FINAL

Fort Monmouth Main Post and Charles Wood Area

Baseline Ecological Evaluation Report

U. S. Army Garrison Fort Monmouth
Fort Monmouth, New Jersey

Directorate of Public Works

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C Groundwater Monitoring Data Evaluated in the BEE

D BEE Investigation Data Evaluated in the BEE

E New Jersey Department of Environmental Protection Ecological Screening Criteria

F Laboratory Data Packages *(Included on DVD)*

G Field Documentation, Field Measured Parameters, NOAA Tide Tables, and Sediment Sample Descriptions

H Fort Monmouth Maximum Background Concentrations from the 1995 SI Report

I NJDEP Correspondence

J Fort Monmouth Surface Water Salinity Data for Main Post (2004-2009)

K Fort Monmouth Utility Maps

LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
µg/L	micrograms per liter
µmhos	micromhos
ACM	Asbestos-Containing Materials
AST	Above-ground Storage Tank
BEE	Baseline Ecological Evaluation
bgs	below ground surface
BRAC	Base Realignment and Closure Act of 1990
CEA	Classification Exception Area
CECOM	U.S. Army Communications and Electronics Command
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COC	Chain-of-Custody
COPEC	Contaminant of Potential Ecological Concern
CORRACTS	Corrective Action Activity Site
CWA	Charles Wood Area
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DER	Declaration of Environmental Restriction
DPW	Directorate of Public Works
DQO	Data Quality Objective
Eco-SSL	Ecological Soil Screening Level
ECP	Environmental Condition of Property
EDR	Environmental Data Resources, Inc.
EMI	Electromagnetic Induction
ER-L	Effects Range-Low
ER-M	Effects Range-Medium
ESC	Ecological Screening Criteria
FSPM	Field Sampling Procedures Manual
ft msl	feet above mean sea level
FTMM	Fort Monmouth
gamma-BHC	gamma-Hexachlorocyclohexane
GC/MS	Gas Chromatography/Mass Spectrometry
GIS	Geographic Information System
GPS	Global Positioning System

GWQC	Groundwater Quality Criteria
IA	Installation Assessment
IDW	Investigation-Derived Waste
IRP	Installation Restoration Program
LEL	Lowest Effect Level
LUST	Leaking Underground Storage Tank
MDL	Method Detection Limit
mg/kg	milligrams per kilogram
MP	Main Post
MTBE	Methyl *tert*-Butyl Ether
N.J.A.C.	New Jersey Administrative Code
NAD	North American Datum
ND	Non-Detect
NFA	No Further Action
NFRA	No Further Remedial Action
NFRAP	No Further Remedial Action Planned
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
ORNL	Oak Ridge National Laboratory
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PID	Photoionization Detector
PPE	Personal Protective Equipment
ppt	parts per thousand
PRG	Preliminary Remediation Goal
QC	Quality Control
R&D	Research and Development
RA	Remedial Action
RAM	Radioactive Materials
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RPD	Relative Percent Difference
SEL	Severe Effect Level
Shaw	Shaw Environmental, Inc.
SHWS	State Hazardous Waste Site

SI	Site Investigation
SOP	Standard Operating Procedure
SQG	Small Quantity Generator
SRP	Site Remediation Program
STP	Sewage Treatment Plant
SVOC	Semivolatile Organic Compound
SWQC	Surface Water Quality Criteria
TAL	Target Analyte List
TBA	*tert*-Butyl Alcohol
TCE	Trichloroethene
TCL	Target Compound List
TIC	Tentatively Identified Compound
TPH	Total Petroleum Hydrocarbons
TRSR	Technical Requirements for Site Remediation
TSDF	Transport, Storage, and Disposal Facility
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
UTM	Universal Transverse Mercator
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compound
VSI	Visual Site Inspection
Weston	Roy F. Weston, Inc.
WP	Work Plan

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE), Baltimore District, tasked Shaw Environmental, Inc. (Shaw) to perform a Baseline Ecological Evaluation (BEE) at Fort Monmouth (FTMM) to fulfill requirements as set forth in New Jersey Department of Environmental Protection (NJDEP) Technical Requirements for Site Remediation (TRSR) [New Jersey Administrative Code (N.J.A.C.) 7:26E-3.11]. This BEE Report has been prepared under the Baltimore Architectural and Engineering Services Contract Number W912DR-05-D-0026 (Task Order 40) and is based on the Scope of Work dated June 3, 2008; information obtained through consultation with FTMM, U.S. Army Environmental Command, USACE, and NJDEP personnel; and the final Work Plan (WP) dated January 2010. A draft final WP, dated July 2009, was submitted to the NJDEP for review. NJDEP comments (dated September 1, 2009) were addressed and a conference call was held on November 13, 2009 to finalize the WP. The final WP was submitted to the NJDEP for review and approval prior to implementation of the work and an approval letter was obtained from the NJDEP on April 28, 2010 (**Appendix I**).

FTMM is an Army installation occupying approximately 1,126 acres in Monmouth County in central New Jersey, approximately 40 miles east of Trenton. FTMM is comprised of two operational areas known as the Main Post (MP) and the Charles Wood Area (CWA). The MP encompasses a 673-acre area and the CWA encompasses a 489-acre area.

The primary mission of FTMM is to provide command, administrative, and logistical support for Headquarters, U.S. Army Communications and Electronics Command. The support provided by the Garrison is used by tenants in the performance of research, development, procurement, and production of prototype communications and electronics equipment for use by the U.S. Armed Forces. The MP provides supporting administrative, training, and housing functions, as well as many of the community and industrial facilities for FTMM. These facilities are distributed across the property, with no distinct clustering of functions. The CWA is used primarily for research and development, testing, housing, and recreation. The CWA research, development, and testing facilities occupy the southwest corner of CWA. The northwest corner formerly consisted of residential units but is currently undeveloped. Residential units currently occupy the southeastern boundary, and the golf course occupies the northeast corner. In 2005, FTMM was identified as a facility to be closed as part of the Defense Base Realignment and Closure Act of 1990 (BRAC), Public Law 101-510, as amended. As part of this process, it is necessary for the Army to identify and document the environmental liabilities associated with installations where the BRAC action will involve the disposal of property. The environmental condition of property (ECP) process is the mechanism to provide a summary of the current environmental condition of a property.

A Phase I ECP Assessment was conducted in 2006 and 2007. The final Phase I ECP Report for FTMM was completed on January 29, 2007 (Shaw, 2007). The Phase I ECP evaluated the existing environmental conditions, and characterized the property into parcels according to their environmental condition based on Department of Defense guidelines. Using the results of the Phase I ECP Report, site investigation (SI) sampling recommendations were developed for 21 specific parcels and two areas of concern where no existing data or insufficient data were present to fully evaluate the environmental condition of the property. The ECP SI was conducted in 2007 and 2008 and the final SI Report for FTMM was completed on July 21, 2008 (Shaw, 2008). Eight parcels identified through the FTMM SI were deemed to require additional evaluation through the BEE process to fully evaluate the environmental condition of the property. NJDEP concurred with the determination that a BEE is required for these eight ECP sites in correspondence dated October 28, 2008.

Within the FTMM MP and CWA are 27 active/open Installation Restoration Program (IRP) Sites. The NJDEP indicated to the Army that, pursuant to N.J.A.C. 7:26E-3.11, BEEs are required at open/active IRP sites prior to considering No Further Action (NFA) determinations. Of these 27 IRP Sites, 14 have been determined to require additional evaluation through the BEE process. In addition to these IRP Sites, it was determined that a BEE should also be conducted related to FTMM-20, which had been listed as Response Complete in the 2007 Installation Action Plan for FTMM (Fort Monmouth, 2007).

The NJDEP describes the purpose of conducting a BEE as follows (NJDEP, 2009a):

A critical part of every site investigation is the baseline ecological evaluation required in N.J.A.C 7:26E-3.11. The Technical Requirements for Site Remediation require each person conducting the remediation of a contaminated site or area of concern to conduct a baseline ecological evaluation as part of the process to ensure that the resulting remedy is protective of the environment. The Department uses the information that the person is already required to collect in the baseline ecological evaluation as the first step in determining whether or not natural resource injuries potentially exist as a result of a discharge at a site. In the baseline ecological evaluation, the person responsible for conducting the remediation must determine whether or not any natural resources may have been injured by a discharge.

The BEE is Tier I of the ecological evaluation and ecological risk assessment process as developed by the Site Remediation Program (SRP), and is defined in the TRSR and Site Remediation News (NJDEP, 1997). The BEE was developed to be an efficient and cost-effective screening process. As such, the results of a BEE will determine whether potential ecological impacts are negligible or whether more site-specific ecological evaluation is warranted.

The objective of the BEE at FTMM is to examine each of the 23 identified sites (8 ECP parcels and 15 IRP sites) and the sample results from sediment, surface water, soil, and groundwater at these sites for the co-occurrence of 1) contaminants of potential ecological concern (COPECs), 2) environmentally sensitive natural resources, and 3) a chemical migration pathway to these sensitive natural resources. In order to reach this objective, a data and literature review were conducted, a field investigation, including field sampling as applicable, was performed, and data analysis and ecological hazard characterization were completed within the BEE report. An additional objective of the field sampling was to provide information regarding the general background characteristics of surface water and sediment in the FTMM area through the collection of several upgradient samples to assist risk managers in the decision-making process.

The occurrence of COPECs is typically determined through a comparison of existing site data with ecological screening levels. Additional data needs were identified prior to the BEE and environmental samples were collected in 2010 as part of the BEE. The occurrence of environmentally sensitive natural resources and of potential chemical migration pathways was determined from existing literature for the site, a qualitative site visit, and other available information such as the NJDEP Natural Heritage database. Reviews of NJDEP tidal and freshwater wetland maps, U.S. Geological Survey (USGS) topographic maps, and U.S. Department of Agriculture (USDA) Soil Conservation Service soil survey maps were performed to provide an overview of the habitat expected to occur at or in the vicinity of the site. The qualitative site visit was conducted for the purpose of verifying information gathered and to identify existing ecology communities and species, environmentally sensitive natural resources, and potential contaminant pathways.

In order to evaluate the nature of contaminants detected at the FTMM sites and to identify the COPECs, several steps were followed. The first step was to review the analytical data collected from the environmental media with regards to the sites and selection of the data appropriate for use in the BEE. Site data addressed in this BEE is comprised of data previously collected for Remedial Investigations (e.g., near surface soil data for former landfills), ECP SIs, and routine environmental monitoring (e.g., groundwater data) and data collected specifically to fill data gaps for the BEE. The second step was the identification of the most appropriate and applicable criteria or benchmarks for comparison to data. The third step was the identification of the COPECs at the sites and an evaluation of these COPECs in terms of potential ecological impact.

COPECs are defined for the purposes of this BEE as those constituents that were detected above the appropriate screening benchmarks in any of the samples from a given medium from a site. These ecological screening concentrations (ESC) are intentionally conservative values and exceedances of these concentrations are not meant to imply ecological risks. A qualitative determination of the potential for adverse effects from site constituents was made based on the COPECs, the presence of environmentally sensitive areas, and the potential migration pathways of site constituents, as well as site history, natural geology, and other potential sources.

The character of the land use surrounding the FTMM properties typifies mixed use, small town development in New Jersey. Commercial services and shopping centers populate main roads interspersed with residential structures, apartments and office buildings. Business and light industrial parks are found along highways, streams and railroad tracks. Surrounding properties include National Priorities List (NPL) sites, State Hazardous Waste Sites, Leaking Underground Storage Tank Sites, and Voluntary Cleanup Program sites. These, as well as general small urban development activities lend to an increase in general anthropogenic inputs in the area.

Elevated concentrations of many metals, relative to the conservatively low ESC, are naturally found within the urban coastal plain region in which FTMM is located. In particular, glauconitic soils which are prevalent at FTMM and have been reported in the creek sediments are naturally high in arsenic, beryllium, chromium, nickel and vanadium as well as other metals.

COPECs identified in soils generally represent limited potential for direct ecological exposure as they are either from subsurface (e.g., landfill near surface samples) or are not within ecological habitats (e.g., near buildings, roads, and parking areas). COPECs identified in groundwater are not representative of direct ecological exposures. COPECs in both soil and groundwater, however, may migrate to nearby surface water or sediment where ecological exposures may occur.

Many organic COPECs identified in soil or groundwater were not identified as COPECs in surface water or sediment, suggesting limited organic contaminant migration to sensitive ecological receptors. Most of these were detected infrequently in soil or groundwater or at low concentrations in relation to the ESC.

Many organic COPECs identified in surface water or sediment were not identified as COPECs in soil or groundwater, suggesting the sources are unrelated to the sites under investigation, or were at low concentrations in relation to the ESC, which are intentionally conservative values. Polycyclic aromatic hydrocarbons (PAHs), in particular, though identified as COPECs, were found in sediments and surface water at concentrations similar to background sample concentrations or at locations indicative of other sources (e.g., at the upstream extent of the site and downstream of active roads or parking areas).

In surface water, lead was most often identified as a COPEC; however, it was found at similar concentrations at most of the sites and in the background samples. Most of the sediment metals identified as COPECs were at concentrations similar to background. Some metals (chromium, copper, lead, mercury, silver, and zinc) were found at a few locations above background levels measured during the BEE investigation, but many of these are similar to those reported for ambient soil in the region (BEM Systems, Inc., 1998) or, in particular, glauconitic soils (Dooley, 2001). Though there may be a potential for some ecological risk due to elevated metals in these limited areas, it is likely that these metals are related to natural geology or other anthropogenic sources.

Though metals may be present above the background concentrations measured in limited areas during the 2010 BEE, many of these concentrations may still be related to natural or general anthropogenic sources and the differences in site concentrations from the measured background concentrations can be a function of the greater number of site samples collected compared to background samples. Regardless, these figures show that the area of metal concentrations greater than the measured background concentrations is limited in extent, with no definitive spatial distribution that would suggest the source of metals are related to sites evaluated in the BEE. Though these may represent a potential ecological risk in limited areas, it is concluded that constituents at FTMM are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at FTMM are not warranted or recommended. **Table ES-1** presents a summary of the results of this BEE.

Table ES-1
Fort Monmouth Main Post and Charles Wood Area
Baseline Ecological Evaluation Summary

ECP Parcel / IRP Site Designation	Associated Building / Feature	Acreage	Proximal Ecological Feature Evaluated	COPECs Identified Based on BEE results	Potential for Ecological Effects from COPECs	Recommendation
Main Post						
IRP Site FTMM-2	Landfill 2	8.10	Mill Creek	Near Surface Soil: SVOCs, Pesticides, PCBs, Metals Groundwater: VOCs, Pesticides, Metals Surface Water: SVOCs, Lead Sediment: SVOCs, PCBs, Metals	low	No Additional Ecological Assessment
IRP Site FTMM-3	Landfill 3	8.00	Lafetra Creek	Near Surface Soil: SVOCs, Pesticides, PCBs, Metals Groundwater: None Surface Water: None Sediment: SVOCs, Pesticides, Metals	low	No Additional Ecological Assessment
IRP Site FTMM-4	Landfill 4	1.40	Mill Creek	Near Surface Soil: SVOCs, Pesticides, Metals Groundwater: Metals Surface Water: None Sediment: SVOCs, PCBs, Metals	low	No Additional Ecological Assessment
IRP Site FTMM-5	Landfill 5	3.20	Mill Creek	Near Surface Soil: SVOCs, Pesticides, PCBs, Metals Groundwater: None Surface Water: None Sediment: SVOCs, Pesticides, Metals	low	No Additional Ecological Assessment
IRP Site FTMM-8	Landfill 8	7.20	Parkers Creek	Near Surface Soil: SVOCs, Pesticides, PCBs, Metals Groundwater: Pesticides Surface Water: None Sediment: Pesticides, PCBs, Metals	low	No Additional Ecological Assessment
IRP Site FTMM-12	Landfill 12	7.10	Husky Brook	Near Surface Soil: SVOCs, Pesticides, Metals Groundwater: Metals Surface Water: None Sediment: SVOCs, Pesticides, PCBs, Metals	low	No Additional Ecological Assessment
IRP Site FTMM-14	Landfill 14	6.90	Husky Brook	Near Surface Soil: SVOCs, Pesticides, Metals Groundwater: Metals Surface Water: None Sediment: SVOCs, Pesticides, PCBs, Metals	low	No Additional Ecological Assessment
IRP Site FTMM-15	Water Tank	0.30	Parkers Creek	Surface Soil: Not Applicable/Not Evaluated Groundwater: Not Applicable/Not Evaluated Surface Water: None Sediment: Pesticides, Metals	low	No Additional Ecological Assessment
IRP Site FTMM-16	Building 498, Pesticide Storage	0.12	Oceanport Creek	Surface Soil: Not Applicable/Not Evaluated Groundwater: Not Applicable/Not Evaluated Surface Water: None Sediment: SVOCs, Metals	low	No Additional Ecological Assessment
IRP Site FTMM-18	Former Training Area	4.85	Parkers Creek	Surface Soil: SVOCs, Pesticides, Metals Groundwater: Metals Surface Water: None Sediment: Metals	low	No Additional Ecological Assessment
IRP Site FTMM-20 Pre-1941 STP	Pre-1941 Former Sanitary Sewage Treatment Plant	0.77	Parkers Creek	Surface Soil: Not Applicable/Not Evaluated Groundwater: Not Applicable/Not Evaluated Surface Water: None Sediment: Metals	low	No Additional Ecological Assessment
IRP Site FTMM-59 Building 1122	Building 1122, Unknown Discharge	0.34	Mill Creek	Surface Soil: Not Applicable/Not Evaluated Groundwater: None Surface Water: SVOCs, Lead Sediment: SVOCs,Metals	low	No Additional Ecological Assessment
ECP Parcel 43	Building 1122, "Do-it-Youself" Vehicle Repair Shop	1.54				

Table ES-1
Fort Monmouth Main Post and Charles Wood Area
Baseline Ecological Evaluation Summary

ECP Parcel / IRP Site Designation	Associated Building / Feature	Acreage	Proximal Ecological Feature Evaluated	COPECs Identified Based on BEE results	Potential for Ecological Effects from COPECs	Recommendation
Main Post						
IRP Site FTMM-61 Building 283	Building 283, Leaking UST, Gasoline	0.20	Parkers Creek	Surface Soil: SVOCs, PCBs, Metals Groundwater: Zinc Surface Water: None Sediment: Metals	low	No Additional Ecological Assessment
ECP Parcel 49	Buildings 283, 288, 291, 292, 293, 295, Former Squier Laboratory Complex	9.09				
ECP Parcel 39	Building 1150, Former Photoprocessing Activities	0.50	Mill Creek	Surface Soil: Metals Groundwater: Not Applicable/Not Evaluated Surface Water: SVOCs, Lead Sediment: SVOCs, PCBs, Metals	low	No Additional Ecological Assessment
ECP Parcel 61	Building 1075, Patterson Army Health Clinic	14.66	Husky Brook	Surface Soil: SVOCs, Metals Groundwater: Not Applicable/Not Evaluated Surface Water: None Sediment: SVOCs, Metals	low	No Additional Ecological Assessment
ECP Parcel 69	Building 900, Former Tactical Motor Pool	0.31	Oceanport Creek	Surface Soil: Metals Groundwater: None Surface Water: None Sediment: SVOCs, Metals	low	No Additional Ecological Assessment
Charles Wood Area						
IRP Site CW-6 FTMM-28	Former Pesticide Storage - Building 2044	0.67	Un-named Wetland, Wampum Brook	Surface Soil: Pesticides, SVOCs, Metals Groundwater: Metals Surface Water: PCBs, Metals Wetland Sediment: Pesticides, PCBs, SVOCs, Metals	low	No Additional Ecological Assessment
ECP Parcel 15	Building 2700, Meyers Center Laboratory	37.99	Shrewsbury Creek	Surface Soil: Not Applicable/Not Evaluated Groundwater: Metals Surface Water: Lead Sediment: Chromium	low	No Additional Ecological Assessment
IRP Site CW-3A FTMM-25	Suspected Former Landfill, CW-3A	2.08	Shrewsbury Creek	Near Surface Soil: Pesticides, PCBs, SVOCs, Metals Groundwater: Metals Surface Water: SVOCs, Cadmium, Zinc Sediment: Pesticides, SVOCs, Metals	low	No Additional Ecological Assessment
ECP Parcel 27	Southwest portion of CWA that includes the former Pulse Power Center, Machine Shop, Paint and Fabrication facility, Former Motor Pool, and portions of the former Watson Laboratories	29.83	Shrewsbury Creek	Surface Soil: Metals Groundwater: Not Applicable/ Not Evaluated Surface Water: Metals Sediment: Metals	low	No Additional Ecological Assessment
ECP Parcel 28	Former Eatontown Laboratory, Battery Test Facility, Safety Calibration Laboratory Office, Former Motor Pool	37.78	Shrewsbury Creek	Surface Soil: None Groundwater: Cadmium Surface Water: Lead Sediment: Chromium	low	No Additional Ecological Assessment

BEE - Baseline Ecological Evaluation
COPEC - Constituent of
CWA - Charles Wood
ECP - Environmental
IRP - Installation
PAH - Polycyclic
PCB - Polychlorinated
SVOC - Semivolatile
UST - Underground
VOC - Volatile Organic Compound

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Baltimore District, tasked Shaw Environmental, Inc. (Shaw) to perform a Baseline Ecological Evaluation (BEE) at Fort Monmouth (FTMM) to fulfill requirements as set forth in New Jersey Department of Environmental Protection (NJDEP) Technical Requirements for Site Remediation (TRSR) [New Jersey Administrative Code (N.J.A.C.) 7:26E-3.11]. This BEE report has been prepared under the Baltimore Architectural and Engineering Services Contract Number W912DR-05-D-0026 (Task Order 40) and is based on the Scope of Work dated June 3, 2008, the Work Plan (WP) dated January 2010, and information obtained through consultation with FTMM, U.S. Army Environmental Command, USACE, and NJDEP personnel. A draft final WP, dated July 2009, was submitted to the NJDEP for review. NJDEP comments (dated September 1, 2009) were addressed and a conference call was held on November 13, 2009, to finalize the WP. The final WP was submitted to the NJDEP for review and approval prior to implementation of the work and an approval letter was obtained from the NJDEP on April 28, 2010 (**Appendix I**).

FTMM is located in the central-eastern portion of New Jersey in Monmouth County (**Figure 1-1**). The installation includes Main Post (MP), Charles Wood Area (CWA), and the Evans Area. This WP only addresses the MP (**Figure 1-2**) and the CWA (**Figure 1-3**). The MP encompasses an area of approximately 637 acres and the CWA encompasses an area of approximately 489 acres and is located 1 mile west of the MP. The MP and CWA were selected in 2005 for closure under the Defense Base Realignment and Closure Act of 1990 (BRAC), Public Law 101-510, as amended.

The primary mission of FTMM is to provide command, administrative, and logistical support for Headquarters, U.S. Army Communications and Electronics Command. The support provided by the Garrison is used by tenants in the performance of research, development, procurement, and production of prototype communications and electronics equipment for use by the U.S. Armed Forces. The MP provides supporting administrative, training, and housing functions, as well as many of the community and industrial facilities for FTMM. These facilities are distributed across the property, with no distinct clustering of functions. The CWA is used primarily for research and development (R&D), testing, housing, and recreation. The CWA research, development, and testing facilities occupy the southwest corner of CWA. The northwest corner formerly consisted of residential units but is currently undeveloped. Residential units currently occupy the southeastern boundary, and the golf course occupies the northeast corner. FTMM was identified as a facility to be closed as part of BRAC 2005. As part of this process, it is necessary for the Army to identify and document the environmental liabilities associated with installations where the BRAC action will involve the disposal of property. The environmental condition of property (ECP) process is the mechanism to provide a summary of the current environmental condition of a property.

A Phase I ECP Assessment was conducted in 2006 and 2007. The final Phase I ECP Report for FTMM was completed on January 29, 2007 (Shaw, 2007). The Phase I ECP evaluated the existing environmental conditions, and characterized the property into parcels according to their environmental condition based on Department of Defense guidelines. Using the results of the Phase I ECP Report, site investigation (SI) sampling recommendations were developed for 21 specific parcels and two areas of concern where no existing data or insufficient data were present to fully evaluate the environmental condition of the property. The SI was conducted in 2007 and 2008 and the final SI Report for FTMM was completed on July 21, 2008 (Shaw, 2008). Eight parcels identified through the FTMM SI were deemed to require additional evaluation through the BEE process to fully evaluate the environmental condition of the property. NJDEP concurred with the determination that a BEE is required for these eight ECP sites in correspondence dated October 28, 2008.

Within the FTMM MP and CWA are 27 active/open Installation Restoration Program (IRP) Sites. The NJDEP indicated to the Army that, pursuant to the TRSR (N.J.A.C. 7:26E-3.11; NJDEP, 2009b), BEEs are required at open/active IRP sites prior to considering No Further Action (NFA) determinations. The NJDEP determination was documented in correspondence pertaining to IRP Sites M-12 and M-14 Landfills (dated July 25, 2007), IRP Site M-18 Landfill (dated August 14, 2007), and Building 283 (dated October 24, 2007). Of the 27 IRP Sites, 14 (FTMM-2, 3, 4, 5, 8, 12, 14, 15, 16, 18, 25, 28, 59, and 61) have been determined to require additional evaluation through the BEE process. In addition to these IRP

Sites, it was determined that a BEE should also be conducted related to FTMM-20, which had been listed as Response Complete in the 2007 Installation Action Plan for FTMM (Fort Monmouth, 2007). **Section 3.0** of this WP describes each of the IRP and ECP sites that were selected for inclusion in the BEE process, summarizes the previous findings, and describes the rationale for inclusion.

1.1 PURPOSE AND OBJECTIVES

The BEE is Tier I of the ecological evaluation and ecological risk assessment process as developed by the Site Remediation Program (SRP), and is defined in the TRSR and Site Remediation News (NJDEP, 1997). The BEE was developed to be an efficient and cost-effective screening process. As such, the results of the BEE will determine whether potential ecological impacts are negligible or whether more site-specific ecological evaluation is warranted.

The objective of the BEE at FTMM is to assess whether the presence of constituents of concern in sediments, surface water, soil, and groundwater on MP and CWA have the potential for adverse effects to biological receptors. This assessment is made through the examination of information on each of the 23 identified sites (8 ECP parcels and 15 IRP sites) and the sample results from sediment, surface water, soil, and groundwater at the sites for the co-occurrence of 1) contaminants of potential ecological concern (COPECs), 2) environmentally sensitive natural resources, and 3) a chemical migration pathway to these sensitive natural resources. This objective was accomplished based on the results of a data and literature review, a qualitative site visit, field sampling, data analysis and ecological hazard characterization, and an evaluation of the general background characteristics of surface water and sediment in the FTMM area.

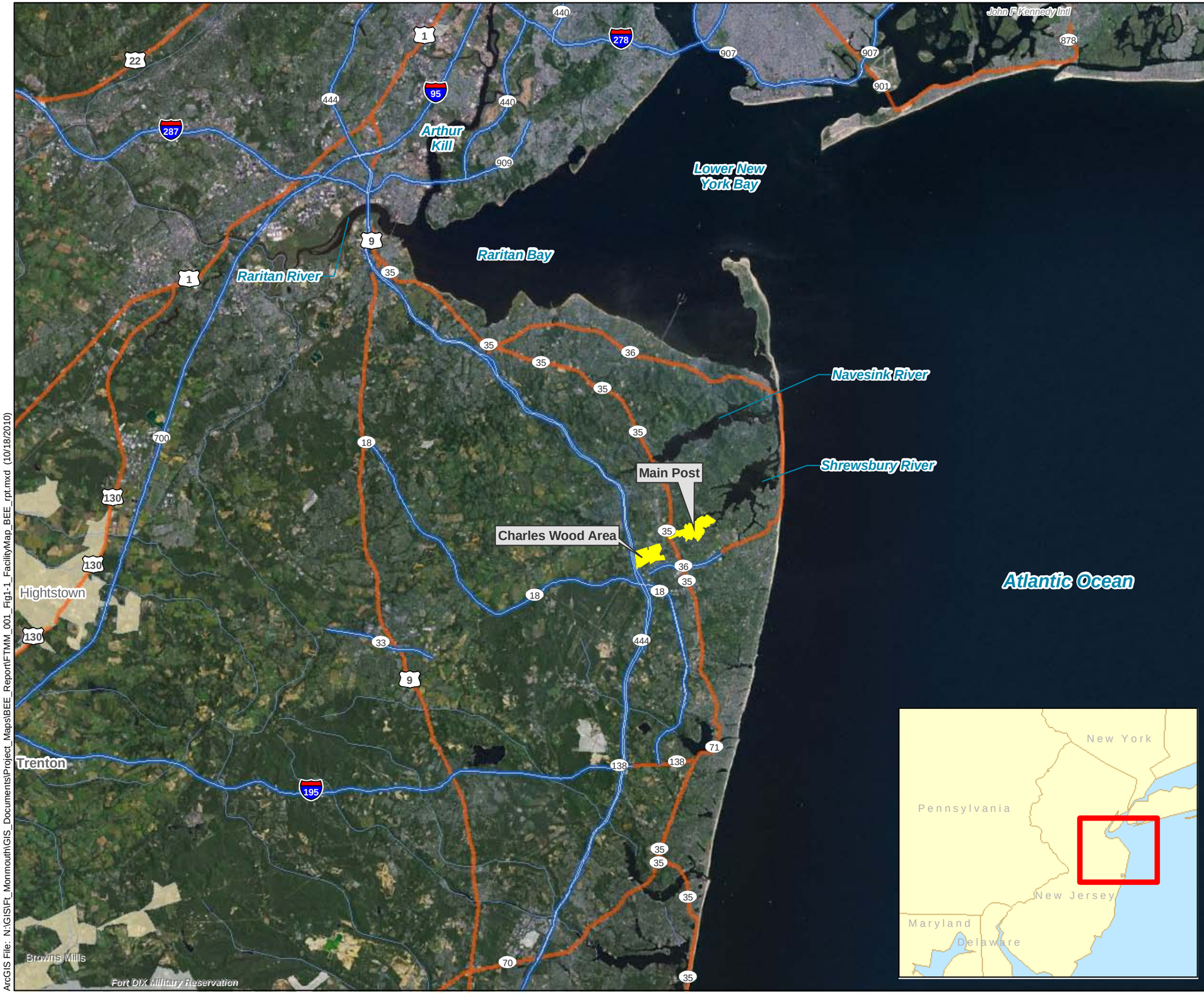
The occurrence of COPECs is determined through a comparison of existing site data with ecological screening levels. The occurrence of environmentally sensitive natural resources and of potential chemical migration pathways is determined from existing literature for the site, a qualitative site visit, and other available information such as the NJDEP Natural Heritage database. NJDEP tidal and freshwater wetland maps, U.S. Geological Survey (USGS) topographic maps, and U.S. Department of Agriculture (USDA) Soil Conservation Service soil survey maps.

If it is determined through the BEE process that there are COPECs present, that there are environmentally sensitive natural resources at or near the sites, and that there are potential pathways from the contamination to the environmentally sensitive natural resources, than further ecological investigation or risk assessments may be required. The nature of these investigations or Tier II and Tier III assessments are determined based on the findings of the BEE and conducted in accordance with U.S. Environmental Protection Agency (USEPA, 1989a) and other applicable guidance.

This investigation will be used by the Army to determine if any future needs or actions are necessary in order to obtain a NFA Letter from NJDEP. The NJDEP SRP, as well as the Office of Natural Resources Restoration, will determine whether ecological injuries may have occurred and whether further investigations are required.

1.2 REPORT ORGANIZATION

Section 2.0 describes the location of the sites, provides site background information, and summarizes the environmental setting at FTMM. This section also identifies and describes the individual sites that are addressed in the BEE, including general history and previous investigation results, presence of ecologically sensitive areas, and potential contaminant migration pathways. **Section 3.0** presents the data evaluation performed to identify the COPECs at each site. **Section 4.0** presents a qualitative evaluation of potential for adverse effects at each site. **Section 5.0** presents a summary and conclusions. **Section 6.0** provides a list of references used in developing the WP. **Appendix A** through **Appendix D** contain the data evaluated in this BEE. **Appendix E** contains the applicable NJDEP Ecological Screening Criteria (ESC). **Appendix F** contains the analytical data packages for environmental samples collected as part of the BEE. **Appendix G** contains field documentation and field measured parameters. **Appendix H** contains Fort Monmouth Maximum Background Concentrations from the 1995 SI Report. **Appendix I** contains the NJDEP letter of approval, dated April 28, 2010, of the final WP. **Appendix J** contains Fort Monmouth salinity data for several locations within the Main Post for the period 2004 through 2009.



LEGEND

Ft Monmouth Installation Area

Note: Aerial photography (1-meter resolution) was obtained from ESRIArcOnline World Imagery Map Services.

N

Scale:

0 2 4 8 Miles

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw Environmental, Inc.

FIGURE 1-1

FORT MONMOUTH BASELINE ECOLOGICAL EVALUATION REPORT

FACILITY LOCATION MAP

FORT MONMOUTH
NEW JERSEY

ArcGIS File: N:\GIS\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_001_Fig1-1_FacilityMap_BEE_rpt.mxd (10/18/2010)

LEGEND

- Water Feature
- Road Centerline
- Building
- Municipal Boundary
- Installation Boundary

Note: Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.

N

Scale:

0 450 900 1,800 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw Environmental, Inc.

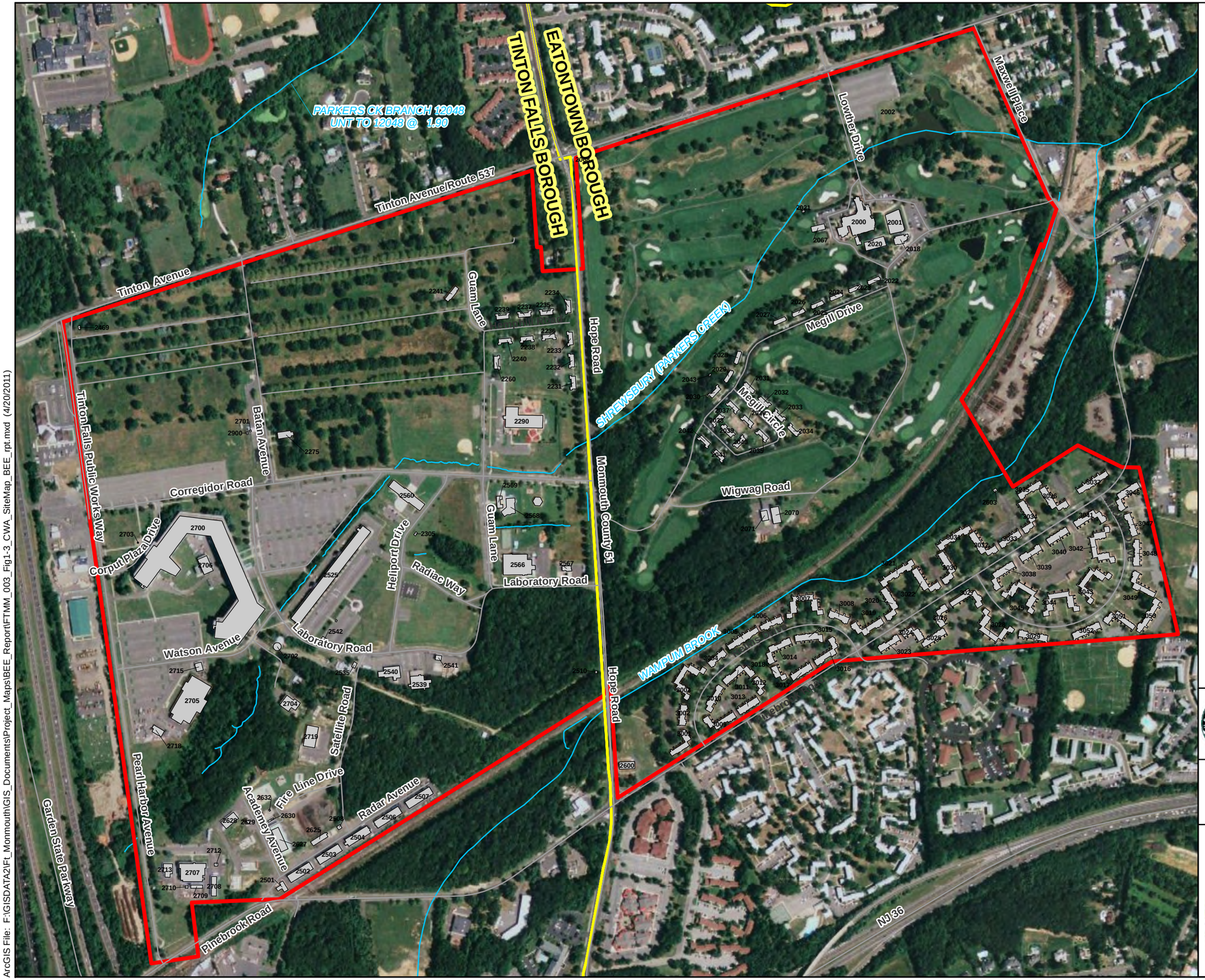
FIGURE 1-2

FORT MONMOUTH BASELINE ECOLOGICAL EVALUATION REPORT

MAIN POST SITE MAP

FORT MONMOUTH NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_002_Fig1-2_MP_SiteMap_BEE_rpt.mxd (4/20/2011)



LEGEND

- Road Centerline
- Water Feature
- Building
- Municipal Boundary
- Installation Boundary

Note: Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.

N

Scale:

0 290 580 1,160 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw Environmental, Inc.

FIGURE 1-3

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

CHARLES WOOD AREA
SITE MAP

FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_003_Fig1-3_CWA_SiteMap_BEE_rpt.mxd (4/20/2011)

2.0 FORT MONMOUTH BACKGROUND AND GENERAL ENVIRONMENTAL SETTING

The following sections summarize the site background and environmental setting of the geographical area surrounding the FTMM MP and CWA. Included is a description of the site location, site background and current conditions, and environmental setting, including regional and local geology, hydrogeology, topography, surface drainage, ecology, and land use.

2.1 LOCATION AND DESCRIPTION

FTMM is located in the central-eastern portion of New Jersey in Monmouth County, approximately 45 miles south of New York City, 70 miles northeast of Philadelphia, and 40 miles north of Trenton. The Atlantic Ocean is approximately 3 miles to the east. FTMM falls within the boroughs of Eatontown, Oceanport, and Tinton Falls. The areas surrounding FTMM are characterized by a mixture of residential, commercial, and light industrial uses (**Section 2.4.8**). A review of the land use plans for the surrounding municipalities shows that land uses are compatible with those along the inside perimeter of FTMM. FTMM occupies approximately 1,126 acres and is currently comprised of two operational areas: the MP and the CWA. The two areas are located about 2 miles from one another.

The primary mission of FTMM is to provide command, administrative, and logistical support for the U.S. Army Communications and Electronics Command (CECOM) Headquarters. The Installation performs research, development, procurement, and production of prototype communications and electronics equipment for use by the U.S. Armed Forces.

2.1.1 MAIN POST

The MP provides supporting administrative, training, and housing functions, as well as many of the community and industrial facilities for FTMM. These facilities are distributed across the property, with no distinct clustering of functions. The MP encompasses approximately 637 acres and contains a total of 397 buildings and structures. The MP is bounded by State Highway 35 to the west, Parkers Creek to the north, the New Jersey Transit Railroad to the east, and Main Street and State Highway 71 to the south. Universal Transverse Mercator (UTM) coordinate locations [North American Datum (NAD) 83, Zone 18 (meters)] for the MP include:

- Northeast Corner: 582178.33995, 4463977.92694
- Southeast Corner: 582755.27789, 4463525.90188
- Northwest Corner: 579532.14255, 4462789.29460
- Southwest Corner: 579689.14842, 4462269.63793

2.1.2 CHARLES WOOD AREA

The CWA is used primarily for R&D, testing, housing, and recreation. The CWA R&D and testing facilities occupy the southwest corner of the subpost. Residential areas are located along the southeastern boundary and were formerly located in the northwest corner; the golf course occupies the northeast corner. The CWA, located 2 miles west of the MP, is composed of approximately 489 acres and contains a total of 241 buildings and structures. The CWA is bounded by the Garden State Parkway to the west, Tinton Avenue to the north, Maxwell Place and the New Jersey Transit Railroad to the east, and Pinebrook Road to the south. UTM coordinate locations for the CWA [NAD83, Zone 18 (meters)] include:

- Northeast Corner: 578997.83200, 4462033.09195
- Southeast Corner: 579386.98486, 4460899.58327
- Northwest Corner: 577293.44846, 4461472.84017
- Southwest Corner: 577466.30241, 4460271.56946

2.2 HISTORICAL LAND USE

Historical Army uses of the FTMM MP and CWA property are well documented in *A Concise History of the U.S. Army Communications-Electronics Life Cycle Management Command and Fort Monmouth, New Jersey* (U.S. Army Communications-Electronics Life Cycle Management Command,

2005) and *Fort Monmouth: Landmarks and Place Names* (Kozlowski, 2004). The following sections provide a brief summary of the historical uses of the sites.

2.2.1 MAIN POST

The original FTMM Army camp, established for signal troop training in 1917, was located at Little Silver, New Jersey. Historical land use of the area included a 1-mile horse racing track, Monmouth Park, which had been established in 1870 and operated for 20 years. The track was located in the vicinity of Patterson Army Health Clinic near the intersection of Broad Street and Park Avenue. A larger Monmouth Park was reconstructed and opened on July 4, 1890. The oval track was centered on present day Greeley Field. The entire facility encompassed 640 acres (almost all of the MP area). Grandstands and a luxury hotel along Parkers Creek were part of the associated land uses. The Monmouth Park Race Track closed in 1893. Vacated buildings and structures fell into ruin and the hotel burned to the ground in 1915. The land was owned by Melvin Van Keuren when it was evaluated for use by Camp Little Silver. The Army leased 468 acres from Mr. Van Keuren on May 16, 1917. Prior to the Army's lease, the land had been farmed, producing a potato crop for approximately 4 years. The leased area was bounded on the north by the Shrewsbury River (currently referred to as Parkers' Creek), on the west and south by a stone road from Eatontown, and on the east by Oceanport-Little Silver Road. The condition of the land was reported as overgrown and overrun with poison ivy. The land was purchased by the government in 1919.

2.2.2 CHARLES WOOD AREA

The CWA was acquired by the Army in 1941. The CWA tract included the former Monmouth County Country Club (originally Sun Eagles Country Club), Olmstead Gardens, and areas currently occupied by the golf course and Myer Center. FTMM personnel indicated an orchard was located in the golf course area prior to Army acquisition. The Sun Eagles Country Club was constructed in the 1920s and included a clubhouse (currently Gibbs Hall), an 18-hole golf course, a polo field, and an airfield. A 7,000-troop cantonment area was immediately built on the land, including barracks, mess halls, a school building, an office building, a recreation hall, a Post Exchange, an infirmary, and a chapel.

2.3 FACILITY HISTORY

The MP of FTMM was established on June 17, 1917, as Camp Little Silver. The name of the Camp was changed after 3 months to Camp Alfred Vail. The initial mission of the Camp was to train Signal Corps operators for service in World War I. In the first 19 months of the Camp's existence, 129 semi-permanent structures were built, a tent camp established on the site of a former swamp, and a parade ground established on the site of a former marsh. A radio laboratory and an airfield were constructed in 1918. After the war, Camp Vail was designated as the site of the Signal Corps School, the only training area for Signal Corpsmen in the country. All but four World War I structures were demolished by 1924.

In 1925, the facility became a permanent post, and its name was changed to Fort Monmouth. The primary mission of FTMM continued to be Signal Corps training and electronics research. In 1934, laboratory operations were consolidated in a new facility, Squier Laboratory (Building 283). Research on radios and radar continued here until the early 1950s. During World War II, the pace of training increased tremendously at FTMM. The expanded laboratory effort was accomplished by starting new laboratories at other post facilities. Squier Laboratory continued to be the principal laboratory on the MP until 1954. In 1955 and 1956, 72 World War II wooden structures were demolished to make room for permanent structures. These new buildings were used for residential, administrative, commercial, and recreational purposes. A small number of additional administrative buildings were completed during the 1970s, 1980s, and 1990s.

Camp Charles Wood was purchased in 1941 and opened in 1942. The eastern half of the property was formerly a golf course, and the western half was residential property and farmland. During World War II, the Camp was used for training Signal Corpsmen. Antenna shelters were constructed on 26.5 acres of land and used by the Signal Corps Laboratory for R&D purposes.

A new R&D facility, the Myer Center (Building 2700), was completed in 1954. R&D activities that had formerly been conducted at Squier Laboratory and some activities from the Evans Area were

transferred to the Myer Center. To this day, laboratories within the Myer Center facility continue to develop state-of-the-art electronic and communications equipment for use by the U.S. Armed Forces. FTMM has a long history of R&D activity. The majority of this activity has been related to communications and electronic equipment. For the completion of these research activities, FTMM has operated and continues to operate a variety of laboratories. Additionally, FTMM has a significant history of training and housing troops. In support of these activities, FTMM has had a full complement of support activities including vehicle maintenance, warehousing, medical and dental services, photo processing, printing, historic solid waste handling methods (e.g., landfills), and facility infrastructure [e.g., underground storage tanks (USTs)]. Many of the former activities have resulted in environmental releases that are being addressed within the IRP and BRAC ECP processes.

2.4 ENVIRONMENTAL SETTING

The following is a description of the geological and hydrogeological setting of the area as well as the surrounding land use characteristics. The information in the following sections was taken from previous environmental reports produced by Roy F. Weston, Inc. (Weston, 1995) and Shaw (2007; 2008).

2.4.1 CLIMATE

The climate, temperature, and humidity of Monmouth County, New Jersey, is characteristic of the temperate zone of the Mid-Atlantic states. The mean annual temperature for Monmouth County is about 52 degrees Fahrenheit (°F); the summers are generally warm, with an average temperature around 70 °F and average minimum and maximum temperatures exceed 60 and 80 °F, respectively. Winters are moderate, with an average temperature around 30 °F.

Precipitation in Monmouth County averages between 40 and 50 inches per year; slightly more than half the total annual precipitation falls between April and September. Thunderstorms generally occur during the summer months, and hurricanes or tropical storms move northward along the Mid-Atlantic coast.

2.4.2 TOPOGRAPHY

The land surface at the MP is relatively flat and ranges in elevation from 4 feet above mean sea level (ft msl) in the east at Oceanport Creek to 32 ft msl at the western end of the post, near Highway 35. The eastern half of the post is generally 10 ft msl in elevation. The greatest elevation is at the M-8 Landfill, located on Parkers Creek, and along Lafetra Creek, Mill Creek, and Husky Brook.

At CWA, the land surface slopes from 72 ft msl in the southwest to 20 ft msl at the eastern end of the golf course. In general, the southwestern corner of CWA is gently rolling and has the greatest relief.

2.4.3 SURFACE WATER DRAINAGE AND WETLANDS

Within the western part of the MP, surface water runoff flows either north into Lafetra Creek or south into Mill Creek, both of which originate off site to the west of the MP. Mill Creek flows along the southern boundary of MP until it turns north and joins Lafetra Creek to form Parkers Creek. Parkers Creek flows eastward along the northern boundary and joins Oceanport Creek east of MP. Most of Parkers, Lafetra, and Mill Creeks in the vicinity of the MP are tidally influenced.

Surface water runoff from the southern half of the MP flows into Husky Brook and Husky Brook Lake through a series of drainage ditches and outfalls. Husky Brook originates off site to the west of the MP and flows into Husky Brook Lake on site. Husky Brook exits Husky Brook Lake and flows into Oceanport Creek, which forms the southern boundary of the eastern area. Oceanport Creek and Husky Brook below Husky Brook Lake are tidally influenced.

Parkers and Oceanport Creeks, as well as the tributaries to these creeks, on the Main Post are classified by the NJDEP, for the purposes of determining surface water quality criteria, as fresh nontrout water/saline water (FW2-NT/SE1). This classification indicates that the waterbody may exhibit a saltwater/freshwater interface; the point of demarcation between freshwater and saltwater is determined through salinity measurements. These waterbodies are characterized as freshwater FW2-NT where the mean salinity at high tide is 3.5 parts per thousand (ppt) or less and as saline SE1 where the mean salinity at high tide is greater than 3.5 ppt (N.J.A.C. 7:9B *et seq*.).

Salinity measurements were collected during surface water and sediment sample collection in June 2010 for the BEE investigation. These data are provided in **Appendix G**. Though these data represent conditions at the time of sample collection and not necessarily high tide conditions, several salinity measurements were recorded at or near high tide, based on National Oceanic and Atmospheric Administration (NOAA) tidal charts for Gooseneck Point which is located east of the MP (NOAA, 2010). These data are indicated as such in **Appendix G**. Quarterly salinity data collected by Fort Monmouth between 2004 and 2009 are provided in **Appendix J**. Data known to be collected during high tide are indicated as such in **Appendix J**. A summary of the average high tide salinity for waterbodies in the MP based on the documented high tide data are summarized below in **Table 2-1** and presented in **Figure 2-1**.

Table 2-1. Summary of High Tide Salinity Data

Creek	FTMM Site	FTMM Station	Average High Tide Salinity (ppt) n=3	BEE Station	Average High Tide Salinity (ppt) n=1	Overall Site Average High Tide Salinity (ppt)
Parkers Creek						
	Downgradient of Main Post	21	21.3			21.3
	Site M-18			P49-SW3	20.36	17.5
				P49-SW2	20.13	
		27	15.7			
	Site M-8			M8-SD5	16.3	15.5
		28	14.3			
				M8-SD6	17.37	
				M8-SD7	16.54	
Lafetra Creek						
	Site M-3	5	9.7			9.7
		26	7.0			7.0
		3	4.0			4.0
	Upgradient End of Main Post	14	0.0			0.0
Mill Creek						
	Site M-4	5	9.7			9.7
	Site M-2	24	6.7			3.4
				M2-SD08	0.27	
				M2-SD09	0.27	
				M2-SD10	0.27	
				M2-SD11	0.27	
				M2-SD12	0.27	
				M2-SD13	0.27	
		15	5.3			
	Upgradient End of Main Post	13	0.0			0.0
Oceanport Creek						
	Downgradient of Main Post	22	21.0			21.0
	Site M-16			M16-SD4	21.04	21.0
	Sites M-12/M-14	9	18.3			11.2
				P61-SW1	10.45	
		19	4.3			
	Husky Brook Pond	12	0.0	M14-SW14	0.13	0.0
	Upgradient End of Main Post	11	0.0			0.0

Based on the high tide salinity measurements, the freshwater/saltwater demarcation line lies between Landfill M-3 and the upgradient end of the Main Post on Lafetra Creek, between Landfill M-4 and Landfill M-2 on Mill Creek, and between Landfills M-12 and M-14 and Husky Brook Pond on Husky Brook. Therefore, all of Parkers and Lafetra Creeks, in the vicinity of the sites addressed in this BEE as well as all of Mill Creek on the Main Post west of Landfill M-4 and Oceanport Creek and Husky Brook below Husky Brook Pond are classified as SE1 waters. Areas of these creeks upgradient of the MP are classified as FW2-NT. These freshwater and saltwater designations are consistent with those presented in the Weston SI report (Weston, 1995), which designated all their surface water and sediment sampling locations at the MP to be saltwater with the exception of Landfill M-2, based on field-observations of tidal influence.

The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory indicates the presence of wetlands at the MP. Parkers and Oceanport Creeks are classified as estuarine and marine deepwater with estuarine and marine wetland areas. Husky Brook and Lafetra Creek are classified predominantly as freshwater riverine, emergent wetland, and forested/shrub wetland. Husky Brook Lake is classified as a freshwater pond.

Surface water runoff at the CWA is drained by Wampum Brook and Shrewsbury Creek. Shrewsbury Creek flows eastward through the center of the CWA and Wampum Brook flows along the southern boundary. These join east of the CWA before becoming Wampum Lake. Wampum Lake discharges into Mill Creek, which flows through the MP. All surface water streams at the CWA are classified as FW2-NT by the NJDEP for the purposes of determining surface water quality criteria, indicating they are non-trout freshwaters.

Several CWA wetland areas are identified on the USFWS National Wetland Inventory. Most of Shrewsbury Creek and Wampum Brook are classified as freshwater forested/shrub wetland, and the open water in the golf course in the eastern portion of the CWA is classified as a freshwater pond.

2.4.4 REGIONAL AND LOCAL GEOLOGY

Monmouth County lies within the New Jersey Section of the Atlantic Coastal Plain physiographic province. The MP, as well as the CWA and the Evans Area, are located in what may be referred to as the Outer Coastal Plain subprovince or the Outer Lowlands.

In general, New Jersey Coastal Plain formations consist of a seaward-dipping wedge of unconsolidated deposits of clay, silt, and gravel. These formations, which typically strike northeast-southwest with a dip ranging from 10 to 60 feet per mile, were deposited on Precambrian and lower Paleozoic rocks. The sediments, predominantly derived from deltaic, shallow marine, and continental shelf environments, date from the Cretaceous through the Quaternary Periods. The mineralogy ranges from quartz to glauconite.

The formations record several major transgressive/regressive cycles and contain units that are generally thicker to the southeast and reflect a deeper water environment. More than 20 regional geologic units are present within the sediments of the Coastal Plain. Regressive, upward coarsening deposits are usually aquifers (e.g., the Englishtown and Kirkwood Formations, and the Cohansey Sand), while the transgressive deposits are typically confining units (e.g., the Merchantville, Marshalltown and Navesink formations). The individual thicknesses for these units vary greatly (that is, from several feet to several hundred feet).

Based on the regional geologic map, the Cretaceous Age Red Bank and Tinton Sands outcrop at the MP. The Red Bank sand conformably overlies the Navesink Formation and dips to the southeast at a slope of 35 feet per mile. The upper member of the Red Bank Sand (Shrewsbury) is a yellowish-gray to reddish-brown clayey, medium- to coarse-grained sand that contains abundant rock fragments, minor mica, and glauconite. The lower member (Sandy Hook) is a dark gray to black, medium- to fine-grained sand with abundant clay, mica, and glauconite.

The Tinton Sand conformably overlies the Red Bank sand and ranges from a clayey medium- to very coarse-grained feldspathic quartz, and glauconite sand to a glauconitic coarse sand. The color varies from dark yellowish-orange or light brown to moderate brown, and from light olive to grayish-olive.

Glauconite may constitute 60 to 80 percent of the sand fraction in the upper part of the unit. The upper part of the Tinton Sand is often highly oxidized and iron-oxide encrusted.

Both the Tinton Sand and the Hornerstown Sand (or marl) crop out at the CWA. The Hornerstown unconformably overlies the Tinton Sand and is a dusky-green to grayish-olive or grayish-olive-green clayey glauconitic sand that may oxidize to moderate reddish-brown and dusky red. The percentage of quartz sand ranges from a few percent to 30 percent. Approximately half of this formation is composed of silt and clay.

The Kirkwood Formation (part of the Kirkwood-Cohansey system) crops out southeast of the MP and dips to the southeast at a slope of 20 feet per mile. The Kirkwood Formation consists of alternating layers of sand and clay. The upper unit is a light gray to yellowish-brown fine-grained quartz sand with quartz nodules and small pebbles. The lower unit is a brown silt in Monmouth County.

2.4.5 SOILS

According to the Monmouth County Soil Survey (USDA, 2008), much of the MP is covered by urban land (developed land with disturbed soils). The majority of the area is of the Udorthents-Urban land complex with 0 to 8 percent slopes (UDauB). The following soil series and classification units are mapped in the MP Area:

AptAV – Appoquinimink-Transquaking-Mispillion complex, 0-1% slope, very frequently flooded

DoeB – Downser sandy loam, 2-5% slopes

FrkB – Freehold sandy loam, 2-5% slopes

FrrC – Freehold-Urban land complex, 0-10% slopes

HumAt – Humaquepts, 0-3% slopes, frequently flooded

KrhB – Kresson loam, 2-5% slopes

ShrA – Shrewsbury sandy loam, 0-2% slopes

ThgB – Tinton loamy sand, 0-5% slopes

ThhB – Tinton-Urban land complex, 0-5% slopes

UdaB – Udorthents, 0-8% slopes

UdauB – Urban land complex, 0-8% slopes

The CWA is covered by less urban land complexes than the MP. The Shrewsbury sandy loam, Freehold sandy loam, and Freehold-Urban land complex are the dominant soil types. The following soil series and classification units are mapped in the CWA:

AtsA – Atsion sand, 0-2% slopes

EveB – Evesboro sand, 0-5% slopes

FrkB – Freehold sandy loam, 2-5% slopes

FrkC – Freehold sandy loam, 5-10% slopes

FrrC – Freehold-Urban land complex, 0-10% slopes

HocA – Holmdel sandy loam, 0-2% slopes

HofB – Holmdel-Urban land complex, 0-5% slopes

PHG – Pits, sand and gravel

ShrA – Shrewsbury sandy loam, 0-2% slopes

UdauB – Udorthents-Urban land complex, 0-8% slopes

2.4.6 HYDROGEOLOGY

FTMM lies in the Atlantic and Eastern Gulf Coastal Plain groundwater region. This groundwater region is underlain by undeformed unconsolidated to semi-consolidated sedimentary deposits. Water chemistry near the surface is variable with low dissolved solids and high iron concentrations. In the areas underlain by glauconitic sediments such as the Red Bank and Tinton sands, the water chemistry is dominated by calcium, magnesium, and iron. The sediments in the area of the site were deposited in fluvial-deltaic to nearshore environments.

The water table aquifer is identified as part of the composite confining units or minor aquifers, which include the Navesink Formation, the Red Bank Sand, Tinton Sand, Hornerstown Sand, Vincentown Formation, the Manasquan Formation, Shark River Formation, Piney Point Formation, and the basal clay of the Kirkwood Formation. The Hornerstown Sand probably serves as an aquitard or aquiclude rather than as an aquifer due to its high silt and clay content.

2.4.7 NATURAL BACKGROUND CONSTITUENTS

The local geology and soil types determine the levels of naturally-occurring constituents present in soil. For instance, glauconitic soils, such as those present in the Cretaceous Age Red Bank and Tinton Sands of the FTMM area, can exhibit high concentrations of naturally-occurring arsenic and beryllium (Dooley, 2001), and the upper part of the Tinton Sand is often highly iron-oxide encrusted. The ambient levels of metals in soils of the urban coastal plain region are reported by Sanders (2003) based on an extensive characterization study conducted by BEM Systems, Inc. (1998). These natural background levels are meant to be inclusive of naturally-occurring levels in soil as well as those from regional deposition but not those from point source contamination. **Table 2-2** presents a summary of these ambient levels.

Naturally-occurring metals present in soil also affects the concentrations of these constituents measured in groundwater. Elevated concentrations of arsenic and lead in groundwater at FTMM have been found within the glauconitic-rich soil layers and are most likely attributed to these natural conditions (FTMM, 2011). The presence of glauconitic soils were noted in sediment samples collected during the BEE investigation, particularly in Parkers, Lafetra, and Mill Creeks in the MP (**Appendix G**). Dooley (2001) reported higher than ambient concentrations in glauconitic soils for several metals. In particular, the 90th percentile concentrations of aluminum [49,130 milligrams per kilogram (mg/kg)], arsenic (77 mg/kg), barium (340 mg/kg), beryllium (9.6 mg/kg), chromium (769 mg/kg), cobalt (11 mg/kg), nickel (24 mg/kg), vanadium (213 mg/kg), and zinc (mg/kg) were greater than those reported as ambient soil levels for the urban coastal region (BEM Systems, Inc).

2.4.8 ECOLOGY

The MP and CWA are within the Atlantic Coastal Plain, in the Outer Coastal Plain physiographic region of New Jersey, and contain both upland and wetland ecological habitats. Coastal plains are typically of low relief and consequently suitable for the formation of wetlands. Areas of wetlands are present on both the MP and CWA, with estuarine and fresh water wetlands present on the MP. Much of the upland areas of the MP and CWA consist of extensive areas of regularly mowed lawns and landscaped areas. However, upland ecological habitats are present, and include forested areas and old field herbaceous habitat. Except for occasional transient species, no federally listed or proposed threatened or endangered flora or fauna are known to exist on the site. There was one observance in 1992 of a New Jersey listed endangered species, the clustered sedge. In addition, no federal or state listed species were observed during the BEE site visit conducted on the MP and CWA on September 15, 2009. This section includes descriptions of the important ecological habitats present at the MP and CWA. As indicated in **Section 2.4.3**, the USFWS National Wetland Inventory maps have designated wetland areas at the MP and CWA. Areas along Oceanport Creek and Parkers Creek are designated estuarine and marine wetlands or open waters; areas along Mill Creek, Husky Brook, Lafetra and Shrewsbury Creeks are freshwater emergent or forested/shrub wetlands.

Estuarine Wetlands. Estuarine wetlands on the MP are associated with the tidal brackish waters of Parkers and Oceanport Creeks. They include both mesohaline areas of moderate salinity (5-18 ppt) and oligohaline areas of low salinity (0.5-5 ppt). Emergent wetlands in mesohaline tidal areas of New Jersey are often characterized by smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites*

australis). Other species present often include marsh elder (*Iva frutescens*), eastern baccharis (*Baccharis halimifolia*), spike grass (*Distichlis spicata*), salt hay (*Spartina patens*), seaside goldenrod (*Solidago sempervirens*), and salt marsh asters (*Aster subulatus* and *A. tenuifolius*). Where present on the MP, estuarine wetlands are dominated by common reed. Common reed tends to create a monoculture and, although they can provide valuable habitat, are generally not considered to be high quality wetlands. Common reed wetlands provide nesting habitat for many avian species, including Pied-billed Grebe (*Podilymbus podiceps*), Black-crowned and Yellow-crowned Night Heron (*Nycticorax nycticorax* and *Nyctanassa violacea*), American and Least Bittern (*Botaurus lentiginosus* and *Ixobrychus exilis*), Green Heron (*Butorides virescen*s), Coot (*Fulica americana),* Common Moorhen (*Gallinula chloropus*), King and Virginia Rail (*Rallus elegans* and *Rallus limicola*), grackles (*Quiscalus* sp.), Red-winged Blackbird (*Agelaius phoeniceus*), Swamp Sparrow (*Melospiza georgiana*), Marsh Wren (*Cistothorus palustris*), and several waterfowl species. White-tailed deer (*Odocoileus virginianus*), northern raccoon (*Procyon lotor*), and other mammalian species use common reed wetlands for refuge cover. In many areas of the MP steep banks along the creeks limit the extent of the riparian zone and thereby prevent the formation of extensive wetlands. These areas have a narrow riparian zone dominated by marsh elder, also known as high-tide bush. Avian wildlife species observed utilizing estuarine wetlands at the MP during the BEE site visit included Double-crested Cormorant (*Phalacrocorax auritus*), Common Egret (*Ardea alba*), Great Blue Heron (*Ardea herodias*), Little Blue Heron (*Egretta caerulea*), Wilson's Plover (*Charadrius wilsonia*), and numerous small sandpipers (*Calidris sp.*).

Freshwater Wetlands. Freshwater wetlands occur on both the MP and CWA. The most extensive of these are forested wetlands, with areas of emergent wetlands associated with the fresh water portions of the several creeks that traverse the MP and CWA. Forested wetlands in the area are typically dominated by red maple (*Acer rubrum*) and other hardwoods, including sweetgum (*Liquidambar styraciflua*), and black gum (*Nyssa sylvatica*). Shrubs/vines include arrowwood (*Viburnum dentatum*), coastal sweet pepperbush (*Clethra alnifolia*), and greenbrier (*Smilax rotundifolia*). Herbaceous species found in these forested wetlands include smartweed (*Polygonum sp.*), jewelweed (*Impatiens capensis*), violets (*Viola sp.*), asters, sedges and ferns. Forested wetlands at the MP and CWA may be utilized by mammalian species including white-tailed deer, eastern gray squirrel (*Sciurus carolinensis*), northern raccoon, Virginia opossum (*Didelphis virginiana*), and striped skunk (*Mephitis mephitis*). Numerous avian species are known to utilize forested wetlands habitat for nesting and foraging including: Barred Owl (*Strix varia*), Veery (*Catharus fuscescens*), Wild Turkey (*Meleagris gallopavo*), American Woodcock (*Scolopax minor*), and several species of woodpeckers and warblers. Although several streams are present at the MP and CWA, fresh water emergent wetlands are limited in some areas due to stream bank stabilization. Fresh water emergent vegetation includes cattail (*Typha latifolia*), water smartweed (*Polygonum amphibium*), arrowhead (*Sagittaria sp.*), pondweed (*Potamogeton sp.*), sedges, and rushes. Although limited in extent, emergent wetlands at the MP and CWA may provide habitat for muskrat (*Ondatra zibethicus*), Mallard (*Anas platyrhynchos*) and other species of water fowl, and for herptiles including northern water snake (*Nerodia sipedon*) and several frog species. Avian species observed utilizing freshwater wetlands or adjacent open waters at the MP during the BEE site visit included Mallard and Belted Kingfisher (*Megaceryle alcyon*).

Forested Uplands. Although most upland areas of the MP and CWA are developed, patches of upland forest are present in several areas. Dominant tree species include red oak (*Quercus rubra*), chestnut oak (*Quercus prinus*), tuliptree (*Liriodendron tulipifera*), and sweetgum (*Liquidambar styraciflua*). Understory species include sassafras (*Sassafras albidum*), flowering dogwood (*Cornus florida*), and black cherry (*Prunus serotina*). Mammals utilizing forested uplands include white-tailed deer, eastern gray squirrel, northern raccoon, Virginia opossum, striped skunk, eastern chipmunk (*Tamias striatus*), red fox (*Vulpes vulpes*), and white-footed mouse (*Peromyscus leucopus*). Avian species inhabiting forested uplands at the MP and CWA and utilizing these areas for foraging and nesting habitat are likely to include Red-tailed Hawk (*Buteo jamaicensis*), Cooper's Hawk (*Accipiter cooperii*), Blue Jay (*Cyanocitta cristata*), Tufted Titmouse (*Baeolophus bicolor*), Carolina Chickadee (*Parus carolinensis*), Red-eyed Vireo (*Vireo olivaceus*), Wood Thrush (*Hylocichla mustelina*), and several species of wood warblers. Avian species observed or heard in forested upland habitat during the BEE site visit included Catbird (*Dumetella carolinensis*), Carolina Chickadee, and American Robin (*Turdus migratorius*).

Old Field Habitat. Old field habitats include formerly mowed areas where the vegetation includes grasses and forbes and often immature trees. Old field habitat at the MP includes grasses, many forbes including Queen Ann's lace (*Daucus carota*), pokeweed (*Phytolacca americana*), goldenrod (*Solidago sp.*), milkweed (*Asclepias syriaca*), and sparse saplings of tree species including eastern red cedar (*Juniperus virginiana*) and winged sumac (*Rhus copallinum*). Mammals utilizing this habitat at the MP and CWA are likely to include include white-tailed deer, groundhog (*Marmota monax*), eastern cottontail (*Sylvilagus floridanus*), and meadow vole (*Microtus pennsylvanicus*). Deer and groundhog burrows were observed in this habitat at MP in the vicinity of IRP Site M-14. Avian species that prefer open old field habitat and are likely to be present at the MP and CWA include Northern Mockingbird (*Mimus polyglottos*), Eastern Bluebird (*Sialia sialis*), American Goldfinch (*Spinus tristis*), Rufus-sided Towhee (*Pipilo erythrophthalmus*), Common Yellowthroat (*Geothlypis trichas*), and other warblers, and several sparrow species. Birds observed or heard in or in the vicinity of old-field habitat during the BEE site visit included Mourning Dove (*Zenaida macroura*), House Finch (*Carpodacus mexicanus*), Carolina Wren (*Thryothorus ludovicianus*), Fish Crow (*Corvus ossifragus*), and Northern Mockingbird.

2.4.9 SURROUNDING LAND USE

In addition to ambient levels of background constituents, contaminants can also be present in the environment within the region of FTMM due to proximal off-site sources. This section describes the surrounding general land use, properties observed during surveys, and a review of regulatory databases. This information is adapted from that contained in the Environmental Condition of Property Report (Shaw, 2007) and recent searches of the NJDEP web-based application (http://www.nj.gov/dep/gis/deptutorial.htm#), performed to update information obtained during the 2007 effort.

2.4.9.1 ADJACENT PROPERTIES

The character of land use surrounding the FTMM properties typifies mixed use, small town development in New Jersey. Commercial services and shopping centers populate main roads, periodically interspersed with a residential structure, apartments, or an office building. Boundaries between towns are typically unnoticeable, although each town still tries to maintain a downtown "Main Street" shopping district. New tracts of housing subdivisions offer privacy from commonly traveled roads. Old residential development is characteristically along grid-style side roads which are quickly becoming encroached with small business and commercial service endeavors. Business and light industrial parks are tucked away along highways, streams, and RR tracks. **Figure 2-2** presents a schematic representation of general land use categories surrounding FTMM.

Main Post. The MP is surrounded by four towns. Little Silver lies to the northeast, Oceanport to the southeast, Eatontown to the southwest, and Shrewsbury to the northwest. The northeast boundary of MP is bordered by the Shrewsbury River, from the northeast corner to the area north of Battery Avenue, where the water narrows and becomes known as Parkers Creek. The downtown commercial and business district of Little Silver runs along Oceanport Avenue. Light industrial businesses are located east of Oceanport Avenue. Commercial businesses, including an animal hospital are located along the west side of Oceanport Avenue. An apartment complex is also located along the west side of Oceanport Avenue. Gas stations, the railroad station, and various stores surround the intersection of Oceanport Avenue and Sycamore Avenue. Further to the east, development is primarily residential. The eastern boundary of the MP is the railroad tracks with residential development along Horseneck Point Road.

The southeast boundary of the MP is bordered by Oceanport Creek, from the southeast corner to Wallington Avenue, where the water narrows. The area south of Oceanport Creek and east of the railroad tracks is developed with residential structures. Monmouth Park Racetrack is just west of the railroad and south of Bridgewaters Drive. Main Street in Oceanport borders the MP to the south, west of Oceanport Avenue. Residential houses, a church, and houses converted to small service businesses are located along Main Street to the south. The land immediately adjacent to the MP, north along Main Street, is residential development and a fire station. Another small area of residences borders the south boundary of MP north of the intersection of Main and Broad Streets. The Eatontown Sewage Authority, a church, residences, apartments, and the Eatontown municipal building are adjacent to the south of the MP along Throckmorton Avenue.

The intersection of Broad and Main Streets, Eatontown is located to the southwest of the MP. Small commercial stores, restaurants, and gas stations line Main Street in this area. A park surrounds Wampum Lake north of West Street. Storage USA is immediately adjacent along the southwest boundary of the MP, developed with an office and six self-service storage buildings. Two gas stations are located at the intersection of Main Street and Tinton Avenue. North along Main Street, the area is developed with banks, hotels, office buildings, and shopping centers. The Revmont Park Office Building is immediately adjacent to the MP on the northwest corner of the property, followed by Register Plaza Office Park, and a shopping center. As Main Street heads north towards Sycamore Avenue, development trends towards older residential structures. North of MP, Lafetra Creek runs along the property line. North of the creek are wooded areas with new subdivision housing developments. The entire area north of MP to Sycamore Avenue is primarily residential development.

Table 2-3 highlights specific properties observed during the adjacent property survey and the regulatory database review as presented in the Environmental Condition of Property Report (Shaw, 2007). The properties highlighted were documented with releases of contaminants or were observed with potentially hazardous substances on their premises.

Table 2-3. Properties Observed During Main Post Property Survey

Location	Property	Concern	Potential Impact
Oceanport Avenue & Main Street	Abandoned Shell Gas Station	Observed monitoring wells. State Hazardous Waste Site (SHWS) – Closed with restrictions 3/2005 (1).	Low due to hydraulic separation by Oceanport Creek.
61/63 Main Street	Residence	Observed above-ground storage tank (AST) along MP fence line.	High if there is a release.
9 Monmouth Park Place	Hi Tech Turf	Observed 55-gallon drum and AST. SHWS – Active 4/2004 (2).	High due to status and upgradient location.
25 Lake Avenue		SHWS – Active 10/2005 (3).	High due to status and upgradient location.
330 Broad Street		SHWS – Active 04/1997 (4).	Moderate due to date and upgradient location.
25 Cloverdale Avenue		SHWS – Active 09/2005 (5).	High due to status and upgradient location.
29 Rose Court	Residence	New Jersey Spills & Voluntary Cleanup Program (VCP) – 11/1999 (6).	Moderate due to date and upgradient location.
Broad & Rose	Getty Gas Station	Observed monitoring wells. SHWS – Active 08/2004 (7).	High due to status and upgradient location.
Route 35 & Tinton Avenue	Lukoil Gas Station – previous location of Mobil Station	SHWS – Active 04/1997 (8).	Moderate due to date and upgradient location.
Route 35 & Tinton Avenue	Exxon Gas Station	Historic Leaking Underground Storage Tank (historic LUST) 1991 (9).	Moderate due to date and upgradient location.
160 Main Street (Route 35)	Abandoned Amoco Gas Station	Observed monitoring wells. SHWS – Active 01/2001 (10).	High due to status and upgradient location.
37 Tinton Avenue	Residence	SHWS – Active 10/2000 (11).	High due to status and upgradient location.

Charles Wood Area. The CWA is surrounded by two towns. Eatontown lies to the east and south and Tinton Falls lies to the west and north. Tinton Avenue runs along the entire northern boundary of the CWA. North of the Golf Course, across Tinton Avenue, the land is developed with apartment complexes and the Ranney School. The northern branch of Parkers Creek also bisects this area. The area north of Tinton Avenue and west of Hope Road is developed with apartments, residential structures

and the Monmouth Regional High School. Further west on Tinton Avenue, across the Garden State Parkway, a nursery business occupies a large tract of land.

Tinton Falls Borough Department of Public Works facilities are located along the entire western property line of the CWA. Construction of new buildings is underway closest to Tinton Avenue. South of the new construction are the police department buildings. Further south are Department of Public Works storage warehouses for equipment, sand, and mulch, parking, a fueling station, and the equipment/truck storage yard. The Department of Public Works also operates a recycling collection center in this area. The southwest adjacent land appears to be cultivated with rows of bushes or trees. West of the Department of Public Works facilities is the Garden State Parkway and the Monmouth County Highway Department Site 3&6. Materials, equipment, sand, and mulch are stored outside in this area.

The southern boundary of the CWA is Pinebrook Road. A light industrial park is located along Park Road, from the southwest corner of the CWA to Hope Road. Businesses in this area include Standard Co., Hatteras Press, the Residence Inn, Garden State Delivery, IROC, DRS Technologies, Comcast, Ranger Industries, the Marriott, and Applebee's. Several commercial establishments are located along Pinebrook Road, south of the CWA, including an air conditioning and heating contractor, a construction contractor, and a 7-Eleven convenience store.

East of Hope Road, along Pinebrook Road to the south, the area is developed with office buildings and apartment complexes. Further south is Route 36. Apartment complexes and the Vetter School are located adjacent to the southeast corner of the CWA. The Eatontown Department of Public Works is located east of the CWA along Pinebrook Road. The facility has storage buildings, outside storage of materials and equipment, and a fueling station. A railroad switch storage yard and the Indian Head Enterprises (utility, pipe, and sewer company) is also located in this area along Pinebrook Road. Another railroad materials and equipment storage yard boarders the CWA property to the east off of Maxwell Road. The Borough of Eatontown also operates a recycling collection center along Lewis Street to the east of the CWA.

Maxwell Road runs along the eastern border of the CWA golf course. Fiore Paving facilities are located along Maxwell Road next to the railroad tracks. Further north along Maxwell the area is developed with residential structures. Several residences were observed to have ASTs.

Table 2-4 highlights specific properties observed during the adjacent property survey and the regulatory database review conducted in 2007. The properties highlighted were documented with releases of contaminants in the Environmental Data Resources, Inc. (EDR) report or were observed with potentially hazardous substances on their premises.

Table 2-4. Properties Observed During CWA 2007 ECP Property Survey

Location	Property	Concern	Potential Impact
539 Tinton Avenue	Concession Supply Company	Observed AST & Cylinders. SHWS – Active 05/2002. Inst Control – 08/2005 (1).	High due to status and upgradient location.
535 & 556 Tinton Avenue	Tinton Falls Borough	Observed AST and outside equipment /materials storage. SHWS – Active 10/1999 (2).	High due to status and upgradient location.
600 Tinton Avenue	CECOM (7)	SHWS – Active 12/2005 (3).	High due to status and upgradient location.
Pinebrook Road & GSP	Monmouth County Highway Dist 3&6	Observed outside storage of equipment/materials. SHWS – Active 11/1995. Class. Exempt area (4).	High due to status and upgradient location.
100 Park Road	Standard Company	Observed outside storage of equipment/materials. Historic LUST/New Jersey Release.	Low due to NFA 09/1994.

Table 2-4. Properties Observed During CWA 2007 ECP Property Survey

Location	Property	Concern	Potential Impact
45 Park Road	Hecon Corporation	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – No Further Remedial Action (NFRA) Transport, Storage, and Disposal Facility (TSDF)	Low due to NFA 11/1998.
14 Park Road	Mazel Company	CERCLA-NFRA	Low due to NFA 04/1984.
1 Coldstream Way	Metallurgical Industries	Area observed to be vacant field. Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) – Remedial Action (RA) 06/1997. SHWS – Active 03/1995. Industrial Site Recovery Act – 03/1995 (5).	High due to status and upgradient location.
Pinebrook & Hope Roads	Fitzpatrick & Associates	Observed outside equipment/materials storage.	High if there is a release.
250 Pinebrook Road	Eatontown Borough	Observed AST and outside equipment /materials storage. SHWS – Closed with Restrictions - 08/1995. Inst Control - (6)	Moderate due to continued fueling operations and closure status with restrictions.
37 Maxwell Road	Fiore Paving	Observed outside equipment/materials storage. New Jersey manifest.	High if there is a release.
Maxwell & Mill	Residence	Observed AST.	High if there is a release.

Numerous adjacent properties have the potential to impact the surface water quality in the vicinity of FTMM. Historically, there was concern that FTMM sewage plants were degrading surface water quality. In response to NJDEP concerns that sewage discharges were causing deleterious effects on Parkers Creek, an evaluation of the effluent and the receiving streams was performed in 1971. The evaluation concluded that the effluent met all written requirements of federal, state and local water pollution agencies. There was no visual evidence of contamination, no noticeable sewage odor and the color and turbidity of the effluent were less than that of the receiving stream (First U.S. Army Medical Laboratory, 1971). Another evaluation of the impact of wastewater discharges on the environment concluded that the impact was minimal (USAEHA, 1977). It was noted that the condition of the streams entering the installation were of similar or poorer quality due to a variety of upstream industrial operations such as Styrofoam cup manufacturing, metal plating and photo processing as well as domestic discharges. Water samples collected from Wampum Brook upstream of the CWA Sewage Treatment Plant (STP) outfall indicated no evidence of life in the brook (USAEHA, 1976).

2.4.9.2 STANDARD ENVIRONMENTAL RECORD SOURCES

A comprehensive search of state and federal environmental databases was undertaken for the facility as part of the ECP Report (Shaw, 2007) and any listed sites within standard search distances were identified. Two EDR area studies were performed: one for the MP and one for the CWA. The findings of this search, as it pertains to the FTMM surrounding land use and this BEE, are summarized below and the complete search results are provided in Appendix K of the ECP Report (Shaw, 2007).

Main Post Off-Site Facilities Summary. **Table 2-5** summarizes the results of the EDR search for the MP area. Within each database type, the location relative to MP (i.e., upgradient or downgradient)

has been provided. The location of these facilities relative to MP was based on topographic gradient, as identified on the USGS topographic quadrangle maps provided in the EDR report.

One Resource Conservation and Recovery Act (RCRA) Corrective Action Activity Site (CORRACTS) facility is reported within the 1-mile radius of the MP. The Lowe's Home Improvement Center, 118 Highway 35 South, Eatontown, is approximately ¾-mile south and upgradient from the MP. Twenty RCRA Small Quantity Generators (SQGs) facilities are reported within the ¼-mile radius of the MP. A total of 73 SHWS facilities are reported within the 1-mile radius of the MP. Eight leaking underground storage tank (LUST) facilities are reported within a ½-mile radius of the MP, an additional 22 are on the historical LUST database (this database has been inactive since 2002), and 19 facilities are also listed as registered UST sites. A total of 126 participants are listed in the VCP within a ½-mile radius of the MP.

The facilities identified in the EDR search include several service stations with USTs and other light industrial facilities. Though many are hydraulically separate from MP to prevent the migration of shallow groundwater to the MP, migration of contaminants towards Parkers Creek, Oceanport Creek, and their tributaries is feasible.

Table 2-5. MP Standard Environmental Record Results

Record(s) Source for FTMM MP	Number of Sites	Minimum Search Distance (miles)
Federal RCRA CORRACTS Facilities	1	1.0
Federal RCRA Small Quantity Generators	21	0.25
New Jersey State Hazardous Waste Sites	73	1.0
New Jersey State Landfill, Historic Landfill, and Approved Class B Recycling Facilities	3	0.5
New Jersey Active LUST Facilities	8	0.5
New Jersey Historical LUST Facilities	22	0.5
New Jersey Engineering Controls	1	0.5
New Jersey Institutional Controls	4	0.5
New Jersey VCP Facilities	126	0.5
New Jersey Registered UST Facilities	19	0.25

Charles Wood Area Off-Site Facilities Summary. **Table 2-6** summarizes the results of the EDR search for the CWA. Within each database type, the location relative to CWA (i.e., upgradient or downgradient) has been provided. The location of these facilities relative to CWA was based on topographic gradient, as identified on the USGS topographic quadrangle maps provided in the EDR report.

One National Priorities List (NPL) facility, the Naval Weapons Station Earl, is approximately ¾-mile southwest of the CWA in Colts Neck Township. Two RCRA CORRACTS facilities are reported within the ½-mile radius of the CWA: the Lowe's Home Improvement Center and the Naval Weapons Station Earl. One CERCLIS facility is reported within the ½-mile radius of the CWA; the Metallurgical Industries site participates in a state-lead cleanup program. Two additional CERCLIS facilities are listed as No Further Remedial Action Planned (NFRAP): Mazel Chemical Company and Hecon Corporation. Hecon Corporation is listed as a RCRA TSDF. There is one facility within a ¼-mile radius listed as a RCRA Large Quantity Generator (The Standard Group) and nine listed as RCRA SQGs, including public works facilities and cleaners. A total of 53 SHWS facilities are reported within the ½-mile radius of the CWA. Two facilities are listed in the Historic Solid Waste Facility Directory (Tinton Falls Borough Compost and All County Recycling) and are located upgradient of the CWA. Four LUST facilities are reported within a ½-mile radius of the CWA, an additional 20 are on the historical LUST database (this database has been inactive since 2002), and 16 facilities are also listed as registered UST sites. A total of 16 participants are listed in the VCP within a ½-mile radius of the CWA.

The facilities identified in the EDR search include several service stations with USTs and other light industrial facilities. Some of these sites are located upgradient and contaminant migration in shallow groundwater from these sites could impact groundwater at the CWA. Many, though, are hydraulically separate from CWA preventing the migration of shallow groundwater to the CWA; migration of contaminants towards Shrewsbury Creek and Wampum Brook is feasible.

Table 2-6. CWA Standard Environmental Record Results

Record(s) Source for FTMM Charles Wood Area	Number of Sites	Minimum Search Distance (miles)
Federal NPL Facilities	1	1.0
Federal RCRA CORRACTS Facilities	2	1.0
Federal CERCLIS Facilities	1	0.5
Federal CERCLIS-NFRAP Facilities	2	0.5
Federal RCRA TSD Facilities	1	0.5
Federal RCRA Large Quantity Generators	1	0.25
Federal RCRA Small Quantity Generators	9	0.25
New Jersey State Hazardous Waste Sites	53	1.0
New Jersey State Landfill, Historic Landfill, and Approved Class B Recycling Facilities	3	0.5
New Jersey Active LUST Facilities	4	0.5
New Jersey Historical LUST Facilities	20	0.5
New Jersey Institutional Controls	3	0.5
New Jersey VCP Facilities	16	0.5
New Jersey Registered UST Facilities	16	0.25

2.5 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

The Phase I ECP Assessment conducted in 2006 and 2007 evaluated the existing environmental conditions of FTMM MP and CWA (including IRP sites) and MP and CWA were characterized into 95 parcels according to their environmental condition (Shaw, 2007). **Tables 2-7 and 2-8** list all ECP parcels and IRP sites at CWA and MP, respectively. **Tables 2-7 and 2-8** are organized by ECP parcel, with all IRP sites listed with the parcel in which they are included. Within the FTMM MP and CWA are 21 parcels that were evaluated through the FTMM SI under the BRAC 2005 ECP process and 27 active/open IRP Sites. Within the 27 active/open IRP Sites, 14, as well as 1 IRP site listed as Response Complete (Fort Monmouth, 2007), have been determined to require additional evaluation through the BEE process.

In addition, eight of the 21 ECP parcels included in the FTMM SI under the BRAC 2005 ECP process are deemed to require a BEE based on NJDEP correspondence. In total, 23 sites/parcels were evaluated as part of this BEE. The IRP sites and ECP parcels evaluated as part of the BEE are summarized in **Table 2-9**.

This section provides brief site descriptions and summaries of the previous investigations or remedial actions at the IRP and ECP sites that are addressed in the BEE. Though detected concentrations were often compared to criteria within these previous reports, the criteria are not necessarily ecologically based. The comparisons discussed in this section are simply summarized and do not imply ecological risks.

Table 2-9: Fort Monmouth Main Post/Charles Wood Area BEE Sites

Site No.	Associated Building/Feature	AEDB-R No.	Proximal Ecological Feature to be Evaluated
Main Post			
IRP Site M-2	Landfill 2	FTMM-02	Mill Creek
IRP Site M-3	Landfill 3	FTMM-03	Lafetra Creek
IRP Site M-4	Landfill 4	FTMM-04	Mill Creek
IRP Site M-5	Landfill 5	FTMM-05	Mill Creek
IRP Site M-8	Landfill 8	FTMM-08	Parkers Creek
IRP Site M-12	Landfill 12	FTMM-12	Husky Brook
IRP Site M-14	Landfill 14	FTMM-14	Husky Brook
IRP Site M-15	Water Tank	FTMM-15	Parkers Creek
IRP Site M-16	Building 498, Pesticide Storage	FTMM-16	Oceanport Creek
IRP Site M-18	Former Training Area	FTMM-18	Parkers Creek
IRP Site Pre-1941 STP	Pre-1941 Former Sanitary STP	FTMM-20	Parkers Creek
IRP Site Building 1122	Building 1122, Unknown Discharge	FTMM-59	Mill Creek
IRP Site Building 283	Building 283, LUST, Gasoline	FTMM-61	Parkers Creek
ECP Parcel 39	Building 1150, Former Photoprocessing Activities	N.A.	Mill Creek
ECP Parcel 43	Building 1122, "Do-It-Yourself" Vehicle Repair Shop	N.A.	Mill Creek
ECP Parcel 49	Buildings 283, 288, 291, 292, 293, 295, Former Squier Laboratory Complex	N.A.	Parkers Creek
ECP Parcel 61	Building 1075, Patterson Army Health Clinic	N.A.	Husky Brook
ECP Parcel 69	Building 900, Former Tactical Motor Pool	N.A.	Oceanport Creek
Charles Wood Area			
IRP Site CW-3A	Landfill, CW-3A	FTMM-25	Shrewsbury Creek
IRP Site CW-6	Former Pest. Storage	FTMM-28	Un-named Wetland
ECP Parcel 15	Building 2700, Meyers Center laboratory	N.A.	Shrewsbury Creek
ECP Parcel 27	Buildings 2507 and 2704	N.A.	Shrewsbury Creek
ECP Parcel 28	Building 2525	N.A.	Shrewsbury Creek

2.5.1 MAIN POST

2.5.1.1 LANDFILL 2 (FTMM-2)

The FTMM-2 Landfill is located in the southwestern corner of the MP, on the south bank of Mill Creek. The 8.1-acre landfill operated from 1964 until 1968. The types of materials disposed in the landfill have been reported to include construction debris, scrap metal, asbestos-containing materials (ACM), vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components. Metal, concrete, and other types of landfill debris can be observed protruding from the stream bank along Mill Creek.

Under the IRP SI phase, three monitoring wells were installed to evaluate groundwater quality. In addition, surface water samples were collected from Mill Creek. All samples were analyzed for target compound list (TCL)+30, target analyte list (TAL) metals, and cyanide. The results are as follows:

- Chlorobenzene, arsenic, and lead were detected in downgradient monitoring wells at concentrations exceeding NJDEP Ground Water Quality Criteria (GWQC).

- Trichloroethene (TCE) and tetrachloroethene (PCE) were detected in surface water at concentrations exceeding the NJDEP Surface Water Quality Criteria (SWQC).

Under an enhanced SI phase, seven additional monitoring wells were installed to further evaluate groundwater quality. Subsequently, consecutive quarterly rounds of groundwater samples were collected for analysis. The results are as follows:

- Benzene, chlorobenzene, cadmium, and lead have been detected in six of the seven downgradient monitoring wells at concentrations exceeding the NJDEP GWQC.

A remedial investigation (RI) to delineate contaminants of concern within groundwater and soil has been completed. A second RI that evaluated the potential for environmental contaminants being present within the existing landfill cover material has also been completed. The results are as follows:

- Polychlorinated biphenyls (PCBs) were identified in site soils at two separate areas within the boundary of the landfill.

The IRP recommended a NFA for near surface soil (Versar, Inc., 2001). For PCB contamination in subsurface soils, the Directorate of Public Works (DPW) incorporated a document equivalent to a Declaration of Environmental Restriction (DER) into the FTMM Installation Master Plan. For groundwater, the DPW established a Classification Exception Area (CEA). Subsequently, it was determined that the FTMM-2 Landfill required additional evaluation through the BEE process.

As part of the BEE, 12 sediment samples and two surface water samples were collected from Mill Creek adjacent to Landfill 2 (FTMM-2), one surface water and one sediment sample were collected upstream of Landfill 2 (FTMM-2), and two surface water samples were collected downstream of Landfill 2 (FTMM-2). These are discussed further in **Section 3.4.2.1**.

Mill Creek borders Landfill 2 (FTMM-2) along its north side and a small drainage tributary to Mill Creek borders it along its west side. The bank of Mill Creek along Landfill 2 (FTMM-2) has undergone stabilization and a service road lies adjacent to Mill Creek. The site slopes gently to the north and surface runoff is discharged to Mill Creek. Groundwater underlying Landfill 2 (FTMM-2) flows to the north-northwest to Mill Creek. Conductivity and salinity monitoring conducted in 1995 in Mill Creek indicate the presence of freshwater with conductivity readings less than 240 micromhos (µmhos) and salinity readings less than 0.2 ppt with a maximum tidal fluctuation of 1.2 feet (Weston, 1995).

As indicated on the FTMM utility maps in **Appendix K**, several storm water outfalls discharge into Mill Creek in the vicinity of Landfill 2 (FTMM-2) from the vicinity of Building 1150 and Building 1152 located in Parcel 39 (**Section 2.5.1.14**) located north of Mill Creek from Landfill 2. A gas utility line and a storm water line located in the southeastern corner of Landfill 2 may provide additional migration pathways for contaminants from Landfill 2; migration along these pathways would not be in the direction of Mill Creek.

The vegetative cover of Landfill 2 (FTMM-2) is mostly cut field with isolated areas of wood-shrub habitat. Silver maple (*Acer saccharinum*), viburnum (*Viburnum* sp.), smartweed (*Polygonum* sp.), and blackgum (*Nyssa sylvatica*) are present along Mill Creek. The upland portions contain black walnut (*juglans nigra*), silver maple, boxwood (*Buxus* sp.), catalpa (*Catalpa speciosa*), and black locust (*Robinia pseudoacacia*).

Geographic Information System (GIS) digital data available through the NJDEP indicate the presence of deciduous wetlands along Mill Creek and to the east and west of Landfill 2 (FTMM-2) as well as herbaceous wetlands across the site. A site visit on September 9, 2009, confirmed the presence of deciduous wetlands bordering Mill Creek and Landfill 2 (FTMM-2); however, the site was typical of upland habitat and not herbaceous wetlands.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

2.5.1.2 LANDFILL 3 (FTMM-3)

The M-3 Landfill is located between North Drive and Lafetra Creek in the west-central part of the MP and it is bordered by Mill Creek to the east. The 8.0-acre landfill operated from 1959 until 1964. The types of materials disposed of in the landfill have been reported to include construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components.

Under the IRP SI, three monitoring wells were installed to evaluate groundwater quality. In addition, surface water samples were collected from Lafetra Creek. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Chlorobenzene and lead were detected in downgradient monitoring wells at concentrations exceeding the NJDEP GWQC.
- No contaminants of concern were detected in surface water samples collected during the SI phase.
- Surface water samples collected under a New Jersey Pollutant Discharge Elimination System (NJPDES) permit identified PCE at concentrations exceeding the NJDEP SWQC.

Under an enhanced SI, five additional monitoring wells were installed to further evaluate groundwater quality. Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis. The results are as follows:

- Benzene, chlorobenzene, cadmium, and lead were detected in all five downgradient monitoring wells at concentrations exceeding the NJDEP GWQC.

The IRP recommended NFA for near surface soil (Versar, Inc. 2004a), and a CEA was prepared for groundwater. Subsequently, the M-3 Landfill was considered to require additional evaluation through the BEE process.

As part of the BEE, 11 sediment samples and two surface water samples were collected from Lafetra Creek and five sediment samples and one surface water sample were collected from Mill Creek adjacent to Landfill 3 (FTMM-3), and one surface water and one sediment sample were collected upstream of Landfill 3 (FTMM-3) on Mill Creek. These are discussed further in **Section 3.4.2.2**.

Lafetra Creek borders Landfill 3 (FTMM-3) along its north side and Mill Creek borders it along its east side. The banks of Mill Creek and Lafetra Creek along Landfill 3 (FTMM-3) have undergone stabilization and a service road lies adjacent to Mill Creek and Lafetra Creek. The site slopes gently to the north and east and surface runoff is discharged to Mill Creek or Lafetra Creek. Groundwater underlying Landfill 3 (FTMM-3) flows predominantly to the north to Lafetra Creek.

As indicated on the FTMM utility maps in **Appendix K**, there are no outfalls or discharges from FTMM into Lafetra Creek or Mill Creek in the vicinity of Landfill 3 (FTMM-3) that may serve as potential contaminant migration pathways nor utility lines through Landfill 3 that may provide additional contaminant migration pathways from Landfill 3.

The vegetative cover of Landfill 3 (FTMM-3) is mostly cut field with isolated areas of wood-shrub habitat. Silver maple is present along the bank growing through the stabilizing riprap and poison ivy (*Toxicodendron radicans*) can be found on many of the trees. Opposite the landfill, emergent wetlands are dominated by cattail (*Typha* sp.) with patches of common reed (*Phragmites australis*). In the upland areas are black gum, American beech (*Fagus grandifolia*), pin oak (*Quercus palustris*), and silver maple as wells as mixed grasses and forbes including foxtail (*Alopercurus* sp.) and catalpa as well as Japanese knotweed (*Polygonum cuspidatum*) and wild grape (*Vitis* sp.).

GIS digital data available through the NJDEP indicate the presence of freshwater tidal wetlands along the Lafetra Creek opposite Landfill 3 (FTMM-3) as well as deciduous wetlands further to the north and to the west of Landfill 3 (FTMM-3).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. Lafetra Creek, as well as the adjacent wetlands, is Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.3 LANDFILL 4 (FTMM-4)

The M-4 Landfill is located on MP in the area bounded by Avenue of Memories to the south, North Drive to the north, Mill Creek to the west, and Wilson Avenue to the east. The 1.4-acre landfill operated from 1955 until 1956. The types of materials disposed of in the landfill have been reported to include construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components.

Under the IRP SI, three monitoring wells were installed to evaluate groundwater quality. All samples were analyzed for TCL+30 parameters, TAL metals, and cyanide. The results are as follows:

- A single pesticide [4,4′-dichlorodiphenyltrichloroethane (4,4′-DDT)] was detected in an upgradient monitoring well at concentrations exceeding the NJDEP GWQC. As of 2002, 15 consecutive quarterly rounds of groundwater samples had been collected for subsequent analysis. Lead was initially detected in site monitoring wells at concentrations exceeding the NJDEP GWQC.

The IRP recommended NFA for the site (Versar, Inc., 2004b, 2005a). Subsequently, it was determined that the FTMM-4 Landfill required additional evaluation through the BEE process.

As part of the BEE, six sediment samples and one surface water sample were collected from Mill Creek adjacent to Landfill 4 (FTMM-4). These are discussed further in **Section 3.4.2.3**.

Mill Creek borders Landfill 4 (FTMM-4) along its west side. Both banks of Mill Creek along Landfill 4 (FTMM-4) have undergone stabilization. The site slopes gently to the west and surface runoff is discharged to Mill Creek. Groundwater underlying Landfill 4 (FTMM-4) flows to the west in the direction of Mill Creek.

As indicated on the FTMM utility maps in **Appendix K**, storm water outfalls discharge into Mill Creek in the vicinity of Landfill 4 (FTMM-4) near the northern and southern end of Landfill 4 (FTMM-4) which direct discharges from the surrounding area including the vicinity of Buildings 689, 1123, and 1221. The storm water line discharging into the northern end of Landfill 4 crosses Landfill 4 in a northwesterly direction and may act as a preferentially migration pathway for contaminants from Landfill 4 towards Mill Creek.

Landfill 4 (FTMM-4) is mostly mowed lawn with scattered large trees with grasses and forbes and small trees along Mill Creek. Along the creek are grasses and forbes with small trees; dominant vegetation is poison ivy, black cherry (*Prunus serotina*), catalpa, and goldenrod (*Solidago* sp.). To the south along the creek are Virginia creeper and wild rose, as well as pin oak and black willow (*salix nigra*). Black locust (*Robinia pseudoacacia*) and black oak (*Quercus velutina*) are present in the mowed area as well as Norway maple (*Acer platanoides*) and American bittersweet (*Celastrus scandens*) bordering the road.

No significant habitats in the vicinity of Landfill 4 (FTMM-4) are identified within GIS digital data available through the NJDEP.

2.5.1.4 LANDFILL 5 (FTMM-5)

The FTMM-5 Landfill is located just north of the FTMM-4 Landfill in the area bounded by North Drive to the south, an unpaved road south of Building 198 to the north, Wilson Avenue to the east, and Mill Creek and Parkers Creek to the west. The 3.2-acre landfill operated from 1952 until 1959. The types of materials disposed of in the landfill have been reported to include construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated

photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components.

Under the IRP SI, two monitoring wells were installed to evaluate groundwater quality. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- PCE was detected in one monitoring well at concentrations exceeding the NJDEP GWQC. Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis.
- Surface water samples collected under an NJPDES permit identified PCE at concentrations exceeding the NJDEP SWQC.

Under the RI, approximately 260 groundwater and soil samples were collected by means of a Geoprobe® sampling device. Following the Geoprobe® investigation, 13 additional monitoring wells were installed to further evaluate groundwater quality. At present, the extent of the PCE plume has been delineated both vertically and horizontally within site soil and groundwater.

The IRP recommended NFA for near surface soil (Versar, Inc., 2004c), and a CEA was prepared for groundwater. Subsequently, it was determined that the M-5 Landfill required additional evaluation through the BEE process.

As part of the BEE, six sediment samples and one surface water sample were collected from Mill Creek adjacent to Landfill 5 (FTMM-5). These are discussed further in **Section 3.4.2.4**.

Mill Creek borders Landfill 5 (FTMM-5) along its west side. Landfill 3 (FTMM-3) lies across Mill Creek to the west, Landfill 8 (FTMM-8) is to the north, and Landfill 4 (FTMM-4) is to the south. The bank of Mill Creek along Landfill 5 (FTMM-5) has undergone stabilization. The site slopes gently to the west and surface runoff is discharged to Mill Creek. Groundwater at the Landfill 5 (FTMM-5) flows to the west to Mill Creek.

As indicated on the FTMM utility maps in **Appendix K**, there are no outfalls or discharges from FTMM into Mill Creek adjacent Landfill 5 (FTMM-5) that may serve as potential contaminant migration pathways, though there are storm water utility discharges located immediate upstream of Landfill 5 (FTMM-5) that serve to drain the surrounding roads and building areas. There are, however, storm water lines within Landfill 5 that may act as additional contaminant migration pathways for transport from Landfill 5, particularly toward Landfill 8 (FTMM-8) located to the north (**Section 2.5.1.5**).

Landfill 5 (FTMM-5) is mostly mowed lawn with scattered large trees: white oak (*Quercus alba*), red mulberry (*Morus rubra*), black gum, and red maple. Along the creek are mixed forbs and shrubs: black locust, horseweed (*Conyza* sp.), Queen Anne's lace (*Daucus carota*), black-eyed Susan (*Rudbeckia hirta*), and cone flowers (*Echinacea* sp.).

Though the GIS digital data available through the NJDEP do not indicate the presence of critical habitats at Landfill 5 (FTMM-5), the forested area to the north is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species, and is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.5 LANDFILL 8 (FTMM-8)

The FTMM-8 Landfill is located north of Buildings 692 and 697 in a bend of Parkers Creek. The 7.2-acre landfill operated from 1962 until 1981. Following closure of the FTMM-8 Landfill, all solid wastes generated at FTMM were directed to the Monmouth County Landfill. The types of materials disposed of in the landfill have been reported to include construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components.

Under the SI, four monitoring wells were installed to evaluate groundwater quality. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Benzene and chlorobenzene were detected in downgradient monitoring wells at concentrations exceeding the NJDEP GWQC.

Under an enhanced SI phase, seven additional monitoring wells were installed to further evaluate groundwater quality. The results are as follows:

- Benzene and chlorobenzene were detected in four downgradient monitoring wells at concentrations exceeding the NJDEP GWQC.

Contaminant concentrations are consistent with those identified during the IRP SI phase and subsequent quarterly long-term monitoring results for surface water and groundwater at the FTMM-8 Landfill.

PCB soil contamination was identified at one location within the FTMM-8 Landfill. A second RI was also completed that evaluated the potential for environmental contaminants being present within the existing landfill cover material.

The IRP recommended NFA for near surface soil (Versar, Inc., 2004d). For subsurface soils, the DPW incorporated a document equivalent to a DER into the FTMM Installation Master Plan for PCB soil contamination. A CEA was prepared for groundwater. Subsequently, it was determined that the FTMM-8 Landfill required additional evaluation through the BEE process.

As part of the BEE, 10 sediment samples and two surface water samples were collected from Parkers Creek adjacent to Landfill 8 (FTMM-8), and one surface water and one sediment sample were collected upstream of Landfill 8 (FTMM-8) on the North Branch Parkers Creek. These are discussed further in **Section 3.4.2.5**.

Parker Creek borders Landfill 8 (FTMM-8) along its west, north, and east sides. The bank of Parkers Creek along Landfill 8 (FTMM-8) has undergone stabilization and a service road lies adjacent to Parkers Creek. The site slopes sharply toward Parkers Creek and surface runoff is discharged to Parkers Creek. Groundwater underlying Landfill 8 (FTMM-8) flows to the north-northwest to Parkers Creek.

As indicated on the FTMM utility maps in **Appendix K**, storm water outfalls discharge into Parkers Creek at the western end of Landfill 8 (FTMM-8), as well as to the east of Landfill 8, which may direct discharges from the surrounding area, including Landfill 5 (**Section 2.5.1.4**), to Parkers Creek. Storm water utility lines in the south and eastern end of Landfill 8 may provide additional contaminant migration pathways from Landfill 8 including towards Parkers Creek to the west.

Common reed dominates the emergent wetlands opposite Parkers Creek from Landfill 8 (FTMM-8). The upland area is heavily wooded. Dominant species are cedar (*Chamaecyparis* sp.), sweet gum (*Liquidambar styraciflua*), black locust, Japanese knotweed, staghorn sumac (*Rhus typhina*), foxtail grass, Asiatic dayflower (*Commelina communis*), pin oak, common mullein (*Verbascum thapsus*), boxwood (*Buxus* sp.), black willow, poison ivy, silver maple, yellow birch (*Betula alleghaniensis*), Norway maple, red oak, and tree of heaven (*Ailanthus altissima*).

GIS digital data available through the NJDEP indicate the presence of phragmites dominated wetlands along Parkers Creek opposite Landfill 8 (FTMM-8), with deciduous shrub/scrub wetlands and deciduous wetlands present further from the landfill. Landfill 8 (FTMM-8) is identified as coastal forest habitat.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland areas across Parkers Creek and the forested areas on Landfill 8 (FTMM-8) are habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. Parkers Creek and the wetlands and forested areas are listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.6 LANDFILL 12 (FTMM-12)

The M-12 Landfill is located on the MP, on the south side of Husky Brook, west of Murphy Drive. Dates of operation for the 7.1-acre landfill are unknown. The types of materials disposed in the landfill have been reported to include construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components. Metal, concrete, and other types of landfill debris can be observed protruding from the stream bank along Husky Brook.

Under the IRP SI, three monitoring wells were installed to evaluate groundwater quality. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Arsenic, cadmium, mercury, and lead were detected in site monitoring wells at concentrations less than the NJDEP GWQC.

An RI of site groundwater has been completed and eight additional monitoring wells have been installed at the site. The results are as follows:

- Arsenic was consistently detected in two monitoring wells at concentrations exceeding the NJDEP GWQC.

An RI that evaluated the potential for environmental contaminants being present within the existing landfill cover material was completed.

The IRP recommended NFA for near surface soil (Versar, Inc., 2003), and a CEA was submitted for groundwater. Subsequently, it was determined that the FTMM-12 Landfill required additional evaluation through the BEE process.

As part of the BEE, nine sediment samples and two surface water samples were collected from Husky Brook adjacent to Landfill 12 (FTMM-12), one surface water sample and one sediment sample were collected downstream of Landfill 12 (FTMM-12) on Oceanport Creek, one surface water and two sediment samples were collected immediately upstream of Landfill 12 (FTMM-12), and one surface water sample and one sediment sample were collected further upstream. These are discussed further in **Section 3.4.2.6**.

Husky Brook borders Landfill 12 (FTMM-12) along its north side and a small tributary to Husky Brook divides Landfill 12 (FTMM-12) into an east and a west section. The bank of Husky Brook along Landfill 12 (FTMM-12) has undergone stabilization. The site is generally flat and groundwater underlying Landfill 12 (FTMM-12) flows to the north to Husky Brook.

As indicated on the FTMM utility maps in **Appendix K**, several storm water outfalls discharge into Husky Brook, as well as the small tributary to Husky Brook, in the vicinity of Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14) from the surrounding areas. Several of the storm water utility lines cross through Landfill 12 and may act as preferential contaminant migration pathways for transport from Landfill 12 towards Husky Brook.

The riparian zone on both banks of Husky Brook is characterized as hardwoods and shrubs and contains groundsel bush, locust trees, black cherry, common wormwood (*Artemisia vulgaris*), bayberry, black oak, milkweed, horseweed, goldenrod, eastern cottonweed, staghorn sumac, Queen Anne's lace, red cedar, marsh elder, silver maple, and pin oak. Some common reed is present nearest Wallington Avenue-Murphy Drive. The upland area south of Husky Brook is old field habitat and includes common reed and tall grasses, mugwort, goldenrod, Queen Anne's lace, vetch, as well as black locust, marsh elder, groundsel bush, wild grape, staghorm sumac, bayberry, silver maple, crab apple, and gray birch.

GIS digital data available through the NJDEP indicate the presence of deciduous wooded wetlands along both banks of Husky Brook in the western half of Landfill 12 (FTMM-12) as well as along the small tributary that divides Landfill 12 (FTMM-12). Based on on-site observations, these wetlands are less extensive than indicated through the NJDEP data.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland areas along Husky Brook and the small tributary are habitat Rank 1, which is assigned to patches that meet

suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. To the east of Landfill 12 (FTMM-12), on the opposite side of Wallington Avenue-Murphy Drive, the emergent wetland areas are habitat Rank 4 for the Least Tern; this rank indicates at least one or more occurrences of a state endangered species. Husky Brook, as well as the wetlands and the forested areas of Landfill 12 (FTMM-12), is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.7 LANDFILL 14 (FTMM-14)

The M-14 Landfill is located on the MP, on the north side of Husky Brook, west of Murphy Drive. The 6.9-acre landfill operated from 1965 until 1966. The types of materials disposed of in the landfill have been reported to include construction debris, scrap metal, ACM, vegetative waste, unwashed containers that previously held hazardous materials/wastes, outdated photographic chemicals, small quantities of outdated drugs, sludge from the STP, soot and boiler scale, incinerator ash, oil spill debris, oil filters, batteries, fluorescent tubes, and electronic components. Metal, concrete, and other types of landfill debris were previously observed protruding from the stream bank along Husky Brook.

Under the IRP SI, three monitoring wells were installed to evaluate groundwater quality. In addition, surface water samples were collected from Husky Brook. All samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Lead was detected in one downgradient monitoring well above NJDEP GWQC.

As of 2002, 11 consecutive quarterly rounds of groundwater samples had been collected for subsequent analysis. The results are as follows:

- Arsenic was detected in one site monitoring well at concentrations exceeding the NJDEP GWQC.
- Lead and *cis*-1,2-dichloroethene were detected in surface water samples less than the NJDEP SWQC.

The IRP recommended NFA for the site (Versar, Inc., 2004e). Subsequently, it was determined that the FTMM-14 Landfill required additional evaluation through the BEE process.

As part of the BEE, 10 sediment samples and two surface water samples were collected from Husky Brook adjacent to Landfill 14 (FTMM-14), one surface water sample and one sediment sample were collected downstream of Landfill 14 (FTMM-14) on Oceanport Creek, one surface water and two sediment samples were collected immediately upstream of Landfill 14 (FTMM-14), and one surface water sample and one sediment sample were collected further upstream. These are discussed further in **Section 3.4.2.7**.

Husky Brook borders Landfill 14 (FTMM-14) along its south side. An access road/walking trail lies adjacent to Husky Brook for most of the length of Landfill 14 (FTMM-14) before crossing over Husky Brook. The bank of Husky Brook along Landfill 14 (FTMM-14) has undergone stabilization. The site is generally flat and groundwater underlying Landfill 14 (FTMM-14) flows to the south to Husky Brook.

As indicated on the FTMM utility maps in **Appendix K**, several storm water outfalls discharge into Husky Brook, as well as the small tributary to Husky Brook, in the vicinity of Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14) from the surrounding areas. Though several of the storm water utility lines cross through Landfill 12 and may act as preferential contaminant migration pathways for transport from Landfill 12 towards Husky Brook, the storm water and gas lines located in the northern section of Landfill 14 may act as contaminant migration pathways from Landfill 14 to the east, west, and north, away from Husky Brook.

The riparian zone on both banks of Husky Brook is characterized as hardwoods and shrubs and contains groundsel bush, locust trees, black cherry, common wormwood, bayberry, black oak, milkweed, horseweed, goldenrod, eastern cottonweed, staghorn sumac, Queen Anne's lace, red cedar, marsh elder, silver maple, and pin oak. Some common reed is present nearest Wallington Avenue-Murphy Drive. The area to the east and north of the trail is mostly mixed tall grasses. To the west of the field area is a

heavily wooded section; this area contains boxwood, sweetgum, pin oak, black locust, goldenrod, milkweed, pokeweed, wild rose, black cherry, poison ivy, Asiatic bittersweet, sassafras, and black oak. An emergent wetland area is present bordering Husky Brook and is characterized by cattail, smartweed, and vibernum. The far western section is maintained lawn with isolated trees.

GIS digital data available through the NJDEP indicate the presence of deciduous wooded wetlands along both banks of Husky Brook in the western half of Landfill 14 (FTMM-14) as well as along the small tributary that divides Landfill 12 (FTMM-12). Based on on-site observations, these wetlands are less extensive than indicated through the NJDEP data.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland areas along Husky Brook and the small tributary are habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. To the east of Landfill 14 (FTMM-14), on the opposite side of Wallington Avenue-Murphy Drive, the emergent wetland areas are habitat Rank 4 for the Least Tern; this rank indicates at least one or more occurrences of a state endangered species. Husky Brook, as well as the wetlands and the forested areas of Landfill 14 (FTMM-14), is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.8 WATER TANK (FTMM-15)

The 1980 Installation Assessment (IA) report (USATHAMA, 1980) identified the 0.3-acre FTMM-15 site as a potential Area of Concern. A 500,000-gallon AST is located at the FTMM-15 site. The tank, built in 1941, is of steel construction and was always used for the storage of potable water. The tank is located in the northeast section of the MP next to Parkers Creek, a tributary of the Shrewsbury River.

Under the IRP SI, environmental contaminants in the form of pesticides and heavy metals were identified in site soil. The results are as follows:

- Two pesticides, 4,4′-dichlorodiphenyldichloroethylene (4,4′-DDE) and 4,4′-DDT, were identified at concentrations exceeding the NJDEP Residential Direct Contact Soil Cleanup Criteria. It was determined that the pesticide contamination was the result of past over spraying practices.
- Three heavy metals—cadmium, lead, and zinc—were also identified at concentrations exceeding the NJDEP Residential Direct Contact Soil Cleanup Criteria.

Under the IRP RI, environmental sampling confirmed that the contaminants of concern had migrated horizontally towards Parkers Creek. A corrective action was implemented at the FTMM-15 site involving the removal of the contaminated soil from the site, thereby eliminating the contaminants of concern. Final remedial activities were completed in November of 1999. An RA report will be submitted to NJDEP with a NFA recommendation from the Army.

The IRP recommended NFA for the site. Subsequently, it was determined that FTMM-15 required additional evaluation through the BEE process.

As part of the BEE, four sediment samples and three surface water samples were collected from Parkers Creek adjacent to FTMM-15, of which one surface water sample and one sediment sample were collected immediately downstream of FTMM-15 and one surface water sample and one sediment sample were collected immediately upstream of FTMM-15. These are discussed further in **Section 3.4.2.8**.

Parkers Creek borders FTMM-15 along its north side. Parkers Creek is a wide, open water tidal water body in this area. The banks along Parkers Creek are steep and groundwater underlying FTMM-15 flows to the north to Parkers Creek.

The area of FTMM-15 immediately surrounding the water tank is maintained lawn. The banks along Parkers Creek are steep and vegetated. Vegetation includes poison ivy, pin oak, alder, Japanese knotweed, black willow, staghorn sumac, black locust, rose, and Norway maple.

No significant habitats in the vicinity of FTMM-15 are identified within GIS digital data available through the NJDEP.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that Parkers Creek is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.9 PESTICIDE STORAGE, BUILDING 498 (FTMM-16)

A former pesticide storage and mixing area was located at the 0.12-acre FTMM-16 site on the MP. The facility (Building 498) is a brick structure and was constructed in 1939. Pesticide management was conducted at the site until the late 1950s. Following this, the operation was moved to Building 65.

Under the IRP SI, a total of 10 pesticide compounds were detected greater than laboratory quantitative limits in site soil. Five pesticide compounds were found at concentrations exceeding the NJDEP Residential Direct Contact Soil Cleanup Criteria.

Environmental sampling confirmed that the contaminants were migrating horizontally in the direction of Oceanport Creek. The creek is located approximately 250 feet downgradient of the FTMM-16 site. A corrective action was implemented to remove the contaminated soil from the site, and final remedial activities were completed in February of 1999.

The IRP recommended a NFA for the site. Subsequently, it was determined that FTMM-16 required additional evaluation through the BEE process.

As part of the BEE, four sediment samples and three surface water samples were collected from Oceanport Creek near FTMM-16, of which one surface water sample and one sediment sample were collected downstream of FTMM-16, and one surface water sample and one sediment sample were collected upstream of FTMM-16. These are discussed further in **Section 3.4.2.9**.

Site FTMM-15 is approximately 100 yards north of Oceanport Creek which is a wide, open water tidal water body in this area. Immediately south of Site FTMM-15 is a marina and the banks of Oceanport Creek are contained by bulkheads. West of the marina and east of Oceanport Avenue the bank slopes gently to Oceanport Creek. Groundwater underlying FTMM-16 flows to the south to Oceanport Creek.

The area immediately surrounding the FTMM-15 site is maintained lawn. Along Oceanport Creek are buildings, structures, and pavement associated with the marina. West of the marina is an emergent wetland area of sedges and rushes dominated by cattails and common reeds.

GIS digital data available through the NJDEP indicate the presence of low marsh saline wetlands west of the marina and east of Oceanport Avenue.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area along Oceanport Creek is habitat Rank 4 for the Least Tern; this rank indicates at least one or more occurrences of a state endangered species. Oceanport Creek, as well as the wetlands, is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.10 FORMER TRAINING AREA/LANDFILL (FTMM-18)

The FTMM-18 site is a former training area utilized by the Army Signal School and other Army units. The FTMM-18 site is located on the MP, between Parkers Creek to the north and Buildings 283, 289, 293, and 294 to the south. The 4.85-acre site is partially paved and the remaining portion is an open sandy area. A tidal marsh adjoins the site. The 1980 IA report (USATHAMA, 1980) identifies diesel and gasoline generators and military vehicles being used at this site. The report states that numerous fuel spills occurred at the site as a result of these activities.

Under the IRP SI, nine soil borings in a grid pattern were drilled at the site. Two soil samples were collected from each boring, either 6 to 12 inches or 12 to 18 inches below the bottom of the asphalt (to avoid bias) and either from intervals with visible staining or from just above the water table. Soil

samples were analyzed for volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH). The results are as follows:

- No compounds of concern were detected at concentrations exceeding the NJDEP Direct Residential Contact Soil Cleanup Criteria.

Two soil boring locations were converted to monitoring wells in order to evaluate groundwater quality. One existing monitoring well was also used to evaluate groundwater quality. Groundwater samples were analyzed for TCL+30, TAL metals, and TPH. The results are as follows:

- Arsenic, lead, and 4,4′-dichlorodiphenyldichloroethane (4,4′-DDD) were detected in downgradient monitoring wells at concentrations exceeding the NJDEP GWQC.

Under an enhanced SI under the IRP, three additional monitoring wells were installed to further evaluate groundwater quality. Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis. The results are as follows:

- Benzene and lead were detected in four of the six site monitoring wells at concentrations exceeding the NJDEP GWQC.

A geophysical survey was also conducted under the SI to determine whether the M-18 site was a former landfill. The data gathered from geophysical survey identified waste materials buried at the site. Subsequent trenching work confirmed the presence of construction debris.

A RI that evaluated the potential for environmental contaminants being present within the existing landfill cover material was completed. This resulted in a NFA determination regarding the landfill cover material.

The IRP recommended NFA for near surface soil (Versar, Inc., 2004f), and a CEA was submitted for groundwater. Subsequently, it was determined that FTMM-18 required additional evaluation through the BEE process.

As part of the BEE, four sediment samples and one surface water sample were collected from Parkers Creek adjacent to Site FTMM-18, and one surface water sample and one sediment sample were collected immediately upstream of Site FTMM-18. These are discussed further in **Section 3.4.2.10**.

Parkers Creek borders Site FTMM-18 along all but its southern boundary. At the western end, Parkers Creek is narrow (approximately 10 yards) but then opens to a wide (approximately 100 yard) open water tidal area at the eastern end. The bank of Parkers Creek on the western side of Site FTMM-18 has undergone stabilization. The central portion of the site is generally flat with greater slopes to the north and east and groundwater underlying Site FTMM-18 flows toward Parkers Creek.

As indicated on the FTMM utility maps in **Appendix K**, several storm water utility lines may discharge into Parkers Creek in the vicinity of Site FTMM-18. These storm water lines drain areas south and east of Site FTMM-18 including Buildings 291 to 296 and Building 283 (FTMM-61) in Parcel 49 (**Sections 2.5.1.13 and 2.5.1.15**). Several of the storm water utility lines cross through Site FTMM-18 in a northerly direction and may act as preferential contaminant migration pathways for transport from Site FTMM-18 towards Parkers Creek.

The western and central portion of Site FTMM-18 is maintained lawn with some hardwoods and small pockets of emergent wetland dominated by common reed. The western border, adjacent to Parkers Creek, contains shrubs and small hardwoods. Some pines are planted in this area and an active Osprey platform is present. Bordering Parkers Creek to the north and east are extensive emergent wetlands dominated by common reed in the high marsh and sedge-reed wetlands in the low marsh. The northeastern and eastern portions also contain forested wetlands sloping sharply to the emergent wetlands and Parkers Creek. Common vegetation at Landfill 18 (FTMM-18) includes black locust, black cherry, northern boxwood, Asian bittersweet, wild grape, marsh elder, goldenrod, red cedar, poison ivy, tree of heaven, red mulberry, and bayberry.

GIS digital data available through the NJDEP indicate the presence of Phragmites dominated coastal wetlands and high marsh saline wetlands adjacent to Parkers Creek. Based on observations,

there is also an area of deciduous wetlands between the maintained lawns and the emergent wetlands, and a small emergent wetlands within the area of maintained lawn.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland areas along Parker Creek are habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. Parkers Creek, as well as the associated wetlands, is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.11 PRE-1941 FORMER SANITARY SEWAGE TREATMENT PLANT (FTMM-20)

Site FTMM-20 is the location of the former Sanitary STP adjacent to Parkers Creek in an area north of Allen Avenue in approximately the same location as current Building 259. Though the date of construction and period of operation are unknown, it is believed that this STP operated until the second MP STP came on line in 1941.

As part of the IRP SI (Weston, 1995), one sediment sample was collected from Parkers Creek at the former wastewater discharge point. The results from this sample are as follows:

- Arsenic, cadmium, chromium, and zinc were detected at concentrations exceeding NJDEP sediment criteria and background levels.

Additional sediment samples were collected during the IRP RI to delineate the extent of the metal contamination at the site (Versar, Inc., 2004g). Sediment samples at three depths at seven locations in the vicinity of the former wastewater discharge point, as well as three locations northwest and away from the influence of the STP discharge were collected. The RI results are as follows:

- Heavy metal concentrations at the site were consistent with background metal concentrations from nearby, undisturbed locations.

The RI Report was submitted to the NJDEP in 2004 requesting a NFA determination. Subsequently, it was determined that the FTMM-20 Landfill required additional evaluation through the BEE process.

As part of the BEE, two sediment samples and two surface water samples were collected from Parkers Creek adjacent to Site FTMM-20. These are discussed further in **Section 3.4.2.11**.

The majority of the area of Site FTMM-20 is pavement and maintained lawns sloping towards Parkers Creek to the northwest. Adjacent to Parkers Creek the banks are steep and dominated by hardwoods and shrubs. Emergent wetlands exist at the bottom of the slope dominated by common reed. Groundwater in the vicinity of Site FTMM-20 is to the northwest and toward Parkers Creek.

No significant habitats in the vicinity of Site FTMM-20 are identified within GIS digital data available through the NJDEP.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that Parkers Creek is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.12 BUILDING 1122, UNKNOWN DISCHARGE (FTMM-59)

Site FTMM-59 is located on Alexander Avenue, adjacent to Mill Creek on the MP. The 0.34-acre Site FTMM-59 contains Building 1122, which is also identified as part of the 1.54-acre Parcel 43. Site FTMM-59 and ECP Parcel 43 are addressed in this BEE as one site – FTMM-59.

Building 1122 is located on the MP and houses a modern “do-it-yourself” vehicle repair shop. Building 1122 is a single story slab building approximately 11,600 square feet in size. Furniture paint stripping was reported in the Woodworking Craft Shop section of Building 1122 in 1973. Currently, all vehicle repairs are done by FTMM personnel and are performed inside the building. Degreasing solvents are used, which generates hazardous waste. Pneumatic lifts are present. The 2006 Stormwater Pollution Prevention Plan states, “Floor drains located near the pneumatic lifts, have been closed off.”

Used oil is collected in a 55-gallon drum stored inside the shop. When filled, the contents are pumped into a 995-gallon, double-walled AST located between the repair shop and the car wash (Building 1124). The floors drains, previously connected to the car wash facility in Building 1124, were sealed in June 2007. The enclosed car wash facility is located east of the repair shop. All wash water is recycled and reused and an active oil/water separator is in place. A 1993 renovation plan, which details the replacement of the floor drains, shows that the drains were connected to the sanitary sewer system. A former oil/water separator was associated with this building.

In 2007, as part of the ECP SI (Shaw, 2008), sediment, soil gas, and indoor air samples were collected to assess environmental conditions on Parcel 43. Six sediment samples were collected from three sample borings located along the south bank of Mill Creek at potential discharge locations adjacent to Building 1122. Mill Creek is a tidally influenced water body in this portion of the facility. At each sample location, two samples were collected: one from the 0- to 6-inch below ground surface (bgs) interval and the other from the 12- to 18-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. All samples collected were analyzed for TCL+30 (without pesticides) and TAL metals. The results are as follows:

A total of 11 semivolatile organic compounds (SVOCs), 2 VOCs, and 18 metals were detected in sediment samples.

- Eight SVOCs [anthracene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*k*)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene] were detected at concentrations that exceeded the salt water sediment criteria in two samples.
- The two VOCs were detected at concentrations less than the salt water sediment criteria .
- Eight of 18 metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) were detected at concentrations that exceeded the salt water sediment criteria in all six samples.

Five soil gas samples (including one duplicate) and an indoor air sample were collected in and around Building 1122 to evaluate vapor intrusion. Samples were analyzed for VOCs. The results are as follows:

Twenty-one VOCs were detected in all five soil gas samples. A total of 25 VOCs were detected in the indoor air sample.

- Of the 21 VOCs detected in soil, 2 (PCE and TCE) exceeded the NJDEP generic vapor intrusion non-residential indoor air screening levels.
- Of the 25 VOCs detected in indoor air, 2 (benzene and dichloromethane) exceeded the NJDEP generic vapor intrusion screening levels.

The DPW removed one UST located next to Building 1122 (a self-help vehicle repair shop) in June 1994. The UST was a single wall steel tank used for storing No. 2 fuel oil. During tank closure activities, a petroleum discharge to site soil and groundwater was identified. Upon further investigation, the DPW determined that a second UST was removed from the same area during the late 1980s. Discussions with site personnel indicated that the tank was removed because of inventory control problems. It is assumed that the site was not fully remediated during the first UST closure.

In accordance with NJDEP UST Site Assessment activity requirements, all petroleum contaminated soils have been removed and disposed. In addition, the DPW has installed two monitoring wells to determine any adverse impact to groundwater. The results are as follows:

- TCE was initially detected at concentrations exceeding the NJDEP GWQC.

Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis. The results are as follows:

- TCE continues to be quantified in one of the two site monitoring wells at concentrations exceeding the NJDEP GWQC.

Surface water sampling points (Mill Creek) downstream from the site and are currently being monitored.

The IRP recommended a CEA for groundwater, and a BEE was recommended for Parcel 43 in the ECP SI.

As part of the BEE, two surface water samples were collected from Mill Creek adjacent to Building 1122, FTMM-59 and Parcel 43. These are discussed further in **Section 3.4.2.12**.

Mill Creek borders Building 1122, FTMM-59, and Parcel 43 along its north side. The bank of Mill Creek along this area has not undergone stabilization. FTMM-59 and Parcel 43 is mostly paved with small patches of mowed and maintained lawns. The site slopes gently to the north and the banks immediately adjacent to Mill Creek are steep. Surface runoff is discharged to Mill Creek. Groundwater underlying FTMM-59 and Parcel 43 flows to the north-northwest to Mill Creek.

As indicated on the FTMM utility maps in **Appendix K**, a storm water outfall may discharge into Mill Creek to the east of Building 1122. This storm water line may drain the area of Building 1122 and Parcel 43 as well as buildings to the east. Storm water and gas lines located around Building 1122 may also act as contaminant migration pathways from Parcel 43 away from Mill Creek.

The vegetative cover along Mill Creek adjacent to FTMM-59 and Parcel 43 is mostly hardwoods with a thick understory. Common vegetation includes black jack oak, black cherry, black locust, pin oak, poison ivy, sassafras, jewelweed, greenbrier, Japanese knotweed, crab apple, and wild rose.

GIS digital data available through the NJDEP indicate the presence of deciduous wetlands along Mill Creek in the area of Building 1122, FTMM-59, and Parcel 43.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

2.5.1.13 BUILDING 283, LEAKING UST, GASOLINE (FTMM-61)

Site FTMM-61 is located off of Sherrill Avenue in the northern section of the MP and encompasses an area of less than 0.2 acre. Because FTMM-61 is within Parcel 49, the two areas are addressed in this BEE as one site: FTMM-61. On August 28, 1997, a 3,000-gallon steel UST (No. 0081533-229) used to store gasoline was removed. The UST was located within the courtyard of Building 283. Following its removal, the UST was inspected and numerous holes were noted. Soils within the tank excavation that corresponded with the locations of the holes in the tank were dark in color and appeared to be contaminated. Based on site assessment activities, it was concluded that a discharge to the environment had occurred. The NJDEP hotline was notified and the site was assigned Case # 97-8-28-1330-33. Approximately 400 cubic yards of contaminated soil was removed and disposed off-site in accordance with NJDEP requirements. Groundwater was encountered at 12.0 feet below grade and a sheen was observed on the groundwater. In response to this observation, one groundwater sample was collected. The sample was analyzed for VOCs to include a calibration for xylenes plus 15 tentatively identified compounds (TICs). The results are as follows:

- Benzene, ethylbenzene, toluene, and lead were detected at concentrations exceeding the NJDEP GWQC.

Subsequently, consecutive quarterly rounds of groundwater samples have been collected for analysis. The results are as follows:

- Benzene was detected at a concentration at concentrations exceeding the GWQC.
- Ethyl benzene was detected at a concentration at concentrations exceeding the GWQC.
- Toluene was detected at a concentration at concentrations exceeding the GWQC.
- Lead was detected at a concentration at concentrations exceeding the GWQC.

The IRP recommended that a CEA for groundwater be submitted. Subsequently, the site was considered to require additional evaluation through the BEE process.

As part of the BEE, two surface water samples were collected from Parkers Creek adjacent to Parcel 49 and Building 283. These are discussed further in **Section 3.4.2.13**.

Parkers Creek borders FTMM-61 and Parcel 49 along its north side. The bank of Parkers Creek adjacent to FTMM-61 and Parcel 49 has not undergone stabilization and is steep and well-vegetated. Parcel 49 is mostly buildings and pavement with small portions of mowed and maintained lawns. The site slopes gently to the north and surface runoff is discharged to Parkers Creek. Groundwater underlying Parcel 49 flows to the north toward Parkers Creek.

As indicated on the FTMM utility maps in **Appendix K**, several storm water utility lines may discharge into Parkers Creek in the vicinity of Building 283 and Parcel 49 (**Section 2.5.1.15**). These storm water lines drain the areas around Building 283 and Parcel 49. Several of the storm water utility lines cross through Site FTMM-18 in a northerly direction and may act as preferential contaminant migration pathways for transport from Parcel 49 to Site FTMM-18 and Parkers Creek. Two storm water utility lines discharge northeast of Building 283 directly into Parkers Creek. Storm water, gas, and water lines located around Building 283 and Parcel 49 may also act as contaminant migration pathways from Parcel 49 and not directly to Parkers Creek.

The vegetative cover of the wooded area along Parkers Creek adjacent to FTMM-61 and Parcel 49 contains red oak, white oak, black locust, and black gum.

GIS digital data available through the NJDEP indicate the presence of mixed high marsh saline wetlands and Phragmites dominated coastal wetlands along Parkers Creek on the western portion of FTMM-61 and Parcel 49.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. In addition, Parkers Creek is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.14 BUILDING 1150 (PARCEL 39)

Parcel 39 is located in the southwestern portion of the MP and encompasses the area between Building 1150 (Vail Hall) and Mill Creek, approximately 0.5 acre. Building 1150 is utilized for administrative purposes. Within the basement is a large Uninterruptible Power Supply Room, emergency generator, floor drains, and a sump pump strictly for high water table events (discharges to basin behind the building and ultimately to Mill Creek). Film developing activities formerly occurred in the basement of the building.

In 2007, as part of an ECP SI (Shaw, 2008), sediment and surface soil were collected to assess environmental conditions on Parcel 39.

A total of four sediment samples were collected from two sample borings located along the north bank of Mill Creek adjacent to Building 1150. Samples were collected from deposition locations immediately downgradient of the drainage basin located directly behind Building 1150. At each sample location, two samples were collected: one from the 0- to 6-inch bgs interval and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. All samples collected were analyzed for TCL+30 (without pesticides) and TAL metals. The results are as follows:

A total of 9 SVOCs and 18 metals were detected in Parcel 39 sediment samples.

- Six [benzo(*a*)anthracene, benzo(*a*)pyrene, chrysene, fluoranthene, phenanthrene, and pyrene] of the nine SVOCs were detected at concentrations that exceeded the freshwater comparison criteria in two samples.
- Arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc were detected at concentrations that exceeded the freshwater comparison criteria in all four samples.

Based upon the resulting data, the ECP SI recommended NFA for soil within Parcel 39.

One surface soil sample was collected from one boring located below an outfall on the north bank of Mill Creek adjacent to Building 1150. The outfall is the end of an underground terracotta pipe that leads from the direction of Building 1150. A sample was collected in order to determine if any contamination exists from potential historical discharges from Building 1150. The surface soil sample for non-VOC analysis was collected from the 0- to 6-inch interval bgs, and the soil sample for VOC analysis was collected from the 18- to 24-inch bgs interval. No visual or olfactory evidence of soil contamination was noted. All samples collected were analyzed for TCL+30 (without pesticides) and TAL metals. The results are as follows:

- A total of 4 SVOCs and 18 metals were detected at concentrations less than the non-residential and impact to groundwater comparison criteria in the Parcel 39 surface soil sample.

Based upon the resulting data, the ECP SI recommended that a BEE be conducted for surface water and sediment at Parcel 39.

As part of the BEE, three sediment samples and one surface water sample were collected from Mill Creek adjacent to Parcel 39. Parcel 39 is on the opposite bank of Mill Creek from Landfill 2 (FTMM-2) and these samples were also collected as part of the Landfill 2 investigation. These are discussed further in **Section 3.4.2.14**.

Mill Creek borders Parcel 39 along its south side. The bank of Mill Creek along Parcel 39 has not undergone stabilization, though the opposite bank along Landfill 2 has been stabilized. Parcel 39 consists mostly of buildings and pavement with some mowed and maintained lawns. The site slopes gently to the south and the banks to Mill Creek are steep; surface runoff is discharged to Mill Creek. Groundwater underlying Parcel 39 flows to the south towards Mill Creek.

As indicated on the FTMM utility maps in **Appendix K**, several storm water outfalls discharge into Mill Creek from the vicinity of Building 1150 and Building 1152 located in Parcel 39 located north of Mill Creek from Landfill 2 (**Section 2.5.1.1**), and these storm water utility lines may act as preferential contaminant migration pathways towards Mill Creek.

Within the lawn areas are tulip trees and black gum. Near Mill Creek, the vegetative cover includes Norway maple, silver maple, black cherry, Asiatic bittersweet, Japanese knotweed, poison ivy, pignut hickory (*Carya glabra*), black willow, black gum, Asiatic dayflower, and burning bush (*Euonymus alata*).

GIS digital data available through the NJDEP indicate the presence of deciduous wetlands and herbaceous wetlands along Mill Creek.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the forested wetland area along Mill Creek adjacent to Parcel 39 is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

2.5.1.15 BUILDINGS 283, 288, 291, 292, 293, 295 (ECP PARCEL 49)

Parcel 49 encompasses the buildings associated with the former Squier Laboratory and other facilities with similar operational histories in the north-central portion of the MP and incorporates an area of approximately 4 acres. The Squier Laboratory Complex included existing Buildings 283, 285, 288, 292, 293, and 298, and former Buildings S-5, S-6, S-6 Annex, S-9, S-10, S-11, S-12, and S-15. Buildings 291, 294, and 295, and former Buildings 289, 290, L-3, T-45, X-9, and X-7 have a similar operational history and are included in Parcel 49 along with the Squier Laboratory buildings. Environmental concerns associated with Squier Laboratory operations include the use of chemicals, solvents, radioisotopes, and metals when waste handling procedures may not have been sufficiently protective to preclude a release to the environment.

A corollary investigation of the historical use of radioactive materials (RAM) was conducted by Cabrera during the Phase I ECP. A Special Investigation Report issued in 1951 for the Squier Signal Laboratory Director discussed a wipe test performed on samples of aluminum covered with polonium lacquer (approximately 230 microcuries) to ensure that no hazard was present at Building 283.

Building 292 serves as storage space for the communications-electronics museum. This storage space contains or contained a Chinese radio and a vacuum tube where radiological commodities were identified with radiological readings above background levels, and radium-contaminated components were found in a posted radioactive storage locker. This storage space once contained 65 items containing RAM, but numerous non-radioactive items have since been removed.

In 2007, as part of the ECP SI (Shaw, 2008), sediment, soil, and groundwater samples were collected to assess environmental conditions on Parcel 49.

Seven (including one duplicate) sediment samples were collected from three sample borings located along the south bank of Parkers Creek. Parkers Creek is a tidally influenced water body in this portion of the facility. Samples were collected in order to determine if previous discharges from former septic and sump systems associated with the Squier Complex have impacted sediment within Parkers Creek. At each sample location, two samples were collected; one from the 0- to 6-inch bgs interval, and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. All samples collected were analyzed for TCL+30 (without pesticides), TAL metals, and cyanide. The results are as follows:

A total of 10 SVOCs, 1 VOC, and 20 metals were detected in Parcel 49 sediment samples.

- All 10 SVOCs and the 1 VOC (acetone) were detected at concentrations less than the saltwater sediment criteria.
- Of the 20 metals, 9 (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) were detected at concentrations that exceeded the saltwater sediment criteria in all seven sediment samples.

Six surface soil samples and seven subsurface soil samples (including one duplicate sample) were collected from six distinct Geoprobe® borings located throughout Parcel 49. An additional seven surface soil samples were collected via hand-auger throughout Parcel 49. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch interval bgs. For borings located in paved areas, non-VOC surface soil samples were collected from the 0- to 6-inch interval directly below the pavement sub-base. Surface soil samples for VOC analysis were collected from the 18- to 24-inch interval bgs. Subsurface soil samples were collected from the 6-inch interval directly above the water table. No visual or olfactory evidence of contaminated soil was noted. All soil samples were analyzed for TCL+30 (without pesticides), TAL metals, and cyanide. The results are as follows:

A total of 22 SVOCs, 5 VOCs, 20 metals, and 1 Aroclor were detected in Parcel 49 soil samples.

- Of the 22 SVOCs, 7 [benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, benzo(*k*)fluoranthene, chrysene, dibenzo(*a,h*)anthracene, and indeno(1,2,3-*cd*)pyrene] were detected at concentrations that exceeded the non-residential comparison criteria in five surface soil samples.
- The five VOCs were detected at concentrations less than the applicable criteria.
- Of the 20 metals, 1 (arsenic) was detected at concentrations that exceeded regulatory criteria.
- Aroclor 1260 was detected in one surface soil sample at a concentration that exceeded regulatory criteria.
- Cyanide was not detected in soil.

Two groundwater samples were collected from two temporary wells that were installed using the Geoprobe®. Temporary wells P49GW-1 and P49GW-1 were installed north of Building 293 and east of former Building 289, respectively. The samples were analyzed for TCL+30 (without pesticides/PCBs) and *tert*-butyl alcohol (TBA). Five groundwater samples (including one duplicate sample) were collected from four existing FTMM monitoring wells located along the northern perimeter of the former Squier Complex area to evaluate groundwater on a parcel-wide basis. These samples were analyzed for TCL+30 (without pesticides), TBA, TAL metals, and cyanide. The results are as follows:

A total of 4 SVOCs, 9 VOCs, and 18 metals were detected in groundwater samples collected in Parcel 49.

- Of the four SVOCs, one [bis(2-ethylhexyl) phthalate] was detected at concentrations that exceeded the NJDEP GWQC in three groundwater samples. The contamination was likely the result of the polyethylene sampling tube that is commonly used for sampling wells. Therefore, it is not considered to be a contaminant of concern in groundwater at Parcel 49.
- Of the nine VOCs, two (benzene and bromodichloromethane) were detected at concentrations that exceed the NJDEP GWQC in two groundwater samples.
- Of the 18 metals, 6 (aluminum, arsenic, beryllium, iron, manganese, and sodium) were detected at concentrations that exceeded the NJDEP GWQC.

Based upon the resulting data, the SI recommended additional evaluation of soils, further evaluation of groundwater under the M-18 groundwater CEA, and that Parcel 49 be included as part of the BEE.

As part of the BEE, two surface water samples were collected from Parkers Creek adjacent to Parcel 49 and Building 283. These are discussed further in **Section 3.4.2.15**.

Parkers Creek borders Parcel 49 along its north side. The bank of Parkers Creek adjacent to Parcel 49 has not undergone stabilization and is steep and well-vegetated. Parcel 49 is mostly buildings and pavement with small portions of mowed and maintained lawns. The site slopes gently to the north and surface runoff is discharged to Parkers Creek. Groundwater underlying Parcel 49 flows to the north toward Parkers Creek.

As indicated on the FTMM utility maps in **Appendix K**, several storm water utility lines may discharge into Parkers Creek in the vicinity of Building 283 (**Section 2.5.1.13**) and Parcel 49. These storm water lines drain the areas around Building 283 and Parcel 49. Several of the storm water utility lines cross through Site FTMM-18 in a northerly direction and may act as preferential contaminant migration pathways for transport from Parcel 49 to Site FTMM-18 and Parkers Creek. Two storm water utility lines discharge northeast of Building 283 directly into Parkers Creek. Storm water, gas, and water lines located around Building 283 and Parcel 49 may also act as contaminant migration pathways from Parcel 49 and not directly to Parkers Creek.

The vegetative cover of the wooded area along Parkers Creek adjacent to Parcel 49 contains red oak, white oak, black locust, and black gum.

GIS digital data available through the NJDEP indicate the presence of mixed high marsh saline wetlands and Phragmites dominated coastal wetlands along Parkers Creek on the western portion of Parcel 49.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. In addition, Parkers Creek is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.16 BUILDING 1075 (ECP PARCEL 61)

Parcel 61, located in the south-central portion of the MP, encompasses Patterson Army Health Clinic (Building 1075) and the surrounding land (approximately 15 acres). Constructed in 1961 to house Patterson Army Hospital, Building 1075 has been used continuously since that time, although it was downgraded to a health clinic in 1995. Operations in the 1960s, 1970s, and 1980s included X-ray processing and laboratory operations. Operations in the building extensively used mercury-containing equipment, developing chemicals, and other chemicals and waste associated with medical operations.

In 2007, as part of the ECP SI (Shaw, 2008), sediment and surface soil samples were collected to assess environmental conditions on Parcel 61.

Four sediment samples were collected from two borings to investigate potential historical discharges to stormwater from Building 1075. One sample was collected at the stormwater outfall, MP17, located along the southeast bank of Oceanport Creek directly north of Building 975. The other sample was collected downstream on the southeast bank of the tributary to Oceanport Creek. Oceanport Creek is a tidally influenced water body in this portion of the facility. At each sample location, two samples were collected, one from the 0- to 6-inch bgs interval, and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. All samples were analyzed for TCL+30 (without pesticides) and TAL metals. The results are as follows:

A total of 16 SVOCs, 1 VOC, and 18 metals were detected in Parcel 61 sediment samples.

- Of the 16 SVOCs, 11 [acenaphthene, anthracene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*k*)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene] were detected at concentrations that exceeded the freshwater sediment criteria in all four sediment samples.
- The VOC toluene was detected at concentrations below the freshwater sediment criteria in one sample.
- Of the 18 metals, 4 (arsenic, chromium, copper, and lead) were detected at concentrations that exceeded the freshwater sediment criteria.

Four surface soil samples were collected from one hand auger location (P61SS-1) and three Geoprobe® boring locations (P61SS-2, 3, and 4). Samples were located along the southeast and northeast corners of Building 1075. Sample P61SS-1 was collected in a grass-covered area near a door at the southeastern corner of Building 1075. Samples P61SS-2 and P61SS-3 were collected near the loading docks of Building 1075. Sample P61SS-4 was collected near the basement door at the northeast corner of Building 1075. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch interval bgs. For surface soil samples located in paved areas, non-VOC surface soil samples were collected from the 0- to 6-inch interval directly below the pavement sub-base. Surface soil samples collected for VOC analysis were collected from the 18- to 24-inch interval bgs. All samples were analyzed for TCL+30 (without pesticides), TAL metals, and cyanide. No visual or olfactory evidence of soil contamination was noted. The results are as follows:

A total of 19 SVOCs and 18 metals were detected in Parcel 61 soil samples.

- Of the 19 SVOCs, 3 [benzo(*a*)anthracene, benzo(*b*)fluoranthene, and benzo(*a*)pyrene] were detected at concentrations exceeding the non-residential comparison criteria in one surface soil sample.
- All 18 metals identified in soil were detected below the Non-Residential Direct Contact Soil Cleanup Criteria.
- Cyanide was not detected in soil at Parcel 61.

Based upon the resulting data, the SI recommended soil for additional evaluation and inclusion of Parcel 61 in a BEE.

As part of the BEE, one surface water sample from the tributary to Oceanport Creek. This is discussed further in **Section 3.4.2.16**.

Parcel 61 is mostly buildings and pavement with small portions of mowed and maintained lawns. Though no significant habitats are present in the immediate vicinity of Parcel 49, stormwater discharges to a small tributary to Husky Brook.

As indicated on the FTMM utility maps in **Appendix K**, several storm water utility lines drain the area around Building 1075 and Parcel 61. These direct discharges to a small tributary to Husky Brook in the vicinity of Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14) (**Sections 2.5.1.6 and 2.5.1.7**). The numerous storm water, gas, and water lines located in and around Parcel 61 may also act as contaminant migration pathways from Parcel 61 to or away from Husky Brook or its tributary.

The vegetative cover along the small tributary to Husky Brook includes boxwood, sweetgum, pin oak, black locust, goldenrod, milkweed, pokeweed, wild rose, black cherry, poison ivy, Asiatic bittersweet, sassafras, and black oak.

GIS digital data available through the NJDEP indicate the presence of deciduous shrub/scrub wetlands along the tributary to Husky Brook.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. In addition, Husky Brook and the adjacent wetlands are listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.1.17 BUILDING 900 (ECP PARCEL 69)

Building 900 is a former tactical motor pool located in the southeastern portion of the MP, which has been utilized for general storage for approximately the last 10 years. It encompasses approximately 0.3 acre. A waste oil tank immediately outside the building was connected by a fill pipe originating from inside the building (since removed). A storm sewer inlet was observed in the parking lot in close proximity to the building during the 2006 Visual Site Inspections (VSIs). A boiler was formerly located outside the building. A 1993 U.S. Army Environmental Hygiene Agency report cites a TCE parts cleaner and 500-gallon waste oil AST being present at the building during the 1993 site visit. The tank has been removed from the building. All TCE parts cleaners were eliminated from use (MP and CWA) in February 1994 under Environmental Program Requirements Project FM0094F088.

Solvents were previously used for cleaning vehicle parts at various locations throughout FTMM. Both the military and the contractors operated solvent parts cleaners. These solvent parts cleaners consisted of a tank and sink with nozzle. The military used Super Agitene for its parts cleaners while the contractor used Siloo Tyme II. Each parts cleaner held about 30 gallons of fluid, which was reused until it needed changing. Fluid changes occurred every 4 months to every 3 years, depending on location and usage.

In 2007, as part of the ECP SI (Shaw, 2008), sediment, soil, and groundwater samples were collected to assess environmental conditions on Parcel 69.

Five sediment samples (including one duplicate sample) were collected from two borings located along the south bank of Oceanport Creek. Oceanport Creek is a tidally influenced water body in this portion of the facility. Sediment samples were collected in order to investigate any potential historical discharges to stormwater from Building 900. One sample was collected directly at a stormwater outfall within Oceanport Creek upstream of Murphy Drive, and the other sample was collected at a stormwater outfall discharging to Oceanport Creek downstream of Murphy Drive. At each sample location, two samples were collected; one from the 0- to 6-inch bgs interval, and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted.

All samples collected were analyzed for TCL+30 (without pesticides) and TAL metals.

The results are as follows:

A total of 8 SVOCs, 4 VOCs, and 20 metals were detected in Parcel 69 sediment samples.

- Of the eight SVOCs, seven [acenaphthene, anthracene, benzo(*a*)anthracene, chrysene, fluoranthene, phenanthrene, and pyrene] were detected at concentrations that exceeded the saltwater sediment criteria.
- All four VOCs were detected at concentrations below the saltwater sediment criteria.
- Of the 20 metals, 9 (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) were detected at concentrations that exceeded the saltwater sediment criteria.

Four surface soil samples and five subsurface soil samples (including one duplicate sample) were collected from four distinct Geoprobe® borings. Three borings, P69SB1, P69SB2, and P69SB3, were

located in the vicinity of the former waste oil AST. The other boring, P69SB-4, was located north of Building 900 to evaluate the absence or presence of contamination downgradient of the building. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch bgs interval. At borings located in paved areas, non-VOC surface soil samples were collected from the 0- to 6-inch interval directly below the pavement sub-base. Surface soil samples collected for VOC analysis were collected from the 18- to 24-inch bgs interval. Subsurface soil samples were collected from the 6-inch interval directly above the water table. No visual or olfactory evidence of soil contamination was noted. All samples collected were analyzed for TCL+30 (without pesticides), TAL metals, and cyanide. The results are as follows:

- A total of 5 SVOCs, 17 metals, and 2 VOCs were detected in concentrations less than the Non-Residential Direct Contact Soil Cleanup Criteria in Parcel 69 surface soil.

Three groundwater samples (including one duplicate sample) were collected from two distinct temporary wells that were installed with the Geoprobe® rig. One temporary well, P69GW-1, was installed in an area of the former waste oil AST east of Building 900, and the other well, P69GW-4, was installed downgradient (north) of Building 900. Samples were analyzed for TCL+30 (without pesticides/PCBs). The results are as follows:

A total of one SVOC and three VOCs were detected in Parcel 69 groundwater.

- The SVOC bis(2-ethylhexyl) phthalate was detected at concentrations exceeding the NJDEP GWQC in two samples. The contamination was likely the result of the polyethylene sampling tube that is commonly used for sampling wells. Therefore, it is not considered to be a contaminant of concern in groundwater at Parcel 69.
- Of the three VOCs detected, one (PCE) was detected at a concentration that exceeds the NJDEP GWQC in one sample.

Based upon the resulting data, the SI recommended NFA for soil, but additional evaluation for groundwater. In accordance with N.J.A.C 7:26E-3.11 (NJDEP, 2009b), Parcel 69 will be addressed as part of this facility-wide BEE.

As part of the BEE, one surface water sample was collected from Oceanport Creek. This is discussed further in **Section 3.4.2.17**.

Parcel 69 is mostly buildings and pavement with small portions of mowed and maintained lawns. Though no significant habitats are present in the immediate vicinity of Parcel 69, stormwater discharges to Oceanport Creek.

The vegetation at Oceanport Creek near stormwater discharge from Parcel 69 is dominated by common reed.

GIS digital data available through the NJDEP indicate the presence of Phragmites dominated coastal wetlands.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the emergent wetland area along Oceanport Creek is habitat Rank 4, which is assigned to patches with one or more occurrences of a state endangered species, in this case the Least Tern. Oceanport Creek and the adjacent wetlands are also listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. However, the presence of bald eagles has not been documented for this site.

2.5.2 CHARLES WOOD AREA

2.5.2.1 LANDFILL, SITE CW-3A (FTMM-25)

The CW-3A site (3.1 acres) was identified as a suspected landfill area during the Preliminary Assessment (PA) phase study under the IRP as IRP Site FTMM-25. Interviews with long-term DPW employees suggested that a former landfill might be present at the site in question. The suspected landfill is located north of the Pulse Power facility (Building 2707), which is also located in the southwestern part of the CWA.

On September 25, 1997, several test pits were excavated at the CW-3A site (FTMM-25) to ascertain whether the site was previously utilized as a landfill. Upon excavating the test pits, waste materials, mostly in the form of construction debris, were observed within the test pits. The debris itself consisted of concrete, asphalt, brick, wood, glass, and assorted scrap metals. Coal ash was also observed within each of the test pits. To evaluate the potential impact the landfill may have had on site soils and groundwater, four shallow monitoring wells were installed on-site. During monitoring well construction, continuous split-spoon soil samples were collected in 4-foot increments. Based upon field observations and measurements, soil samples were collected at the following depth intervals bgs: 0 to 6 inches, 18 to 24 inches, and immediately above the water table. Samples collected at the 18- to 24-inch interval were collected solely for VOCs to include a gas chromatography/mass spectrometry (GC/MS) library search. Samples collected at the 0- to 6-inch interval were analyzed for TCL+30 minus the VOC parameters, TAL metals, and cyanide. Samples collected just above the water table were analyzed for TCL+30 parameters, TAL metals, and cyanide. The results are as follows:

- Benzo(a)anthracene, benzo(*a*)pyrene, and cadmium were detected at concentrations exceeding NJDEP Residential Direct Contact Soil Cleanup Criteria.

A coal ash sample was also collected on December 17, 1997, and was analyzed for TCL+30, TAL metals, and cyanide.

During the week of January 12, 1998, groundwater samples were collected from each of the four monitoring wells. A second round of groundwater samples was collected during the week of January 26, 1998. All groundwater samples were analyzed for TCL+30, TAL metals, and cyanide. The results are as follows:

- Benzene and lead were detected in three downgradient monitoring wells at concentrations exceeding the NJDEP GWQC.
- Arsenic, chromium, and lead were detected in one upgradient monitoring well at concentrations exceeding the NJDEP GWQC.

As of 2002, eight consecutive quarterly rounds of groundwater samples had been collected for chemical analysis. A second RI that evaluated the potential for the presence of environmental contaminants within the existing landfill cover material also was completed.

The IRP recommended NFA for the site (Versar, Inc., 2004h, 2005b). Subsequently, it was determined that the CW-3A Landfill (FTMM-25) required additional evaluation through the BEE process.

As part of the BEE, two surface water samples and six sediment samples were collected from Shrewsbury Creek in the area of Landfill CW-3A (FTMM-25), and one surface water and one sediment sample were collected from Shrewsbury Creek immediately upstream of Landfill CW-3A (FTMM-25). These are discussed further in **Section 3.4.3.1**.

Shrewsbury Creek borders Landfill CW-3A (FTMM-25) along its northern boundary. In this area, Shrewsbury Creek is narrow (less than 5 feet) and is non-tidal freshwater. The banks of Shrewsbury Creek are fairly steep and have not undergone stabilization. The southern portion of the site is generally flat with greater slopes to the north and east and groundwater underlying Landfill CW-3A (FTMM-25) flows toward Shrewsbury Creek.

As indicated on the FTMM utility maps in **Appendix K**, several storm water utility lines drain the area of Parcel 27 around Buildings 2707 and 2713 which discharges to Shrewsbury Creek at the western end of Landfill CW-3A (FTMM-25). The storm water and water lines that cross through the southern end of Landfill CW-3A (FTMM-25) may also act as contaminant migration pathways from Landfill CW-3A.

The southwestern portion of Landfill CW-3A (FTMM-25) is mowed and maintained lawn surrounded by trees including black locust, black walnut, red cedar, Virginia creeper, and Asiatic bittersweet; the largest portion of Landfill CW-3A, though, is heavily wooded. Along Shrewsbury Creek the vegetation includes wild grape, honeysuckle, wild rose, goldenrod, coastal sweet pepperbush (*Clethra alnifolia*), arrowwood, greenbrier, jewelweed, smartweed, Asiatic dayflower, and poison ivy. The upland areas are forested with a closed canopy and sparse vegetation on the forest floor; dominant species include beech, chestnut oak, sassafras, American holly, black oak, and red maple.

GIS digital data available through the NJDEP indicate the presence of deciduous wooded wetlands along Shrewsbury Creek.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

2.5.2.2 FORMER PESTICIDE STORAGE AREA, SITE CW-6 (FTMM-28)

Building 2044 was part of a small complex of buildings located in the southwest section of the CWA golf course. The complex also included Building 2070, a large metal shed, and two smaller metal igloos. Currently, Buildings 2070, 2071, and 2046 are located in the area as confirmed by the VSI. Building 2070 is used to store golf course maintenance and landscaping equipment, such as mowers and tractors. Building 2071 is used as the equipment repair facility. Building 2046 is used as a golf cart and equipment wash area (closed loop) and was also used for pesticide mixing until 2001. The golf course maintenance complex may predate the purchase of the golf course by the Army. Pesticides and herbicides may have been stored and mixed in this area prior to Army ownership of the property. The 1980 IA report (USATHAMA, 1980) contains a 1979 inventory of pesticides and herbicides that were used on the golf course and stored in Building 2044. Pesticides that were present in significant quantities include malathion, sevin, resmethrin, Borocel IV, chlordane, and Dibrom. The IA also discusses a pest control program that was in effect in 1979. The compounds that were used in large quantities include carbaryl (sevin), malathion, chlordane, and diazinon. Some of the herbicides identified in the IA include 2,4-dichlorophenoxyacetic acid, Dacthal, 2,4,5-trichlorophenoxyacetic, and sodium arsenite (USATHAMA, 1980).

The course groundskeeper, who had been part of the grounds crew for 33 years (1960 to 1993), was interviewed during the PA phase. The groundskeeper stated that pesticides and herbicides also were stored inside the two metal igloos and that former mixing activities generally took place directly outside the two igloos. Pesticides and herbicides are not currently stored or mixed on site. The facility has hired an outside contractor to apply pesticides and herbicides.

Under the IRP SI, soil borings were completed at two locations where pesticide mixing was documented to occur within the 0.6-acre site. Two soil samples were collected from each boring, one surface sample and the other sample from the interval just above the water table. In addition, each boring was converted to a monitoring well in order to evaluate groundwater quality. Both soil and groundwater samples were analyzed for TCL+30. The results are as follows:

- Dieldrin was identified in one soil sample at concentrations exceeding the NJDEP Residential Direct Contact Soil Cleanup Criteria.
- Benzene was detected in one groundwater sample at concentrations exceeding the NJDEP GWQC.

Two additional monitoring wells were installed during the IRP RI phase. As of 2002, 15 consecutive quarterly rounds of groundwater samples had been collected for subsequent analysis. The results are as follows:

- Heptachlor epoxide and arsenic were initially detected in two of the four site monitoring wells at concentrations exceeding the NJDEP GWQC. alpha-Chlordane, gamma-chlordane, and 4,4′-DDD also were detected in the two monitoring wells; however, these contaminants were identified at concentrations less than the NJDEP GWQC.

The IRP recommended NFA for the site (Versar, Inc., 2005c). Subsequently, Site CW-6 (FTMM-28) was considered to require additional evaluation through the BEE process.

As part of the BEE, four soil samples were collected from the forested area to the west of the building complex and four sediment samples were collected from the wetlands south-southwest of the building complex in the vicinity of Wampum Brook. These are discussed further in **Section 3.4.3.2**.

Though the building complex is primarily paved areas and buildings, the area immediately west is forested wetland with Wampum Brook to the south of the site. Groundwater underlying Site CW-6 (FTMM-28) flows toward Wampum Brook.

As indicated on the FTMM utility maps in **Appendix K**, storm water, gas, and water utility lines in the area of FTMM-28 may act as additional contaminant migration pathways from Landfill CW-3A away from the direction of Wampum Brook.

The forested areas are dominated by black gum with some red oak and sweet gum. Milkweed is present along the roads. Ferns are present on the forest floor and there are few forbs and grasses. Coastal sweetpepperbush and poison ivy present and skunk cabbage (*Symplocarpus foetidus*) is prevalent in the wetter areas to the southwest.

GIS digital data available through the NJDEP indicate that the area west and south of Site CW-6 is deciduous wooded wetlands.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 2, which is assigned to patches containing one or more occurrences of a species of special concern, in this case the Wood Thrush.

2.5.2.3 BUILDING 2700 (ECP PARCEL 15)

The Myer Center facility (Building 2700) is located in the CWA of FTMM at the intersection of Pearl Harbor Avenue and Corregidor Road. Parcel 15 encompasses an area of approximately 70 acres of which the Building 2700 footprint is 171,000 square feet. It was built in 1954 and has an extensive history of laboratory operations, photoprocessing, and paint spraying booths. Operations included electrochemical research, growing and shaping of crystals, various plating operations, mixing of magnetic powders, machining, welding, spray painting, use of solvents for equipment cleaning, and other miscellaneous laboratory operations utilizing standard laboratory chemicals. By 1959, additional operations included shock and vibration testing of certain components; glass blowing; a plastics laboratory that made plastic castings, laminates, and forms sprayed with polyester resins; and a ceramics laboratory. A satellite dispensary and dental clinic was present in 1972 that serviced 2,610 employees. During the 2006 VSI performed as part of the Phase I ECP, the Dental Clinic was no longer operational at Building 2700. According to FTMM personnel, no chemical wastes have been discharged to the sanitary sewer since the mid-1980s. Activities at Building 2700 have since been converted primarily to administrative functions. Current waste management practices prohibit the discharge of any materials, other than water and biodegradable soaps, into the sanitary sewer system.

In 2007, as part of the ECP SI (Shaw, 2008), sediment, soil, groundwater, soil gas, and indoor air samples were collected to assess environmental conditions on Parcel 15. Geophysical surveys were conducted to determine if USTs remained on site.

Seven sediment samples (including one duplicate sample) were collected from three sample borings located adjacent to three stormwater outfalls within Shrewsbury Creek. These sample locations were south of the walking bridge, near the southwest portion of Building 2525 on the western side of Shrewsbury Creek. Samples were collected to investigate any potential historical discharges from Building 2700 into Shrewsbury Creek. Shrewsbury Creek is a non-tidal water body in this portion of the facility located southeast of Building 2700 in the CWA.

At each sample location, two samples were collected: one from the 0- to 6-inch bgs interval and the other from the 18- to 24-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. Samples collected were analyzed for TCL+30 (without pesticides) and TAL metals. The results are as follows:

A total of 12 SVOCs and 18 metals were detected in Parcel 15 sediment samples.

- Of the 12 SVOCs, 2 (acenaphthene and fluorene) were detected at concentrations that exceeded the freshwater sediment criteria in one sample.
- Of the 18 metals, 2 (chromium and copper) were detected at concentrations that exceeded the freshwater sediment criteria in three samples.

Fifty-three surface soil samples and 59 subsurface soil samples (including 6 duplicate samples) were collected from 53 distinct Geoprobe® borings in order to investigate any potential releases associated with former barracks located north of Building 2700. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch interval bgs. For borings located in paved areas, non-VOC surface soil samples were collected from the 0- to 6-inch interval directly below the pavement sub-base. Surface soil samples collected for VOC analysis were collected from the 18- to 24-inch bgs interval. Subsurface soil samples were collected from the 6-inch interval directly above the water table from each boring. Samples were analyzed for TPH and VOC+10. The results are as follows:

- TPH was detected in 7 of the 53 surface soil samples and in 2 of the 59 subsurface soil samples. None of the TPH results exceeded regulatory standards; therefore, VOCs were not analyzed.

Seven groundwater samples (including one duplicate sample) were collected from six distinct temporary wells that were installed. Temporary wells were installed along the downgradient boundary of the parcel (along Shrewsbury Creek). Groundwater samples were collected to investigate any potential release from possible former heating oil USTs associated with former barracks, as well as other potential discharges from historical activities at Building 2700. Samples were analyzed for TCL+30 (without pesticides or PCBs) and TAL metals. The results are as follows:

A total of 1 SVOC, 1 VOC, and 19 metals were detected in Parcel 15 groundwater samples.

- One SVOC, bis(2-ethylhexyl) phthalate, was detected at concentrations that exceeded the NJDEP GWQC. The contamination was most likely the result of the polyethylene sampling tube that is commonly used for sampling wells. Therefore, it is not considered to be a concern in groundwater at Parcel 15.
- One VOC, toluene, was detected at a concentration less than the NJDEP GWQC.
- Of the 19 metals detected, 6 (aluminum, arsenic, iron, lead, manganese, and sodium) were detected at concentrations exceeding the NJDEP GWQC.

A total of 15 soil gas and 15 indoor air samples were collected in and around Building 2700. A total of 32 VOCs were detected in Parcel 15 soil gas samples and a total of 22 VOCs were detected in Parcel 15 indoor air samples. The results are as follows:

- Of the 32 VOCs detected, 4 (benzene, PCE, TCE, and vinyl chloride) were detected at concentrations that exceeded the NJDEP generic vapor intrusion non-residential soil gas screening levels in 14 soil gas samples.
- Twenty-two VOCs were detected at concentrations less than the NJDEP generic vapor intrusion non-residential indoor air screening levels in indoor air samples.

As part of the geophysical survey, an electromagnetic induction (EMI) survey was conducted throughout the area of the parcel where former barracks were identified to determine if USTs are present. Follow-up ground-penetrating radar surveys were conducted where anomalies were identified during the EMI surveys. No suspected USTs were identified as a result of the geophysical survey.

Based upon the resulting data, the SI recommended that NFA be taken for soil and groundwater within Parcel 15 and surface water and sediment be further evaluated within a BEE.

As part of the BEE, two surface water samples were collected from Shrewsbury Creek in the vicinity of the stormwater outfalls. These are discussed further in **Section 3.4.3.3**.

Shrewsbury Creek is east of Building 2700. In this area, Shrewsbury Creek is narrow and is non-tidal freshwater. Both banks of Shrewsbury Creek are steep and have not undergone stabilization. Though the banks are heavily vegetated, the surrounding area is predominantly pavement and buildings.

As indicated on the FTMM utility maps in **Appendix K**, several storm water lines drain the area of Parcel 15 around Building 2700, as well as the area of Parcel 27 around Building 2525, which discharges to Shrewsbury Creek. Numerous storm water, gas, and water utility lines in the area of Parcel 15 may act

as additional contaminant migration pathways from Parcel 15 with direction dependent on the utility gradients.

Vegetation along the banks of Shrewsbury Creek is thick and includes common reed, black walnut, pin oak, wild grape, wild morning glory, pokeweed, Asiatic bittersweet, poison ivy, wild rose, sweet gum, milkweed, goldenrod, Virginia creeper, red cedar, Norway maple, white mulberry, black cherry, sassafras, and winged sumac.

GIS digital data available through the NJDEP indicate the presence of deciduous scrub/shrub wetlands along the narrow corridor of Shrewsbury Creek.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

2.5.2.4 BUILDINGS 2507 AND 2704 (ECP PARCEL 27)

Parcel 27 is located in the southwest portion of CWA and includes the Environmental Test Facility (Building 2704), former Pulse Power Center (Building 2707), Sheet Metal Shop (Building 2502), Machine Shop (2503), Paint and Fabrication Facility (2506), and a Former Motor Pool (2501). Parcel 27 encompasses an area of approximately 30 acres.

Building 2704 has been used as an environmental test chamber since 1965. Chemical use in this building is limited to hydraulic fluid and standard shop chemicals (i.e., petroleum-based solvents, oils, and greases). While current waste handling practices are modern, historical waste handling practices are unknown. The building has multiple floor drains which, according to engineering drawings, are connected to the storm sewer.

Building 2507 is the Tactical Vehicle Repair Shop where petroleum and solvent use would be common during vehicle maintenance operations.

In 2007, as part of the ECP SI (Shaw, 2008), sediment and surface soil were collected to assess environmental conditions on Parcel 27. Geophysical surveys were conducted to determine if a former debris burial area remained on site.

Four sediment samples were collected from two sample borings located within Shrewsbury Creek. One sample was located adjacent to a stormwater outfall and the other was located downstream. At each sample location, two samples were collected; one from the 0- to 6-inch interval bgs, and the other from the 12- to 18-inch interval bgs. No visual or olfactory evidence of sediment contamination was noted. All samples were analyzed for TCL+30 (without pesticides) and TAL metals. The results are as follows:

A total of 8 SVOCs and 20 metals were detected in Parcel 27 sediment samples.

- Of the eight SVOCs, none were detected that exceeded the freshwater sediment criteria.
- Of the 20 metals, 8 (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) were detected at concentrations that exceeded the freshwater sediment criteria in all four samples.

Two surface soil samples were collected from two sample borings located in the wooded area to the northeast of Building 2507. At each location, the sample was collected from the 0- to 6-inch bgs interval, and a sample for VOC analysis was collected from the 18- to 24-inch bgs interval. No visual or olfactory evidence of soil contamination was noted. All samples collected were analyzed for TCL+30 (without pesticides) and TAL metals. The results are as follows:

- A total of 8 SVOCs and 18 metals were detected in Parcel 27 surface soil samples below the Non-Residential Direct Contact Soil Cleanup Criteria.

An EMI survey was conducted over the area identified as a possible debris burial area.

- No anomalies indicative of debris burial areas were identified.

Based upon the resulting data, the SI recommended that NFA be taken for soil within Parcel 27 and surface water and sediment be further evaluated within a BEE.

As part of the BEE, two surface water samples were collected from Shrewsbury Creek in the vicinity of the stormwater outfalls. These are discussed further in **Section 3.4.3.4**.

Shrewsbury Creek is north of Building 2704. In this area, Shrewsbury Creek is narrow and is non-tidal freshwater.

Along Shrewsbury Creek the vegetation includes wild grape, honeysuckle, wild rose, goldenrod, coastal sweet pepperbush, arrowwood, greenbrier, jewelweed, smartweed, Asiatic dayflower, and poison ivy.

GIS digital data available through the NJDEP indicate the presence of deciduous wooded wetlands along Shrewsbury Creek.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

2.5.2.5 BUILDING 2525 (PARCEL 28)

Parcel 28, with an area of approximately 30 acres, is located in the CWA and encompasses Building 2525 – the former Eatontown Laboratory complex. Building 2525 was constructed between 1941 and 1942. The Eatontown Signal Laboratory was renamed Watson Laboratories in 1945 and subsequently moved to Rome, New York, in 1951.

Three separate septic tanks and leach fields and one underground transformer vault are within the Building 2525 area. The main sanitary sewer line from the building is shown to discharge to a septic tank and leach field east of the building. A review of the DPW map and engineering drawings repository indicated a 2-inch “acid proof drain” leading from Bay 1 to a dry well southeast of the building. Floor drains were shown to discharge to the brook northwest of the building. Building revitalization plans show all floor drains were later connected to the sanitary sewer system. Building 2525 was included in the Watson Laboratory complex in the mid-1940s. Crystal growing and processing operations were conducted in the Watson Laboratory building located in the southwest portion of the CWA in the early 1950s. Operations included cleaning of crystals, quartz etching, soldering, and gold (and other metal) plating, which was conducted in Building 2532. These operations involved chemicals such as carbon tetrachloride, ammonium bifluoride, cadmium sulfate, and sulfuric acid. Crystal etching using ammonium bifluoride was also noted in Building 2538. Other processes associated with the Watson Laboratories included machining of metals and remelting lead in Building 2533, growing of crystals and physical chemistry in Building 2534, and machining of crystals in Building 2538.

Following the 1951 Watson Laboratories move, the Aviation Research and Development Command Laboratory was moved from the Myer Center to Building 2525. This laboratory operation occupied the building until 1978. A 1978 industrial hygiene survey reported ozalid reproduction in Room 5101 of Building 2525. Building revitalization plans show all floor drains connected to the sanitary sewer system. No sumps or floor drains were noted during the 2006 VSI. The use of the building has been strictly administrative since the late 1990s, as confirmed during the VSI.

Parcel 28 also contains the CECOM laboratory and radiological testing facility housed in Building 2540. This building contains a gamma irradiator, Radiac calibrators, a storage room for low-level RAM with multiple radioactive sources from the demilitarization of commodities, a nuclear counting laboratory, and several health physics laboratories. A survey of the interior of Building 2540 will be performed as part of the radiological scoping surveys.

According to the 1993 Environmental Research, Inc., Aerial Photographic Site Analysis, there are a fenced open storage area and possible tank pads in the northern portion of Parcel 28, to the northeast of Building 2525.

In 2007, as part of the ECP SI (Shaw, 2008), sediment, soil, and groundwater samples were collected to assess environmental conditions on Parcel 28. Geophysical surveys were conducted to

determine the absence or presence of formerly utilized septic tanks, associated leaching fields, and USTs.

A total of four sediment samples were collected from two sample borings located along the southeast bank of Shrewsbury Creek adjacent to Building 2525. Samples were located directly downgradient of potential former discharge pipes observed on the southeast bank of the creek. Samples were collected to investigate any potential historical discharges from former floor drains to outfalls that were associated with Building 2525 into Shrewsbury Creek. Shrewsbury Creek is a non-tidal water body in this portion of the facility located southeast of Building 2700 in the CWA. At each sample location, two samples were collected: one from the 0- to 6-inch bgs interval and the other from the 12- to 18-inch bgs interval. No visual or olfactory evidence of impacted sediment was noted. All samples were analyzed for TCL+30 (without pesticides) and TAL metals. The results are as follows:

A total of 5 SVOCs, 1 VOC, and 17 metals were detected in Parcel 28 sediment samples.

- All SVOCs and the one VOC (acetone) were detected at concentrations less than the freshwater sediment criteria.
- Of the 17 metals, 1 (chromium) was detected at a concentration that exceeded the freshwater sediment criteria in all for samples.

A total of three surface soil samples and three subsurface soil samples were collected from three distinct Geoprobe® borings in order to investigate potential septic system discharges and former storage pads that were identified through aerial analysis. An additional two surface soil samples were collected from hand-augered borings. Surface soil samples for non-VOC analysis were collected from the 0- to 6-inch bgs interval. Surface soil samples collected for VOC analysis were collected from the 18- to 24-inch bgs interval. Subsurface soil samples were collected from the 6-inch interval directly above the water table from each boring. No visual or olfactory evidence of soil contamination was noted during field operations. Samples were analyzed for TCL+30 (without pesticides) and TAL metals. The results are as follows:

A total of 12 SVOCs, 1 VOC, and 17 metals were detected in Parcel 28 surface and subsurface soil samples. The results are as follows:

- The 12 SVOCs and 1 VOC (acetone) were detected at concentrations less than the Non-Residential Direct Contact Soil Cleanup Criteria.
- Of the 17 metals, 1 (arsenic) was detected at a concentration in excess of the Non-Residential Direct Contact Soil Cleanup Criteria in one sample.

Four test pits located in an open field east of Building 2525 and Heliport Drive, and one test pit northeast of Building 2525, were excavated to determine if any contamination exists from former septic tank and leach fields that once serviced Building 2525. Soil sample depths were contingent upon field observations (e.g., depth to water table, thickness of layered engineered gravel) and field screening results. A total of eight subsurface soil samples (including two duplicate samples) were collected from the five test pits. No visual or olfactory evidence of impacted soil was noted. All samples were analyzed for TCL+30 (minus pesticides) and TAL metals. The results are as follows:

- A total of 12 SVOCs, 1 VOC, and 17 metals were detected in concentrations less than the Non-Residential Direct Contact Soil Cleanup Criteria in soil samples collected from test pits.

A total of five groundwater samples (including one duplicate sample) were collected from four distinct temporary wells that were installed with the Geoprobe® rig. Three temporary wells were installed downgradient of former drainage fields, and one temporary well was installed downgradient of a former storage pad area located in an open field west of Building 2290 and Guam Lane. Samples were analyzed for TCL+30 (without pesticides/PCBs), TAL metals, ammonia, nitrate, and nitrite.

A total of 1 SVOC, 3 VOCs, and 13 metals were detected in Parcel 28 groundwater samples. The results are as follows:

- One SVOC, bis(2-ethylhexyl) phthalate, was detected at concentrations less than the NJDEP GWQC.

- Three VOCs (acetone, chloroform, and toluene), were detected at concentrations less than the NJDEP GWQC in Parcel 28 groundwater samples.
- Two metals (aluminum and manganese) were detected at concentrations exceeding the NJDEP GWQC.
- Nitrite and nitrate were detected at concentrations less than the GWQC.

The geophysical survey was conducted to investigate the location of former septic tanks, USTs, and drywells. The results are as follows:

- No drywell was identified within Parcel 28; however, one possible UST (P28-8), one suspected septic holding tank, and one suspected septic distribution box and associated piping were identified.

Based upon the resulting data, the SI recommended that NFA be taken for soil within Parcel 28 and surface water and sediment be further evaluated within a BEE.

As part of the BEE, four surface water samples were collected from Shrewsbury Creek in the vicinity of the stormwater outfalls. These are discussed further in **Section 3.4.3.5**.

Shrewsbury Creek is north of Building 2525. In this area, Shrewsbury Creek is narrow and is non-tidal freshwater. Both banks of Shrewsbury Creek are steep and have not undergone stabilization. Though the banks are heavily vegetated, the surrounding area is predominantly pavement and buildings.

As indicated on the FTMM utility maps in **Appendix K**, several storm water lines drain the area of Parcel 28 around Building 2525, as well as the area of Parcel 15 around Building 2700, which discharges to Shrewsbury Creek. Numerous storm water, gas, and water utility lines in the area of Parcel 28 may act as additional contaminant migration pathways from Parcel 28 with direction dependent on the utility gradients.

Vegetation along the banks of Shrewsbury Creek is thick and includes common reed, black walnut, pin oak, wild grape, wild morning glory, pokeweed, Asiatic bittersweet, poison ivy, wild rose, sweet gum, milkweed, goldenrod, Virginia creeper, red cedar, Norway maple, white mulberry, black cherry, sassafras, and winged sumac.

GIS digital data available through the NJDEP indicate the presence of deciduous scrub/shrub wetlands along the narrow corridor of Shrewsbury Creek.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

Table 2-2
Ambient Levels of Selected Metals and Other Analytes in Soil

Parameter	N	Detects	MDL (mg/kg)	Mean (mg/kg)	Median (mg/kg)	Minimum (mg/kg)	Maximum (mg/kg)	90th Percentile (mg/kg)	95th Percentile (mg/kg)	Geometric Mean (mg/kg)
Metals										
Aluminum	95	95	20	6734	6800	424	23100	10800	12300	5425
Antimony	95	0	6	NA	NA	NA	NA	NA	NA	NA
Arsenic	95	86	1	7.9	5.2	0.50	83.1	13.6	15.7	4.7
Barium	95	62	20	36.0	28.3	10.0	154	65.8	83.7	27.3
Beryllium	95	15	0.5	0.36	0.29	0.25	1.80	0.68	0.76	0.33
Cadmium	95	5	0.5	0.36	0.29	0.25	2.70	0.32	0.85	0.32
Calcium	95	61	500	1312	995	250	21600	2000	3810	797
Chromium	95	95	1	18.7	11.8	1.1	171	34.7	39.8	12.9
Cobalt	95	7	5	3.5	2.9	2.5	32.0	3.2	6.7	3.1
Copper	95	86	2.5	15.0	9.3	1.3	93.0	33.3	41.3	9.7
Iron	95	95	10	11909	8830	735	68900	21100	35700	8448
Lead	95	86	10	59.7	37.6	5	344	144	179	37.5
Magnesium	95	56	500	1056	673	250	13800	1870	2660	664
Manganese	94	94	1.5	111	62.4	2.6	1030	206	423	60.1
Mercury	95	40	0.1	0.18	0.06	0.05	6.10	0.21	0.33	0.09
Nickel	94	42	4	5.2	2.4	2.0	16.9	12.3	13.9	4.1
Potassium	94	45	500	1022	310	250	22300	1750	2090	568
Selenium	94	0	1	NA	NA	NA	NA	NA	NA	NA
Silver	94	3	1	0.68	0.6	0.50	6.30	0.65	0.65	0.61
Sodium	94	0	500	NA	NA	NA	NA	NA	NA	NA
Thallium	94	2	1	0.67	0.6	0.50	1.70	1.15	1.25	0.64
Vanadium	94	89	5	21.1	16	2.5	202	35.5	46.3	15.8
Zinc	94	91	2	53.4	39.9	1.0	259	106	157	36.4
PAHs										
Benzo(a)anthracene	94	54	0.029	0.14	0.04	0.01	1.82	0.43	0.57	0.04
Benzo(a)pyrene	94	48	0.037	0.14	0.02	0.01	1.8	0.42	0.67	0.04
Benzo(b)fluoranthene	94	49	0.04	0.35	0.19	0.05	4.09	0.66	1.24	0.23
Benzo(b+k)fluoranthene	95	47	0.08	0.35	0.19	0.05	4.1	0.66	1.2	0.23
Dibenzo(a,h)anthracene	94	9	0.037	0.03	0.01	0.01	0.29	0.02	0.13	0.01
Indeno(1,2,3-c,d)pyrene	94	33	0.018	0.07	0.01	0.01	0.57	0.23	0.37	0.02
Chrysene	94	53	0.022	0.15	0.05	0.01	1.78	0.47	0.7	0.05

Notes:
Source - BEM Systems, Inc., 1998
N = Number of samples
MDL = Method detection limit

Table 2-7
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
1	2600, 3001 - 3052, 3216	Pine Brook residential housing area, General Storage Warehouse	63.14	No	This is the Pine Brook residential housing area in the southeast portion of Charles Wood Area (CWA) and includes one general storage warehouse (2600). No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Tank AST-2070-a (500-gallon capacity for gasoline) and tank AST-2070-b (500-gallon capacity for diesel fuel) are in use; secondary containment is in place; and no evidence of a release was identified. Former residential fuel oil storage tanks have been either removed or closed in place and no contamination was identified during closure. No evidence of release or contamination has been detected; a Baseline Ecological Evaluation (BEE) is not required.
2	IRP Site FTMM-63 (Bldg 2603)	Sewage Lift Station	0.19	No	This parcel is a sewage lift station at which a 275-gallon underground storage tank (UST) and 225 cubic yards of potentially contaminated soil were removed in 1998. No contaminants remain at the site in soil or groundwater at concentrations above New Jersey Department of Environmental Protection (NJDEP) cleanup criteria. Tank AST-2603 (500-gallon capacity for diesel) and an emergency generator are present for the lift station; secondary containment is in place; and no evidence of a release was identified. Though Wampum Brook runs past Parcel 2, potentially contaminated soil was removed and no contamination remains in soil or groundwater. No migration pathway exists to environmentally sensitive areas. A BEE is not required. BEEs and sampling being conducted related to CW-6 also addresses Parcel 2 and Wampum Brook.
3	3050	Former UST	0.05	No	This is the location of a former residential UST for #2 fuel oil (UST-3050-30). The UST and 23 cubic yards of potentially contaminated soil have been removed. A Closure Report was submitted to NJDEP on 06/01/00, and a No Further Action (NFA) approval letter was received from the NJDEP on 8/29/00. Contaminated soils have been removed and no migration pathway exists to environmentally sensitive areas, so a BEE is not required.
4	3027	Former UST	0.05	No	This is the location of a former residential UST for #2 fuel oil (UST-3027-28). The UST and 8.7 cubic yards of petroleum-contaminated soil have been removed. A closure report was submitted to the NJDEP requesting an NFA determination on 10/17/2001; however, no regulatory concurrence is required for former residential USTs. Contaminated soils have been removed and no migration pathway exists to environmentally sensitive areas, so a BEE is not required.
5	3021	Former UST	0.08	No	Former Residential UST-3021-27 (#2 fuel oil) and 113 tons of contaminated soil were removed from this parcel. No contamination above NJDEP criteria remains in groundwater. A Closure Report was submitted to the NJDEP, and an NFA approval letter was received from the NJDEP on 10/17/00. Though Wampum Brook runs past Parcel 5, potentially contaminated soil was removed and no contamination remains in soil or groundwater; a BEE is not required. No migration pathway exists to environmentally sensitive areas. BEEs and sampling being conducted related to CW-6 also addresses Parcel 5 and Wampum Brook.
6	FTMM-31 (CW-9)	Former Sludge Disposal	1.60	No	This parcel was investigated under the Fort Monmouth Installation Restoration Program (IRP). Sludge generated from Fort Monmouth sewage treatment plants was historically stored in this area before being used as a soil conditioner and fertilizer on the golf course. This parcel is located on the CWA Golf Course southeast of Building 2070. No contaminants were identified above NJDEP Direct Contact Soil Cleanup Criteria or groundwater quality standards during the Site Investigation. An NFA determination was approved by the NJDEP in 1996. Since no contaminants are present, a BEE is not required.
7	IRP Site FTMM-28 (CW-6)	Former Pesticide Storage Building 2044 UST-2044-24 UST-2044-32 UST-2044-33	0.67	Yes	This parcel was investigated under the Fort Monmouth IRP. Use of pesticides and herbicides prior to and as part of Army ownership have occurred in this parcel. The pesticide dieldrin was detected in one soil sample slightly above NJDEP Direct Contact Soil Cleanup Criteria; pesticides - heptachlor epoxide and chlordane as well as arsenic were historically detected above criteria in groundwater but have been at concentrations below criteria in recent rounds of sampling. A Remedial Investigation (RI) report requesting an NFA determination from the NJDEP was submitted in May 2005. Three former USTs and potentially contaminated soil were removed in 1993. Fuel-related contaminants were initially detected in groundwater above NJDEP criteria and a long term monitoring program was initiated. No fuel-related contaminants were detected subsequent to 1997, and an NFA approval letter for all three former USTs was received from the NJDEP on 1/10/2003. A BEE is recommended to address potential contamination related to CW-6 in soils and sediment/soils in adjacent deciduous wooded wetlands as well as Wampum Brook.
8	2043	UST-2043-36	0.05	No	This is the location of a former UST for diesel fuel (UST-2043-36). The UST and potentially contaminated soil have been removed. No contaminants were detected in groundwater above the NJDEP groundwater criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 1998, and an NFA approval letter was received from the NJDEP on 10/23/2000. Contaminated soils have been removed and no migration pathway exists to environmentally sensitive areas, so a BEE is not required.

Table 2-7
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
9	2068 Golf Course Pesticide Mixing Area Outdoor Pool & Chlorination facilities Residential housing	Golf Course Pesticide Mixing Area Outdoor Pool & Chlorination facilities Residential housing	161.27	No	This parcel is inclusive of the CWA Golf Course (including clubhouse, maintenance facilities, and current pesticide mixing facilities), residential housing along Megill Drive (Buildings 2022 - 2042), and the outdoor pool and associated chlorination facilities. The current pesticide mixing facilities are state-of-the-art and include secondary containment. No storage of pesticides occurs on Fort Monmouth property. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Tanks AST-2021, AST-2043, and AST-2044 are in use; secondary containment is in place; and no evidence of a release was identified. Twenty-one (21) former residential fuel oil USTs have been removed, no contamination was identified during closure, and no regulatory concurrence is required. Four non-residential USTs have been removed; no contamination was identified during closure; and NFA approval letters were received from the NJDEP in 2000. No contamination or releases have been identified; a BEE is not required.
10	2000	Former UST	0.04	No	Former Residential UST-2000-38 (#2 fuel oil). Petroleum-related contaminants were detected in post-excavation soil samples at concentrations below the NJDEP cleanup criteria. A Closure Report was submitted to the NJDEP, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soils were removed and no migration pathways are present to environmentally sensitive areas; a BEE is not required.
11	2067	UST-2067-37	0.08	No	This is the location of a former UST for #2 fuel oil (UST-2067-37). The UST and 90 cubic yards of potentially contaminated soil have been removed. A closure report was submitted to the NJDEP requesting an NFA determination in 2002, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soils were removed and no migration pathways are present to environmentally sensitive areas; a BEE is not required.
12	FTMM-29 (CW-7)	Former Polychlorinated Biphenyl (PCB) Transformer Location	0.10	No	This parcel was investigated under the Fort Monmouth IRP. A PCB transformer, formerly located in front of the Officers Club in Building 2000, was removed from service in 1990 and disposed off site; PCB contamination in the soil was removed in 1998. An RI report requesting an NFA determination from the NJDEP was submitted in September 2004. Subsequent to NJDEP's response to the NFA request, additional surface water, sediment, and soil samples were collected and concentrations were below criteria. An additional request for an NFA determination will be submitted to NJDEP. Though Parkers Creek is within 300 feet of Parcel 12, PCB contaminated soil has been removed and migration pathways to Parkers Creek are not present; a BEE is not required.
13	Former Residential Bldgs 2004 - 2016	Potential USTs associated with former residential housing	6.42	No	A 1956 fuel distribution plan displays fuel oil USTs associated with former residential dwellings in this area. Due to the age of these USTs, there is no documentation regarding whether they have been removed. This area is currently paved. No contamination has been detected and no suspected USTs were identified during a geophysical survey conducted as part of the 2008 Site Investigation; a BEE is not required.
14	NW Area of CWA	Former Residential Housing in NW Area of CWA Former #2 Fuel oil UST Former wash rack, vehicle storage area	77.47	No	Former residential area in northwest portion of CWA. Based on the timeframe in which these early structures existed (buildings were demolished prior to 1960), it is likely that USTs were utilized for fuel storage. No documentation exists confirming whether USTs have been removed. One suspected UST was identified during a geophysical survey conducted as part of the 2008 Site Investigation and is currently being addressed. This parcel also includes a former UST for #2 fuel oil (UST-2275-12) at which a release was noted during removal activities. The UST and contaminated soils have been removed. A closure report was submitted to the NJDEP requesting an NFA determination in 1998, and an NFA approval letter was received from the NJDEP on 8/29/2000. This parcel includes the area identified in a 1947 aerial photograph as a vehicle wash rack and vehicle storage area. Contaminated soil has been removed, evidence of a release to groundwater has not been detected, and there are no migration pathways to environmentally sensitive areas; a BEE is not required. BEEs and sampling being conducted related to Parcel 15 and Parcel 28 also address Parcel 14 and Shrewsbury Creek.

Table 2-7
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
15	2700 (Myer Center) 2705 FTMM-23 (CW-2)	Industrial and Laboratory Activities	37.99	Yes	This parcel encompasses current and former laboratory and industrial processes within Building 2700 and the surrounding area. Building 2705 is a former photo processing facility and night vision laboratory. Chemical and hazardous susbstance use has been extensively documented in association with the historic and current research and industrial activities in this parcel. Due to groundwater volatile organic compound contamination identified in adjacent parcel 16, vapor intrusion is a potential recognized environmental condition in this area. The former wastewater treatment lime pit located northwest of Building 2700 was investigated under the Fort Monmouth IRP as Site FTMM-23 (CW-2). The lime pit was demolished and disposed of in 2002. An NFA determination has been requested from the NJDEP. No response has been received from the NJDEP. Tank AST-2700A (500-gallon capacity for diesel fuel) and tank AST-2700B (500-gallon capacity for diesel fuel) are in use; secondary containmen is in place; and no evidence of a release was identified. A 1999 freon release due to a ruptured disc on equipment in Building 2706 is listed in the New Jersey Hazardous Material Incident Database. Acenaphthene, fluorene, chromium, and copper were identified as constituents of concern in sediment during the 2008 Site Investigation. A BEE is recommended for Parcel 15 to address potential discharges through stormwater outfalls into Shrewsbury Creek.
16	FTMM-22 (CW-1)	Former Wastewater Treatment Lime Pit	0.62	No	The former wastewater treatment lime pit located in the courtyard of Building 2700 and is being addressed under the Fort Monmouth IRP as Site FTMM-22 (CW-1). Volatile organic compounds are present in groundwater at concentrations above NJDEP Groundwater Quality Criteria. At present, the contaminant plume has not encroached upon Building 2700. However, the downgradient migration pathway is in the direction of the referenced building and vapor intrusion is a potential recognized environmental condition. A contaminant treatment system (soil vapor extraction and air sparging) was in place until 2005. Treatment of the groundwater through enhanced bioremediation (Hydrogen Release Compound [HRC] injection) will commence in FY 07 with the goal of achieving groundwater compliance by FY10. No migration of contaminants towards Parker Creek is occurring and a BEE is not recommended.
17	UST-2700-36 UST-2700-37 UST-2700-38 UST-2700-39	Former #6 Fuel oil USTs	0.16	No	Five former #6 fuel oil tanks (UST-2700-35, UST-2700-36, UST-2700-37, UST-2700-38, and UST-2700-39) and a total of 500 cubic yards of potentially contaminated soil were removed in 1998. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 10/23/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
18	UST-2700-61	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and potentially contaminated soil were removed in 1994. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria. A closure report was submitted to the NJDEP requesting an NFA determinatior in 2002, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required. BEEs and sampling being conducted related to Parcel 15 and Parcel 28 also address Parcel 18 and Shrewsbury Creek.
19	UST-2337-65	Former #2 Fuel oil UST	0.17	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1994. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria. A closure report was submitted to the NJDEP requesting an NFA determinatior in 2002, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required. BEEs and sampling being conducted related to Parcel 15 and Parcel 28 also address Parcel 19 and Shrewsbury Creek.
20	along SW portion Parkers Creek	SW portion Parkers Creek	8.30	No	This is the undisturbed, wooded area surrounding Parkers Creek in the southwest portion of the CWA. No release or disposal of hazardous substances or petroleum products has occurred; a BEE is not required.
21	FTMM-25 (CW-3A)	Suspected former landfill	2.08	Yes	The suspected former landfill located in the southwestern portion of the CWA north of Building 2707 is being addressed under the Fort Monmouth IRP as Site FTMM-25 (CW-3A). Construction debris and coal ash were identified during the excavation of exploratory test pits. No contaminants of concern were identified in soil or groundwater at this site during RIs conducted under the IRP, and an NFA determination was submitted for NJDEP approval. A BEE is recommended since a potential migration pathway may exist for contaminants to enter Shrewsbury Creek.
22	UST-2707-40	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1998. A closure report was submitted to the NJDEP requesting an NFA determination in 1999, and an NFA approval letter was received from the NJDEP on 2/24/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
23	UST-2500-53 UST-2500-54 UST-2500-55	Former Gasoline USTs	0.05	No	Five former gasoline USTs and petroleum-contaminated soil were removed in 1993. A closure report was submitted to the NJDEP requesting an NFA determination in 1996, and an NFA approval letter was received from the NJDEP on 4/20/2001. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.

Table 2-7
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
24	UST-2502-13	Former #2 Fuel oil UST	0.03	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1996. A closure report was submitted to the NJDEP requesting an NFA determination in 1998, and an NFA approval letter was received from the NJDEP on 8/29/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
25	UST-2503-14	Former #2 Fuel oil UST	0.03	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1996. A closure report was submitted to the NJDEP requesting an NFA determination in 1998, and an NFA approval letter was received from the NJDEP on 7/10/1998. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
26	UST-2504-15	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1995. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 10/23/00. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
27	2501 2503 2506 2507 2624 2625 2630 2632 2704 2707 2708 2709 2710 2713 Former Watson Laboratories	Southwest portion of CWA that includes the former Pulse Power Center, Machine Shop, Paint and Fabrication facility, Former Motor Pool, and portions of the former Watson laboratories	29.83	Yes	This parcel in the southwestern portion of CWA includes numerous current and former industrial and research operations. This area formerly housed the Pulse Power Center (2707, 2708, 2709, 2710, 2713), a paint shop (2506), a machine shop (2503), motor pool (2501), hazardous waste storage locations, and portions of the former Watson laboratories. 2501 - Former motor pool. 2503 - This facility is a machine shop and formerly contained a parts cleaner that utilized solvents. 2506 - Former paint and fabrication shop that utilized solvents and petroleum products. 2507 - Tactical Vehicle Repair Shop where petroleum and solvent use would be common during vehicle maintenance operations. 2624 - Former Hazardous Waste Storage Facility; 1980 U.S. Army Toxic and Hazardous Materials Agency reported that this facility was used for storage of bulk research chemicals. 2704 - Environmental testing of electronic equipment. Floor drains shown as connected to storm sewer. Former Watson Laboratories - this former complex of laboratories included Buildings 2532, 2533, 2534, and 2538. Operations at these former facilities occurred in the early to mid-1950s. The buildings have been demolished. Four aboveground storage tanks currently in use. Twelve (12) USTs removed from 1993 to 2002. No releases noted. NJDEP Closure Approval Letters received for seven closures. Awaiting NJDEP response for five tanks closed in 2002. Metals were identified as constituents of concern in sediment during the 2008 Site Investigation. A BEE is recommended to address potential discharges from floor drains and storm sewers from Buildings 2507 and 2704 into Shrewsbury Creek.
28	2525 2535 2539 2540 Former Motor Pool NW of 2566	Former Eatontown Laboratory, Battery Test Facility, Safety calibration laboratory office, Former Motor Pool	37.78	Yes	This parcel encompasses Buildings 2525, 2535, 2539, 2540, and all land within this area. Numerous demolished buildings located to the east and southeast of 2525. Industrial operations include the battery test facility (2535), former Eatontown laboratory (2525), and the Safety office calibration laboratory. Outdoor storage and ground staining were identified in the area of the former motor pool in aerial photographs from 1947, 1957, 1963, 1974, and 1991. Ten (10) former fuel oil USTs have been removed; no contamination was identified during closure; and NFA approval letters were received from the NJDEP. Chromium was identified as a constituent of concern in sediment during the 2008 Site Investigation. A BEE is recommended to address potential historic discharges from former floor drains to outfalls that were associated with Building 2525 into Shrewsbury Creek.
29	UST-2561-31	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1995. A closure report was submitted to the NJDEP requesting an NFA determination in 1998, and an NFA approval letter was received from the NJDEP on 7/10/98. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
30	UST-2562-41	Former gasoline UST	0.05	No	A former gasoline UST and potentially contaminated soil were removed in 1993. All confirmatory soil analytical results were below NJDEP criteria. Methyl-tertiary-butyl ether (MTBE) and lead were previously detected in groundwater above NJDEP criteria, but have been below the standards since November 1998. A closure report requesting NFA was submitted to the NJDEP on 01/02/02. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
31	UST-2537-27	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST and 15 cubic yards of petroleum-contaminated soil were removed in 1997. A closure report was submitted to the NJDEP requesting an NFA determination in 1998, and an NFA approval letter was received from the NJDEP on 8/29/00. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
32	Former Indoor Small Arms Range (Bldg T-2537) FTMM-26 (CW-4)	Former Indoor Small Arms Range (Bldg T-2537)	0.33	No	The former indoor small arms firing range located west of Building 2566 was investigated under the Fort Monmouth IRP as Site FTMM-26 (CW-4). Lead identified in soil above NJDEP Direct Contact Soil Cleanup Criteria, spent rounds, and casings were removed in 1997. An RI report requesting an NFA determination from the NJDEP was submitted in October 2005. An NFA was issued on April 26, 2007. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas. A BEE is not required.

Table 2-7
Charles Wood Area
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Site Name	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
33	UST-2534-24	Former #2 Fuel oil UST	0.05	No	A former #2 fuel oil UST was removed in 1994. Petroleum-related contaminants were detected in post-excavation soil samples at concentrations below the NJDEP cleanup criteria. A Closure Report was submitted to the NJDEP, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
34	2567 FTMM-58	Army & Air Force Exchange Service (AAFES) Gasoline Station (FTMM-58)	1.26	No	This parcel is being addressed under the Fort Monmouth IRP as Site FTMM-58 (Building 2567). Site FTMM-58 is an active gasoline service station operated by the AAFES organization. Three modern gasoline USTs are in use at Building 2567. The station is located at the corner of Hope Road and Laboratory Road. Five single-walled steel USTs and 1,000 cubic yards of petroleum-contaminated soil were removed as part of a renovation project that was initiated in 1991. Gasoline-related contaminants were detected in groundwater above NJDEP groundwater quality criteria. Due to groundwater contamination from volatile organic compounds, vapor intrusion is a recognized environmental condition in this area. A Classification Exception Area was filed with the NJDEP; and in situ bioremediation (Oxygen Release Compound [ORC] injection) and monitored natural attenuation, including groundwater monitoring, were selected as the remedial approach. Groundwater contamination is restricted to the immediate vicinity of Building 2567 and no evidence of migration to environmentally sensitive areas has been detected; a BEE is not required.
35	Child Development Center (2290) Residential Housing (2231-2240, 2260) FTMM-27 Former sewage treatment plant	2290, 2231 - 2240, 2260	58.88	No	This parcel includes the Child Development Center (2290), existing residential housing (2231 - 2240, 2260), the former sewage treatment plant, and the wooded portion of CWA south of 2566. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. The former Charles Wood Sanitary Treatment Plant (STP) is addressed under the Fort Monmouth IRP as Site FTMM-27 (CW-5). The former STP was located in the center of the CWA, bounded by Hope Road to the east, Corregidor Road to the north, Guam Lane to the west, and Laboratory Road to the south. The STP was closed on October 29, 1975, and demolished in 1983. No compounds of concern were detected above NJDEP criteria, and an NFA determination was approved by the NJDEP in 1994. Eleven former residential fuel oil USTs have been removed; no contamination was identified during closure; and no regulatory concurrence is required. Since no contamination is present, a BEE is not required.

Table 2-8
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
36	1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1230 1231 1152 170 200 FTMM-09, 47	Current use is administrative and government tenant activities, electrical substation (1231), Military Academy Prep School (1204, 1230), former Signal School (1200)	118.54	No	This parcel is the western portion of Main Post. Batteries associated with Uninterrupted Power Supplies (UPSs) are present in association with electrical substations and computer/mission activities throughout the area. Two aboveground storage tanks (ASTs), one located at Building 200 and one located at Building 127, are in use with secondary containment in place. One underground storage tank (UST) with leak detection and secondary containment in place is located at Building 1203. FTMM-09 (M-9 Former Polychlorinated Biphenyl [PCB] Transformer Site) and FTMM-47 (Buildings 1002, 1208, and 1209 former PCB transformer site) were investigated under the Intallation Restoration Program (IRP) and it was determined no transformers were leaking and all transformers are considered non-PCB class equipment. Staining of concrete and elevated concentrations of PCBs in concrete samples collected below existing transformers at Buildings 1208 and 1209 were determined to be minor in nature and will be addressed accordingly upon removal or replacement of existing transformers. A No Further Action (NFA) determination was approved by the New Jersey Department of Environmental Protection (NJDEP) in 1994. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas; therefore, no Baseline Ecological Evaluation (BEE) is required.
37	1220 FTMM-10	Boiler Plant	1.06	No	This parcel includes the boiler plant (Building 1220), small amounts of various chemicals utilized during operation of the facility, and associated current and former petroleum storage locations. Ten former fuel oil USTs and petroleum-contaminated soil were removed, and NFA approval letters were received from the NJDEP in 2000 and 2003. FTMM-10 (Asbestos Storage Area) was inspected under the IRP, no asbestos containing material was found, and an NFA determination was approved by the NJDEP in 1994. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
38	Former Outdoor Firing Range (1940-1955 Pistol Range) FTMM-21	Former Outdoor Small Arms Firing Range	0.59	No	This parcel is the 1940-1955 Small Arms Training Range and is included in the Fort Monmouth Military Munitions Response Program (MMRP). The area has been a maintained grass-covered area for over 40 years. Due to the historic use of this site as a small arms firing range, metals contamination in soil was investigated and no metals were found above NJDEP soil criteria. The former pistol range is overlain by maintained grass areas and asphalt pavement. No contaminants were identified during the 2008 Site Investigation; therefore, no BEE is required.
39	1150	Vail Hall - Communications back up and administrative offices	0.60	Yes	This parcel is the area between Building 1150 and Parkers Creek. Floor drains and a sump pump are present in the basement of 1150 for high water table intrusion and ultimately discharge to Parkers Creek via a basin behind the building. Building 1150 houses a large UPS room in the basement for communications backup and previous activities included film developing. Base/Neutrals (B/Ns) and metals were identified as constituents of concern in sediment during the 2008 Site Investigation. A BEE is recommended to address potential discharges to Parkers Creek.
40	FTMM-02	Former Landfill	8.10	Yes	This parcel was investigated under the Fort Monmouth IRP as Site FTMM-02. This is the location of former landfill M-2. An NFA recommendation was submitted to the NJDEP for near surface soil; NJDEP's response in June 2009 included a request for additional sediment samples from Mill Creek and a BEE. An equivalent to a Declaration of Environmental Restriction has been incorporated into the Fort Monmouth Master Plan for PCB contamination in below grade soil. A Groundwater CEA was established with the NJDEP. Volatile organic compounds present in groundwater at concentrations above NJDEP Groundwater Quality Criteria (NJ GWQC) are being remediated via enhanced bioremediation (Oxygen Release Compound [ORC] injection) through FY08. Long-term monitoring of groundwater and surface water continues on a quarterly basis. Potential migration pathways may exist for contaminants to enter Mill Creek from the Landfill; a BEE is recommended.
41	FTMM-59	Groundwater in vicinity of Building 1122	0.34	No	This parcel was investigated under the Fort Monmouth IRP as IRP Site FTMM-59. A Groundwater Classification Exception Area (CEA) was submitted to the NJDEP. Volatile organic compounds present in groundwater at concentrations above NJ GWQC are being remediated via enhanced bioremediation (Hydrogen Release Compound [HRC] injection). Long-term monitoring of groundwater and surface water continues on a quarterly basis. The identification of volatile organic compounds in the groundwater in excess of criteria and the potential for migration into overlying buildings qualifies vapor intrusion as a recognized environmental concern in this area. The contaminated groundwater will be evaluated through the BEE for Parcel 43 (Building 1122).
42	UST-1122-171	Former UST	0.02	No	A fuel oil tank and potentially contaminated soil were removed in 1994. Metals were detected in groundwater above criteria. Agreement was reached with the NJDEP in 1998 to conduct 4 rounds of sampling and close out the groundwater monitoring due to high background metals. Report was submitted and no response has been received from the NJDEP; monitoring is ongoing. The metals in groundwater will be evaluated through the BEE for Parcel 43 (Building 1122).
43	1122	Do-it-Yourself Auto Repair and Craft Shop	1.54	Yes	This parcel encompasses Building 1122 (Do-it-yourself auto repairs) and Building 1124 (Car wash). Building 1122 is a hazardous waste generator and numerous areas of patched asphalt and old concrete pads have been noted. An oil/water separator (w/vessel) and floor drains confirmed to be connected to sanitary system per 1993 floor plans. Surface drainage from this area may have had the potential to allow contaminants to migrate into Mill Creek and B/Ns and metals were identified as constituents of concern in sediment during the 2008 Site Investigation. A BEE is recommended.

Table 2-8
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
44	Former Skeet Range FTMM-03, 04, 05, 06, and 08	Former Skeet Range and Former Landfills	25.30	Yes	This parcel includes one MMRP site (1940-1955 Skeet Range) and IRP sites FTMM-03, 04, 05, 06, and 08. The IRP sites are former landfill areas (M-3, M-4, M-5, M-8) and a post burning area (M-6). Extensive soil evaluation has been conducted throughout this parcel, and an NFA determination has been requested from the NJDEP in relation to near surface soils throughout the parcel. No response has been received from the NJDEP. The Department of Public Works incorporated an equivalent to a Declaration of Environmental Restriction into the Fort Monmouth Master Plan for PCB below grade soil contamination at M-8. FTMM-03 - Groundwater - CEA currently being prepared for subsequent submission to the NJDEP. A Monitored Natural Attenuation (MNA) program is approved by the NJDEP and is currently under way. Long-term monitoring of groundwater and surface water continues on a quarterly basis. FTMM-05 - Groundwater - CEA currently being prepared for subsequent submission to the NJDEP. An HRC injection program is approved by the NJDEP and is currently under way through FY08 to address volatile organic compounds in groundwater. Long-term monitoring of groundwater and surface water continues on a quarterly basis throughout the parcel. BEE recommended for Former Landfills since a potential migration pathway may exist for contaminants to enter either Lafetra Creek, Mill Creek or Parkers Creek from the Landfills.
45	UST-697-194 UST-697-195 UST-697-195	Former USTs	0.04	No	Three 1,000-gallon waste oil tanks were removed on June 1, 1990. No documentation existed on condition of tanks or adjacent soils during removal. A site assessment was initiated at the suspected locations of the former USTs in November 1992. Petroleum-related compounds were detected in soil samples below State criteria. Initial groundwater samples exceeded NJ GWQC for chlorinated volatile organic compounds and pesticides. Closure Report submitted to NJDEP on 02/26/96 recommending additional groundwater sampling. Quarterly groundwater samples were collected from August 1997 to December 2001. Groundwater concentrations in the 2001 samples were below the NJ GWQC. Revised Closure Report submitted to NJDEP on 5/15/02. NJDEP closure approval letter received 01/10/2003. No contamination remains at the site and no migration to environmentally sensitive areas has been detected; therefore, no BEE is required. BEEs and sampling being conducted related to M-8 and M-18 also address Parcel 45 and Parkers Creek.
46	FTMM-07	Former Incinerator	0.03	No	This parcel was investigated under the Fort Monmouth IRP as Site FTMM-07 (M-7 Burning Area). The M-7 burning area was a former incinerator located within Building 697. The incinerator was used until 1990 for burning classified documents. The Incinerator was dismantled in 1993; NFA determination approved by NJDEP in 1994. There is no contamination present at Parcel 46 or evidence of migration to environmentally sensitive areas; therefore, no BEE is required. BEEs and sampling being conducted related to M-8 and M-18 also address Parcel 46 and Parkers Creek.
47	FTMM-19	Former Pistol Range	2.23	No	This parcel includes a former pistol range and the former sanitary treatment plant (FTMM-19). The firing range was used from 1935 to 1940 for small arms. The sewage treatment plant closed in 1975. No compounds of concern detected above NJDEP criteria for soil or sediment. NFA approved by NJDEP in 1996. Since no contaminants were found at Parcel 47, no BEE is required.
48	FTMM-18	Former Training Area	4.85	Yes	This parcel was investigated under the Fort Monmouth IRP as Site FTMM-18 - Near Surface Soils (Cover Soil). A geophysical survey and subsequent trenching identified buried waste materials at the site. A BEE is recommended since a potential migration pathway may exist for contaminants to enter Parkers Creek.
49	283, 288, 291, 292, 293, 295	Former Squier Laboratory Complex, Museum, Battery Test Facility	9.09	Yes	Building 283 is currently administrative space. Previous use included the Squier laboratory - primary R&D laboratory until 1954 (when the laboratory operations were transferred to Building 2700). Former repair/experimental work within this parcel included photographic equipment, a battery test facility (which was destroyed by fire in the 1980s and subsequently rebuilt), climatic testing lab, plastics research and development. Numerous former buildings existed in this parcel that were associated with Squier laboratory operations in the 1950s. B/Ns and PCBs were identified as constituents of concern in soil and metals were identified as constituents of concern in sediment during the 2008 Site Investigation. Migration of contaminants from UST at Building 283 or discharges from former septic and sump systems associated with Squier Complex to Parkers Creek may have occurred, so a BEE is recommended.
50	FTMM-54 Building 296) FTMM-55 (Building 290) FTMM-61 (Building 283)	Former fuel distribution facility, Former USTs	2.18	No	Three sites within this parcel are included in the Fort Monmouth IRP. Site FTMM-54 is a former abandoned fuel distribution facility that was removed during a renovation project at Building 296. Benzene and lead are present in groundwater above criteria and are being addressed through the implementation of MNA, which includes quarterly groundwater monitoring. Site FTMM-55 is the site of a former UST system which was located at Building 290. Petroleum-contaminated soil has been removed; lead and arsenic detections in groundwater are being addressed through MNA (including quarterly groundwater monitoring), while a request for an NFA determination is under review by the NJDEP. FTMM-61 is a former 3,000-gallon UST site at which petroleum-contaminated soil was removed and petroleum-related contaminants are present in groundwater. In situ bioremediation (ORC injection) is being conducted through FY08 to address groundwater, long-term monitoring of groundwater is ongoing. In total within this parcel, 15 USTs that were removed had evidence of petroleum release during closure and were properly addressed via removal of contaminated soil, and NFA approval letters were received for all 15 USTs. Contaminated groundwater is addressed through the Fort Monmouth IRP as summarized above. The identification of volatile organic compounds in the groundwater in excess of criteria indicates vapor intrusion is a potential recognized environmental concern in this area. Contaminated soils have been removed and no pathways to environmentally sensitive areas are present; no BEE is required. BEEs and sampling being conducted related to M-8 and M-18 also address Parcel 50 and Parkers Creek.

Table 2-8
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
51	750 Area 787, 788, 789 500 Area 600 Area 1100 former Barracks FTMM-11	Motor Pool Administrative Barracks Former USTs	87.00	No	This parcel includes the 750 motor pool; the area around Buildings 787, 788, and 789; the 600 Area Buildings; 500 Area Buildings; former barracks along Semaphore Ave, and IRP Site FTMM-11. Per communications with facility personnel involved with the 750 Motor Pool construction project in the 1980s, multiple former USTs associated with former barracks in the area were removed during construction. Extensive soil sampling and three UST removals were conducted in the area of Buildings 787, 788, and 789 as part of the U.S. Army's Residential Communities Initiative (RCI) and Enhanced Use Leasing (EUL) programs. Soil grid sampling was conducted throughout the area. Locations at which contaminated soil was identified above NJDEP residential cleanup criteria were excavated and disposed off site. Numerous UST removals and extensive investigation of the 600 Area were conducted under the 600 Area Work Plan that was approved by the NJDEP. A petroleum release was documented to have potentially occurred at 24 of the removed USTs in this parcel. An NFA approval letter was obtained from the NJDEP for all 24 locations where evidence of a petroleum release was identified. Current operations in the 600 Area include dry metal fabrication of vehicle equipment shelters (no solvents used). Small amounts of chemicals are utilized in this area, and lead acid batteries are present in association with emergency generators and UPSs. FTMM-11 (M-11 Elevated Water Tank) was investigated unde the IRP. Site reconnaissance work revealed no visible stains, stressed vegetation or soil at the site and an NFA determination was approved by the NJDEP in 1994. Eleven suspected USTs were identified during a geophysical survey conducted as part of the 2008 Site Investigation and are currently being addressed. This parcel consists of maintained grass and pavement associated with residential housing and the 750 motor pool. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
52	FTMM-53, Bldg 699	gasoline service station	1.38	No	This parcel was investigated under the Fort Monmouth IRP as FTMM-53 (Building 699). Site FTMM-53 is an active gasoline service station operated by the Army & Air Force Exchange Service (AAFES) organization. On November 5, 1984, a tank tightness test identified a leak in two USTs. No action was taken until 1989 when a line leak was identified; subsequently, the piping was excavated and replaced. Volatile organic compounds were identified in soil and groundwater at concentrations exceeding NJDEP cleanup criteria. Since that time, a groundwater treatment system (to recover free product and to control plume migration) has been operating in conjunction with a quarterly groundwater monitoring program. The cleanup strategy is to continue remedial action activities and monitoring efforts at the Building 699 site. Shut-down of the treatment system is expected in FY08 and quarterly groundwater monitoring of 13 wells will be performed for 2 years after shut-down. A CEA is currently being prepared for subsequent submission to the NJDEP. The identification of volatile organic compounds in the soil and groundwater in excess of criteria indicates vapor intrusion is a potential recognized environmental concern in this area and tetrachloroethene was identified as a constituent of concern in soil gas during the 2008 Site Investigation. Contaminated soil has been removed and contaminated groundwater is contained in the immediate vicinity of Building 699; no migration to environmentally sensitive areas had been detected; a BEE is not required.
53	700 Area	former housing	11.53	No	Extensive soil sampling and numerous UST removals were conducted as part of the U.S. Army's RCI and EUL programs. Soil grid sampling was conducted throughout the area. Locations at which contaminated soil was identified above NJDEP residential cleanup criteria were excavated and disposed off site and there are no migration pathways to environmentally sensitive areas; therefore, no BEE is recommended.
54	700 Area 800 Area	Lane Hall (Social events and food service) Former Dental Clinic	44.74	No	This parcel includes a sewage lift station (Building 752) at which antifreeze is stored for an emergency generator, former dental clinic and photoprocessing facility currently utilized as a locker room (Building 814); and Lane Hall (Building 702) which is utilized for social events and food service. No release or disposal of hazardous substances or petroleum products has occurred; therefore, no BEE is required.
55	876 FTMM-47	Former Motor Pool Former Medical and Veterinarian Laboratory	11.80	No	Medical and veterinarian laboratories were previously located in former Building 876 and a 1999 Chemical Inventory recorded storage of hazardous substances in this former building. A motor pool formerly existed within this parcel. FTMM-47 (Buildings 1002, 1208, and 1209 former PCB transformer site) was investigated under the IRP and it was determined the staining of concrete and elevated concentrations of PCBs in concrete samples collected below existing transformers at Building 1002 was minor in nature and will be addressed accordingly upon removal or replacement of existing transformers. An NFA determination was approved by the NJDEP. There are no migration pathways to environmentally sensitive areas; a BEE is not required.
56	800 Area RCI Project	Former housing	15.18	No	Extensive soil sampling and numerous UST removals were conducted as part of the U.S. Army's RCI and EUL programs. Soil grid sampling was conducted throughout the area. Locations at which contaminated soil was identified above NJDEP residential cleanup criteria were excavated and disposed off site. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
57		Former Coal Storage and RR Unloading area	8.71	No	Former coal storage and unloading area along former railroad in south central portion of Main Post. B/Ns were identified as constituents of concern in soil and metals were identified as constituents of concern in groundwater during the 2008 Site Investigation and are being further evaluated. No migration pathway to ecological receptors has been identified. There are no migration pathways to environmentally sensitive areas; a BEE is not required. BEE and sampling being conducted related to M-14 also addresses Parcel 57 and Husky Brook.

Table 2-8
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
58	UST-800-127 UST-801-129	Former #2 fuel oil USTs	1.04	No	Two #2 fuel oil USTs and associated petroleum-contaminated soil were removed. Initial groundwater results showed one semi-volatile organic compound exceeded the NJ GWQC. A monitoring well was installed and no compounds were detected above NJ GWQC in four rounds of sampling. Closure Reports requesting NFA were submitted to the NJDEP, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
60	1077, 1078	Residential Housing	4.22	No	Residential housing area southwest of Patterson Army Health Clinic. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Since no contaminants are present and no release has occurred, no BEE is required.
61	810, 1075, 1076	Medical Facility Veterinary Clinic	14.66	Yes	This parcel includes the veterinary clinic (Building 810), Patterson Army Health Clinic (Building 1075), and former Patterson Boiler Plant (former Building 1076). Former X-ray operations were conducted with film development at 1075; over the counter medicines stored on site; medical waste disposed through 1075. Based on extensive previous medical activities within this parcel, potential for historic release of developing chemicals and other waste associated with medical operations exists. B/Ns were identified as constituents of concern in soil and B/Ns and metals were identified as constituents of concern in sediment during the 2008 Site Investigation. Stormwater discharges to a tributary to Oceanport Creek from Building 1075 may have occurred; a BEE is recommended.
62	FTMM-13	Former Pathogenic Waste Incinerator	0.13	No	This parcel was investigated under the Fort Monmouth IRP as FTMM-13 (M-13 Pathogenic Waste Incinerator). The pathogenic waste incinerator formerly located on the west side of former Building 1076 was constructed in 1975. The pathogenic waste incinerator was taken out of service in December 1992. Site reconnaissance work revealed no ash or debris in or around the incinerator unit and the incinerator was dismantled in November 1993. An NFA determination was approved by the NJDEP in 1994. No contaminants have been identified and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
63	UST-810-131	Former #2 fuel oil UST	0.12	No	A former #2 fuel oil UST was removed in 1998. Visible petroleum contamination of soil was observed during the removal of the UST, and potentially contaminated soil was removed. No detections in groundwater or soil samples were above NJDEP criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 8/29/2000. No pathway to environmentally sensitive areas is present, so no BEE is required.
64	FTMM-64 (Building 812)	former gasoline distribution area	3.18	No	This parcel was investigated under the Fort Monmouth IRP as FTMM-64 (Building 812). This parcel is a former gasoline distribution area. Volatile organic compounds and metals are present in groundwater above the NJ GWQC; no contaminants identified in soil above criteria. Treatment of groundwater is underway via enhanced bioremediation (HRC/ORC injection). A CEA was submitted with the NJDEP, awaiting response. Long-term monitoring of groundwater continues on a quarterly basis. The identification of volatile organic compounds in the groundwater in excess of criteria indicates vapor intrusion is a potential recognized environmental concern in this area. There is no migration pathway to environmentally sensitive areas, so no BEE is required.
65	FTMM-66 (Building 886)	former fuel oil storage area	3.15	No	This parcel is addressed under the Fort Monmouth IRP as FTMM-66 (Building 886). Based upon historical records, Site FTMM-66 was identified as a former fuel oil storage area. Aerial photos indicate a former AST was located adjacent to Building 886, located off Murphy Drive on the Main Post. The AST had a storage capacity of 250,000 gallons and stored #2 fuel oil. The AST was removed in the 1970s. Soil contamination was identified at the site during the removal of a 1,000-gallon steel, fuel oil UST located on the west side of Building 886. Soils contained petroleum contamination exceeding NJDEP residential direct contact soil cleanup criteria, and free product was observed in groundwater. 4,000 tons of soil were removed in February 2003. A CEA was filed with the NJDEP and MNA, including groundwater monitoring, was selected as the remedial approach. Long-term groundwater monitoring continues on a quarterly basis. There is no migration pathway to environmentally sensitive areas, so no BEE is required.
66	900 Building Area	Electrical Substation General Storage Police Station	28.92	No	This parcel includes general storage (Buildings 908, 975 and 976), the police station (977), and an electrical substation (Building 978). The electrical substation (Building 978) houses 18 lead acid batteries and non-PCB transformers, all contained within secondary containment. Building 977 houses lead acid batteries associated with an emergency generator. Building 901, currently used in an administrative capacity, formerly housed radar training. Chemicals utilized in this operation included alcohols and freon 113. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Therefore, no BEE is required.
67	UST-949-203	Former #2 fuel oil UST	0.12	No	A former diesel UST and potentially contaminated soil were removed in 1998. One volatile organic compound was detected above the NJ GWQC during the initial round of groundwater sampling. Subsequent quarterly samples collected in 9/2000, 10/2000, 1/2001, and 4/2001 showed no compounds above NJ GWQC. Closure Report requesting NFA submitted to NJDEP on 07/17/2001. NJDEP Closure Approval Letter received on 01/10/2003. No contaminants remain at the site and there is no pathway to environmentally sensitive areas, so no BEE is required.
68	900 Building Area former USTs	Former #2 fuel oil USTs	4.74	No	This parcel includes 12 former USTs. Petroleum discharges were identified at five of the USTs and associated petroleum-contaminated soil was remediated. NFA approval letters were received in 2000 (UST-909-147, UST-914-152, UST-977-204, and UST-979-205) and 2003 (UST-905-145). Lead acid batteries associated with an emergency generator are present at Building 979. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.

Table 2-8
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
69	900	Former vehicle repair/motor pool	0.31	Yes	This facility is a former vehicle repair/motor pool facility where solvent-based parts cleaners were previously utilized as part of routine vehicle maintenance activities. This building has been used as general storage for the past 10 years. Metals and B/Ns were identified as constituents of concern in sediment during the 2008 Site Investigation. Stormwater outfalls discharging into Oceanport Creek may have the potential to have led to migration of contaminants to Oceanport Creek, so a BEE is recommended.
70	551	Classroom, former (early 1950s) photoprocessing	1.73	No	Former industrial processes included the use of carbon tetrachloride, benzol, acids, and photographic chemicals in an adjacent Quonset hut in the early 1950s. This facility is currently used for administrative and classroom activities. No constituents of concern were identified in sediment or soil during the 2008 Site Investigation. Though Husky Brook is adjacent to Parcel 70, no contaminants have been found in environmental media, so a BEE is not required.
71	FTMM-12, FTMM-14	Former Landfill	14.65	Yes	This parcel was investigated under the Fort Monmouth IRP as FTMM-12 (M-12 Landfill) and FTMM-14 (M-14 Landfill). A remedial action that addressed soil erosion problems along Husky Brook was completed in June of 2001. An NFA recommendation for near surface soil was submitted to the NJDEP; NJDEP's response in July 2007 included a request for additional sediment samples from Husky Brook and a BEE. Metals and volatile organic compounds have been detected in groundwater slightly above the NJ GWQC. Long-term monitoring of groundwater and surface water continues on a quarterly basis, and a CEA request has been submitted to the NJDEP for groundwater. An NFA recommendation was submitted to the NJDEP. A BEE is recommended since a potential migration pathway may exist for contaminants to enter Husky Brook.
72	200 Area 300 Area	Residential Housing Parade Grounds Administrative	101.38	No	This parcel is located in the north-central portion of Main Post and includes residential housing along Gosselin Ave., Sherrill Ave., Allen Ave., and Signal Ave.; the parade grounds; administrative offices in Building 286 (Russell Hall), and electronic research facilities in the northeastern portion of the parcel. Hospital facilities were formerly located in Building 209 prior to the construction of Patterson Army Health Clinic. Building 209 is now used for administrative purposes. No release or disposal of hazardous substances or petroleum products has occurred, and there has been no migration of such substances from adjacent areas. Forty-five (45) former fuel oil USTs have been removed and no contamination was identified during closure. Approval of an NFA recommendation was received from the NJDEP for six USTs, the remaining 39 removed USTs were residential USTs for which no regulatory concurrence is required. Since no contamination is present related to Parcel 72, no BEE is required.
73	UST-286-60	Former #2 fuel oil UST	0.12	No	A former #2 fuel oil UST and 3 cubic yards of petroleum-contaminated soil were removed. A closure report was submitted to the NJDEP requesting an NFA determination in 1999, and an NFA approval letter was received from the NJDEP on 2/24/2000. Additionally, there are no migration pathways to environmentally sensitive areas, so no BEE is required.
74	205, 206, 207, 208, 257, 282, 287	Residential Housing, Fire House, and former fuel oil USTs	10.74	No	This parcel includes the fire house and existing housing southeast of Hidreth Ave. Eight former residential fuel oil USTs and associated petroleum-contaminated soil have been removed. No regulatory concurrence is required for residential USTs. Despite no requirement for regulatory concurrence, an NFA approval letter was obtained for 7 of the 8 USTs. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
75	FTMM-20	Pre-1941 Sewage Treatment Plant	0.28	Yes	This parcel is addressed under the Fort Monmouth IRP as FTMM-20 (Pre-1941 Sewage Treatment Plant). During the RI, metals were detected in sediment samples above criteria. Though these metals may be comparable to background levels; a BEE is recommended.
76	200 Area 300 Area	Residential Housing Former Barracks	12.06	No	This parcel includes the existing residential housing buildings north of Housing Ave. and the former 300 Area Barracks. Numerous USTs are illustrated on historic maps associated with the 300 Area Barracks that are not documented to have been removed. Thirteen (13) residential USTs and associated petroleum-contaminated soil (for which no NJDEP closure approval is required) were removed in association with existing residential housing in this parcel as well. Seven suspected USTS were identified during a geophysical survey conducted as part of the 2008 Site Investigation; however, no constituents of concern were identified in soil or groundwater. The 7 suspected USTs are currently being investigated. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
77	UST-210-8	Former #2 fuel oil UST	0.37	No	A former #2 fuel oil UST and 10 cubic yards of petroleum-contaminated soil were removed in 1994, and no contaminants were detected in groundwater above NJDEP criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 1996. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
78	FTMM-15	Elevated Water Tank	0.30	Yes	This parcel is addressed under the Fort Monmouth IRP as Site FTMM-15 (M-15 Water Tank). Two pesticides and three metals were identified above NJDEP direct contact soil cleanup criteria. A corrective action was implemented in 1999 involving the removal of the contaminated soil from the site. A Remedial Action report will be submitted to NJDEP with an NFA recommendation from the Army. RI sampling had confirmed that horizontal migration towards Parkers Creek had occurred prior to Remedial Action, so BEE is recommended.

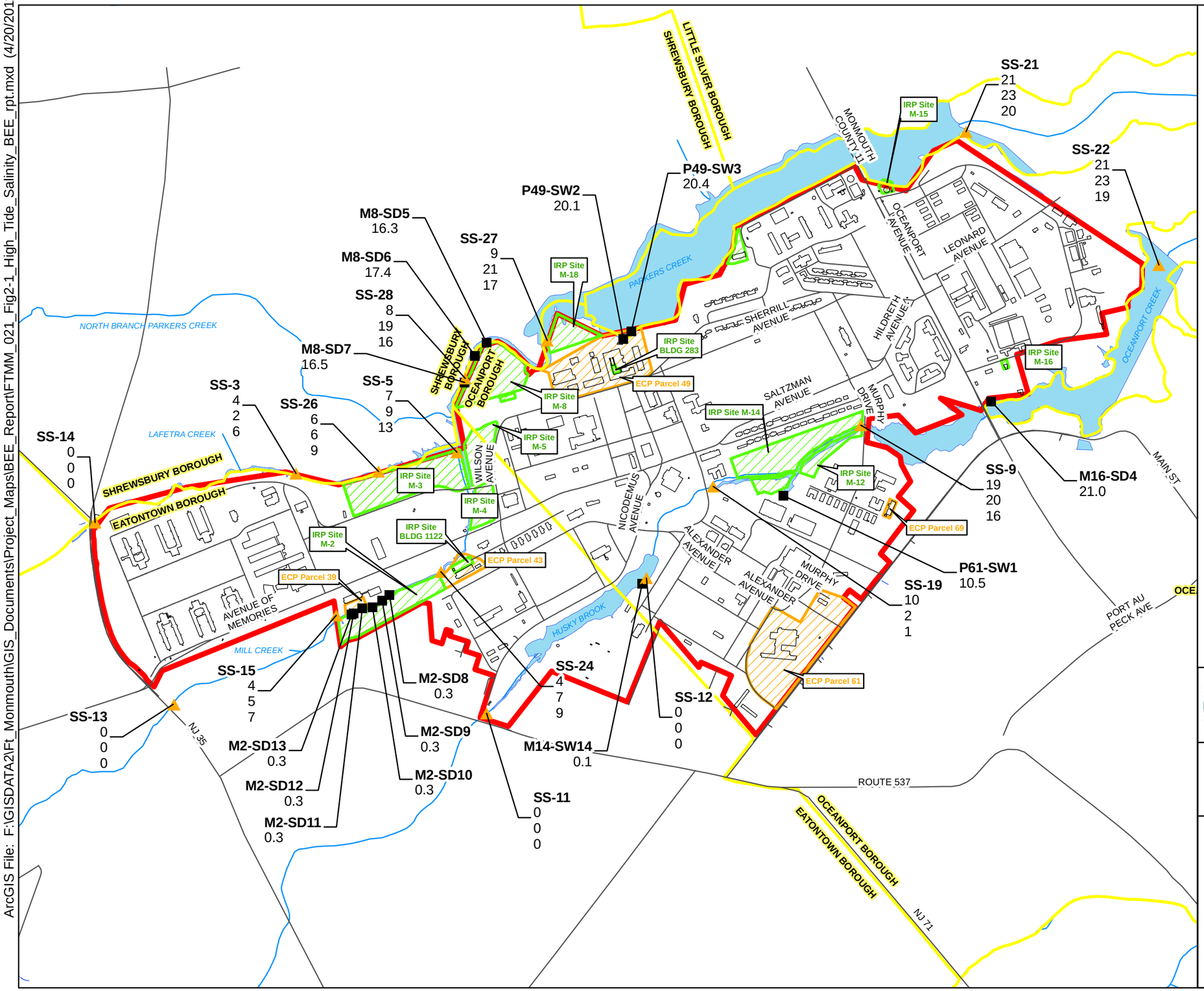
Table 2-8
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
79	142 494 Bldg 75 Former Tank Farm	Box/Crate Shop Marina Former Bulk Petroleum Storage Tanks	43.64	No	This parcel includes the Box/Crate shop (all hazmat packaged and shipped through this building, but not stored at this location), the water supply treatment building (Building 494), former Building 75 Tank Area adjacent to the railroad, the marina, and the former 400 area housing. There were 38 USTs removed from this parcel. Eight of the tanks had leaked and soil removals were conducted. Some of the USTs were residential and did not require closure documentation. Twenty-five (25) approval letters for the UST removals were received from the NJDEP. Four suspected USTs were identified during a geophysical survey conducted as part of the 2008 Site Investigation; however, no constituents of concern were identified in soil or groundwater. The four suspected USTs are currently being investigated. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
80	Former Buildings 105 and 106		0.93	No	This parcel includes former Buildings 105 and 106 - former photoprocessing facilities located northeast of Oceanport Ave., directly southeast of the current credit union (Building 495). These building served as photoprocessing facilities from the 1940s until they were demolished in the 1980s. No constituents of concern wer idetified during the 2008 Site Investigation and the parcel consists of maintained lawn, pavement, and buildigns. No migration pathway to sensitive environmental resource is present; a BEE is not required.
81	FTMM-16 (Bldg 498)	Former Pesticide Storage Area	0.12	Yes	A former pesticide storage and mixing area was located at the M-16 site on Main Post. The facility (Building 498) is a brick structure and was constructed in 1939. Pesticide management practices were conducted at the site until the late 1950s. Remedial actions were completed in 1999 under the Fort Monmouth IRP to remove pesticide-contaminated soil. A Remedial Action report will be submitted to NJDEP with an NFA recommendation from the Army. Sampling prior to Remedial Action confirmed that migration horizontally in the direction of Oceanport Creek had occurred, so a BEE is recommended.
82	400 Area RCI	Remediated soil contamination in 400 Area	0.13	No	PCB-contaminated soil was excavated to below NJDEP cleanup criteria and disposed off site in 2005 as part of the U.S. Army's RCI and EUL programs. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
83	109	Former photoprocessing Current and former maintenance shops (carpentry, plumbing, heating, HVAC, electrical) Former coal storage	35.34	No	This parcel is located in the northeastern portion of the Main Post and is associated with numerous current and former industrial processes and vehicle operations including former vehicle wash platforms, former photoprocessing and printing plants, current and former vehicle maintenance areas, former heating plants, former refrigerant repair, former coal storage, and current and former carpentry, plumbing, and electrical shops. Three modern USTs are currently in use at Building 273 (Garrison Motor Pool), three waste oil ASTs are present at Building 484, one waste oil AST is present at Building 481, and one waste oil AST is present at Building 121. All existing USTs and ASTs have secondary containment in place. Numerous former USTs have been removed throughout this parcel, and petroleum-contaminated soil was addressed when encountered at each UST location. Lead and B/Ns were identified as constituents of concern in surface soil during the 2008 Site Investigation. The entire parcel consists of maintained lawn, pavement, and buildings. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
84	FTMM-56 (Former Building 80)	Former #2 fuel oil UST	0.29	No	This parcel is addressed under the Fort Monmouth IRPas Site FTMM-56 (Building 80). A former #2 fuel oil UST and 56 cubic yards of petroleum-contaminated soil were removed in 1993. Although a discharge was identified during the UST closure, the discharge is believed to have come from activities prior to and not related to the UST removal (pre-1984). Gasoline-related constituents and one pesticide were detected at concentrations above the NJ GWQC. MNA (which includes quarterly groundwater monitoring) has been implemented as the remedial approach for this parcel pending approval of an NFA recommendation by the NJDEP. An RI report requesting an NFA determination was submitted to the NJDEP in May 2005. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
85	UST-116-9	Former #2 fuel oil UST	0.13	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1994. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 10/23/00. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
86	UST-117-72	#2 fuel oil UST	0.13	No	A former #2 fuel oil UST was removed in 1994. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 1998. There are no migration pathways to environmentally sensitive areas; a BEE is not required.
87	UST-64-4 (#2 fuel oil) UST-65-5 (#2 fuel oil) UST-161-14 (#2 fuel oil) UST-161-68 (waste oil) UST-173-19 (#2 fuel oil)	5 former USTs	0.45	No	This parcel includes 5 former USTs and associated petroleum-contaminated soil that were removed. Closure Reports requesting NFA have been submitted for all 5 USTs. NFA approval letters were received from NJDEP for UST-64-4 on 10/23/00, UST-65-5 on 8/29/2000, and UST-173-19 on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
88	FTMM-17 (Former Building 65)	Former Pesticide Storage Area	0.27	No	This parcel was included in the Fort Monmouth IRP under Site FTMM-17 (M-17 Former Pesticide Storage Area, Bldg 65). Building 65 has been demolished; chlordane was detected in the soil 6-12 inches below grade consistent with termite control practices in the 1980s; no chlordane was detected in groundwater. An NFA determination was approved by the NJDEP in 1994. There are no migration pathways to environmentally sensitive areas; a BEE is not required.

Table 2-8
Main Post, Fort Monmouth, New Jersey
ECP Parcel and IRP Site Summary

Parcel Number	Building No. / Associated IRP Site / Associated UST	Design Use Description	Size of Parcel (Acres)	Selected for BEE	Basis/Remarks
89	UST-64-3 'UST-485-57	2 former #2 fuel oil USTs	0.14	No	Two former #2 fuel oil tanks (UST-64-3, UST-485-57) and petroleum-contaminated soil were removed. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 8/29/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
90	FTMM-57 (Former Bldg 108 USTs)	5 former #2 fuel oil USTs	0.38	No	Five former USTs associated with former Building 108 are addressed under the Fort Monmouth IRP as Site FTMM-57. The 5 USTs were removed in 1993; volatile organic compounds and metals have been detected in groundwater above NJ GWQC. A CEA for site groundwater, which restricts the use of groundwater within a defined area until such time that contaminants of concern achieve compliance with the NJ GWQC, was filed with the NJDEP. An RI report requesting an NFA determination has been submitted to the NJDEP. Currently, as part of a monitoring program, four groundwater monitoring wells are sampled on a quarterly basis. Contaminated groundwater is restricted to the area in the vicinit of the former USTs and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
91	UST-280-25	Former #2 Fuel oil UST	0.14	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1997. A closure report was submitted to the NJDEP requesting an NFA determination in 2000, and an NFA approval letter was received from the NJDEP on 10/23/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
92	UST-484-56	Former #2 Fuel oil UST	0.04	No	A former #2 fuel oil UST and 13 cubic yards of petroleum-contaminated soil were removed in 1995. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria. A closure report was submitted to the NJDEP requesting an NFA determination in 1998, and an NFA approval letter was received from the NJDEP on 8/29/2000. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
93	UST-482-54	Former #2 Fuel oil UST	0.04	No	A former #2 fuel oil UST and petroleum-contaminated soil were removed in 1994. Petroleum-related contaminants were detected in confirmatory soil samples at concentrations below the NJDEP cleanup criteria and groundwater results were below the NJ GWQC. A closure report was submitted to the NJDEP requesting an NFA determination in 2002, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
94	UST-164-15 UST-277-24	Former #2 Fuel oil USTs	0.17	No	Two former #2 fuel oil tanks (UST-164-15, UST-277-24) and petroleum-contaminated soil were removed. A closure report was submitted to the NJDEP requesting an NFA determination in 2002, and an NFA approval letter was received from the NJDEP on 1/10/2003. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.
95	PCB Transformer leak near Bldgs 454 and 456	Pole Mounted PCB Transformer leak	0.44	No	This parcel is located northeast of Oceanport Ave. in the vicinity of Buildings 454 and 456. Three pole-mounted 50 KVA transformers (PCB-contaminated class) were knocked to the ground as a result of a storm in 1992 and the contents of two of the transformers leaked onto the ground. The transformers were properly disposed of along with 50 cubic yards of PCB-contaminated soil. Final post-excavation samples were non-detect for PCBs and showed levels of total petroleum hydrocarbons (TPH) below the NJDEP standard. An additional 20 surface soil samples were collected from the perimeter of the entire excavation. These samples were analyzed for TPH. None of these samples contained TPH in excess of the NJDEP soil standard. Contaminated soil has been removed and there are no migration pathways to environmentally sensitive areas; a BEE is not required.

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_021_Fig2-1_High_Tide_Salinity_BEE_rpt.mxd (4/20/2011)



LEGEND

- **Surface Water Sampling Point** High Tide Salinity Measurements (ppt)
- **BEE Sampling Location** High Tide Salinity Measurement (ppt)
- Water Feature
- Road Centerline
- IRP Site
- ECP Parcel
- Building
- Water Body
- Installation Boundary
- Municipal Boundary

N

0 500 1,000 2,000

Scale: Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

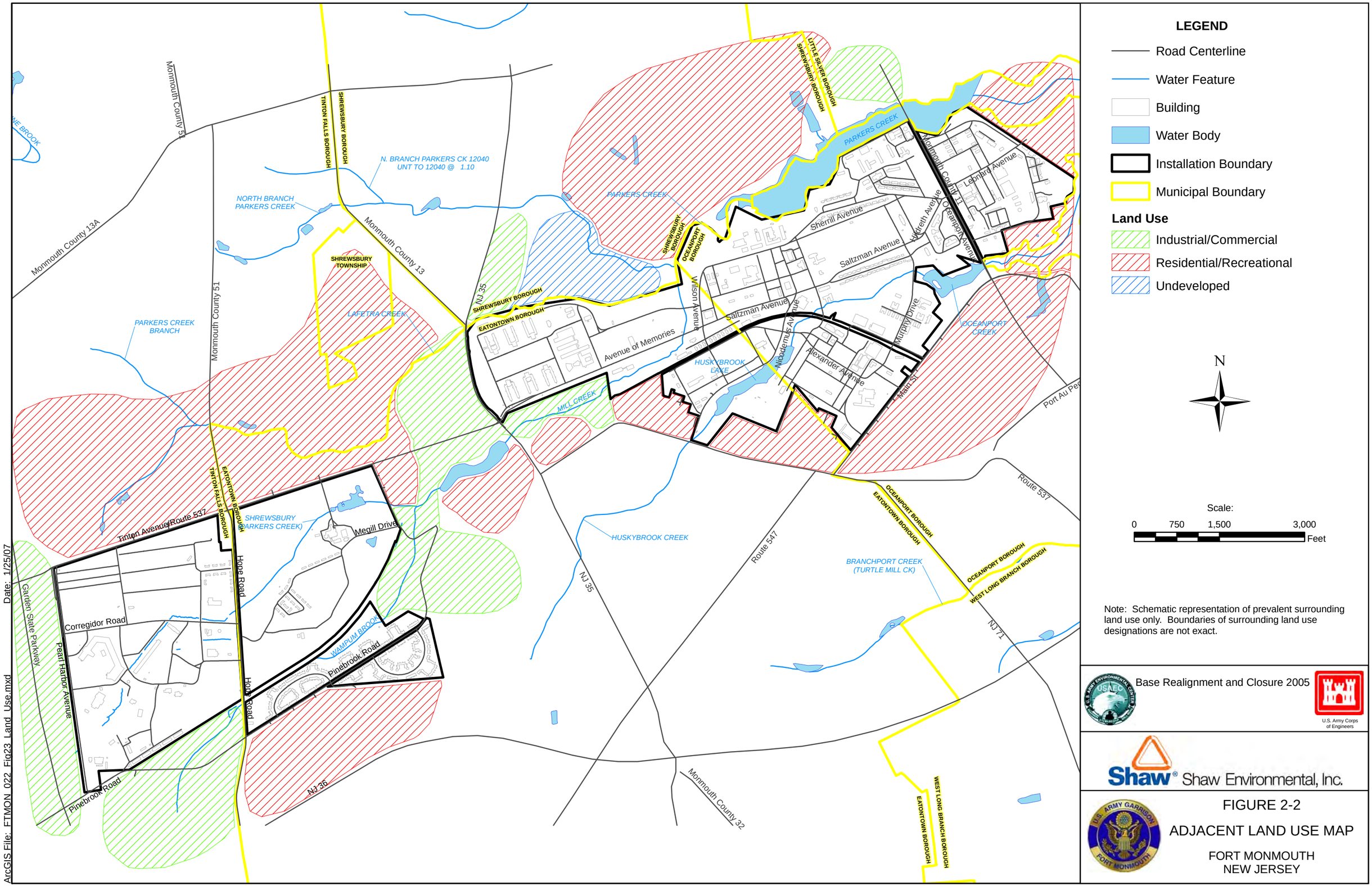
Shaw® Shaw Environmental, Inc.

FIGURE 2-1

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

HIGH TIDE SALINITY RESULTS

MAIN POST
FORT MONMOUTH
NEW JERSEY


LEGEND
Road Centerline
Water Feature
Building
Water Body
Installation Boundary
Municipal Boundary
Land Use
Industrial/Commercial
Residential/Recreational
Undeveloped
N
Scale:
0 750 1,500 3,000
Feet
Note: Schematic representation of prevalent surrounding land use only. Boundaries of surrounding land use designations are not exact.
Monmouth County 51
Monmouth County 13A
Monmouth County 13
Monmouth County 11
Monmouth County 32
NJ 35
NJ 36
NJ 71
Route 537
Route 547
Tinton Avenue/Route 537
Garden State Parkway
Pearl Harbor Avenue
Corregidor Road
Pinebrook Road
Hope Road
Megill Drive
Avenue of Memories
Wilson Avenue
Saltzman Avenue
Sherrill Avenue
Leonard Avenue
Alexander Avenue
Murphy Drive
Maurer St
Port Au Per
TINTON FALLS BOROUGH
SHREWSBURY BOROUGH
SHREWSBURY TOWNSHIP
EATONTOWN BOROUGH
OCEANPORT BOROUGH
LITTLE SILVER BOROUGH
WEST LONG BRANCH BOROUGH
N. BRANCH PARKERS CK 12040
UNT TO 12040 @ 1.10
NORTH BRANCH PARKERS CREEK
PARKERS CREEK
PARKERS CREEK BRANCH
LAFETRA CREEK
MILL CREEK
HUSK BROOK LAKE
HUSKYBROOK CREEK
OCEANPORT CREEK
BRANCHPORT CREEK (TURTLE MILL CK)
SHREWSBURY (PARKERS CREEK)
WAMPUM BROOK
Base Realignment and Closure 2005
U.S. Army Corps of Engineers
Shaw Environmental, Inc.
FIGURE 2-2
ADJACENT LAND USE MAP
FORT MONMOUTH
NEW JERSEY
Date: 1/25/07
ArcGIS File: FTMON_022_Fig23_Land_Use.mxd

3.0 DATA EVALUATION

In order to evaluate the nature of contaminants detected at the FTMM sites and to identify the COPECs, several steps were followed. The first step was a review of the analytical data collected from the environmental media with regards to the sites and selection of the data appropriate for use in the BEE. The second step was the identification of the most appropriate and applicable criteria or benchmarks for comparison to data. The third step was the identification of the COPECs at the sites and an evaluation of these COPECs in terms of potential ecological impact. The following sections describe these steps in detail.

3.1 REVIEW OF AVAILABLE SITE DATA

Site data addressed in this BEE include data previously collected for RIs (e.g., near surface soil data for former landfills), ECP SIs, and routine environmental monitoring (e.g., groundwater data) and data collected specifically to fill data gaps for the BEE. The data evaluated in this BEE appear in **Appendix A** (RI data), **Appendix B** (ECP SI data), **Appendix C** (groundwater monitoring data), and **Appendix D** (BEE investigation data).

Exposure of ecological receptors to contaminants in soil predominantly occurs within the surface soils. Ecological receptors are not frequently exposed to subsurface soils; therefore, subsurface soils collected at 2 feet bgs and below are not evaluated in this BEE. Near-surface soil data are available for most IRP sites in RI reports [Landfill 2 (FTMM-2), Landfill 3 (FTMM-3), Landfill 4 (FTMM-4), Landfill 5 (FTMM-5), Landfill 8 (FTMM-8), Landfill 12 (FTMM-12), Landfill 14 (FTMM-14), Former Training Area/Landfill (FTMM-18), and Landfill CW-3A (FTMM-25)] and most ECP Parcels in the SI report (Parcel 15, Parcel 27, Parcel 5, Parcel 39, Parcel 49, Parcel 61, Parcel 69). Contaminated soils have been excavated and removed and the areas backfilled and graded at Building 283, Building 1122, the Water Tank FTMM-15, the pre-1941 STP (FTMM-20), and Building 498 (FTMM-16); soils at these sites are not addressed in the BEE. Only subsurface soil sample data was previously available for the Former Pesticide Storage Area, CW-6 (FTMM-28); soils samples were collected as part of the BEE investigation from this site to support the BEE.

Though ecological receptors are not exposed directly to contaminants in groundwater, pathways may exist by which groundwater may flow to potential exposure points (e.g., discharge of groundwater into surface water bodies). Therefore, the most recent 2-year period of readily available groundwater data from routine environmental monitoring are evaluated in this BEE to best represent current conditions; this constitutes the 2008 and 2009 calendar years. Though groundwater may discharge to surface water bodies, groundwater contaminant concentrations are not meant to represent potential surface water concentrations. It should be noted also that, though the CEAs are meant to minimize the potential human health exposure to contaminants in groundwater, they do not inhibit potential ecological exposures. Groundwater data are available from the routine environmental monitoring for applicable IRP sites [Landfill 2 (FTMM-2), Landfill 3 (FTMM-3), Landfill 4 (FTMM-4), Landfill 5 (FTMM-5), Landfill 8 (FTMM-8), Landfill 12 (FTMM-12), Landfill 14 (FTMM-14), Building 498/FTMM-16, Former Training Area/Landfill FTMM-18, Landfill CW-3A (FTMM-25), Former Pesticide Storage Area/CW-6 (FTMM-28), Building 1122 (FTMM-59), and Building 283 (FTMM-61)] and from the SI Report (Shaw, 2008) for applicable ECP sites (Parcel 15, Parcel 28, Parcel 49, and Parcel 69). No groundwater samples were collected as part of the BEE.

Ecological receptors may be exposed directly to contaminants in surface water and sediment of the various creeks and ponds that drain the sites. As with soils, ecological receptors are not frequently exposed to contaminants in subsurface sediments. The top 6.0 inches of sediment is usually considered to be the biotic zone, and only data from the top 6 inches of sediments is evaluated in this BEE. Previous sediment data for most IRP sites addressed only PCBs. Sediment samples were collected as part of the BEE from applicable IRP sites for an expanded analytical program [Landfill 2 (FTMM-2), Landfill 3 (FTMM-3), Landfill 4 (FTMM-4), Landfill 5 (FTMM-5), Landfill 8 (FTMM-8), Landfill 12 (FTMM-12), Landfill 14 (FTMM-14), Water Tank/FTMM-15, Building 498/FTMM-16, Former Training Area/Landfill FTMM-18, Pre-1941 STP/FTMM-20, Landfill CW-3A (FTMM-25), Former Pesticide Storage Area/CW-6 (FTMM-28), Building 1122 (FTMM-59), and Building 283 (FTMM-61)]. The data from the samples collected as part of this BEE, and not the previous IRP sediment samples, are evaluated in this BEE. Sediment data are also

available from the SI Report (Shaw, 2008) for applicable ECP sites (Parcel 15, Parcel 27, Parcel 28, Parcel 39, Parcel 43, Parcel 49, Parcel 61, and Parcel 69) and are evaluated in this BEE.

As with sediment, surface water analysis in previous samples, particularly for IRP sites, has been for a limited suite of parameters. Surface water samples evaluated in this BEE were collected as part of the BEE for an expanded analytical program; surface water samples were collected for applicable IRP and ECP sites [Landfill 2 (FTMM-2), Landfill 3 (FTMM-3), Landfill 4 (FTMM-4), Landfill 5 (FTMM-5), Landfill 8 (FTMM-8), Landfill 12 (FTMM-12), Landfill 14 (FTMM-14), Water Tank/FTMM-15, Building 498/FTMM-16, Former Training Area/Landfill FTMM-18, Pre-1941 STP/FTMM-20, Landfill CW-3A (FTMM-25), Former Pesticide Storage Area/CW-6 (FTMM-28), Building 1122 (FTMM-59), Building 283 (FTMM-61), Parcel 15, Parcel 27, Parcel 28, Parcel 39, Parcel 43, Parcel 49, Parcel 61, and Parcel 69).

3.2 BEE SITE INVESTIGATION METHODOLOGIES

This section describes the methods utilized in conducting the BEE field activities. This work included the following:

- Surface soil sampling.
- Sediment sampling.
- Surface water sampling.

This section also describes the collection procedures for field quality control (QC) samples, the decontamination procedures for sampling equipment, and the management procedures for investigation-derived wastes (IDW). **Table 3-1** and **Table 3-2** present a list of all samples collected and parameters analyzed as part of the BEE field activities. The sample locations are presented on **Figure 3-1** for the MP and on **Figure 3-2** for the CWA. The 2010 sampling and analysis activities were conducted to meet NJDEP requirements (N.J.A.C. 7:26E-3.11; NJDEP, 2009b) for a BEE. Though a BEE is often performed as part of an SI, this work is not intended to satisfy the general requirements of an SI or RI as presented in the TRSR (N.J.A.C. 7:26E; NJDEP, 2009b) nor is it intended to provide data necessary for a sediment quality evaluation (NJDEP, 1998). Previous reports and comments were reviewed to identify previous data gaps and data needs, and surface water, sediment, and surface soil samples were collected to fill data gaps and gather enough information to satisfy the requirements of a BEE.

3.2.1 SURFACE SOIL SAMPLING

Surface soil samples collected during the BEE were collected from the top 6 inches of the soil. Soil samples were collected from the surface through use of a decontaminated hand trowel. The surficial vegetative material was first removed from the sampling location prior to sample collection. A decontaminated stainless steel trowel was than manually inserted in the soil to extract the sample and transfer it into a decontaminated stainless steel bowl for homogenization.

Once collected all surface soil samples were field screened with a properly calibrated photoionization detector (PID) instrument. To field screen the soil sample, a decontaminated stainless-steel trowel was used to make a cross-sectional slice of the soil sample in order to expose the porous surface.

During the sampling, samples collected for VOCs analysis were collected in accordance with TRSR, N.J.A.C. 7:26E-2.1(a)4 (NJDEP, 2009b) and NJDEP sampling procedures (NJDEP, 2005) using the En Core® method. For this method, laboratory prepared sample bottles are used but do not contain preservatives, and the following procedures were followed:

- Surface soil was trimmed away from the soil boring and the sample was collected immediately from the exposed surface using the coring device.
- The En Core® sampler was loaded according to manufacturer's instructions.
- The lid was secured immediately and the container was placed within the designated resealable bag.
- No additional tape/adhesive labels were affixed to the sample container but the resealable bags were properly labeled.

- Samples were placed upright into an iced cooler.
- An additional aliquot was collected from each sample location to determine percent moisture content.

The remaining soil was used for other analyses, which included SVOCs, pesticides, PCBs, metals, grain size, and organic carbon content. The procedure for homogenizing and sampling for these analyses was as follows:

- Any rocks or large organic matter was removed from the sample.
- The sample was thoroughly mixed within the stainless steel bowl by turning the entire sample over at least three times using a stainless steel trowel or scoop.
- The entire sample was then homogenized using the coning and quartering procedure.
- The required soil volume was then placed into the appropriate sample bottles.
- A label containing the applicable sample specific information was affixed to each sample bottle.
- The sample bottles were placed into an iced cooler.

The latitude and longitude of each sample location was recorded with a hand-held global positioning system (GPS) unit. Disposable latex gloves were used during all sampling activities and were changed between each sample location. The chain-of-custody (COC) was completed after sample collection and sealed in a plastic bag and taped to the lid inside the sample cooler for transport to the analytical laboratory.

3.2.2 SURFACE WATER SAMPLING

The collection of surface water samples proceeded from downstream to upstream locations so that disturbances related to prior sampling would not affect sample quality. In tidal waters where downstream and upstream is dependent on the predominant direction of flow of the surface water at the time of collection, surface water samples were collected during outgoing tides for consistency between samples. At each location, the surface water sample was collected prior to sediment sample collection to reduce sediment load in the samples.

Surface water samples were collected by simple immersion of laboratory cleaned sample bottles in accordance with the Field Sampling Procedures Manual (FSPM) (NJDEP, 2005). This was accomplished by gently dipping an unpreserved, pre-cleaned bottle in the water with the mouth of the bottle facing the upgradient direction to eliminate the collection of resuspended sediments from lowering the bottle. Where sample bottles could not be dipped without disturbing underlying sediment, an extendable pole was used to dip the sample bottles. The sample water was then transferred to the appropriate (preserved, if applicable) sample containers.

The following steps were taken during the sample water collection:

- For samples taken from a boat, the boat was anchored or secured in an appropriate location to enable the boat to drift over the desired sample location.
- The water depth was measured and the state of the tide was estimated.
- The probe of the calibrated multi-parameter water quality meter was lowered to mid-depth of the water column and the field parameters were recorded after stabilization of the readings.
- A clean, sample-dedicated bottle was then dipped below the surface.
- All appropriate sample containers were carefully filled by pouring the surface water from the sampling bottle into the appropriate sample containers.
- For dissolved metals, a peristaltic pump equipped with dedicated tubing and an in-line 0.45 micrometer filter was used to transfer surface water samples directly into appropriate preserved sample containers.

- A label containing the applicable sample specific information was affixed to each sample bottle.
- The sample bottles were placed into an iced cooler.

The latitude and longitude of each sample location was recorded with a hand-held GPS unit. Disposable latex gloves were used during all sampling activities and were changed between each sample location. The COC was completed after sample collection and sealed in a plastic bag and taped to the lid inside the sample cooler for transport to the analytical laboratory.

3.2.3 SEDIMENT SAMPLING

The collection of sediment samples proceeded from downstream to upstream locations so that disturbances related to prior sampling would not affect sample quality. The sampling of tidal waters was completed from the predominant downgradient flow of the surface water at the time of collection. Sediment samples were collected from previous sample locations, depositional zones, or potential migration pathways. Areas where stream bank stabilization efforts disturbed sediments were avoided during sediment sampling; in these areas, sediment sampling was conducted when tides were low enough to visually identify undisturbed sediments. At each location where applicable, sediment samples were collected after surface water samples.

Sediment sampling was conducted, whenever possible, from the shoreline. Sediment samples were collected from the 0- to 6-inch interval. Sediment samples from wetland areas without overlying water (e.g., sediments in the wetlands near the Former Pesticide Storage Area/CW-6) were collected with a hand trowel. Submerged sediments were collected with a hand auger. All sampling locations were GPS located.

The following steps were taken during sample collection:

- For samples taken from a boat, the boat was anchored or secured in an appropriate location to enable the boat to drift over the desired sample location.
- The water depth was measured and the state of the tide was estimated.
- The probe of the calibrated multi-parameter water quality meter was lowered to mid-depth of the water column and the field parameters were recorded after stabilization of the readings.
- The sediment sample was collected and the top 6 inches of material was transferred to a stainless steel bowl.
- Once collected, the sediment samples were field screened with a properly calibrated PID.
- The sample for VOC analysis was immediately collected from the stainless steel bowl using En Core methods previously described for soil samples.
- The remaining sample was then homogenized using the coning and quartering method described for soil samples.
- All appropriate sample containers were carefully filled using a dedicated soil sampling scoop.
- A label containing the applicable sample specific information was affixed to each sample bottle.
- The sample bottles were placed into an iced cooler.

3.2.4 DECONTAMINATION PROCEDURES

All equipment that came into contact with potentially contaminated material was decontaminated prior to use at each sampling location. Given that surface water samples were collected through immersion of dedicated sampling bottles and filtered samples used dedicated tubing and in-line filters, decontamination was not applicable to surface water sampling. Decontamination procedures for field equipment were in accordance with the NJDEP FSPM (NJDEP, 2005) three-step decontamination procedure for non-aqueous samples, which is detailed below. All equipment was thoroughly decontaminated before use and between sampling locations.

All decontaminated equipment was stored on plastic sheeting or wrapped in aluminum foil. Stainless steel hand augers, bowls, trowels, and other sampling equipment were decontaminated as follows:

- Equipment was cleaned with a brush in a tap water and Alconox wash.
- Equipment was rinsed with tap water.
- Equipment was rinsed with distilled and deionized water.

3.2.5 INVESTIGATION-DERIVED WASTE

Sampling activities performed as part of the BEE generated a variety of IDW including used person protective equipment (PPE), decontamination fluids, and disposable sampling equipment. The procedures and practices of handling IDW generated during the BEE site activities were consistent with the NJDEP FSPM (NJDEP, 2005) and the guide "Management of Investigation-Derived Waste During Site Inspections" (USEPA, 1991).

Decontamination of sampling equipment generated IDW consisting of decontamination waters. Decontamination water was re-applied to the ground surface since all of the following criteria were met:

- The water was not permitted to migrate off site.
- There was no potential for contaminating a previously uncontaminated aquifer.
- The discharge would not cause contamination to the ground surface soil.
- There was no immediate threat to human health or the environment.
- There was no indication from field instrumentation or visual observations to indicate that the material is a potential RCRA hazardous waste.

IDW was also generated from use of PPE (e.g., gloves) and disposable equipment (filters, tubing, soil scoops) during the BEE. This material was stored in plastic garbage bags and taken off site for proper disposal.

3.2.6 QUALITY CONTROL

To ensure the quality of the data collected during the 2010 BEE sampling event, all field procedures were conducted in accordance with methodologies outlined in **Section 3.1** and the BEE WP (Shaw, 2010). The field sampling methodologies utilized were developed based on the NJDEP FSPM, N.J.A.C. 7:14 – Technical Requirements for Site Remediation, and N.J.A.C 7:14B – USTs. All laboratory analyses were conducted by NJDEP certified and National Environmental Laboratory Accreditation Program approved laboratories. Included within **Appendix E** is a table that provides the minimum of ESC for each contaminant included in the analytical program and the subcontract laboratory's expected Method Detection Limits (MDLs).

3.2.6.1 COMPLETENESS

Completeness is a measure of the amount of information that must be collected during a field investigation to allow for a successful achievement of the sampling activities. Sampling completeness for this BEE was assessed through the evaluation of the total number of samples proposed in the WP versus the actual number of samples collected and analyzed. A total of 151 samples were proposed for collection in the WP and 152 samples were collected. Thus, the resulting sampling completeness for this project was 100.6 percent for all matrices. One proposed surface water sample (CW3-SW8) was not collected because there was no water existing in Shrewsbury Creek at the proposed location. The furthest upgradient location on Shrewsbury Creek at which surface water existed and a sample was able to be collected was location CW3-SW8. One surface water and one sediment sample (CWA-SD1 and CWA-SW1) were added to the sampling and analysis program during field operations. The samples added were collected within Shrewsbury Creek at the furthest point downstream on the CWA property.

3.2.6.2 REPRESENTATIVENESS AND DOCUMENTATION QUALITY REVIEW

Representativeness is a measure of the degree to which the results accurately reflect the media that were sampled. Procedures based on NJDEP protocol were utilized to ensure that samples collected were representative of their respective media. These procedures contained sampling protocols (e.g., sediment sampling) and field handling protocols (e.g., storage, shipping) which were designed to protect the representativeness of the collected samples. Field activities were audited and documentation of sample collection, shipment, and receipt activities were reviewed for accuracy and completeness and to ensure the implementation of standard operating procedures (SOPs).

Review of accuracy, precision, and completeness of sample documentation and observations from field audits suggest that the designed sampling program for the BEE was followed and resulted in the collection of representative samples.

3.2.6.3 REVIEW OF QC SAMPLES

Standard QC checks were implemented during all field and laboratory activities conducted during the 2010 BEE. These included field checks such as the collection of field/rinse blanks, trip blanks, and duplicate samples for laboratory analysis, as well as laboratory QC checks such as method blanks. Laboratory reports included in **Appendix F** contain a full description of the final results, methods of analysis, levels of detection, and method blank data.

Analytical data were evaluated against method blank, trip blank, and field blank data in order to evaluate the contribution of constituents detected in QC samples to the analytical results. Results of the analyses of field/rinse blanks were used to assess the effectiveness of equipment decontamination procedures in preventing cross-contamination between samples and to determine if compounds detected in the collected samples were attributable to the sampling equipment. One field/rinse blank was collected on each day of sampling and analyzed for all parameters.

Trip blanks were used to determine if any on-site atmospheric contaminants were seeping into the sample bottles, or if cross-contamination of samples was occurring during shipment or storage of the sample containers. Trip blanks are applicable to aqueous VOC samples. The trip blanks accompanied the samples into the field prior to sampling, remained with the collected samples during the sampling sequence, accompanied all aqueous VOC sample bottles shipped to the laboratory, and remained with the samples at the off-site laboratory prior to analysis. Trip blanks were analyzed from each day of sampling and analyzed for VOCs, except for on the second day of sampling when a trip blank was not supplied by the laboratory with the sample bottles. Due to the low frequency and concentrations of VOCs detected in aqueous samples, this did not impact the analyses; in most instances, the trip blanks were demonstrated analyte-free. Results of method blank analyses were used to determine if constituents detected in samples were introduced during sample extraction and analysis.

A summary of constituents detected in blank samples (field/rinse blanks and trip blanks) is included in **Appendix F**. Most of the analytes detected in blank samples are common laboratory contaminants and were likely introduced into the samples during laboratory extraction/analysis. The low concentrations of constituents identified in field/rinsate blanks indicate that no significant cross-contamination occurred between samples.

Field duplicates were collected to identify the cumulative precision of the sampling and analytical process and sent to the laboratory blind. The Relative Percent Difference (RPD) was calculated only for those analytes which were detected in both samples of the duplicate pair. Analytes that were non-detect in either or both of the samples of the duplicate pair were excluded from the duplicate assessment. Precision control criterion was established at 50% RPD for the aqueous and solid samples. All analytes exceeding criteria are treated as estimated ("J" qualified) for the field duplicate pair based upon high RPD(s). Most of the high RPDs were observed for analytes that were detected at very low concentrations that were laboratory qualified as estimated due to low concentrations at or below the MDL. The poor precision is probably due to sample non-homogeneity and/or sample matrix effects with the given analysis. A summary of RPDs for duplicate sample pairs collected during the 2010 BEE is included in **Appendix F**.

Full data validation was not required to achieve the BEE objectives.

3.2.6.4 WORK PLAN VARIANCES

Overall, the sampling and analyses performed were sufficient to meet project objectives and comply with the WP. Variances that occurred during implementation of the field and laboratory efforts were minimal. One proposed surface water sample (CW3-SW8) was not collected because there was no water existing in the creek at the proposed location. The furthest upgradient location at which surface water existed was sampled (location CW3-SW8) as prescribed in the WP. One surface water and one sediment sample (CWA-SD1 and CWA-SW1) were added to the sampling and analysis program during field operations. The two samples were collected within Wampum Brook at the furthest point downstream on the CWA property.

3.2.6.5 REVIEW OF TENTATIVELY IDENTIFIED COMPOUNDS

The VOC+15 and SVOC+15 lists of organic compounds designated for analysis included up to 30 non-targeted organic compounds as detected by GC/MS analysis. A summary of total TICs in samples collected during the 2010 BEE sampling event is provided in **Appendix F**. All detected non-targeted compounds are reported as TICs in the laboratory deliverables, also included in **Appendix F**.

A qualitative review was conducted and TICs were identified at low concentrations in one or more soil, sediment, and surface water samples. TICs are commonly observed in soil, surface water, and sediment samples and are likely attributable to naturally-occurring organic constituents due to elevated carbon content. The majority of observed TICs are commonly detected constituents that were present at low concentrations.

3.2.6.6 METHOD DETECTION LIMITS

In order to accurately identify COPECs in environmental media, it is useful to be able to detect potential contaminants that are present at concentrations greater than the ESC. Thus, one data quality objective (DQO) of the analytical program is to have MDLs at concentrations at or less than the ESC wherever possible. Unfortunately, for some parameters, the conservative benchmarks used as ESC are less than normal laboratory MDLs. The DQO for surface water samples was set at the lower of the freshwater ESC and the saltwater ESC, the DQO for sediment samples was set at the lower of the freshwater sediment ESC and the saltwater sediment ESC, and the DQO for soil was set at the soil ESC (**Section 3.3**). Included within **Appendix E** is a table that provides the minimum of ESC for each contaminant included in the analytical program and the subcontract laboratory's expected MDLs.

In surface water, MDLs for hexachlorobenzene, toxaphene, 4,4′-DDE, cadmium, copper, and silver were greater than the DQOs in all samples. The MDL for benzo(*a*)anthracene was greater than the DQO in one sample and the MDLs for Aroclor 1016 and Aroclor 1254 were greater than the MDLs in some of the samples.

In sediments, MDLs for acrylonitrile, methylene bromide, diethyl phthalate, 2-chlorophenol, 2,4-dichlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, pentachlorophenol, 4-nitrophenol, and toxaphene were greater than the DQOs in all samples. The MDLs for several PAHs [acenaphthene, acenaphthylene, benzo(*a*)pyrene, benzo(*k*)fluoranthene, dibenzo(*a,h*)anthracene, fluorene, 2-methylnaphthalene, and naphthalene], phthalates [bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, and di-*n*-butyl phthalate)], phenolic compounds (phenol and 2-4-dimethylphenol), other SVOCs (2,4-dinitrotoluene, hexachlorobutadiene, hexachloroethane, and nitrobenzene), pesticides (toxaphene, 4,4′-DDT, and heptachlor), PCBs (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1248, Aroclor 1260), and metals (antimony, selenium, and silver) were greater than the MDLs in some of the samples.

It should be noted that a MDL greater than the DQO does not imply that the MDL is greater than the media-specific ESC. Additionally, many of the elevated MDLs were in samples in which the parameter was detected; thus, the elevated MDL has no impact on the ability to detect the parameter. The evaluation of COPECs with regard to elevated MDLs is discussed in more detail in **Section 3.4**.

3.3 IDENTIFICATION OF STANDARDS AND BENCHMARKS

The TRSR references several sources for ESC for use in a BEE. This includes ESC sources for sediment, surface water, and soil. The NJDEP also maintains a table of current recommended ESC based on those aforementioned sources as well as others (NJDEP, 2009c). The SRP's Environmental

Toxicology and Risk Assessment Unit has developed this table from various sources to allow ease of reference for selection of ESC for surface water, sediment, and soil.

Not all contaminants have listed ESC for all media; contaminants detected in environmental media without ESC are identified in this BEE report, but the development of ESC is beyond the scope of the BEE. The most recent version of the cited ESC is used in this BEE. The NJDEP ESC table, which was last updated on March 10, 2009, is presented in **Appendix E**. Also included within **Appendix E** is a table that provides the minimum of those ESC for each contaminant and the subcontract laboratory's MDLs.

Some contaminants for some media have multiple values provided. The following sections describe the process used in selection of appropriate ESC for this BEE and is meant to provide a systematic approach which maintains appropriate conservativeness in this screening level assessment.

3.3.1 IDENTIFICATION OF STANDARDS AND BENCHMARKS FOR SEDIMENT

For sediments, the TRSR referenced sources are the following:

- USEPA Briefing Report to the EPA Science Advisory Board on the Equilibrium Partitioning Approach to Generate Sediment Quality Criteria (USEPA, 1989b).
- USEPA Technical Basis for Deriving Sediment Quality Criteria for Nonionic Organic Contaminants for the Protection of Benthic Organisms by Using Equilibrium Partitioning (USEPA, 1993).
- Effects Range-Low (ER-L) and Effects Range-Median (ER-M) values (Long et al., 1995).
- Lowest Effect Level (LEL) and Severe Effect Level (SEL) values (Persaud et al., 1993).

The first two sources provide a method for determining screening criteria based on the equilibrium partitioning approach which uses applicable surface water screening criteria organic carbon partitioning coefficients. As such, these criteria are a function of the site-specific organic carbon content in the sediment and are usually presented based on 1% total organic carbon content.

The ER-L and ER-M values were developed for marine environments and are based on evaluation of data from numerous studies including equilibrium partitioning modeling, laboratory bioassays, and field studies. The ER-L values represent a concentration at which adverse effects are only found in approximately 10% of the studies. The ER-M values represent a concentration at which adverse effects are found in approximately 50% of the studies.

The LEL and SEL values were developed for freshwater environments and are also based on evaluation of data from numerous studies and include equilibrium partitioning modeling, laboratory bioassays, and field studies, as well as sediment background levels. The LEL values represent a level of contamination that has no effect on the majority of sediment-dwelling organisms. The SEL values represent a level of contamination which is likely to affect the health of sediment-dwelling organisms.

NJDEP (1998) recommends using benchmarks listed in the TRSR from Long et al. (1995) and Persaud et al. (1993) as well as chronic values from MacDonald et al. (1992) for several VOCs.

The NJDEP maintains a table of current recommended ESC based on these aforementioned sources as well as others (NJDEP, 2009c). This table often has more than one value for a given parameter and a given medium (e.g., sediment, surface water, soil). For this BEE, the three sources listed above (Long et al., 1995; Persaud et al., 1993; MacDonald et al., 1992) as presented in the NJDEP table (NJDEP, 2009c) are used as the primary source of ESC.

For saltwater sediments, the ER-L (Long et al., 1995) is used as the ESC. If an ER-L is not available, but a chronic value based on equilibrium partitioning (MacDonald et al., 1992) is available, then the chronic value is used. If no values are provided from one of these two primary sources, then values available from secondary sources [e.g., USEPA Region V ecological screening values (USEPA Region 5, 2003)] are used.

For freshwater sediments, the LEL (Persaud et al., 1993) is used as the ESC. If an LEL is not available, but the table recommends the use of either the saltwater chronic value based on equilibrium

partitioning (MacDonald et al., 1992) or the saltwater ER-L (Long et al., 1995), then the saltwater chronic value or saltwater ER-L is used. It should be noted that though the table may list a value as an LEL it may not actually be the LEL as determined by Persaud et al. (1993). If no values are provided from one of these three primary sources, then values available from secondary sources [e.g., USEPA Region V ecological screening values (USEPA Region 5, 2003), NOAA Quick Screening Reference Tables (Buchman, 2008)] are used.

3.3.2 IDENTIFICATION OF STANDARDS AND BENCHMARKS FOR SURFACE WATER

For surface water, the TRSR referenced sources are the following:

- USEPA Ambient Water Quality Criteria, 40 CFR Part 131 (USEPA, 2006; 2010).
- New Jersey Surface Water Quality Standards (N.J.A.C., 2010).

These sources contain values for freshwater and saltwater and include values for the protection of human health and protection of aquatic organisms from effects due to both acute and chronic exposures. The NJDEP table (NJDEP, 2009c) includes values from these sources and they are used as the primary source of surface water ESC. Values developed for the protection of human health are never used as ESC for an ecological evaluation. If provided, values used for the protection from chronic effects are used as ESC. Acute values are only used as ESC if, values used for the protection of aquatic life from chronic effects are not available.

The freshwater surface water ESC for several metals are functions of site-specific hardness. The equations used for these calculations are provided with the NJDEP table (**Appendix E**). The minimum hardness detected in a surface water body during the BEE investigation near an individual site where freshwater criteria are potentially applicable was used to calculate the site-specific BEE for the individual site. Freshwater hardness-dependent criteria were not calculated for individual sites where only saltwater criteria are applicable and the magnitude of the measured hardness render the calculated criteria irrelevant.

For chromium, values may be presented for total chromium, trivalent chromium, or hexavalent chromium. When available from primary sources, the value for total chromium is used as the ESC for this BEE. If not available from a primary source for total chromium, then the value for trivalent chromium is used for this BEE. Values provided for hexavalent chromium are used as ESC in this BEE if, and only if, values from primary sources for total chromium and trivalent chromium are not available. The freshwater ESC used in this BEE is based on total chromium and the saltwater ESC is based on hexavalent chromium.

The freshwater surface water ESC for pentachlorophenol is a function of pH. A pH value of 6 was used to determine an ESC for surface water bodies at the MP and a value of 5.76 was used at the CWA; these represent the minimum pH values measured during the BEE investigation.

If no values are provided from one of these primary sources, then values available from secondary sources [e.g., USEPA Region V ecological screening values (USEPA Region 5, 2003)] are used. The NJDEP table also provides some values that were developed specific to Shell Oil at an active remediation site. These values are not used as ESC in this BEE, since other sources were available.

3.3.3 IDENTIFICATION OF STANDARDS AND BENCHMARKS FOR SOIL

For soil, the TRSR referenced sources are the following:

- Fish and Wildlife Service Contaminant Hazard Reviews (Eisler, 1999).
- Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants (Will and Suter, 1995).

The contaminant hazard reviews available from the Fish and Wildlife Service do not necessarily provide values to use as soil ESC but provide information related to toxicity, bioaccumulation, and bioavailability of contaminants to wildlife. This information is utilized by others (USEPA, 2005; Efroymson et al., 1997a; Sample et al.,1996) in developing appropriate values.

The toxicological benchmarks for plants cited above have been revised (Efroymson et al., 1997b) and, like the 1994 revision, were developed for Oak Ridge National Laboratory (ORNL) using a method similar to that used for calculating the ER-L and ER-M values (Long and Morgan, 1990; Long et al., 1995). Other benchmarks for the protection of wildlife for contaminants in soil have also been derived for ORNL (Sample et al., 1996). In this document, several species-specific benchmarks are determined based on food chain modeling for different contaminants. The NJDEP table provides the minimum of the plant toxicity and wildlife benchmarks as wildlife preliminary remediation goals (PRGs) for potential use as soil ESC.

The USEPA (2005) developed ecological soil screening levels (Eco-SSLs). These represent the result of a multi-stakeholder group consisting of federal, state, consulting, industry, and academic participants performed in order to conserve resources by limiting the need for EPA and other risk assessors to perform repetitious toxicity data literature searches and data evaluations for the same contaminants at every site. The general approach to develop these Eco-SSLs involved a literature search, screening the literature for acceptability, evaluating the results for applicability in deriving the Eco-SSLs, and deriving the value. These values represent a broad spectrum of wildlife and include mammals, birds, plants, and soil invertebrates. The literature screened in this process included that used by ORNL in developing wildlife PRGs.

The USEPA Eco-SSLs (USEPA, 2005), the ORNL wildlife PRGs (Sample et al., 1996), and the ORNL plant toxicity benchmarks (Efroymson et al., 1997b), are considered the primary source of values for ESC in this BEE. The most conservative (i.e., minimum) values from the NJDEP tables (2009c) that represent either the USEPA Eco-SSLs or the ORNL wildlife PRGs or plant toxicity benchmarks are used as ESC for this BEE. If values are not available from either of these sources, then secondary sources are used for ESC. These include the USEPA Region V ecological screening values (USEPA Region 5, 2003). Though developed from food chain models, as were those for Eco-SSLs and wildlife PRGs, these values did not involve as comprehensive an effort in either the literature review or screening for acceptability and do not provide sufficient supporting documentation.

3.4 IDENTIFICATION OF COPECS

COPECs are defined for the purposes of this BEE as those constituents that were detected at concentrations greater than the appropriate screening benchmarks in any of the samples from a given medium from a site. For some parameters, the conservative benchmarks used as ESC are lower than normal laboratory method detection limits (MDLs). If these parameters are not detected, it is possible that they are present at a concentration exceeding the ESC. This is particularly important for surface water and sediment, the two media to which ecological receptors may be directly and routinely exposed. Therefore, for parameters not detected in samples from either surface water or sediment, the MDLs were also compared to the ESC. These parameters were not identified as possible COEPCs if any of the following were true:

- These parameters were not identified as COPECs in other site media.
- These parameters were not detected exceeding the ESC in samples for which the MDL was not greater than the conservative ESC.
- The MDLs for these parameters were only marginally greater than the conservative ESC, or related parameters (e.g., other chlorinated benzenes, other related pesticides) were not detected above ESC in these samples.
- These parameters are not expected to found as site-related contaminants.

For surface water, MDLs for a few SVOCs, pesticides, PCBs, and metals were above one or both ESC in some or all samples.

- The MDLs for hexachlorobenzene exceeded the freshwater ESC in all surface water samples; there is no saltwater ESC. However, this organic compound was not identified as a COPEC in other media at the sites and is not considered a COPEC in surface water. The MDL for benzo(*a*)pyrene exceeded the freshwater ESC in one sample at one site; it was, however, detected in that sample and is considered a COPEC at that site.

- The MDLs for toxaphene exceeded the freshwater and saltwater ESC in all surface water samples; however, this pesticide was not identified as a COPEC in other media at the sites and is not considered a COPEC in surface water. The MDLs for 4,4′-DDE exceeded the freshwater ESC in all surface water samples; there is no saltwater ESC. Though 4,4′-DDE was identified as a COPEC in soil, groundwater, or sediment at some sites, 4,4′-DDE is not considered to be mobile in abiotic media and is expected to adsorb strongly to organic matter; however, based on the extremely low ESC for 4,4′-DDE in surface water [0.00000000451 micrograms/liter (µg/L)], 4,4′-DDE is considered a possible COPEC in surface water if it is identified as a COPEC in sediment.
- The MDLs for Aroclor 1016 and Aroclor 1254 were marginally greater than the freshwater ESC at some sites, but less than the saltwater ESC. These Aroclors are considered possible COPECs in surface water only if they are detected at concentrations exceeding the ESC.
- The MDLs for cadmium, copper, and silver were greater than one or both ESC in some or all samples. The MDLs for cadmium and silver exceeded the freshwater ESC in all samples but were below the saltwater ESC. The MDLs for copper exceeded the saltwater ESC but were below the freshwater ESC. Cadmium, copper, and zinc are identified as possible COPECs in surface water if they are identified as COPECs in other site media.

For sediment, MDLs for some VOCs, SVOCs, pesticides, PCBs, and metals were greater than one or both ESC in some or all samples. It should be noted that organic parameters that were not detected in the BEE investigation sediment samples were reported at the MDL. Those in the SI data are presented as non-detect at a reporting limit; organic parameters were routinely presented detectable to a detection limit concentration of one-tenth this reporting limit.

- The MDLs for acrylonitrile and methyl bromide exceeded the freshwater sediment ESC in all samples; there are no saltwater sediment ESC. These were not identified as COPECs in other media and are not considered COPECs in sediment. The MDL for 1,1-dichloroethene exceeded the freshwater ESC in one sample at one site in the BEE investigation and in all samples in the SI. It was not detected at the BEE investigation site in the other samples nor was it identified as a COPEC in other media at these sites; and it is not considered a COPEC in sediment at the site. The MDL for 1,2-dichloro-benzene exceeded the saltwater ESC in all SI samples; it was not identified as a COPEC in other media at those sites and is not considered a COPEC in sediment.
- The MDLs for nine PAHs [acenaphthene, acenaphthylene, anthracene, benzo(*g,h,i*)perylene, benzo(*k*)fluoranthene, dibenzo(*a,h*)anthracene, fluorene, 2-methylnaphthalene, and naphthalene] were only marginally greater than the ESC in some or all samples from some sites. In samples where MDLs exceeded applicable ESC in only some samples, these PAHs were either detected in samples at the sites and considered COPECs or not detected in the samples at the site for which MDLs met the ESC and are not considered COPECs. In samples where MDLs exceeded applicable ESC in all samples, these PAHs were considered possible COPECs in sediment if identified as COPECs in other site media.
- The MDLs for four phthalates [bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, diethyl phthalate, and di-*n*-butyl phthalate) exceeded the ESC in some or all samples at some sites. Most of these MDLs were only marginally greater than the ESC, and these phthalates were not detected in sediment samples for which the MDLs met the ESC or identified as COPECs in other site media. These phthalates are not considered COPECs in sediment.
- The MDLs for several phenolic compounds (phenol, 2-chlorophenol, 2,4-dichlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, pentachlorophenol, 2,4-dimethylphenol, 4-nitrophenol, and 2,4-dinitrophenol) exceeded the ESC in some or all samples at some sites. Of these, only 2,4-dintirophenol was detected in any sediment samples and it is considered a COPEC at those sites. The other phenolic compounds were not identified as COPECs in other media at these sites and were not detected in other samples for which the MDLs met the ESC; these phenolic compounds are not considered COPECs at the sites.

- The MDLs for four other SVOCs (2,4-dinitrotoluene, hexachlorobutadiene, hexachloroethane, 1,2,4-trichlorobenzene, hexachlorobenzene, and nitrobenzene) exceeded the ESC in some or all samples at some sites. Of these, hexachlorobutadiene was detected in sediment at one site and it is considered a COPEC at that site and was identified as a COPEC in surface water at another site; it is considered a possible COPEC in sediment at that site. The other SVOCs were not identified as COPECs in other media at these sites, were not detected in other samples for which the MDLs met the ESC, and related compounds were not identified as COPECs at the sites; these SVOCs are not considered COPECs at the sites.
- The MDLs for three pesticides (toxaphene, 4,4′-DDT, and heptachlor) exceeded the ESC in some or all samples at some sites. The MDLs for toxaphene exceeded the freshwater sediment ESC in all samples; there is no saltwater sediment ESC for toxaphene. Toxaphene was not identified as a COPEC in other media and it is not considered a COPEC in sediment. The MDL for 4,4′-DDT exceeded the freshwater sediment ESC in one samples; it was, however, detected in that sample and is considered a COPEC at the site. The MDLs for heptachlor only marginally exceeded the saltwater sediment ESC in some samples but were all below the freshwater sediment ESC.
- The MDLs for five PCB mixtures (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1248, and Aroclor 1260) marginally exceeded the ESC in some or all samples at some sites. The Aroclor 1221 and Aroclor 1232 MDLs slightly exceeded the saltwater ESC in some samples at one site, but were below the freshwater ESC; these Aroclors were not detected in the samples where the MDLs met the ESC and are not considered COPECs at the sites. The MDL for Aroclor 1248 in one sample marginally exceeded the freshwater ESC; Aroclor 1248 was not detected in the other samples and it is not considered a COPEC at the site. The MDLs for Aroclor 1016 and Aroclor 1260 marginally exceeded the ESC in samples at several sites. Aroclor 1260 was detected in samples at three sites and is considered a COPEC at those sites. Aroclor 1016 and Aroclor 1260 were not detected in any of the other sediment samples at the other sites where MDLs met the ESC and they were not identified as COPECs in other media; Aroclor 1016 and Aroclor 1260 are not considered COPECs in sediment at these sites.
- The MDLs of three metals (antimony, selenium, and silver) exceeded the ESC at a few sites. Where selenium MDLs exceeded the ESC, selenium was detected exceeding the ESC and selenium is considered a COPEC. The MDLs for antimony and silver exceeded the ESC in only one sample at one site. Antimony and silver were not detected at concentrations exceeding the ESC in the other samples at the site where the MDLs met the ESC and these metals are not considered COPECs in sediment at the site.

The following sections present the concentrations measured in background media during the BEE investigation and address the identification of COPECs, as well as possible COPECs based on MDL review, for each of the sites and parcels addressed in this BEE.

3.4.1 CONSTITUENTS IN BACKGROUND MEDIA

As noted in **Section 2.4.7**, the local geology and soil types determine the levels of naturally-occurring constituents present in soil. These natural background levels (**Table 2-3**) are meant to be inclusive of naturally-occurring levels in soil as well as those from regional deposition but not those from point source contamination. The local geology and soil types determine the levels of naturally-occurring constituents present in soil (Dooley, 2001; Sanders, 2003; BEM Systems, Inc., 1998).

Background levels for FTMM were reported by Weston (1995) in the SI report (**Appendix H**). FTMM-specific background levels were reported for soil, groundwater, surface water, and sediment, and background levels were reported for Monmouth County for soil and groundwater for select constituents. In addition to characterizing background levels related to soil geology and regional deposition, the FTMM-specific levels also incorporate effects from local land use (**Section 2.4.9**).

Background concentrations of constituents were also investigated during the BEE investigation. Surface water and sediment samples were analyzed for the same constituents as were site samples.

Nine surface water and sediment samples were collected from locations upgradient of the MP on Husky Brook, Mill Creek, Lafetra Creek, and Northern Branch of Parkers Creek. One surface water and two sediment samples were collected from locations upgradient of the CWA on Shrewsbury Creek. One surface water and sediment sample were collected from Wampum Brook in the CWA, but upgradient of site activities. Additionally, one surface water and one sediment sample each were collected from both Shrewsbury Creek and Wampum Brook in the CWA at points near the downgradient (eastern) border of the CWA. All background sampling locations were in freshwater areas, the following discussions compare results to both freshwater and saltwater criteria since background concentrations can affect both freshwater and saltwater areas on site.

3.4.1.1 MAIN POST BACKGROUND

3.4.1.1.1 Main Post Surface Water Background

Nine surface water samples were collected from locations upgradient of the MP activities. Two were collected from Husky Brook, three were collected from Mill Creek, three were collected from Lafetra Creek, and one was collected from the North Branch of Parkers Creek. Parameters detected in surface water samples are presented in **Table D-1**.

VOCs. Three VOCs were detected in surface water from MP background samples. Chloroform and PCE were detected in one sample each, and *cis*-1,2-dichloroethene was detected in three samples. All detected concentrations were less than the available freshwater and saltwater ESC.

Pesticides/PCBs. No pesticides or PCBs were detected in surface water from MP background samples.

SVOCs. Four SVOCs were detected in surface water from MP background samples. Benzoic acid and 1,2,4-tetrachlorobenzene were detected in one sample each; anthracene and benzo(*a*)anthracene were detected in two samples each. The detected concentrations of anthracene and benzo(*a*)anthracene were greater than the applicable freshwater or saltwater ESC.

Metals. A total of 14 metals were detected in surface water from MP background samples: aluminum, arsenic, barium, calcium, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, thallium, and zinc. Only lead was detected at concentrations greater than the applicable freshwater or saltwater ESC.

A summary of the MP background surface water concentrations is presented in **Table 3-3**. This table includes the number of detected concentrations, the number of exceedances for freshwater ESC and saltwater ESC, the range of detected concentrations, and the location of the maximum detected concentration.

3.4.1.1.2 Main Post Sediment Background

Nine sediment samples were collected from locations upgradient of the MP activities. Two were collected from Husky Brook, three were collected from Mill Creek, three were collected from Lafetra Creek, and one was collected from the North Branch of Parkers Creek. Parameters detected in surface sediment samples are presented in **Table D-2**.

VOCs. Four VOCs were detected in sediment from MP background samples. Acetone was detected in six samples, methylene chloride was detected in four samples, toluene was detected in one sample, and 2-butanone was detected in two samples. All detected concentrations were less than the available freshwater and saltwater sediment ESC.

Pesticides. Two pesticides (4,4′-DDD and 4,4′-DDE) were detected in sediment from MP background samples. 4,4′-DDD and 4,4′-DDE were detected in samples from Mill Creek and Husky Brook and most detected concentrations exceeded the saltwater sediment ESC but not the freshwater sediment ESC.

PCBs. Two PCB mixtures (Aroclor 1242 and Aroclor 1254) were detected in sediment from MP background samples. PCBs were detected in samples from Mill Creek. Most detected concentrations exceeded the fresh water or saltwater sediment ESC.

SVOCs. A total of 20 SVOCs were detected in sediment from MP background samples. Bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, and dimethyl phthalate were detected in some sediment samples, but, as noted elsewhere, phthalates are commonly found in field and laboratory QC samples and may not be representative of actual conditions. Other SVOCs detected in sediment from MP background samples were acenaphthene, acenaphthylene, anthracene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, benzo(*g,h,i*)perylene, benzo(*k*)fluoranthene, chrysene, dibenzo(*a,h*)anthracene, dibenzofuran, 3,3′-dichlorobenzidine, fluoranthene, fluorene, indeno(1,2,3-*cd)*pyrene, phenanthrene, and pyrene. Most were found at concentrations that were greater than the freshwater or saltwater sediment ESC.

Metals. A total of 23 metals were detected in sediment from MP background samples: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc. Most of the metals with applicable freshwater or saltwater sediment ESC were found at concentrations in one or more sediment sample exceeding the ESC: antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc.

A summary of the MP background sediment concentrations is presented in **Table 3-4**. This table includes the number of detected concentrations, the number of exceedances for freshwater ESC and saltwater sediment ESC, the range of detected concentrations, and the location of the maximum detected concentration.

3.4.1.2 CHARLES WOOD AREA BACKGROUND

3.4.1.2.1 Charles Wood Area Surface Water Background

Two surface water samples were collected from locations upgradient of the CWA activities. One was collected from Shrewsbury Creek and one was collected from Wampum Brook. Parameters detected in surface water samples are presented in **Table D-3**.

VOCs. One VOC was detected in surface water from CWA background samples. Methyl *tert*-butyl ether (MTBE) was detected in one sample. The detected concentration was less than the freshwater and saltwater ESC.

Pesticides. One pesticide was detected in surface water from CWA background samples. 4,4′-DDD was detected in one surface water sample. There are no available freshwater or saltwater ESC for 4,4′-DDD.

PCBs. One PCB mixture was detected in surface water from CWA background samples. Aroclor 1242 was detected in one surface water sample at a concentration greater than both the freshwater and saltwater ESC.

SVOCs. One SVOC was detected in surface water from CWA background samples. Anthracene was detected in one surface water sample; the concentration was greater than the applicable freshwater ESC.

Metals. A total of 19 metals were detected in surface water from CWA background samples: aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, vanadium, and zinc. The detected concentrations of total cadmium, total chromium, total copper, total lead, total vanadium, and total zinc exceeded the applicable freshwater ESC in one or both samples; however, only the dissolved concentrations of cadmium, cobalt, and lead were above the applicable freshwater ESC. These exceedances of dissolved concentration ESC were all from the surface water sample from Wampum Brook. Concentrations of total nickel and dissolved nickel exceeded the saltwater ESC. Total chromium, copper, lead, and zinc also exceeded the saltwater ESC in at least one sample.

A summary of the CWA background surface water concentrations is presented in **Table 3-5**. This table includes the number of detected concentrations, the number of exceedances for freshwater ESC and saltwater ESC, the range of detected concentrations, and the location of the maximum detected concentration.

3.4.1.2.2 Charles Wood Area Sediment Background

Three sediment samples were collected from locations upgradient of the CWA activities. Two were collected from Shrewsbury Creek and one was collected from Wampum Brook. Parameters detected in surface sediment samples are presented in **Table D-4**.

VOCs. Five VOCs were detected in sediment from CWA background samples. Acetone, methylene chloride, and 2-butanone were detected in one or two samples from Shrewsbury Creek. Styrene and toluene were detected in the sample from Wampum Brook. All detected concentrations were less than the available freshwater and saltwater sediment ESC.

Pesticides. One pesticide (4,4′-DDD) was detected in sediment from CWA background samples. 4,4′-DDD was detected in one sample from Shrewsbury Creek. The detected concentration was less than the applicable freshwater sediment ESC but above the saltwater sediment ESC.

PCBs. No PCBs were detected in sediment from CWA background samples.

SVOCs. A total of 18 SVOCs were detected in sediment from CWA background samples. Dimethyl phthalate was detected in all sediment samples, but, as noted elsewhere, phthalates are commonly found in field and laboratory QC samples and may not be representative of actual conditions. Other SVOCs detected in sediment from CWA background samples were acenaphthene, acenaphthylene, anthracene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, benzo(*g,h,i*)perylene, benzo(*k*)fluoranthene, chrysene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-*cd*)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene. Though all 18 were detected in Wampum Brook, dimethyl phthalate and three of the PAHs [anthracene, benzo(*a*)anthracene, and benzo(*a*)pyrene] were also detected in Shrewsbury Creek. Most of the PAHs in Wampum Brook were found at concentrations that were greater than the freshwater or saltwater sediment ESC.

Metals. A total of 20 metals were detected in sediment from CWA background samples: aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, sodium, vanadium, and zinc. Seven of the metals with applicable freshwater or saltwater sediment ESC were found at concentrations in one or more sediment sample greater than the ESC: barium, cadmium, chromium, lead, mercury, nickel, and selenium.

A summary of the CWA background sediment concentrations is presented in **Table 3-6**. This table includes the number of detected concentrations, the number of exceedances for freshwater ESC and saltwater sediment ESC, the range of detected concentrations, and the location of the maximum detected concentration.

3.4.1.3 CHARLES WOOD AREA DOWNGRADIENT SURFACE WATER

Two surface water samples were collected from locations downgradient of the CWA activities. One was collected from Shrewsbury Creek and one was collected from Wampum Brook. Parameters detected in surface water samples are presented in **Table D-5**.

VOCs. VOCs were not detected in surface water from CWA downgradient samples.

Pesticides. No pesticides were detected in surface water from CWA downgradient samples.

PCBS. One PCB mixture was detected in surface water from CWA downgradient samples. Aroclor 1242 was detected in the sample from Wampum Brook at a concentration less than that from the Wampum Brook background sample. The detected concentration was above both the freshwater and saltwater ESC.

SVOCs. One SVOC was detected in surface water from CWA background samples. Hexachlorobutadiene was detected in the Shrewsbury Creek downgradient sample at a concentration greater than the applicable freshwater ESC.

Metals. A total of 15 metals were detected in surface water from CWA downgradient samples: aluminum, arsenic, barium, calcium, cadmium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, and zinc. The detected concentrations of total cadmium exceeded the

freshwater ESC in Wampum Brook but not in Shrewsbury Creek; the dissolved concentrations were below the ESC. Total lead and dissolved lead exceeded the freshwater ESC in both samples. Dissolved selenium also slightly exceeded the freshwater ESC in the Shrewsbury Creek sample.

A summary of the CWA downgradient surface water concentrations is presented in **Table 3-7**. This table includes the number of detected concentrations, the number of exceedances for freshwater ESC and saltwater ESC, the range of detected concentrations, and the location of the maximum detected concentration.

3.4.1.4 CHARLES WOOD AREA DOWNGRADIENT SEDIMENT

Two sediment samples were collected from locations downgradient of the CWA activities. One was collected from Shrewsbury Creek and one was collected from Wampum Brook. Parameters detected in surface sediment samples are presented in **Table D-6**.

VOCs. Two VOCs were detected in sediment from CWA downgradient samples. Acetone was detected in both sediment samples and methylene chloride was detected in the sample from Shrewsbury Creek. All detected concentrations were less than the available freshwater and saltwater sediment ESC.

PCBs. Aroclor 1242 was detected in sediment from CWA downgradient samples. Aroclor 1242 was detected in the sample from Wampum Brook. The detected concentration was below the applicable freshwater sediment ESC but above the saltwater sediment ESC. No other PCBs were detected in sediment from CWA downgradient samples.

SVOCs. A total of eight SVOCs were detected in sediment from CWA downgradient samples. Dimethyl phthalate was detected in both sediment samples, but, as noted elsewhere, phthalates are commonly found in field and laboratory QC samples and may not be representative of actual conditions. Other SVOCs detected in sediment from CWA downgradient samples were anthracene, benzo(*a*)anthracene, and benzo(*a*)pyrene which were detected in both samples, acenaphthene and phenanthrene which were detected in the Shrewsbury Creek sample, and fluoranthene and pyrene which were detected in the Wampum Brook sample. The concentrations of acenaphthene and phenanthrene in the Wampum Brook sample were greater than the freshwater sediment ESC.

Metals. A total of 21 metals were detected in sediment from CWA downgradient samples: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, sodium, vanadium, and zinc. Seven of the metals with applicable freshwater or saltwater sediment ESC were found at concentrations in one or more sediment sample exceeding the ESC: cadmium, chromium, and selenium in both samples; arsenic, mercury, and lead in Shrewsbury Creek; and nickel in Wampum Brook.

A summary of the CWA downgradient sediment concentrations is presented in **Table 3-8**. This table includes the number of detected concentrations, the number of exceedances for freshwater ESC and saltwater sediment ESC, the range of detected concentrations, and the location of the maximum detected concentration.

3.4.2 MAIN POST

3.4.2.1 LANDFILL 2 (FTMM-2)

Near surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Landfill 2 (FTMM-2).

3.4.2.1.1 COPECs for Soil at Landfill 2 (FTMM-2)

Near surface (6-12 inches bgs) soil samples were collected from Landfill 2 (FTMM-2) as part of the IRP RI investigation (Versar, 2001). A total of 195 samples were analyzed for SVOCs, pesticides, PCBs, and metals. Parameters detected in near surface soil samples are presented in **Table A-1**.

SVOCs. A total of 22 SVOCs were detected in near surface soil samples from Landfill 2 (FTMM-2). Of these 22 SVOCs, five were detected at concentrations exceeding the soil ESC in at least one sample. Benzo(*a*)pyrene was detected in five samples at concentrations exceeding the 1.52 mg/kg ESC. Benzo(*a*)anthracene, chrysene, naphthalene and bis(2-ethylhexyl) phthalate were detected at concentrations exceeding the soil ESC in one or two samples each. Bis(2-ethylhexyl) phthalate is

commonly found in field and laboratory QC samples, and bis(2-ethylhexyl) phthalate is not considered a COPEC. These four PAHs, benzo(*a*)pyrene, benzo(*a*)anthracene, chrysene, and naphthalene, are considered COPECs in soil at Landfill 2 (FTMM-2).

Pesticides. Eight pesticides were detected in near surface soil samples from Landfill 2 (FTMM-2). Six of these pesticides were detected at concentrations exceeding the soil ESC in at least one sample. 4,4′-DDT was detected in most of the soil samples and the majority of these contained 4,4′-DDT at concentrations that were greater than the 0.00035 mg/kg ESC. 4,4′-DDD was detected in two samples at concentrations that exceeded the 0.758 mg/kg ESC. 4,4′-DDE was detected in only one sample at a concentration that exceeded the 0.596 mg/kg ESC. Dieldrin was detected in several samples with concentrations exceeding the 0.0049 mg/kg ESC. Endrin was detected in one sample at a concentration exceeding the 0.0101 mg/kg ESC. gamma-BHC was also detected in one sample at a concentration exceeding the 0.005 mg/kg ESC. These six pesticides (4,4′-DDD, 4,4′-DDT, 4,4′-DDE, dieldrin, endrin, and gamma-BHC) are considered COPECs at Landfill 2 (FTMM-2).

PCBs. Four Aroclors were detected in near surface soil samples from Landfill 2 (FTMM-2). These were detected infrequently. Aroclor 1242 and Aroclor 1248 were detected in one sample each. Aroclor 1254 was detected in four samples and Aroclor 1260 was detected in three samples. Most of these concentrations exceeded the ESC. These PCB mixtures (Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260) are considered COPECs in soil at Landfill 2 (FTMM-2).

Metals. A total of 23 metals were detected in near surface soil samples from Landfill 2 (FTMM-2) of which most metals were detected in the majority of the samples. Thallium and silver were detected in 1 and 10 samples, respectively. Eighteen metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc) were detected at concentrations exceeding the soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Landfill 2 (FTMM-2). The other 17 metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc) are considered COPECs in soil at Landfill 2 (FTMM-2).

3.4.2.1.2 COPECs for Groundwater at Landfill 2

Sixteen groundwater monitoring wells at Landfill 2 (FTMM-2) have been monitored during the 2008-2009 time period. Mill Creek could receive groundwater discharge from Landfill 2 (FTMM-2). Mill Creek, in the vicinity of Landfill 2 (FTMM-2), is classified as freshwater (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-1**.

VOCs. A total of nine VOCs were detected in groundwater samples from Landfill 2 (FTMM-2) during the 2008-2009 time period. Of these 16 VOCs, one (chlorobenzene) was detected at concentrations exceeding the freshwater ESC (47 µg/L); these samples were all collected from one monitoring well (M2MW03). Mill Creek, in the vicinity of Landfill 2 (FTMM-2), is freshwater. Chlorobenzene is considered a COPEC in groundwater at Landfill 2 (FTMM-2).

SVOCs. A total of four SVOCs were detected in groundwater samples from Landfill 2 (FTMM-2) during the 2008-2009 time period. No SVOCs were detected at concentrations exceeding the freshwater ESC; SVOCs are not considered COPECs in groundwater at Landfill 2 (FTMM-2).

PCBs. No PCBs were detected in groundwater samples from Landfill 2 (FTMM-2) during the 2008-2009 time period. PCBs are not considered COPECs in groundwater at Landfill 2 (FTMM-2).

Pesticides. A total of 19 pesticides were detected in groundwater samples from Landfill 2 (FTMM-2) during the 2008-2009 time period. Of the 19 pesticides, nine pesticides were detected exceeding the freshwater ESC in at least one sample. Aldrin, alpha-chlordane, gamma-chlordane, 4,4′-DDE, 4,4′-DDT, endrin, heptachlor, heptachlor epoxide, and methoxychlor were detected at concentrations above their ESC. Of these, aldrin and endrin were detected exceeding the ESC in only one of the wells, and alpha-chlordane and heptachlor epoxide were detected exceeding the ESC in only two of the monitoring wells. These nine pesticides (aldrin, alpha-chlordane, gamma-chlordane, 4,4′-DDE,

4,4′-DDT, endrin, heptachlor, heptachlor epoxide, and methoxychlor) are considered COPECs in groundwater at Landfill 2 (FTMM-2).

Metals. A total of eight metals were detected in groundwater samples from Landfill 2 (FTMM-2) during the 2008-2009 time period. Of these eight, five (antimony, barium, cadmium, lead, and selenium) were detected in at least one groundwater sample at concentrations exceeding the freshwater ESC. One sample had an antimony concentration exceeding the freshwater ESC of 80 µg/L. Barium concentrations in four of the monitoring wells had concentrations exceeding the 220 µg/L freshwater ESC. Cadmium was detected at a concentration exceeding the freshwater ESC (0.16 µg/L) in one well. Lead and selenium were detected at concentrations exceeding the ESC (5.4 and 5 µg/L, respectively) in most, if not all, of the wells. Antimony, barium, cadmium, lead, and selenium are considered COPECs in groundwater at Landfill 2 (FTMM-2).

3.4.2.1.3 COPECs for Surface Water at Landfill 2 (FTMM-2)

Two surface water samples were collected from Mill Creek adjacent to Landfill 2 (FTMM-2) as part of the 2010 BEE. One sample was collected immediately downstream of a storm water outfall from the area of Building 1150 in Parcel 39 and the other sample was downstream of all storm water outfalls from Parcel 39 (**Appendix K**). Mill Creek, in the vicinity of Landfill 2 (FTMM-2), is classified as freshwater (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-7**.

Pesticides. No pesticides were detected in surface water samples at Landfill 2 (FTMM-2). Pesticides are not considered COPECs in surface water at Landfill 2 (FTMM-2).

PCBs. No PCBs were detected in surface water samples at Landfill 2 (FTMM-2). PCBs are not considered COPECs in surface water at Landfill 2 (FTMM-2).

VOCs. Three VOCs were detected in at least one of the two surface water samples. PCE, TCE, and *cis*-1,2-dichloroethene were detected at concentrations less than the ESC. VOCs are not considered COPECs in surface water at Landfill 2 (FTMM-2).

SVOCs. Three SVOCs were detected in at least one of the two surface water samples. Anthracene (0.10 and 0.11 µg/L) and benzo(*a*)anthracene (0.22 and 0.23 µg/L) were detected exceeding the freshwater ESC (0.035 and 0.025 µg/L, respectively); 1,2,4-trichlorobenzene was detected in one surface water sample at a concentration less than the ESC. Anthracene and benzo(*a*)anthracene are considered COPECs in surface water at Landfill 2 (FTMM-2).

Metals. A total of 12 metals were detected in surface water samples at Landfill 2 (FTMM-2). One metal was detected at concentrations exceeding the freshwater ESC. Total lead (6.2 and 6.36 µg/L) and dissolved lead (7.86 and 10.1 µg/L) were detected at concentrations exceeding the freshwater ESC for dissolved lead (5.4 µg/L). Lead is considered a COPEC in surface water at Landfill 2 (FTMM-2).

3.4.2.1.4 COPECs for Sediment at Landfill 2 (FTMM-2)

Thirteen sediment samples (including one duplicate sample) were collected from Mill Creek adjacent to Landfill 2 (FTMM-2) as part of the 2010 BEE. Sediment sample locations were based on previous sediment sampling conducted for the RI and were located in the field based on depositional characteristics and potential contaminant migration pathways and included storm water outfalls (**Appendix K**) into Mill Creek in the vicinity of Landfill 2 (FTMM-2) from the area of Building 1150 and Parcel 39 (**Section 3.4.2.13**). Mill Creek, in the vicinity of Landfill 2 (FTMM-2), is classified as freshwater (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table D-8**.

VOCs. Three VOCs (acetone, methylene chloride, and 2-butanone) were detected in at least one sediment sample each, but none were detected at concentrations exceeding the ESC.

Pesticides. Four pesticides (4,4'-DDT, 4,4'-DDE, 4,4'-DDD, and alpha-chlordane) were detected in at least one sediment sample each from Landfill 2. None were detected at concentrations exceeding the freshwater sediment ESC and pesticides are not considered COPECs in sediment at Landfill 2 (FTMM-2).

PCBs. Three PCBs mixtures (Aroclor 1242, Aroclor 1254, and Aroclor 1260) were detected in at least one sediment sample each from Landfill 2 (FTMM-2); each was detected at a concentration greater

than the freshwater sediment ESC in at least one sample. Aroclor 1242 was detected in one sample (0.12 mg/kg) greater than the ESC for PCBs of 0.07 mg/kg. Aroclor 1254 was detected in one sample (0.064 mg/kg) greater than the 0.06 mg/kg freshwater sediment ESC for Aroclor 1254, and Aroclor 1260 was detected in two samples (0.01 and 0.04 mg/kg) greater than the 0.005 mg/kg freshwater sediment ESC for Aroclor 1260. Aroclor 1242, Aroclor 1254, and Aroclor 1260 are considered COPECs in sediment at Landfill 2 (FTMM-2).

SVOCs. A total of 20 SVOCs were detected in surface sediment samples at Landfill 2 (FTMM-2). Of the 20 detected SVOCs, six were detected in at least one sediment sample at concentrations exceeding the ESC. Bis(2-ethylhexyl) phthalate was detected in one sediment sample at a concentration (0.28 mg/kg) which exceeds the freshwater sediment ESC of 0.182 mg/kg. As noted elsewhere, bis(2-ethylhexyl) phthalate is commonly found in field and laboratory QC samples and is not considered a COPEC in sediment at Landfill 2 (FTMM-2). Chrysene (0.37 mg/kg), dibenzo(*a,h*)anthracene (0.1 mg/kg), 2,4-dinitrophenol (1.1 mg/kg), and pyrene (0.71 mg/kg) were detected in one sample each above the freshwater sediment ESC. Fluoranthene (0 0.92 mg/kg) was detected above the ESC in one sample. All SVOC exceedances were detected in only 2 of the 12 sediment samples (M2-SD7 and M2-SD13). Chrysene, dibenzo(*a,h*)anthracene, 2,4-dinitrophenol, fluoranthene, and pyrene are considered COPECs in sediment at Landfill 2 (FTMM-2).

Metals. Of the 22 metals detected in sediment at Landfill 2 (FTMM-2), seven (arsenic, cadmium, chromium, copper, lead, mercury, and nickel) were detected in at least one sample at concentrations exceeding the freshwater sediment ESC. Arsenic concentrations in one sample (8.09 mg/kg), cadmium concentrations in all 12 samples (1.44 to 2.76 mg/kg), chromium concentrations in all 12 samples (31.8 to 125 mg/kg), copper concentrations in one sample (22.5 mg/kg), lead in four samples (31.2 to 52.8 mg/kg), mercury in one sample (0.21 mg/kg), and nickel in one sample (29.2 mg/kg) exceeded the freshwater sediment ESC (6 mg/kg arsenic, 0.6 mg/kg cadmium, 26 mg/kg chromium, 16 mg/kg copper, 31 mg/kg lead, 0.2 mg/kg mercury, and 16 mg/kg nickel). Though there are no freshwater sediment ESC for barium and selenium, detected concentrations of these metals were detected at concentrations greater than the available saltwater sediment ESC in some sediment samples. These metals were identified as COPECs in soil and groundwater at Landfill 2 (FTMM-2) and are considered COPECs in sediment. Arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, and selenium are considered COPECs in sediment at Landfill 2 (FTMM-2).

3.4.2.1.5 Summary of COPECs for Landfill 2 (FTMM-2)

Parameters detected in soil, groundwater, surface water, or sediment at Landfill 2 (FTMM-2) at concentrations greater than the applicable ESC are identified as COPECs for the site. Though cadmium and 4,4′-DDE were not detected in surface water at Landfill 2 (FTMM-2), their MDLs were greater than the freshwater ESC. Given that cadmium is considered a COPEC in soil, groundwater, and sediment and 4,4′-DDE is considered a COPEC in soil and groundwater (though not sediment), they are considered possible COPECs in surface water. The COPECs, and possible COPECs, identified for Landfill 2 (FTMM-2) are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	Chlorobenzene	None	None
Pesticides			
Gamma-BHC 4,4′-DDD 4,4′-DDE 4,4′-DDT Dieldrin Endrin	Aldrin gamma-Chlordane alpha-Chlordane DDE DDT Endrin Heptachlor Heptachlor epoxide Methoxychlor	None	None
PCBs			
Aroclor 1242 Aroclor 1248	None	None	Aroclor 1242 Aroclor 1254

Soil	Groundwater	Surface Water	Sediment
Aroclor 1254 Aroclor 1260			Aroclor 1260
SVOCs			
Benzo(*a*)anthracene Benzo(*a*)pyrene Chrysene Naphthalene	None	Anthracene Benzo(*a*)anthracene	Chrysene Dibenzo(*a,h*)anthracene 2,4-Dinitrophenol Fluoranthene Pyrene
Metals			
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Mercury Nickel Selenium Silver Thallium Vanadium Zinc	Antimony Barium Cadmium Lead Selenium	Lead	Arsenic Barium Cadmium Chromium Copper Lead Mercury Nickel Selenium
Possible COPECs			
		DDE Cadmium	

3.4.2.2 LANDFILL 3 (FTMM-3)

Near surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Landfill 3.

3.4.2.2.1 COPECs for Soil at Landfill 3 (FTMM-3)

Near surface (6-12 inches bgs) soil samples were collected from Landfill 3 (FTMM-3) as part of the IRP RI investigation (Versar, 2004a). A total of 205 samples were analyzed for SVOCs, pesticides, PCBs, and metals. Parameters detected in near surface soil samples are presented in **Table A-2**.

SVOCs. A total of 23 SVOCs were detected in near surface soil samples from Landfill 3 (FTMM-3). Of these 23 SVOCs, 13 were detected at concentrations exceeding the soil ESC in at least one sample. Phenanthrene, fluoranthene, pyrene, benzo(*b*)fluoranthene, indeno(1,2,3-*cd)*pyrene, dibenzo(*a,h*)anthracene, and benzo(*g,h,i*)perylene were detected exceeding the ESC in one soil sample each; most of these exceedances occurred in the same soil sample. In addition, benzo(*a*)anthracene, naphthalene, and chrysene were detected in several soil samples at concentrations exceeding the ESC. Benzo(*a*)pyrene was detected at concentrations exceeding the ESC in more than 10% of the soil samples. Bis(2-ethylhexyl) phthalate and di-*n*-butyl phthalate were also detected at concentrations greater than the ESC. As noted elsewhere, phthalates are commonly found in field and laboratory QC samples, and these phthalates are not considered COPECs. Benzo(*a*)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(*g,h,i*)perylene, chrysene, dibenzo(*a,h*)anthracene, fluoranthene, indeno(1,2,3-*cd*)pyrene, naphthalene, phenanthrene, and pyrene are considered COPECs in soil at Landfill 3 (FTMM-3).

Pesticides. Ten pesticides were detected in near surface soil samples from Landfill 3 (FTMM-3). Nine of these pesticides were detected at concentrations exceeding the soil ESC in at least one sample. 4,4′-DDT was detected in most of the samples and the majority of the concentrations exceeded the 0.0035 mg/kg ESC. 4,4′-DDD was detected in two samples at concentrations that were greater than the 0.758 mg/kg ESC. 4,4′-DDE, dieldrin, and gamma-BHC were detected in several samples at

concentrations that were exceeding the ESC. Endrin was detected in one sample at a concentration above the 0.0101 mg/kg ESC. Heptachlor was detected in one sample at a concentration above the 0.00598 mg/kg ESC. Gamma- and alpha-chlordane were detected in two samples each above the 0.224 mg/kg chlordane ESC. 4,4′-DDD, 4,4′-DDE, 4,4′-DDT, dieldrin, endrin, gamma-BHC, alpha-chlordane, gamma-chlordane, and heptachlor are considered COPECs at Landfill 3 (FTMM-3).

PCBs. One PCB Aroclor was detected in near surface soil samples from Landfill 3 (FTMM-3). Aroclor 1260 was detected in six samples. These concentrations were above the 0.371 mg/kg ESC. Aroclor 1260 is considered a COPEC in soil at Landfill 3 (FTMM-3).

Metals. A total of 23 metals were detected in near surface soil samples from Landfill 3 (FTMM-3) of which most metals were detected in the majority of the samples. Thallium and silver were detected infrequently, being detected in 2 and 25 samples, respectively; antimony was detected in less than half the samples (102 of 205). Sixteen metals (aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc) were detected at concentrations exceeding the soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Landfill 3 (FTMM-3). Antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc are considered COPECs in soil at Landfill 3 (FTMM-3).

3.4.2.2.2 COPECs for Groundwater at Landfill 3 (FTMM-3)

Eight groundwater monitoring wells at Landfill 3 (FTMM-3) have been monitored for VOCs during the 2008-2009 time period. Lafetra Creek could receive groundwater discharge from Landfill 3 (FTMM-3). Lafetra Creek, in the vicinity of Landfill 3 (FTMM-3), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-2**.

VOCs. A total of 11 VOCs were detected in groundwater samples from Landfill 3 (FTMM-3) during the 2008-2009 time period. None of the detected VOCs were at concentrations greater than the applicable saltwater ESC. VOCs are not considered COPECs in groundwater at Landfill 3 (FTMM-3).

3.4.2.2.3 COPECs for Surface Water at Landfill 3 (FTMM-3)

Two surface water samples were collected from Lafetra Creek adjacent to Landfill 3 (FTMM-3) as part of the 2010 BEE. Lafetra Creek, in the vicinity of Landfill 3 (FTMM-3), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-9**.

VOCs. No VOCs were detected in surface water samples at Landfill 3 (FTMM-3). VOCs are not considered COPECs in surface water at Landfill 3 (FTMM-3).

SVOCs. No SVOCs were detected in surface water samples at Landfill 3 (FTMM-3). SVOCs are not considered COPECs in surface water at Landfill 3 (FTMM-3).

Pesticides. No pesticides were detected in surface water samples at Landfill 3 (FTMM-3). Pesticides are not considered COPECs in surface water at Landfill 3 (FTMM-3).

PCBs. No PCBs were detected in surface water samples at Landfill 3 (FTMM-3). PCBs are not considered COPECs in surface water at Landfill 3 (FTMM-3).

Metals. A total of 13 metals were detected in surface water samples at Landfill 3 (FTMM-3). None of these were detected at concentrations exceeding the saltwater ESC. Metals are not considered COPECs in surface water at Landfill 3 (FTMM-3).

3.4.2.2.4 COPECs for Sediment at Landfill 3 (FTMM-3)

Twelve sediment samples (including one duplicate sample) were collected from Lafetra Creek adjacent to Landfill 3 (FTMM-3) as part of the 2010 BEE. Sediment sample locations were based on previous sediment sampling conducted for the RI and were located in the field based on depositional characteristics and potential contaminant migration pathways. Lafetra Creek, in the vicinity of Landfill 3 (FTMM-3), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table D-10**.

VOCs. A total of seven VOCs were detected in sediment samples at Landfill 3 (FTMM-3). None were detected at concentrations exceeding the available saltwater sediment ESC. VOCs are not considered COPECs in sediment at Landfill 3 (FTMM-3).

PCBs. No PCBs were detected in sediment samples at Landfill 3 (FTMM-3). PCBs are not considered COPECs at Landfill 3 (FTMM-3).

Pesticides. Three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) were detected in one or two sediment samples each at Landfill 3 (FTMM-3). Only one sample had concentrations exceeding the ESC. Sample M3-SD10 had a concentration of 0.0095 mg/kg 4,4′-DDD, which is greater than the saltwater sediment ESC (0.002 mg/kg) and a concentration of 0.18 mg/kg 4,4′-DDT, which is greater than the saltwater sediment ESC (0.001 mg/kg). 4,4′-DDD and 4,4′-DDT are considered COPECs in sediment at Landfill 3 (FTMM-3).

SVOCs. A total of 15 SVOCs were detected in surface sediment samples at Landfill 3 (FTMM-3). Of the 15 detected SVOCs, one was detected in one sediment sample at a concentration greater than the saltwater ESC. Bis(2-ethylhexyl) phthalate was detected in one sediment sample at a concentration (5.5 mg/kg) exceeding the saltwater sediment ESC of 0.18216 mg/kg. As noted elsewhere, bis(2-ethylhexyl) phthalate is commonly found in field and laboratory QC samples and is not considered a COPEC in sediment at Landfill 3 (FTMM-3).

Metals. Of the 23 metals detected in sediment at Landfill 3 (FTMM-3), 13 (arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc) were detected in at least one sample at concentrations greater than the saltwater sediment ESC and are considered COPECs in sediment at Landfill 3 (FTMM-3).

3.4.2.2.5 Summary of COPECs for Landfill 3 (FTMM-3)

Parameters detected in soil, groundwater, surface water, or sediment at Landfill 3 (FTMM-3) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Landfill 3 (FTMM-3), its MDLs were greater than the saltwater ESC. Given that copper is considered a COPEC in soil and sediment, it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Landfill 3 (FTMM-3) are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
Gamma-BHC alpha-Chlordane gamma-Chlordane 4,4′-DDD 4,4′-DDE 4,4′-DDT Dieldrin Endrin Heptachlor	Not Applicable	None	DDD DDT
PCBs			
Aroclor 1260	Not Applicable	None	None
SVOCs			
Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*b*)fluoranthene Benzo(*g,h,i*)perylene Chrysene Dibenzo(*a,h*)anthracene Fluoranthene Indeno(1,2,3-*cd*)pyrene	Not Applicable	None	None

Soil	Groundwater	Surface Water	Sediment
Naphthalene Phenanthrene Pyrene			
Metals			
Antimony Arsenic Barium Cadmium Chromium Cobalt Copper Lead Manganese Mercury Nickel Selenium Silver Vanadium Zinc	Not Applicable	None	Arsenic Barium Cadmium Chromium Cobalt Copper Lead Mercury Nickel Selenium Silver Vanadium Zinc
Possible COPECs			
		Copper	

3.4.2.3 LANDFILL 4 (FTMM-4)

Near surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Landfill 4 (FTMM-4).

3.4.2.3.1 COPECs for Soil at Landfill 4 (FTMM-4)

Near surface (6-12 inches bgs) soil samples were collected from Landfill 4 (FTMM-4) as part of the IRP RI investigation (Versar, 2004b). A total of 63 samples were analyzed for SVOCs, pesticides, PCBs, and metals. Parameters detected in near surface soil samples are presented in **Table A-3**.

SVOCs. A total of 22 SVOCs were detected in near surface soil samples from Landfill 4 (FTMM-4). Of these 22 SVOCs, three were detected at concentrations exceeding the soil ESC in at least one sample. Bis(2-ethylhexyl) phthalate was detected frequently and several samples had concentrations that were greater than the 0.925 mg/kg ESC. As noted elsewhere, bis(2-ethylhexyl) phthalate is commonly found in field and laboratory QC samples; therefore, it is not considered a COPEC. Benzo(*a*)pyrene was detected in more than half of the 63 samples and two samples had concentrations (3.5 and 1.6 mg/kg) greater than the 1.52 mg/kg ESC. Naphthalene was detected in four samples at concentrations exceeding the 0.0994 mg/kg ESC. Benzo(*a*)pyrene and naphthalene are considered COPECs in soil at Landfill 4 (FTMM-4).

Pesticides. Four pesticides were detected in near surface soil samples from Landfill 4 (FTMM-4). Three of these pesticides were detected at concentrations exceeding the soil ESC in at least one sample. 4,4′-DDT was detected in most of the 63 samples and the majority of these had concentrations that were greater than the 0.0035 mg/kg ESC. 4,4′-DDD was detected in one sample at a concentration that exceeded the 0.758 mg/kg ESC. 4,4′-DDE was detected in three samples at concentrations that were greater than the 0.596 mg/kg ESC. 4,4′-DDD, 4,4′-DDE, and 4,4′-DDT are considered COPECs at Landfill 4 (FTMM-4).

PCBs. No PCBs were detected in near surface soil samples from Landfill 4 (FTMM-4). PCBs are not considered COPECs in soil at Landfill 4 (FTMM-4).

Metals. A total of 23 metals were detected in near surface soil samples from Landfill 4 (FTMM-4) of which most metals were detected in the majority of the samples. Cadmium, thallium, selenium, and silver were detected infrequently. Thallium and selenium were detected in one sample each, cadmium was detected in four samples, and selenium was detected in 13 samples. Sixteen metals (aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc) were detected at concentrations exceeding the soil ESC. Aluminum, like

iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Landfill 4 (FTMM-4). Antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc are considered COPECs in soil at Landfill 4 (FTMM-4).

3.4.2.3.2 COPECs for Groundwater at Landfill 4 (FTMM-4)

Four monitoring wells at Landfill 4 (FTMM-4) have been monitored for metals during the 2008-2009 time period. Sampling for SVOCs, pesticides, PCBs, and VOCs was discontinued after the October 2004 sampling event per NJDEP approval letter dated November 2004. SVOCs, pesticides, PCBs, and VOCs are not considered COPECs in groundwater at Landfill 4 (FTMM-4). Mill Creek could receive groundwater discharge from Landfill 4 (FTMM-4). Mill Creek, in the vicinity of Landfill 4 (FTMM-4), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-3**.

Metals. A total of 12 metals were detected in groundwater samples from Landfill 4 (FTMM-4) during the 2008-2009 time period. Of these 12, five were detected at concentrations that exceeded the saltwater ESC in at least one sample. Arsenic was detected at concentrations greater than the saltwater ESC in three monitoring wells. Selenium was detected at concentrations greater than the saltwater ESC in two wells. Cadmium, copper, and lead were detected at concentrations exceeding the saltwater ESC in one sample each. Arsenic, cadmium, copper, lead, and selenium are considered COPECs in groundwater at Landfill 4 (FTMM-4).

3.4.2.3.3 COPECs for Surface Water at Landfill 4 (FTMM-4)

One surface water sample was collected from Mill Creek adjacent to Landfill 4 (FTMM-4) as part of the 2010 BEE. One sample was collected downstream of the storm water outfall at the northern end of Landfill 4 (FTMM-4) and the other sample was collected downstream of the storm water outfall at the southern end of Landfill 4 (FTMM-4) (**Appendix K**). Mill Creek, in the vicinity of Landfill 4 (FTMM-4), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in the surface water sample are presented in **Table D-11**.

PCBs. No PCBs were detected in surface water samples at Landfill 4 (FTMM-4). PCBs are not considered COPECs in surface water at Landfill 4 (FTMM-4).

Pesticides. No pesticides were detected in surface water samples at Landfill 4 (FTMM-4). Pesticides are not considered COPECs in surface water at Landfill 4 (FTMM-4).

VOCs. Two VOCs were detected in the surface water sample. PCE (0.6 µg/L) and *cis*-1,2-dichloroethene (1.1 µg/L) were detected at concentrations less than the ESC. VOCs are not considered COPECs in surface water at Landfill 4 (FTMM-4).

SVOCs. Four SVOCs were detected in the surface water sample. There are no saltwater ESC four these SVOCs; they are not considered COPECs in surface water at Landfill 4 (FTMM-4).

Metals. A total of 12 metals were detected in the surface water sample at Landfill 4 (FTMM-4). None of these were detected at concentrations greater than the saltwater ESC. Metals are not considered COPECs in surface water at Landfill 4 (FTMM-4).

3.4.2.3.4 COPECs for Sediment at Landfill 4 (FTMM-4)

Six sediment samples were collected from Mill Creek adjacent to Landfill 4 (FTMM-4) as part of the 2010 BEE. Sediment sample locations were based on previous sediment sampling conducted for the RI and were located in the field based on depositional characteristics and potential contaminant migration pathways and included storm water outfalls (**Appendix K**) into Mill Creek in the vicinity of Landfill 4 (FTMM-4) from the surrounding areas including Buildings 689, 1123, and 1221. Mill Creek, in the vicinity of Landfill 4 (FTMM-4), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in the sediment samples are presented in **Table D-12**.

VOCs. A total of two VOCs (acetone and methylene chloride) were detected in sediment samples at Landfill 4 (FTMM-4). None were detected at concentrations exceeding the available saltwater sediment ESC. VOCs are not considered COPECs in sediment at Landfill 4 (FTMM-4).

PCBs. Three PCB mixtures (Aroclor 1232, Aroclor 1242, and Aroclor 1260) were detected in at least one sediment sample each from Landfill 4 (FTMM-4); all were detected at concentrations greater than the saltwater sediment ESC in at least one sample. Aroclor 1232 was detected in one sample (0.093 mg/kg) and Aroclor 1242 was detected in two samples (0.055 mg/kg and 0.075 mg/kg) greater than the ESC for PCBs in saltwater sediment of 0.023 mg/kg. Aroclor 1260 was detected in five samples (0.010 mg/kg to 0.036 mg/kg) above the 0.005 mg/kg saltwater sediment ESC for Aroclor 1260. These three PCBs are considered COPECs in sediment at Landfill 4 (FTMM-4).

Pesticides. Three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) were detected in one to three sediment samples each at Landfill 4 (FTMM-4). 4,4′-DDD in two samples and 4,4′-DDT in one sample were at concentrations exceeding the saltwater ESC. 4,4′-DDD and 4,4′-DDT are considered COPECs in sediment at Landfill 4 (FTMM-4).

SVOCs. A total of 15 SVOCs were detected in surface sediment samples at Landfill 4 (FTMM-4). Of the 15 detected SVOCs, six were detected in one sediment sample (M4-SD4) at concentrations exceeding the ESC. Acenaphthene (0.12 mg/kg), anthracene (0.15 mg/kg), benzo(*a*)anthracene (0.31 mg/kg), fluoranthene (0.70 mg/kg), fluorene (0.097 mg/kg), and phenanthrene (0.62 mg/kg) were detected above the saltwater sediment ESC at M4-SD4. Acenaphthene, anthracene, benzo(*a*)anthracene, fluoranthene, fluorene, and phenanthrene are considered COPECs in sediment at Landfill 4 (FTMM-4).

Metals. Of the 23 metals detected in sediment at Landfill 4 (FTMM-4), seven (arsenic, cadmium, cobalt, lead, mercury, and selenium) were detected in at least one sample at concentrations greater than the saltwater sediment ESC. Arsenic concentration in one sample (10.2 mg/kg), cadmium concentrations in three samples (1.26 to 1.49 mg/kg), cobalt concentrations in four samples (13.9 to 24.6 mg/kg), lead in two samples (52.3 to 65.1 mg/kg), mercury concentrations in three samples (0.188 to 0.257 mg/kg), and selenium concentrations in all six samples (1.63 to 3.67 mg/kg) exceeded the freshwater sediment ESC (8.2, 1.2, 10, 47, 0.15, and 1 mg/kg, respectively). Arsenic, cadmium, lead, mercury, nickel, and selenium are considered COPECs in sediment at Landfill 4 (FTMM-4).

3.4.2.3.5 Summary of COPECs for Landfill 4 (FTMM-4)

Parameters detected in soil, groundwater, surface water, or sediment at Landfill 4 (FTMM-4) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Landfill 4 (FTMM-4), its MDLs were greater than the saltwater ESC. Given that copper is considered a COPEC in soil and groundwater (though not in sediment), it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Landfill 4 (FTMM-4) are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
4,4′-DDD 4,4′-DDE 4,4′-DDT	None	None	DDD DDT
PCBs			
None	None	None	Aroclor 1232 Aroclor 1242 Aroclor 1260
SVOCs			
Benzo(*a*)pyrene Naphthalene	None	None	Acenaphthene Anthracene Benzo(a)anthracene Fluoranthene Fluorene

Soil	Groundwater	Surface Water	Sediment
			Phenanthrene
Metals			
Antimony Arsenic Barium Cadmium Chromium Cobalt Copper Lead Mercury Nickel Selenium Silver Thallium Vanadium Zinc	Arsenic Cadmium Copper Lead Selenium	None	Arsenic Cadmium Cobalt Lead Mercury Selenium
Possible COPECs			
		Copper	

3.4.2.4 LANDFILL 5 (FTMM-5)

Near surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Landfill 5 (FTMM-5).

3.4.2.4.1 COPECs for Soil at Landfill 5 (FTMM-5)

Near surface (6-12 inches bgs) soil samples were collected from Landfill 5 (FTMM-5) as part of the IRP RI investigation (Versar, 2004c). A total of 173 samples were analyzed for SVOCs, pesticides, PCBs, and metals. Parameters detected in near surface soil samples are presented in **Table A-4**.

SVOCs. A total of 27 SVOCs were detected in near surface soil samples from Landfill 5 (FTMM-5). Of these 27 SVOCs, six were detected at concentrations exceeding the soil ESC in at least one sample. Benzo(*a*)anthracene, 2-methylnaphthalene, and chrysene were detected in one or two samples each at concentrations exceeding the ESC. Benzo(*a*)pyrene was detected in eight samples at concentrations exceeding the 1.52 mg/kg ESC. Naphthalene was detected in 16 samples at concentrations exceeding the 0.0994 mg/kg ESC. Bis(2-ethylhexyl) phthalate was detected in two samples at concentrations exceeding the 0.925 mg/kg ESC. As noted elsewhere, bis(2-ethylhexyl) phthalate is commonly found in field and laboratory QC samples; therefore, it is not considered a COPEC. Benzo(a)anthracene, benzo(a)pyrene, 2-methylnaphthalene, naphthalene, and chrysene are considered COPECs in soil at Landfill 5 (FTMM-5).

Pesticides. Twelve pesticides were detected in near surface soil samples from Landfill 5 (FTMM-5). Eight of these pesticides were detected at concentrations exceeding the soil ESC in at least one sample. 4,4′-DDT was detected at concentrations that were greater than the 0.0035 mg/kg ESC in about 20% of the samples. 4,4′-DDD was detected in three samples at concentrations that were greater than the 0.758 mg/kg ESC. 4,4′-DDE was detected in five samples at concentrations that were greater than the 0.596 mg/kg ESC. Dieldrin was detected in one sample at a concentration greater than the 0.0049 mg/kg ESC. Endosulfan sulfate was detected in one sample at a concentration greater than the 0.0358 mg/kg ESC. Endrin aldehyde was detected in one sample at a concentration greater than the 0.0105 mg/kg ESC. Heptachlor was detected in one sample at a concentration greater than the 0.00598 mg/kg ESC. Heptachlor epoxide was detected in one sample at a concentration greater than the 0.152 mg/kg ESC. Gamma- and alpha-chlordane were detected in one sample each at concentrations exceeding the 0.224 mg/kg chlordane ESC. alpha-Chlordane, gamma-chlordane, 4,4′-DDD, 4,4′-DDE, 4,4′-DDT, dieldrin, endosulfan sulfate, endrin aldehyde, heptachlor, and heptachlor epoxide are considered COPECs at Landfill 5 (FTMM-5).

PCBs. One PCB mixture (Aroclor 1254) was detected in near surface soil samples from Landfill 5 (FTMM-5). Aroclor 1254 was detected in two samples. One concentration was greater than the 0.371 mg/kg ESC. Aroclor 1254 is considered a COPEC in soil at Landfill 5 (FTMM-5).

Metals. A total of 23 metals were detected in near surface soil samples from Landfill 5 (FTMM-5) and most metals were detected in the majority of the samples. Thallium, selenium, and silver were detected infrequently, being detected in 41, 32, and 17 samples, respectively; cadmium was detected in less than half the samples (68 of 173). Eighteen metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc) were detected at concentrations exceeding the soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Landfill 5 (FTMM-5). Antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc are considered COPECs in soil at Landfill 5 (FTMM-5).

3.4.2.4.2 COPECs for Groundwater at Landfill 5 (FTMM-5)

Ten groundwater monitoring wells at Landfill 5 (FTMM-5) have been monitored for VOCs during the 2008-2009 time period. Mill Creek could receive groundwater discharge from Landfill 5 (FTMM-5). Mill Creek, in the vicinity of Landfill 5 (FTMM-5), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-4**.

VOCs. A total of six VOCs were detected in groundwater samples from Landfill 5 (FTMM-5) during the 2008-2009 time period. No VOCs were found at concentrations exceeding the available saltwater ESC. VOCs are not considered COPECs in groundwater at Landfill 5 (FTMM-5).

3.4.2.4.3 COPECs for Surface Water at Landfill 5 (FTMM-5)

One surface water sample was collected from Mill Creek adjacent to Landfill 5 (FTMM-5) as part of the 2010 BEE. The surface water sample was collected at an approximate mid-point of Landfill 5 and downstream of potential storm water outfalls located immediately upstream of Landfill 5 (**Appendix K**). Additionally, one surface water sample collected in relation of Landfill 8 (FTMM-8) was collected at the northern end of Landfill 5 just upstream of the confluence of Mill Creek with Lafetra Creek (**Section 3.4.2.5**). Mill Creek, in the vicinity of Landfill 5 (FTMM-5), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in the surface water sample are presented in **Table D-13**.

PCBs. No PCBs were detected in surface water samples at Landfill 5 (FTMM-5). PCBs are not considered COPECs in surface water at Landfill 5 (FTMM-5).

Pesticides. No pesticides were detected in surface water samples at Landfill 5 (FTMM-5). Pesticides are not considered COPECs in surface water at Landfill 5 (FTMM-5).

VOCs. Two VOCs were detected in the surface water sample. PCE (0.69 µg/L) and *cis*-1,2-dichloroethene (0.97 µg/L) were detected at concentrations below the available ESC. VOCs are not considered COPECs in surface water at Landfill 5 (FTMM-5).

SVOCs. Two SVOCs were detected in the surface water sample. None were detected at concentrations exceeding the saltwater ESC. SVOCs are not considered COPECs in surface water at Landfill 5 (FTMM-5).

Metals. A total of 13 metals were detected in the surface water sample at Landfill 5 (FTMM-5). None of these were detected at concentrations exceeding the saltwater ESC. Metals are not considered COPECs in surface water at Landfill 5 (FTMM-5).

3.4.2.4.4 COPECs for Sediment at Landfill 5 (FTMM-5)

Seven sediment samples (including one duplicate sample) were collected from Mill Creek adjacent to Landfill 5 (FTMM-5) as part of the 2010 BEE. Sediment sample locations were based on previous sediment sampling conducted for the RI and were located in the field based on depositional characteristics and potential contaminant migration pathways. Mill Creek, in the vicinity of Landfill 5

(FTMM-5), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in the sediment samples are presented in **Table D-14**.

VOCs. A total of five VOCs were detected in sediment samples at Landfill 5 (FTMM-5). None were detected at concentrations exceeding the available freshwater sediment ESC. VOCs are not considered COPECs in sediment at Landfill 5 (FTMM-5).

PCBs. No PCBs were detected in sediment samples at Landfill 5 (FTMM-5). PCBs are not considered COPECs in sediment at Landfill 5 (FTMM-5).

Pesticides. Four pesticides (alpha-chlordane, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) were detected in four sediment samples each at Landfill 5 (FTMM-5). Three of these pesticides, 4,4'-DDD (0.0036 to 0.016 mg/kg), 4,4'-DDE (0.003 to 0.0072 mg/kg), and 4,4'-DDT (0.0011 to 0.0021 mg/kg), were detected in three to four sediment samples at concentrations greater than the saltwater sediment ESC of 0.002 mg/kg for 4,4′-DDD, 0.0022 mg/kg for 4,4′-DDE, and 0.001 mg/kg for 4,4′-DDT. 4,4′-DDD, 4,4′-DDE, and 4,4′-DDT are considered COPECs in sediment at Landfill 5 (FTMM-5).

SVOCs. A total of 16 SVOCs were detected in surface sediment samples at Landfill 5 (FTMM-5). Of the 16 detected SVOCs, nine were detected in at least one sediment sample at concentrations exceeding the saltwater sediment ESC. Acenaphthylene (0.15 mg/kg), anthracene (0.15 to 0.23 mg/kg), benzo(*a*)anthracene (0.34 mg/kg), fluoranthene (0.67 mg/kg), fluorene (0.27 mg/kg), 2-methylnaphthalene (0.40 mg/kg), naphthalene (0.26 mg/kg), phenanthrene (0.36 and 0.96 mg/kg), and pyrene (0.58 and 0.70 mg/kg) were detected at concentrations exceeding the freshwater sediment ESC. Acenaphthylene, anthracene, benzo(*a*)anthracene, fluoranthene, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene are considered COPECs in sediment at Landfill 5 (FTMM-5).

Metals. Of the 23 metals detected in sediment at Landfill 5 (FTMM-5), 12 (arsenic, barium, cadmium, chromium, cobalt, lead, mercury, nickel, selenium, silver, vanadium, and zinc) were detected in at least one sample at concentrations greater than the saltwater sediment ESC. Arsenic concentrations in three samples (11.0 to 43.5 mg/kg), barium in one sample (50.7 mg/kg), cadmium concentrations in three samples (1.72 to 6.65 mg/kg), chromium in one sample (119 mg/kg), cobalt in one sample (13.3 mg/kg), lead in one sample (62.4 mg/kg), mercury in one sample (0.155 mg/kg), nickel in one sample (27.6 mg/kg), selenium in all seven samples (1.33 to 13.2 mg/kg), silver in one sample (1.29 mg/kg), vanadium in one sample (71.6 mg/kg), and zinc in two samples (150 and 203 mg/kg) exceeded the saltwater sediment ESC (8.2, 48, 1.2, 81, 10, 47, 0.15, 21, 1, 1, 57, and 150 mg/kg, respectively). Arsenic, barium, cadmium, chromium, cobalt, lead, mercury, nickel, selenium, silver, vanadium, and zinc are considered COPECs in sediment at Landfill 5 (FTMM-5).

3.4.2.4.5 Summary of COPECs for Landfill 5 (FTMM-5)

Parameters detected in soil, groundwater, surface water, or sediment at Landfill 5 (FTMM-5) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Landfill 5 (FTMM-5), its MDLs were greater than the saltwater ESC. Given that copper is considered a COPEC in soil (but not in sediment), it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Landfill 5 (FTMM-5) are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
alpha-Chlordane gamma-Chlordane 4,4′-DDD 4,4′-DDE 4,4′-DDT Dieldrin Endosulfan sulfate Endrin aldehyde	Not Applicable	None	DDD DDE DDT

Soil	Groundwater	Surface Water	Sediment
Heptachlor Heptachlor epoxide			
PCBs			
Aroclor 1254	Not Applicable	None	None
SVOCs			
Benzo(*a*)anthracene Benzo(*a*)pyrene Chrysene Naphthalene 2-Methylnaphthalene	Not Applicable	None	Acenaphthylene Anthracene Benzo(*a*)anthracene Fluoranthene Fluorene 2-Methylnaphthalene Naphthalene Phenanthrene Pyrene
Metals			
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Mercury Nickel Selenium Silver Thallium Vanadium Zinc	Not Applicable	None	Arsenic Barium Cadmium Chromium Cobalt Lead Mercury Nickel Selenium Silver Vanadium Zinc
Possible COPECs			
		Copper	

3.4.2.5 LANDFILL 8 (FTMM-8)

Near surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Landfill 8 (FTMM-8).

3.4.2.5.1 COPECs for Soil at Landfill 8 (FTMM-8)

Near surface (6-12 inches bgs) soil samples were collected from Landfill 8 (FTMM-8) as part of the IRP RI investigation (Versar, 2004d). A total of 291 samples were analyzed for SVOCs, pesticides, PCBs, and metals. Parameters detected in near surface soil samples are presented in **Table A-5**.

SVOCs. A total of 35 SVOCs were detected in near surface soil samples from Landfill 8 (FTMM-8). Of these 35 SVOCs, 20 were detected at concentrations exceeding the soil ESC in at least one sample. Twelve of these SVOCs exceeded the soil ESC in the same two or three samples; these were 2,4-dimethylphenol, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(*b*)fluoranthene, benzo(*k*)fluoranthene, indeno(1,2,3-*cd*)pyrene, dibenzo(*a,h*)anthracene, and benzo(*g,h,i*)perylene. Benzo(*a*)anthracene, chrysene, benzo(*a*)pyrene, and 2-methylnaphthalene were detected exceeding the ESC in less than 5 percent of the soil samples and naphthalene was detected above the ESC in about 10% of the soil samples. The highest concentrations of these four PAHs were detected in the same three samples as the exceedances of the other PAH ESC. Hexachlorobenzene was detected in one sample at a concentration greater than the 0.199 mg/kg ESC. Butyl benzyl phthalate and bis(2-ethylhexyl) phthalate were detected in several samples at concentrations exceeding the ESC of 0.239 and 0.925 mg/kg, respectively. As noted elsewhere, phthalates are commonly found in field and laboratory QC samples, and phthalates are not considered COPECs. Naphthalene, 2-methylnaphthalene, 2,4-dimethylphenol, acenaphthene, fluorene, phenanthrene, anthracene,

fluoranthene, pyrene, benzo(*b*)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-*cd*)pyrene, dibenzo(a,h)anthracene, benzo(*g,h,i*)perylene, benzo(*a*)anthracene, chrysene, and benzo(*a*)pyrene are considered COPECs in soil at Landfill 8 (FTMM-8).

Pesticides. Ten pesticides were detected in near surface soil samples from Landfill 8 (FTMM-8). Each of these pesticides were detected at concentrations exceeding the soil ESC in at least one sample. 4,4′-DDT was detected in most of the 291 samples and these concentrations greater than the 0.0035 mg/kg ESC. 4,4′-DDD was detected at concentrations greater than the 0.758 mg/kg ESC in less than 5 percent of the samples. 4,4′-DDE was detected in one sample at a concentration that was above the 0.596 mg/kg ESC. Dieldrin was detected at concentrations exceeding the 0.049 mg/kg ESC in about 20% of the samples. Endrin, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, and gamma-BHC were detected in one sample each at concentrations that were exceeding the ESC. 4,4′-DDD, 4,4′-DDE, 4,4′-DDT, dieldrin, endrin, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, and gamma-BHC are considered COPECs at Landfill 8 (FTMM-8).

PCBs. Three PCB Aroclors were detected in near surface soil samples from Landfill 8 (FTMM-8) in less than 5% of the samples and most of these concentrations were exceeding the ESC. Aroclor 1016, Aroclor 1254, and Aroclor 1260 are considered COPECs in soil at Landfill 8 (FTMM-8).

Metals. A total of 23 metals were detected in near surface soil samples from Landfill 8 (FTMM-8) of which most metals were detected in the majority of the samples. Thallium was detected infrequently, being detected in only two samples; silver was detected in less than half the samples (83 of 291). Eighteen metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc) were detected at concentrations exceeding the soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Landfill 8 (FTMM-8). Antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc are considered COPECs in soil at Landfill 8. (FTMM-8)

3.4.2.5.2 COPECs for Groundwater at Landfill 8 (FTMM-8)

Monitoring for VOCs and pesticides have occurred at 14 groundwater monitoring wells at Landfill 8 (FTMM-8) during the 2008-2009 time period. Sampling for SVOCs, PCBs, and metals was discontinued after the March 2004 sampling event per NJDEP approval letter dated November 2004. SVOCs, PCBs, and metals are not considered COPECs in groundwater at Landfill 8 (FTMM-8). Parkers Creek could receive groundwater discharge from Landfill 8 (FTMM-8). Parkers Creek, in the vicinity of Landfill 8 (FTMM-8), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-5**.

VOCs. A total of 15 VOCs were detected in groundwater samples from Landfill 8 (FTMM-8) during the 2008-2009 time period. None of these were detected in concentrations that exceeded the available saltwater ESC. VOCs are not considered COPECs in groundwater at Landfill 8 (FTMM-8).

Pesticides. A total of 12 pesticides were detected in groundwater samples from Landfill 8 (FTMM-8) during the 2008-2009 time period. Eight of these (alpha- and gamma-chlordane, 4,4′-DDT, dieldrin, endosulfan I, endrin, heptachlor, and methoxychlor) were detected in concentrations that exceeded the saltwater ESC, and they are considered COPECs in groundwater at Landfill 8 (FTMM-8).

3.4.2.5.3 COPECs for Surface Water at Landfill 8 (FTMM-8)

Three surface water samples were collected from Parkers Creek adjacent to Landfill 8 (FTMM-8) as part of the 2010 BEE. One surface water sample was collected at the upstream end Landfill 8 (FTMM-8), at the northern end of Landfill 5 (FTMM-5), just upstream of the confluence of Mill Creek with Lafetra Creek. The other two samples were collected adjacent to Landfill M-8 on the west and east side near existing groundwater monitoring well locations. Additionally, another surface water sample was collected in relation to Site FTMM-18 (**Section 3.4.2.10**) to the east of Landfill 8 (FTMM-8) and near potential storm water outfalls (**Appendix K**). Parkers Creek, in the vicinity of Landfill 8 (FTMM-8), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-15**.

PCBs. No PCBs were detected in surface water samples at Landfill 8 (FTMM-8). PCBs are not considered COPECs in surface water at Landfill 8.

Pesticides. No pesticides were detected in surface water samples at Landfill 8 (FTMM-8). Pesticides are not considered COPECs in surface water at Landfill 8 (FTMM-8).

VOCs. No VOCs were detected in surface water samples at Landfill 8 (FTMM-8). VOCs are not considered COPECs in surface water at Landfill 8 (FTMM-8).

SVOCs. One SVOC, dimethyl phthalate, was detected in one surface water sample. There are no available ESC for dimethyl phthalate, and it is not considered a COPEC for surface water at Landfill 8 (FTMM-8).

Metals. A total of 14 metals were detected in surface water samples at Landfill 8 (FTMM-8). None of these were detected at concentrations exceeding the saltwater ESC. Metals are not considered COPECs in surface water at Landfill 8 (FTMM-8).

3.4.2.5.4 COPECs for Sediment at Landfill 8 (FTMM-8)

Twelve sediment samples (including one duplicate sample) were collected from Parkers Creek adjacent to Landfill 8 (FTMM-8) as part of the 2010 BEE. Sediment sample locations were based on previous sediment sampling conducted for the RI and were located in the field based on depositional characteristics and potential contaminant migration pathways and included storm water outfalls (**Appendix K**) into Parkers Creek in the vicinity of Landfill 8 (FTMM-8) and Site FTMM-18 (**Section 3.4.2.10**). Parkers Creek, in the vicinity of Landfill 8 (FTMM-8), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table D-16**.

VOCs. A total of seven VOCs were detected in sediment samples at Landfill 8 (FTMM-8). None were detected at concentrations exceeding the available saltwater sediment ESC. VOCs are not considered COPECs in sediment at Landfill 8 (FTMM-8).

PCBs. Two PCB mixtures (Aroclor 1242 and Aroclor 1260) were detected in one or two sediment samples each at Landfill 8 (FTMM-8). Aroclor 1242 was detected at concentrations greater than the saltwater sediment ESC for PCBs in two samples (0.05 and 0.17 mg/kg) and Aroclor 1260 was detected greater than both the saltwater sediment ESC for Aroclor 1260 in one sample (0.011 mg/kg). Aroclor 1242 and Aroclor 1260 are considered COPECs in sediment at Landfill 8 (FTMM-8).

Pesticides. Two pesticides (4,4'-DDD and 4,4'-DDE) were detected in two to three sediment samples each at Landfill 8 (FTMM-8). Three samples had detected concentrations (0.0021 to 0.0033 mg/kg) of 4,4'-DDD exceeding the saltwater sediment ESC. Detected concentrations of 4,4'-DDE were less than the ESC. Therefore, 4,4'-DDD is considered a COPEC in sediment at Landfill 8 (FTMM-8).

SVOCs. A total of nine SVOCs were detected in surface sediment samples at Landfill 8 (FTMM-8). None of the detected SVOCs exceeded the available saltwater sediment ESC. SVOCs are not considered COPECs in sediment at Landfill 8 (FTMM-8).

Metals. Of the 23 metals detected in sediment at Landfill 8 (FTMM-8), 14 were detected in at least one sample at concentrations greater than the saltwater sediment ESC. Barium in six samples (59.6 to 103 mg/kg), selenium in all 12 samples (2.64 to 13.8 mg/kg), and vanadium in four samples (60.9 to 99.1 mg/kg) exceeded the saltwater sediment ESC of 48, 1, and 57 mg/kg, respectively. One sample had a concentration of manganese (364 mg/kg) greater than the saltwater sediment ESC (260 mg/kg). Concentrations of the other 10 metals (arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, silver, and zinc) exceeded the saltwater sediment ESC in at least three samples each. Arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc are considered COPECs in sediment at Landfill 8 (FTMM-8).

3.4.2.5.5 Summary of COPECs for Landfill 8 (FTMM-8)

Parameters detected in soil, groundwater, surface water, or sediment at Landfill 8 (FTMM-8) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Landfill 8 (FTMM-8), its MDLs were greater than the saltwater ESC. Given that copper is considered a COPEC in soil and sediment, it is considered a possible COPEC in

surface water. The COPECs, and possible COPECs, identified for Landfill 8 (FTMM-8) are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
gamma-BHC alpha-Chlordane gamma-Chlordane 4,4′-DDD 4,4′-DDE 4,4′-DDT Dieldrin Endrin Heptachlor Heptachlor epoxide	alpha-Chlordane gamma-Chlordane 4,4′-DDT Dieldrin Endrin Endosulfan I Heptachlor Methoxychlor	None	DDD
PCBs			
Aroclor 1016 Aroclor 1254 Aroclor 1260	None	None	Aroclor 1242 Aroclor 1260
SVOCs			
Acenaphthene Anthracene Benzo(*a*)anthracene Benzo(*b*)fluoranthene Benzo(*a*)pyrene Benzo(*g,h,i*)perylene Benzo(*k*)fluoranthene Chrysene Dibenzo(a,h)anthracene Fluoranthene Fluorene Hexachlorobenzene Indeno(1,2,3-*cd*)pyrene 2-Methylnaphthalene 2,4-Dimethylphenol Naphthalene Phenanthrene Pyrene	None	None	None
Metals			
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Mercury Nickel Selenium Silver Thallium Vanadium Zinc	None	None	Arsenic Barium Cadmium Chromium Cobalt Copper Lead Manganese Mercury Nickel Selenium Silver Vanadium Zinc
Possible COPECs			
		Copper	

3.4.2.6 LANDFILL 12 (FTMM-12)

Near surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Landfill 12 (FTMM-12).

3.4.2.6.1 COPECs for Soil at Landfill 12 (FTMM-12)

Near surface (6-12 inches bgs) soil samples were collected from Landfill 12 (FTMM-12) as part of the IRP RI investigation (Versar, 2003). A total of 147 samples were analyzed for SVOCs, pesticides, PCBs, and metals. Parameters detected in near surface soil samples are presented in **Table A-6**.

SVOCs. A total of 23 SVOCs were detected in near surface soil samples from Landfill 12 (FTMM-12). Of these 23 SVOCs, five were detected at concentrations exceeding the soil ESC in at least one sample. Benzo(*a*)anthracene was detected in four samples at concentrations exceeding the 5.21 mg/kg ESC. Chrysene was detected in four samples at concentrations exceeding the 4.73 mg/kg ESC. Benzo(*a*)pyrene and naphthalene were detected in several samples at concentrations exceeding the ESC of 1.52 and 0.0994 mg/kg, respectively. Bis(2-ethylhexyl) phthalate was detected in one sample at a concentration greater than the 0.925 mg/kg ESC. As noted elsewhere, bis(2-ethylhexyl) phthalate is commonly found in field and laboratory QC samples; therefore, it is not considered a COPEC. Benzo(*a*)anthracene, benzo(*a*)pyrene, naphthalene, and chrysene are considered COPECs in soil at Landfill 12 (FTMM-12).

Pesticides. Six pesticides were detected in near surface soil samples from Landfill 12 (FTMM-12). Four of these pesticides were detected at concentrations exceeding the soil ESC in at least one sample. 4,4′-DDT was detected in most of the 147 samples and the majority of these samples had concentrations that were greater than the 0.0035 mg/kg ESC. 4,4′-DDD, 4,4′-DDE, and dieldrin were detected in a few samples each at concentrations that exceeded the ESC. 4,4′-DDD, 4,4′-DDE, 4,4′-DDT, and dieldrin are considered COPECs at Landfill 12 (FTMM-12).

PCBs. No PCBs were detected in near surface soil samples from Landfill 12 (FTMM-12). PCBs are not considered COPECs in soil at Landfill 12 (FTMM-12).

Metals. A total of 23 metals were detected in near surface soil samples from Landfill 12 (FTMM-12) of which most metals were detected in the majority of the samples. Thallium and silver were detected infrequently, being detected in only one and 11 samples, respectively. Antimony and selenium were detected in less than half the samples. Fourteen metals (aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, selenium, vanadium, and zinc) were detected at concentrations exceeding the soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Landfill 12 (FTMM-12). Antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, selenium, vanadium, and zinc are considered COPECs in soil at Landfill 12 (FTMM-12).

3.4.2.6.2 COPECs for Groundwater at Landfill 12 (FTMM-12)

Eleven monitoring wells at Landfill 12 (FTMM-12) have been monitored for metals during the 2008-2009 time period. Husky Brook could receive groundwater discharge from Landfill 12 (FTMM-12). Husky Brook, in the vicinity of Landfill 12 (FTMM-12), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-6**.

Metals. A total of 11 metals were detected in groundwater samples from Landfill 12 (FTMM-12) during the 2008-2009 time period. Of these 11, five were detected at concentrations that exceeded the saltwater ESC in at least one sample. Arsenic, cadmium, copper, nickel, and selenium were detected at concentrations exceeding the saltwater ESC. Arsenic, cadmium, copper, nickel, and selenium are considered COPECs in groundwater at Landfill 12 (FTMM-12).

3.4.2.6.3 COPECs for Surface Water at Landfill 12 (FTMM-12)

Five surface water samples (including a duplicate sample) were collected from Husky Brook in relation to Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14) as part of the 2010 BEE. One surface water sample was collected at the western end of Landfill 12 near a storm water outfall and drainage from Malterer Avenue and surrounding areas. One sample was collected near the confluence with the small

tributary to Husky Brook and a sample related to Parcel 61 (**Section 3.4.2.15**) was collected at the southern end of this tributary near storm water outfalls from the areas to the south. One sample was collected in Husky Brook downstream of all storm water outfalls in the vicinity of Landfill 12 and Landfill 14 (**Appendix K**), and the other sample was collected in Oceanport Creek downstream of both Landfill 12 and Landfill 14. The evaluation of surface water samples is discussed in **Section 3.4.1.6** with respect to Landfill 14 (FTMM-14).

3.4.2.6.4 COPECs for Sediment at Landfill 12 (FTMM-12)

Thirteen sediment samples were collected from Husky Brook in relation to Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14) as part of the 2010 BEE. Sediment sample locations were based on previous sediment sampling conducted for the RI and were located in the field based on depositional characteristics and potential contaminant migration pathways and included storm water outfalls (**Appendix K**) into Husky Brook in the vicinity of Landfill 12 and Landfill 14 from the surrounding areas including Building 1075 and Parcel 61 (**Section 3.4.2.15**). The evaluation of sediment samples is discussed in **Section 3.4.1.6** with respect to Landfill 14 (FTMM-14).

3.4.2.6.5 Summary of COPECs for Landfill 12 (FTMM-12)

Parameters detected in soil, groundwater, surface water, or sediment at Landfill 12 (FTMM-12) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Landfill 12 (FTMM-12), its MDLs were greater than the saltwater ESC. Given that copper is considered a COPEC in soil, groundwater, and sediment, it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Landfill 12 (FTMM-12) are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	Not Applicable	None	None
Pesticides			
4,4′-DDD 4,4′-DDE 4,4′-DDT Dieldrin	Not Applicable	None	4,4′-DDD 4,4′-DDE 4,4′-DDT
PCBs			
None	Not Applicable	None	Aroclor 1254
SVOCs			
Benzo(*a*)anthracene Benzo(*a*)pyrene Chrysene Naphthalene	Not Applicable	None	Acenaphthene Anthracene Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*g,h,i*)perylene Benzo(*k*)fluoranthene Chrysene Fluorene Fluoranthene Indeno(1,2,3-*cd*)pyrene Phenanthrene Pyrene
Metals			
Antimony Arsenic Barium Cadmium Chromium Cobalt Copper Lead Manganese	Arsenic Cadmium Copper Nickel Selenium	None	Arsenic Barium Cadmium Chromium Cobalt Copper Lead Nickel Selenium

Soil	Groundwater	Surface Water	Sediment
Mercury Selenium Vanadium Zinc			Silver Vanadium Zinc
Possible COPECs			
		Copper	

3.4.2.7 LANDFILL 14 (FTMM-14)

Near surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Landfill 14 (FTMM-14).

3.4.2.7.1 COPECs for Soil at Landfill 14 (FTMM-14)

Near surface (6-12 inches bgs) soil samples were collected from Landfill 14 (FTMM-14) as part of the IRP RI investigation (Versar, 2004e). A total of 119 samples were analyzed for SVOCs, pesticides, PCBs, and metals. Parameters detected in near surface soil samples are presented in **Table A-7**.

SVOCs. A total of 21 SVOCs were detected in near surface soil samples from Landfill 14 (FTMM-14). Of these 21 SVOCs, five were detected at concentrations exceeding the soil ESC in at least one sample. Phenanthrene was detected in one sample at a concentration above the ESC of 45.7 mg/kg. Naphthalene was detected in six samples at concentrations that were greater than the 0.0994 mg/kg ESC. Benzo(*a*)anthracene and chrysene were detected at concentrations exceeding the soil ESC in the same two samples. Benzo(*a*)pyrene was detected in five samples at concentrations exceeding the 1.52 mg/kg ESC. The highest concentrations of these PAHs were detected in the same soil sample. Benzo(*a*)pyrene, benzo(*a*)anthracene, chrysene, naphthalene, and phenanthrene are considered COPECs in soil at Landfill 14 (FTMM-14).

Pesticides. Six pesticides were detected in near surface soil samples from Landfill 14 (FTMM-14). Four of these pesticides were detected at concentrations exceeding the soil ESC in at least one sample. 4,4′-DDT was detected in most of the 116 samples and the majority of these had concentrations that were greater than the 0.0035 mg/kg ESC. 4,4′-DDD was detected in one sample at a concentration that exceeded the 0.758 mg/kg ESC. 4,4′-DDE was detected in two samples at concentrations that were greater than the 0.596 mg/kg ESC. Dieldrin was detected in one sample at a concentration that exceeded the 0.049 mg/kg ESC. 4,4′-DDD, 4,4′-DDE, 4,4′-DDT, and dieldrin are considered COPECs at Landfill 14 (FTMM-14).

PCBs. No PCBs were detected in near surface soil samples from Landfill 14 (FTMM-14). PCBs are not considered COPECs in soil at Landfill 14 (FTMM-14).

Metals. A total of 22 metals were detected in near surface soil samples from Landfill 14 (FTMM-14) of which most metals were detected in the majority of the samples. Silver was detected infrequently, being detected in only two samples. Thirteen metals (aluminum, antimony, arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, vanadium, and zinc) were detected at concentrations exceeding the soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Landfill 14 (FTMM-14). Antimony, arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, vanadium, and zinc are considered COPECs in soil at Landfill 14 (FTMM-14).

3.4.2.7.2 COPECs for Groundwater at Landfill 14 (FTMM-14)

Monitoring for VOCs and metals have occurred at six groundwater monitoring wells at Landfill 14 (FTMM-14) during the 2008-2009 time period. Sampling for SVOCs was discontinued after the August 2004 sampling event per NJDEP approval letter dated November 2004. SVOCs are not considered COPECs in groundwater at Landfill 14 (FTMM-14). Husky Brook could receive groundwater discharge from Landfill 14 (FTMM-14). Husky Brook, in the vicinity of Landfill 14 (FTMM-14), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-7**.

VOCs. A total of three VOCs were detected in groundwater samples from Landfill 14 (FTMM-14) during the 2008-2009 time period. None of these were detected in concentrations that exceeded the available saltwater ESC. VOCs are not considered COPECs in groundwater at Landfill 14 (FTMM-14).

Metals. A total of 11 metals were detected in groundwater samples from Landfill 14 (FTMM-14) during the 2008-2009 time period. Of these 11, five were detected at concentrations that exceeded the saltwater ESC in at least one sample. Arsenic, cadmium, copper, nickel, and selenium were detected at concentrations exceeding the saltwater ESC. Arsenic, cadmium, copper, nickel, and selenium are considered COPECs in groundwater at Landfill 14 (FTMM-14).

3.4.2.7.3 COPECs for Surface Water at Landfill 14 (FTMM-14)

Five surface water samples (including a duplicate sample) were collected from Husky Brook in relation to Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14) as part of the 2010 BEE. One surface water sample was collected at the western end of Landfill 14 near a storm water outfall and drainage from Malterer Avenue and surrounding areas. One sample was collected near the confluence with the small tributary to Husky Brook and a sample related to Parcel 61 (**Section 3.4.2.15**) was collected at the southern end of this tributary near storm water outfalls from the areas to the south (**Appendix K**). One sample was collected in Husky Brook downstream of all storm water outfalls in the vicinity of Landfill 12 and Landfill 14, and the other sample was collected in Oceanport Creek downstream of both Landfill 12 and Landfill 14. Husky Brook, in the vicinity of Landfill 12 (FTMM-12), is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-17**.

PCBs. No PCBs were detected in surface water samples at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14). PCBs are not considered COPECs in surface water at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

Pesticides. No pesticides were detected in surface water samples at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14). Pesticides are not considered COPECs in surface water at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

VOCs. Two VOCs, chloroform and *cis*-1,2-dichloroethene, were detected in surface water samples but none were detected at concentrations exceeding the available saltwater ESC. VOCs are not considered COPECs in surface water at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

SVOCs. Five SVOCs [anthracene, benzo(*a*)anthracene, benzo(a)pyrene, 3,3′-dichlorobenzidine, and 1,2,4-trichlorobenzene] were detected in surface water samples. There are no saltwater ESC for the detected SVOCs. SVOCs are not considered COPECs in surface water at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

Metals. A total of 14 metals were detected in surface water samples at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14). None of these were detected at concentrations exceeding the saltwater ESC. Metals are not considered COPECs in surface water at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

3.4.2.7.4 COPECs for Sediment at Landfill 14 (FTMM-14)

Thirteen sediment samples were collected from Husky Brook in relation to Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14) as part of the 2010 BEE. Husky Brook, in the vicinity of Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14), is classified as saline estuarine (**Section 2.4.3**). Sediment sample locations were based on previous sediment sampling conducted for the RI and were located in the field based on depositional characteristics and potential contaminant migration pathways and included storm water outfalls (**Appendix K**) into Husky Brook in the vicinity of Landfill 12 and Landfill 14 from the surrounding areas including Building 1075 and Parcel 61 (**Section 3.4.2.15**). Parameters detected in sediment samples are presented in **Table D-18**.

VOCs. A total of four VOCs were detected in sediment samples at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14). None were detected at concentrations exceeding the available saltwater sediment ESC. VOCs are not considered COPECs in sediment at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

PCBs. One PCB mixture (Aroclor 1254) was detected in one sediment sample at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14). Aroclor 1254 was detected at a concentration greater than the

saltwater sediment ESC in one sample (0.23 mg/kg). Aroclor 1254 is considered a COPEC in sediment at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

Pesticides. Four pesticides (alpha-chlordane, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) were detected in 4 to 10 sediment samples each at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14). alpha-Chlordane concentrations did not exceed the saltwater sediment ESC. Nine samples had 4,4'-DDD concentrations (0.0031 to 0.0091 mg/kg) greater than the saltwater sediment ESC (0.002 mg/kg). Seven samples had 4,4'-DDE concentrations (0.0025 to 0.0071 mg/kg) greater than the saltwater sediment ESC (0.0022 mg/kg). Four samples had 4,4'-DDT concentrations (0.0014 to 0.013 mg/kg) greater than the saltwater sediment ESC (0.001 mg/kg). Therefore, 4,4′-DDD, 4,4′-DDE, and 4,4′-DDT are considered COPECs in sediment at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

SVOCs. A total of 15 SVOCs were detected in surface sediment samples at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14). Bis(2-ethylhexyl) phthalate was detected in one sediment sample; the concentration (0.84 mg/kg) was greater than the saltwater sediment ESC (0.18216 mg/kg). As noted previously, bis(2-ethylhexyl) phthalate is commonly found in field and laboratory QC samples and is not considered a COPEC in sediment at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14). Twelve PAHs were detected at concentrations exceeding the saltwater ESC in one to six samples each. These 12 PAHs, acenaphthene, anthracene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*g,h,i*)perylene, benzo(*k*)fluoranthene, chrysene, fluoranthene, fluorene, indeno(1,2,3-*cd*)pyrene, phenanthrene, and pyrene, are considered COPECs in sediment at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

Metals. Of the 22 metals detected in sediment at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14), 12 were detected in at least one sample at concentrations greater than the saltwater sediment ESC. Barium in one sample (54.0 mg/kg), selenium in 10 samples (1.04 to 5.99 mg/kg), and vanadium in one sample (61.1 mg/kg) exceeded the saltwater sediment ESC of 48, 1, and 57 mg/kg, respectively. One sample had a concentration of cobalt (13.7 mg/kg) greater than the saltwater sediment ESC (10 mg/kg). Concentrations of the other seven metals (arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc) exceeded saltwater ESC in one or two samples each. Arsenic, barium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, silver, vanadium, and zinc are considered COPECs in sediment at Landfill 12 (FTMM-12) and Landfill 14 (FTMM-14).

3.4.2.7.5 Summary of COPECs for Landfill 14 (FTMM-14)

Parameters detected in soil, groundwater, surface water, or sediment at Landfill 14 (FTMM-14) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Landfill 14 (FTMM-14), its MDLs were greater than the saltwater ESC. Given that copper is considered a COPEC in soil, groundwater, and sediment, it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Landfill 14 (FTMM-14) are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
4,4′-DDD 4,4′-DDE 4,4′-DDT Dieldrin	Not Applicable	None	4,4′-DDD 4,4′-DDE 4,4′-DDT
PCBs			
None	Not Applicable	None	Aroclor 1254
SVOCs			
Benzo(*a*)anthracene Benzo(*a*)pyrene Chrysene Naphthalene Phenanthrene	None	None	Acenaphthene Anthracene Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*g,h,*i)perylene Benzo(*k*)fluoranthene

Soil	Groundwater	Surface Water	Sediment
			Chrysene Fluoranthene Fluorene Indeno(1,2,3-*cd*)pyrene Phenanthrene Pyrene
Metals			
Antimony Arsenic Cadmium Chromium Copper Lead Manganese Mercury Nickel Selenium Vanadium Zinc	Arsenic Cadmium Copper Nickel Selenium	None	Arsenic Barium Cadmium Chromium Cobalt Copper Lead Nickel Selenium Silver Vanadium Zinc
Possible COPECs			
		Copper	

3.4.2.8 WATER TANK (FTMM-15)

Surface water and sediment analytical data were evaluated for the identification of COPECs related to the water tank at Site FTMM-15.

3.4.2.8.1 COPECs for Surface Water at Site FTMM-15

Three surface water samples were collected from Parkers Creek in relation to Site FTMM-15 as part of the 2010 BEE. Parkers Creek could receive groundwater discharge from Site FTMM-15. Parkers Creek, in the vicinity of Site FTMM-15, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-19**.

VOCs. No VOCs were detected in surface water samples at Site FTMM-15. VOCs are not considered COPECs in surface water at Site FTMM-15.

Pesticides. No pesticides were detected in surface water samples at Site FTMM-15. Pesticides are not considered COPECs in surface water at Site FTMM-15.

PCBs. No PCBs were detected in surface water samples at Site FTMM-15. PCBs are not considered COPECs in surface water at Site FTMM-15.

SVOCs. Two SVOCs [anthracene and benzo(*a*)anthracene] were detected in surface water samples. There are no available saltwater ESC for the detected SVOCs. PAHs are not considered COPECs in surface water at Site FTMM-15.

Metals. A total of 15 metals were detected in surface water samples at Site FTMM-15. None of these metals were detected at concentrations exceeding the applicable saltwater ESC. Metals are not considered COPECs for surface water at Site FTMM-15.

3.4.2.8.2 COPECs for Sediment at Site FTMM-15

Four sediment samples were collected from Parkers Creek adjacent to Site FTMM-15 as part of the 2010 BEE. Parkers Creek, in the vicinity of Site FTMM-15, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table D-20**.

VOCs. A total of five VOCs were detected in sediment samples at Site FTMM-15. None were detected at concentrations exceeding the available saltwater sediment ESC. VOCs are not considered COPECs in sediment at Site FTMM-15.

PCBs. No PCBs were detected in sediment samples at Site FTMM-15. PCBs are not considered COPECs in sediment at Site FTMM-15.

Pesticides. One pesticide (4,4'-DDT) was detected in one sediment sample at Site FTMM-15. The detected concentration (0.0041 mg/kg) exceeded the saltwater sediment ESC (0.001 mg/kg). 4,4'-DDT is considered a COPEC in sediment at Site FTMM-15.

SVOCs. A total of six SVOCs were detected in surface sediment samples at Site FTMM-15. None of these were detected at concentrations exceeding the saltwater sediment ESC. SVOCs are not considered COPECs in sediment at Site FTMM-15.

Metals. A total of 23 metals were detected in sediment at Site FTMM-15. Of these 23 metals, nine were detected in at least one sample at concentrations exceeding the applicable saltwater sediment ESC. Chromium was detected in one sample at a concentration (95.5 mg/kg) greater than the ESC (81 mg/kg). Vanadium was detected in one sample at a concentration (83.2 mg/kg) greater than the ESC (57 mg/kg). Lead was detected in two samples at concentrations (59.7 and 108 mg/kg) greater than the ESC (47 mg/kg). Zinc was detected in two samples at concentrations (178 and 262 mg/kg) greater than the ESC (150 mg/kg). Arsenic was detected in three samples at concentrations (10.6 to 14.9 mg/kg) greater than the ESC (8.2 mg/kg). Mercury was detected in three samples at concentrations (0.16 to 0.293 mg/kg) greater than the ESC (0.15 mg/kg). Silver was detected in three samples at concentrations (1.25 to 1.44 mg/kg) greater than the ESC (1 mg/kg). All four samples had cadmium concentrations (1.31 to 2.97 mg/kg) and selenium concentrations (3.79 to 6.98 mg/kg) exceeding the ESC of 1.2 mg/kg for cadmium and 1 mg/kg for selenium. Arsenic, cadmium, chromium, lead, mercury, selenium, silver, vanadium, and zinc are considered COPECs in sediment at Site FTMM-15.

3.4.2.8.3 Summary of COPECs for Site FTMM-15

Parameters detected in soil, groundwater, surface water, or sediment at Site FTMM-15 at concentrations greater than the applicable ESC were identified as COPECs for the site. Copper was not detected in surface water at Site FTMM-15 and its MDLs were greater than the saltwater ESC. However, since copper was not identified as a COPEC in other site media, it is not considered a COPEC in surface water. The COPECs, and possible COPECs, identified for Site FTMM-15 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	Not Applicable	None	None
Pesticides			
Not Applicable	Not Applicable	None	DDT
PCBs			
Not Applicable	Not Applicable	None	None
SVOCs			
Not Applicable	Not Applicable	None	None
Metals			
Not Applicable	Not Applicable	None	Arsenic Cadmium Chromium Lead Mercury Selenium Silver Vanadium Zinc

3.4.2.9 PESTICIDE STORAGE, BUILDING 498 (FTMM-16)

Surface water and sediment analytical data were evaluated for the identification of COPECs related to the Pesticide Storage, Building 498, at Site FTMM-16. No recent groundwater data is available for evaluation at Site FTMM-16.

3.4.2.9.1 COPECs for Surface Water at Site FTMM-16

Three surface water samples were collected from Oceanport Creek in relation to Site FTMM-16 as part of the 2010 BEE. Oceanport Creek, in the vicinity of Site FTMM-16, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-21**.

VOCs. No VOCs were detected in surface water samples at Site FTMM-16. VOCs are not considered COPECs in surface water at Site FTMM-16.

SVOCs. No SVOCs were detected in surface water samples at Site FTMM-16. SVOCs are not considered COPECs in surface water at Site FTMM-16.

Pesticides. No pesticides were detected in surface water samples at Site FTMM-16. Pesticides are not considered COPECs in surface water at Site FTMM-16.

PCBs. No PCBs were detected in surface water samples at Site FTMM-16. PCBs are not considered COPECs in surface water at Site FTMM-16.

Metals. A total of 14 metals were detected in surface water samples at Site FTMM-16. Metals are not considered COPECs for surface water at Site FTMM-16.

3.4.2.9.2 COPECs for Sediment at Site FTMM-16

Five sediment samples (including one duplicate sample) were collected from Oceanport Creek adjacent to Site FTMM-16 as part of the 2010 BEE. Oceanport Creek, in the vicinity of Site FTMM-16, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table D-22**.

VOCs. A total of six VOCs were detected in sediment samples at Site FTMM-16. None were detected at concentrations exceeding the available saltwater sediment ESC. VOCs are not considered COPECs in sediment at Site FTMM-16.

PCBs. No PCBs were detected in sediment samples at Site FTMM-16. PCBs are not considered COPECs in sediment at Site FTMM-16.

Pesticides. One pesticide (4,4'-DDD) was detected in one sediment sample at Site FTMM-16. The detected concentration (0.0014 mg/kg) was not above the saltwater sediment ESC (0.002 mg/kg); 4,4'-DDD is not considered a COPEC in sediment at Site FTMM-16.

SVOCs. A total of seven SVOCs were detected in surface sediment samples at Site FTMM-16. Only one, hexachlorobutadiene, was detected in one sample at a concentration (0.008 mg/kg) greater than the saltwater sediment ESC (0.0013 mg/kg). Hexachlorobutadiene is considered a COPEC in sediment at Site FTMM-16.

Metals. A total of 23 metals were detected in sediment at Site FTMM-16. Of these 23 metals, 12 were detected in three or four samples each at concentrations exceeding the applicable saltwater sediment ESC. Arsenic was detected in four samples at concentrations (15.1 to 24.5 mg/kg) greater than the ESC (8.2 mg/kg). Cadmium was detected in four samples at concentrations (9.71 to 12.3 mg/kg) greater than the ESC (1.2 mg/kg). Chromium was detected in four samples at concentrations (117 to 144 mg/kg) greater than the ESC (81 mg/kg). Cobalt was detected in three samples at concentrations (12.5 to 13.6 mg/kg) greater than the ESC (10 mg/kg). Copper was detected in four samples at concentrations (42.3 to 124 mg/kg) greater than the ESC (34 mg/kg). Lead was detected in four samples at concentrations (74.5 to 212 mg/kg) greater than the ESC (47 mg/kg). Mercury was detected in three samples at concentrations (0.451 to 0.502 mg/kg) greater than the ESC (0.15 mg/kg). Nickel was detected in three samples at concentrations (30.7 to 35.2 mg/kg) greater than the ESC (21 mg/kg). Selenium was detected in four samples at concentrations (5.32 to 11.0 mg/kg) greater than the ESC (1 mg/kg). Silver was detected in four samples at concentrations (3.78 to 6.44 mg/kg) greater than the ESC (1 mg/kg). Vanadium was detected in three samples at concentrations (81.9 to 106 mg/kg) greater than the ESC (57 mg/kg). Zinc was detected in four samples at concentrations (160 to 500 mg/kg) greater than the ESC (150 mg/kg). Arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc are considered COPECs in sediment at Site FTMM-16.

3.4.2.9.3 Summary of COPECs for Site M-16

Parameters detected in soil, groundwater, surface water, or sediment at Site FTMM-15 at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Site FTMM-16, its MDLs were greater than the saltwater ESC. Given that copper was identified as a COPEC in sediment, it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Site FTMM-16 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	Not Applicable	None	None
Pesticides			
Not Applicable	Not Applicable	None	None
PCBs			
Not Applicable	Not Applicable	None	None
SVOCs			
Not Applicable	Not Applicable	None	Hexachlorobutadiene
Metals			
Not Applicable	Not Applicable	None	Arsenic Cadmium Chromium Cobalt Copper Lead Mercury Nickel Selenium Silver Vanadium Zinc
Possible COPECs			
		Copper	

3.4.2.10 FORMER TRAINING AREA/LANDFILL (FTMM-18)

Near surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Site FTMM-18.

3.4.2.10.1 COPECs for Soil at Site FTMM-18

Near surface (6-12 inches bgs) soil samples were collected from Site FTMM-18 as part of the IRP RI investigation (Versar, 2004f). A total of 62 samples were analyzed for SVOCs, pesticides, PCBs, and metals. Parameters detected in near surface soil samples are presented in **Table A-8**.

SVOCs. A total of 22 SVOCs were detected in near surface soil samples from Site FTMM-18. Of these 22 SVOCs, two were detected at concentrations exceeding the soil ESC: benzo(a)pyrene was detected in two samples at concentrations exceeding the 1.52 mg/kg ESC and naphthalene was detected in five samples at concentrations exceeding the 0.0994 mg/kg ESC. Benzo(a)pyrene and naphthalene are considered COPECs in soil at Site FTMM-18.

Pesticides. Nine pesticides were detected in near surface soil samples from Site FTMM-18. Two of these pesticides was detected at concentrations exceeding the soil ESC in at least one sample. 4,4′-DDT was detected in several samples at concentrations that were greater than the 0.0035 mg/kg ESC and endrin aldehyde were detected in a sample at concentrations exceeding the ESC. 4,4′-DDT and endrin aldehyde are considered COPECs at Site FTMM-18.

PCBs. No PCBs were detected in near surface soil samples from Site FTMM-18. PCBs are not considered COPECs in soil at Site FTMM-18.

Metals. A total of 22 metals were detected in near surface soil samples from Site FTMM-18 of which most metals were detected in the majority of the samples. Silver was detected infrequently, being detected in only five samples. Twelve metals (aluminum, antimony, arsenic, cadmium, chromium, copper, lead, mercury, selenium, silver, vanadium, and zinc) were detected at concentrations exceeding the soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Site FTMM-18. Antimony, arsenic, cadmium, chromium, copper, lead, mercury, selenium, silver, vanadium, and zinc are considered COPECs in soil at Site FTMM-18.

3.4.2.10.2 COPECs for Groundwater at Site FTMM-18

Monitoring for VOCs and metals have occurred at three groundwater monitoring wells at Site FTMM-18 during the 2008-2009 time period. Sampling for SVOCs, pesticides, and PCBs was discontinued after the November 2004 sampling event per NJDEP approval letter dated November 2004. SVOCs, pesticides, and PCBs are not considered COPECs in groundwater at Site FTMM-18. Parkers Creek could receive groundwater discharge from Site FTMM-18. Parkers Creek, in the vicinity of Site FTMM-18, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-8**.

VOCs. One VOC, acetone, was detected in groundwater samples from Site FTMM-18 during the 2008-2009 time period. There are no freshwater or saltwater ESC available for acetone. VOCs are not considered COPECs in groundwater at Site FTMM-18.

Metals. A total of 12 metals were detected in groundwater samples from Site FTMM-18 during the 2008-2009 time period. Four of these metals (arsenic, copper, selenium, and cadmium) were detected at concentrations that exceeded the saltwater ESC. Arsenic, cadmium, copper, and selenium are considered COPECs in groundwater at Site FTMM-18.

3.4.2.10.3 COPECs for Surface Water at Site FTMM-18

Two surface water samples were collected from Parkers Creek adjacent to Site FTMM-18 as part of the 2010 BEE. One surface water sample was collected west of Site FTMM-18 between outfalls between Site FTMM-8 and FTMM-18 (**Appendix K**), and the other sample was collected on the western side of Site FTMM-18 downstream of these two outfalls. Additionally, two surface water samples were collected in relation to Building 283 (FTMM-61) and Parcel 49 (**Section 3.4.2.14**) near storm water outfalls at the eastern end of Site FTMM-18 (**Appendix K**). Parkers Creek, in the vicinity of Site FTMM-18, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-23**.

PCBs. No PCBs were detected in surface water samples at Site FTMM-18. PCBs are not considered COPECs in surface water at Site FTMM-18.

Pesticides. No pesticides were detected in surface water samples at Site FTMM-18. Pesticides are not considered COPECs in surface water at Site FTMM-18.

VOCs. No VOCs were detected in surface water samples at Site FTMM-18. VOCs are not considered COPECs in surface water at Site FTMM-18.

SVOCs. No SVOCs were detected in surface water samples at Site FTMM-18. SVOCs are not considered COPECs in surface water at Site FTMM-18.

Metals. A total of 14 metals were detected in surface water samples at Site FTMM-18. None of these metals were detected at concentrations exceeding the applicable saltwater ESC. Metals are not considered COPECs in surface water at Site FTMM-18.

3.4.2.10.4 COPECs for Sediment at Site FTMM-18

Five sediment samples were collected from Parkers Creek adjacent to Site FTMM-18 as part of the 2010 BEE. Sediment sample locations were based on previous sediment sampling conducted for the RI and were located in the field based on depositional characteristics and potential contaminant migration pathways and included storm water outfalls (**Appendix K**) into Parkers Creek in the vicinity of Site FTMM-18 from the surrounding areas including Buildings 291 to 296 and Building 283 (FTMM-61) in

Parcel 49 (**Section 3.4.2.14**). Parkers Creek, in the vicinity of Site FTMM-18, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table D-24**.

PCBs. No PCBs were detected in sediment samples at Site FTMM-18. PCBs are not considered COPECs at Site FTMM-18.

Pesticides. No pesticides were detected in sediment samples at Site FTMM-18. Pesticides are not considered COPECs at Site FTMM-18.

VOCs. A total of three VOCs were detected in sediment samples at Site FTMM-18. None were detected at concentrations exceeding the available saltwater sediment ESC. VOCs are not considered COPECs in sediment at Site FTMM-18.

SVOCs. Four SVOCs were detected in surface sediment samples at Site FTMM-18. None of the detected SVOCs exceeded the available saltwater sediment ESC. SVOCs are not considered COPECs in sediment at Site FTMM-18.

Metals. Of the 23 metals detected in sediment at Site FTMM-18, 12 were detected in at least one sediment sample each at concentrations exceeding the applicable saltwater sediment ESC. Arsenic was detected in two samples at concentrations (11.9 and 22.8 mg/kg) greater than the ESC (8.2 mg/kg). Cadmium was detected in four samples at concentrations (3.38 to 5.65 mg/kg) greater than the ESC (1.2 mg/kg). Chromium was detected in three samples at concentrations (84.6 to 132 mg/kg) greater than the ESC (81 mg/kg). Cobalt was detected in two samples at concentrations (11.6 and 56 mg/kg) greater than the ESC (10 mg/kg). Copper was detected in one sample at a concentration (82.9 mg/kg) greater than the ESC (34 mg/kg). Lead was detected in two samples at concentrations (67.7 and 166 mg/kg) greater than the ESC (47 mg/kg). Mercury was detected in three samples at concentrations (0.591 to 0.669 mg/kg) greater than the ESC (0.15 mg/kg). Nickel was detected in two samples at concentrations (22.3 to 45.1 mg/kg) greater than the ESC (21 mg/kg). Selenium was detected in five samples at concentrations (2.47 to 12.3 mg/kg) greater than the ESC (1 mg/kg). Silver was detected in two samples at concentrations (26.1 to 27.9 mg/kg) greater than the ESC (1 mg/kg). Vanadium was detected in one sample at a concentration (63 mg/kg) which exceeds the ESC (57 mg/kg). Zinc was detected in three samples at concentrations (187 to 358 mg/kg) greater than the ESC (150 mg/kg). Arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc are considered COPECs in sediment at Site FTMM-18.

3.4.2.10.5 Summary of COPECs for Site FTMM-18

Parameters detected in soil, groundwater, surface water, or sediment at Site FTMM-18 at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Site FTMM-18, its MDLs were greater than the saltwater ESC. Given that copper was identified as a COPEC in soil, groundwater, and sediment, it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Site FTMM-18 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
4,4′-DDT Endrin aldehyde	None	None	None
PCBs			
None	None	None	None
SVOCs			
Benzo(a)pyrene Naphthalene	None	None	None
Metals			
Antimony Arsenic Cadmium Chromium	Arsenic Cadmium Copper Selenium	None	Arsenic Cadmium Chromium Cobalt

Soil	Groundwater	Surface Water	Sediment
Copper Lead Mercury Selenium Silver Vanadium Zinc			Copper Lead Mercury Nickel Selenium Silver Vanadium Zinc
Possible COPECs			
		Copper	

3.4.2.11 PRE-1941 FORMER SANITARY SEWAGE TREATMENT PLANT, FTMM-20

Surface water and sediment analytical data were evaluated for the identification of COPECs related to the Pre-1941 Former Sanitary STP, Site FTMM-20.

3.4.2.11.1 COPECs for Surface Water at the Pre-1941 Former Sanitary STP FTMM-20

Two surface water samples were collected from Parkers Creek adjacent to Site FTMM-20 as part of the 2010 BEE. Parkers Creek, in the vicinity of Site FTMM-20, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-25**.

PCBs. No PCBs were detected in surface water samples at Site FTMM-20. PCBs are not considered COPECs in surface water at Site FTMM-20.

Pesticides. No pesticides were detected in surface water samples at Site FTMM-20. Pesticides are not considered COPECs in surface water at Site FTMM-20.

VOCs. No VOCs were detected in surface water samples at Site FTMM-20. VOCs are not considered COPECs in surface water at Site FTMM-20.

SVOCs. One SVOC, dimethyl phthalate was detected in the surface water samples at Site FTMM-20. There are no surface water ESC for dimethyl phthalate. SVOCs are not considered COPECs in surface water at Site FTMM-20.

Metals. A total of 14 metals were detected in surface water samples at Site FTMM-20. Parkers Creek, in the vicinity of Site FTMM-20, is saline. None of these metals were detected at concentrations exceeding the applicable saltwater ESC. Metals are not considered COPECs for surface water at Site FTMM-20.

3.4.2.11.2 COPECs for Sediment at the Pre-1941 Former Sanitary STP FTMM-20

Two sediment samples were collected from Parkers Creek adjacent to Site FTMM-20 as part of the 2010 BEE. Parkers Creek, in the vicinity of Site FTMM-20, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table D-26**.

PCBs. No PCBs were detected in sediment samples at Site FTMM-20. PCBs are not considered COPECs at Site FTMM-20.

Pesticides. No pesticides were detected in sediment samples at Site FTMM-20. Pesticides are not considered COPECs at Site FTMM-20.

VOCs. A total of two VOCs were detected in sediment samples at Site FTMM-20. None were detected at concentrations exceeding the available saltwater sediment ESC. VOCs are not considered COPECs in sediment at Site FTMM-20.

SVOCs. Four SVOCs were detected in surface sediment samples at Site FTMM-20. None of the detected SVOCs exceeded the available saltwater sediment ESC. SVOCs are not considered COPECs in sediment at Site FTMM-20.

Metals. Of the 23 metals detected in sediment at Site FTMM-20, 12 were detected in at least one sediment sample each at concentrations exceeding the applicable saltwater sediment ESC. Arsenic

was detected in both samples at concentrations (9.36 and 23.8 mg/kg) greater than the ESC (8.2 mg/kg). Cadmium was detected in both samples at concentrations (1.31 to 2.87 mg/kg) greater than the ESC (1.2 mg/kg). Chromium was detected in one sample at a concentration (99.4 mg/kg) greater than the ESC (81 mg/kg). Cobalt was detected in one sample at a concentration (11.4 mg/kg) greater than the ESC (10 mg/kg). Copper was detected in one sample at a concentration (71.2 mg/kg) greater than the ESC (34 mg/kg). Lead was detected in one sample at a concentration (59.4 mg/kg) greater than the ESC (47 mg/kg). Mercury was detected in one sample at a concentration (0.322 mg/kg) greater than the ESC (0.15 mg/kg). Nickel was detected in one sample at a concentration (21.6 mg/kg) marginally greater than the ESC (21 mg/kg). Selenium was detected in both samples at concentrations (4.04 and 6.86 mg/kg) greater than the ESC (1 mg/kg). Silver was detected in both samples at concentrations (1.35 and 8.07 mg/kg) greater than the ESC (1 mg/kg). Vanadium was detected in one sample at a concentration (60.9 mg/kg) greater than the ESC (57 mg/kg). Zinc was detected in one sample at a concentration (184 mg/kg) greater than the ESC (150 mg/kg). Though Parkers Creek is tidal in the vicinity of Site M-20, the greatest concentrations of these metals were detected in the upstream sample and the lower concentrations were detected in the downstream sample. Arsenic, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc are considered COPECs in sediment at Site FTMM-20.

3.4.2.11.3 Summary of COPECs for Site FTMM-20

Parameters detected in soil, groundwater, surface water, or sediment at Site FTMM-20 at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Site FTMM-20, its MDLs were greater than the saltwater ESC. Given that copper was identified as a COPEC in sediment, it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Site FTMM-20 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	Not Applicable	None	None
Pesticides			
Not Applicable	Not Applicable	None	None
PCBs			
Not Applicable	Not Applicable	None	None
SVOCs			
Not Applicable	Not Applicable	None	None
Metals			
Not Applicable	Not Applicable	None	Arsenic Cadmium Chromium Cobalt Copper Lead Mercury Nickel Selenium Silver Vanadium Zinc
Possible COPECs			
		Copper	

3.4.2.12 BUILDING 1122, FTMM-59 (ECP PARCEL 43)

Groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Building 1122, ECP Parcel 43.

3.4.2.12.1 COPECs for Groundwater at Building 1122, FTMM-59 (ECP Parcel 43)

Five groundwater monitoring wells were monitoring for VOCs during the 2008-2009 time period. Sampling for SVOCs, pesticides, PCBs, and metals was discontinued after the October 2004 sampling event per NJDEP approval letter dated November 2004. SVOCs, pesticides, PCBs, and metals are not considered COPECs in groundwater at Building 1122, FTMM-59 and Parcel 43. Mill Creek could receive groundwater discharge at Building 1122, Site FTMM-59 and Parcel 43. Mill Creek, in the vicinity of Building 1122, is classified as freshwater (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-9**.

VOCs. Six VOCs were detected in groundwater samples during the 20008-2009 period. None of the detected VOCs were at concentrations greater than the applicable freshwater ESC. VOCs are not considered COPECs for groundwater at Building 1122, FTMM-59 and Parcel 43.

3.4.2.12.2 COPECs for Surface Water at Building 1122, FTMM-59 (ECP Parcel 43)

Two surface water samples were collected from Mill Creek adjacent to Building 1122, FTMM-59 and Parcel 43 as part of the 2010 BEE. One surface water sample was collected in Mill Creek to the east of Building 1122 at a storm water outfall, and the other sample was collected in Mill Creek at a point closest to Building 1122. Mill Creek, in the vicinity of Building 1122, FTMM-59 and Parcel 43, is classified as freshwater (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-27**.

PCBs. No PCBs were detected in surface water samples at Building 1122, FTMM-59 and Parcel 43. PCBs are not considered COPECs in surface at Building 1122, FTMM-59 and Parcel 43.

VOCs. Two VOCs (*cis*-1,2-dichloroethene and PCE) were detected in surface water samples at Building 1122, FTMM-59 and Parcel 43 but at concentrations less than the freshwater ESC. VOCs are not considered COPECs in surface at Building 1122, FTMM-59 and Parcel 43.

SVOCs. Six SVOCs, anthracene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzoic acid, 3,3′-dichlorobenzidine, and 1,2,4-trichlorobenzene, were detected in the surface water samples at Building 1122, FTMM-59 and Parcel 43. Anthracene, benzo(a)pyrene, and benzo(a)anthracene concentrations exceeded the applicable freshwater ESC. Both anthracene concentrations (0.12 µg/L) exceeded the 0.035 µg/L ESC. One benzo(*a*)pyrene concentration (0.31 µg/L) exceeded the 0.014 µg/L ESC. Benzo(*a*)anthracene concentrations (0.23 and 0.24 µg/L) exceeded the 0.025 µg/L ESC. Anthracene, benzo(*a*)pyrene, and benzo(*a*)anthracene are considered COPECs in surface water at Building 1122.

Metals. A total of 12 metals were detected in surface water samples at Building 1122, FTMM-59 and Parcel 43. Only lead was detected at concentrations greater than the applicable freshwater ESC in the surface water samples. Total lead concentrations (6.8 and 7.76 µg/L) and dissolved lead concentrations (7.2 and 11.5 µg/L) exceeded the 5.4 µg/L freshwater ESC. Lead is considered a COPEC for surface water at Building 1122.

3.4.2.12.3 COPECs for Sediment at Building 1122, FTMM-59 (ECP Parcel 43)

Three surface sediment samples were collected from Mill Creek adjacent to Building 1122, FTMM-59 and Parcel 43 as part of the ECP SI (Shaw, 2008). These three sediment sample locations were selected to evaluate historical discharges from Building 1122 based on depositional characteristics and potential contaminant migration pathways and included the storm water outfall to the east of Building 1122 (**Appendix K**) into Mill Creek. Mill Creek, in the vicinity of Building 1122, FTMM-59 and Parcel 43, is classified as freshwater (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table B-1**.

PCBs. No PCBs were detected in sediment samples at Building 1122, FTMM-59 and Parcel 43. PCBs are not considered COPECs at Building 1122, FTMM-59 and Parcel 43.

VOCs. Two VOCs (acetone and methylene chloride) were detected in sediment samples at Building 1122, FTMM-59 and Parcel 43. None were detected at concentrations exceeding the available freshwater sediment ESC. VOCs are not considered COPECs in sediment at Building 1122, FTMM-59 and Parcel 43.

SVOCs. Eleven SVOCs were detected in surface sediment samples at Building 1122, FTMM-59 and Parcel 43. Eight of the detected SVOCs exceeded the available freshwater sediment ESC. Benzo(*a*)anthracene was detected in all three samples and two concentrations (0.510 and 0.610 mg/kg) exceeding the 0.32 mg/kg freshwater sediment ESC. Benzo(*a*)pyrene was detected in all three samples and two concentrations (0.510 and 0.610 mg/kg) exceeding the 0.37 mg/kg freshwater sediment ESC. Benzo(*k*)fluoranthene was detected in all three samples and two concentrations (0.340 and 0.390 mg/kg) exceeding the 0.24 mg/kg freshwater sediment ESC. Chrysene was detected in all three samples and two concentrations (0.86 and 0.88 mg/kg) exceeding the 0.34 mg/kg freshwater sediment ESC. Fluoranthene was detected in all three samples and two concentrations (1.40 and 1.30 mg/kg) exceeding the 0.75 mg/kg freshwater sediment ESC. Phenanthrene was detected in all three samples and one concentration (0.700 mg/kg) exceeded the 0.56 mg/kg freshwater sediment ESC. Pyrene was detected in all three samples and two concentrations (1.60 and 1.40 mg/kg) exceeded the 0.49 mg/kg freshwater sediment ESC. Bis(2-ethylhexyl) phthalate was detected in all three samples at concentrations from 0.440 mg/kg to 1.40 mg/kg. As noted previously, phthalates are common laboratory contaminants and are often found at low concentrations in both field and laboratory QC samples. Bis(2-ethylhexyl) phthalate is not considered a COPEC in surface sediment at Building 1122, FTMM-59 and Parcel 43. Benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*k*)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene are considered COPECs in sediment at Building 1122, FTMM-59 and Parcel 43.

Metals. Of the 18 metals detected in sediment at Building 1122, FTMM-59 and Parcel 43, eight were detected in at least one sediment sample each at concentrations exceeding the applicable freshwater sediment ESC. Arsenic was detected in all three samples and the concentrations (7.48 to 10.2 mg/kg) exceeded the ESC (6 mg/kg). Cadmium was detected in all three samples and two concentrations (1.67 and 1.86 mg/kg) were greater than the ESC (0.6 mg/kg). Chromium was detected in all three samples and the concentrations (155 to 161 mg/kg) exceeded the ESC (26 mg/kg). Copper was detected in all three samples and the concentrations (29.1 to 53.6 mg/kg) were greater than the ESC (16 mg/kg). Lead was detected in all three samples and the concentrations (45.0 to 116 mg/kg) were greater than the ESC (31 mg/kg). Mercury was detected in all three samples and the concentrations (0.25 to 0.47 mg/kg) were greater than the ESC (0.2 mg/kg). Nickel was detected in all three samples and the concentrations (23.7 to 36.4 mg/kg) were greater than the ESC (16 mg/kg). Zinc was detected in all three samples and two concentrations (252 and 286 mg/kg) exceeded the ESC (120 mg/kg). Arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc are considered COPECs in sediment at Building 1122, FTMM-59 and Parcel 43.

3.4.2.12.4 Summary of COPECs for Building 1122, FTMM-59 and Parcel 43

Parameters detected in soil, groundwater, surface water, or sediment at Building 1122, FTMM-59 and Parcel 43 at concentrations greater than the applicable ESC were identified as COPECs for the site. Though cadmium and silver were not detected in surface water at Building 1122, FTMM-59 and Parcel 43, their MDLs were greater than the freshwater ESC. Given that cadmium is considered a COPEC in sediment, it is considered a possible COPEC in surface water. The sediment detection limits for several PAHs [acenaphthene, acenaphthylene, anthracene, dibenzo(*a,h*)anthracene, fluorene, and 2-methylnaphthalene] exceeded the freshwater sediment ESC. Of these, acenaphthene was identified as a COPEC in surface water. Therefore, anthracene is considered a possible COPEC in sediment. The COPECs, and possible COPECs, identified for Building 1122, FTMM-59 and Parcel 43 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
Not Applicable	None	None	Not Applicable
PCBs			
Not Applicable	None	None	None
SVOCs			
Not Applicable	None	Anthracene Benzo(a)anthracene Benzo(a)pyrene	Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*k*)fluoranthene

Soil	Groundwater	Surface Water	Sediment
			Chrysene Fluoranthene Phenanthrene Pyrene
Metals			
Not Applicable	None	Lead	Arsenic Cadmium Chromium Copper Lead Mercury Nickel Zinc
Possible COPECs			
		Cadmium	Anthracene

3.4.2.13 BUILDING 1150 (PARCEL 39)

Surface soil, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Building 1150, ECP Parcel 39.

3.4.2.13.1 COPECs for Soil at Building 1150 (ECP Parcel 39)

One surface soil sample was collected as part of the ECP SI (Shaw, 2008). This sample was located at the outfall of a clay pipe leading from the direction of Building 1150. Parameters detected in the surface soil sample are presented in **Table B-2**.

VOCs. No VOCs were detected in the surface soil sample. VOCs are not considered COPECs at Parcel 39.

PCBs. No PCBs were detected in the surface soil sample. PCBs are not considered COPECs at Parcel 39.

SVOCs. Four SVOCs were detected in the surface soil sample at Parcel 39. No SVOCs were found at concentrations exceeding the soil ESC. SVOCs are not considered COPECs in surface soil at Parcel 69.

Metals. A total of 18 metals were detected in the surface soil sample. Of these 18, eight were found at concentrations exceeding the soil ESC. The concentration of aluminum (7450 mg/kg) was above the 50 mg/kg soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Parcel 39. Cadmium, chromium, cobalt, lead, mercury, vanadium, and zinc are considered COPECs in soil at Parcel 39.

3.4.2.13.2 COPECs for Surface Water at Building 1150 (ECP Parcel 39)

One surface water sample was collected from Mill Creek adjacent to Building 1150 as part of the 2010 BEE; this surface water sample was also adjacent to Landfill 2, which is located south of Building 1150, across Mill Creek from Building 1150, and was collected immediately downstream of a storm water outfall from the area of Building 1150 in Parcel 39. Additionally, another surface water sample was collected downstream of all storm water outfalls from Parcel 39 (**Appendix K**) as part of the Landfill 2 (FTMM-2) sample collections (**Section 3.4.2.1.3**). Mill Creek, in the vicinity of Building 1150, Parcel 39, is classified as freshwater (**Section 2.4.3**). Parameters detected in the surface water sample are presented in **Table D-28**.

PCBs. No PCBs were detected in surface water samples at Building 1150. PCBs are not considered COPECs in surface water at Building 1150.

Pesticides. No pesticides were detected in surface water samples at Building 1150. Pesticides are not considered COPECs in surface water at Building 1150.

SVOCs. Three SVOCs, anthracene, benzo(*a*)anthracene, and 1,2,4-trichlorobenzene, were detected in the surface water samples at Building 1150. Anthracene and benzo(*a*)anthracene concentrations exceeded the applicable freshwater ESC. The anthracene concentration (0.11 µg/L) exceeded the 0.035 µg/L ESC and the benzo(*a*)anthracene concentration (0.22 µg/L) exceeded the 0.025 µg/L ESC. Anthracene and benzo(*a*)anthracene are considered COPECs in surface water at Building 1150.

Metals. A total of 12 metals were detected in surface water samples at Building 1150. Mill Creek, in the vicinity of Building 1150, is freshwater. Only lead was detected greater than the applicable freshwater ESC in the surface water sample. The total lead concentration (6.2 µg/L) and the dissolved lead concentration (10.1 µg/L) exceeded the 5.4 µg/L freshwater ESC. Lead is considered a COPEC for surface water at Building 1150.

3.4.2.13.3 COPECs for Sediment at Building 1150 (ECP Parcel 39)

Two surface sediment samples were collected from Mill Creek adjacent to Building 1150 as part of the ECP SI (Shaw, 2008). These were collected from deposition locations immediately downgradient of the drainage basin located immediately behind Building 1150 (**Appendix K**). Additionally, four sediment samples were collected as part of the 2010 BEE for Landfill 2 are adjacent to Building 1150 (**Section 3.4.2.1.3**). These sediment sample locations were based on previous sediment sampling conducted for the RI for Landfill 2 (FTMM-2) and were located in the field based on depositional characteristics and potential contaminant migration pathways and included storm water outfalls (**Appendix K**) into Mill Creek from the area of Building 1150 and Parcel 39. Mill Creek, in the vicinity of Building 1150, Parcel 39, is classified as freshwater (**Section 2.4.3**). Parameters detected in sediment samples as part of the ECP SI are presented in **Table B-3** and as part of the BEE are presented in **Table D-29**.

PCBs. One PCB mixture, Aroclor 1254, was detected in 2010 BEE sediment samples at Building 1150. Aroclor 1254 was detected in two samples and one concentration (0.064 mg/kg) exceeded the 0.06 mg/kg freshwater ESC. Aroclor 1254 is considered a COPEC at Building 1150.

VOCs. Three VOCs (acetone, methylene chloride, and 2-butanone) were detected in 2010 BEE sediment samples at Building 1150. None were detected at concentrations exceeding the available freshwater or saltwater sediment ESC. VOCs are not considered COPECs in sediment at Building 1150.

SVOCs. Eight SVOCs were detected in surface sediment samples at Building 1150 during the ECP SI and seven of these [benzo(*a*)anthracene, bis(2-ethylhexyl) phthalate, chrysene, di-*n*-butyl phthalate, fluoranthene, phenanthrene, and pyrene] were detected at concentrations exceeding the freshwater sediment ESC. Though 13 SVOCs were detected in surface sediment samples at Building 1150 during the 2010 BEE, only four of these [bis(2-ethylhexyl) phthalate, chrysene, fluoranthene, and pyrene] were detected at concentrations exceeding the freshwater sediment ESC. Concentrations detected during the 2010 BEE were less than those detected during the previous ECP SI. The concentrations of fluoranthene (0.92 mg/kg), chrysene (0.37 mg/kg), pyrene (0.71 mg/kg), and bis(2-ethylhexyl) phthalate (0.28 mg/kg) exceeded the ESC (0.75 mg/kg, 0.34 mg/kg, 0.49 mg/kg, and 0.182 mg/kg, respectively) in the BEE samples. In the SI samples, the concentrations of benzo(*a*)anthracene (0.54 mg/kg), bis(2-ethylhexyl) phthalate (2.1 and 1.3 mg/kg), chrysene (0.37 and 0.71 mg/kg), di-*n*-butyl phthalate (1.9 mg/kg), fluoranthene (0.99 mg/kg), phenanthrene (0.67 mg/kg), and pyrene (1.0 and 2.0 mg/kg) exceeded the ESC of 0.32, 0.182, 0.34, 1.114, 0.75, 0.56, and 0.49 mg/kg, respectively. As noted previously, phthalates are common laboratory contaminants and are often found at low concentrations in both field and laboratory QC samples. Bis(2-ethylhexyl) phthalate and di-*n*-butyl phthalate are not considered COPECs in surface sediment at Building 1150. Benzo(*a*)anthracene, chrysene, fluoranthene, phenanthrene, and pyrene are considered COPECs in sediment at Building 1150.

Metals. During the ECP SI, 18 metals were detected in sediment at Building 1150 and eight of these (arsenic, cadmium chromium, copper, lead, mercury, nickel, and zinc) were detected at concentrations exceeding the freshwater sediment ESC. Though 22 metals were detected in surface sediment samples at Building 1150 during the 2010 BEE, only three of these (arsenic, cadmium, and chromium) were detected at concentrations exceeding the freshwater sediment ESC. Concentrations

detected during the BEE were generally less than those detected during the previous ECP SI. The concentrations of arsenic (8.09 and 8.89 mg/kg), cadmium (0.629 to 2.09 mg/kg), chromium (37.7 to 131 mg/kg), copper (27.7 to 41.0 mg/kg), lead (61.7 mg/kg), mercury (0.67 mg/kg), nickel (32.4 mg/kg), and zinc (210 mg/kg) exceeded the ESC of 6, 0.6, 26, 16, 31, 0.2, 16, and 120 mg/kg, respectively in the BEE or SI samples. Vanadium was detected at concentrations exceeding the saltwater sediment ESC; there are no freshwater ESC for vanadium. Vanadium was identified as a COPEC in surface soil and is considered a COPEC in sediment. Arsenic, cadmium, chromium, copper, lead, mercury, nickel, vanadium, and zinc are considered COPECs in sediment at Building 1150.

3.4.2.13.4 Summary of COPECs for Building 1150

Parameters detected in soil, groundwater, surface water, or sediment at Building 1150 (Parcel 39) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though cadmium and silver were not detected in surface water at Building 1150, their MDLs were greater than the freshwater ESC. Given that cadmium is considered a COPEC in sediment, it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Building 1150 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
None	Not Applicable	None	None
Pesticides			
Not Applicable	Not Applicable	None	None
PCBs			
None	Not Applicable	None	Aroclor 1254
SVOCs			
None	Not Applicable	Anthracene Benzo(*a*)anthracene	Benzo(*a*)anthracene Chrysene Fluoranthene Phenanthrene Pyrene
Metals			
Cadmium Chromium Cobalt Lead Mercury Vanadium Zinc	Not Applicable	Lead	Arsenic Cadmium Chromium Copper Lead Mercury Nickel Vanadium Zinc
Possible COPECs			
		Cadmium	

3.4.2.14 BUILDINGS 283, 288, 291, 293, 295 (FTMM-61 AND ECP PARCEL 49)

Surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Building 283 (FTMM-61) and Buildings 283, 288, 291, 293, and 295 (Parcel 49).

3.4.2.14.1 COPECs for Surface Soil at FTMM-61 and Parcel 49

Ten surface soil samples were collected in relation to FTMM-61 and Parcel 49 as part of the ECP SI (Shaw, 2008). Parameters detected in surface soil samples are presented in **Table B-4**.

PCBs. One PCB mixture, Aroclor 1260, was detected in three of the surface soil samples at FTMM-61 and Parcel 49. Two of the concentrations (0.47 and 8.85 mg/kg) exceeded the soil ESC (0.371 mg/kg). Aroclor 1260 is considered a COPEC in soil at Parcel 49.

SVOCs. Twenty-two SVOCs were detected in surface soil samples in at least one sample each at FTMM-61 and Parcel 49. Ten SVOCs were found at concentrations exceeding the soil ESC; nine of

these SVOCs are PAHs. The highest concentrations of these PAHs were found in one of the soil samples: benzo(*a*)anthracene (80 mg/kg), benzo(*a*)pyrene (54 mg/kg), benzo(*b*)fluoranthene (75 mg/kg), chrysene (79 mg/kg), fluoranthene (190 mg/kg), 2-methylnaphthalene (4.4 mg/kg), naphthalene (11 mg/kg), phenanthrene (170 mg/kg), and pyrene (160 mg/kg). Benzo(*a*)anthracene, benzo(a)pyrene, and chrysene were also detected exceeding the ESC in one or two other surface soil samples, but at much lower concentrations. Butyl benzyl phthalate was also detected in three samples at concentrations (0.52 to 1.8 mg/kg) exceeding the 0.239 mg/kg ESC. As noted previously, phthalates are commonly found in field and laboratory QC samples and are not considered COPECs in sediment at FTMM-61 and Parcel 49. Benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*b*)fluoranthene, chrysene, fluoranthene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene are considered COPECs in surface soil at Parcel 49.

Metals. A total of 19 metals were detected in surface soil samples; 10 (aluminum, arsenic, cadmium, chromium, copper, lead, manganese, mercury, vanadium, and zinc) of which were found at concentrations exceeding the soil ESC. Concentrations of aluminum (7,310 to 21,600 mg/kg) were greater than the 50 mg/kg soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at FTMM-61 and Parcel 49. Arsenic, cadmium, chromium, copper, lead, manganese, mercury, vanadium, and zinc are considered COPECs in soil at FTMM-61 and Parcel 49.

3.4.2.14.2 COPECs for Groundwater at FTMM-61 and Parcel 49

Seven groundwater samples (including one duplicate sample) were collected from two distinct temporary wells and four monitoring wells as part of the ECP SI (Shaw, 2008). One of the temporary wells was located north of Building 283 and the other was located east of former Building 289. The monitoring wells were located along the northern perimeter of the former Squier Complex. Parkers Creek could receive groundwater discharge at FTMM-61 and Parcel 49. Parkers Creek, in the vicinity of FTMM-61 and Parcel 49, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table B-5**.

VOCs. Nine VOCs (acetone, benzene, bromodichloromethane, chloroform, ethylbenzene, methyl ethyl ketone, vinyl chloride, xylenes, and toluene) were detected in groundwater samples but at concentrations less than the ESC. VOCs are not considered COPECs at FTMM-61 and Parcel 49.

SVOCs. Four SVOCs were also detected in groundwater samples. One SVOC [bis(2-ethylhexyl) phthalate] was detected in the groundwater samples at concentrations exceeding the ESC. As noted previously, bis(2-ethylhexyl) phthalate, a commonly used plasticizer, is present in a wide variety of plastic products and is commonly detected in field and laboratory QC samples. It was detected in the field blank associated with FTMM-61 and Parcel 49 groundwater sampling (Shaw, 2008) and it is not considered a COPEC in groundwater at FTMM-61 and Parcel 49.

Metals. A total of 18 metals were detected in groundwater samples at FTMM-61 and Parcel 49. Only one metal, zinc, was detected at concentrations in at least one sample exceeding the applicable saltwater ESC. Zinc was detected in three samples and two concentrations (103 and 107 µg/L) were greater than the 81 µg/L ESC. Zinc is considered a COPEC in groundwater at FTMM-61 and Parcel 49.

3.4.2.14.3 COPECs for Surface Water at FTMM-61 and Parcel 49

Two surface water samples were collected from Parkers Creek in relation to FTMM-61 and Parcel 49 as part of the 2010 BEE. These two surface water samples were collected at storm water line outfalls into Parkers Creek, to the east of Building 283 and north of Parcel 49. Parkers Creek, in the vicinity of FTMM-61 and Parcel 49, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-30**.

PCBs. No PCBs were detected in surface water samples at FTMM-61 and Parcel 49. PCBs are not considered COPECs in sediment at FTMM-61 and Parcel 49.

VOCs. No VOCs were detected in surface water samples at FTMM-61 and Parcel 49. VOCs are not considered COPECs in sediment at FTMM-61 and Parcel 49.

SVOCs. One SVOC, dimethyl phthalate, was detected in the surface water samples at FTMM-61 and Parcel 49. There are no surface water ESC for dimethyl phthalate. SVOCs are not considered COPECs in surface water at FTMM-61 and Parcel 49.

Metals. A total of 13 metals were detected in surface water samples at FTMM-61 and Parcel 49. None of these metals were detected at concentrations exceeding the applicable saltwater ESC. Metals are not considered COPECs for surface water at FTMM-61 and Parcel 49.

3.4.2.14.4 COPECs for Sediment at FTMM-61 and Parcel 49

Seven surface sediment samples (including one duplicate sample) representing three sediment locations were collected from Parkers Creek in relation to FTMM-61 and Parcel 49 as part of the ECP SI (Shaw 2008). These three sediment sample locations were selected to evaluate historical discharges from Building 283 and Parcel 49 based on depositional characteristics and potential contaminant migration pathways and included the storm water outfalls in Parkers Creek to the east of Building 283 (**Appendix K**) associated with former septic systems at Building 78 and sump pump discharges related to Building 283. Parkers Creek, in the vicinity of FTMM-61 and Parcel 49, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table B-6**.

VOCs. No VOCs were detected in surface sediment samples at FTMM-61 and Parcel 49. VOCs are not considered COPECs at FTMM-61 and Parcel 49.

PCBs. No PCBs were detected in surface sediment samples at FTMM-61 and Parcel 49. PCBs are not considered COPECs at FTMM-61 and Parcel 49.

SVOCs. Ten SVOCs were detected in surface sediment samples at FTMM-61 and Parcel 49. One of the detected SVOCs exceeded the available saltwater sediment ESC. Di-*n*-butyl phthalate was detected in all samples at concentrations from 0.890 to 2.40 mg/kg. As noted previously, phthalates are common laboratory contaminants and are often found at low concentrations in both field and laboratory QC samples. Di-*n*-butyl phthalate is not considered a COPEC in surface sediment at FTMM-61 and Parcel 49.

Metals. Of the 20 metals detected in sediment at FTMM-61 and Parcel 49, 12 were detected in at least one sediment sample each at concentrations exceeding the applicable saltwater sediment ESC. Aluminum was detected in two sediment samples at concentrations (2.92 and 1.85%) exceeding the saltwater sediment ESC (1.8%). Aluminum, like iron, is a major component of soil and sediment, and is usually not considered a COPEC except in very low pH environments. Aluminum is not considered a COPEC at FTMM-61 and Parcel 49. Arsenic was detected in all samples and the concentrations (14.8 to 29.7 mg/kg) exceeding the ESC (8.2 mg/kg). Barium was detected in all samples and the concentrations (65.3 to 96.4 mg/kg) greater than the ESC (48 mg/kg). Cadmium was detected in all samples and concentrations in three samples (1.65 to 5.55 mg/kg) greater than the ESC (1.2 mg/kg). Chromium was detected in all samples and the concentrations (149 to 353 mg/kg) were greater than the ESC (81 mg/kg). Copper was detected in all samples and three concentrations (76.5 to 111 mg/kg) were greater than the ESC (34 mg/kg). Lead was detected in three samples and one concentration (148 mg/kg) was greater than the ESC (47 mg/kg). Mercury was detected in three samples and the concentrations (0.23 to 0.53 mg/kg) were greater than the ESC (0.15 mg/kg). Nickel was detected in all samples and two concentrations (44.0 and 68.5 mg/kg) were greater than the ESC (21 mg/kg). Silver was detected in one sample and the concentration (1.40 mg/kg) was greater than the ESC (1 mg/kg). Vanadium was detected in all samples and the concentrations (79.3 to 125 mg/kg) were greater than the ESC (57 mg/kg). Zinc was detected in all samples and two concentrations (1320 and 2090 mg/kg) exceeded the ESC (150 mg/kg). Arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, silver, vanadium, and zinc are considered COPECs in sediment at FTMM-61 and Parcel 49.

3.4.2.14.5 Summary of COPECs for FTMM-61 and Parcel 49

Parameters detected in soil, groundwater, surface water, or sediment at FTMM-61 and Parcel 49 at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at FTMM-61 and Parcel 49, its MDLs were greater than the saltwater ESC. Given that copper was identified as a COPEC in soil and sediment (though not in groundwater), it is considered a possible COPEC in surface water. The sediment detection limits for

several PAHs [acenaphthene, acenaphthylene, anthracene, benzo(*g,h,i*)perylene, dibenzo(*a,h*)anthracene, fluorene, 2-methylnaphthalene, and pyrene] were greater than the saltwater sediment ESC. These PAHs were not detected in any of the saltwater samples from FTMM-61 and Parcel 49; however, 2-methylnaphthalene and pyrene are considered COPECs in soil. Therefore, 2-methylnaphthalene and pyrene are considered possible COPECS in sediment. The COPECs, and possible COPECs, identified for FTMM-61 and Parcel 49 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
Not Applicable	Not Applicable	Not Applicable	Not Applicable
PCBs			
Aroclor 1260	Not Applicable	None	None
SVOCs			
Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*b*)fluoranthene Chrysene Fluoranthene 2-Methylnaphthalene Naphthalene Phenanthrene Pyrene	None	None	None
Metals			
Arsenic Cadmium Chromium Copper Lead Manganese Mercury Vanadium Zinc	Zinc	None	Arsenic Barium Cadmium Chromium Copper Lead Mercury Nickel Silver Vanadium Zinc
Possible COPECs			
		Copper	2-Methylnaphthalene Pyrene

3.4.2.15 BUILDING 1075 (ECP PARCEL 61)

Surface soil, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Parcel 61.

3.4.2.15.1 COPECs for Surface Soil at Parcel 61

One surface soil sample was collected from Parcel 61 as part of the ECP SI (Shaw, 2008) near the southeastern corner of Building 1075. Parameters detected in the surface soil sample are presented in **Table B-7**.

PCBs. No PCBs were detected in the surface soil sample. PCBs are not considered COPECs at Parcel 61.

SVOCs. A total of 18 SVOCs were detected in the surface soil sample. Of these 18, three were detected above the soil ESC. Benzo(*a*)pyrene (3.7 mg/kg) exceeded the 1.52 mg/kg ESC, chrysene (5.0 mg/kg) exceeded the 4.73 mg/kg ESC, and naphthalene (1.2 mg/kg) exceeded the 0.0994 mg/kg ESC. These three PAHs are considered COPECs at Parcel 61.

Metals. A total of 18 metals were detected in the surface soil sample. Of these 18, eight (aluminum, cadmium, chromium, copper, lead, mercury, vanadium, and zinc) were identified at

concentrations exceeding the soil ESC. The concentration of aluminum (10,100 mg/kg) exceeded the 50 mg/kg soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Parcel 61. Cadmium, chromium, copper, lead, mercury, vanadium, and zinc are considered COPECs in soil at Parcel 61.

3.4.2.15.2 COPECs for Surface Water at Parcel 61

One surface water sample was collected from a tributary to Husky Brook in relation to Parcel 61 as part of the 2010 BEE. This surface water sample was collected directly downgradient of the stormwater outfall in the tributary to Husky Brook. Husky Brook, in the vicinity of Parcel 61, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-31**.

VOCs. No VOCs were detected in surface water samples at Parcel 61. VOCs are not considered COPECs in surface water at Parcel 61.

PCBs. No PCBs were detected in surface water samples at Parcel 61. PCBs are not considered COPECs in surface water at Parcel 61.

SVOCs. Two SVOCs [benzo(*a*)anthracene and hexachlorobutadiene] were detected in the surface water sample. There are no available saltwater ESC for the detected SVOCs. Benzo(*a*)anthracene and hexachlorobutadiene are not considered COPECs in surface water at Parcel 61.

Metals. A total of 14 metals were detected in surface water samples at Parcel 61. None of these were detected at concentrations exceeding the available saltwater ESC. Metals are not considered COPECs in surface water at Parcel 61.

3.4.2.15.3 COPECs for Sediment at Parcel 61

Two sediment samples were collected from a tributary to Husky Brook in relation to Parcel 61 as part of the ECP SI (Shaw, 2008). One sediment sample was collected directly downgradient of the stormwater outfall into the tributary to Husky Brook and the other was collected downgradient of that near the confluence of the tributary with Husky Brook. Husky Brook, in the vicinity of Parcel 61, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table B-8**.

VOCs. No VOCs were detected in sediment samples at Parcel 61. VOCs are not considered COPECs at Parcel 61.

PCBs. No PCBs were detected in sediment samples at Parcel 61. PCBs are not considered COPECs at Parcel 61.

SVOCs. A total of 13 SVOCs were detected in surface sediment samples at Parcel 61. Bis(2-ethylhexyl) phthalate was detected in both sediment samples; the concentrations (0.380 and 0.460 mg/kg) were greater than the saltwater sediment ESC (0.18216 mg/kg). As noted previously, phthalates are commonly found in field and laboratory QC samples and are not considered COPECs in sediment at Parcel 61. Ten PAHs were detected at concentrations exceeding the saltwater ESC in one or both samples: acenaphthene (1.60 mg/kg), anthracene (0.160 and 0.290 mg/kg), benzo(a)anthracene (0.490 and 0.740 mg/kg), benzo(*a*)pyrene (0.430 and 0.650 mg/kg), benzo(*k*)fluoranthene (0.380 mg/kg), chrysene (0.710 and 0.920 mg/kg), fluoranthene (1.3 and 1.7 mg/kg), fluorene (0.140 mg/kg), phenanthrene (0.680 and 1.2 mg/kg), and pyrene (1.5 and 2.2 mg/kg). Acenaphthene, anthracene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*k*)fluoranthene, chrysene, fluoranthene, fluorene, phenanthrene, and pyrene are considered COPECs in sediment at Parcel 61.

Metals. Of the 17 metals detected in sediment at Parcel 61, two were detected in at least one sample at concentrations greater than the saltwater sediment ESC. Arsenic in one sample (13.3 mg/kg) was detected greater than the saltwater sediment ESC (8.2 mg/kg). Chromium was detected in one sample at a concentration (86.0 mg/kg) that exceeded the saltwater sediment ESC (81 mg/kg). Arsenic and chromium are considered COPECs in sediment at Parcel 61.

3.4.2.15.4 Summary of COPECs for Parcel 61

Parameters detected in soil, groundwater, surface water, or sediment at Building 1075 (Parcel 61) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Parcel 61, its MDLs were greater than the saltwater ESC. Given that copper was identified as a COPEC in soil (though not in sediment), it is considered a possible COPEC in surface water. Several PAHs [acenaphthylene, benzo(*g,h,i*)perylene, dibenzo(*a,h*)anthracene, and 2-methylnaphthalene] were not detected in sediment samples, but their detection limits were greater than the saltwater sediment ESC in both samples. These were not identified as COPECs in other media at the site and are not considered COPECs in **sediment**. The COPECs, and possible COPECs, identified for Parcel 61 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	Not Applicable	None	None
Pesticides			
Not Applicable	Not Applicable	Not Applicable	Not Applicable
PCBs			
None	Not Applicable	None	None
SVOCs			
Benzo(*a*)pyrene Chrysene Naphthalene	Not Applicable	None	Acenaphthene Anthracene Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*k*)fluoranthene Chrysene Fluoranthene Fluorene Phenanthrene Pyrene
Metals			
Cadmium Chromium Copper Lead Mercury Vanadium Zinc	Not Applicable	None	Arsenic Chromium
Possible COPECs			
		Copper	

3.4.2.16 BUILDING 900 (ECP PARCEL 69)

Surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Building 900 (Parcel 69).

3.4.2.16.1 COPECs for Soil at Parcel 69

Four surface soil samples were collected in relation to Parcel 69 as part of the ECP SI (Shaw, 2008). Parameters detected in surface soil samples are presented in **Table B-9**.

PCBs. No PCBs were detected in surface soil samples at Parcel 69. PCBs are not considered COPECs in soil at Parcel 69.

SVOCs. Four SVOCs were detected in surface soil samples in at least one sample each at Parcel 69. No SVOCs were found at concentrations exceeding the soil ESC. SVOCs are not considered COPECs in surface soil at Parcel 69.

Metals. A total of 17 metals were detected in surface soil samples. Of these 17, seven were identified at concentrations exceeding the soil ESC. Concentrations of aluminum (6,760 to 9,190 mg/kg) exceeded the 50 mg/kg soil ESC. Aluminum, like iron, is a common component of soils and sediments

and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Parcel 69. Chromium, copper, lead, mercury, vanadium, and zinc are considered COPECs in soil at Parcel 69.

3.4.2.16.2 COPECs for Groundwater at Parcel 69

Three groundwater samples (including one duplicate sample) were collected from two distinct temporary wells as part of the ECP SI (Shaw, 2008). One of these was located in an area of a former waste oil AST east of Building 900 and the other was located downgradient of Building 900. Oceanport Creek could receive groundwater discharge at Parcel 69. Oceanport Creek, in the vicinity of Parcel 69, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table B-10**.

VOCs. Three VOCs (acetone, PCE, and toluene) were detected in groundwater samples but at concentrations less than the ESC. VOCs are not considered COPECs in groundwater at Parcel 69.

SVOCs. One SVOC [bis(2-ethylhexyl) phthalate] was also detected in the groundwater samples. As noted previously, bis(2-ethylhexyl) phthalate, a commonly used plasticizer, is present in a wide variety of plastic products and is commonly detected in field and laboratory QC samples. It was detected in the field blank associated with Parcel 69 groundwater sampling (Shaw, 2008) and it is not considered a COPEC in groundwater at Parcel 69.

3.4.2.16.3 COPECs for Surface Water at Parcel 69

One surface water sample was collected from Oceanport Creek in relation to Parcel 69 as part of the 2010 BEE. Oceanport Creek, in the vicinity of Parcel 69, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-32**.

PCBs. No PCBs were detected in surface water samples at Parcel 69. PCBs are not considered COPECs in surface water at Parcel 69.

VOCs. No VOCs were detected in surface water samples at Parcel 69. VOCs are not considered COPECs in surface water at Parcel 69.

SVOCs. No SVOCs were detected in surface water samples at Parcel 69. SVOCs are not considered COPECs in surface water at Parcel 69.

Metals. A total of 10 metals were detected in surface water samples at Parcel 69. None of these metals were detected at concentrations exceeding the applicable saltwater ESC. Metals are not considered COPECs for surface water at Parcel 49.

3.4.2.16.4 COPECs for Sediment at Parcel 69

Four surface sediment samples representing two sediment locations were collected from Oceanport Creek in relation to Parcel 69 as part of the ECP SI (Shaw, 2008). Oceanport Creek, in the vicinity of Parcel 69, is classified as saline estuarine (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table B-11**.

PCBs. No PCBs were detected in surface sediment samples at Parcel 69. PCBs are not considered COPECs in sediment at Parcel 69.

VOCs. Three VOCs (acetone, carbon disulfide, and methylene chloride) were detected in sediment samples. VOCs are not considered COPECs in sediment at Parcel 69.

SVOCs. Five SVOCs were detected in surface sediment samples at Parcel 69. All five of the detected SVOCs exceeded the available saltwater sediment ESC. Di-*n*-butyl phthalate was detected in both samples at concentrations ranging from 1.20 to 4.80 mg/kg. As noted previously, phthalates are common laboratory contaminants and are often found at low concentrations in both field and laboratory QC samples. Bis(2-ethylhexyl) phthalate is not considered a COPEC in surface sediment at Parcel 69. Acenaphthene in two samples (0.50 and 1.2 mg/kg), fluoranthene (0.79 and 2.8 mg/kg), phenanthrene in one sample (0.25 mg/kg), and pyrene (1.1 and 3.1 mg/kg) exceeded the saltwater ESC of 0.016, 0.6, 0.24, and 0.665 mg/kg, respectively. Acenaphthene, fluoranthene, phenanthrene, and pyrene are considered COPECs in sediment at Parcel 69.

Metals. Of the 20 metals detected in sediment at Parcel 49, 14 were detected in at least one sediment sample each at concentrations exceeding the applicable saltwater sediment ESC. Aluminum was detected in both sediment samples and one concentration (4.13%) exceeded the saltwater sediment ESC (1.8%). Aluminum, like iron, is a major component of soil and sediment, and is usually not considered a COPEC except in very low pH environments. Aluminum is not considered a COPEC at Parcel 69. Arsenic was detected in all samples and one concentration (36.2 mg/kg) exceeded the ESC (8.2 mg/kg). Barium was detected in all samples and one concentration (89.6 mg/kg) exceeded the ESC (48 mg/kg). Cadmium was detected in one sample and the concentration (14.1 mg/kg) exceeded the ESC (1.2 mg/kg). Chromium was detected in all samples and the concentrations (74.5 to 345 mg/kg) were greater than the ESC (81 mg/kg). Cobalt was detected in both samples and one concentration (20.3 mg/kg) exceeded the ESC (10 mg/kg). Copper was detected in all samples and one concentration (203 mg/kg) exceeded the ESC (34 mg/kg). Lead was detected in both samples and one concentration (410 mg/kg) exceeded the ESC (47 mg/kg). Manganese was detected in both samples and one concentration (339 mg/kg) exceeded the ESC (260 mg/kg). Mercury was detected in one sample and the concentration (0.83 mg/kg) exceeded the ESC (0.15 mg/kg). Nickel was detected in all samples and one concentration (53.1 mg/kg) exceeded the ESC (21 mg/kg). Silver was detected in one sample and the concentration (9.99 mg/kg) exceeded the ESC (1 mg/kg). Vanadium was detected in all samples and one concentration (185 mg/kg) exceeded the ESC (57 mg/kg). Zinc was detected in all samples and one concentration (515 mg/kg) exceeded the ESC (150 mg/kg). Arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, silver, vanadium, and zinc are considered COPECs in sediment at Parcel 69.

3.4.2.16.5 Summary of COPECs for Parcel 69

Parameters detected in soil, groundwater, surface water, or sediment at Building 900 (Parcel 69) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though copper was not detected in surface water at Parcel 69, its MDLs were greater than the saltwater ESC. Given that copper was identified as a COPEC in soil and sediment, it is considered a possible COPEC in surface water. Several PAHs [acenaphthylene, anthracene, benzo(*a*)anthracene, benzo(*g,h,i*)perylene, benzo(*k*)fluoranthene, dibenzo(*a,h*)anthracene, fluorene, indeno(1,2,3-*cd*)pyrene, 2-methylnaphthalene, and naphthalene] were not detected in sediment samples but their detection limits were greater than the saltwater sediment ESC in both samples. These PAHs were not identified as COPECs in other site media and are not considered COPECs for sediment. The COPECs, and possible COPECs, identified for Parcel 69 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
Not Applicable	Not Applicable	Not Applicable	Not Applicable
PCBs			
None	Not Applicable	None	None
SVOCs			
None	None	None	Acenaphthene Fluoranthene Phenanthrene Pyrene
Metals			
Chromium Copper Lead Mercury Vanadium Zinc	Not Applicable	None	Arsenic Barium Cadmium Chromium Cobalt Copper Lead Manganese Mercury Nickel

Soil	Groundwater	Surface Water	Sediment
			Silver Vanadium Zinc
Possible COPECs			
		Copper	

3.4.3 CHARLES WOOD AREA

3.4.3.1 LANDFILL, SITE CW-3A, FTMM-25

Near surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Landfill CW-3A (FTMM-25).

3.4.3.1.1 COPECs for Soil at Landfill CW-3A

Near surface (6-12 inches bgs) soil samples were collected from Landfill CW-3A (FTMM-25) as part of the IRP RI investigation (Versar, 2005b). A total of 48 samples were analyzed for SVOCs, pesticides, PCBs, and metals. Parameters detected in near surface soil samples are presented in **Table A-9**.

SVOCs. A total of 21 SVOCs were detected in near surface soil samples from Landfill CW-3A (FTMM-25). Of these 21 SVOCs, two were detected at concentrations exceeding the soil ESC in at least one sample. Naphthalene was detected in one sample at a concentration greater than the 0.0994 mg/kg ESC. Bis(2-ethylhexyl) phthalate was detected in two samples at concentrations exceeding the 0.925 mg/kg ESC. As noted elsewhere, bis(2-ethylhexyl) phthalate is commonly found in field and laboratory QC samples, and bis(2-ethylhexyl) phthalate is not considered a COPEC. Naphthalene is considered a COPEC in soil at Landfill CW-3A (FTMM-25).

Pesticides. Six pesticides were detected in near surface soil samples from Landfill CW-3A (FTMM-25). Four of these pesticides were detected at concentrations exceeding the soil ESC in at least one sample. 4,4′-DDT was detected in half of the 48 samples and the majority of these had concentrations that were greater than the 0.0035 mg/kg ESC. Dieldrin was detected in four samples and the concentrations were greater than the 0.049 mg/kg ESC. Endrin aldehyde and heptachlor were detected in one sample each at concentrations exceeding the 0.0105 and 0.0538 mg/kg ESC, respectively. 4,4′-DDT, endrin aldehyde, dieldrin, and heptachlor are considered COPECs at Landfill CW-3A (FTMM-25).

PCBs. Two Aroclors were detected in near surface soil samples from Landfill CW-3A (FTMM-25). Aroclor 1260 and Aroclor 1254 were detected in one sample each. The concentration of Aroclor 1254 exceeded the 0.371 mg/kg ESC. Aroclor 1254 is considered a COPEC in soil at Landfill CW-3A (FTMM-25).

Metals. A total of 22 metals were detected in near surface soil samples from Landfill CW-3A (FTMM-25) of which most metals were detected in the majority of the samples. Silver was detected infrequently, being detected in seven samples; selenium was detected in less than half the samples (14 of 48). Fourteen metals (aluminum, antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, vanadium, and zinc) were detected at concentrations exceeding the soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Landfill CW-3A. Antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, selenium, silver, vanadium, and zinc are considered COPECs in soil at Landfill CW-3A (FTMM-25).

3.4.3.1.2 COPECs for Groundwater at Landfill CW-3A (FTMM-25)

Four groundwater monitoring wells at Landfill CW-3A (FTMM-25) have been monitored for metals during the 2008-2009 time period. Shrewsbury Creek could receive groundwater discharge from Landfill CW-3A (FTMM-25). Shrewsbury Creek, in the vicinity of Landfill CW-3A (FTMM-25), is classified as freshwater (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-10**.

Metals. A total of 10 metals were detected in groundwater samples from Landfill CW-3A (FTMM-25) during the 2008-2009 time period. Of these 10, six (barium, cadmium, chromium, copper, lead, and selenium) were detected in at least one groundwater sample at concentrations exceeding the freshwater ESC. Barium concentrations in one well (CW3AMW02) were all greater than the 220 µg/L freshwater ESC. Barium did not exceed the ESC in any of the other three monitoring wells during this period. Most of the concentrations of copper from one well (CW3AMW03) exceeded the 6.5 µg/L site-specific freshwater ESC. Copper did not exceed the ESC in any of the other three monitoring wells during this period. Chromium was detected in one sample at a concentration greater than the freshwater ESC (19 µg/L). Cadmium, lead, and selenium were detected at concentrations exceeding the ESC in most, if not all, of the wells in at least one sample. Barium, cadmium, chromium, copper, lead, and selenium are considered COPECs in groundwater at Landfill CW-3A (FTMM-25).

3.4.3.1.3 COPECs for Surface Water at Landfill CW-3A (FTMM-25)

Two surface water samples were collected from Shrewsbury Creek adjacent to Landfill CW-3A (FTMM-25) as part of the 2010 BEE. One surface water sample was collected downstream of the stormwater outfall at the western end of Landfill CW-3A (**Appendix K**), and the other surface water sample was collected downgradient of that location. Shrewsbury Creek, in the vicinity of Landfill CW-3A (FTMM-25), is classified as freshwater (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-33**.

VOCs. One VOC was detected in at least one of the two surface water samples. Toluene was detected at a concentration (6.8 µg/L) less than the freshwater ESC. VOCs are not considered COPECs in surface water at Landfill CW-3A (FTMM-25).

SVOCs. Three SVOCs were detected in at least one of the two surface water samples. One sample had a concentration of 3,3′-dichlorobenzidine (0.61 µg/L) less than the freshwater ESC. Anthracene (0.11 µg/L) and benzo(*a*)pyrene (0.31 µg/L) were detected greater than the freshwater ESC (0.035 and 0.014 µg/L, respectively). Anthracene and benzo(*a*)pyrene are considered COPECs in surface water at Landfill CW-3A (FTMM-25).

PCBs. PCBs were not detected in surface water samples and are not considered COPECs in surface water at Landfill CW-3A (FTMM-25).

Pesticides. Pesticides were not detected in surface water samples and are not considered COPECs in surface water at Landfill CW-3A (FTMM-25).

Metals. A total of 18 metals were detected in surface water samples at Landfill CW-3A (FTMM-25). Of these 18, four were detected at concentrations exceeding the freshwater ESC. Total copper (8.48 µg/L) and total lead (6.18 and 8.81 µg/L) were detected at concentrations exceeding the freshwater ESC for dissolved copper (6.5 µg/L) and dissolved lead (5.4 µg/L); dissolved copper and dissolved lead were not detected. Copper and lead are not considered COPECs in surface water. Total cadmium (0.97 µg/L) and dissolved cadmium (0.79 µg/L) were detected at concentrations greater than the freshwater ESC (0.14 µg/L) in one surface water sample, and total zinc (117 µg/L) and dissolved zinc (99.8 µg/L) were detected greater than the freshwater ESC (88 µg/L) in one surface water sample. Cadmium and zinc are considered COPECs in surface water at Landfill CW-3A (FTMM-25).

3.4.3.1.4 COPECs for Sediment at Landfill CW-3A (FTMM-25)

Six sediment samples were collected from Shrewsbury Creek adjacent to Landfill CW-3A (FTMM-25) as part of the 2010 BEE. Sediment sample locations were based on previous sediment sampling conducted for the RI and were located in the field based on depositional characteristics and potential contaminant migration pathways and included storm water outfalls (**Appendix K**) into Shrewsbury Creek in the vicinity of Landfill CW-3A (FTMM-25) from the area of Buildings 2707 and 2713 in Parcel 27 (**Section 3.4.3.4**). Shrewsbury Creek, in the vicinity of Landfill CW-3A (FTMM-25), is classified as freshwater (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table D-34**.

VOCs. Four VOCs (acetone, methylene chloride, toluene, and 2-butanone) were detected in at least one sediment sample each, but none were detected at concentrations exceeding the ESC.

PCBs. No PCBs were detected in sediment samples at Landfill CW-3A (FTMM-25).

Pesticides. Three pesticides (4,4'-DDT, 4,4'-DDE, and 4,4'-DDD) were detected in at least one sediment sample each from Landfill CW-3A. Only one sample had a 4,4'-DDD concentration (0.013 mg/kg) exceeding the freshwater sediment ESC (0.008 mg/kg), and 4,4'-DDD is considered a COPEC in sediment at Landfill CW-3A (FTMM-25).

SVOCs. A total of 16 SVOCs were detected in surface sediment samples at Landfill CW-3A (FTMM-25). Of the 16 detected SVOCs, 12 were detected in one sediment sample (CW3-SD6) at concentrations exceeding the freshwater ESC; these were all PAHs: 0.78 mg/kg acenaphthene, 4.1 mg/kg anthracene, 7.0 mg/kg benzo(a)anthracene, 4.6 mg/kg benzo(a)pyrene, 2.0 mg/kg benzo(*g,h,i*)perylene, 2.3 mg/kg benzo(*k*)fluoranthene, 5.6 mg/kg chrysene, 17 mg/kg fluoranthene, 1.4 mg/kg fluorene, 2.0 mg/kg indeno(1,2,3-*cd*)pyrene, 15 mg/kg phenanthrene, and 13 mg/kg pyrene. Acenaphthene, anthracene, benzo(*a*)anthracene, benzo(*a*)pyrene, benzo(*g,h,i*)perylene, benzo(*k*)fluoranthene, chrysene, fluoranthene, fluorene, indeno(1,2,3-*cd*)pyrene, phenanthrene, and pyrene are considered COPECs in sediment at Landfill CW-3A (FTMM-25).

Metals. Of the 20 metals detected in sediment at Landfill CW-3A (FTMM-25), five (arsenic, cadmium, chromium, copper, and lead) were detected in at least one sample at concentrations exceeding the freshwater sediment ESC. Arsenic concentrations in one sample (6.59 mg/kg), cadmium concentrations in three samples (1.07 to 3.38 mg/kg), chromium concentrations in five samples (29.3 to 145 mg/kg), copper concentrations in two samples (23.3 and 31.6 mg/kg), and lead in one sample (31.2 mg/kg) exceeded the ESC of 6, 0.6, 26, 16, and 31 mg/kg, respectively. Though there are no freshwater sediment ESC for barium, selenium, and vanadium, detected concentrations of these metals were detected at concentrations greater than the available saltwater sediment ESC. These metals were identified as COPECs in other environmental media at Landfill CW-3A (FTMM-25) and are considered COPECs in sediment. Arsenic, barium, cadmium, chromium, copper, lead, selenium, and vanadium are considered COPECs in sediment at Landfill CW-3A (FTMM-25).

3.4.3.1.5 Summary of COPECs for Landfill CW-3 (FTMM-25)A

Parameters detected in soil, groundwater, surface water, or sediment at Landfill CW-3A (FTMM-25) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though silver was not detected in surface water at Landfill CW-3A (FTMM-25), its MDLs were greater than the freshwater ESC. Given that silver is considered a COPEC in sediment (though not in soil or groundwater), it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Landfill CW-3A (FTMM-25) are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	Not Applicable	None	None
Pesticides			
DDT Dieldrin Endrin aldehyde Heptachlor	Not Applicable	None	DDD
PCBs			
Aroclor 1254	Not Applicable	None	None
SVOCs			
Naphthalene	Not Applicable	Anthracene Benzo(a)pyrene	Acenaphthene Anthracene Benzo(*a*)anthracene Benzo(*a*)pyrene Benzo(*g,h,i*)perylene Benzo(*k*)fluoranthene Chrysene Fluoranthene Fluorene Indeno(1,2,3-*cd*)pyrene Phenanthrene

Soil	Groundwater	Surface Water	Sediment
			Pyrene
Metals			
Antimony Arsenic Barium Cadmium Chromium Copper Lead Manganese Mercury Selenium Silver Vanadium Zinc	Barium Cadmium Chromium Copper Lead Selenium	Cadmium Zinc	Arsenic Barium Cadmium Chromium Copper Lead Selenium Vanadium
Possible COPECs			
		Silver	

3.4.3.2 FORMER PESTICIDE STORAGE AREA, SITE CW-6 (FTMM-28)

Surface soil, groundwater, surface water, and wetland sediment analytical data were evaluated for the identification of COPECs related to the Former Pesticide Storage Area, Site CW-6 (FTMM-28).

3.4.3.2.1 COPECs for Soil at Former Pesticide Storage Area, Site CW-6 (FTMM-28)

Four surface soil samples were collected as part of the 2010 BEE at Site CW-6 (FTMM-28). Parameters detected in sediment samples are presented in **Table D-35**.

VOCs. Five VOCs were detected in surface soil samples at Site CW-6 (FTMM-28). None of the VOCs were detected at concentrations exceeding the soil ESC. VOCs are not considered COPECs in soil at Site CW-6 (FTMM-28).

SVOCs. Fifteen SVOCs were detected in surface soil samples at Site CW-6 (FTMM-28). One SVOC, chrysene, was detected at a concentration (22 mg/kg) greater than the soil ESC (4.73 mg/kg). Chrysene is considered a COPEC in soil at Site CW-6 (FTMM-28).

Pesticides. Five pesticides were detected in surface soil samples at Site CW-6 (FTMM-28). Dieldrin (0.0092 mg/kg) and 4,4'-DDT (0.021 to 0.23 mg/kg) were detected in at least one soil sample each greater than the soil ESC of 0.049 and 0.0035 mg/kg, respectively. Dieldrin and 4,4'-DDT are considered COPECs in soil at Site CW-6 (FTMM-28).

PCBs. No PCBs were detected in surface soil samples at Site CW-6 (FTMM-28). PCBs are not considered COPECs in surface soil at Site CW-6 (FTMM-28).

Metals. A total of 23 metals were detected in surface soil samples at Site CW-6 (FTMM-28). Eleven metals (aluminum, antimony, arsenic, cadmium, chromium, copper, lead, mercury, selenium, vanadium, and zinc) were detected exceeding the ESC in at least one of the surface soil samples from Site CW-6 (FTMM-28). Aluminum (1,640 to 6,740 mg/kg), antimony (0.62 to 3.06 mg/kg), chromium (13.1 to 55.2 mg/kg), lead (30.9 to 356 mg/kg), mercury (0.218 to 8.1 mg/kg), selenium (1.1 to 7.61 mg/kg), vanadium (12.3 to 55.6 mg/kg), and zinc (42.5 to 373 mg/kg) were detected at concentrations exceeding the ESC in all four of the surface soil samples. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Landfill Site CW-6. Antimony, arsenic, cadmium, chromium, copper, lead, mercury, selenium, vanadium, and zinc are considered COPECs in soil at CW-6 (FTMM-28).

3.4.3.2.2 COPECs for Groundwater at Former Pesticide Storage Area, Site CW-6 (FTMM-28)

Four groundwater monitoring wells at Site CW-6 (FTMM-28) have been monitored during the 2008-2009 time period. Sampling for SVOCs and VOCs was discontinued after the November 2004 sampling event per NJDEP approval letter dated November 2004. SVOCs and VOCs are not considered COPECs in groundwater at Landfill 2. Wampum Brook could receive groundwater discharge from Site CW-6 (FTMM-28). Wampum Brook, in the vicinity of Site CW-6 (FTMM-28), is classified as freshwater (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table C-11**.

Metals. A total of 11 metals were detected in groundwater samples from Site CW-6 (FTMM-28) during the 2008-2009 time period. Of these 11, four (cadmium, copper, lead, and selenium) were detected in at least one groundwater sample at concentrations exceeding the freshwater ESC. Lead concentrations in one well (CW6MW01) during two quarters in 2008 were greater than the 5.4 µg/L freshwater ESC. Copper exceeded the site-specific freshwater ESC for dissolved copper of 8.1 µg/L in two of the monitoring wells. Cadmium and selenium were detected at concentrations exceeding the ESC (0.14 and 5 µg/L, respectively) in all of the wells in at least one sample. Cadmium, copper, lead, and selenium are considered COPECs in groundwater at Landfill CW-3A.

3.4.3.2.3 COPECs for Surface Water at Former Pesticide Storage Area, Site CW-6 (FTMM-28)

Two surface water samples were collected as part of the 2010 BEE at Site CW-6 (FTMM-28). These were located upstream of Site CW-6 (FTMM-28) where Wampum Brook enters the CWA and downstream of Site CW-6 (FTMM-28) where Wampum Brook exits the CWA. Wampum Brook, in the vicinity of Site CW-6 (FTMM-28), is classified as freshwater (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-36**.

VOCs. One VOC was detected in surface water samples at Site CW-6 (FTMM-28). MTBE was detected in one sample at a concentration less than the freshwater ESC. VOCs are not considered COPECs in surface water at Site CW-6 (FTMM-28).

PCBs. One PCB mixture was detected in surface water samples at Site CW-6 (FTMM-28). Aroclor 1242 was detected in both surface water samples at concentrations (0.13 and 0.3 µg/L) exceeding the freshwater ESC (0.014 µg/L). Aroclor 1242 is considered a COPEC in surface water at Site CW-6 (FTMM-28).

SVOCs. No SVOCs were detected in surface water samples. SVOCs are not considered COPECs in surface water at Site CW-6 (FTMM-28).

Pesticides. No pesticides were detected in surface water samples. Pesticides are not considered COPECs in surface water at Site CW-6 (FTMM-28).

Metals. A total of 13 metals were detected in surface water samples at Site CW-6 (FTMM-28). Of these 13, three (cadmium, lead, and zinc) were detected at concentrations exceeding the freshwater ESC in at least one sample. Total cadmium (0.52 and 1.13 µg/L) and dissolved cadmium (0.8 µg/L) were detected greater than the site-specific freshwater ESC (0.14 µg/L) and total cobalt (29.4 µg/L) and dissolved cobalt (28.7 µg/L) were exceeded the freshwater ESC (24 µg/L) in one surface water sample. This sediment sample was collected from Wampum Brook upstream of Site CW-6 (FTMM-28) at the upgradient boundary of the CWA. Cobalt is not considered a COPEC in surface water at Site CW-6 (FTMM-28). Total lead (7.94 and 8.09 µg/L) and dissolved lead (6.32 and 8.79 µg/L) were detected at concentrations exceeding the freshwater ESC (5.4 µg/L) in both samples. Cadmium and lead are considered COPECs in surface water at Site CW-6 (FTMM-28).

3.4.3.2.4 COPECs for Sediment at Former Pesticide Storage Area, Site CW-6 (FTMM-28)

Four sediment samples were collected from the wetland area southwest of Site CW-6 (FTMM-28) and two sediment samples were collected from Wampum Brook as part of the 2010 BEE. Wampum Brook, in the vicinity of Site CW-6 (FTMM-28), is classified as freshwater (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table D-37**.

VOCs. Five VOCs (acetone, methylene chloride, styrene, toluene, and 2-butanone) were detected in at least one sediment sample each, but none were detected at concentrations exceeding the freshwater sediment ESC. VOCs are not considered COPECs in wetland sediments at Site CW-6 (FTMM-28).

Pesticides. One pesticide (4,4'-DDE) was detected in one wetland sediment sample from Site CW-6 (FTMM-28). The concentration (0.006 mg/kg) exceeded the freshwater sediment ESC (0.005 mg/kg) and 4,4'-DDE is considered a COPEC in sediment at Site CW-6 (FTMM-28).

PCBs. Two PCB mixtures (Aroclor 1242 and Aroclor 1260) were detected in one sediment sample each. Aroclor 1260 was detected in one wetland sediment sample at a concentration (0.1 mg/kg) which exceeds the freshwater sediment ESC (0.005 mg/kg); Aroclor 1242 was detected at a concentration less than the freshwater sediment ESC for PCBs (0.07 mg/kg). Aroclor 1260 is considered a COPEC in wetland sediment at Site CW-6 (FTMM-28).

SVOCs. A total of 20 SVOCs were detected in surface sediment samples at Site CW-6 (FTMM-28). Of the 20 detected SVOCs, 15 were detected in one sediment sample (CW6-SD6) at concentrations exceeding the ESC; these were all PAHs: 0.47 mg/kg acenaphthene, 1.6 mg/kg acenaphthylene, 0.3 mg/kg anthracene, 1.0 mg/kg benzo(*a*)anthracene, 1.2 mg/kg benzo(*a*)pyrene, 0.89 mg/kg benzo(*g,h,i*)perylene, 0.74 mg/kg benzo(*k*)fluoranthene, 1.9 mg/kg chrysene, 4.9 mg/kg fluoranthene, 0.82 mg/kg fluorene, 0.98 mg/kg indeno(1,2,3-*cd*)pyrene, 1.3 mg/kg 2-methylnaphthalene, 4.4 mg/kg naphthalene, 8.3 mg/kg phenanthrene, and 3.3 mg/kg pyrene. This sediment sample was collected from Wampum Brook upstream of Site CW-6 (FTMM-28) at the upgradient boundary of the CWA. These PAHs are not considered COPECs in sediment at Site CW-6 (FTMM-28). One SVOC (2,4-dinitrophenol) was detected in two wetland sediment samples at concentrations (1.2 and 1.7 mg/kg) that exceeded the freshwater sediment ESC (0.00621 mg/kg). Thus, 2,4-dinitrophenol is considered a COPEC in wetland sediments at Landfill CW-6 (FTMM-28).

Metals. Of the 22 metals detected in sediment at Site CW-6 (FTMM-28), nine (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) were detected in at least one sample at concentrations exceeding the freshwater sediment ESC. Arsenic concentrations in two wetland samples (11.7 and 13.1 mg/kg), cadmium concentrations in five samples (0.9 to 5.56 mg/kg), chromium concentrations in six samples (35.3 to 150 mg/kg), copper concentrations in four samples (26.2 to 56.2 mg/kg), lead in four samples (124 to 218 mg/kg), mercury in three samples (0.426 to 6.6 mg/kg), nickel in three samples (16.2 to 56.2 mg/kg), silver in four samples (1.1 to 12.1 mg/kg), and zinc in one sample (168 mg/kg) exceeded the ESC of 6, 0.6, 26, 16, 31, 0.2, 16, 1.0, and 120 mg/kg, respectively. Though there are no freshwater sediment ESC for barium, selenium, and vanadium, detected concentrations of these metals were detected at concentrations greater than the available saltwater sediment ESC. Of these metals, selenium and vanadium were identified as COPECs in other environmental media at Site CW-6 (FTMM-28) and are considered COPECs in sediment. Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, vanadium, and zinc are considered COPECs in sediment at Site CW-6 (FTMM-28).

3.4.3.2.5 Summary of COPECs for Site CW-6 (FTMM-28)

Parameters detected in soil, groundwater, surface water, or sediment at Site CW-6 (FTMM-28) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though silver and 4,4′-DDE were not detected in surface water at Landfill CW-6 (FTMM-28), their MDLs were greater than the freshwater ESC. Given that silver and 4,4′-DDE are considered COPECs in sediment (though not in soil or groundwater), they are considered possible COPECs in surface water. The COPECs, and possible COPECs, identified for Landfill CW-6 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
None	None	None	None
Pesticides			
DDT Dieldrin	Not Applicable	None	DDE

Soil	Groundwater	Surface Water	Sediment
PCBs			
None	Not Applicable	Aroclor 1242	Aroclor 1260
SVOCs			
Chrysene	None	None	2,4-Dinitrophenol
Metals			
Antimony Arsenic Cadmium Chromium Copper Lead Mercury Selenium Vanadium Zinc	Cadmium Copper Lead Selenium	Cadmium Lead	Arsenic Cadmium Chromium Copper Lead Mercury Nickel Selenium Silver Vanadium Zinc
Possible COPECs			
		DDE Silver	

3.4.3.3 BUILDING 2700 (ECP PARCEL 15)

Groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Building 2700 and ECP Parcel 15.

3.4.3.3.1 COPECs for Groundwater at Building 2700 (Parcel 15)

Seven groundwater samples (including one duplicate sample) were collected from six distinct temporary wells as part of the ECP SI (Shaw, 2008). These were located along the downgradient boundary of the parcel along Shrewsbury Creek. Shrewsbury Creek could receive groundwater discharge from Parcel 15. Shrewsbury Creek, in the vicinity of Parcel 15, is classified as freshwater (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table B-12**.

VOCs. One VOC, toluene, was detected in one groundwater sample but at a concentration less than the ESC. VOCs are not considered COEPCs in groundwater at Parcel 15.

SVOCs. One SVOC, bis(2-ethylhexyl) phthalate, was detected in three groundwater samples at concentrations from 1.19 to 4.04 µg/L exceeding the freshwater ESC of 0.3 µg/L. Bis(2-ethylhexyl) phthalate, a commonly used plasticizer, is present in a wide variety of plastic products and is commonly detected in field and laboratory QC samples. It was detected in the field blank associated with Parcel 15 groundwater sampling (Shaw, 2008) and it is not considered a COPEC in groundwater at Parcel 15.

Metals. A total of 19 metals were detected in Parcel 15 groundwater samples. Of the 19 metals detected, seven (barium, cadmium, chromium, copper, lead, selenium, and vanadium) were detected at least once at concentrations greater than the respective freshwater ESC. Barium, cadmium, chromium, copper, lead, selenium, and vanadium are considered COPECs in groundwater at Parcel 15.

3.4.3.3.2 COPECs for Surface Water at Building 2700 (ECP Parcel 15)

Two surface water samples were collected from Shrewsbury Creek adjacent to Parcel 15 as part of the 2010 BEE. These samples were collected at the discharge points of an underground stream diversion near the southwest end of Building 2525 and of a stormwater pipe outfall (**Appendix K**). Shrewsbury Creek, in the vicinity of Parcel 15, is classified as freshwater (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-38**.

VOCs. No VOCs were detected in surface water samples at Parcel 15. VOCs are not considered COPECs in surface water at Parcel 15.

SVOCs. No SVOCs were detected in surface water samples at Parcel 15. SVOCs are not considered COPECs in surface water at Parcel 15.

PCBs. No PCBs were detected in surface water samples at Parcel 15. PCBs are not considered COPECs in surface water at Parcel 15.

Metals. A total of 12 metals were detected in Parcel 15 surface water samples. Of the 12 metals detected, two (cadmium and lead) were detected at least once exceeding the freshwater ESC. Total cadmium was detected in one surface water sample at a concentration of 0.55 µg/L which exceeds the freshwater ESC of 0.15 µg/L. However, the ESC is based on dissolved cadmium and cadmium was not detected in either of the filtered surface water samples from Parcel 15; cadmium is not considered a COPEC in surface water at Parcel 15. Lead was detected in all surface water samples from Parcel 15. Total lead concentrations ranged from 6.84 to 8.3 µg/L and dissolved lead concentrations ranged from 4.33 to 8.27 µg/L. The freshwater ESC for lead of 5.4 µg/L is based on dissolved lead and one of the two filtered surface water samples had a lead concentration above the ESC. Lead is considered a COPEC in surface water at Parcel 15.

3.4.3.3.3 COPECs for Sediment at Building 2700 (ECP Parcel 15)

A total of three surface sediment samples were collected from three stormwater outfall locations within Shrewsbury Creek adjacent to Parcel 15 as part of the ECP SI (Shaw, 2008). These samples were collected at the discharge points of an underground stream diversion near the southwest end of Building 2525 and of two other stormwater pipe outfalls (**Appendix K**). Shrewsbury Creek, in the vicinity of Parcel 15, is classified as freshwater (**Section 2.4.3**). Parameters detected in sediment samples are presented in **Table B-13**.

SVOCs. A total of 10 SVOCs were detected in Parcel 15 surface sediment samples. One SVOC, bis(2-ethylhexyl) phthalate, was detected in one of three surface sediment samples with a concentration of 1.3 mg/kg which exceeds the freshwater sediment ESC of 0.182 mg/kg. As noted previously, phthalates are common laboratory contaminants and are often found at low concentrations in both field and laboratory QC samples. Bis(2-ethylhexyl) phthalate is not considered a COPEC in surface sediment at Parcel 15.

Metals. A total of 18 metals were detected in Parcel 15 surface sediment samples. Only one metal was detected in surface sediment samples from Parcel 15 at concentrations exceeding the freshwater sediment ESC. Total chromium was detected at concentrations ranging from 29.4 to 37.0 mg/kg. These are above the 26 mg/kg ESC, and chromium is considered a COPEC in sediment at Parcel 15.

3.4.3.3.4 Summary of COPECs for Parcel 15

Parameters detected in soil, groundwater, surface water, or sediment at Building 2700 (Parcel 15) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though cadmium was not detected in filtered surface water samples at Parcel 15, their MDLs were greater than the freshwater ESC. Given that cadmium was detected at concentrations exceeding the freshwater ESC in unfiltered surface water samples and cadmium is considered a COPEC in groundwater, it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Parcel 15 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	Not Applicable
Pesticides			
Not Applicable	Not Applicable	Not Applicable	Not Applicable
PCBs			
Not Applicable	Not Applicable	None	Not Applicable
SVOCs			
Not Applicable	None	None	None
Metals			
Not Applicable	Barium Cadmium Chromium Copper	Lead	Chromium

Soil	Groundwater	Surface Water	Sediment
	Lead Selenium Vanadium		
Possible COPECs			
		Cadmium	

3.4.3.4 BUILDINGS 2507 AND 2704 (ECP PARCEL 27)

Surface soil, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Buildings 2507 and 2704 in ECP Parcel 27.

3.4.3.4.1 COPECs for Surface Soil at Buildings 2507 and 2704 (ECP Parcel 27)

Three surface soil samples (including one duplicate) were collected at Parcel 27 as part of the SI (Shaw, 2008). Parameters detected in surface soil samples are presented in **Table B-14**.

VOCs. No VOCs were detected in surface soil samples at Parcel 27. VOCs are not considered COPECs in surface soil.

PCBs. No PCBs were detected in surface soil samples at Parcel 27. PCBs are not considered COPECs in surface soil.

SVOCs. A total of eight SVOCs were detected in surface soil samples. Of these, only one was detected greater than the soil ESC. Bis(2-ethylhexyl) phthalate was detected in the duplicate sample at a concentration (0.940 mg/kg) which exceeds the 0.92954 mg/kg soil ESC. As noted elsewhere, bis(2-ethylhexyl) phthalate is commonly found in field and laboratory QC samples, and bis(2-ethylhexyl) phthalate is not considered a COPEC. SVOCs are not considered COPECs in soil at Parcel 27.

Metals. A total of 18 metals were detected in surface soil samples at Parcel 27. Of these, 10 (aluminum, arsenic, cadmium, chromium, copper, lead, manganese, mercury, vanadium, and zinc) were detected in at least one surface soil sample each above the soil ESC. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Parcel 27. Arsenic, cadmium, chromium, copper, lead, manganese, mercury, vanadium, and zinc are considered COPECs at Parcel 27.

3.4.3.4.2 COPECs for Surface Water at Buildings 2507 and 2704 (ECP Parcel 27)

Two surface water samples were collected from Shrewsbury Creek adjacent to Parcel 27, at an outfall and at an additional location downstream, as part of the 2010 BEE. One surface water sample was collected at a stormwater outfall and the other was collected downstream of that location. Shrewsbury Creek, in the vicinity of Parcel 27, is classified as freshwater (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-39**.

VOCs. No VOCs were detected in surface water samples at Parcel 27. VOCs are not considered COPECs in surface water at Parcel 27.

SVOCs. No SVOCs were detected in surface water samples at Parcel 27. SVOCs are not considered COPECs in surface water at Parcel 27.

PCBs. No PCBs were detected in surface water samples at Parcel 27. PCBs are not considered COPECs in surface water at Parcel 27.

Metals. A total of 14 metals were detected in Parcel 27 surface water samples. Of the 14 metals detected, three (cadmium, chromium, and lead) were detected at least once exceeding the freshwater ESC. Total cadmium was detected at concentrations of 0.76 and 0.88 µg/L and dissolved cadmium was detected at concentrations of 0.52 and 0.69 µg/L; these exceed ESC for dissolved cadmium of 0.16 µg/L. Chromium was detected in one filtered sample at a concentration (28.5 µg/L) greater than the ESC for dissolved chromium of 21 µg/L. Total lead was detected at concentrations of 5.46 and 10.6 µg/L and dissolved lead was detected at concentrations of 5.77 and 8.18 µg/L; these exceed the freshwater ESC

for dissolved lead of 5.4 µg/L. Cadmium, chromium, and lead are considered COPECs in surface water at Parcel 27.

3.4.3.4.3 COPECs for Sediment at Buildings 2507 and 2704 (ECP Parcel 27)

Two surface sediment samples were collected from Shrewsbury Creek adjacent to Parcel 27, at an outfall and at an additional location downstream as part of the ECP SI (Shaw, 2008). One sediment sample was collected at a stormwater outfall and the other was collected downstream of that location. Shrewsbury Creek, in the vicinity of Parcel 27, is classified as freshwater (**Section 2.4.3**). Parameters detected in surface sediment samples are presented in **Table B-15**.

SVOCs. A total of seven SVOCs were detected in Parcel 27 surface sediment samples. None of the SVOCs detected in surface sediment samples exceeded the freshwater sediment ESC. SVOCs are not considered COPECs in sediment at Parcel 27.

Of the 17 metals detected, six (arsenic, cadmium, chromium, copper, lead, and zinc) were detected at concentrations exceeding the freshwater sediment ESC. Arsenic (6.11 mg/kg), copper (187 mg/kg), lead (84.9 mg/kg), and zinc (264 mg/kg) were detected greater than their ESC of 6, 16, 31, and 120 mg/kg, respectively, in one of the two surface sediments collected at Parcel 27. Cadmium (0.715 and 1.76 mg/kg) and total chromium (49.8 and 49.6 mg/kg) were detected at concentrations exceeding the ESC (0.6 and 26 mg/kg, respectively) in both surface sediment samples. Arsenic, cadmium, chromium, copper, lead, and zinc are considered COPECs in sediment at Parcel 27.

3.4.3.4.4 Summary of COPECs for Parcel 27

Parameters detected in soil, groundwater, surface water, or sediment at Buildings 2507 and2704 (Parcel 27) at concentrations greater than the applicable ESC were identified as COPECs for the site. The COPECs, and possible COPECs, identified for Parcel 27 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
None	Not Applicable	None	Not Applicable
Pesticides			
Not Applicable	Not Applicable	Not Applicable	Not Applicable
PCBs			
None	Not Applicable	None	Not Applicable
SVOCs			
None	Not Applicable	None	None
Metals			
Arsenic Cadmium Chromium Copper Lead Manganese Mercury Vanadium Zinc	Not Applicable	Cadmium Chromium Lead	Arsenic Cadmium Chromium Copper Lead Zinc

3.4.3.5 BUILDING 2525 (ECP PARCEL 28)

Surface soil, groundwater, surface water, and sediment analytical data were evaluated for the identification of COPECs related to Building 2525 and ECP Parcel 28.

3.4.3.5.1 COPECs for Surface Soil at Building 2525 (ECP Parcel 28)

Two surface soil samples were collected from Parcel 28 as part of the ECP SI (Shaw, 2008). Parameters detected in surface soil samples are presented in **Table B-16**.

PCBs. No PCBs were detected in surface soil samples and PCBs are not considered COPECs at Parcel 28.

SVOCs. Five SVOCs were detected in surface soil samples but none were detected at concentrations greater than the soil ESC. SVOCs are not considered COPECs in surface soil at Parcel 28.

Metals. A total of 17 metals were detected in surface soil samples. Of these, five (aluminum, chromium, lead, vanadium, and zinc) were detected at concentrations exceeding the ESC in at least one sample each. Aluminum, like iron, is a common component of soils and sediments and is not considered a COPEC except in conditions of very low pH where aluminum could be bioavailable; aluminum is not considered a COPEC in soil at Parcel 28. Chromium, lead, vanadium, and zinc are considered COPECs at Parcel 28.

3.4.3.5.2 COPECs for Groundwater at Building 2525 (ECP Parcel 28)

Five groundwater samples (including one duplicate sample) were collected from four distinct temporary wells as part of the ECP SI (Shaw, 2008). Three of these were located downgradient of former drainage fields and one was located downgradient of a former storage pad area located in an open field west of Building 2290 and Guam Lane. Shrewsbury Creek could receive groundwater discharge from Parcel 28. Shrewsbury Creek, in the vicinity of Parcel 28, is classified as freshwater (**Section 2.4.3**). Parameters detected in groundwater samples are presented in **Table B-17**.

VOCs. Three VOCs (acetone, chloroform, and toluene) were detected in at least one groundwater sample each but at concentrations less than the ESC. VOCs are not considered COPECs in groundwater at Parcel 28.

SVOCs. One SVOC, bis(2-ethylhexyl) phthalate, was detected in three groundwater samples at concentrations from 0.94 to 2.30 µg/L which exceed the ESC of 0.3 µg/L. As discussed earlier, bis(2-ethylhexyl) phthalate, a commonly used plasticizer, is present in a wide variety of plastic products and is commonly detected in field and laboratory QC samples, and it is not considered a COPEC in groundwater at Parcel 28.

Metals. A total of 13 metals were detected in Parcel 28 groundwater samples. Of the 13 metals detected, only cadmium was detected at a concentration greater than the ESC. Detected concentrations ranged from 0.314 to 0.533 µg/L which exceed the freshwater ESC of 0.15 µg/L. Cadmium is considered a COPEC in groundwater at Parcel 28.

3.4.3.5.3 COPECs for Surface Water at Building 2525 (ECP Parcel 28)

Two surface water samples were collected from Shrewsbury Creek adjacent to Parcel 28 as part of the BEE. These were located downgradient of potential former discharge pipes which had been previously observed on the southeast bank of the creek. Shrewsbury Creek, in the vicinity of Parcel 28, is classified as freshwater (**Section 2.4.3**). Parameters detected in surface water samples are presented in **Table D-40**.

VOCs. No VOCs were detected in surface water samples at Parcel 28. VOCs are not considered COPECs in surface water at Parcel 28.

SVOCs. No SVOCs were detected in surface water samples at Parcel 28. SVOCs are not considered COPECs in surface water at Parcel 28.

PCBs. No PCBs were detected in surface water samples at Parcel 28. PCBs are not considered COPECs in surface water at Parcel 28.

Metals. A total of 11 metals were detected in Parcel 28 surface water samples. Of the 11 metals detected, only lead was detected at a concentration exceeding the freshwater ESC. Total lead was detected at concentrations of 6.36 and 7.74 µg/L and dissolved lead was detected at concentrations of 5.74 and 7.14 µg/L; these exceed the freshwater ESC for dissolved lead of 5.4 µg/L. Lead is considered a COPEC in surface water at Parcel 28.

3.4.3.5.4 COPECs for Sediment at Building 2525 (ECP Parcel 28)

Two surface sediment samples were collected from Shrewsbury Creek adjacent to Parcel 28 as part of the ECP SI (Shaw, 2008). These were located along the southeast bank of Shrewsbury Creek adjacent to Building 2525 directly downgradient of potential former discharge pipes observed on the

southeast bank of the creek. Shrewsbury Creek, in the vicinity of Parcel 28, is classified as freshwater (**Section 2.4.3**). Parameters detected in surface sediment samples are presented in **Table B-18**.

VOCs. One VOC (acetone) was detected in both Parcel 28 surface sediment samples. There are no available sediment ESC for acetone. VOCs are not considered COPECs in sediment at Parcel 28.

SVOCs. A total of five SVOCs were detected in Parcel 28 surface sediment samples. None of the SVOCs detected in surface sediment samples exceeded the freshwater sediment ESC. SVOCs are not considered COPECs in sediment at Parcel 28.

Metals. Of the 17 metals detected, one (chromium) was detected at concentrations greater than the freshwater sediment ESC. Total chromium (36.8 and 43.0 mg/kg) was detected greater than the ESC (26 mg/kg) in both surface sediment samples. Chromium is considered a COPEC in sediment at Parcel 28.

3.4.3.5.5 Summary of COPECs for Parcel 28

Parameters detected in soil, groundwater, surface water, or sediment at Building 2525 (Parcel 28) at concentrations greater than the applicable ESC were identified as COPECs for the site. Though cadmium was not detected in surface water at Parcel 28, its MDLs were greater than the freshwater ESC. Given that cadmium is considered a COPEC in groundwater, it is considered a possible COPEC in surface water. The COPECs, and possible COPECs, identified for Parcel 28 are summarized below by medium.

Soil	Groundwater	Surface Water	Sediment
VOCs			
Not Applicable	None	None	None
Pesticides			
Not Applicable	Not Applicable	Not Applicable	Not Applicable
PCBs			
None	Not Applicable	None	Not Applicable
SVOCs			
None	None	None	None
Metals			
Chromium Lead Vanadium Zinc	Cadmium	Lead	Chromium
Possible COPECs			
		Cadmium	

Table 3-1
Sample and Analytical Summary
Main Post

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Sampled (SD, SW, and SS)			Analytical Suite											Comments/Variances
									VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
M-2	M2-SD3	6/24/10	15:08	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD4	6/24/10	15:24	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD5	6/24/10	15:36	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD6	6/24/10	15:53	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD7	6/25/10	8:45	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD8	6/25/10	9:05	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD9	6/25/10	9:25	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD10	6/25/10	9:40	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD11	6/25/10	9:55	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD12	6/25/10	10:10	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD13	6/25/10	10:30	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD14	6/24/10	14:15	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SW6	6/21/10	11:15	na	na		SW		x	x	x	x	x	x		x			x	
M-2	M2-SW11	6/21/10	11:30	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples at M-2						12	2													
M-3	M3-SD1	6/18/10	10:38	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD2	6/18/10	10:50	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD3	6/18/10	11:28	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD4	6/18/10	11:50	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD5	6/18/10	13:33	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD6	6/18/10	13:50	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD7	6/18/10	14:08	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD8	6/21/10	14:40	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD9	6/21/10	14:57	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD10	6/21/10	15:12	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD11	6/21/10	14:25	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SW3	6/21/10	8:31	na	na		SW		x	x	x	x	x	x		x			x	
M-3	M3-SW8	6/21/10	8:50	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples at M-3						11	2													

Table 3-1
Sample and Analytical Summary
Main Post

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Sampled (SD, SW, and SS)			Analytical Suite											Comments/Variances
									VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
M-4	M4-SD1	6/22/10	13:55	0	0.5	SD			x	x	x	x			x		x	x	x	
M-4	M4-SD2	6/22/10	14:14	0	0.5	SD			x	x	x	x			x		x	x	x	
M-4	M4-SD3	6/22/10	14:30	0	0.5	SD			x	x	x	x			x		x	x	x	
M-4	M4-SD4	6/22/10	14:46	0	0.5	SD			x	x	x	x			x		x	x	x	
M-4	M4-SD5	6/22/10	15:07	0	0.5	SD			x	x	x	x			x		x	x	x	
M-4	M4-SD6	6/22/10	15:30	0	0.5	SD			x	x	x	x			x		x	x	x	
M-4	M4-SW4	6/21/10	9:45	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples at M-4						6	1													
M-5	M5-SD1	6/17/10	12:18	0	0.5	SD			x	x	x	x			x		x	x	x	
M-5	M5-SD2	6/18/10	9:23	0	0.5	SD			x	x	x	x			x		x	x	x	
M-5	M5-SD3	6/18/10	9:37	0	0.5	SD			x	x	x	x			x		x	x	x	
M-5	M5-SD4	6/18/10	9:04	0	0.5	SD			x	x	x	x			x		x	x	x	
M-5	M5-SD5	6/18/10	9:57	0	0.5	SD			x	x	x	x			x		x	x	x	
M-5	M5-SD6	6/18/10	10:17	0	0.5	SD			x	x	x	x			x		x	x	x	
M-5	M5-SW4	6/18/10	8:45	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples at M-5						6	1													

Table 3-1
Sample and Analytical Summary
Main Post

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Sampled (SD, SW, and SS)			Analytical Suite											Comments/Variances
									VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
M-8	M8-SD1	6/23/10	13:05	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD2	6/17/10	10:46	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD3	6/17/10	16:24	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD4	6/17/10	16:44	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD5	6/17/10	16:00	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD6	6/23/10	13:29	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD7	6/23/10	13:38	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD8	6/17/10	13:45	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD9	6/17/10	11:35	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD10	6/17/10	11:58	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD12	6/17/10	12:50	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SW3	6/17/10	16:18	na	na		SW		x	x	x	x	x	x		x			x	
M-8	M8-SW7	6/23/10	11:05	na	na		SW		x	x	x	x	x	x		x			x	
M-8	M8-SW12	6/23/10	11:20	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples at M-8						11	3													

Table 3-1
Sample and Analytical Summary
Main Post

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Sampled (SD, SW, and SS)			Analytical Suite											Comments/Variances
									VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
M-12/M-14	M14-SD1	6/15/10	9:10	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD2	6/15/10	9:40	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD3	6/15/10	10:25	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD4	6/15/10	10:50	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD5	6/15/10	11:36	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD6	6/15/10	12:10	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD7	6/15/10	14:33	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD8	6/15/10	15:23	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD9	6/16/10	10:50	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD10	6/16/10	11:22	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD11	6/16/10	11:50	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD12	6/28/10	13:45	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD13	6/16/10	12:48	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SW3	6/22/10	10:08	na	na		SW		x	x	x	x	x	x		x			x	
M-12/M-14	M14-SW8	6/15/10	15:01	na	na		SW		x	x	x	x	x	x		x			x	
M-12/M-14	M14-SW12	6/28/10	13:53	na	na		SW		x	x	x	x	x	x		x			x	
M-12/M-14	M14-SW13	6/22/10	11:32	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples at M-12/M-14						13	4													

Table 3-1
Sample and Analytical Summary
Main Post

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Sampled (SD, SW, and SS)			Analytical Suite											Comments/Variances
									VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
M-15	M15-SD1	6/14/10	13:45	0	0.5	SD			x	x	x	x			x		x	x	x	
M-15	M15-SD2	6/14/10	14:10	0	0.5	SD			x	x	x	x			x		x	x	x	
M-15	M15-SD3	6/14/10	14:30	0	0.5	SD			x	x	x	x			x		x	x	x	
M-15	M15-SD4	6/14/10	15:02	0	0.5	SD			x	x	x	x			x		x	x	x	
M-15	M15-SW1	6/14/10	13:40	na	na		SW		x	x	x	x	x	x		x			x	
M-15	M15-SW2	6/14/10	14:00	na	na		SW		x	x	x	x	x	x		x			x	
M-15	M15-SW4	6/14/10	14:55	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples at M-15						4	3													

Table 3-1
Sample and Analytical Summary
Main Post

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Sampled (SD, SW, and SS)			Analytical Suite											Comments/Variances
									VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
M-16	M16-SD1	6/14/10	10:04	0	0.5	SD			x	x	x	x			x		x	x	x	
M-16	M16-SD2	6/14/10	10:44	0	0.5	SD			x	x	x	x			x		x	x	x	
M-16	M16-SD3	6/14/10	11:10	0	0.5	SD			x	x	x	x			x		x	x	x	
M-16	M16-SD4	6/14/10	11:55	0	0.5	SD			x	x	x	x			x		x	x	x	
M-16	M16-SW1	6/23/10	11:55	na	na		SW		x	x	x	x	x	x		x			x	
M-16	M16-SW2	6/23/10	12:05	na	na		SW		x	x	x	x	x	x		x			x	
M-16	M16-SW4	6/23/10	12:18	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples for M-16						4	3													

Table 3-1
Sample and Analytical Summary
Main Post

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Sampled (SD, SW, and SS)			Analytical Suite											Comments/Variances
									VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
M-18	M18-SD1	6/16/10	15:45	0	0.5	SD			x	x	x	x			x		x	x	x	
M-18	M18-SD2	6/17/10	9:03	0	0.5	SD			x	x	x	x			x		x	x	x	
M-18	M18-SD3	6/16/10	16:36	0	0.5	SD			x	x	x	x			x		x	x	x	
M-18	M18-SD4	6/16/10	17:00	0	0.5	SD			x	x	x	x			x		x	x	x	
M-18	M18-SD5	6/17/10	10:00	0	0.5	SD			x	x	x	x			x		x	x	x	
M-18	M18-SW3	6/22/10	10:08	na	na		SW		x	x	x	x	x	x		x			x	
M-18	M18-SW5	6/17/10	9:50	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples for M-18						5	2													
M-20	M20-SD1	6/23/10	9:50	0	0.5	SD			x	x	x	x			x		x	x	x	
M-20	M20-SD2	6/23/10	10:15	0	0.5	SD			x	x	x	x			x		x	x	x	
M-20	M20-SW1	6/23/10	9:45	na	na		SW		x	x	x	x	x	x		x			x	
M-20	M20-SW2	6/23/10	10:10	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples for M-20						2	2													

Table 3-1
Sample and Analytical Summary
Main Post

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Sampled (SD, SW, and SS)	Analytical Suite											Comments/Variances
							VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
43 & Building 1122	P43-SW2	6/22/10	9:36	na	na	SW	x	x	x		x	x		x			x	
43 & Building 1122	P43-SW3	6/22/10	9:18	na	na	SW	x	x	x		x	x		x			x	
Total Samples for ECP43						2												
49 & Building 283	P49-SW2	6/23/10	8:53	na	na	SW	x	x	x		x	x		x			x	
49 & Building 283	P49-SW3	6/23/10	8:40	na	na	SW	x	x	x		x	x		x			x	
Total Samples for ECP49						2												
61	P61-SW1	6/15/10	14:01	na	na	SW	x	x	x		x	x		x			x	
Total Samples for ECP61						1												
69	P69-SW2	6/28/10	13:30	na	na	SW	x	x	x		x	x		x			x	
Total Samples for ECP69						1												

Table 3-1
Sample and Analytical Summary
Main Post

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Sampled (SD, SW, and SS)			Analytical Suite											Comments/Variances
									VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
NA	MP-SD1	6/25/10	12:05	0	0.5	SD			x	x	x	x			x		x	x	x	
NA	MP-SD2	6/25/10	14:15	0	0.5	SD			x	x	x	x			x		x	x	x	
NA	MP-SD3	6/25/10	15:05	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD1	6/25/10	13:40	0	0.5	SD			x	x	x	x			x		x	x	x	
M-2	M2-SD2	6/24/10	14:40	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD12	6/21/10	15:40	0	0.5	SD			x	x	x	x			x		x	x	x	
M-3	M3-SD13	6/25/10	11:25	0	0.5	SD			x	x	x	x			x		x	x	x	
M-8	M8-SD11	6/21/10	10:15	0	0.5	SD			x	x	x	x			x		x	x	x	
M-12/M-14	M14-SD14	6/16/10	14:12	0	0.5	SD			x	x	x	x			x		x	x	x	
NA	MP-SW1	6/25/10	11:55	na	na		SW		x	x	x	x	x	x		x			x	
NA	MP-SW2	6/25/10	14:02	na	na		SW		x	x	x	x	x	x		x			x	
NA	MP-SW3	6/25/10	14:58	na	na		SW		x	x	x	x	x	x		x			x	
M-2	M2-SW1	6/25/10	13:38	na	na		SW		x	x	x	x	x	x		x			x	
M-2	M2-SW2	6/24/10	14:33	na	na		SW		x	x	x	x	x	x		x			x	
M-3	M3-SW12	6/22/10	8:43	na	na		SW		x	x	x	x	x	x		x			x	
M-3	M3-SW13	6/25/10	11:15	na	na		SW		x	x	x	x	x	x		x			x	
M-8	M8-SW11	6/21/10	10:05	na	na		SW		x	x	x	x	x	x		x			x	
M-12/M-14	M14-SW14	6/22/10	12:09	na	na		SW		x	x	x	x	x	x		x			x	
Total Upgradient Samples						9	9													
Total Samples at MP						83	38	0	121	121	121	115	38	38	83	38	83	83	121	

Notes:
ASTM - American Society for Testing and Materials
B/N - Base/Neutral
BEE - Baseline Ecological Evaluation
ECP - Environmental Condition of Property
IRP - Installation Restoration Property
na - not applicable
PCB - Polychlorinated Biphenyl
SD - Sediment
SS - Surface Soil
SW - Surface Water
TAL - Target Analyte List
TOC - Total Organic Carbon

Table 3-2
Sampling and Analytical Summary
Charles Wood Area

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Ssampled (SD, SW, and SS)			Analytical Suite											Comments/Variances
									VO+15 (Method 8260B)	BN+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	
CW-3	CW3-SD1	6/28/10	8:50	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-3	CW3-SD2	6/28/10	9:05	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-3	CW3-SD3	6/28/10	9:18	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-3	CW3-SD4	6/28/10	9:40	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-3	CW3-SD5	6/28/10	10:20	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-3	CW3-SD6	6/28/10	10:48	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-3	CW3-SW4	6/28/10	9:50	na	na		SW		x	x	x	x	x	x		x			x	
CW-3	CW3-SW5	6/28/10	10:15	na	na		SW		x	x	x	x	x	x		x			x	
Total Samples at CW-3						6	2													
CW-6	CW6-SD1	6/18/10	16:32	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-6	CW6-SD2	6/18/10	16:14	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-6	CW6-SD3	6/18/10	16:42	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-6	CW6-SD4	6/18/10	16:47	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-6	CW6-SD5	6/24/10	10:35	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-6	CW6-SD6	6/24/10	9:40	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-6	CW6-SW5	6/24/10	10:29	na	na		SW		x	x	x	x	x	x		x			x	
CW-6	CW6-SW6	6/24/10	9:33	na	na		SW		x	x	x	x	x	x		x			x	
CW-6	CW6-SS1	6/18/10	15:23	0	0.5			SS	x	x	x	x			x		x	x		
CW-6	CW6-SS2	6/18/10	15:40	0	0.5			SS	x	x	x	x			x		x	x		
CW-6	CW6-SS3	6/18/10	15:50	0	0.5			SS	x	x	x	x			x		x	x		
CW-6	CW6-SS4	6/18/10	15:59	0	0.5			SS	x	x	x	x			x		x	x		
Total Samples at CW-6						6	2	4												
15	P15-SW1	6/24/10	12:33	na	na		SW		x	x	x		x	x		x			x	
15	P15-SW3	6/24/10	12:15	na	na		SW		x	x	x		x	x		x			x	
Total Samples at ECP15							2													

Table 3-2
Sampling and Analytical Summary
Charles Wood Area

IRP or ECP Site	BEE Sample Location Name	Sample Date	Sample Time	Top Depth	Bottom Depth	Media Ssampled (SD, SW, and SS)			Analytical Suite: VO+15 (Method 8260B)	B/N+15 (Method 8270C)	PCBs (Method 8082)	Pesticides (Method 8081A)	TAL Metals - SW - field filtered (Method 6010B/7470A)	TAL Metals - SW - unfiltered (Method 6010B/7470A)	TAL Metals - SS/SD - (Method 6010B/7471A)	Hardness (SM2340B)	TOC (Lloyd Kahn)	Grain Size (ASTM D442-53)	Filed Measured Parameters (dissolved oxygen, pH, temperature, salinity, and conductivity)	Comments/Variances
27	P27-SW1	6/25/10	15:58	na	na		SW		x	x	x		x	x		x			x	
27	P27-SW2	6/25/10	15:45	na	na		SW		x	x	x		x	x		x			x	
Total Samples at ECP27							2													
28	P28-SW1	6/24/10	11:54	na	na		SW		x	x	x		x	x		x			x	
28	P28-SW2	6/24/10	11:34	na	na		SW		x	x	x		x	x		x			x	
Total Samples for ECP28							2													
CW-3	CW3-SD7	6/28/10	11:40	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-3	CW3-SD8	6/28/10	12:10	0	0.5	SD			x	x	x	x			x		x	x	x	
CW-3	CW3-SW7	6/28/10	11:35	na	na		SW		x	x	x	x	x	x		x			x	
CW-3	CW3-SW8	na	na	na	na				x	x	x	x	x	x		x			x	Sample not collected. There was no water existing in the creek upstream of the CW3-SW7 sample location.
Total Upgradient Samples						2	1													
CWA	CWA-SD1	6/24/10	9:00	0	0.5	SD			x	x	x	x			x		x	x	x	Sample added to program to evaluate the furthest downgradient location within Wampum Brook on CWA.
CWA	CWA-SW1	6/24/10	8:55	na	na		SW		x	x	x	x	x	x		x			x	Sample added to program to evaluate the furthest downgradient location within Wampum Brook on CWA.
Total Samples Downgradient of CWA						1	1													
Total Samples at CWA						15	12	4	30	30	30	24	12	12	18	12	18	18	26	

Notes:
ASTM - American Society for Testing and Materials
B/N - Base/Neutral
BEE - Baseline Ecological Evaluation
CWA - Charles Wood Area
ECP - Environmental Condition of Property
IRP - Installation Restoration Property
na - not applicable
NEW - indicates location does not coincide with a previous sample location
PCB - Polychlorinated Biphenyl
SD - Sediment
SS - Surface Soil
SW - Surface Water
TAL - Target Analyte List
TOC - Total Organic Carbon

Table 3-3
Summary of Analytes Detected in Main Post Background Surface Water Samples

Analyte	ESC		# of Freshwater ESC Exceedances	# of Saltwater ESC Exceedances	# of Detections	# of Samples	Minimum Concentration	Maximum Concentration	Location of Maximum
	FW-SW	SW-SW							
VOCs (ug/L)									
Chloroform	140	NAV	0	0	1	9	2.9	2.9	M14-SW14
cis-1,2-Dichloroethene	NAV	NAV	0	0	3	9	1.3	3.3	MP-SW3
Tetrachloroethene	45	NAV	0	0	1	9	1.3	1.3	M2-SW2
SVOCs (ug/L)									
Anthracene	0.035	NAV	2	0	2	9	0.052	0.12	M14-SW14
Benzo(a)anthracene	0.025	NAV	2	0	2	9	0.23	0.23	M14-SW14; M3-SW12
Benzoic acid	NAV	NAV	0	0	1	9	12	12	MP-SW1
1,2,4-Trichlorobenzene	30	NAV	0	0	1	9	0.56	0.56	M14-SW14
Pesticides (ug/L)	***None detected***								
PCBs (ug/L)	***None detected***								
Metals (ug/L)									
Aluminum	NAV	NAV	0	0	14	18	6.63	78.6	M3-SW12
Arsenic	150	36	0	0	2	18	4.67	4.73	M8-SW11-Diss
Barium	220	NAV	0	0	18	18	31.4	64.7	M2-SW1; MP-SW2-Diss
Calcium	NAV	NAV	0	0	18	18	22600	40700	M8-SW11
Iron	NAV	NAV	0	0	18	18	84.8	2520	M3-SW12
Lead	5.4	24	18	0	18	18	5.79	18.8	M2-SW1-Diss
Magnesium	NAV	NAV	0	0	18	18	3550	53800	M8-SW11
Manganese	NAV	NAV	0	0	18	18	32.1	106	M8-SW11
Mercury	0.77	0.94	0	0	2	18	0.09	0.11	MP-SW1-Diss
Nickel	33	22	0	0	15	18	4.65	15.8	MP-SW3
Potassium	NAV	NAV	0	0	18	18	2400	19900	M8-SW11
Sodium	NAV	NAV	0	0	18	18	24300	433000	M8-SW11
Thallium	10	NAV	0	0	5	18	3.33	8.77	M8-SW11
Zinc	85	81	0	0	18	18	38.1	59.9	MP-SW2
Misc. (ug/L)									
Hardness	na	na	na	na	9	9	71124	323391	M8-SW11

Notes:
ug/L = micrograms per liter
ESC = Ecological Screening Criteria (See Section 3.3)
FW-SW = Fresh Water-Surface Water
SW-SW = Salt Water-Surface Water
NAV = No Available Value
FW-SW ESC for cadmium, chromium, copper, nickel, and zinc are based on minimum detected hardness in Main Post site and background samples (Appendix E)
na = Not Applicable

Table 3-4
Summary of Analytes Detected in Main Post Background Sediment Samples

Analyte	ESC		# of FW-SED ESC Exceedances	# of SW-SED ESC Exceedances	# of Detections	# of Samples	Minimum Concentration	Maximum Concentration	Location of Maximum
	FW-SED	SW-SED							
VOCs (mg/kg)									
Acetone	NAV	NAV	0	0	6	9	0.012	0.34	MP-SD2
Methylene chloride	0.159	NAV	0	0	4	9	0.0025	0.0088	MP-SD2
Toluene	2.5	2.5	0	0	1	9	0.013	0.013	MP-SD3
2-Butanone	NAV	NAV	0	0	2	9	0.0094	0.095	MP-SD2
SVOCs (mg/kg)									
Acenaphthene	0.016	0.016	2	2	2	9	0.11	0.12	M3-SD12
Acenaphthylene	0.044	0.044	1	1	1	9	0.089	0.089	MP-SD2
Anthracene	0.22	0.085	1	4	6	9	0.017	0.25	MP-SD3
Benzo(a)anthracene	0.32	0.261	4	4	7	9	0.018	1.2	MP-SD3
Benzo(a)pyrene	0.37	0.43	3	3	7	9	0.025	1.2	MP-SD3
Benzo(b)fluoranthene	10.4	1.8	0	0	5	9	0.066	1.8	MP-SD3
Benzo(g,h,i)perylene	0.17	0.17	3	3	3	9	0.38	0.87	MP-SD3
Benzo(k)fluoranthene	0.24	0.24	3	3	4	9	0.13	0.64	MP-SD3
bis(2-Ethylhexyl)phthalate	0.182	0.18216	0	0	1	9	0.069	0.069	M3-SD12
Butylbenzylphthalate	1.97	0.063	0	1	1	9	0.6	0.6	M2-SD2
Chrysene	0.34	0.384	4	4	5	9	0.064	1.7	MP-SD3
Dibenz(a,h)anthracene	0.06	0.063	1	1	1	9	0.088	0.088	M3-SD12
Dibenzofuran	NAV	NAV	0	0	2	9	0.062	0.082	MP-SD2
3,3'-Dichlorobenzidine	0.127	NAV	0	0	1	9	0.016	0.016	M3-SD13
Dimethylphthalate	NAV	NAV	0	0	9	9	0.28	0.79	MP-SD2
Fluoranthene	0.75	0.6	4	4	6	9	0.064	4.5	MP-SD3
Fluorene	0.19	0.019	1	2	2	9	0.13	0.32	MP-SD2
Indeno(1,2,3-c,d)pyrene	0.2	0.2	3	3	4	9	0.095	0.84	MP-SD3
Phenanthrene	0.56	0.24	3	4	5	9	0.15	3.1	MP-SD3
Pyrene	0.49	0.665	4	4	5	9	0.12	3	MP-SD3
Pesticides (mg/kg)									
4,4'-DDD	0.008	0.002	0	3	3	9	0.0022	0.0047	M2-SD1
4,4'-DDE	0.005	0.0022	0	1	2	9	0.0017	0.0034	M14-SD14
PCBs (mg/kg)									
Aroclor 1242	0.07	0.023	0	1	1	9	0.064	0.064	M2-SD2
Aroclor 1254	0.06	0.06	1	1	2	9	0.021	0.086	M2-SD1
Metals (mg/kg)									
Aluminum	25500	18000	0	0	9	9	965	17600	M3-SD13
Antimony	3	9.3	2	0	7	9	1.08	6.96	M2-SD2
Arsenic	6	8.2	7	6	9	9	0.68	61.6	M3-SD13
Barium	NAV	48	0	5	9	9	11.5	196	MP-SD2
Beryllium	NAV	NAV	0	0	9	9	0.2	3.83	MP-SD2
Cadmium	0.6	1.2	9	8	9	9	0.75	17.2	M3-SD13

Table 3-4
Summary of Analytes Detected in Main Post Background Sediment Samples

Analyte	ESC		# of FW-SED ESC Exceedances	# of SW-SED ESC Exceedances	# of Detections	# of Samples	Minimum Concentration	Maximum Concentration	Location of Maximum
	FW-SED	SW-SED							
Calcium	NAV	NAV	0	0	8	9	446	4310	MP-SD1
Chromium	26	81	8	3	9	9	9.24	125	M3-SD13
Cobalt	50	10	0	4	9	9	1.05	16.8	MP-SD2
Copper	16	34	3	2	6	9	1.88	165	M2-SD2
Iron	NAV	NAV	0	0	9	9	2960	162000	M3-SD13
Lead	31	47	4	2	9	9	5.61	945	M2-SD1
Magnesium	NAV	NAV	0	0	9	9	192	4650	M3-SD13
Manganese	630	260	0	1	9	9	4.86	551	MP-SD1
Mercury	0.2	0.15	1	1	8	9	0.02	0.424	MP-SD2
Nickel	16	21	4	3	9	9	2.55	53.5	MP-SD2
Potassium	NAV	NAV	0	0	9	9	507	12000	MP-SD1
Selenium	NAV	1	0	8	9	9	0.95	19	M3-SD13
Silver	1	1	1	1	1	9	11.2	11.2	MP-SD2
Sodium	NAV	NAV	0	0	9	9	28.6	1230	M8-SD11
Thallium	NAV	NAV	0	0	3	9	0.88	3.02	M3-SD13
Vanadium	NAV	57	0	4	9	9	6.82	218	M3-SD13
Zinc	120	150	5	4	9	9	31.4	423	MP-SD2
Misc. (mg/kg)									
Total Organic Carbon	na	na	na	na	9	9	900	6100	MP-SD2

Notes:
mg/kg = micrograms per kilogram
ESC = Ecological Screening Criteria (See Section 3.3)
FW-SED = Fresh Water-Sediment
SW-SED = Salt Water-Sediment
NAV = No Available Value
na = Not Applicable

Table 3-5
Summary of Analytes Detected in Charles Wood Area Background Surface Water Samples

Analyte	ESC		# of Freshwater ESC Exceedances	# of Saltwater ESC Exceedances	# of Detections	# of Samples	Minimum Concentration	Maximum Concentration	Location of Maximum
	FW-SW	SW-SW							
VOCs (ug/L)									
Methyl-tert-butyl ether	51000	18000	0	0	1	2	3.8	3.8	CW3-SW7
SVOCs (ug/L)									
Anthracene	0.035	NAV	1	0	1	2	0.11	0.11	CW3-SW7
Pesticides (ug/L)									
4,4'-DDD	NAV	NAV	0	0	1	2	0.008	0.008	CW3-SW7
PCBs (ug/L)									
Aroclor 1242	0.014	0.03	1	1	1	2	0.3	0.3	CW6-SW6
Metals (ug/L)									
Aluminum	NAV	NAV	0	0	4	4	14	9500	CW3-SW7
Arsenic	150	36	0	0	2	4	6.83	20.7	CW3-SW7
Barium	220	NAV	0	0	4	4	73.8	131	CW3-SW7
Beryllium	3.6	NAV	0	0	1	4	0.8	0.8	CW3-SW7
Cadmium	0.14	8.8	3	0	3	4	0.8	2.07	CW3-SW7
Calcium	NAV	NAV	0	0	4	4	28400	30300	CW3-SW7
Chromium	19	50	1	1	2	4	2.55	55.5	CW3-SW7
Cobalt	24	NAV	2	0	3	4	7.94	29.4	CW6-SW6
Copper	6.5	3.1	1	1	1	4	9.99	9.99	CW3-SW7
Iron	NAV	NAV	0	0	4	4	1440	38400	CW3-SW7
Lead	5.4	24	3	1	3	4	6.32	69.7	CW3-SW7
Magnesium	NAV	NAV	0	0	4	4	5730	14100	CW3-SW7
Manganese	NAV	NAV	0	0	4	4	127	160	CW3-SW7
Mercury	0.77	0.94	0	0	2	4	0.1	0.41	CW3-SW7
Nickel	34	22	0	2	3	4	14.5	32.6	CW6-SW6
Potassium	NAV	NAV	0	0	4	4	3370	14300	CW3-SW7
Sodium	NAV	NAV	0	0	4	4	66800	120000	CW3-SW7-Diss
Vanadium	12	NAV	1	0	2	4	6.91	60.1	CW3-SW7
Zinc	88	81	1	1	4	4	45.2	149	CW3-SW7
Misc. (ug/L)									
Hardness	na	na	na	na	2	2	94486	133738	CW3-SW7

Notes:
ug/L = micrograms per liter
ESC = Ecological Screening Criteria (See Section 3.3)
FW-SW = Fresh Water-Surface Water
SW-SW = Salt Water-Surface Water
NAV = No Available Value
FW-SW ESC for cadmium, chromium, copper, nickel, and zinc are based on minimum detected hardness in Charles Wood Area site and background samples (Appendix E).
na = Not Applicable

Table 3-6
Summary of Analytes Detected in Charles Wood Area Background Sediment Samples

Analyte	ESC		# of FW-SED ESC Exceedances	# of SW-SED ESC Exceedances	# of Detections	# of Samples	Minimum Concentration	Maximum Concentration	Location of Maximum
	FW-SED	SW-SED							
VOCs (mg/kg)									
Acetone	NAV	NAV	0	0	2	3	0.093	0.34	CW3-SD8
Methylene chloride	0.159	0.159	0	0	2	3	0.0093	0.013	CW3-SD7
Styrene	0.254	0.254	0	0	1	3	0.001	0.001	CW6-SD6
Toluene	2.5	2.5	0	0	1	3	0.002	0.002	CW6-SD6
2-Butanone	NAV	NAV	0	0	1	3	0.1	0.1	CW3-SD8
SVOCs (mg/kg)									
Acenaphthene	0.016	0.016	1	1	1	3	0.47	0.47	CW6-SD6
Acenaphthylene	0.044	0.044	1	1	1	3	1.6	1.6	CW6-SD6
Anthracene	0.22	0.085	1	1	3	3	0.011	0.3	CW6-SD6
Benzo(a)anthracene	0.32	0.261	1	1	1	3	0.028	1.0	CW6-SD6
Benzo(a)pyrene	0.37	0.43	1	1	3	3	0.03	1.2	CW6-SD6
Benzo(b)fluoranthene	10.4	1.8	0	1	1	3	2.1	2.1	CW6-SD6
Benzo(g,h,i)perylene	0.17	0.17	1	1	1	3	0.89	0.89	CW6-SD6
Benzo(k)fluoranthene	0.24	0.24	1	1	1	3	0.74	0.74	CW6-SD6
Chrysene	0.34	0.384	1	1	1	3	1.9	1.9	CW6-SD6
Dibenzofuran	NAV	NAV	0	0	1	3	0.48	0.48	CW6-SD6
Dimethylphthalate	NAV	NAV	0	0	3	3	0.45	1.6	CW3-SD7
Fluoranthene	0.75	0.6	1	1	1	3	4.9	4.9	CW6-SD6
Fluorene	0.19	0.019	1	1	1	3	0.82	0.82	CW6-SD6
Indeno(1,2,3-c,d)pyrene	0.2	0.2	1	1	1	3	0.98	0.98	CW6-SD6
2-Methylnaphthalene	0.07	0.07	1	1	1	3	1.3	1.3	CW6-SD6
Naphthalene	0.16	0.16	1	1	1	3	4.4	4.4	CW6-SD6
Phenanthrene	0.56	0.24	1	1	1	3	8.3	8.3	CW6-SD6
Pyrene	0.49	0.665	1	1	1	3	3.3	3.3	CW6-SD6
Pesticides (mg/kg)									
4,4'-DDD	0.008	0.002	0	1	1	3	0.0031	0.0031	CW3-SD7
PCBs (mg/kg)	***None detected***								
Metals (mg/kg)									
Aluminum	25500	18000	0	0	3	3	860	10200	CW3-SD7
Arsenic	6	8.2	0	0	3	3	0.68	5.43	CW3-SD8
Barium	NAV	48	0	2	3	3	4.41	140	CW3-SD8
Beryllium	NAV	NAV	0	0	3	3	0.38	1.14	CW3-SD7
Cadmium	0.6	1.2	2	0	3	3	0.38	1.08	CW3-SD7
Calcium	NAV	NAV	0	0	3	3	16.7	2480	CW3-SD7
Chromium	26	81	3	1	3	3	60.7	97.3	CW3-SD8
Cobalt	50	10	0	0	3	3	3.74	8.94	CW6-SD6
Copper	16	34	0	0	3	3	2.49	7.09	CW3-SD8
Iron	NAV	NAV	0	0	3	3	9040	14700	CW3-SD7
Lead	31	47	1	0	3	3	5.67	36	CW3-SD7
Magnesium	NAV	NAV	0	0	3	3	160	1900	CW3-SD7
Manganese	630	260	0	0	3	3	4.36	69.1	CW3-SD8
Mercury	0.2	0.15	1	1	3	3	0.064	0.251	CW3-SD7
Nickel	16	21	1	1	3	3	9.51	56.2	CW6-SD6
Potassium	NAV	NAV	0	0	3	3	441	2000	CW3-SD7
Selenium	NAV	1	0	3	3	3	1.82	4.15	CW3-SD8
Sodium	NAV	NAV	0	0	3	3	150	4050	CW3-SD8
Vanadium	NAV	57	0	0	3	3	10.7	50.3	CW3-SD7
Zinc	120	150	0	0	3	3	15.3	84.9	CW3-SD7
Misc. (mg/kg)									
Total Organic Carbon	na	na	na	na	3	2	540	8200	CW3-SD8

Notes:
mg/kg = micrograms per kilogram
ESC = Ecological Screening Criteria (See Section 3.3)
FW-SED = Fresh Water-Sediment
SW-SED = Salt Water-Sediment
NAV = No Available Value
na = Not Applicable

Table 3-7
Summary of Analytes Detected in Charles Wood Area Downgradient Surface Water Samples

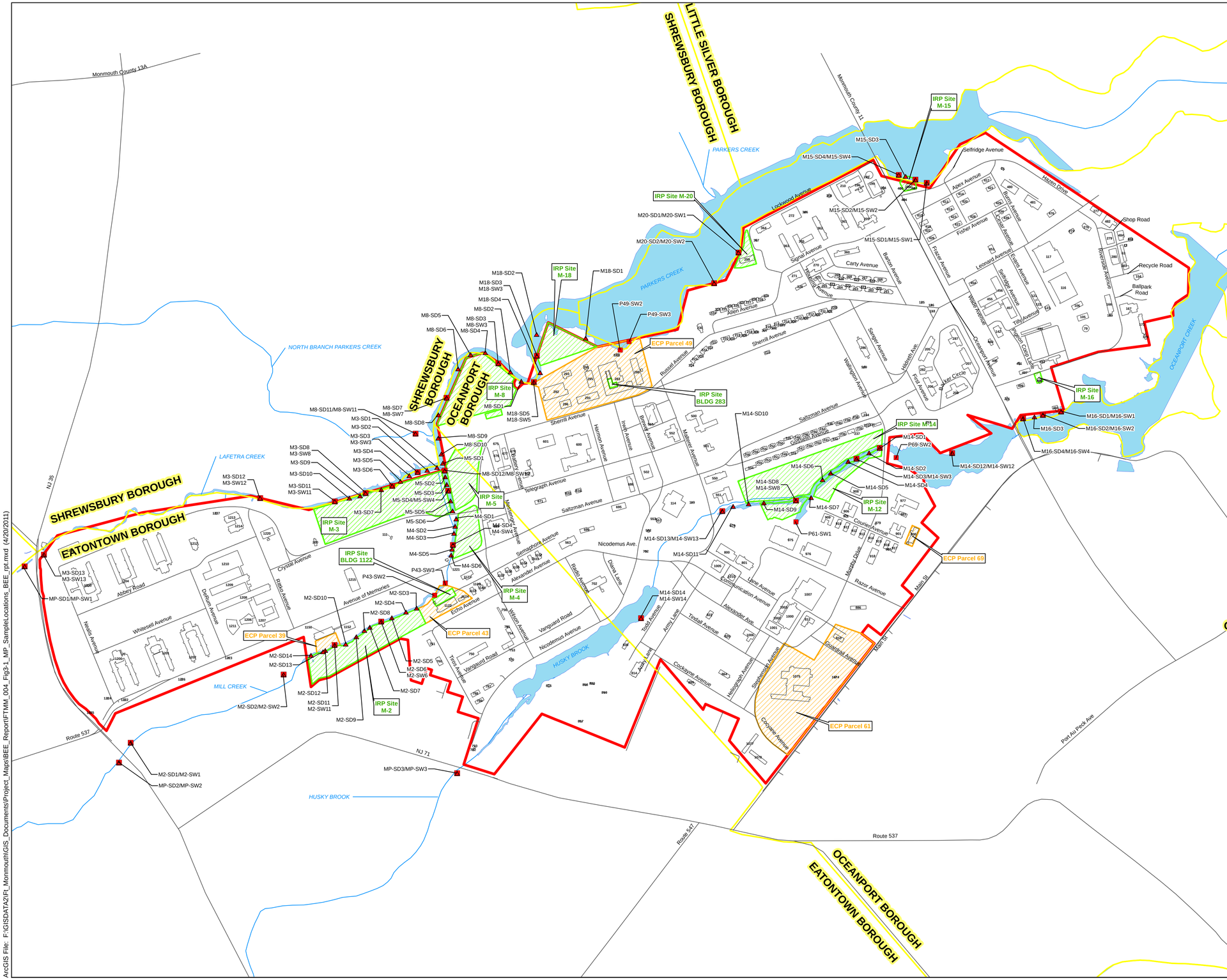
Analyte	ESC		# of Freshwater ESC Exceedances	# of Saltwater ESC Exceedances	# of Detections	# of Samples	Minimum Concentration	Maximum Concentration	Location of Maximum
	FW-SW	SW-SW							
VOCs (ug/L)	***None detected***								
SVOCs (ug/L)									
Hexachlorobutadiene	0.053	NAV	1	0	1	2	0.12	0.12	CWA-SW1
Pesticides (ug/L)	***None detected***								
PCBs (ug/L)	***None detected***								
Aroclor 1242	0.014	0.03	1	1	0	2	0.13	0.13	CW6-SW5
Metals (ug/L)									
Aluminum	NAV	NAV	0	0	4	4	11.4	130	CW6-SW5
Arsenic	150	36	0	0	2	4	7.47	10.2	CWA-SW1
Barium	220	NAV	0	0	2	4	58.5	76.1	CWA-SW1
Cadmium	0.14	8.8	1	0	1	4	0.52	0.52	CW6-SW5
Calcium	NAV	NAV	0	0	4	4	29600	45600	CWA-SW1
Iron	NAV	NAV	0	0	4	4	252	10800	CWA-SW1
Lead	5.4	24	4	0	4	4	8.09	14	CWA-SW1-Diss
Magnesium	NAV	NAV	0	0	4	4	4490	4830	CW6-SW5
Manganese	NAV	NAV	0	0	4	4	109	591	CWA-SW1
Nickel	34	22	0	1	2	4	20.8	23	CW6-SW5
Potassium	NAV	NAV	0	0	4	4	3100	5340	CWA-SW1
Selenium	5	71	1	0	1	4	5.33	5.33	CWA-SW1-Diss
Sodium	NAV	NAV	0	0	4	4	36100	55500	CW6-SW5
Zinc	88	81	0	0	4	4	48.3	80.1	CW6-SW5
Misc. (ug/L)									
Hardness	na	na	na	na	2	2	95205	132498	CWA-SW1

Notes:
ug/L = micrograms per liter
ESC = Ecological Screening Criteria (See Section 3.3)
FW-SW = Fresh Water-Surface Water
SW-SW = Salt Water-Surface Water
NAV = No Available Value
FW-SW ESC for cadmium, chromium, copper, nickel, and zinc are based on minimum detected hardness in Charles Wood Area site and background samples (Appendix E).
na = Not Applicable

Table 3-8
Summary of Analytes Detected in Charles Wood Area Downgradient Sediment Samples

Analyte	ESC		# of FW-SED ESC Exceedances	# of SW-SED ESC Exceedances	# of Detections	# of Samples	Minimum Concentration	Maximum Concentration	Location of Maximum
	FW-SED	SW-SED							
VOCs (mg/kg)									
Acetone	NAV	NAV	0	0	2	2	0.015	0.021	CWA-SD1
Methylene chloride	0.159	NAV	0	0	1	2	0.0032	0.0032	CWA-SD1
SVOCs (mg/kg)									
Acenaphthene	0.016	0.016	1	1	1	2	0.49	0.49	CWA-SD1
Anthracene	0.22	0.085	0	0	2	2	0.0053	0.082	CWA-SD1
Benzo(a)anthracene	0.32	0.261	0	0	2	2	0.031	0.033	CW6-SD5
Benzo(a)pyrene	0.37	0.43	0	0	2	2	0.02	0.036	CW6-SD5
Dimethylphthalate	NAV	NAV	0	0	2	2	0.43	0.53	CWA-SD1
Fluoranthene	0.75	0.6	0	0	1	2	0.093	0.093	CW6-SD5
Phenanthrene	0.56	0.24	1	1	1	2	0.6	0.6	CWA-SD1
Pyrene	0.49	0.665	0	0	1	2	0.068	0.068	CW6-SD5
Pesticides (mg/kg)	***None detected***								
PCBs (mg/kg)	***None detected***								
Aroclor 1242	0.07	0.023	0	1	1	2	0.05	0.05	CW6-SD5
Metals (mg/kg)									
Aluminum	25500	18000	0	0	2	2	2170	4170	CWA-SD1
Antimony	3	9.3	0	0	1	2	0.76	0.76	CWA-SD1
Arsenic	6	8.2	1	0	2	2	3.18	6.29	CWA-SD1
Barium	NAV	48	0	0	2	2	13.1	40.3	CWA-SD1
Beryllium	NAV	NAV	0	0	2	2	0.44	1.02	CW6-SD5
Cadmium	0.6	1.2	2	1	2	2	1.15	1.34	CW6-SD5
Calcium	NAV	NAV	0	0	1	2	5370	5370	CWA-SD1
Chromium	26	81	2	0	2	2	32.8	50.2	CW6-SD5
Cobalt	50	10	0	0	2	2	3.36	5.82	CW6-SD5
Copper	16	34	0	0	2	2	4.63	15.6	CWA-SD1
Iron	NAV	NAV	0	0	2	2	14200	15700	CW6-SD5
Lead	31	47	1	0	2	2	13.4	32.4	CWA-SD1
Magnesium	NAV	NAV	0	0	2	2	316	1270	CWA-SD1
Manganese	630	260	0	0	2	2	4.9	59.6	CWA-SD1
Mercury	0.2	0.15	1	1	2	2	0.047	0.249	CWA-SD1
Nickel	16	21	1	1	2	2	8.06	29.7	CW6-SD5
Potassium	NAV	NAV	0	0	2	2	871	1560	CWA-SD1
Selenium	NAV	1	0	2	2	2	2.72	3.17	CW6-SD5
Sodium	NAV	NAV	0	0	2	2	133	238	CWA-SD1
Vanadium	NAV	57	0	0	2	2	19.9	24.1	CWA-SD1
Zinc	120	150	0	0	2	2	49.8	104	CWA-SD1
Misc. (mg/kg)									
Total Organic Carbon	na	na	na	na	2	2	3700	4700	CW6-SD5

Notes:
mg/kg = micrograms per kilogram
ESC = Ecological Screening Criteria (See Section 3.3)
FW-SED = Fresh Water-Sediment
SW-SED = Salt Water-Sediment
NAV = No Available Value
na = Not Applicable



LEGEND

Sample Locations

- Sediment Sample Location
- Surface Water Sample Location
- Sediment/Surface Water Sample Location
- Road Centerline
- Building
- Municipal Boundary
- Water Feature
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary

N

Scale:

0 425 850 1,700 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

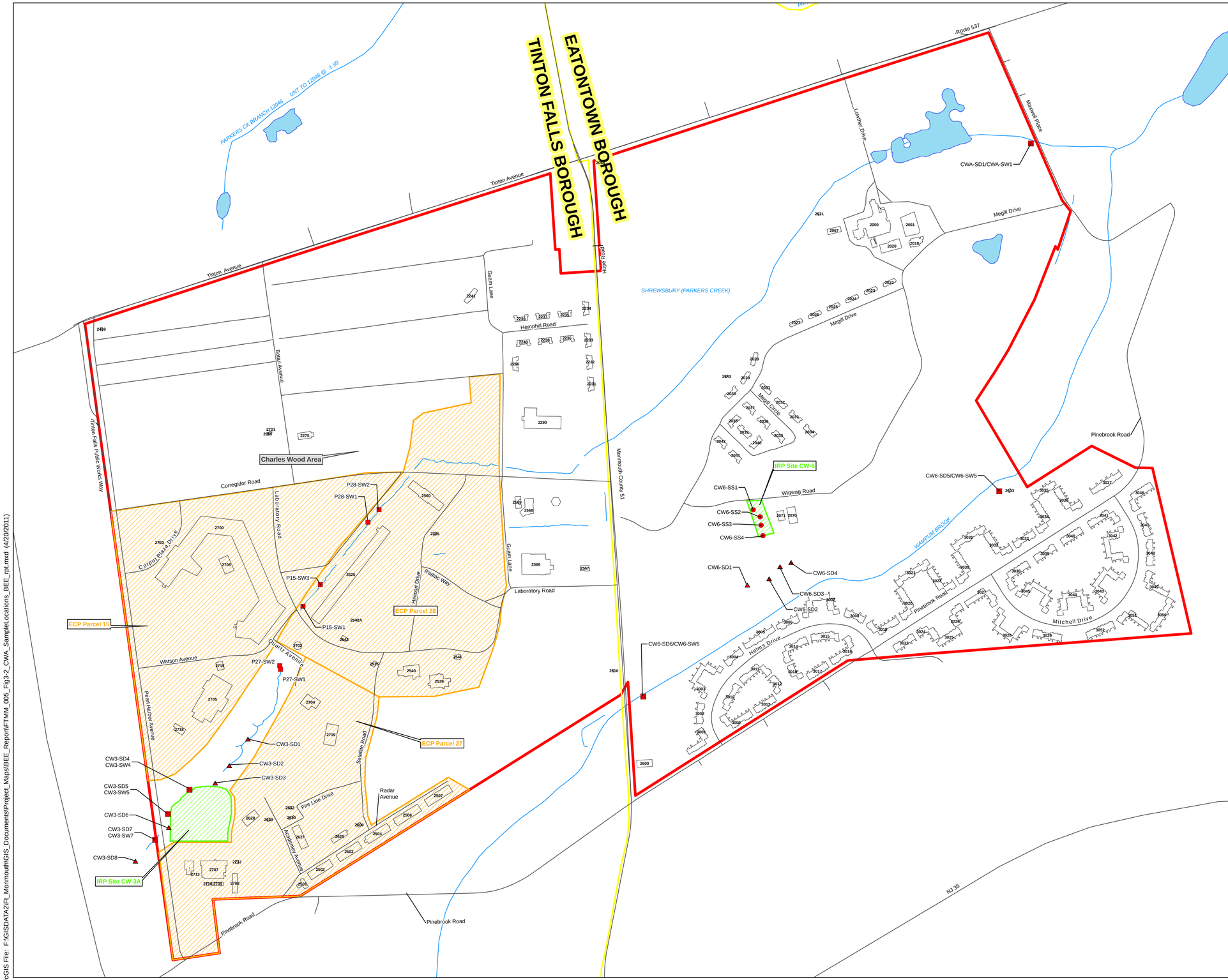
FIGURE 3-1

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

SAMPLE LOCATIONS

MAIN POST
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_004_Fig3-1_MP_SampleLocations_BEE_rpt.mxd (4/20/2011)



LEGEND

Sample Locations

- Sediment Sample Location
- Surface Water Sample Location
- Sediment/Surface Water Sample Location
- Surface Soil Sample Location
- Road Centerline
- Water Feature
- Building
- Municipal Boundary
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary

N

Scale:

0 300 600 1,200 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 3-2

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

SAMPLE LOCATIONS

CHARLES WOOD AREA
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_005_Fig3-2_CWA_SampleLocations_BEE_rpt.mxd (4/20/2011)

4.0 DISCUSSION

COPECs were identified in the previous section through a comparison of analytical data from site media (surface soil, groundwater, surface water, and sediment) to concentrations used as screening levels for ecological concern. A qualitative determination of the potential for adverse effects from site constituents is made in this section based on the COPECs, the presence of environmentally sensitive areas, and the potential migration pathways of site constituents.

4.1 MAIN POST

On the MP, 13 IRP Sites and five ECP Parcels were addressed in this BEE. Two of the IRP sites are contained within ECP Parcels and are addressed as one.

4.1.1 LANDFILL 2 (FTMM-2)

Near surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to near surface soils or groundwater, but ecological receptors may be exposed to surface water or sediment. This evaluation identified several pesticides, PCBs, SVOCs, and metals as COPECs in near surface soil and one VOC, several pesticides, and several metals as COPECs in groundwater. Though there are no direct ecological exposures to near surface soils or groundwater, the COPECs may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. Two SVOCs and lead were identified as COPECs in surface water. PCBs, SVOCs, and metals were identified as COPECs in sediment. Though 4,4′-DDE and cadmium were not detected in surface water, their surface water MDLs were greater than the applicable ESC. Given that 4,4′-DDE is a COPEC in soil and cadmium is a COPEC in soil, groundwater, and sediment, they are considered possible COPECs in surface water. **Table 4-1** and **Table 4-2** provide a summary of the COPECs in surface water and sediment at Landfill 2 (FTMM-2) as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous wetlands along Mill Creek and to the east and west of Landfill 2 (**Figure 4-1**) as well as herbaceous wetlands across the site (**Figure 4-2**). A site visit on September 9, 2009, confirmed the presence of deciduous wetlands bordering Mill Creek and Landfill 2 (FTMM-2); however, the site itself was typical of upland habitat and not herbaceous wetlands.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

The potential for ecological effects from COPECs at Landfill 2 (FTMM-2) is judged to be minimal for the following reasons:

- Ecological receptors are not frequently exposed to subsurface soils; COPECs are in subsurface soils and ecological exposure is unlikely though contaminants may migrate to potential exposure points.
- Most SVOCs, pesticides, and PCBs in soil were detected infrequently at concentrations exceeding the ESC.
- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- Though identified as COPECs in near surface soil or groundwater, VOCs and pesticides were not identified as COPECs in surface water or sediment where exposure may occur.
- Lead concentrations in sediment were similar to those in background samples (**Table 3-3**).
- PCBs in sediment at low concentrations are ubiquitous due to varied anthropogenic sources. Detected concentrations of PCBs were low, mostly within a factor of 2 of the LELs used for screening and orders of magnitude less than the SELs, and detected concentrations were similar to those in background samples (**Table 3-4**).

- PAHs have many anthropogenic sources and are ubiquitous in environmental media. The few detected concentrations of PAHs identified as COPECs were at low concentrations and at concentrations similar to those in background samples (**Table 3-3** and **Table 3-4**). These SVOCs, though some were identified as COPECs in soil, were not identified as COPECs in groundwater indicating that their current presence in surface water and sediment may not be due to migration from Landfill 2 (FTMM-2).
- The concentrations of metals in surface water and sediment exceeding ESC were similar to those found in background samples (**Table 3-3** and **Table 3-4**).

Within the landfill, COPECs were identified in soils and groundwater that could migrate to ecological exposure points in nearby surface water or sediment. COPECs in surface water were limited to two PAHs and lead and COPECs in sediment, though potentially related to landfill soil or groundwater COPECs indicating a potential migration pathway, are at low concentrations relative to the ESC and similar to background concentrations. Based on these considerations and the information provided in this report, it is concluded that constituents at Landfill 2 (FTMM-2) are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Landfill 2 (FTMM-2) are not warranted or recommended.

4.1.2 LANDFILL 3 (FTMM-3)

Near surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to near surface soils or groundwater, but ecological receptors may be exposed to surface water or sediment. This evaluation identified one PCB, several pesticides, SVOCs, and metals as COPECs in near surface soil. VOCs were not identified as COPECs in groundwater. Though there are no direct ecological exposures to near surface soils, the COPECs in soil may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper was greater than the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. Two pesticides and several metals were identified as COPECs in sediment. **Table 4-3** and **Table 4-4** provide a summary of the COPECs in surface water and sediment at Landfill 3 (FTMM-3) as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of freshwater tidal wetlands (**Figure 4-2**) along Lafetra Creek opposite Landfill 3 (FTMM-3) as well as deciduous wetlands (**Figure 4-1**) further to the north and to the west of Landfill 3 (FTMM-3).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species and that Lafetra Creek as well as the adjacent wetlands are Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Landfill 3 (FTMM-3) is judged to be minimal for the following reasons:

- Ecological receptors are not frequently exposed to subsurface soils; COPECs are in subsurface soils and ecological exposure is unlikely though contaminants may migrate to potential exposure points.
- With the exception of two PAHs and 4,4′-DDT, SVOCs and pesticides in soil were detected infrequently at concentrations exceeding the ESC.
- No COPECs were identified in groundwater that may flow to potential exposure points.
- The concentration of 4,4′-DDD (0.0095 mg/kg) exceeded the saltwater sediment ESC (0.002 mg/kg). One detected concentration (0.18 mg/kg) of 4,4′-DDT, exceeded the ER-L value used for screening (0.001 mg/kg) as well as the ER-M value (0.007 mg/kg) but similar to that reported in SI background samples for sediment and soil (Weston, 1995).

- Though identified as COPECs in near surface soil, PCBs were not identified as COPECs in surface water or sediment where ecological exposures may occur.
- PAHs, though identified as COPECs in near surface soil, were not identified as COPECs in surface water or sediment where ecological exposure may occur.
- With the exception of the concentration of copper in one sediment sample, the concentrations of metals were similar to those found in background samples (**Table 3-3** and **Table 3-4**). The remaining sediment sample copper concentrations were low with respect to the ESC and similar to that in most of the background samples.

Within the landfill, COPECs were identified in soils that could migrate to ecological exposure points in nearby surface water or sediment. No COPECs were identified in surface water. The metals COPECs in sediment, though potentially related to landfill soil COPECs, are mostly found at low concentrations in relation to the ESC and similar to background concentrations. Based on these considerations and the information provided in this report, it is concluded that constituents at Landfill 3 (FTMM-3) are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Landfill 3 (FTMM-3) are not warranted or recommended.

4.1.3 LANDFILL 4 (FTMM-4)

Near surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to near surface soils or groundwater, but ecological receptors may be exposed to surface water or sediment. This evaluation identified a few pesticides, two SVOCs, and several metals as COPECs in near surface soil. Five metals were identified as COPECs in groundwater. Though there are no direct ecological exposures to near surface soils or groundwater, the COPECs in soil and groundwater may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper was greater than the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. Two pesticides, three PCBs, six SVOCs, and six metals were identified as COPECs in sediment. **Table 4-5** and **Table 4-6** provide a summary of the COPECs in surface water and sediment at Landfill 4 (FTMM-4) as well as background and ambient levels of those constituents.

No significant habitats in the vicinity of Landfill 4 are identified within the GIS digital data available through the NJDEP.

The potential for ecological effects from COPECs at Landfill 4 (FTMM-4) is judged to be minimal for the following reasons:

- Ecological receptors are not frequently exposed to subsurface soils; COPECs are in subsurface soils and ecological exposure is unlikely though contaminants may migrate to potential exposure points.
- With the exception of 4,4′-DDT, pesticide and SVOC concentrations in soil exceeding COPECs were detected infrequently at concentrations exceeding the ESC.
- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- Though identified as COPECs in near surface soil, pesticides were not identified as COPECs in surface water and detected infrequently in sediment where ecological exposures may occur. Detected concentrations in sediment were low with respect to the applicable ESC.
- Though copper was identified as a potential COPEC in surface water, copper concentrations in sediment were similar to those in background samples (**Table 3-4**).
- Though PCBs were detected in sediment, they were not detected in near surface soils at Landfill 4 (FTMM-4), and may not be related to the Landfill. PCBs at low concentrations are ubiquitous due to varied anthropogenic sources. Detected concentrations of PCBs in sediment were low, all within a factor of 8 of the ER-Ls used for screening and orders of

magnitude less than the ER-Ms, and detected concentrations were similar to those in background samples (**Table 3-4**).

- PAHs in surface water and sediment have many anthropogenic sources and are ubiquitous in environmental media. The few detected concentrations of PAHs identified as COPECs were at low concentrations and at concentrations similar to those in background samples (**Table 3-3** and **Table 3-4**).
- The concentrations of metals in surface water and sediment were similar to those found in background samples (**Table 3-3** and **Table 3-4**).

Within the landfill, COPECs were identified in soils and groundwater that could migrate to ecological exposure points in nearby surface water or sediment. COPECs in surface water were limited to lead which is found at similar concentrations within background samples. The metals COPECs in sediment, though potentially related to landfill soil or groundwater COPECs indicating a potential migration pathway, are found at low concentrations in relation to the ESC and similar to background concentrations. Based on these considerations and the information provided in this report, it is concluded that constituents at Landfill 4 (FTMM-4) are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Landfill 4 (FTMM-4) are not warranted or recommended.

4.1.4 LANDFILL 5 (FTMM-5)

Near surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to near surface soils or groundwater, but ecological receptors may be exposed to surface water or sediment. This evaluation identified one PCB, several pesticides, SVOCs, and metals as COPECs in near surface soil. No VOCs were identified as COPECs in groundwater. Though there are no direct ecological exposures to near surface soils or groundwater, the COPECs in soil may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper was greater than the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. Three pesticides, several SVOCs, and several metals were identified as COPECs in sediment. **Table 4-7** and **Table 4-8** provide a summary of the COPECs in surface water and sediment at Landfill 5 (FTMM-5) as well as background and ambient levels of those constituents.

Though the GIS digital data available through the NJDEP do not indicate the presence of critical habitats at Landfill 5 (FTMM-5), the forested area to the north is Habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species, and is listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Landfill 5 (FTMM-5) is judged to be minimal for the following reasons:

- Ecological receptors are not frequently exposed to subsurface soils; COPECs are in subsurface soils and ecological exposure is unlikely though contaminants may migrate to potential exposure points.
- Most SVOCs, pesticides, and PCBs in soil were detected infrequently at concentrations exceeding the ESC.
- No VOCs were identified as COPECs in groundwater that may flow to potential exposure points.
- Though copper was identified as a potential COPEC in surface water, copper concentrations in sediment were similar to those in background samples (**Table 3-4**).

- All detected concentrations of the pesticides 4,4′-DDD, 4,4′-DDE, and 4,4′-DDT were within a factor of eight of the saltwater sediment ESC (most were within a factor of three of the ER-Ls) and below the ER-Ms.
- Though identified as COPECs in near surface soil, PCBs were not identified as COPECs in surface water or sediment where ecological exposures may occur.
- PAHs have many anthropogenic sources and are ubiquitous in environmental media. The few detected concentrations of PAHs identified as COPECs were at low concentrations and most were similar to those in background samples (**Table 3-3** and **Table 3-4**).
- The concentrations of metals in sediment were similar to those found in background samples (**Table 3-3** and **Table 3-4**).

Within the landfill, COPECs were identified in soils and groundwater that could migrate to ecological exposure points in nearby surface water or sediment. No COPECs were identified in surface water. COPECs in sediment, though potentially related to landfill soil COPECs, are at low concentrations and similar to background concentrations. Pesticides in sediment, though potentially related to landfill soil, were detected infrequently and at low concentrations in relation to the ESC. Based on these considerations and the information provided in this report, it is concluded that constituents at Landfill 5 (FTMM-5) are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Landfill 5 (FTMM-5) are not warranted or recommended.

4.1.5 LANDFILL 8 (FTMM-8)

Near surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to near surface soils or groundwater, but ecological receptors may be exposed to surface water or sediment. This evaluation identified several pesticides, PCBs, SVOCs, and metals as COPECs in near surface soil. Several pesticides were identified as COPECs in groundwater. Though there are no direct ecological exposures to near surface soils or groundwater, the COPECs in soils and groundwater may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper exceeded the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. Two PCBs, 4,4′-DDD, and several metals were identified as COPECs in sediment. **Table 4-9** and **Table 4-10** provide a summary of the COPECs in surface water and sediment at Landfill 8 (FTMM-8) as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of Phragmites dominated wetlands (**Figure 4-2**) along Parkers Creek opposite Landfill 8 (FTMM-8), with deciduous shrub/scrub wetlands and deciduous wetlands present further from the landfill (**Figure 4-1**). Landfill 8 (FTMM-8) is identified as a coastal forest habitat.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland areas across Parkers Creek and the forested areas on Landfill 8 (FTMM-8) are habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. Parkers Creek, as well as the wetlands and forested area, is listed as Conservation Rank 4 as potential bald eagle foraging habitat, indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Landfill 8 (FTMM-8) is judged to be minimal for the following reasons:

- Ecological receptors are not frequently exposed to subsurface soils; COPECs are in subsurface soils and ecological exposure is unlikely though contaminants may migrate to potential exposure points.
- Most SVOCs, PCBs, and pesticides in soil were detected infrequently at concentrations exceeding the ESC.

- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- Though copper was identified as a potential COPEC in surface water, copper concentrations in sediment were similar to those in background samples (**Table 3-4**).
- Though several pesticides were identified as COPECs in near surface soil and groundwater, only 4,4′-DDD was detected as a COPEC in sediment where ecological exposure may occur indicating no significant migration of organic COPECs from the landfill.
- The three detected concentrations (0.0021, 0.0023, and 0.0033 mg/kg) in sediment of the pesticide, 4,4′-DDD, were only marginally greater than the saltwater sediment ESC (0.002 mg/kg).
- Though identified as COPECs in near surface soil, PCBs were not identified as COPECs in surface water where ecological exposures may occur.
- PCBs at low concentrations in sediment are ubiquitous due to varied anthropogenic sources. Detected concentrations of PCBs in sediment were all within a factor of eight of the ER-Ls and orders of magnitude less than the ER-Ms, and detected concentrations were similar to those in background samples (**Table 3-4**).
- Though identified as PAHs in near surface soil, PAHs were not identified as COPECs in surface water or sediment where ecological exposures may occur.
- The concentrations of metals were similar to those found in background samples for the BEE investigation (**Table 3-3** and **Table 3-4**) or the background soil and sediment concentrations reported in the SI (Weston, 1995).

Within the landfill, COPECs were identified in soils and groundwater that could migrate to ecological exposure points in nearby surface water or sediment. No COPECs were identified in surface water. Pesticides and PCBs in sediment, though potentially related to landfill soil, were detected infrequently and at low concentrations in relation to the ESC. Metals in sediment were found at concentrations similar to the background concentrations from the BEE investigation or SI. Based on these considerations and the information provided in this report, it is concluded that constituents at Landfill 8 are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Landfill 8 (FTMM-8) are not warranted or recommended.

4.1.6 LANDFILL 12 (FTMM-12)

Near surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to near surface soils or groundwater, but ecological receptors may be exposed to surface water or sediment. This evaluation identified several pesticides, SVOCs, and metals as COPECs in near surface soil. Several metals were identified as COPECs in groundwater. Though there are no direct ecological exposures to near surface soils or groundwater, the COPECs in soil and groundwater may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper was greater than the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. Three pesticides, one PCB, several PAHs and several metals were identified as COPECs in sediment. **Table 4-11** and **Table 4-12** provide a summary of the COPECs in surface water and sediment at Landfill 12 (FTMM-12) as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous wooded (**Figure 4-1**) wetlands along both banks of Husky Brook in the western half of Landfill 12 (FTMM-12). Based on site observations, these wetlands are less extensive than indicated through the NJDEP data.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland areas along Husky Brook and the small tributary are habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. To the east of Landfill 12 (FTMM-12), on the opposite side of Wallington

Avenue-Murphy Drive, the emergent wetland areas are habitat Rank 4 for the Least Tern; this rank indicates at least one or more occurrences of a state endangered species. Husky Brook, as well as the wetlands and forested areas of Landfill 12 (FTMM-12), is listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Landfill 12 (FTMM-12) is judged to be minimal for the following reasons:

- Ecological receptors are not frequently exposed to subsurface soils; COPECs are in near surface soils under a clean soil cover and ecological exposure is unlikely though contaminants may migrate to potential exposure points.
- Most of the SVOCs and pesticides in soil were detected infrequently at concentrations exceeding the ESC.
- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- Several metals were identified as COPECs in groundwater that may flow to potential exposure points in Husky Brook.
- No VOCs were identified as a COPEC in surface water or sediment.
- Though copper was identified as a potential COPEC in surface water, copper concentrations in sediment were similar to those in background samples (**Table 3-4**).
- Several pesticides were identified as COPECs in near surface soil. Of these, only three (4,4′-DDD, 4,4′-DDE, and 4,4′-DDT) were detected at concentrations exceeding the criteria in sediment. 4,4′-DDD, 4,4′-DDE, and 4,4′-DDT were generally only marginally above the saltwater sediment ESC (0.001 to 0.0022 mg/kg).
- Though one PCB was identified as a COPEC in sediment, PCBs were not identified as COPECs in near surface soil and their presence in sediment may not be related to the landfill.
- PAHs have many anthropogenic sources and are ubiquitous in environmental media. The detected concentrations of PAHs identified as COPECs were at low concentrations and most were similar to those in background samples (**Table 3-3** and **Table 3-4**); the highest concentrations were west of Landfill 12 (FTMM-12) near Malterer Avenue and are more likely due to runoff from roads and parking surfaces than from the landfill. Though above the ER-Ls used for screening, all concentrations were well below the ER-Ms.
- No COPECs were identified in surface water.
- The concentrations of metals in sediment were similar to those found in background samples (**Table 3-4**).

Within the landfill, COPECs were identified in soils and groundwater that could migrate to ecological exposure points in nearby surface water or sediment. No COPECs were identified in surface water. The concentrations of metals in sediment, though potentially related to landfill soil or groundwater COPECs indicating a potential migration pathway, are at low concentrations in relation to the ESC and similar to background concentrations. Based on these considerations and the information provided in this report, it is concluded that constituents at Landfill 12 (FTMM-12) are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Landfill 12 (FTMM-12) are not warranted or recommended.

4.1.7 LANDFILL 14 (FTMM-14)

Near surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to near surface soils or groundwater, but ecological receptors may be exposed to surface water or sediment. This evaluation identified several pesticides, SVOCs, and metals

as COPECs in near surface soil. Several metals were identified as COPECs in groundwater. Though there are no direct ecological exposures to near surface soils or groundwater, the COPECs in soil and groundwater may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper exceeded the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. Three pesticides, one PCB, several PAHs and several metals were identified as COPECs in sediment. **Table 4-13** and **Table 4-14** provide a summary of the COPECs in surface water and sediment at Landfill 14 (FTMM-14) as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous wooded wetlands (**Figure 4-1**) along both banks of Husky Brook in the western half of Landfill 14 (FTMM-14) as well as along the small tributary that divides Landfill 12 (FTMM-12). Based on site observations, these wetlands are less extensive than indicated through the NJDEP data.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland areas along Husky Brook and the small tributary are habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. To the east of Landfill 14 (FTMM-14), on the opposite side of Wallington Avenue-Murphy Drive, the emergent wetland areas are habitat Rank 4 for the Least Tern; this rank indicates at least one or more occurrences of a state endangered species. Husky Brook, as well as the wetlands and forested areas of Landfill 14 (FTMM-14), is listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Landfill 14 (FTMM-14) is judged to be minimal for the following reasons:

- Ecological receptors are not frequently exposed to subsurface soils; COPECs are in near surface soils under a clean soil cover and ecological exposure is unlikely though contaminants may migrate to potential exposure points.
- Most SVOCs and pesticides in soil were detected infrequently at concentrations exceeding the ESC.
- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- Several metals were identified as COPECs in groundwater that may flow to potential exposure points.
- No VOCs were identified as COPECs in groundwater, surface water, or sediment.
- No COPECs were identified in surface water.
- Though copper was identified as a potential COPEC in surface water, copper concentrations in sediment were similar to those in background samples (**Table 3-4**).
- Several pesticides were identified as COPECs in near surface soil. Of these, only three (4,4′-DDD, 4,4′-DDE, and 4,4′-DDT) were detected at concentrations exceeding the criteria in sediment. 4,4′-DDD, 4,4′-DDE, and 4,4′-DDT were generally only marginally above the saltwater sediment ESC (0.001 to 0.0022 mg/kg).
- Though one PCB was identified as a COPEC in sediment, PCBs were not identified as COPECs in near surface soil and their presence in sediment may not be related to the landfill.
- PAHs have many anthropogenic sources and are ubiquitous in environmental media. The detected concentrations of PAHs identified as COPECs were at low concentrations and similar to those identified in background samples (**Table 3-3** and **Table 3-4**); the highest concentrations were west of Landfill 14 (FTMM-14) near Malterer Avenue and are more likely

due to runoff from roads and parking surfaces than from the landfill. Though above the ER-Ls used for screening, all concentrations were well below the ER-Ms.

- The concentrations of metals were similar to those found in background samples (**Table 3-4**).

Within the landfill, COPECs were identified in soils and groundwater that could migrate to ecological exposure points in nearby surface water or sediment. No COPECs were identified in surface water. The concentrations of metals in sediment, though potentially related to landfill soil or groundwater COPECs indicating a potential migration pathway, are at low concentrations in relation to the ESC and similar to background concentrations. Based on these considerations and the information provided in this report, it is concluded that constituents at Landfill 14 (FTMM-14) are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Landfill 14 (FTMM-14) are not warranted or recommended.

4.1.8 WATER TANK (FTMM-15)

Surface water and sediment data were evaluated. Ecological receptors may be exposed to surface water or sediment. No COPECs were identified in surface water. One pesticide and several metals were identified as COPECs in sediment. **Table 4-15** provides a summary of the COPECs in sediment at Site FTMM-15 as well as background and ambient levels of those constituents.

No significant habitats in the vicinity of FTMM-15 are identified within GIS digital data available through the NJDEP.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that Parkers Creek is listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Site FTMM-15 is judged to be minimal for the following reasons:

- No VOCs, SVOCs, or PCBs were identified as COPECs in surface water or sediment where ecological exposures could occur.
- No pesticides or metals were identified as COPECs in surface water.
- The detected concentration (0.0041 mg/kg) of one pesticide, 4,4′-DDT, identified as a COPEC in sediment exceeded the saltwater ER-L (0.001 mg/kg) but less than the ER-M (0.007 mg/kg).
- The concentrations of metals were similar to those found in background samples (**Table 3-4**).

No COPECs were identified in surface water. Only one pesticide, in one sample at a low concentration, and metals were identified as COPECs in sediment. Metals were similar to background. Based on these considerations and the information provided in this report, it is concluded that constituents at Site FTMM-15 are unlikely to have a significant effect on sensitive ecological receptors or habitats, and additional ecological assessments at Site M-15 are not warranted or recommended.

4.1.9 PESTICIDE STORAGE, BUILDING 498 (FTMM-16)

Surface water and sediment data were evaluated. Ecological receptors may be exposed to surface water or sediment. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper was greater than the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. One SVOC and several metals were identified as COPECs in sediment. **Table 4-16** and **Table 4-17** provide a summary of the COPECs in surface water and sediment at Site FTMM-16 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of low marsh saline wetlands west of the marina and east of Oceanport Avenue (**Figure 4-2**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that wetland area along Oceanport Creek is habitat Rank 4 for the Least Tern; this rank indicates at least one or more occurrences of a state endangered species. Oceanport Creek, as well as the wetlands, is listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Site FTMM-16 is judged to be minimal for the following reasons:

- No VOCs, pesticides, or PCBs were identified as COPECs in surface water or sediment where ecological exposures could occur.
- No PCBs or metals were identified as COPECs in surface water.
- The only SVOC identified as a COPEC in sediment, hexachlorobutadiene, was only detected in one sample and the concentration (0.008 mg/kg) was within an order of magnitude of the saltwater ESC (0.0013 mg/kg).
- The concentrations of two metals were found in sediment at concentrations above those in background samples (**Table 3-4**): chromium and zinc. Site FTMM-16 is a concern due to the presence of pesticides that were detected to have migrated from the site (a soil removal action was completed in 1999). Chromium, lead, and zinc are not expected to be found related to the operations of the Pesticide Storage Area. These concentrations were detected in sediments collected from an active marina and are more likely due to marina activities rather than those related to pesticide storage at Site FTMM-16 or to natural geology or regional anthropogenic deposition; chromium concentrations were similar to those reported for ambient soils in the urban coastal plain (BEM Systems, Inc., 1998), similar to the range of background soil reported for the SI (Weston, 1995), and less than that reported for glauconitic soils (median concentration of 348 mg/kg) by Dooley (2001).

No COPECs were identified in surface water. Only one SVOC, in one sample at a low concentration, and metals were identified as COPECs in sediment. Though most metals were similar to background, chromium and zinc showed some elevated levels but these are more likely due to marina activities rather than those related to pesticide storage at Site FTMM-16 or natural geology and regional anthropogenic deposition. Based on these considerations and the information provided in this report, constituents related to Site FTMM-16 are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Site FTMM-16 are not warranted or recommended.

4.1.10 FORMER TRAINING AREA/LANDFILL (FTMM-18)

Near surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to near surface soils or groundwater, but ecological receptors may be exposed to surface water or sediment. This evaluation identified two pesticides, two SVOCs, and several metals as COPECs in near surface soil. A few metals were identified as COPECs in groundwater. Though there are no direct ecological exposures to near surface soils or groundwater, the COPECs in soil and groundwater may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper was greater than the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. Several metals were identified as COPECs in sediment. **Table 4-18** and **Table 4-19** provide a summary of the COPECs in surface water and sediment at Site FTMM-18 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of Phragmites dominated coastal wetlands and high marsh saline wetlands adjacent to Parkers Creek (**Figure 4-2**); based on on-site observations, there is also an area of deciduous wetlands between the maintained lawns and the emergent wetlands and there are small emergent wetlands within the area of maintained lawn.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland areas along Parkers Creek are habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species. Parkers Creek as well as the associated wetlands are listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Site FTMM-18 is judged to be minimal for the following reasons:

- Ecological receptors are not frequently exposed to subsurface soils; COPECs are in subsurface soils and ecological exposure is unlikely though contaminants may migrate to potential exposure points.
- The pesticide and PCB COPECs identified in soils were detected infrequently at concentrations exceeding the ESC.
- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- A few metals were identified as COPECs in groundwater that may flow to potential exposure points.
- Though copper was identified as a potential COPEC in surface water, copper concentrations in sediment were similar to those in background samples (**Table 3-4**).
- Though a pesticide and a PAH were identified as COPECs in near surface soils, they were not identified as COPECs in surface water or sediment where ecological exposures may occur.
- With the exception of the concentrations of silver in two sediment samples, the concentrations of metals were similar to those found in background samples from the BEE investigation (**Table 3-3** and **Table 3-4**) or SI (Weston, 1995). Siler was identified as a COPEC in near surface soil but not in groundwater or surface water.

Within the landfill, COPECs were identified in soils and groundwater that could migrate to ecological exposure points in nearby surface water or sediment. No COPECs were identified in surface water. Only metals were identified as COPECs in sediment. Though most metals in sediment were found at concentrations similar to background, silver was detected at concentrations above background. Potential risks due to exposure to elevated silver are limited in area around Site FTMM-18. Based on these considerations and the information provided in this report, constituents related to Site FTMM-18 are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Site FTMM-18 are not warranted or recommended.

4.1.11 PRE-1941 FORMER SANITARY SEWAGE TREATMENT PLANT (FTMM-20)

Surface water and sediment data were evaluated. Ecological receptors may be exposed to surface water or sediment. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper was greater than the applicable ESC and copper was identified as a COPEC in sediment, copper is considered a possible COPEC in surface water. Several metals were identified as COPECs in sediment. **Table 4-20** and **Table 4-21** provide a summary of the COPECs in surface water and sediment at Site FTMM-20 as well as background and ambient levels of those constituents.

No significant habitats in the vicinity of Site FTMM-20 are identified within GIS digital data available through the NJDEP.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that Parkers Creek is listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Site FTMM-20 is judged to be minimal for the following reasons:

- No VOCs, SVOCs, pesticides, or PCBs were identified as COPECs in surface water or sediment where ecological exposures may occur.
- No metals were identified as COPECs in surface water.
- Though copper was identified as a potential COPEC in surface water, copper concentrations in sediment were similar to those in background samples (**Table 3-4**).
- The concentrations of metals in sediment were similar to those found in background samples (**Table 3-4**). Additionally, though Parkers Creek is tidal in the area of Site FTMM-20, the greatest concentrations were found in the upstream samples.

No COPECs were identified in surface water. Only metals were identified as COPECs in sediment. The concentrations of metals in sediment were similar to those in background, consistent with the findings of the SI report (Weston, 1995). Based on these considerations and the information provided in this report, it is concluded that constituents at Site FTMM-20 are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Site FTMM-20 are not warranted or recommended.

4.1.12 BUILDING 1122, FTMM-59 (ECP PARCEL 43)

Groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to groundwater, but ecological receptors may be exposed to surface water or sediment. No COPECs were identified in groundwater. Only three PAHs and lead were identified as COPECs in surface water. Several PAHs and metals were identified as COPECs in sediment. Though cadmium was not detected in surface water, its MDLs were greater than the freshwater ESC and cadmium was identified as a COPEC in sediment; therefore, cadmium is considered a potential COPEC in surface water. **Table 4-22** and **Table 4-23** provide a summary of the COPECs in surface water and sediment at Parcel 43 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous wetlands along Mill Creek in the area of Building 1122 (FTMM-59) and Parcel 43.

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

The potential for ecological effects from COPECs at Building 1122 (FTMM-59) and Parcel 43 is judged to be minimal for the following reasons:

- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- No COPECs were identified in groundwater that may flow to potential exposure points.
- Pesticides, PCBs, and VOCs were not identified as COPECs in surface water or sediment where ecological exposures may occur.
- Lead in surface water was found at concentrations similar to those in background samples (**Table 3-3**).
- Though cadmium was identified as a potential COPEC in surface water, cadmium concentrations in sediment were similar to those in background samples (**Table 3-4**).
- PAHs have many anthropogenic sources and are ubiquitous in environmental media. The detected concentrations of PAHs in surface water and sediment identified as COPECs were at low concentrations and most were similar to those in background samples (**Table 3-3** and **Table 3-4**).

- With the exception of chromium, the concentrations of metals were similar to those found in background samples from the BEE investigation (**Table 3-4**) or SI (Weston, 1995). Chromium concentrations were within the range of ambient soil levels determined for the urban coastal region (BEM Systems, Inc., 1998), the range of background soil concentrations reported for the SI (Weston, 1995), and the range of concentrations reported for glauconitic soils (Dooley, 2001); thus, chromium may be related to natural geology or regional deposition.

No COPECs were identified in groundwater. The only metal identified as a COPEC in surface water was lead, which was found at concentrations similar to background. PAHs identified as COPECs in surface water and sediment were identified at concentrations similar to background and are likely related to general runoff from road surfaces in the area. Though most metals in sediment were found at concentrations similar to background sediment, chromium was detected at concentrations above sediment background but within the range of ambient soil concentrations and below median concentrations for glauconitic soils. Based on these considerations and the information provided in this report, it is concluded that constituents at Building 1122 (FTMM-59) and Parcel 43 are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Building 1122 (FTMM-59) and Parcel 43 are not warranted or recommended.

4.1.13 BUILDING 1150 (ECP PARCEL 39)

Surface soil, surface water, and sediment data were evaluated. Ecological receptors have limited potential for exposure to soils in the area, but ecological receptors may be exposed to surface water or sediment. Several metals were identified as COPECs in soil. Only two PAHs and lead were identified as COPECs in surface water. One PCB, five PAHs, and several metals were identified as COPECs in sediment. Though cadmium was not detected in surface water, its MDLs were greater than the freshwater ESC and cadmium was identified as a COPEC in soil and sediment; therefore, cadmium is considered a potential COPEC in surface water. **Table 4-24** and **Table 4-25** provide a summary of the COPECs in surface water and sediment at Parcel 39 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous wetlands and herbaceous wetlands along Mill Creek in the area of Parcel 39 (**Figure 4-1** and **Figure 4-2**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the forested wetland area along Mill Creek adjacent to Parcel 39 is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

The potential for ecological effects from COPECs at Parcel 39 is judged to be minimal for the following reasons:

- Soil samples represent concentrations near the buildings and operations of Parcel 39 and are limited in area. Ecological receptors are not frequently exposed to these soils, though contaminants may migrate to potential exposure points.
- No VOCs, PCBs, or SVOCs were identified as COPECs in soil.
- Though one PCB was identified as a COPEC in sediments, it was not identified as a COPEC in other site media. PCBs were not identified as COPECs in surface water or soil and may not be related to Parcel 39. The concentration of PCBs was marginally above the ESC.
- Lead in surface water was found at concentrations similar to those in background samples (**Table 3-3**).
- Though copper was identified as a potential COPEC in surface water, copper concentrations in sediment were similar to those in background samples (**Table 3-4**).
- PAHs have many anthropogenic sources and are ubiquitous in environmental media. The detected concentrations of PAHs identified as COPECs in surface water and sediment were

at low concentrations and were similar to those in background samples (**Table 3-3** and **Table 3-4**).

- The concentrations of metals in sediment were similar to those found in background samples (**Table 3-4**).

In soil at Parcel 39, only metals were identified as COPECs. These soils are limited in area and are located near buildings and active areas where the potential for ecological exposures is limited. Metals and PAHs in surface water or sediment were at concentrations similar to background. Based on these considerations and the information provided in this report, it is concluded that constituents at Parcel 39 are unlikely to have a deleterious effect on sensitive ecological receptors or habitats and the potential for ecological risk is considered low, and additional ecological assessments at Parcel 39 are not warranted or recommended.

4.1.14 BUILDINGS 283, 288, 291, 293, 295 (FTMM-61 AND ECP PARCEL 49)

Surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed groundwater and have limited potential for exposure to soils in the area, but ecological receptors may be exposed to surface water or sediment. One PCB, several PAHs, and metals were identified as COPECs in soil. No VOCs were identified as COPECs in groundwater. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper exceeded the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. Several metals were identified as COPECs in sediment. Though pyrene and 2-methylnaphthalene were not detected in sediment, their detection limits were greater than the freshwater sediment ESC and they were identified as COPECs in soil; therefore, pyrene and 2-methylnaphthalene are considered potential COPECs in sediment. **Table 4-26** and **Table 4-27** provide a summary of the COPECs in surface water and sediment at FTMM-61 and Parcel 49 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of mixed high marsh saline wetlands and Phragmites dominated wetlands along Parkers Creek on the western portion of Parcel 49 (**Figure 4-2**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species, and that Parkers Creek is listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at FTMM-61 and Parcel 49 is judged to be minimal for the following reasons:

- Soil samples represent concentrations near the buildings and operations of FTMM-61 and Parcel 49 and are limited in area. Ecological receptors are not frequently exposed to these soils, though contaminants may migrate to potential exposure points.
- Though PAHs were identified as COPECs in soil, they were not identified as COPECs in other site media where ecological exposures may occur, suggesting limited migration of these constituents.
- Though one PCB was identified as a COPEC in soil, it was not identified as a COPEC in other site media where ecological exposures may occur.
- VOCs and pesticides were not identified as COPECs in environmental media.
- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- Zinc was the only COPEC identified in groundwater that may flow to potential exposure points.

- No COPECs were identified in surface water where ecological exposures may occur.
- With the exception of chromium and zinc, the concentrations of metals in sediment were similar to those found in background samples from the BEE investigation (**Table 3-4**) or the SI (Weston, 1995). Concentrations of chromium were greater than the background concentrations but well within the range expected for glauconitic soils (Dooley, 2001); though concentrations were greater than the ER-L they were less than the ER-M. The concentration of zinc in one of two samples and its duplicate sample (1,320 and 2,090 mg/kg) exceeded the ER-M (410 mg/kg).

In FTMM-61 and Parcel 49 soil, PAHs and PCBs were identified as COPECs but were not identified as COPECs in surface water or sediment where ecological exposures may occur, suggesting limited migration. Several metals in soil and zinc in groundwater were identified as COPECs that could migrate to ecological exposure points in nearby surface water or sediment. No COPECs were identified in surface water. Though most metals in sediment were found at concentrations similar to background, a few (chromium and zinc) were detected at concentrations above background; though chromium concentrations are similar to those in glauconitic soils. Based on these considerations and the information provided in this report, it is concluded that there is a potential for some ecological risk due to elevated metals zinc in sediment in a limited area around FTMM-61 and Parcel 49, though these concentrations may be related to other anthropogenic sources. Additional ecological assessments at FTMM-61 and Parcel 49 are not warranted or recommended. It is unlikely to have a significant deleterious effect on sensitive ecological receptors or habitats and the potential for significant ecological risk is considered minimal.

4.1.15 BUILDING 1075 (ECP PARCEL 61)

Surface soil, surface water, and sediment data were evaluated. Ecological receptors have limited potential for exposure to soils within the area, but ecological receptors may be exposed to surface water or sediment. Three PAHs and several metals were identified as COPECs in soil. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper was greater than the applicable ESC and copper was identified as a COPEC in soil, copper is considered a possible COPEC in surface water. Several PAHs and two metals were identified as COPECs in sediment. **Table 4-28** and **Table 4-29** provide a summary of the COPECs in surface water and sediment at Parcel 61 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous shrub/scrub wetlands along the tributary to Husky Brook (**Figure 4-1**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species, and that Husky Brook is listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Parcel 61 is judged to be minimal for the following reasons:

- Soil samples represent concentrations near the buildings and operations of Parcel 61 and are limited in area. Ecological receptors are not frequently exposed to these soils, though contaminants may migrate to potential exposure points.
- PAHs, as well as metals, were identified as COPECs in soil that could migrate to surface water or sediment.
- VOCs, pesticides, and PCBs were not identified as COPECs in environmental media.
- Though copper was identified as a potential COPEC in surface water, copper concentrations in sediment were similar to those in background samples (**Table 3-4**).

- Though PAHs have many anthropogenic sources and are ubiquitous in environmental media, elevated concentrations in soil at Parcel 61 may indicate a site-related source of PAHs to surface water and sediment. The detected concentrations of PAHs identified as COPECs were at low concentrations and most were similar to those in background samples (**Table 3-3** and **Table 3-4**). Though concentrations in sediment exceeded the ER-Ls used for screening, all concentrations were less than the ER-Ms.
- The concentrations of metals in sediment were similar to those found in background samples (**Table 3-4**).

In soil at Parcel 61, PAHs were identified as COPECs. These were also identified as COPECs in sediment of the small tributary to Husky Brook. Metals in sediment were found at concentrations similar to background. Based on these considerations and the information provided in this report, it is concluded that there is a potential for some ecological risk due to elevated PAHs in sediment. These exposures are limited in area in the small tributary to Husky Brook around Parcel 61, and may also be related to other anthropogenic sources; all PAH concentrations were well below the ER-M values, and additional ecological assessments at Parcel 61 are not warranted or recommended.

4.1.16 BUILDING 900 (ECP PARCEL 69)

Surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed groundwater and have limited potential for exposure to soils in the area, but ecological receptors may be exposed to surface water or sediment. Several metals were identified as COPECs in soil. No COPECs were identified in groundwater. No COPECs were identified as COPECs in surface water; however, given that the surface water MDL for copper was greater than the applicable ESC and copper was identified as a COPEC in other site media, copper is considered a possible COPEC in surface water. Several PAHs and metals were identified as COPECs in sediment. **Table 4-30** and **Table 4-31** provide a summary of the COPECs in surface water and sediment at Parcel 69 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of Phragmites dominated coastal wetlands (**Figure 4-2**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the emergent wetland area along Oceanport Creek is habitat Rank 4, which is assigned to patches with one or more occurrences of a state endangered species, in this case the Least Tern. Oceanport Creek and the adjacent wetlands are also listed as Conservation Rank 4 as potential bald eagle foraging habitat (**Figure 4-3**), indicating that open water and adjacent emergent wetlands could be used for foraging by bald eagles. The presence of bald eagles has not been documented for this site.

The potential for ecological effects from COPECs at Parcel 69 is judged to be minimal for the following reasons:

- Soil samples represent concentrations near the buildings and operations of Parcel 69 and are limited in area. Ecological receptors are not frequently exposed to these soils, though contaminants may migrate to potential exposure points.
- Only metals were identified as COPECs in soil.
- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- No COPECs were identified in groundwater that may flow to potential exposure points.
- VOCs, pesticides, and PCBs were not identified as COPECs in environmental media.
- No COPECs were identified in surface water where ecological exposures may occur.
- Though PAHs were identified as COPECs in sediment, they were not identified as COPECs in other site media; PAHs may not be related to Parcel 69 and at concentrations similar to background (**Table 3-4**).

- With the exception of chromium and zinc, the concentrations of metals in sediment were similar to those found in background samples from the BEE investigation (**Table 3-4**) or the SI (Weston, 1995). Chromium concentrations were similar to those found in glauconitic soils (Dooley, 2001).

Based on these considerations and the information provided in this report, it is concluded that though there is a potential for some ecological risk due to elevated metals (including zinc), these exposures are limited in area around Parcel 69 and may be related to regional anthropogenic inputs based on the proximity of the locations to areas of heavy vehicular traffic, and additional ecological assessments at Parcel 69 are not warranted or recommended.

4.2 CHARLES WOOD AREA

In the CWA, two IRP Sites and three ECP Parcels were addressed in this BEE.

4.2.1 LANDFILL, SITE CW-3A (FTMM-25)

Near surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to near surface soils or groundwater, but ecological receptors may be exposed to surface water or sediment. This evaluation identified four pesticides, one PCB, one PAH, and several metals as COPECs in near surface soil. Six metals were identified as COPECs in groundwater. Though there are no direct ecological exposures to near surface soils or groundwater, the COPECs in soil and groundwater may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. Two PAHs, cadmium, and zinc were identified as COPECs in surface water. One pesticide, several SVOC, and several metals were identified as COPECs in sediment. Given that the surface water MDL for silver exceeded the applicable ESC and silver was identified as a COPEC in soil, silver is considered a possible COPEC in surface water. **Table 4-32** and **Table 4-33** provide a summary of the COPECs in surface water and sediment at Landfill CW-3A (FTMM-25) as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous wooded wetlands along Shrewsbury Creek (**Figure 4-4**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

The potential for ecological effects from COPECs at Landfill CW-3A (FTMM-25) is judged to be minimal for the following reasons:

- Ecological receptors are not frequently exposed to subsurface soils; COPECs are in subsurface soils and ecological exposure is unlikely though contaminants may migrate to potential exposure points.
- One PCB was detected in a soil sample at a concentration exceeding the ESC, but PCBs were not identified as COPECs in surface water or sediment where ecological exposures may occur.
- Though two pesticides (4,4′-DDT and dieldrin) were found in soil at concentrations exceeding the ESC, only one pesticide (4,4′-DDD) was identified as a COPEC in sediment and the concentration was low, within a factor of two of the freshwater sediment ESC.
- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- Several metals were identified as COPECs in groundwater.
- VOCs were not identified as COPECs in environmental media.
- PAHs have many anthropogenic sources and are ubiquitous in environmental media. With the exception of the most upstream sediment sample, the detected concentrations of PAHs identified as COPECs in surface water and sediment were at low concentrations and most were similar to those in background samples (**Table 3-5** and **Table 3-6**); the highest

concentrations were immediately downgradient of Pearl Harbor Avenue at the westernmost extreme of the Landfill boundary. Given that PAHs were not identified as COPECs on the landfill (soil or groundwater), it is likely that the PAHs are not related to the landfill.

- The concentrations of metals in surface water were similar to those found in background samples (**Table 3-5**).
- The concentrations of a few metals exceeded the ESC and the concentrations in CWA background samples (arsenic, cadmium, chromium, copper, mercury) (**Table 3-5** and **Table 3-6**), though concentrations were similar to those measured in background samples at the MP (**Table 3-3** and **Table 3-4**), similar to those measure in background samples in the SI (Weston, 1995), or within the range of background soil levels in the region (BEM Systems, Inc., 1998).

Within the landfill, COPECs were identified in soils and groundwater that could migrate to ecological exposure points in nearby surface water or sediment. COPECs in surface water were limited to two PAHs, cadmium and zinc. Several PAHs and metals were identified as COPECs in sediment. PAHs are most likely not due to the landfill since they were only identified as COPECs at the upgradient extent of the landfill near Pearl Harbor Avenue, and PAHs were not identified as COPECs in landfill soil. Most metals were identified at concentrations similar to background. Though chromium concentrations in sediment were greater than measured background concentrations, they were similar to soil concentrations from the region. Based on these considerations and the information provided in this report, it is concluded that constituents at Landfill CW-3A (FTMM-25) are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Landfill CW-3A (FTMM-25) are not warranted or recommended.

4.2.2 FORMER PESTICIDE STORAGE AREA, SITE CW-6 (FTMM-28)

Surface soil, groundwater, surface water, and wetland sediment data were evaluated. Ecological receptors are not directly exposed to groundwater and have limited exposure to soils in the area, but ecological receptors may be exposed to surface water or sediment. This evaluation identified two pesticides, one PAH, and several metals as COPECs in surface soil. Four metals were identified as COPECs in groundwater. Though there are no direct ecological exposures to groundwater and limited potential for exposure to soil in the area, the COPECs in soil and groundwater have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. One PCB, cadmium and lead were identified as COPECs in surface water. One PCB, one pesticide, one SVOC, and several metals were identified as COPECs in sediment. Given that the surface water MDLs for 4,4′-DDE and silver exceeded the applicable ESC and 4,4′-DDE and silver were identified as COPECs in other site media, 4,4′-DDE and silver are considered possible COPECs in surface water. **Table 4-34** and **Table 4-35** provide a summary of the COPECs in surface water and sediment at Site CW-6 (FTMM-28) as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate that the area west and south of Site CW-6 (FTMM-28) is deciduous wooded wetlands (**Figure 4-4**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 2, which is assigned to patches with one or more occurrences of a species of special concern, in this case the Wood Thrush.

The potential for ecological effects from COPECs at Site CW-6 (FTMM-28) is judged to be minimal for the following reasons:

- Soil samples represent concentrations in a small wooded area west of the buildings and operations of Site CW-6 (FTMM-28) and within an active golf course. Ecological receptors are not frequently exposed to these soils.
- Concentrations of pesticides in surface soil, though exceeding the soil ESC, were at low concentrations. The affected area is of limited size and located within an active golf course limiting the potential for ecological exposures.

- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- A few metals were identified as COPECs in groundwater.
- VOCs were not identified as COPECs in environmental media.
- One concentration of a pesticide, 4,4′-DDE, was detected at a concentration exceeding the freshwater sediment ESC in the wetlands. The potential pathways of exposure in the wetlands are more appropriate to those of soil exposures; the concentration is less than the soil ESC.
- COPECs identified in surface water (Aroclor 1242, cadmium, and lead) were found at greater or similar concentrations in Wampum Brook upgradient of Site CW-6 then downgradient of Site CW-6 (FTMM-28) and metals concentrations were similar to background concentrations.
- PAHs have many anthropogenic sources and are ubiquitous in environmental media. With the exception of the most upstream sediment sample, the detected concentrations of PAHs identified as COPECs were at concentrations similar to those in background samples (**Table 3-3** and **Table 3-4**). The greatest concentrations upstream are likely related to other sources and not Site CW-6 (FTMM-28).
- The concentrations of several metals in sediment exceeded the ESC and the concentrations in CWA background samples (**Table 3-5** and **Table 3-6**), though concentrations for most were similar to those measured in background samples at the MP (**Table 3-3** and **Table 3-4**). Only mercury was detected at concentrations that also exceeded the SELs. The greatest concentrations of mercury were found within the wetland area and not in Wampum Brook, and are similar to the range of ambient mercury soil concentrations reported for the urban coastal plain (BEM Systems, Inc., 1998).

COPECs were identified in soils representing a small area but ecological exposures are limited due to the size and its location within an active golf course. Though some metals were identified as COPECS in surface water or sediment as well as soil or groundwater indicating a potential pathway may exist, the COPECs in surface water and sediment of Wampum Brook, south of CW-6 (FTMM-28), were found at greater concentrations at the upstream boundary of the site and are most likely not related to Site CW-6 (FTMM-28). Most metals in wetland sediment were found at concentrations similar to background, though a few were at elevated concentrations they were within the range of ambient soil concentrations reported for the urban coastal plain (BEM Systems, Inc., 1998). Based on these considerations and the information provided in this report, it is concluded that constituents at Site CW-6 (FTMM-28) are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Site CW-6 (FTMM-28) are not warranted or recommended.

4.2.3 BUILDING 2700 (ECP PARCEL 15)

Groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to groundwater, but ecological receptors may be exposed to surface water or sediment. No VOCs, but several metals, were identified as COPECs in groundwater. Though there are no direct ecological exposures to groundwater and limited potential for exposure to soil in the area, the COPECs in groundwater may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. Only lead was identified as a COPEC in surface water; however, given that the surface water MDL for cadmium was greater than the applicable ESC cadmium was identified as a COPEC in groundwater, cadmium is considered a possible COPEC in surface water. Only chromium was identified as a COPEC in sediment. **Table 4-36** and **Table 4-37** provide a summary of the COPECs in surface water and sediment at Parcel 15 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous scrub/shrub wetlands along the narrow corridor of Shrewsbury Creek (**Figure 4-4**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

The potential for ecological effects from COPECs at Parcel 15 is judged to be minimal for the following reasons:

- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- Several metals were identified as COPECs in groundwater that may flow to potential exposure points.
- No VOCs, PCBs, pesticides, or SVOCs were identified as COPECs in environmental media.
- Only lead in surface water and chromium in sediment were identified as COPECs where ecological exposures could occur.
- Lead in surface water was found at concentrations similar to those in background samples (**Table 3-3**) and slightly greater than the freshwater ESC.
- Though cadmium was identified as a potential COPEC in surface water, cadmium concentrations in sediment were similar to those in background samples (**Table 3-4**).
- Chromium in sediment was found at concentrations similar to those in background samples (**Table 3-4**) and slightly greater than the freshwater sediment ESC.

Several metals were identified as COPECs in groundwater that could migrate to ecological exposure points in nearby surface water or sediment. COPECs in surface water were limited to lead and COPECs in sediment were limited to chromium. Both were found at concentrations similar to those in background samples and only slightly greater than the freshwater ESC. Based on these considerations and the information provided in this report, it is concluded that constituents at Parcel 15 are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Parcel 15 are not warranted or recommended.

4.2.4 BUILDINGS 2507 AND 2704 (ECP PARCEL 27)

Surface soil, surface water, and sediment data were evaluated. Ecological receptors have limited potential for exposure to surface soils within the area, but ecological receptors may be exposed to surface water or sediment. Several metals were identified as COPECs in surface soil. Cadmium, chromium, and lead were identified as COPECs in surface water. Six metals were identified as COPECs in sediment. **Table 4-38** and **Table 4-39** provide a summary of the COPECs in surface water and sediment at Parcel 27 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous wooded wetlands along Shrewsbury Creek (**Figure 4-4**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

The potential for ecological effects from COPECs at Parcel 27 is judged to be minimal for the following reasons:

- Soil samples represent concentrations near the buildings and operations of Parcel 27 and are limited in area. Ecological receptors are not frequently exposed to these soils, though contaminants may migrate to potential exposure points.
- Only metals were identified as COPECs in soil.
- No VOCs, PCBs, pesticides, or SVOCs were identified as COPECs in environmental media.
- Cadmium, chromium, and lead in surface water were found at concentrations similar to those in background samples (**Table 3-3**).

- The concentrations of a few metals in sediment exceeded the ESC and the concentrations in CWA background samples (arsenic, cadmium, copper, lead, and zinc) (**Table 3-6**), though concentrations were similar to those measured in background samples at the MP (**Table 3-4**).

Several metals were identified as COPECs in soil that could migrate to ecological exposure points in nearby surface water or sediment. Metals in surface water and sediment were found at concentrations similar to those in the area-wide background. Based on these considerations and the information provided in this report, it is concluded that constituents at Parcel 27 are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Parcel 27 are not warranted or recommended.

4.2.5 BUILDING 2525 (ECP PARCEL 28)

Surface soil, groundwater, surface water, and sediment data were evaluated. Ecological receptors are not directly exposed to groundwater and have limited potential for exposures to soils within the area, but ecological receptors may be exposed to surface water or sediment. Several metals were identified as COPECs in surface soil. No VOCs or SVOCs, but one metal, cadmium, were identified as COPECs in groundwater. Though there are no direct ecological exposures to groundwater and limited potential for exposure to soil in the area, the COPECs in groundwater may have the potential to migrate towards environmentally sensitive habitats where ecological receptors could be exposed to contaminants. Only lead was identified as a COPEC in surface water; however, given that the surface water MDL for cadmium was greater than the applicable ESC, cadmium was identified as a COPEC in groundwater, cadmium is considered a possible COPEC in surface water. Only chromium was identified as a COPEC in sediment. **Table 4-40** and **Table 4-41** provide a summary of the COPECs in surface water and sediment at Parcel 28 as well as background and ambient levels of those constituents.

GIS digital data available through the NJDEP indicate the presence of deciduous scrub/shrub wetlands along the narrow corridor of Shrewsbury Creek (**Figure 4-4**) as well as a strip of emergent wetlands located south of Parcel 28 (**Figure 4-5**).

The NJDEP Landscape Project Critical Wildlife Habitat database indicates that the wetland area is habitat Rank 1, which is assigned to patches that meet suitability requirements for endangered, threatened, or priority wildlife species but do not have confirmed occurrences of such species.

The potential for ecological effects from COPECs at Parcel 28 is judged to be minimal for the following reasons:

- Soil samples represent concentrations near the buildings and operations of Parcel 28 and are limited in area. Ecological receptors are not frequently exposed to these soils, though contaminants may migrate to potential exposure points.
- A few metals were identified as COPECs in soil at Parcel 28.
- Ecological receptors are not exposed directly to contaminants in groundwater, though groundwater may flow to potential exposure points.
- Only one metal, cadmium, was identified as COPECs in groundwater that may flow to potential exposure points. It was not identified as a COPEC in surface water or sediment.
- Though cadmium was identified as a potential COPEC in surface water, cadmium concentrations in sediment were similar to those in background samples (**Table 3-4**).
- No VOCs, PCBs, pesticides, or SVOCs were identified as COPECs in environmental media. Only lead in surface water and chromium in sediment were identified as COPECs where ecological exposures could occur.
- Lead in surface water was found at concentrations similar to those in background samples (**Table 3-3**) and slightly greater than the freshwater ESC.
- Chromium in sediment was found at concentrations similar to those in background samples (**Table 3-4**) and slightly greater than the freshwater sediment ESC.

A few metals were identified as COPECs in soil that could migrate to ecological exposure points in nearby surface water or sediment. Only cadmium was identified as a COPEC in groundwater, but it was not identified as a COPEC in surface water or sediment where ecological exposures may occur. Metals in surface water and sediment were found at concentrations similar to those in background. Based on these considerations and the information provided in this report, it is concluded that constituents at Parcel 28 are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at Parcel 28 are not warranted or recommended.

Table 4-1
Summary of Surface Water COPECs and Background Concentrations at Landfill 2 (FTMM-2)

COPEC	FW ESC (ug/L)	SW ESC (ug/L)	BEE Maximum Background (ug/L)	SI Maximum Surface Water (ug/L)	SI Maximum Ground Water (ug/L)	Mo. Cty Bkgd Ground Water (ug/L)	Site COPEC Summary		
							Maximum Detected (ug/L)	Number Detected Above ESC	Average Concentration (ug/L)
Inorganics									
Lead	5.4	24	18.8	65.9	22.7	<100	10.1	(2 of 2)	8.98
Possible COPECs									
DDE	4.51E-09	NAV	ND	NR	NR	NR	NA	NA	NA
Cadmium	0.14	8.8	0.8	ND	9.5	6	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-2
Summary of Sediment COPECs and Background Concentrations at Landfill 2 (FTMM-2)

COPEC	FW ESC (mg/kg)	SW ESC (mg/kg)	BEE Maximum Background (mg/kg)	SI Maximum Sediment (mg/kg)	SI Maximum Soil (mg/kg)	Mo. Cty Bkgd Soil (mg/kg)	Ambient Soil Levels Maximum Ambient (mg/kg)	Ambient Soil Levels 90th Percentile (mg/kg)	Site COPEC Summary Maximum Detected (mg/kg)	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration (mg/kg)
PCBs											
Aroclor 1242	0.07	0.023	0.064	NR	NR	NR	NR	NR	0.12	(1 of 13)	0.0289
Aroclor 1254	0.06	0.06	0.086	NR	NR	NR	NR	NR	0.064	(1 of 13)	0.0282
Aroclor 1260	0.005	0.005	ND	NR	NR	NR	NR	NR	0.040	(2 of 13)	0.0123
SVOCs											
Chrysene	0.34	0.384	1.9	0.37	0.65	3	1.78	0.47	0.37	(1 of 13)	0.152
Dibenzo(a,h)anthracene	0.06	0.063	0.088	0.12	0.079	ND	0.29	0.02	0.10	(1 of 13)	NA
2,4-Dinitrophenol	0.00621	NAV	ND	NR	NR	NR	NR	NR	1.1	(1 of 13)	NA
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	0.71	(1 of 13)	0.211
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	8.09	(1 of 13)	4.51
Barium	NAV	48	196	87.6	32.3	NR	154	65.8	356	(8 of 13)	80.2
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	2.76	(13 of 13)	1.90
Chromium	26	81	125	88.1	269	0.104	171	34.7	125	(13 of 13)	56.8
Copper	16	34	165	48.4	8	6.05	93	33.3	22.5	(1 of 13)	3.16
Lead	31	47	945	142	19.5	25.9	344	144	52.8	(4 of 13)	22.5
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.21	(1 of 13)	0.104
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	29.2	(1 of 13)	13.0

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-3
Summary of Surface Water COPECs and Background Concentrations at Landfill 3 (FTMM-3)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-4
Summary of Sediment COPECs and Background Concentrations at Landfill 3 (FTMM-3)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Pesticides											
DDD	0.008	0.002	0.0047	0.015	0.0096	NR	NR	NR	0.0095	(1 of 12)	0.00263
DDT	0.008	0.001	ND	0.11	0.11	NR	NR	NR	0.18	(1 of 12)	NA
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	22	(12 of 12)	18.1
Barium	NAV	48	196	87.6	32.3	NR	154	65.8	164	(11 of 12)	78.8
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	4.78	(12 of 12)	2.87
Chromium	26	81	125	88.1	269	0.104	171	34.7	106	(4 of 12)	67.4
Cobalt	50	10	16.8	119	4.5	NR	32	3.2	12.5	(3 of 12)	6.75
Copper	16	34	165	48.4	8	6.05	93	33.3	370	(2 of 12)	41.0
Lead	31	47	945	142	19.5	25.9	344	144	154	(5 of 12)	66.0
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.295	(4 of 12)	0.125
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	30	(3 of 12)	16.0
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	8.85	(12 of 12)	6.87
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	2.14	(3 of 12)	0.64
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	90.2	(6 of 12)	56.4
Zinc	120	150	423	162	81.4	44.6	259	106	352	(6 of 12)	194

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-5
Summary of Surface Water COPECs and Background Concentrations at Landfill 4 (FTMM-4)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-6
Summary of Sediment COPECs and Background Concentrations at Landfill 4 (FTMM-4)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Pesticides											
DDD	0.008	0.002	0.0047	0.015	0.0096	NR	NR	NR	0.0062	(2 of 6)	0.00278
DDT	0.008	0.001	ND	0.11	0.11	NR	NR	NR	0.0016	(1 of 6)	NA
PCBs											
Aroclor 1232	0.07	0.023	ND	NR	NR	NR	NR	NR	0.093	(1 of 6)	NA
Aroclor 1242	0.07	0.023	0.064	NR	NR	NR	NR	NR	0.075	(2 of 6)	0.037
Aroclor 1260	0.005	0.005	ND	NR	NR	NR	NR	NR	0.036	(5 of 6)	0.0195
SVOCs											
Acenaphthene	0.016	0.016	0.47	NR	0.1	ND	NR	NR	0.12	(1 of 6)	NA
Anthracene	0.22	0.085	0.3	0.061	0.1	ND	NR	NR	0.15	(1 of 6)	0.0472
Benzo(a)anthracene	0.32	0.261	1.2	1.3	0.65	ND	1.82	0.43	0.31	(1 of 6)	0.131
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	0.7	(1 of 6)	0.221
Fluorene	0.19	0.019	0.82	NR	0.074	ND	NR	NR	0.097	(1 of 6)	NA
Phenanthrene	0.56	0.24	8.3	0.39	0.39	ND	NR	NR	0.62	(1 of 6)	0.245
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	10.2	(1 of 6)	4.96
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	1.49	(3 of 6)	1.22
Cobalt	50	10	16.8	119	4.5	NR	32	3.2	24.6	(4 of 6)	15.1
Lead	31	47	945	142	19.5	25.9	344	144	65.1	(2 of 6)	42.3
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.257	(3 of 6)	0.149
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	3.67	(6 of 6)	2.62

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-7
Summary of Surface Water COPECs and Background Concentrations at Landfill 5 (FTMM-5)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-8
Summary of Sediment COPECs and Background Concentrations at Landfill 5 (FTMM-5)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Pesticides											
DDD	0.008	0.002	0.0047	0.015	0.0096	NR	NR	NR	0.016	(3 of 7)	0.00463
DDE	0.005	0.0022	0.0034	0.096	0.071	NR	NR	NR	0.0072	(3 of 7)	0.00306
DDT	0.008	0.001	ND	0.11	0.11	NR	NR	NR	0.0021	(4 of 7)	0.0014
SVOCs											
Acenaphthylene	0.044	0.044	1.6	NR	0.041	ND	NR	NR	0.15	(1 of 7)	NA
Anthracene	0.22	0.085	0.3	0.061	0.1	ND	NR	NR	0.23	(3 of 7)	0.104
Benzo(a)anthracene	0.32	0.261	1.2	1.3	0.65	ND	1.82	0.43	0.34	(1 of 7)	0.147
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	0.67	(1 of 7)	0.444
Fluorene	0.19	0.019	0.82	NR	0.074	ND	NR	NR	0.27	(1 of 7)	NA
2-Methylnaphthalene	0.07	0.07	1.3	NR	NR	NR	NR	NR	0.4	(1 of 7)	NA
Naphthalene	0.16	0.16	4.4	NR	NR	NR	NR	NR	0.26	(1 of 7)	NA
Phenanthrene	0.56	0.24	8.3	0.39	0.39	ND	NR	NR	0.96	(2 of 7)	0.284
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	0.7	(1 of 7)	0.431
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	43.5	(3 of 7)	11.5
Barium	NAV	48	196	87.6	32.3	NR	154	65.8	50.7	(1 of 7)	26.8
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	6.65	(3 of 7)	2.13
Chromium	26	81	125	88.1	269	0.104	171	34.7	119	(1 of 7)	47.3
Cobalt	50	10	16.8	119	4.5	NR	32	3.2	13.3	(1 of 7)	7.8
Lead	31	47	945	142	19.5	25.9	344	144	62.4	(1 of 7)	29.6
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.155	(1 of 7)	0.08
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	27.6	(1 of 7)	13.9
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	13.2	(7 of 7)	4.81
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	1.29	(1 of 7)	0.413
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	71.6	(1 of 7)	31.0
Zinc	120	150	423	162	81.4	44.6	259	106	203	(2 of 7)	109

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-9
Summary of Surface Water COPECs and Background Concentrations at Landfill 8 (FTMM-8)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-10
Summary of Sediment COPECs and Background Concentrations at Landfill 8 (FTMM-8)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Pesticides											
DDD	0.008	0.002	0.0047	0.015	0.0096	NR	NR	NR	0.0033	(3 of 12)	0.0022
PCBs											
Aroclor 1242	0.07	0.023	0.064	NR	NR	NR	NR	NR	0.17	(2 of 12)	0.06
Aroclor 1260	0.005	0.005	ND	NR	NR	NR	NR	NR	0.011	(1 of 12)	NA
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	18.9	(6 of 12)	18.9
Barium	NAV	48	196	87.6	32.3	NR	154	65.8	103	(6 of 12)	49.3
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	6.85	(11 of 12)	3.70
Chromium	26	81	125	88.1	269	0.104	171	34.7	131	(4 of 12)	69.6
Cobalt	50	10	16.8	119	4.5	NR	32	3.2	116	(10 of 12)	39.6
Copper	16	34	165	48.4	8	6.05	93	33.3	64.5	(4 of 12)	25.57
Lead	31	47	945	142	19.5	25.9	344	144	179	(7 of 12)	82.3
Manganese	630	260	551	70.2	90.7	59	1030	206	364	(1 of 12)	76.8
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.853	(9 of 12)	0.365
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	60.5	(7 of 12)	24.8
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	13.8	(12 of 12)	6.47
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	5.85	(3 of 12)	2.29
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	99.1	(4 of 12)	46.9
Zinc	120	150	423	162	81.4	44.6	259	106	415	(7 of 12)	195

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-11
Summary of Surface Water COPECs and Background Concentrations at Landfill 12 (FTMM-12)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-12
Summary of Sediment COPECs and Background Concentrations at Landfill 12 (FTMM-12)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Pesticides											
DDD	0.008	0.002	0.0047	0.015	0.0096	NR	NR	NR	0.0091	(9 of 13)	0.0046
DDE	0.005	0.0022	0.0034	0.096	0.071	NR	NR	NR	0.0071	(8 of 13)	0.0029
DDT	0.008	0.001	ND	0.11	0.11	NR	NR	NR	0.013	(4 of 13)	0.0025
PCBs											
Aroclor 1254	0.06	0.06	0.086	NR	NR	NR	NR	NR	0.23	(1 of 13)	NA
SVOCs											
Acenaphthene	0.016	0.016	0.47	NR	0.1	ND	NR	NR	0.64	(1 of 13)	NA
Anthracene	0.22	0.085	0.3	0.061	0.1	ND	NR	NR	0.6	(3 of 13)	0.083
Benzo(a)anthracene	0.32	0.261	1.2	1.3	0.65	ND	1.82	0.43	0.83	(6 of 13)	0.265
Benzo(a)pyrene	0.37	0.43	1.2	1.2	0.6	ND	1.8	0.42	0.68	(3 of 13)	0.231
Benzo(g,h,i)perylene	0.17	0.17	0.89	0.67	0.64	ND	NR	NR	0.36	(2 of 13)	0.323
Benzo(k)fluroanthene	0.24	0.24	0.74	0.58	0.43	ND	4.1	0.66	0.31	(2 of 13)	0.273
Chrysene	0.34	0.384	1.9	0.37	0.65	3	1.78	0.47	0.83	(6 of 13)	0.465
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	2.2	(6 of 13)	0.702
Fluorene	0.19	0.019	0.82	NR	0.074	ND	NR	NR	0.32	(1 of 13)	NA
Indeno(1,2,3-c,d)pyrene	0.2	0.2	0.98	0.7	0.46	ND	0.57	0.23	0.36	(2 of 13)	0.342
Phenanthrene	0.56	0.24	8.3	0.39	0.39	ND	NR	NR	1.9	(5 of 13)	0.534
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	1.5	(5 of 13)	0.815
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	18.6	(1 of 13)	3.37
Barium	NAV	48	196	87.6	32.3	NR	154	65.8	54	(1 of 13)	9.83
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	14	(2 of 13)	1.69
Chromium	26	81	125	88.1	269	0.104	171	34.7	101	(1 of 13)	28.1
Cobalt	50	10	16.8	119	4.5	NR	32	3.2	13.7	(1 of 13)	2.62
Copper	16	34	165	48.4	8	6.05	93	33.3	77.3	(2 of 13)	16.7
Lead	31	47	945	142	19.5	25.9	344	144	171	(1 of 13)	24.2
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	29.2	(1 of 13)	5.72
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	5.99	(10 of 13)	1.83
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	3.54	(1 of 13)	0.49
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	61.1	(1 of 13)	16.7
Zinc	120	150	423	162	81.4	44.6	259	106	218	(1 of 13)	58.8

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-13
Summary of Surface Water COPECs and Background Concentrations at Landfill 14 (FTMM-14)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-14
Summary of Sediment COPECs and Background Concentrations at Landfill 14 (FTMM-14)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Pesticides											
DDD	0.008	0.002	0.0047	0.015	0.0096	NR	NR	NR	0.0091	(9 of 13)	0.0046
DDE	0.005	0.0022	0.0034	0.096	0.071	NR	NR	NR	0.0071	(8 of 13)	0.0029
DDT	0.008	0.001	ND	0.11	0.11	NR	NR	NR	0.013	(4 of 13)	0.0025
PCBs											
Aroclor 1254	0.06	0.06	0.086	NR	NR	NR	NR	NR	0.23	(1 of 13)	NA
SVOCs											
Acenaphthene	0.016	0.016	0.47	NR	0.1	ND	NR	NR	0.64	(1 of 13)	NA
Anthracene	0.22	0.085	0.3	0.061	0.1	ND	NR	NR	0.6	(3 of 13)	0.083
Benzo(a)anthracene	0.32	0.261	1.2	1.3	0.65	ND	1.82	0.43	0.83	(6 of 13)	0.265
Benzo(a)pyrene	0.37	0.43	1.2	1.2	0.6	ND	1.8	0.42	0.68	(3 of 13)	0.231
Benzo(g,h,i)perylene	0.17	0.17	0.89	0.67	0.64	ND	NR	NR	0.36	(2 of 13)	0.323
Benzo(k)fluroanthene	0.24	0.24	0.74	0.58	0.43	ND	4.1	0.66	0.31	(2 of 13)	0.273
Chrysene	0.34	0.384	1.9	0.37	0.65	3	1.78	0.47	0.83	(6 of 13)	0.465
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	2.2	(6 of 13)	0.702
Fluorene	0.19	0.019	0.82	NR	0.074	ND	NR	NR	0.32	(1 of 13)	NA
Indeno(1,2,3-c,d)pyrene	0.2	0.2	0.98	0.7	0.46	ND	0.57	0.23	0.36	(2 of 13)	0.342
Phenanthrene	0.56	0.24	8.3	0.39	0.39	ND	NR	NR	1.9	(5 of 13)	0.534
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	1.5	(5 of 13)	0.815
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	18.6	(1 of 13)	3.37
Barium	NAV	48	196	87.6	32.3	NR	154	65.8	54	(1 of 13)	9.83
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	14	(2 of 13)	1.69
Chromium	26	81	125	88.1	269	0.104	171	34.7	101	(1 of 13)	28.1
Cobalt	50	10	16.8	119	4.5	NR	32	3.2	13.7	(1 of 13)	2.62
Copper	16	34	165	48.4	8	6.05	93	33.3	77.3	(2 of 13)	16.7
Lead	31	47	945	142	19.5	25.9	344	144	171	(1 of 13)	24.2
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	29.2	(1 of 13)	5.72
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	5.99	(10 of 13)	1.83
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	3.54	(1 of 13)	0.49
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	61.1	(1 of 13)	16.7
Zinc	120	150	423	162	81.4	44.6	259	106	218	(1 of 13)	58.8

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-15
Summary of Sediment COPECs and Background Concentrations Site 15 (FTMM-15)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Pesticides											
DDT	0.008	0.001	ND	0.11	0.11	NR	NR	NR	0.0041	(1 of 4)	NA
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	14.9	(3 of 4)	11.3
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	2.97	(4 of 4)	2.28
Chromium	26	81	125	88.1	269	0.104	171	34.7	95.5	(1 of 4)	73.6
Lead	31	47	945	142	19.5	25.9	344	144	108	(2 of 4)	56.9
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.293	(3 of 4)	0.2
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	6.98	(4 of 4)	5.21
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	1.44	(3 of 4)	1.19
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	83.2	(1 of 4)	50.0
Zinc	120	150	423	162	81.4	44.6	259	106	262	(2 of 4)	165

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-16
Summary of Surface Water COPECs and Background Concentrations at Site FTMM-16

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-17
Summary of Sediment COPECs and Background Concentrations at Site FTMM-16

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
SVOCs											
Hexachlorobutadiene	0.0265	0.0013	ND	NR	NR	NR	NR	NR	0.008	(1 of 5)	NA
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	24.5	(4 of 5)	16.9
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	12.3	(4 of 5)	8.86
Chromium	26	81	125	88.1	269	0.104	171	34.7	144	(4 of 5)	108
Copper	16	34	165	48.4	8	6.05	93	33.3	124	(4 of 5)	82.1
Lead	31	47	945	142	19.5	25.9	344	144	212	(4 of 5)	133
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.502	(3 of 5)	0.317
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	35.2	(3 of 5)	22.4
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	11	(4 of 5)	7.65
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	6.44	(4 of 5)	4.35
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	106	(3 of 5)	66.7
Zinc	120	150	423	162	81.4	44.6	259	106	500	(4 of 5)	324

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-18
Summary of Surface Water COPECs and Background Concentrations at Site FTMM-18

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-19
Summary of Sediment COPECs and Background Concentrations at Site FTMM-18

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	22.8	(2 of 5)	9.748
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	5.65	(4 of 5)	3.462
Chromium	26	81	125	88.1	269	0.104	171	34.7	132	(3 of 5)	86.02
Cobalt	50	10	16.8	119	4.5	NR	32	3.2	56	(2 of 5)	16.36
Copper	16	34	165	48.4	8	6.05	93	33.3	82.9	(1 of 5)	25.8
Lead	31	47	945	142	19.5	25.9	344	144	166	(2 of 5)	56.93
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.669	(3 of 5)	0.389
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	45.1	(2 of 5)	18.7
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	12.3	(5 of 5)	7.116
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	27.9	(2 of 5)	10.9
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	63	(1 of 5)	41.54
Zinc	120	150	423	162	81.4	44.6	259	106	358	(3 of 5)	175.3

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-20
Summary of Surface Water COPECs and Background Concentrations at Site FTMM-20

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-21
Summary of Sediment COPECs and Background Concentrations at Site FTMM-20

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	23.8	(2 of 2)	16.6
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	2.87	(2 of 2)	2.09
Chromium	26	81	125	88.1	269	0.104	171	34.7	99.4	(1 of 2)	83.5
Copper	16	34	165	48.4	8	6.05	93	33.3	71.2	(1 of 2)	41.6
Lead	31	47	945	142	19.5	25.9	344	144	59.4	(1 of 2)	46.4
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.322	(1 of 2)	0.215
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	21.6	(1 of 2)	15.7
Selenium	NAV	1	19	1.7	1.9	0.11	ND	ND	6.86	(2 of 2)	5.45
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	8.07	(2 of 2)	4.71
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	60.9	(1 of 2)	48.3
Zinc	120	150	423	162	81.4	44.6	259	106	184	(1 of 2)	132

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-22
Summary of Surface Water COPECs and Background Concentrations at Building 1122, Site FTMM-59, Parcel 43

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
SVOCs									
Anthracene	0.035	NAV	0.12	NR	NR	NR	0.12	(2 of 2)	0.12
Benzo(a)anthracene	0.025	NAV	0.23	NR	NR	NR	0.24	(2 of 2)	0.24
Benzo(a)pyrene	0.014	NAV	ND	NR	NR	NR	0.31	(1 of 2)	0.16
Inorganics									
Lead	5.4	24	18.8	65.9	22.7	<100	11.5	(2 of 2)	9.4
Possible COPECs									
Cadmium	0.14	8.8	0.8	ND	9.5	6	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-23
Summary of Sediment COPECs and Background Concentrations at Building 1122, Site FTMM-59, Parcel 43

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
SVOCs											
Benzo(a)anthracene	0.32	0.261	1.2	1.3	0.65	ND	1.82	0.43	0.61	(2 of 3)	0.44
Benzo(a)pyrene	0.37	0.43	1.2	1.2	0.6	ND	1.8	0.42	0.61	(2 of 3)	0.44
Benzo(k)fluroanthene	0.24	0.24	0.74	0.58	0.43	ND	4.1	0.66	0.39	(2 of 3)	0.30
Chrysene	0.34	0.384	1.9	0.37	0.65	3	1.78	0.47	0.88	(2 of 3)	0.66
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	1.4	(2 of 3)	1.03
Phenanthrene	0.56	0.24	8.3	0.39	0.39	ND	NR	NR	0.7	(1 of 3)	0.48
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	1.6	(2 of 3)	1.15
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	10.2	(3 of 3)	8.6
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	1.86	(2 of 3)	1.3
Chromium	26	81	125	88.1	269	0.104	171	34.7	161	(3 of 3)	157
Copper	16	34	165	48.4	8	6.05	93	33.3	53.6	(3 of 3)	40.7
Lead	31	47	945	142	19.5	25.9	344	144	116	(3 of 3)	78.5
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.47	(3 of 3)	0.33
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	36.4	(3 of 3)	29.5
Zinc	120	150	423	162	81.4	44.6	259	106	286	(2 of 3)	215
Possible COPECs											
Anthracene	0.22	0.085	0.3	0.061	0.1	ND	NR	NR	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-24
Summary of Surface Water COPECs and Background Concentrations at Building 1150, Parcel 39

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
SVOCs									
Anthracene	0.035	NAV	0.12	NR	NR	NR	0.11	(1 of 1)	0.11
Benzo(a)anthracene	0.025	NAV	0.23	NR	NR	NR	0.22	(1 of 1)	0.22
Inorganics									
Lead	5.4	24	18.8	65.9	22.7	<100	10.1	(1 of 1)	10.1
Possible COPECs									
Cadmium	0.14	8.8	0.8	ND	9.5	6	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-25
Summary of Sediment COPECs and Background Concentrations at Building 1150, Parcel 39

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
PCBs											
Aroclor 1254	0.06	0.06	0.086	NR	NR	NR	NR	NR	0.064	(1 of 4)	0.027
SVOCs											
Benzo(a)anthracene	0.32	0.261	1.2	1.3	0.65	ND	1.82	0.43	0.54	(1 of 6)	0.23
Chrysene	0.34	0.384	1.9	0.37	0.65	3	1.78	0.47	0.71	(3 of 6)	0.29
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	0.99	(2 of 6)	0.53
Naphthalene	0.16	0.16	4.4	NR	NR	NR	NR	NR			
Phenanthrene	0.56	0.24	8.3	0.39	0.39	ND	NR	NR	0.67	(1 of 6)	0.21
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	2	(3 of 6)	0.72
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	8.89	(2 of 6)	4.49
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	2.09	(6 of 6)	1.52
Chromium	26	81	125	88.1	269	0.104	171	34.7	131	(6 of 6)	68.2
Copper	16	34	165	48.4	8	6.05	93	33.3	41	(2 of 6)	11.9
Lead	31	47	945	142	19.5	25.9	344	144	61.7	(1 of 6)	26.0
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.67	(1 of 6)	0.17
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	32.4	(1 of 6)	14.4
Zinc	120	150	423	162	81.4	44.6	259	106	210	(1 of 6)	103

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-26
Summary of Surface Water COPECs and Background Concentrations at Buildings 283 (FTMM-61), 288, 291, 293, 295, Parcel 49

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-27
Summary of Sediment COPECs and Background Concentrations at Buildings 283 (FTMM-61), 288, 291, 293, 295, Parcel 49

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	29.7	(4 of 4)	10.5
Barium	NAV	48	196	87.6	32.3	NR	154	65.8	96.4	(4 of 4)	81.1
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	5.5	(3 of 4)	3.29
Chromium	26	81	125	88.1	269	0.104	171	34.7	353	(4 of 4)	230
Cobalt	50	10	16.8	119	4.5	NR	32	3.2	29.3	(2 of 4)	13.9
Copper	16	34	165	48.4	8	6.05	93	33.3	111	(3 of 4)	72.2
Lead	31	47	945	142	19.5	25.9	344	144	148	(1 of 4)	58.9
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.53	(3 of 4)	0.33
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	68.5	(2 of 4)	34.2
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	1.4	(1 of 4)	NA
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	125	(4 of 4)	101
Zinc	120	150	423	162	81.4	44.6	259	106	2090	(3 of 4)	917
Possible COPECs											
2-Methylnaphthalene	0.07	0.07	1.3	NR	NR	NR	NR	NR	NA	NA	NA
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-28
Summary of Surface Water COPECs and Background Concentrations at Building 1075, Parcel 61

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-29
Summary of Sediment COPECs and Background Concentrations at Building 1075, Parcel 61

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
SVOCs											
Acenaphthene	0.016	0.016	0.47	NR	0.1	ND	NR	NR	1.6	(1 of 2)	0.83
Anthracene	0.22	0.085	0.3	0.061	0.1	ND	NR	NR	0.29	(2 of 2)	0.23
Benzo(a)anthracene	0.32	0.261	1.2	1.3	0.65	ND	1.82	0.43	0.74	(2 of 2)	0.62
Benzo(a)pyrene	0.37	0.43	1.2	1.2	0.6	ND	1.8	0.42	0.65	(2 of 2)	0.54
Benzo(k)fluroanthene	0.24	0.24	0.74	0.58	0.43	ND	4.1	0.66	0.38	(1 of 2)	0.22
Chrysene	0.34	0.384	1.9	0.37	0.65	3	1.78	0.47	0.92	(2 of 2)	0.82
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	1.7	(2 of 2)	1.5
Fluorene	0.19	0.019	0.82	NR	0.074	ND	NR	NR	0.14	(1 of 2)	0.10
Phenanthrene	0.56	0.24	8.3	0.39	0.39	ND	NR	NR	1.2	(2 of 2)	0.94
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	2.2	(2 of 2)	1.9
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	13.3	(1 of 2)	7.5
Chromium	26	81	125	88.1	269	0.104	171	34.7	86	(1 of 2)	63

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-30
Summary of Surface Water COPECs and Background Concentrations at Building 900, Parcel 69

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Possible COPECs									
Copper	6.5	3.1	ND	10.2	65.6	730	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-31
Summary of Sediment COPECs and Background Concentrations at Building 900, Parcel 69

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
SVOCs											
Acenaphthene	0.016	0.016	0.47	NR	0.1	ND	NR	NR	1.2	(2 of 2)	0.85
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	2.8	(2 of 2)	1.8
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	3.1	(2 of 2)	2.1
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	36.2	(1 of 2)	19.4
Barium	NAV	48	196	87.6	32.3	NR	154	65.8	89.6	(1 of 2)	52.2
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	14.1	(1 of 2)	7.1
Chromium	26	81	125	88.1	269	0.104	171	34.7	345	(1 of 2)	210
Cobalt	50	10	16.8	119	4.5	NR	32	3.2	20.3	(1 of 2)	11.2
Copper	16	34	165	48.4	8	6.05	93	33.3	203	(2 of 2)	117
Lead	31	47	945	142	19.5	25.9	344	144	410	(1 of 2)	223
Manganese	630	260	551	70.2	90.7	59	1030	206	339	(1 of 2)	197
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	0.83	(1 of 2)	0.45
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	53.1	(1 of 2)	31.2
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	9.9	(1 of 2)	5.1
Vanadium	NAV	57	218	49.1	94.1	1.3	202	35.5	185	(1 of 2)	115
Zinc	120	150	423	162	81.4	44.6	259	106	515	(2 of 2)	321

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-32
Summary of Surface Water COPECs and Background Concentrations at Landfill CW-3A (FTMM-25)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
SVOCs									
Anthracene	0.035	NAV	0.12	NR	NR	NR	0.11	(2 of 2)	0.11
Benzo(a)anthracene	0.025	NAV	0.23	NR	NR	NR	0.31	(1 of 2)	0.16
Inorganics									
Cadmium	0.14-0.17	8.8	0.8	NR	9.5	6	0.79	(1 of 2)	0.52
Zinc	88-108	81	79.9	215	233	60	99.8	(1 of 2)	77.6
Possible COPECs									
Silver	0.12	1.9	NR	NR	ND	<10	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-33
Summary of Sediment COPECs and Background Concentrations at Landfill CW-3A (FTMM-25)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Pesticides											
DDD	0.008	0.002	0.0047	0.015	0.0096	NR	NR	NR	0.013	(1 of 6)	0.004
SVOCs											
Acenaphthene	0.016	0.016	0.47	NR	0.1	ND	NR	NR	0.78	(1 of 6)	NA
Anthracene	0.22	0.085	0.3	0.061	0.1	ND	NR	NR	4.1	(1 of 6)	0.69
Benzo(a)anthracene	0.32	0.261	1.2	1.3	0.65	ND	1.82	0.43	7.0	(1 of 6)	1.19
Benzo(a)pyrene	0.37	0.43	1.2	1.2	0.6	ND	1.8	0.42	4.6	(1 of 6)	0.78
Benzo(g,h,i)perylene	0.17	0.17	0.89	0.67	0.64	ND	NR	NR	2	(1 of 6)	NA
Benzo(k)fluroanthene	0.24	0.24	0.74	0.58	0.43	ND	4.1	0.66	2.3	(1 of 6)	NA
Chrysene	0.34	0.384	1.9	0.37	0.65	3	1.78	0.47	5.6	(1 of 6)	NA
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	17	(1 of 6)	NA
Fluorene	0.19	0.019	0.82	NR	0.074	ND	NR	NR	1.4	(1 of 6)	NA
Indeno(1,2,3-c,d)pyrene	0.2	0.2	0.98	0.7	0.46	ND	0.57	0.23	2	(1 of 6)	NA
Phenanthrene	0.56	0.24	8.3	0.39	0.39	ND	NR	NR	15	(1 of 6)	NA
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	13	(1 of 6)	2.23
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	6.59	(1 of 6)	1.99
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	3.38	(3 of 6)	1.19
Chromium	26	81	125	88.1	269	0.104	171	34.7	145	(5 of 6)	82.6
Copper	16	34	165	48.4	8	6.05	93	33.3	31.6	(2 of 6)	13.3
Lead	31	47	945	142	19.5	25.9	344	144	31.2	(1 of 6)	14.4

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-34
Summary of Surface Water COPECs and Background Concentrations at Site CW-6 (FTMM-28)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
PCBs									
Aroclor-1242	0.014	0.03	0.3	NR	NR	NR	0.3	(2 of 2)	0.215
Inorganics									
Cadmium	0.14-0.17	8.8	0.8	NR	9.5	6	0.8	(1 of 2)	0.53
Chromium	19-23	50	2.55	ND	191	<50			
Cobalt	24	NAV	28.7	4.1	30.6	NR	28.7	(1 of 2)	22.6
Lead	5.4	24	18.8	65.9	22.7	<100	8.79	(2 of 2)	7.56
Zinc	88-108	81	79.9	215	233	60			

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-35
Summary of Sediment COPECs and Background Concentrations at Site CW-6 (FTMM-28)

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Pesticides											
DDE	0.005	0.0022	0.0034	0.096	0.071	NR	NR	NR	0.006	(1 of 6)	NA
PCBs											
Aroclor 1260	0.005	0.005	ND	NR	NR	NR	NR	NR	0.1	(1 of 6)	NA
SVOCs											
Acenaphthene	0.016	0.016	0.47	NR	0.1	ND	NR	NR	0.47	(1 of 6)	NA
Acenaphthylene	0.044	0.044	1.6	NR	0.041	ND	NR	NR	1.6	(1 of 6)	NA
Anthracene	0.22	0.085	0.3	0.061	0.1	ND	NR	NR	0.3	(1 of 6)	0.055
Benzo(a)anthracene	0.32	0.261	1.2	1.3	0.65	ND	1.82	0.43	1	(1 of 6)	0.196
Benzo(a)pyrene	0.37	0.43	1.2	1.2	0.6	ND	1.8	0.42	1.2	(1 of 6)	0.292
Benzo(g,h,i)perylene	0.17	0.17	0.89	0.67	0.64	ND	NR	NR	0.89	(1 of 6)	NA
Benzo(k)fluroanthene	0.24	0.24	0.74	0.58	0.43	ND	4.1	0.66	0.74	(1 of 6)	NA
Chrysene	0.34	0.384	1.9	0.37	0.65	3	1.78	0.47	1.9	(1 of 6)	NA
2,4-Dinitrophenol	0.00621	NAV	ND	NR	NR	NR	NR	NR	1.7	(2 of 6)	1.28
Fluoranthene	0.75	0.6	4.9	1.5	0.46	ND	NR	NR	4.9	(1 of 6)	0.92
Fluorene	0.19	0.019	0.82	NR	0.074	ND	NR	NR	0.82	(1 of 6)	NA
Indeno(1,2,3-c,d)pyrene	0.2	0.2	0.98	0.7	0.46	ND	0.57	0.23	0.98	(1 of 6)	NA
2-Methylnaphthalene	0.07	0.07	1.3	NR	NR	NR	NR	NR	1.3	(1 of 6)	NA
Naphthalene	0.16	0.16	4.4	NR	NR	NR	NR	NR	4.4	(1 of 6)	NA
Phenanthrene	0.56	0.24	8.3	0.39	0.39	ND	NR	NR	8.3	(1 of 6)	NA
Pyrene	0.49	0.665	3.3	2	1.5	ND	NR	NR	3.3	(1 of 6)	0.63
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	13.1	(2 of 6)	5.45
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	5.56	(5 of 6)	2.00
Chromium	26	81	125	88.1	269	0.104	171	34.7	150	(6 of 6)	71.8
Copper	16	34	165	48.4	8	6.05	93	33.3	56.2	(4 of 6)	26.2
Lead	31	47	945	142	19.5	25.9	344	144	218	(4 of 6)	105
Mercury	0.2	0.15	0.424	1.7	ND	NR	6.1	0.21	6.6	(3 of 6)	1.60
Nickel	16	21	56.2	131	8.4	3.2	16.9	12.3	56.2	(3 of 6)	22.3
Silver	1	1	11.2	NR	1.1	0.21	6.3	0.65	12.1	(4 of 6)	3.72
Zinc	120	150	423	162	81.4	44.6	259	106	168	(1 of 6)	87.2

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-36
Summary of Surface Water COPECs and Background Concentrations at Building 2700, Parcel 15

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Inorganics									
Lead	5.4	24	18.8	65.9	22.7	<100	8.27	(1 of 2)	6.3
Possible COPECs									
Cadmium	0.14	8.8	0.8	ND	9.5	6	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-37
Summary of Sediment COPECs and Background Concentrations at Building 2700, Parcel 15

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Inorganics											
Chromium	26	81	125	88.1	269	0.104	171	34.7	37	(3 of 3)	32.5

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-38
Summary of Surface Water COPECs and Background Concentrations at Buildings 2507 and 2704, Parcel 27

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary Maximum Detected	Number Detected Above ESC	Average Concentration
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		(ug/L)
Inorganics									
Cadmium	0.14-0.17	8.8	0.8	NR	9.5	6	0.69	(2 of 2)	0.61
Chromium	19-23	50	2.55	ND	191	<50	28.5	(1 of 2)	14.5
Lead	5.4	24	18.8	65.9	22.7	<100	8.18	(2 of 2)	7.00

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-39
Summary of Sediment COPECs and Background Concentrations at Buildings 2507 and 2704, Parcel 27

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Inorganics											
Arsenic	6	8.2	61.6	14.5	31.6	4.56	83.1	13.6	6.11	(1 of 2)	4.7
Cadmium	0.6	1.2	17.2	NR	ND	0.116	2.7	0.32	1.76	(2 of 2)	1.24
Chromium	26	81	125	88.1	269	0.104	171	34.7	49.8	(2 of 2)	49.7
Copper	16	34	165	48.4	8	6.05	93	33.3	187	(1 of 2)	101
Lead	31	47	945	142	19.5	25.9	344	144	84.9	(1 of 2)	53.4
Zinc	120	150	423	162	81.4	44.6	259	106	264	(1 of 2)	172

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-40
Summary of Surface Water COPECs and Background Concentrations at Building 2525, Parcel 28

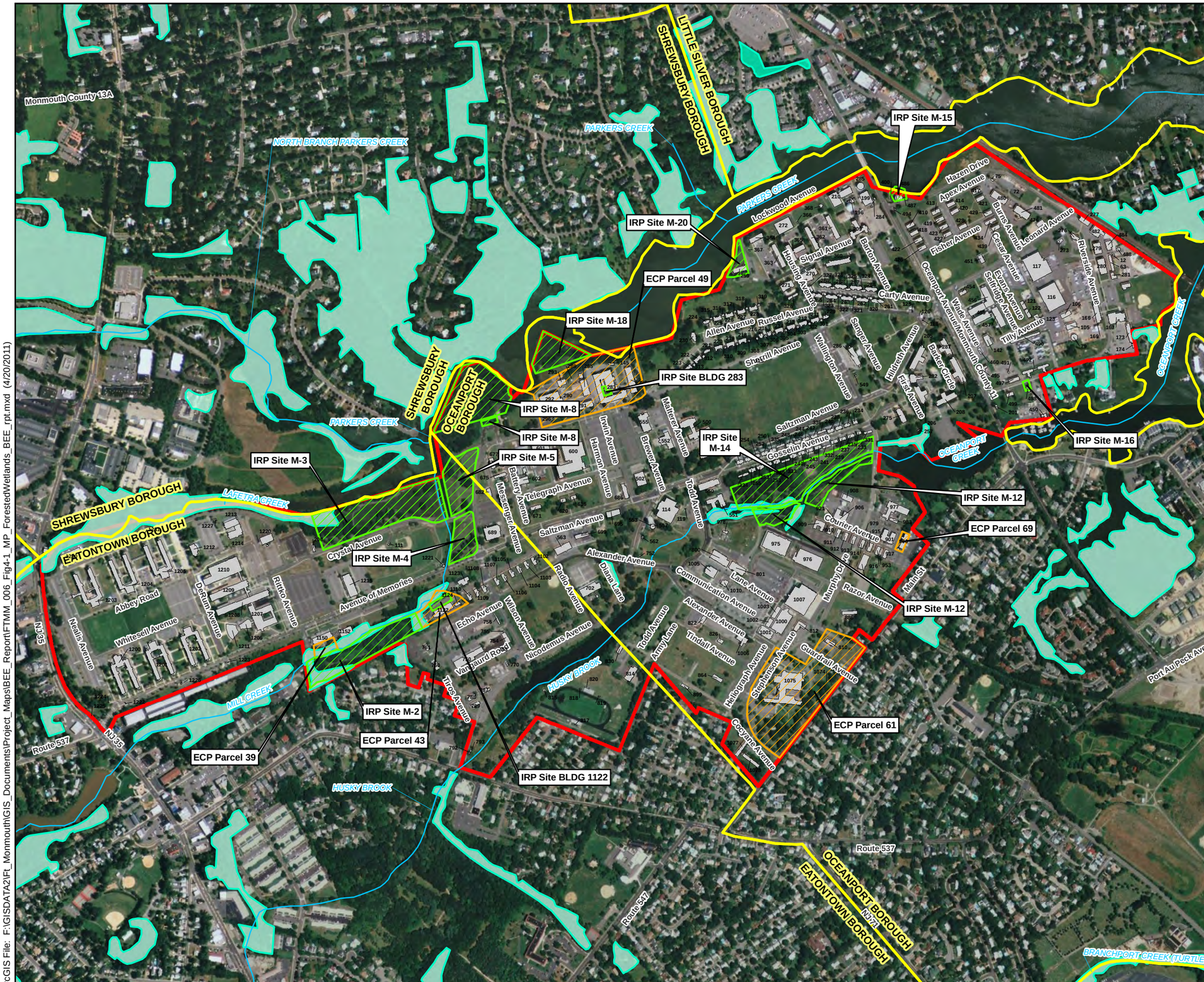
COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Surface Water	SI Maximum Ground Water	Mo. Cty Bkgd Ground Water	Site COPEC Summary		
							Maximum Detected	Number Detected Above ESC	Average Concentration
Inorganics									
Lead	5.4	24	18.8	65.9	22.7	<100	7.14	(2 of 2)	6.44
Possible COPECs									
Cadmium	0.14	8.8	0.8	ND	9.5	6	NA	NA	NA

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.

Table 4-41
Summary of Sediment COPECs and Background Concentrations at Building 2525, Parcel 28

COPEC	FW ESC	SW ESC	BEE Maximum Background	SI Maximum Sediment	SI Maximum Soil	Mo. Cty Bkgd Soil	Ambient Soil Levels Maximum Ambient	Ambient Soil Levels 90th Percentile	Site COPEC Summary Maximum Detected	Site COPEC Summary No Detected Above ESC	Site COPEC Summary Average Concentration
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)		(mg/kg)
Inorganics											
Chromium	26	81	125	88.1	269	0.104	171	34.7	43	(2 of 2)	39.9

FW = Freshwater
SW = Saltwater
ESC = Ecological Screening Criteria
BEE = Baseline Ecological Evaluation data
SI = Site Investigation (Weston, 1995)
Mo. Cty Bkgd = Monmouth County Background Concentration as reported in Weston (1995)
Ambient Soil Levels from BEM Systems, Inc. (1998)
COPEC = Constituent of Potential Ecological Concern
NA = Not applicable
ND = Not detected
NR = Not reported
NAV = Not available
Average Concentrations from ProUCL Ver. 4.00.05 - 1/2 detection limit or Kaplan-Meir Method used when non-detects present.



LEGEND

- Water Feature
- Building
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Forested Wetland

- Suitable (1)
- Priority Species (2)

Notes:
1) Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.
2) Forested wetlands data was obtained from New Jersey Department of Environmental Protection (NJDEP), Division of Fish, Wildlife, and Endangered Nongame Species Program (ENSP), Lanscape Project GIS Data, Version 2.1, November 2007.

N

Scale:
0 450 900 1,800 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw Environmental, Inc.

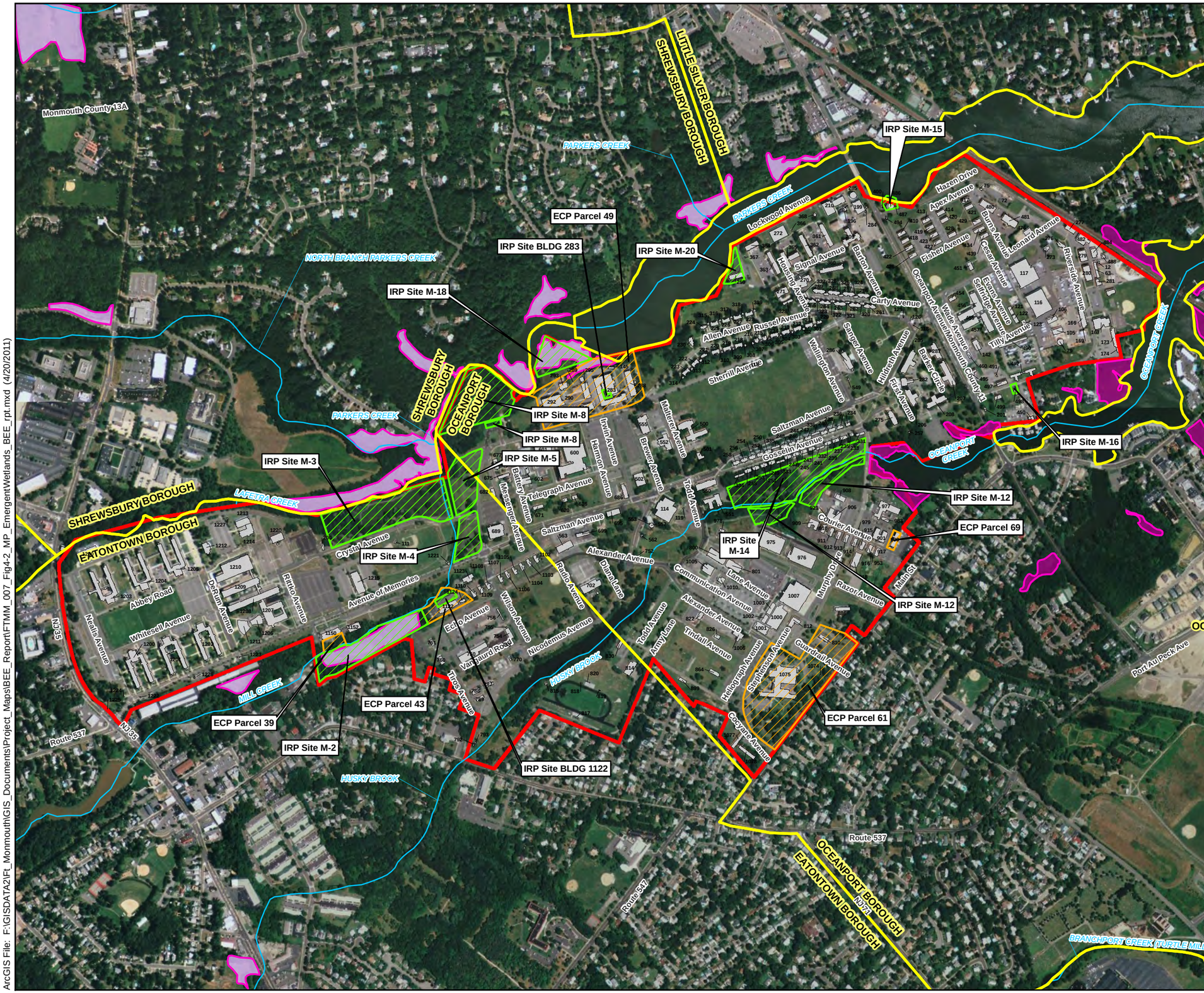
FIGURE 4-1

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

MAIN POST -
FORESTED WETLANDS

FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_006_Fig4-1_MP_ForestedWetlands_BEE_rpt.mxd (4/20/2011)



LEGEND

- Water Feature
- Building
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Emergent Wetland

- Suitable Habitat (1)
- State Endangered (4)

Notes:
1) Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.
2) Emergent wetlands data was obtained from New Jersey Department of Environmental Protection (NJDEP), Division of Fish, Wildlife, and Endangered Nongame Species Program (ENSP), Lanscape Project GIS Data, Version 2.1, November 2007.

N

Scale:
0 450 900 1,800 Feet

Base Realignment and Closure 2005

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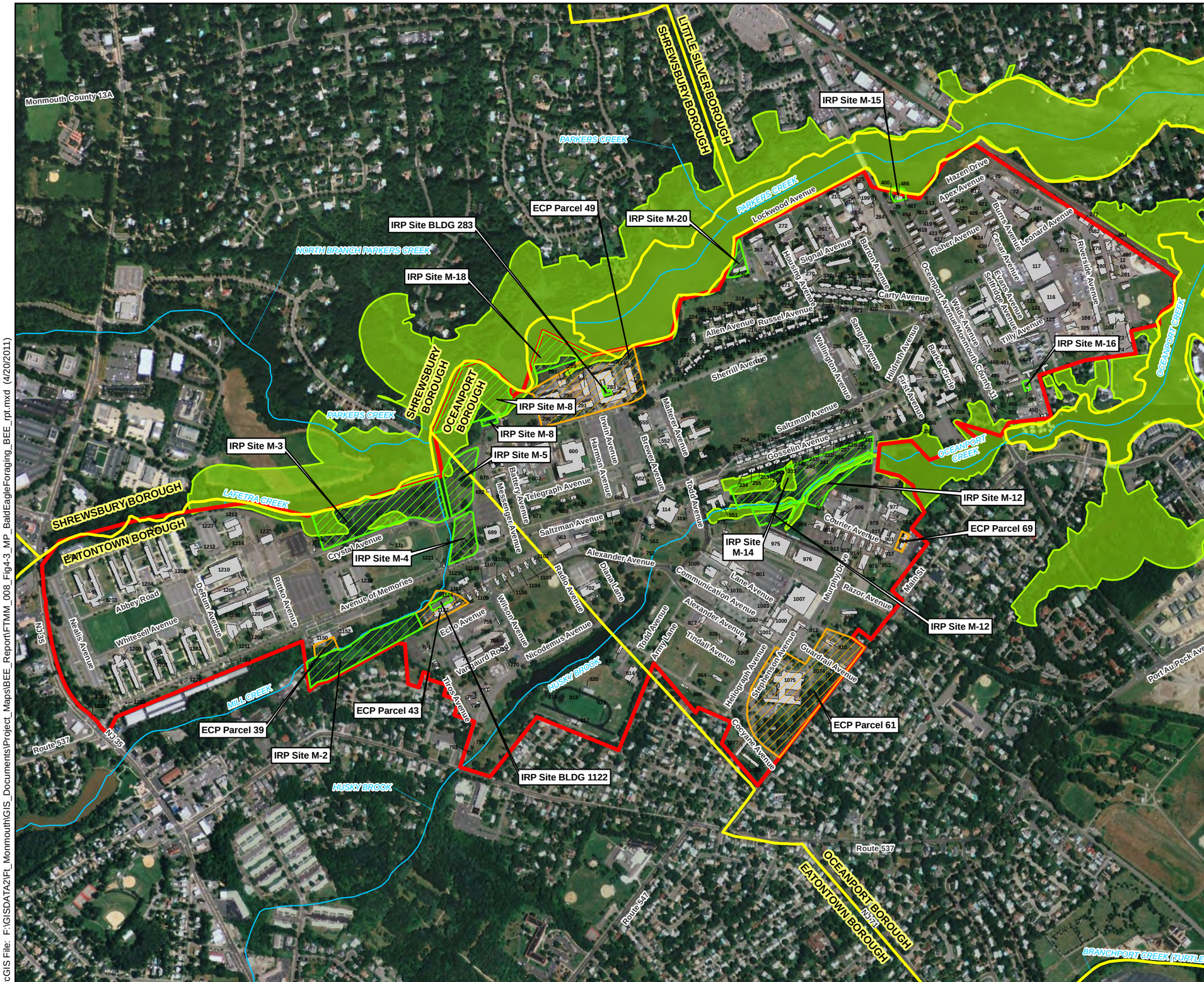
FIGURE 4-2

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

MAIN POST -
EMERGENT WETLANDS

FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_007_Fig4-2_MP_EmergentWetlands_BEE_rpt.mxd (4/20/2011)



LEGEND

- Water Feature
- Building
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary
- Bald Eagle Foraging Area

Notes:
1) Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.
2) Bald Eagle foraging data was obtained from New Jersey Department of Environmental Protection (NJDEP), Division of Fish, Wildlife, and Endangered Nongame Species Program (ENSP), Lanscape Project GIS Data, Version 2.1, November 2007.

N

Scale:
0 450 900 1,800 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

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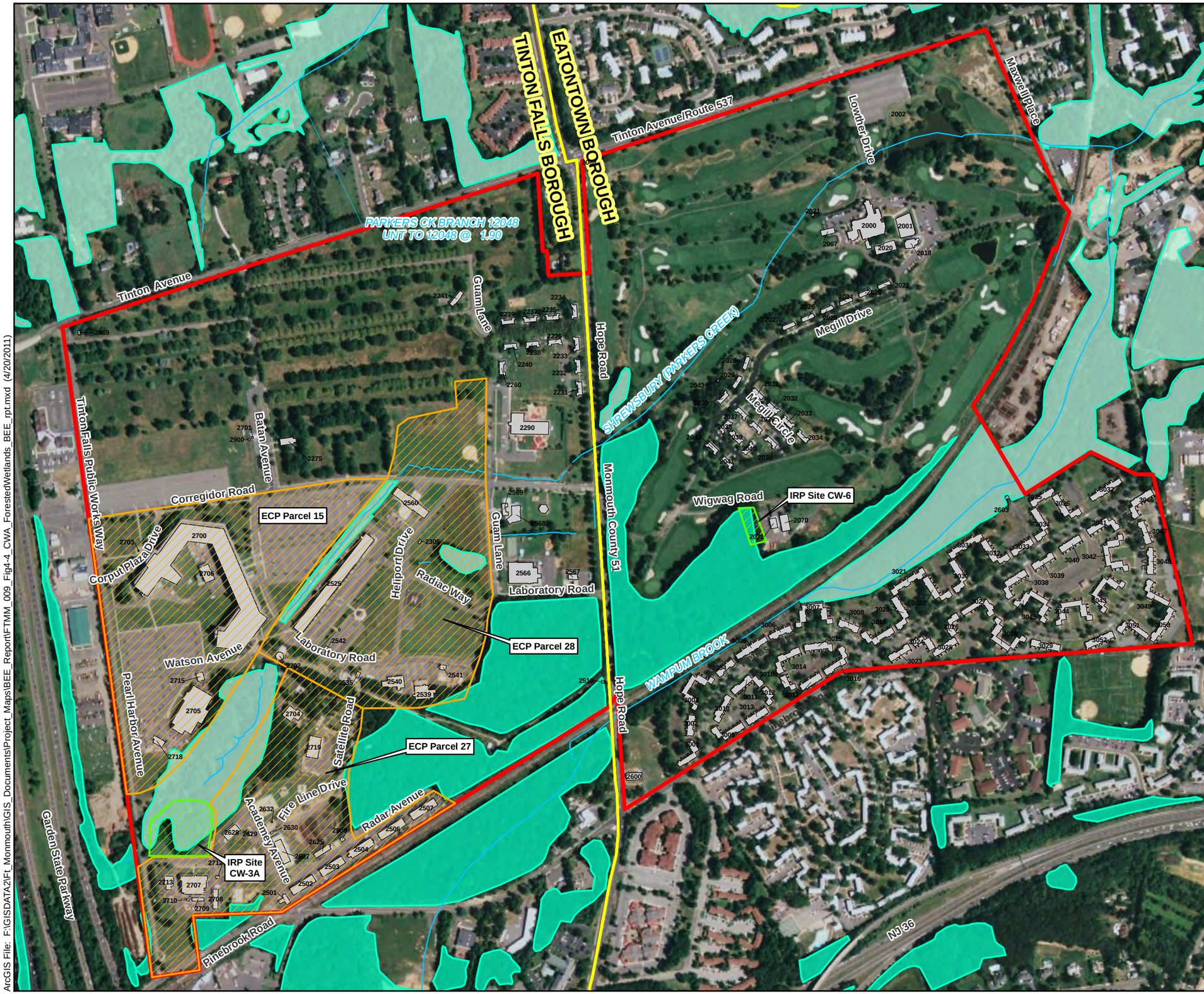
FIGURE 4-3
FORT MONMOUTH
BASELINE ECOLOGICAL EVALUATION REPORT
MAIN POST -
BALD EAGLE FORAGING AREAS

FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_008_Fig4-3_MP_BaldEagleForaging_BEE_rpt.mxd (4/20/2011)



LEGEND

- Water Feature
- Building
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Forested Wetland

- Suitable (1)
- Priority Species (2)

Notes:
1) Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.
2) Forested wetlands data was obtained from New Jersey Department of Environmental Protection (NJDEP), Division of Fish, Wildlife, and Endangered Nongame Species Program (ENSP), Lanscape Project GIS Data, Version 2.1, November 2007.

N

Scale:

0 290 580 1,160 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

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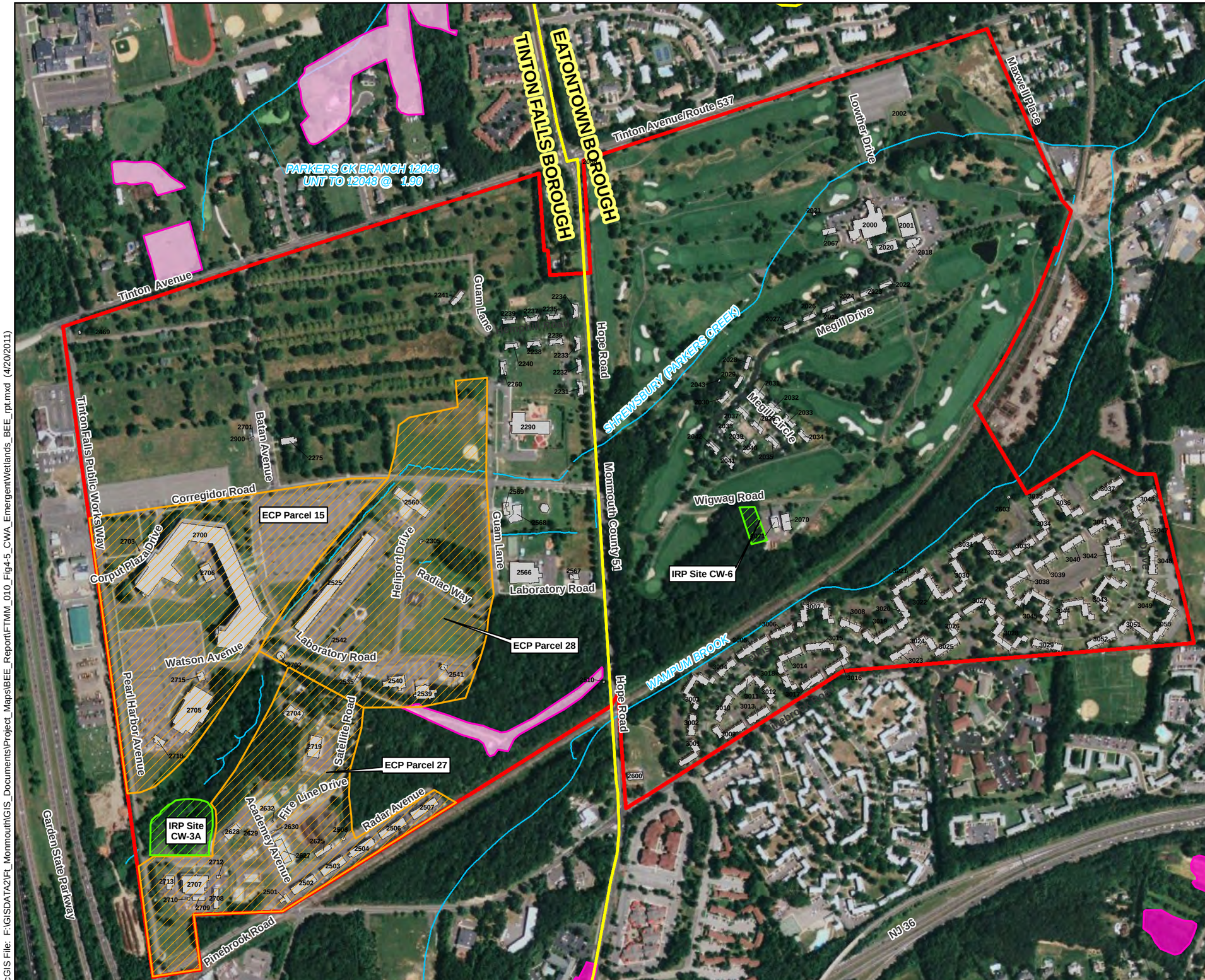
FIGURE 4-4

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

CHARLES WOOD AREA -
FORESTED WETLANDS

FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_009_Fig4-4_CWA_ForestedWetlands_BEE_rpt.mxd (4/20/2011)



LEGEND

- Water Feature
- Building
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Emergent Wetland

- Suitable Habitat (1)
- Priority Species (2)

Notes:
1) Aerial photography (0.5-meter resolution) was obtained from ESRI ArcOnline USA Imagery Map Services.
2) Emergent wetlands data was obtained from New Jersey Department of Environmental Protection (NJDEP), Division of Fish, Wildlife, and Endangered Nongame Species Program (ENSP), Lanscape Project GIS Data, Version 2.1, November 2007.

N

Scale:

0 290 580 1,160 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw Environmental, Inc.

FIGURE 4-5

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

CHARLES WOOD AREA -
EMERGENT WETLANDS

FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_010_Fig4-5_CWA_EmergentWetlands_BEE_rpt.mxd (4/20/2011)

5.0 SUMMARY AND CONCLUSIONS

Within the FTMM MP and CWA are 27 active/open IRP Sites. Fourteen of the 27 IRP Sites were considered to require additional evaluation through the BEE process. In addition to these IRP Sites, it was determined that a BEE should also be conducted related to one other IRP site (FTMM-20), which had been listed as Response Complete in the 2007 Installation Action Plan for FTMM (Fort Monmouth, 2007). Additionally, eight parcels identified through the FTMM ECP SI were deemed to require additional evaluation through the BEE process to fully evaluate the environmental condition of the property; NJDEP concurred with the determination that a BEE is required for these eight ECP sites in correspondence dated October 28, 2008. The BEE and supporting sampling and analyses were performed based on the Scope of Work dated June 3, 2008, and information obtained through consultation with FTMM, U.S. Army Environmental Command, USACE, and NJDEP personnel and in accordance with the final BEE WP (Shaw, 2010). A draft final WP, dated July 2009, was submitted to the NJDEP for review. NJDEP comments (dated September 1, 2009) were addressed and a conference call was held on November 13, 2009, to finalize the WP. The final WP was submitted to the NJDEP for review and approval prior to implementation of the work and an approval letter was obtained from the NJDEP on April 28, 2010 (**Appendix I**).

The objective of the BEE at FTMM is to assess whether the presence of constituents of concern in sediments, surface water, soil, and groundwater on the MP and CWA has the potential for adverse effects to biological receptors. This assessment is determined by examining information on each of the sites and the sample results from sediment, surface water, soil, and groundwater at the sites for the co-occurrence of 1) COPECs, 2) environmentally sensitive natural resources, and 3) a chemical migration pathway to these sensitive natural resources. This objective was accomplished based on the results of a data and literature review, a qualitative site visit, field sampling, data analysis and ecological hazard characterization, and an evaluation of the general background characteristics of surface water and sediment in the FTMM area.

The occurrence of COPECs is determined through a comparison of existing site data with ecological screening levels. The occurrence of environmentally sensitive natural resources and potential chemical migration pathways is determined from existing literature for the site, a qualitative site visit, and other available information such as the NJDEP Natural Heritage database, NJDEP tidal and freshwater wetland maps, the USGS topographic maps, and the USDA Soil Conservation Service soil survey maps.

In order to evaluate the nature of contaminants detected at the FTMM sites and to identify the COPECs, several steps were followed. The first step was a review of the analytical data collected from the environmental media with regards to the sites and selection of the data appropriate for use in the BEE. The second step was the identification of the most appropriate and applicable criteria or benchmarks for comparison to data. The third step was the identification of the COPECs at the sites and an evaluation of these COPECs in terms of potential ecological impact.

Site data addressed in this BEE is comprised of data previously collected for RIs (e.g., near surface soil data for former landfills), ECP SIs, and routine environmental monitoring (e.g., groundwater data) and data collected specifically to fill data gaps for the BEE.

Exposure of ecological receptors to contaminants in soil predominantly occurs within the surface soils. Ecological receptors are not frequently exposed to subsurface soils; therefore, surface soils at 2 feet bgs or below are not evaluated in this BEE. Soil data evaluated in this BEE were from various RI reports (**Appendix A**), the ECP SI report (**Appendix B**), and the BEE investigation samples (**Appendix D**). Though ecological receptors are not exposed directly to contaminants in groundwater, pathways may exist by which groundwater may flow to potential exposure points (e.g., discharge of groundwater into surface water bodies). Where applicable, the most recent 2-year period of readily available groundwater data from routine environmental monitoring were evaluated in this BEE to best represent current conditions (**Appendix C**; **Appendix B**). Though groundwater may discharge to surface water bodies, groundwater contaminant concentrations are not meant to represent potential surface water concentrations. Ecological receptors may be exposed directly to contaminants in surface water and sediment of the various creeks and ponds that drain the sites. As with soils, ecological receptors are not frequently exposed to contaminants in subsurface sediments. The top 6 inches of sediment is usually

considered to be the biotic zone, and only data from the top 6 inches of sediments is evaluated in this BEE. Though sediment data from the ECP SI (**Appendix B**) was evaluated in this BEE, the majority of the surface water and sediment data were from the extensive sampling conducted during the BEE investigation (**Appendix D**). Sampling and analyses were performed in accordance with the final BEE WP (Shaw, 2010), which was approved by the NJDEP on April 28, 2010 (**Appendix I**).

COPECs are defined for the purposes of this BEE as those constituents that were detected at concentrations exceeding the appropriate screening benchmarks in any of the samples from a given medium from a site. These ESC are intentionally conservative values and exceedances of these concentrations are not meant to imply ecological risks. A qualitative determination of the potential for adverse effects from site constituents was made based on the COPECs, the presence of environmentally sensitive areas, and the potential migration pathways of site constituents, as well as site history, natural geology, and other potential sources.

The character of the land use surrounding the FTMM properties typifies mixed use, small town development in New Jersey. Commercial services and shopping centers populate main roads interspersed with residential structures, apartments and office buildings. Business and light industrial parks are found along highways, streams and railroad tracks. Surrounding properties include NPL, SHWS, LUST, and VCP sites. These, as well as general small urban development activities lend to an increase in general anthropogenic inputs in the area.

Elevated concentrations of many metals, in relation to the conservatively low ESC, are naturally found within the urban coastal plain region in which FTMM is located. In particular, glauconitic soils which are prevalent at FTMM and have been reported in the creek sediments are naturally high in arsenic, beryllium, chromium, nickel and vanadium as well as other metals.

COPECs identified in soils generally represent limited potential for direct ecological exposure being either from subsurface (e.g., landfill near surface samples) or not within ecological habitats (e.g., near buildings, roads, and parking areas). COPECs identified in groundwater are not representative of direct ecological exposures. COPECs in both soil and groundwater, however, may migrate to nearby surface water or sediment where ecological exposures may occur.

Many organic COPECs identified in soil or groundwater were not identified as COPECs in surface water or sediment, suggesting limited organic contaminant migration to sensitive ecological receptors. Most of these were detected infrequently in soil or groundwater or at low concentrations in relation to the ESC.

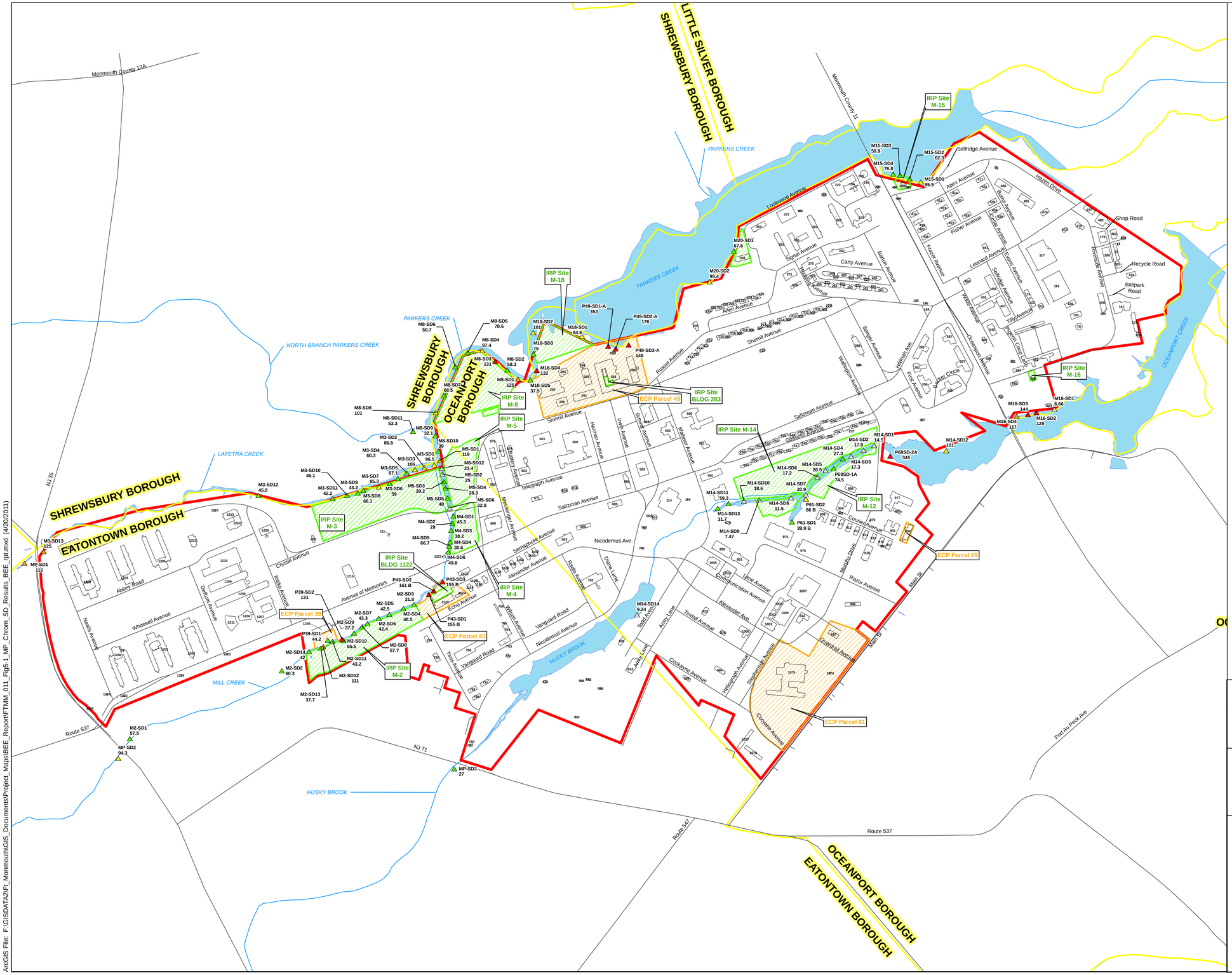
Many organic COPECs identified in surface water or sediment were not identified as COPECs in soil or groundwater, suggesting the sources are unrelated to the sites under investigation, or were at low concentrations in relation to the ESC, which are intentionally conservative values. PAHs, in particular, though identified as COPECs, were found in sediments and surface water at concentrations similar to background sample concentrations or at locations indicative of other sources (e.g., at the upstream extent of the site and downstream of active roads or parking areas).

In surface water, lead was most often identified as a COPEC; however, it was found at similar concentrations at most of the sites and in the background samples. Most of the sediment metals identified as COPECs were at concentrations similar to background. Some metals (chromium, copper, lead, mercury, silver, and zinc) were detected at a few locations exceeding background concentrations measured during the BEE investigation, but many of these are similar to those reported for ambient soil in the region (BEM Systems, Inc., 1998) or, in particular, glauconitic soils (Dooley, 2001). Though there may be a potential for some ecological risk due to elevated metals in these limited areas, it is likely that these metals are related to natural geology or other anthropogenic sources.

Figure 5-1 depicts the concentration distribution of chromium in sediment throughout the MP, based on samples evaluated in this BEE. Samples where chromium was not detected are shown as clear symbols. Those samples where chromium is detected at concentrations below both the freshwater sediment and saltwater sediment ESC are shown in gray. Those samples where chromium concentrations are between the freshwater sediment and saltwater sediment ESC are shown in green. Those samples where chromium concentrations are above both the freshwater sediment and saltwater sediment ESC but within the range of most background (represented by the lower 75th percent of all

background concentrations from both the MP and CWA areas) are shown in yellow, and those samples where chromium concentrations are above both the freshwater sediment and saltwater sediment ESC and above all background concentrations measured as part of the 2010 BEE are shown in red. Similar figures are presented for copper (**Figure 5-2**), lead (**Figure 5-3**), mercury (**Figure 5-4**), silver (**Figure 5-5**), and zinc (**Figure 5-6**) for the MP and for chromium (**Figure 5-7**), copper (**Figure 5-8**), mercury (**Figure 5-9**), and silver (**Figure 5-10**) for the CWA.

Though metals may be present at concentrations greater than the background concentrations measured in limited areas during the 2010 BEE, many of these concentrations may be related to natural or general anthropogenic sources and the differences in site concentrations from the measured background concentrations can be a function of the greater number of site samples collected compared to background samples. Regardless, these figures show that the area of metal concentrations greater than the measured background concentrations is limited in extent, with no definitive spatial distribution that would suggest the source of metals are related to sites evaluated in the BEE. Though these may represent a potential ecological risk in limited areas, it is concluded that constituents at FTMM are unlikely to have a deleterious effect on sensitive ecological receptors or habitats, and additional ecological assessments at FTMM are not warranted or recommended.



LEGEND

Chromium in Sediment (mg/kg)

- Non-Detect
- 0 - 26 (Below ESCs)
- 26 - 81 (Between Freshwater and Saltwater Sediment ESCs)
- 81 - 106.65 (Above ESCs and Within Lower 75% of Background)
- 106.65 - 125 (Above ESCs and Within Top 25% of Background)
- > 125 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaluation (BEE).
2) ESC = Ecological Screening Value

N

Scale:
0 450 900 1,800
Feet

Base Realignment and Closure 2005

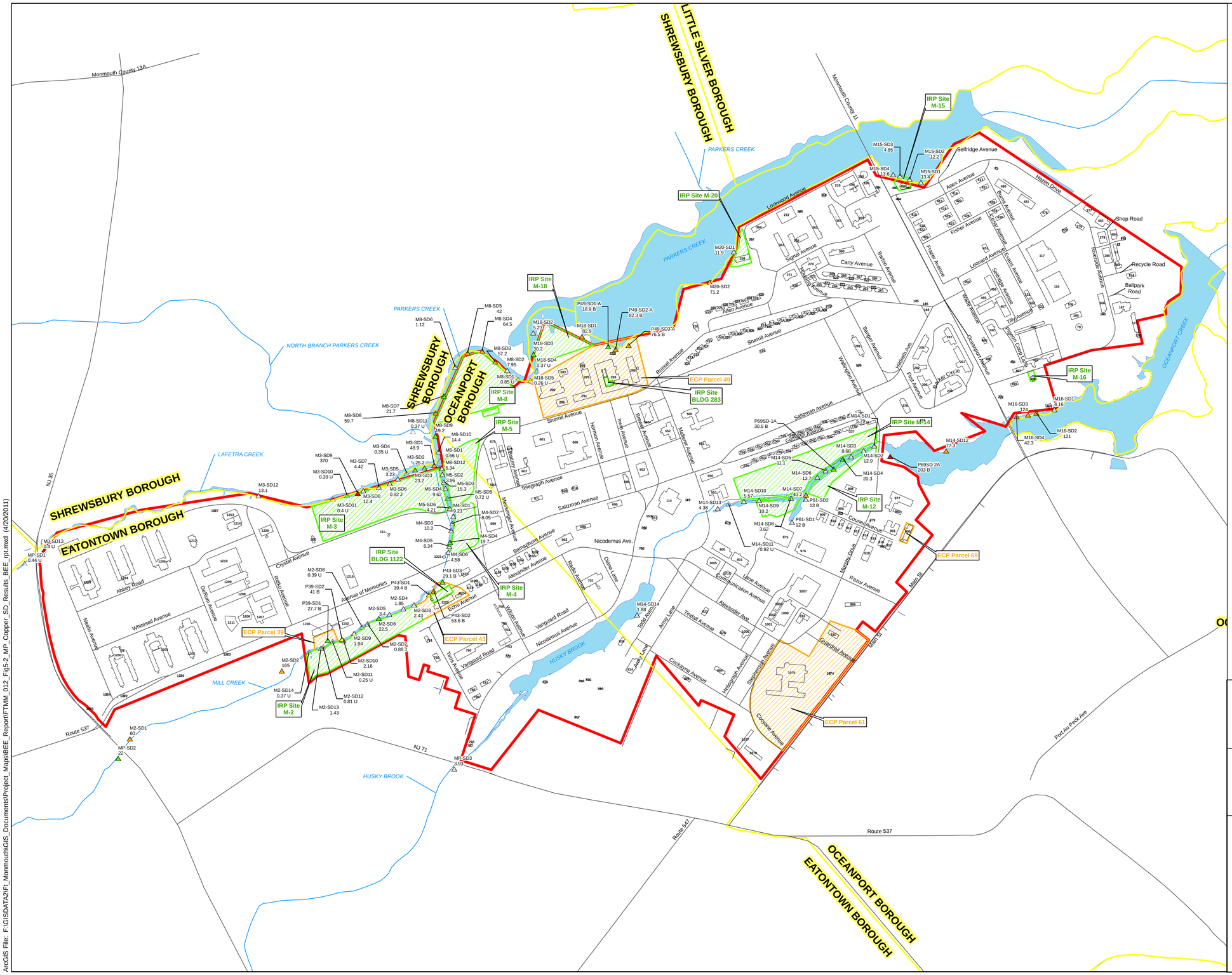
U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 5-1
FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT
CHROMIUM RESULTS IN SEDIMENT

MAIN POST
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_011_Fig5-1_MP_Chrom_SD_Results_BEE_rpt.mxd (4/20/2011)



LEGEND

Copper in Sediment (mg/kg)

- Non-Detect
- 0 - 16 (Below ESCs)
- 16 - 34 (Between Freshwater and Saltwater Sediment ESCs)
- 34 - 41 (Above ESCs and Within Lower 75% of Background)
- 41 - 165 (Above ESCs and Within Top 25% of Background)
- > 165 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaluation (BEE).
2) ESC = Ecological Screening Value

N

Scale:

0 450 900 1,800 Feet

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U.S. Army Corps of Engineers

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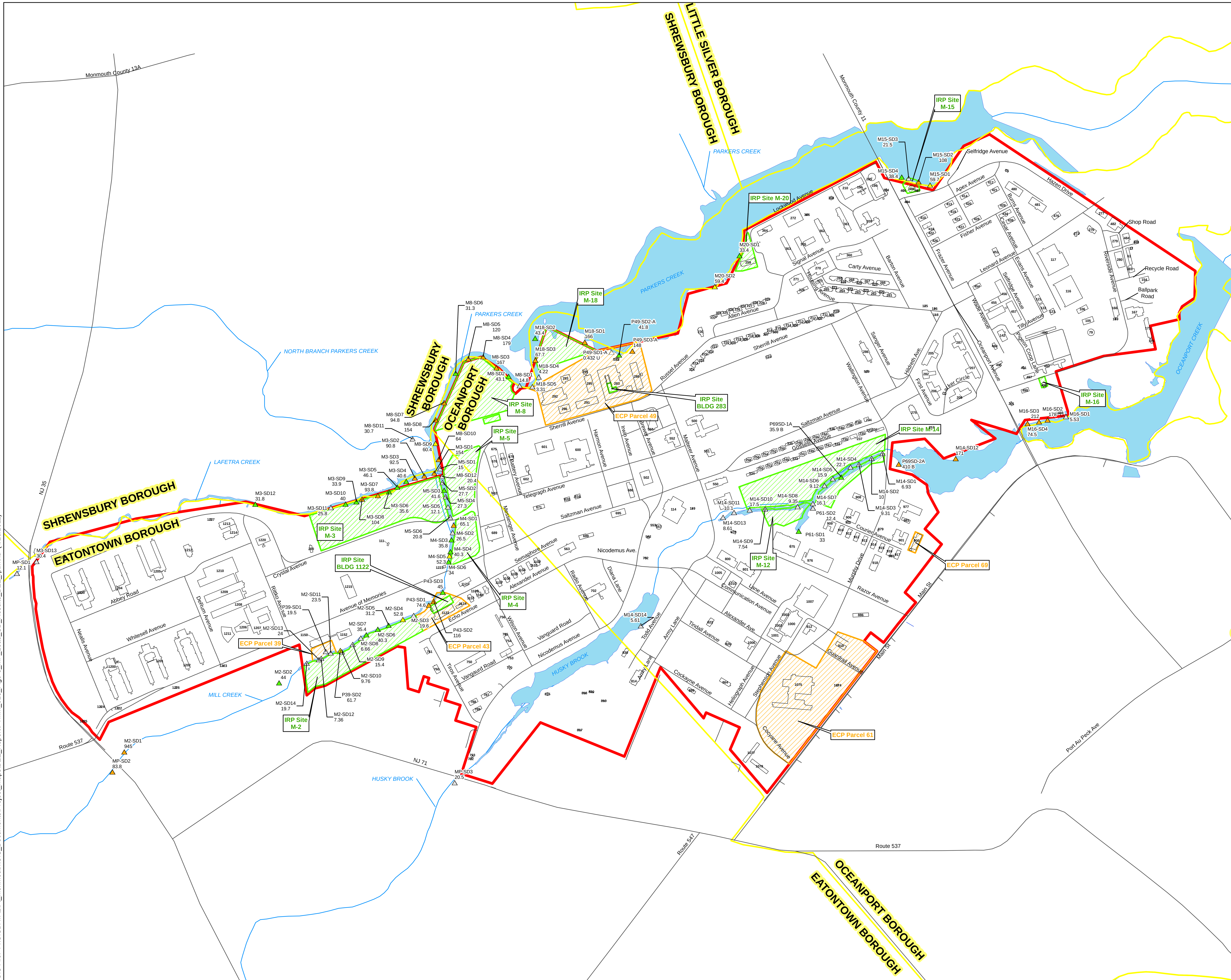
FIGURE 5-2

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

COPPER RESULTS IN SEDIMENT

MAIN POST
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_012_Fig5-2_MP_Copper_SD_Results_BEE_rpt.mxd (4/20/2011)



LEGEND

Lead in Sediment (mg/kg)

- Non-Detect
- 0 - 31 (Below ESCs)
- 31 - 47 (Between Freshwater and Saltwater Sediment ESCs)
- 47 - 63.9 (Above ESCs and Within Lower 75% of Background)
- 63.9 - 945 (Above ESCs and Within Top 25% of Background)
- > 945 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaluation (BEE).
2) ESC = Ecological Screening Value

N

Scale:
0 450 900 1,800 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

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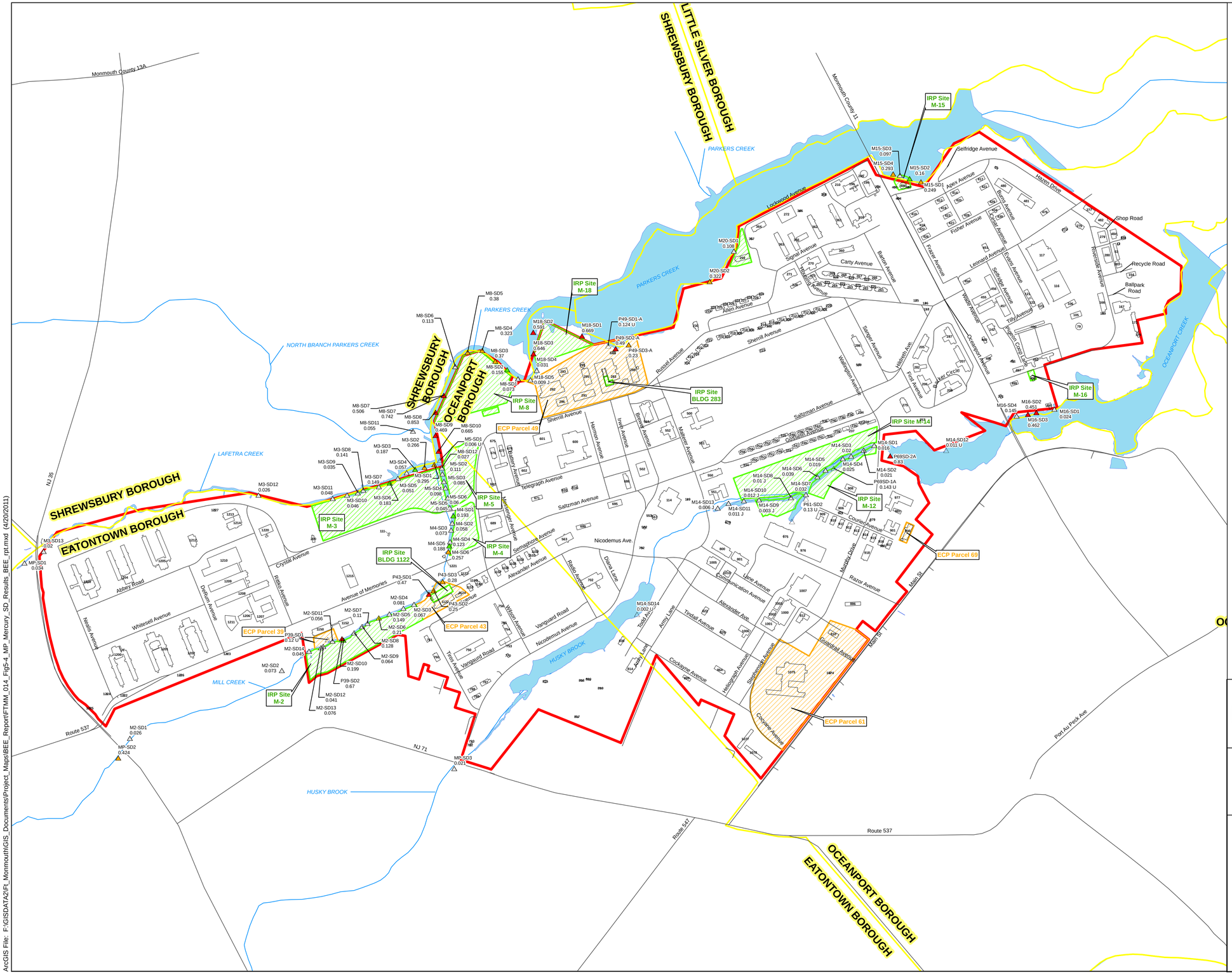
FIGURE 5-3

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

LEAD RESULTS IN SEDIMENT

MAIN POST
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\FL_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_013_Fig5-3_MP_Lead_SD_Results_BEE_rpt.mxd (4/20/2011)



LEGEND

Mercury in Sediment (mg/kg)

- Non-Detect
- 0 - 0.15 (Below ESCs)
- 0.15 - 0.20 (Between Freshwater and Saltwater Sediment ESCs)
- 0.20 - 0.212 (Above ESCs and Below 1/2 Maximum Background)
- 0.212 - 0.424 (Above ESCs and Above 1/2 Maximum Background)
- > 0.424 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaulation (BEE).
2) ESC = Ecological Screening Value

N

Scale:

0 450 900 1,800 Feet

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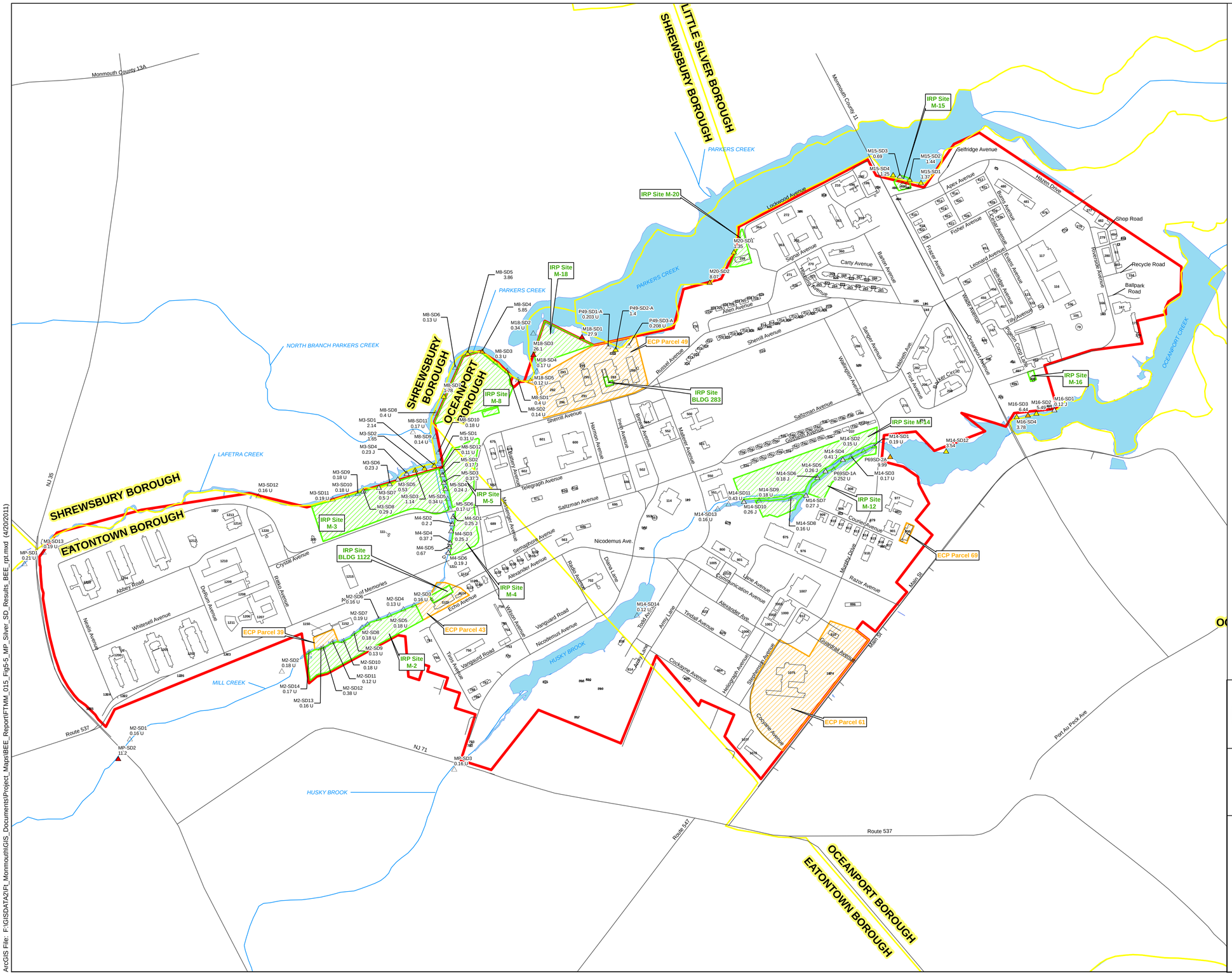
FIGURE 5-4

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

MERCURY RESULTS IN SEDIMENT

MAIN POST
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_014_Fig5-4_MP_Mercury_SD_Results_BEE_rpt.mxd (4/20/2011)



LEGEND

Silver in Sediment (mg/kg)

- Non-Detect
- 0 - 1 (Below ESCs)
- 1 - 5.6 (Above ESCs and Within Range of Most Background)
- 2.6 - 11.2 (Above ESCs and Above 1/2 Maximum Background)
- > 11.2 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaluation (BEE).
2) ESC = Ecological Screening Value

N

Scale:

0 450 900 1,800 Feet

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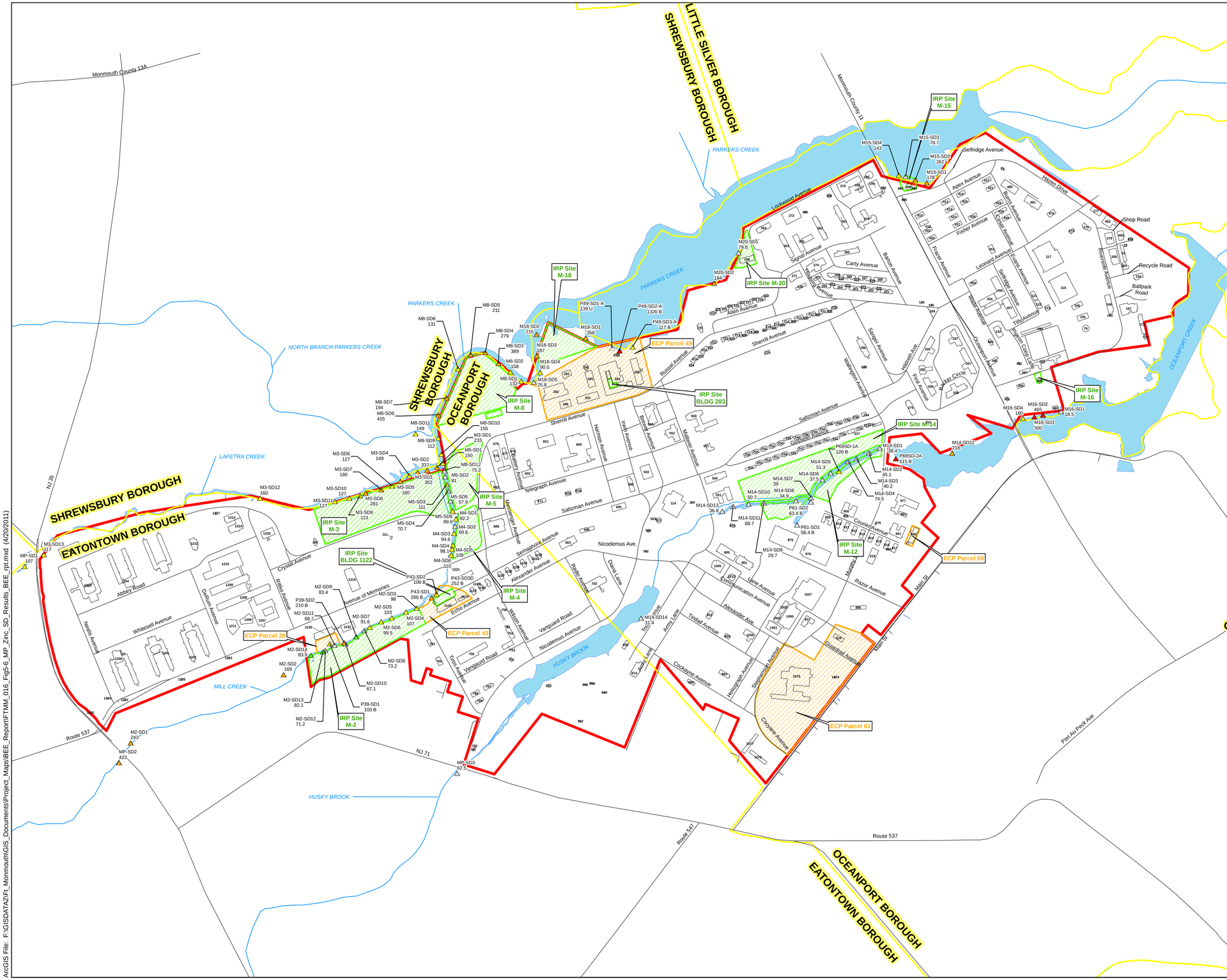
FIGURE 5-5

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

SILVER RESULTS IN SEDIMENT

MAIN POST
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_015_Fig5-5_MP_Silver_SD_Results_BEE_rpt.mxd (4/20/2011)



LEGEND

Zinc in Sediment (mg/kg)

- Non-Detect
- 0 - 81 (Below ESCs)
- 81 - 86 (Between Freshwater and Saltwater Sediment ESCs)
- 86 - 162.5 (Above ESCs and Within Lower 75% of Background)
- 162.5 - 423 (Above ESCs and Within Top 25% of Background)
- > 423 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaluation (BEE).
2) ESC = Ecological Screening Value

N

Scale:
0 450 900 1,800 Feet

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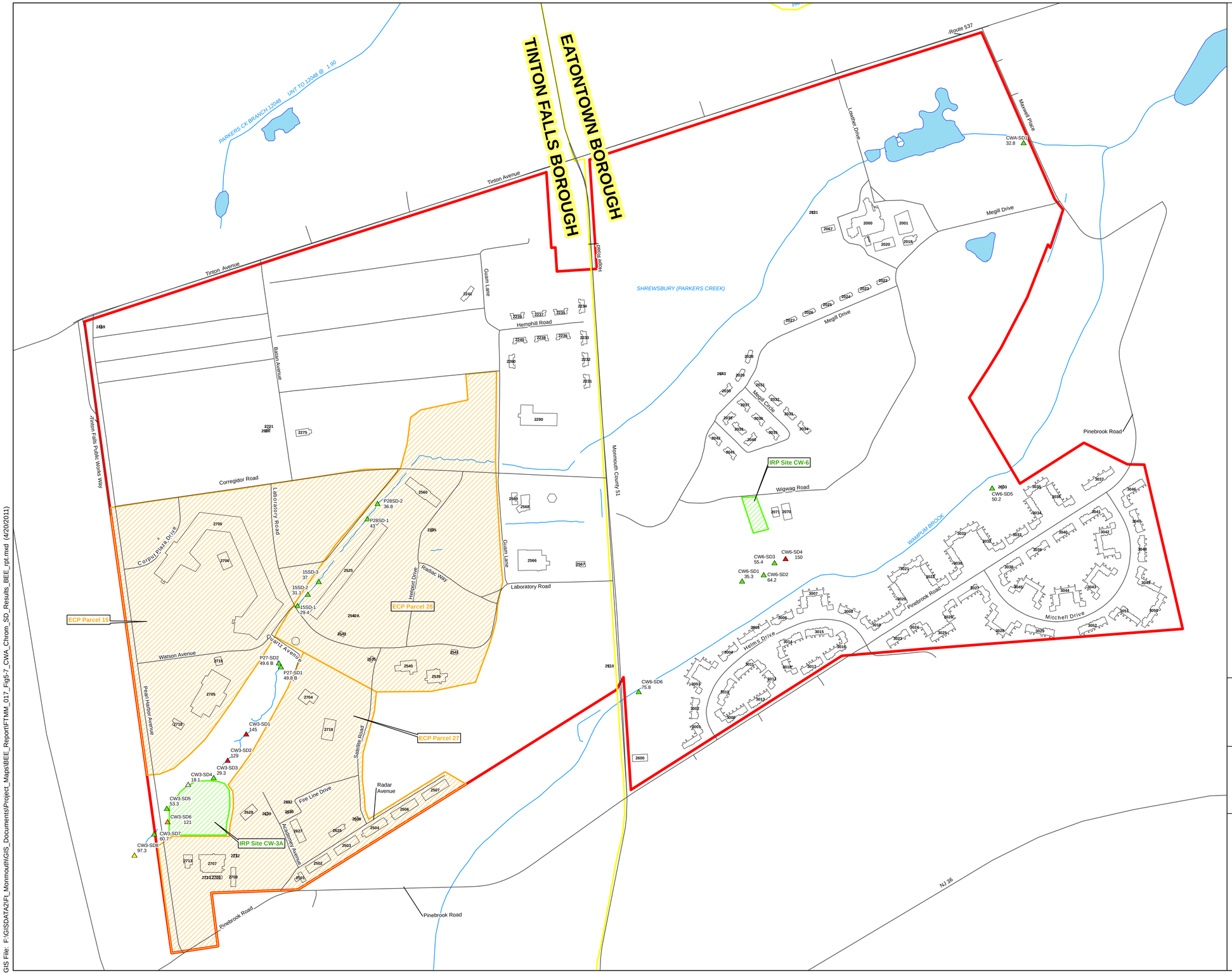
FIGURE 5-6

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

ZINC RESULTS IN SEDIMENT

MAIN POST
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_016_Fig5-6_MP_Zinc_SD_Results_BEE_rpt.mxd (4/20/2011)



LEGEND

Chromium in Sediment (mg/kg)

- Non-Detect
- 0 - 26 (Below ESCs)
- 26 - 81 (Between Freshwater and Saltwater Sediment ESCs)
- 81 - 106.65 (Above ESCs and Within Lower 75% of Background)
- 106.65 - 125 (Above ESCs and Within Top 25% of Background)
- > 125 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaluation (BEE).
2) ESC = Ecological Screening Value

N

Scale:

0 300 600 1,200 Feet

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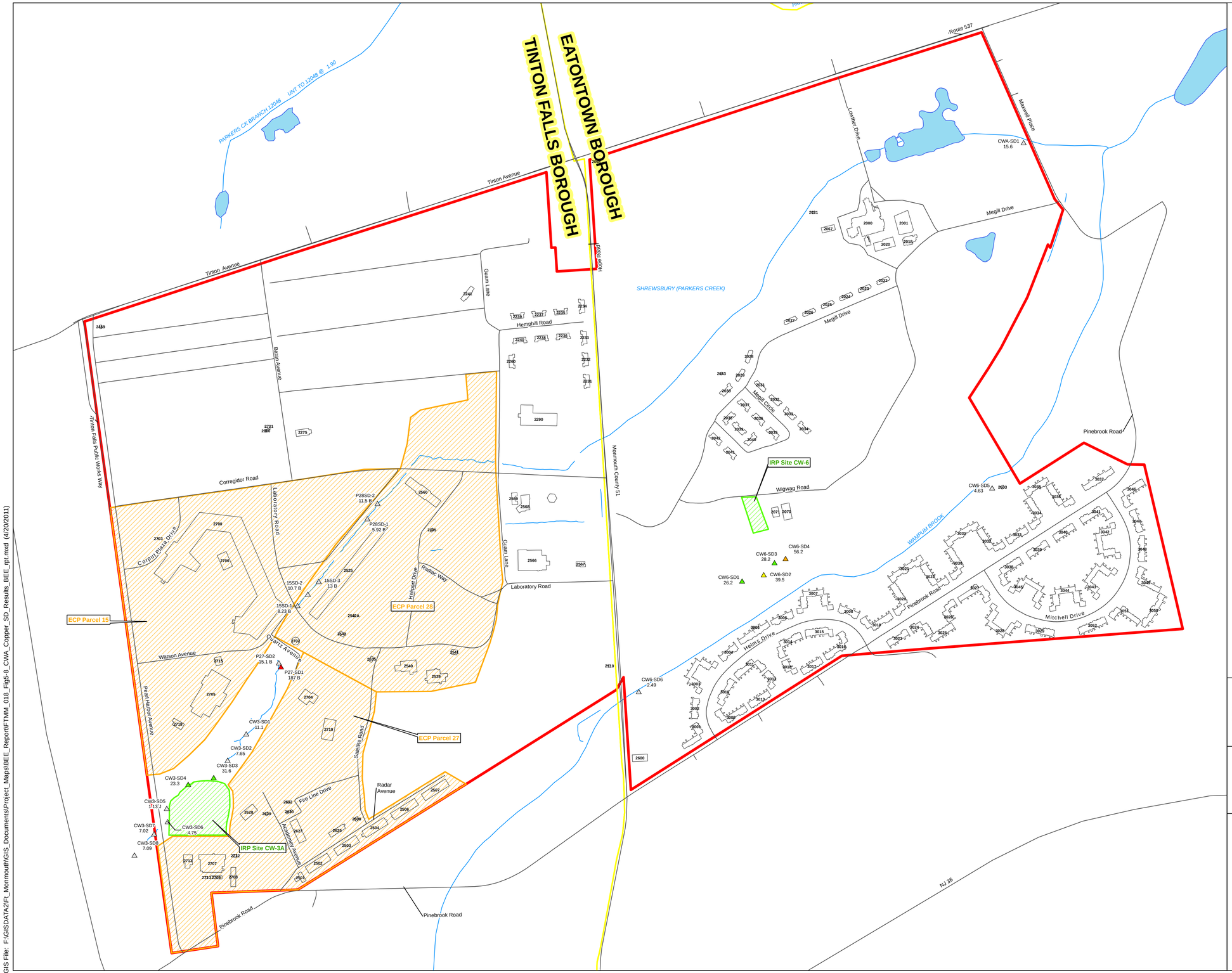
FIGURE 5-7

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

CHROMIUM RESULTS IN SEDIMENT

CHARLES WOOD AREA
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GIS\DATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_017_Fig5-7_CWA_Chrom_SD_Results_BEE_rpt.mxd (4/20/2011)



LEGEND

Copper in Sediment (mg/kg)

- Non-Detect
- 0 - 16 (Below ESCs)
- 16 - 34 (Between Freshwater and Saltwater Sediment ESCs)
- 34 - 41 (Above ESCs and Within Lower 75% of Background)
- 41 - 165 (Above ESCs and Within Top 25% of Background)
- > 165 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaulation (BEE).
2) ESC = Ecological Screening Value

N

Scale:

0 300 600 1,200 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

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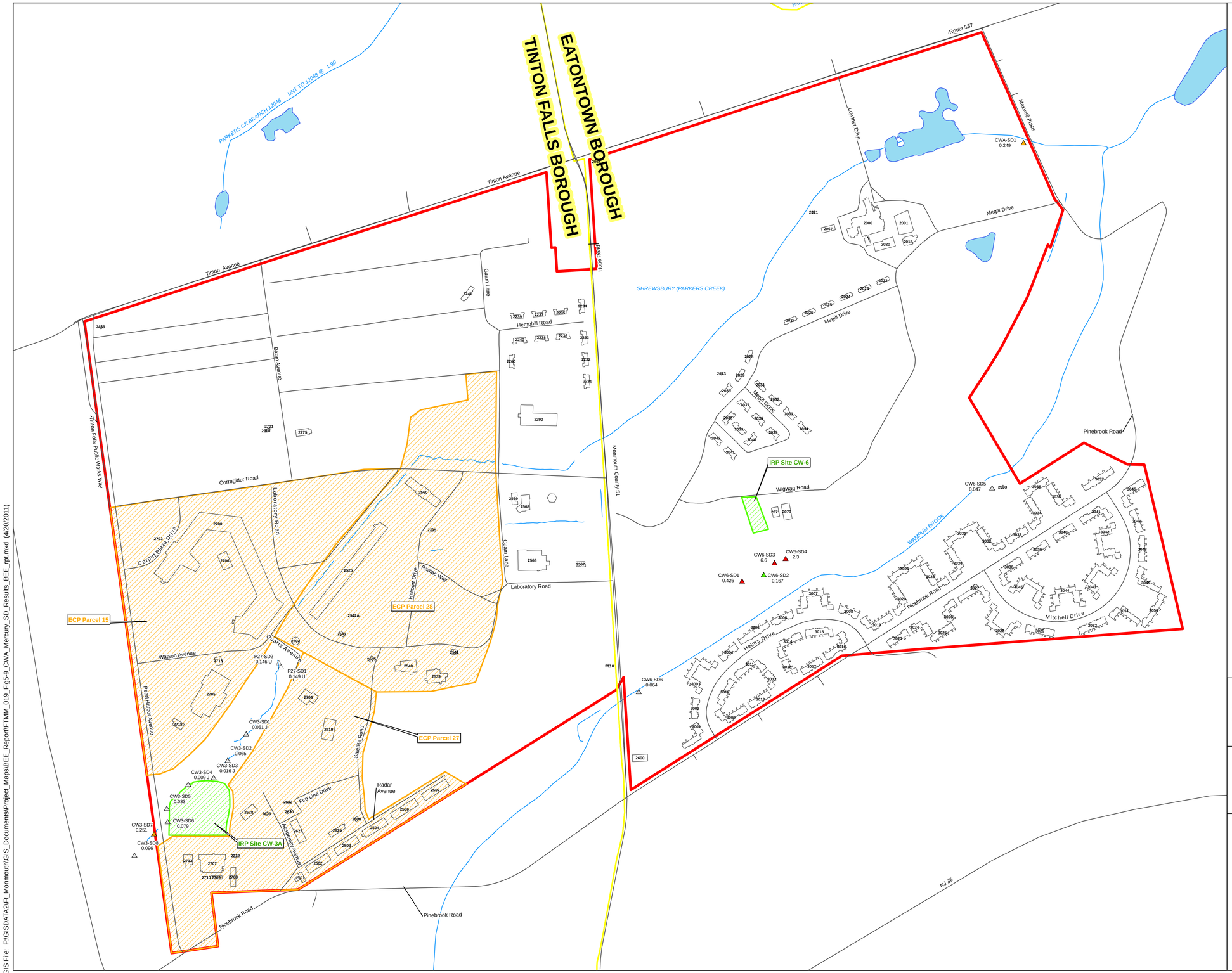
FIGURE 5-8

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

COPPER RESULTS IN SEDIMENT

CHARLES WOOD AREA
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_018_Fig5-8_CWA_Copper_SD_Results_BEE_rpt.mxd (4/20/2011)



LEGEND

Mercury in Sediment (mg/kg)

- Non-Detect
- 0 - 0.15 (Below ESCs)
- 0.15 - 0.20 (Between Freshwater and Saltwater Sediment ESCs)
- 0.20 - 0.212 (Above ESCs and Below 1/2 Maximum Background)
- 0.212 - 0.424 (Above ESCs and Above 1/2 Maximum Background)
- > 0.424 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaulation (BEE).
2) ESC = Ecological Screening Value

N

Scale:

0 300 600 1,200 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

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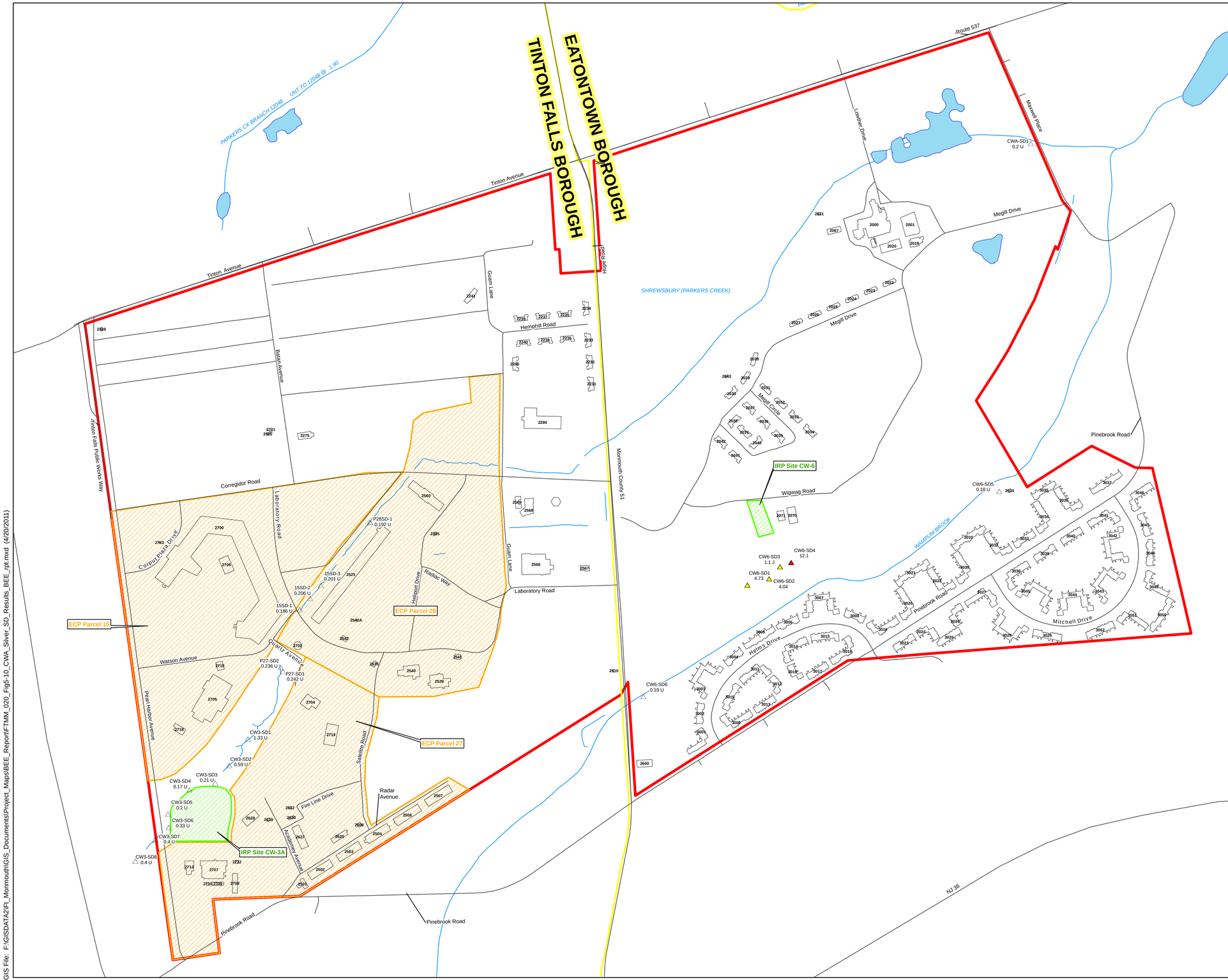
FIGURE 5-9

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

MERCURY RESULTS IN SEDIMENT

CHARLES WOOD AREA
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_019_Fig5-9_CWA_Mercury_SD_Results_BEE_rpt.mxd (4/20/2011)



LEGEND

Silver in Sediment (mg/kg)

- Non-Detect
- 0 - 1 (Below ESCs)
- 1 - 5.6 (Above ESCs and Within Range of Most Background)
- 2.6 - 11.2 (Above ESCs and Above 1/2 Maximum Background)
- > 11.2 (Above Background)
- Road Centerline
- Water Feature
- Building
- Water Body
- IRP Site
- ECP Parcel
- Installation Boundary
- Municipal Boundary

Notes:
1) Results include samples collected in 2007 for the Environmental Condition of Property (ECP) Site Investigation (SI) and the 2010 Baseline Ecological Evaluation (BEE).
2) ESC = Ecological Screening Value

N

Scale:

0 300 600 1,200 Feet

Base Realignment and Closure 2005

U.S. Army Corps of Engineers

Shaw® Shaw Environmental, Inc.

FIGURE 5-10

FORT MONMOUTH
BASELINE ECOLOGICAL
EVALUATION REPORT

SILVER RESULTS IN SEDIMENT

CHARLES WOOD AREA
FORT MONMOUTH
NEW JERSEY

ArcGIS File: F:\GISDATA2\Ft_Monmouth\GIS_Documents\Project_Maps\BEE_Report\FTMM_020_Fig5-10_CWA_Silver_SD_Results_BEE_rpt.mxd (4/20/2011)

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