound
SVOC – Semivolatile organic compound
TRPH – Total recoverable petroleum hydrocarbon
PAH – Polynuclear aroma ic hydrocarbon
PCB – Polychlorinated biphenyl
TDS – Total dissolved solids
TSS – Total suspended solids
* from anions bottle
** from hex chrom bottle
*** from metals bottle
**** from PAH jar

FIGURES

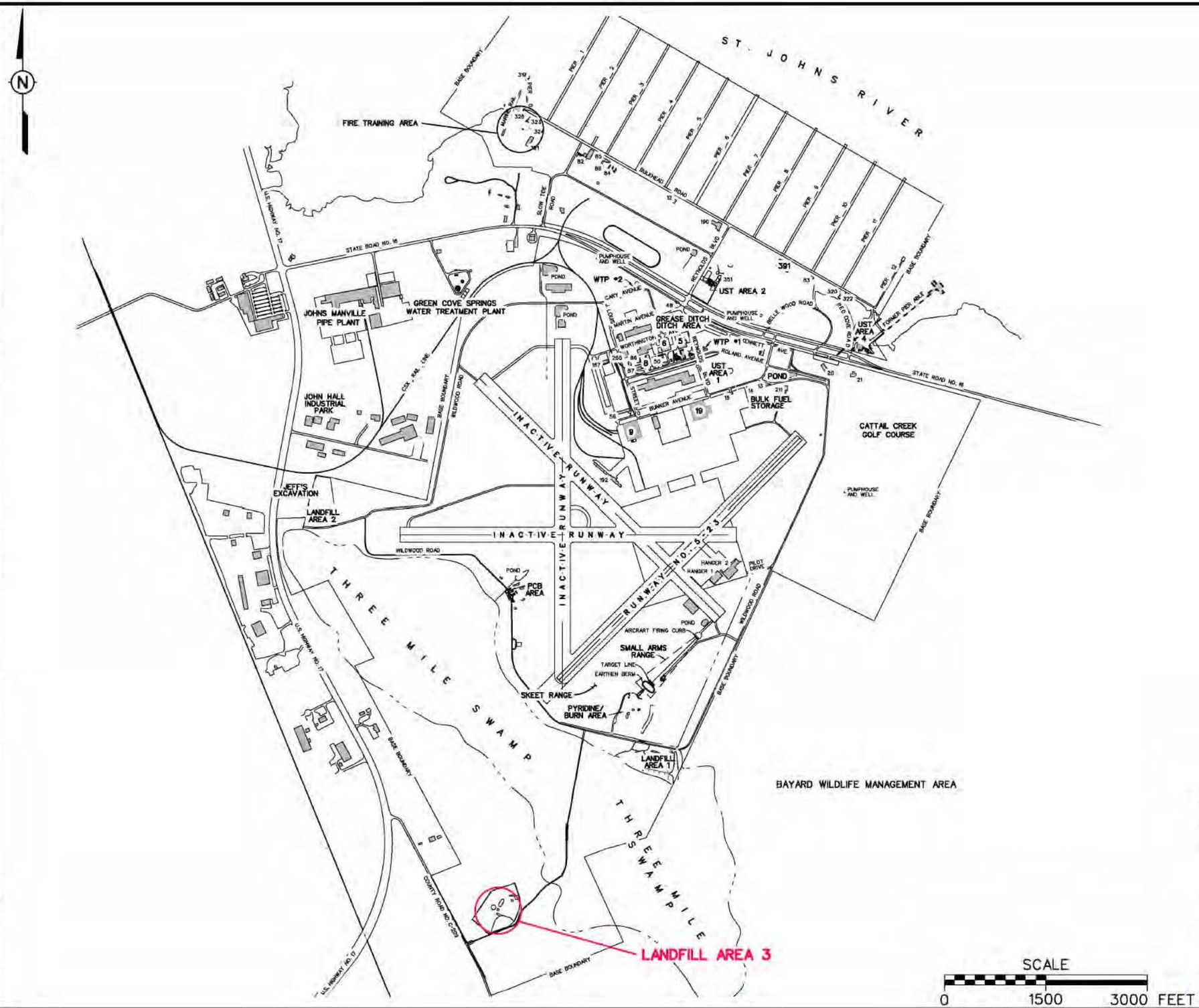

FIGURE 1-1
SITE LOCATION MAP
LANDFILL AREA 3

FORMER LEE FIELD NAVAL AIR STATION
GREEN COVE SPRINGS, FLORIDA

TerranearPMC

Shaw® a world of Solutions™

STARTING DATE: 01OCT09	INITIATOR: C. DAVIS
DRAWN BY: S. MCCAWLEY	GADD REVIEW: S. MCCAWLEY
	PROJ. MGR.: K.CUNNINGHAM
	TECH. REVIEW: K.CUNNINGHAM
	PROJ. NO.: 137051
	DWG. NO.: lee_nas_lf3-sriwp_01.dgn

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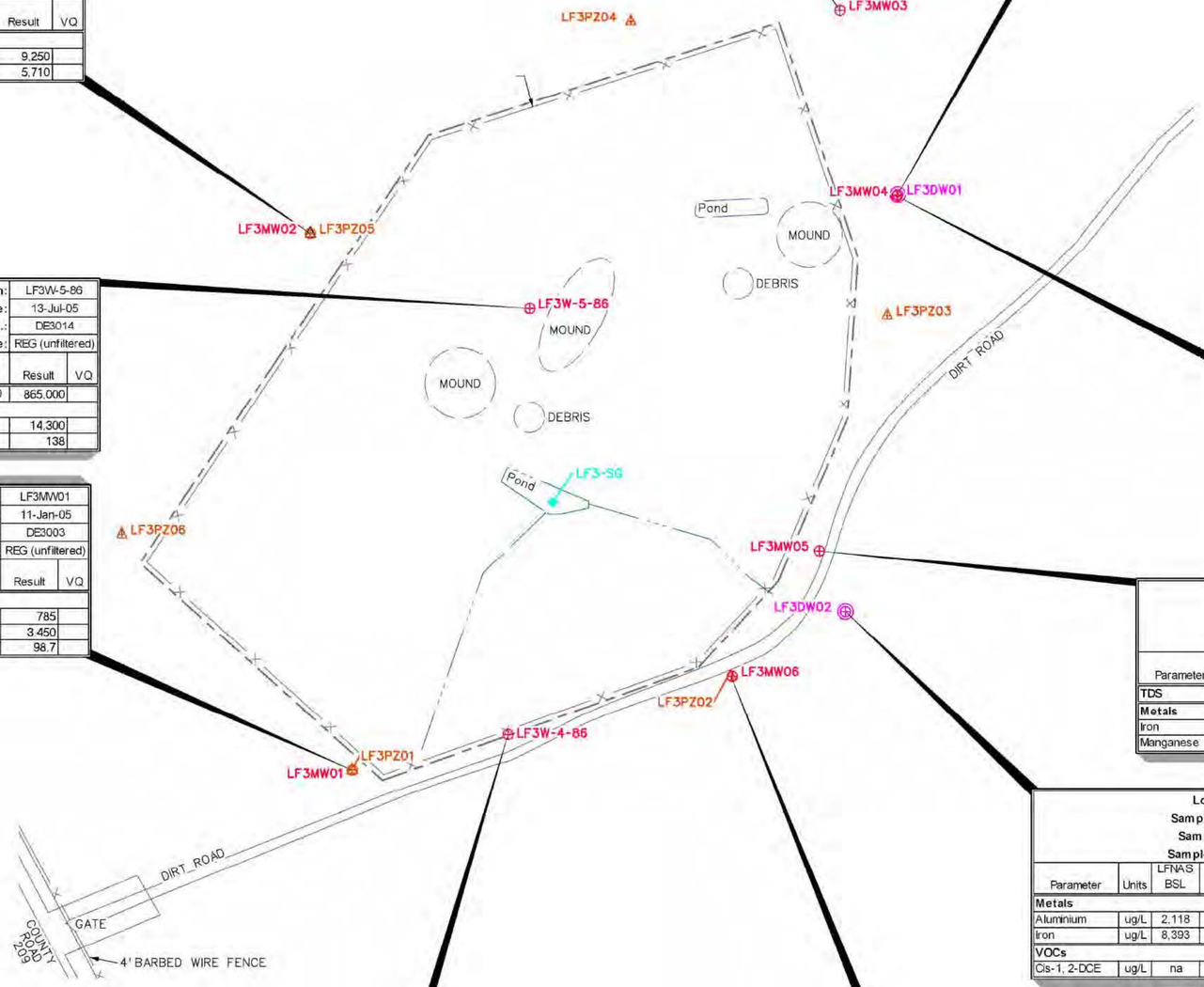

			Location:	LF3MW03	
			Sample Date:	13-Jul-05	
			Sample No.:	DE3017	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
Metals					
Aluminium	ug/L	2,118	200	366	
Iron	ug/L	8,393	300	3,740	
Manganese	ug/L	143	50	87.5	

			Location:	LF3DW01	
			Sample Date:	13-Jul-05	
			Sample No.:	DE3021	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
Metals					
Iron	ug/L	8,393	300	1,980	

			Location:	LF3MW02	
			Sample Date:	13-Jul-05	
			Sample No.:	DE3016	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
Metals					
Aluminium	ug/L	2,118	200	9,250	
Iron	ug/L	8,393	300	5,710	

			Location:	LF3W-5-86	
			Sample Date:	13-Jul-05	
			Sample No.:	DE3014	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
TDS	ug/L	387,490	500,000	865,000	
Metals					
Iron	ug/L	8,393	300	14,300	
Manganese	ug/L	143	50	138	

			Location:	LF3MW04	
			Sample Date:	13-Jul-05	
			Sample No.:	DE3018	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
TDS	ug/L	387,490	500,000	621,000	
Metals					
Iron	ug/L	8,393	300	5,240	
Manganese	ug/L	143	50	367	

			Location:	LF3MW01	
			Sample Date:	11-Jan-05	
			Sample No.:	DE3003	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
Metals					
Aluminium	ug/L	2,118	200	785	
Iron	ug/L	8,393	300	3,450	
Manganese	ug/L	143	50	98.7	

			Location:	LF3MW05	
			Sample Date:	14-Jul-05	
			Sample No.:	DE3019	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
TDS	ug/L	387,490	500,000	592,000	
Metals					
Iron	ug/L	8,393	300	23,200	
Manganese	ug/L	143	50	4,910	

			Location:	LF3DW02	
			Sample Date:	14-Jul-05	
			Sample No.:	DE3022	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
Metals					
Aluminium	ug/L	2,118	200	410	
Iron	ug/L	8,393	300	340	
VOCs					
Cis-1, 2-DCE	ug/L	na	70	98.2	

			Location:	LF3W-4-86	
			Sample Date:	14-Jul-05	
			Sample No.:	DE3013	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
Metals					
Iron	ug/L	8,393	300	3,340	
Manganese	ug/L	143	50	165	

			Location:	LF3MW06	
			Sample Date:	12-Jul-05	
			Sample No.:	DE3020	
			Sample Type:	REG (unfiltered)	
Parameter	Units	LFNAS BSL	FDEP GCTL	Result	VQ
Metals					
Aluminium	ug/L	2,118	200	815	
Iron	ug/L	8,393	300	4,950	
Manganese	ug/L	143	50	210	
VOCs					
Cis-1, 2-DCE	ug/L	na	70	19,200	
Trans-1,2-DCE	ug/L	na	100	3,770	
Trichloroethene	ug/L	na	3	395	
Vinyl Chloride	ug/L	na	1	395	

LEGEND

LF3MW01	SHALLOW MONITORING WELL LOCATION
LF3DW01	DEEP MONITORING WELL LOCATION
LF3PZ04	PIEZOMETER LOCATION
LF3-SG	STAFF GAUGE LOCATION
	SURFACE WATER
	APPROXIMATE LANDFILL BOUNDARY
REG	REGULAR
VQ	VALIDATION QUALIFIER
NA	NOT AVAILABLE
TDS	TOTAL DISOLVED SOLIDS
FDEP GCTL	FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION GROUNDWATER CLEANUP TARGET LEVEL
BSL	BACKGROUND SCREENING LEVEL
ug/L	MICROGRAMS PER LITER
J	ESTIMATED CONCENTRATION

NOTES:

1. LF3W-4-86 AND LF3W-5-86 WERE INSTALLED BY THE MOBILE DISTRICT CORPS OF ENGINEERS IN 1986.
2. WELLS LF3MW01 AND LF3MW02 WERE CONVERTED FROM LF3PZ01 AND LF3PZ05, RESPECTIVELY.

SCALE
0 100 200 FEET

FIGURE 2-1
GROUNDWATER DETECTIONS EXCEEDING GCTLs LANDFILL AREA 3 - JULY 2005

FORMER LEE FIELD NAVAL AIR STATION GREEN COVE SPRINGS, FLORIDA

Shaw® a world of Solutions™

STARTING DATE: 10/05/09 | INITIATOR: C. DAVIS | TECH. REVIEW: K.CUNNINGHAM | DWG. No: lee_nas_lf3-sriwp_03.dgn
DRAWN BY: S. MCCAWLEY | CADD REVIEW: S. MCCAWLEY | PROJ. MGR.: K.CUNNINGHAM | PROJ. NO.: 137051

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Location Code		LFNAS-LF3SB02	LFNAS-LF3SB02
Sample Date		2-Nov-2000	2-Nov-2000
Sample Number		AC0020	AC0021
Sample Depth		0 - 1	1 - 2
PCBs	mg/kg	None detected	None detected
PESTs	mg/kg	None detected	None detected
bis(2-Ethylhexyl)phthalate	mg/kg	0.452 UJ	0.414 J
Total Organic Carbon	mg/kg	36700	NS
TPH (C8-C40)	mg/kg	26.8	ND
Acetone	mg/kg	0.0270 J	0.0327 J
Cymene	mg/kg	0.0053 J	ND
Styrene	mg/kg	0.0492	ND

Location Code		LFNAS-LF3SS04
Sample Date		16-Oct-2000
Sample Number		AC0007
Sample Depth		0 - 1
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
SVOCs	mg/kg	None detected
TPH (C8-C40)	mg/kg	12.3 J
Acetone	mg/kg	0.0391 J

Location Code		LFNAS-LF3SS08
Sample Date		16-Oct-2000
Sample Number		AC0011
Sample Depth		0 - 1
PESTs	mg/kg	None detected
SVOCs	mg/kg	None detected
Aroclor 1260	mg/kg	0.0134 J
TPH (C8-C40)	mg/kg	31.4 J
Cymene	mg/kg	0.0289 J

Location Code		LFNAS-LF3SB03	LFNAS-LF3SB03
Sample Date		2-Nov-2000	2-Nov-2000
Sample Number		AC0022	AC0023
Sample Depth		0 - 1	1 - 2
PAHs	mg/kg	None detected	None detected
PCBs	mg/kg	None detected	None detected
PESTs	mg/kg	None detected	None detected
SVOCs	mg/kg	None detected	None detected
VOCs	mg/kg	None detected	None detected
Total Organic Carbon	mg/kg	130000	NS
TPH (C8-C40)	mg/kg	14.9 J	9.02 J

Location Code		LFNAS-LF3SB04	LFNAS-LF3SB04	LFNAS-LF3SB04
Sample Date		2-Nov-2000	2-Nov-2000	2-Nov-2000
Sample Number		AC0024	AC0025	AC0026
Sample Depth		0 - 1	1 - 3	1 - 3
PCBs	mg/kg	None detected	None detected	None detected
PESTs	mg/kg	None detected	None detected	None detected
SVOCs	mg/kg	None detected	None detected	None detected
VOCs	mg/kg	None detected	None detected	None detected
bis(2-Ethylhexyl)phthalate	mg/kg	0.199 UJ	0.205 J	ND
TPH (C8-C40)	mg/kg	8.38 J	ND	ND
Acetone	mg/kg	0.696 J	ND	ND

Location Code		LFNAS-LF3SS03
Sample Date		16-Oct-2000
Sample Number		AC0006
Sample Depth		0 - 1
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
SVOCs	mg/kg	None detected
VOCs	mg/kg	None detected
Total Organic Carbon	mg/kg	4930
TPH (C8-C40)	mg/kg	12.1

Location Code		LFNAS-LF3SB01	LFNAS-LF3SB01	LFNAS-LF3SB01
Sample Date		2-Nov-2000	2-Nov-2000	2-Nov-2000
Sample Number		AC0016	AC0017	AC0018
Sample Depth		0 - 1	1 - 2.5	1 - 2.5
PCBs	mg/kg	None detected	None detected	None detected
PESTs	mg/kg	None detected	None detected	None detected
bis(2-Ethylhexyl)phthalate	mg/kg	0.266 J	0.418 J	0.327 J
Total Organic Carbon	mg/kg	109000	NS	NS
TPH (C8-C40)	mg/kg	18.3	ND	ND
Acetone	mg/kg	ND	0.0901 J	0.0935 J

Location Code		LFNAS-LF3SS07
Sample Date		16-Oct-2000
Sample Number		AC0010
Sample Depth		0 - 1
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
SVOCs	mg/kg	None detected
Total Organic Carbon	mg/kg	2960
TPH (C8-C40)	mg/kg	89.6 J
Acetone	mg/kg	0.0561 J
Cymene	mg/kg	0.0118 J

Location Code		LFNAS-LF3SS02
Sample Date		16-Oct-2000
Sample Number		AC0005
Sample Depth		0 - 1
PESTs	mg/kg	None detected
Aroclor 1260	mg/kg	0.0174 J
Benzo(a)anthracene	mg/kg	0.241 J
Benzo(a)pyrene	mg/kg	**0.214 J**
Benzo(b)fluoranthene	mg/kg	0.332 J
Benzo(ghi)perylene	mg/kg	0.212 J
Benzo(k)fluoranthene	mg/kg	0.0968 J
Chrysene	mg/kg	0.286 J
Fluoranthene	mg/kg	0.489
Indeno(1,2,3-cd)pyrene	mg/kg	0.210 J
Phenanthrene	mg/kg	0.236 J
Pyrene	mg/kg	0.352 J
TPH (C8-C40)	mg/kg	38.2 J
Acetone	mg/kg	0.0241 J

Location Code		LFNAS-LF3SS12
Sample Date		16-Oct-2000
Sample Number		AC0015
Sample Depth		0 - 1
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
VOCs	mg/kg	None detected
Benzoic Acid	mg/kg	0.395 J
bis(2-Ethylhexyl)phthalate	mg/kg	0.323 J
TPH (C8-C40)	mg/kg	62.2 J
Acetone	mg/kg	- -

Location Code		LFNAS-LF3SS06
Sample Date		16-Oct-2000
Sample Number		AC0009
Sample Depth		0 - 1
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
SVOCs	mg/kg	None detected
VOCs	mg/kg	None detected
TPH (C8-C40)	mg/kg	21.7

Location Code		LFNAS-LF3SS01
Sample Date		16-Oct-2000
Sample Number		AC0004
Sample Depth		0 - 1
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
VOCs	mg/kg	None detected
Benzoic Acid	mg/kg	0.250 J
Total Organic Carbon	mg/kg	16700
TPH (C8-C40)	mg/kg	43.1 J

Location Code		LFNAS-LF3SS11
Sample Date		16-Oct-2000
Sample Number		AC0014
Sample Depth		0 - 1
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
Anthracene	mg/kg	0.116 J
Benzo(a)anthracene	mg/kg	0.677
Benzo(a)pyrene	mg/kg	**0.956**
Benzo(b)fluoranthene	mg/kg	0.948
Benzo(ghi)perylene	mg/kg	1.02
Benzo(k)fluoranthene	mg/kg	0.594
Carbazole	mg/kg	0.0939 J
Chrysene	mg/kg	0.789
Dibenz(a,h)anthracene	mg/kg	**0.207 J**
Fluoranthene	mg/kg	1.01
Indeno(1,2,3-cd)pyrene	mg/kg	1.00
Phenanthrene	mg/kg	0.513
Pyrene	mg/kg	0.988
TPH (C8-C40)	mg/kg	63.7 J
Acetone	mg/kg	0.0660 J

Location Code		LFNAS-LF3SB08	LFNAS-LF3SB08
Sample Date		2-Nov-2000	17-Nov-2000
Sample Number		AC0034	AC0035
Sample Depth		0 - 1	1 - 2
PCBs	mg/kg	None detected	None detected
PESTs	mg/kg	None detected	None detected
SVOCs	mg/kg	None detected	None detected
VOCs	mg/kg	None detected	None detected
TPH (C8-C40)	mg/kg	27.7 J	ND
Cymene	mg/kg	0.0050 J	ND

Location Code		LFNAS-LF3SS05
Sample Date		16-Oct-2000
Sample Number		AC0008
Sample Depth		0 - 1
PAHs	mg/kg	None detected
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
Benzoic Acid	mg/kg	0.425 J
Total Organic Carbon	mg/kg	12200
TPH (C8-C40)	mg/kg	113
Acetone	mg/kg	0.0416 J

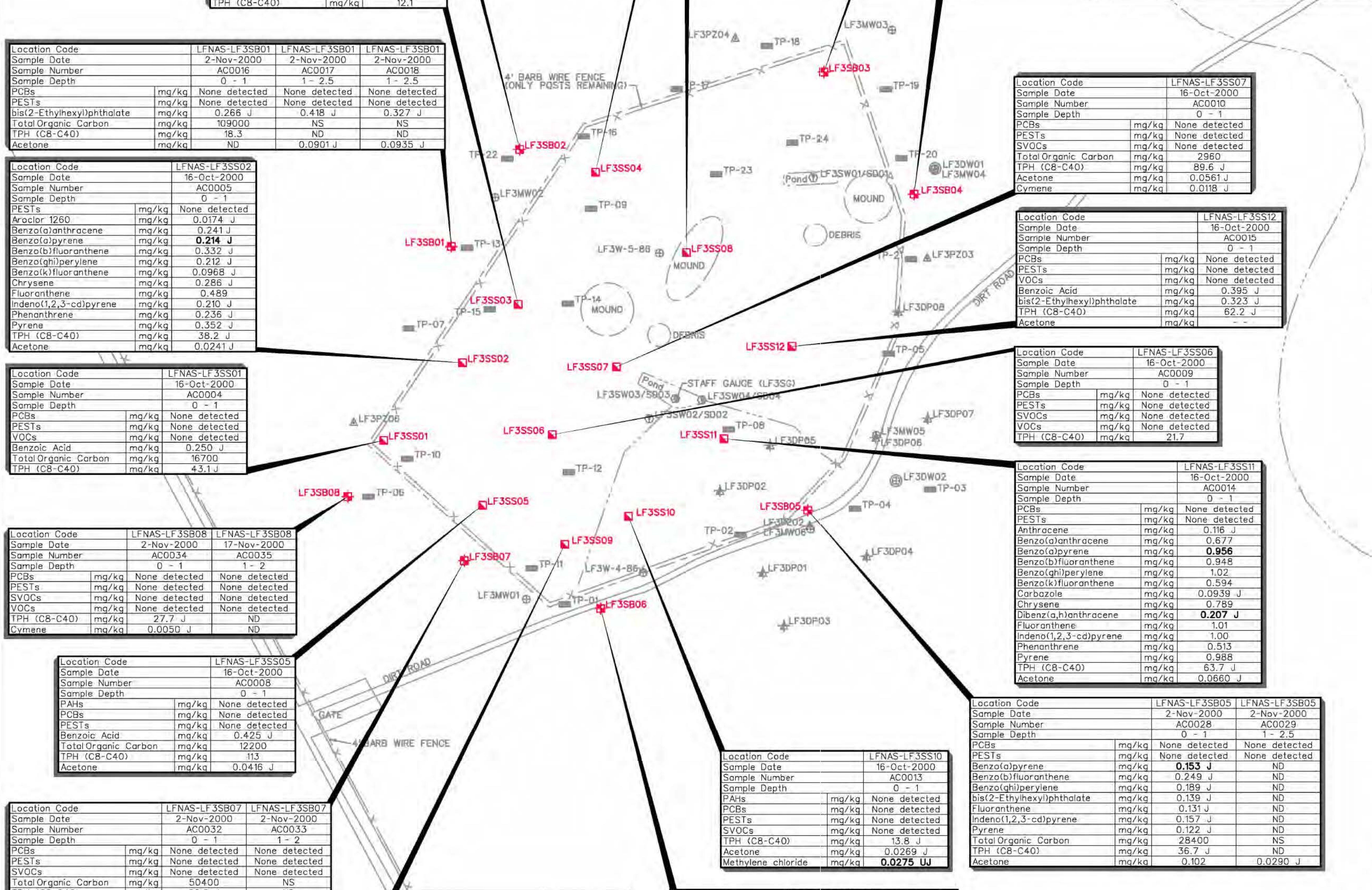
Location Code		LFNAS-LF3SB05	LFNAS-LF3SB05
Sample Date		2-Nov-2000	2-Nov-2000
Sample Number		AC0028	AC0029
Sample Depth		0 - 1	1 - 2.5
PCBs	mg/kg	None detected	None detected
PESTs	mg/kg	None detected	None detected
Benzo(a)pyrene	mg/kg	**0.153 J**	ND
Benzo(b)fluoranthene	mg/kg	0.249 J	ND
Benzo(ghi)perylene	mg/kg	0.189 J	ND
bis(2-Ethylhexyl)phthalate	mg/kg	0.139 J	ND
Fluoranthene	mg/kg	0.131 J	ND
Indeno(1,2,3-cd)pyrene	mg/kg	0.157 J	ND
Pyrene	mg/kg	0.122 J	ND
Total Organic Carbon	mg/kg	28400	NS
TPH (C8-C40)	mg/kg	36.7 J	ND
Acetone	mg/kg	0.102	0.0290 J

Location Code		LFNAS-LF3SS10
Sample Date		16-Oct-2000
Sample Number		AC0013
Sample Depth		0 - 1
PAHs	mg/kg	None detected
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
SVOCs	mg/kg	None detected
TPH (C8-C40)	mg/kg	13.8 J
Acetone	mg/kg	0.0269 J
Methylene chloride	mg/kg	**0.0275 UJ**

Location Code		LFNAS-LF3SB07	LFNAS-LF3SB07
Sample Date		2-Nov-2000	2-Nov-2000
Sample Number		AC0032	AC0033
Sample Depth		0 - 1	1 - 2
PCBs	mg/kg	None detected	None detected
PESTs	mg/kg	None detected	None detected
SVOCs	mg/kg	None detected	None detected
Total Organic Carbon	mg/kg	50400	NS
TPH (C8-C40)	mg/kg	62.9 J	ND
Acetone	mg/kg	0.0302 J	0.0512 J

Location Code		LFNAS-LF3SS09
Sample Date		16-Oct-2000
Sample Number		AC0012
Sample Depth		0 - 1
PCBs	mg/kg	None detected
PESTs	mg/kg	None detected
SVOCs	mg/kg	None detected
Total Organic Carbon	mg/kg	5550
TPH (C8-C40)	mg/kg	21.6 J
Cymene	mg/kg	0.0049 J

Location Code		LFNAS-LF3SB06	LFNAS-LF3SB06
Sample Date		2-Nov-2000	2-Nov-2000
Sample Number		AC0030	AC0031
Sample Depth		0 - 1	1 - 2
PAHs	mg/kg	None detected	None detected
PCBs	mg/kg	None detected	None detected
PESTs	mg/kg	None detected	None detected
SVOCs	mg/kg	None detected	None detected
TPH (C8-C40)	mg/kg	22.8 J	ND
Acetone	mg/kg	0.0468 J	0.0389 J



LEGEND

- LF3MW01 — SHALLOW MONITORING WELL LOCATION
- LF3DW01 — DEEP MONITORING WELL LOCATION
- LF3SB08 — SOIL BORING LOCATION
- LF3SS08 — SURFACE SOIL SAMPLE LOCATION
- LF3PZ04 — PIEZOMETER LOCATION
- LF3DP03 — DIRECT-PUSH SAMPLE LOCATION
- LF3SW03/SD03 — SEDIMENT/SURFACE WATER SAMPLE LOCATION
- TP-05 — TEST PIT LOCATION
- LF3SG — STAFF GAUGE LOCATION

NOTES:

1. LF3W-4-86 AND LF3W-5-86 WERE INSTALLED BY THE MOBILE DISTRICT CORPS OF ENGINEERS IN 1986.
2. WELLS LF3MW01 AND LF3MW02 WERE CONVERTED FROM LF3PZ01 AND LF3PZ05, RESPECTIVELY.
3. BOLD - CONCENTRATIONS EXCEEDS SCTL.
4. ND - ANALYTE NOT DETECTED.
5. NS - NOT SAMPLED.
6. None detected - NO ANALYTES IN GROUP DETECTED.
7. J - ESTIMATED CONCENTRATION.
8. UJ -

SCALE
0 100 200 FEET

FIGURE 2-2
ORGANIC COMPOUNDS DETECTED IN SOIL LANDFILL AREA 3

FORMER LEE FIELD NAVAL AIR STATION GREEN COVE SPRINGS, FLORIDA

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DWG. NO.: las_nas_lf3-sriwp_02.dgn | PROJ. NO.: 137051
TECH. REVIEW: K.CUNNINGHAM | PROJ. MGR.: K.CUNNINGHAM
INITIATOR: C. DAVIS | CADD REVIEW: S. MCCAWLEY
STARTING DATE: 10/05/09 | DRAWN BY: S. MCCAWLEY

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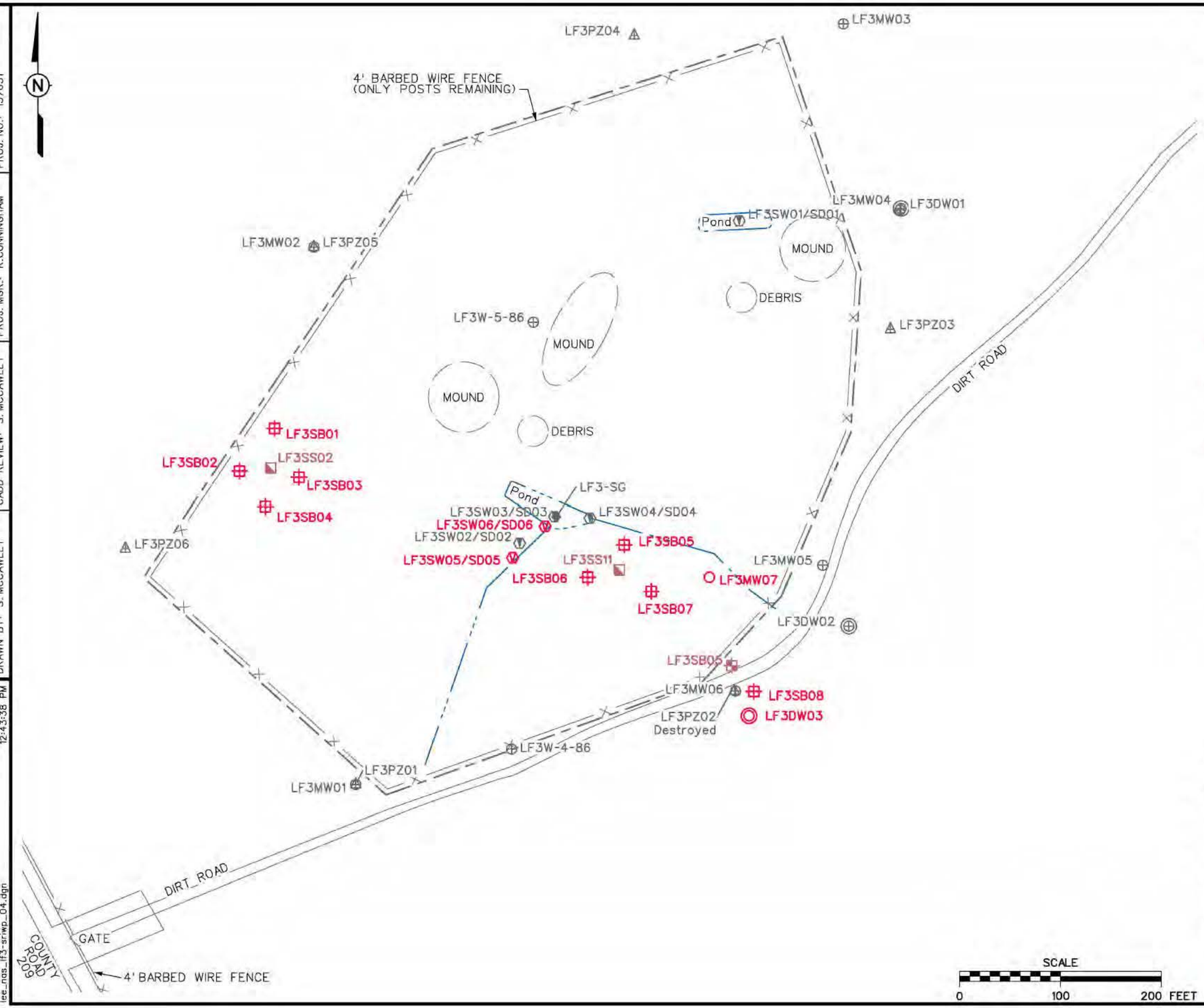

LEGEND

LF3MW01	SHALLOW MONITORING WELL LOCATION
LF3DW01	DEEP MONITORING WELL LOCATION
LF3PZ04	PIEZOMETER LOCATION
LF3-SG	STAFF GAUGE LOCATION
LF3SW01/SD01	SURFACE WATER/SEDIMENT SAMPLE LOCATION
	SURFACE WATER
	APPROXIMATE LANDFILL BOUNDARY
LF3MW07	PROPOSED SHALLOW MONITORING WELL LOCATION
LF3DW03	PROPOSED DEEP MONITORING WELL LOCATION
LF3SW05/SD05	PROPOSED SURFACE WATER/ SEDIMENT SAMPLE LOCATION
LF3SB01	PROPOSED SOIL BORING LOCATION
LF3SB05	SOIL BORING LOCATION OF CONCERN
LF3SS11	SURFACE SOIL LOCATION OF CONCERN

NOTES

1. LF3W-4-86 AND LF3W-5-86 WERE INSTALLED BY THE MOBILE DISTRICT CORPS OF ENGINEERS IN 1986.
2. WELLS LF3MW01 AND LF3MW02 WERE CONVERTED FROM LF3PZ01 AND LF3PZ05, RESPECTIVELY.
3. LF3PZ02 WAS DESTROYED AND REPLACED WITH LF3MW06.

FIGURE 3-1

PROPOSED SOIL BORING, MONITORING WELL, SURFACE WATER, AND SEDIMENT SAMPLE LOCATIONS LANDFILL AREA 3

FORMER LEE FIELD NAVAL AIR STATION GREEN COVE SPRINGS, FLORIDA

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STARTING DATE: 10/05/09	INITIATOR: C. DAVIS	TECH. REVIEW: K.CUNNINGHAM	DWG. No: lfs_nas_lf3-sriwp_04.dgn
DRAWN BY: S. MCCAWLEY	CADD REVIEW: S. MCCAWLEY	PROJ. MGR.: K.CUNNINGHAM	PROJ. NO.: 137051

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