RECORD OF DECISION FOR LANDFILL SITES FTMM-03, FTMM-04, FTMM-05, FTMM-12, FTMM-14, FTMM-18, AND FTMM-25 AT FORT MONMOUTH

OCEANPORT, MONMOUTH COUNTY, NEW JERSEY

June 2017

U.S. Corps of Engineers, New York District
and
U.S. Army Engineering and Support Center, Huntsville, Alabama

New Jersey Department of Environmental Protection
Site Remediation Program
Report Certifications for RCRA GPRA 2020, CERCLA, and Federal Facility Sites

These certifications are to be used for reports submitted for RCRA GPRA 2020, CERCLA, and Federal Facility Sites. The Department has developed guidance for report certifications for RCRA GPRA 2020, CERCLA, and Federal Facility Sites under traditional oversight. The "Person Responsible for Conducting the Remediation Information and Certification" is required to be submitted with each report. For those sites that are required or opt to use a Licensed Site Remediation Professional (LSRP) the report must also be certified by the LSRP using the "Licensed Site Remediation Professional Information and Statement". For additional guidance regarding the requirement for LSRPs at RCRA GPRA 2020, CERCLA and Federal Facility Sites see http://www.nj.gov/dep/srp/srra/training/matrix/quick_ref/rcra_cercla_fed_facility_sites.pdf.

Document: "Record of Decision for Seven Landfill Sites at FTMM"

PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: William R. Colvin
Representative First Name: William Representative Last Name: Colvin
Title: BRAC Environmental Coordinator
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This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: William R Colvin Date: 07/25/2017

Name/Title: William R. Colvin / BRAC Environmental Coordinator

Completed form should be sent to:

Mr. Ashish Joshi
New Jersey Department of Environmental Protection
Division of Remediation Management & Response
Bureau of Northern Field Operations
7 Ridgedale Avenue (2nd Floor)
Cedar Knolls, New Jersey 07927-1112

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LIST OF ACRONYMS

ACRONYM	DEFINITION
°F	°Fahrenheit
amsl	above mean sea level
BEE	Baseline Ecological Evaluation
ARAR	Applicable or Relevant and Appropriate Requirement
Army	the U.S. Army
ASE	Annual Sampling Event
bgs	below ground surface
BRAC	Base Realignment and Closure
BSE	Baseline Sampling Event
CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COCs	constituents of concern
COPC	constituents of potential concern
CWA	Charles Wood Area
EA	Evans Area
EC	engineering controls
FFSRA	Federal Facility Site Remediation Agreement
ft/day	feet per day
FTMM	Fort Monmouth
GES	Groundwater & Environmental Services, Inc.
gpm	gallons per minute
GWQS	Ground Water Quality Standard(s)
HHRA	human health risk assessment
LUC	land use controls
LUCIP	land use control implementation plan
LTM	long-term monitoring
MP	Main Post
NCP	National Contingency Plan
NFA	no further action
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NPW	net present worth
NRDCSRS	Non-Residential Direct Contact Soil Remediation Standard
O&M	operation and maintenance
PAHs	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
RAGS	Risk Assessment Guidance for Superfund

ACRONYM	DEFINITION
RAOs	remedial action objectives
RDCSRS	Residential Direct Contact Soil Remediation Standard
RI	remedial investigation
ROD	Record of Decision
RSL	Regional Screening Level
SI	site investigation
SVOCs	Semi-volatile organic compounds
SWQS	Surface Water Quality Standard
TRSR	Technical Requirements for Site Remediation
USACE	U.S. Army Corps of Engineers
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOCs	volatile organic compounds

SECTION 1 - DECLARATION

1.1 SITE NAME AND LOCATION

This Record of Decision (ROD) presents the presumptive remedy for seven former landfills located at Fort Monmouth (FTMM) in Oceanport, Monmouth County, New Jersey. FTMM was comprised of the Main Post (MP) and Charles Wood Area (CWA) and the Evans Area (EA). FTMM falls within the Boroughs of Eatontown, Oceanport, and Tinton Falls. The MP is located in the Eatontown and Oceanport Boroughs. The CWA is located in the Eatontown and Tinton Falls Boroughs. Landfills FTMM-03, FTMM-04, FTMM-05, FTMM-12, FTMM-14, FTMM-18 are located on the MP and FTMM-25 is located on the CWA.

1.2 STATEMENT OF BASIS AND PURPOSE

The presumptive remedy was selected in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (Title 42 United States Code Section § 9601, et seq.), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as amended, Title 40 CFR Part 300. The presumptive remedy is consistent with the New Jersey Department of Environmental Protection (NJDEP) regulations (New Jersey Administrative Code [N.J.A.C.] 7:26). FTMM has not been placed on the CERCLA National Priorities List. The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) identification number for FTMM is NJD980529762.

The U.S. Army (Army) is the lead federal agency under CERCLA and Executive Order 12580 for FTMM and has selected the presumptive remedy for the seven former landfills. The NJDEP is the state support agency under the NCP for FTMM and concurs with the remedy. The decision documented in this ROD is based on and relies on the Administrative Record file for FTMM.

The Army presented the Proposed Plan for the seven former landfills at a public meeting on March 2, 2017. Comments on the Proposed Plan for the landfills provided by stakeholders were evaluated and considered in selecting the final remedy. See responses to comments in Section 3 – Responsiveness Summary.

1.3 ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect public health and welfare, and will provide safety protection from exposure to solid waste at the landfills for future use, and it complies with the presumptive remedy of containment to address historic landfills.

1.4 DESCRIPTION OF THE SELECTED REMEDY

The major components of the presumptive remedy for the seven former landfills consist of a vegetated soil cover and implementation of land use controls (LUCs).

To address safety concerns, a vegetated soil cover will be placed over the landfill area after the landfill is regraded to provide safety protection for future use. The vegetated soil cover will be placed consistent with the NJDEP regulations (N.J.A.C. 7:26). Additional soil will be added to the existing soil cover to provide a minimum of two feet of clean soil between the ground surface and landfilled debris. The use of a vegetated soil cover will offer safety protection for future use from exposure to solid waste (e.g.; construction/demolition debris) at the landfills and will also control surface water runoff and erosion. A passive methane mitigation system will be installed to address

potential safety concerns due to the proximity of residential houses to the FTMM-14 landfill. The two 100-foot-long trench systems will be located within the landfill boundary and vented to the surface in 25 foot centers. The intent of this passive venting system is in lieu of continued methane monitoring after the installation of the vegetative soil cover. The location of the venting system shall be installed to correspond with sampling points M14SG10 and M14SG 9 and extend in a northeasterly direction parallel to the residential houses. The location of the venting system may require adjustment during installation due to the existences of high pressure gas main and the individual gas main service connections for each housing unit.

LUCs to maintain the soil cap and prevent residential land use will also be implemented at the landfills. The Army will prepare a Land Use Control Implementation Plan (LUCIP) to set forth the manner in which the institutional controls (ICs) will be implemented, document the location of the engineering controls (EC), and identify the procedural responsibilities including landfill cover inspections, monitoring and reporting, and long-term management requirements.

The Army will be responsible for documenting and implementing the LUCs, which is expected to occur through the filing of a deed notice at the time of property transfer, and would also be responsible to conduct reviews to ensure that the LUCs remain protective of human health and the environment. When the property is transferred out of federal control, the LUCs would be incorporated into the title and the new owner would be responsible for complying with the LUCs. Although the Army may later transfer its procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Army would retain ultimate responsibility for remedy integrity.

In addition, Classification Exception Areas (CEAs) will be established at FTMM-05 and FTMM-18 to restrict groundwater use or installation of drinking water wells at the FTMM-05 and FTMM-18 landfills. ICs in the form of CEAs which restrict the use of groundwater will be implemented and will remain in place until NJDEP Groundwater Quality Standands (GWQS) for the identified COCs are achieved at the site.

1.5 STATUTORY DETERMINATIONS

The selected remedy provides safety protection from exposure to solid waste at the landfills for future use, complies with Federal and State laws and regulations that are applicable or relevant and appropriate to the remedy, and is cost effective. The remedy uses permanent solutions to the maximum extent practicable. The remedy does not satisfy the statutory preference for treatment.

CERCLA §121 requires 5-year review (statutory reviews) of sites where the remedial action does not achieve concentrations of hazardous substances acceptable for unrestricted use. Five-year reviews will be conducted in compliance with CERCLA § 121(c) and the 40 CFR § 300.430(f)(4)(ii).

1.6 DATA CERTIFICATION CHECKLIST

Table 1 provides the location of key remedy selection information contained in ROD Section II, Decision Summary. Additional information can be found in the FTMM Administrative Record file. The Environmental Restoration Program Information Repository for FTMM is located at the Monmouth County Library, Eastern Branch, 1001 Route 35, Shrewsbury, New Jersey 07702.

Table 1
ROD Certification Checklist

Criterion	Discussion
Chemicals of concern (COCs) and their respective concentrations	Included in Section 2.6.2
Baseline risk represented by the COCs	Included in Section 2.8
Cleanup levels established for COCs and the basis for these levels	Not applicable
How source materials constituting principal threats are addressed	Included in Section 2.10
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the risk assessment	Included in Section 2.4
Potential land and groundwater uses that will be available at the site as a result of the Selected Remedy	Included in Section 2.8
Estimated capital, operation and maintenance (O&M), and total net present worth (NPW) costs; discount rate; and number of years over which the remedy costs are projected	Included in Section 2.10.3
Key factors that led to the selection of the remedy	Included in Section 2.10

1.7 AUTHORIZING SIGNATURES

Under Executive Order 12580, the Army is the lead agency responsible for implementation of the selected remedy, with support from the NJDEP. This signature page documents the Army's selected remedy, consisting of a vegetated soil cover, and implementation of LUCIP. In addition, the signatures from the NJDEP document concurrence with the ROD.

Thomas C Lederle
Tom Lederle, Chief, U.S. Army BRAC Division

17 July 2017
Date

Mark Pederson, NJDEP Assistant Commissioner

Date

SECTION 2 - DECISION SUMMARY

2.1 SITE NAME, 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, New York, 70 miles northeast of Philadelphia, Pennsylvania, and 40 miles east of Trenton, New Jersey. The Atlantic Ocean is approximately 3 miles to the east. FTMM was comprised of three areas: the MP, the CWA, shown on **Figure 1**, and the EA (not shown). FTMM's MP and CWA were selected for closure by the BRAC Commission in 2005, and officially closed on September 15, 2011. (The EA was closed under BRAC in 1998 and has since been transferred from FTMM.)

This ROD addresses landfills FTMM-03, FTMM-04, FTMM-05, FTMM-12, FTMM-14, FTMM-18, and FTMM-25. The locations of the landfills are shown on **Figure 2**, except for FTMM-25 which is shown on **Figure 3**. Summary descriptions of the individual landfill sites are presented in the following subsections. Detailed descriptions of each landfill, as well as a compilation of previous investigations and an evaluation of available analytical data collected from each site, can be found in the individual RI Reports (**Table 2**).

Table 2
Remedial Investigation Report Submittal Dates

Landfill	Submitted to NJDEP
FTMM-03	February 2016
FTMM-04	July 2014
FTMM-05	October 2015
FTMM-12	August 2015
FTMM-14	July 2015
FTMM-18	October 2015
FTMM-25	August 2016

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 FTMM Landfill Site Background

A study was conducted in 1980, with a follow-up evaluation completed in 1988, at locations that were considered to be major landfill areas. A timeline of significant events, including the years of operation since FTMM opened nearly 100 years ago is provided on **Figure 4**. During the 1980 study, groundwater and surface water samples were collected and analyzed for compliance with National Primary and Secondary Drinking Water Standards. The study concluded that the targeted chemicals were not found at high enough concentrations to cause degradation to ground or surface water. Following the 1988 evaluation, it was recommended that FTMM submit a landfill registration statement to the NJDEP (U.S. Army Toxic and Hazardous Materials Agency

[USATHAMA], 1988).

A follow-up evaluation was completed in 1988 by USATHAMA to determine if environmental/hazardous waste disposal conditions at FTMM (including the landfills) had changed since the assessment in 1980. Based on an assessment of available data, it was recommended that USATHAMA not conduct a site investigation (SI), but that surface water and groundwater sampling at the landfills continue (USATHAMA, 1988). Numerous investigations were conducted at FTMM including the landfills over the past 30 years. The most recent Remedial Investigation (RI) report for each landfill is a compilation of previous investigations and an evaluation of available analytical data collected from each site.

No enforcement activities have been conducted at the seven landfill sites included in this ROD.

2.2.2 FTMM-03

FTMM-03 landfill located in the western portion of the MP, is bordered by Lafetra Creek to the north, Mill Creek to the east, and North Drive to the south and west (**Figure 5**). FTMM-03 was in operation from approximately 1959 to 1964 and was reportedly used for the general disposal of domestic and industrial wastes. The landfill soil cover material ranges in thickness from 0 to 48 inches below ground surface (bgs) and averages 20 inches in thickness.

2.2.3 FTMM-04

FTMM-04 is located on the MP and is bounded by North Drive to the north, Avenue of Memories to the south, and Wilson Avenue to the east (**Figure 6**). Mill Creek bisects the west-central portion of the landfill. FTMM-04 was in use as a landfill between 1955 and 1956, and was reportedly used for the disposal of building demolition debris. The landfill soil cover material ranges in thickness from 6 to 46 inches bgs and averages 32 inches in thickness.

2.2.4 FTMM-05

FTMM-05 located in the western portion of the MP, north of FTMM-04 and south of the FTMM-08 landfill site (not included in this ROD) (**Figure 7**). FTMM-05 is bounded to the south by North Drive, to the north by an unpaved road, Wilson Avenue to the east and Mill Creek and Parkers Creek to the west. A portion of Mill Creek is adjacent to the bounds of the western side of the site. FTMM-05 was in use as a landfill between 1952 and 1959, and was reportedly used for domestic and industrial wastes. The landfill soil cover material at FTMM-05 ranges in thickness from 0 to 72 inches bgs and averages 24 inches in thickness.

2.2.5 FTMM-12

FTMM-12 is located in the central portion of the MP and is bordered by Husky Brook to the north, Murphy Drive to the east, multiple buildings to the south, and Todd Avenue to the west (**Figure 8**). FTMM-12 was in use as a landfill between 1950 and 1966, and was reportedly used for the disposal of automobiles and domestic and industrial wastes. The landfill soil cover material ranges in thickness from 0 to 48 inches bgs and averages 24 inches in thickness.

2.2.6 FTMM-14

FTMM-14 is located on the MP and is bordered by houses along Gosselin Avenue to the north, by Husky Brook to the south, and by Murphy Drive to the east (**Figure 9**). FTMM-14 was in use as a landfill between 1965 and 1966 and was reportedly used as a general-purpose disposal area

for building rubble and was later covered with dredged material from Husky Brook Lake. The landfill soil cover material ranges in thickness from 6 to 78 inches bgs and averages 30.6 inches in thickness.

2.2.7 FTMM-18

FTMM-18 is located on the northern part of the MP, between Parkers Creek to the north and multiple buildings and Sherrill Avenue to the south (**Figure 10**). The period of operation for FTMM-18 is unknown; however past use of the site reportedly consisted of both landfill and non-landfill-related components. A building demolition debris disposal area is located in the southern portion of FTMM-18, just north of Building 293. The landfill soil cover material ranges in thickness from 0 to 60 inches bgs and averages 28 inches in thickness. The Final RI Report for FTMM-18 was submitted to NJDEP in October 2015.

2.2.8 FTMM-25

FTMM-25 is located at the CWA. It is bounded by Pearl Harbor Avenue to the west, Shrewsbury Creek to the north, a wooded area to the east and the Pulse Power Facility Building to the south (**Figure 11**). FTMM-25 currently consists of a partially wooded lot with tall grass in the center and trees to the north, east and west. FTMM-25 was in use as a landfill between 1955 and 1956 and was reportedly used for the disposal of debris from the demolition of buildings at CWA. The landfill soil cover material ranges in thickness from 1 to 30 inches bgs and averages 20 inches in thickness. The Final RI Report for FTMM-25 was submitted to NJDEP in August 2016.

2.3 COMMUNITY PARTICIPATION

A final Proposed Plan for FTMM-03, FTMM-04, FTMM-05, FTMM-12, FTMM-14, FTMM-18, and FTMM-25 was completed and released to the public in February 2017 at the Monmouth County Library, Eastern Branch, 1001 Route 35, Shrewsbury, NJ 07702.

A newspaper notification was posted in the Asbury Park Press on February 6 and 7, 2017 to inform the public of the start of the comment period, to solicit comments from the public, and to announce the public meeting. A public comment period was held from Wednesday, February 8, 2017 to Thursday, March 9, 2017 during which no comments from the public were received. A public meeting was held on Thursday, March 2, 2017 to present the proposed remedy for the seven landfills and seek public comments. At this meeting, representatives from the Army and U.S. Army Corps of Engineers (USACE) were present to answer questions about the site and the presumptive remedy under consideration. One question was received at the public meeting.

2.4 SCOPE AND ROLE OF REMEDY

This ROD describes the remedy to address safety concerns at seven former landfills at FTMM. RIs performed in 2014 and 2015 concluded that risks to human health and the environment from soil at the landfills are within acceptable ranges for the current and future intended land use which consists of passive open spaces, and therefore, no further action (NFA) is required under CERCLA. Although there is no CERCLA risk, and therefore no need for a CERCLA action, a vegetated soil cover will be placed over the landfills to address safety concerns for future use, and the soil cap will be placed consistent with the applicable NJDEP regulations. LUCs to maintain the soil cap and prevent residential land use will be implemented at the landfills.

Containment is considered by USEPA to be a highly effective way to remediate historic landfills in many cases. USEPA has identified containment as a presumptive remedy for historic

landfills because it repeatedly has been shown to be effective at treating similar wastes at other CERCLA sites. USEPA developed presumptive remedies to streamline the selection of cleanup methods for certain categories of sites by narrowing the consideration of cleanup methods to treatment technologies or remediation approaches that have a proven track record in the Superfund program. The Army, as lead agency, has determined that it is appropriate to apply the presumptive remedy of capping for these seven landfills based on the soil and contaminant characteristics found at the sites, and the guidance provided in the directive, Presumptive Remedy for CERCLA Municipal Landfill Sites, USEPA OSWER Directive No. 9355.0-49FS (September 1993). Further information on the selection of presumptive remedies for landfills at military installations is presented in the directive, *Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills, USEPA OSWER Directive No. 9355.0-67FS.*

2.5 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the seven landfill sites was released for public comment in February 2017. No changes occurred to the proposed remedy following the public comment period.

2.6 SITE CHARACTERISTICS

2.6.1 Physical Characteristics

The following subsections describe the general physical characteristics of the MP and CWA at FTMM, as well as those of the seven landfills individually (see Section 2.6.1.7). The RI Reports cited in Table 2.1 include further detailed descriptions of the physiography, topography, vegetation, geology, hydrogeology, and surface water at each of the seven landfill sites.

2.6.1.1 Physiography, Topography, and Vegetation

Both the MP and CWA are located within New Jersey's Atlantic Coastal Plains Physiographic Province, which is comprised of sedimentary beds that gently dip to the southeast. The Coastal Plains Physiographic Province sedimentary beds are dissected by meandering rivers that drain to the Raritan or Delaware River. The topography at FTMM is relatively flat, and has an elevation of 20 to 25 feet above mean sea level (amsl).

Major vegetation zones at FTMM consist of landscaped areas, estuarine and fresh water wetlands, riparian areas, upland forests, and old field habitats. Much of the upland areas of the MP and CWA consist of extensive areas of regularly mowed lawns and landscaped areas

2.6.1.2 Geology

The MP and CWA are situated on New Jersey Coastal Plain deposits that thicken to the southeast. The unconsolidated material in the Coastal Plain deposits date from Cretaceous through the Quaternary Periods and consists of sand, silt, clay, and glauconitic clay. The depth to crystalline bedrock at FTMM is approximately 1,000 feet. The geology of the Long Branch Quadrangle indicates that the Hornerstown, Vincentown, and Tinton Formations are the unconsolidated units that outcrop or occur close to the ground surface in the area of FTMM and are summarized below.

Hornerstown Formation

The Hornerstown underlies much of the MP and the northern portion of the CWA, consists of glauconitic (>50%) clay and silty clay. This unstratified formation is approximately 25 to 30 feet thick and is olive, dark green, and black where unweathered; and olive-brown with brown to reddish-brown mottles where weathered.

Vincentown Formation

The Vincentown Formation unconformably overlies the Hornerstown Formation and consists of glauconitic (5-20%), silty, medium-to-coarse, quartz sand; some fine-to-medium sand; and some very coarse sand to very fine pebbles. This formation is yellow, reddish-yellow, olive-yellow, or olive-brown in color and has a total thickness of 180 feet.

Tinton Formation

The Tinton Formation unconformably underlies the Hornerstown Formation and consists of glauconitic (5-30%), silty, medium-to-coarse and fine-to-medium, quartz sand. The color is reddish-brown, reddish-yellow, or yellowish-brown where weathered, and grayish-brown, brown, and olive-brown where unweathered. It is commonly iron-cemented into beds and masses as much as 15 feet thick. The uppermost 4 to 6 feet, just below the contact with the Hornerstown Formation, is a brown to olive-gray, glauconitic, clayey silt to sandy or silty clay.

2.6.1.3 Groundwater

FTMM lies in the Atlantic and Eastern Gulf Coastal Plain groundwater region. This groundwater region is underlain by unconsolidated to semi-consolidated sedimentary deposits. The chemistry of the water near the surface is variable with low dissolved solids and high iron concentrations. The water chemistry in areas underlain by glauconitic sediments (such as Tinton and Hornerstown Sands) is dominated by calcium, magnesium, manganese, aluminum and iron.

The water table aquifer in the MP and CWA areas is identified as part of the "Navesink-Hornerstown Confining Units," or minor aquifers. The minor aquifers that underlie FTMM include the Tinton Sand, Hornerstown Sand, and Vincentown Formation.

Groundwater is typically encountered at the MP and in the surrounding areas at shallow depths (2 to 9 feet bgs); groundwater elevations fluctuate with the tidal action in area creeks. Shallow groundwater in the MP area is locally influenced by the following factors:

- Tides (due to proximity to the Atlantic Ocean);
- Topography;
- Nature of the fill material within the MP area;
- Presence of clay and silt lenses in the natural overburden deposits; and
- Local groundwater recharge areas (e.g., streams, lakes).

N.J.A.C. 7:9-6, GWQS establishes quality criteria for different classes of groundwater. Class II-A, which is defined as all groundwater that is not classified as one of the other special classes, is the appropriate class for groundwater at Fort Monmouth. The primary designated use for Class II-A groundwater is potable water; secondary uses include agricultural and industrial water. However, groundwater at FTMM is not used for potable purposes since a municipal water supply is currently used at FTMM.

2.6.1.4 Surface Water

The northeastern and southeastern portions of the MP are bordered by Parkers Creek and Oceanport Creek, respectively, and the southern portion of the MP is bordered by Husky Brook. The Shrewsbury River is located within one mile to the east of the MP. Wampum Brook is located to the south of the CWA, and Shrewsbury Creek traverses the CWA from west to east. Shrewsbury

Creek and Wampum Brook merge approximately 300 feet east of the CWA to form Mill Creek. No other surface water bodies were identified within one mile of the CWA.

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 deep water with estuarine and marine wetland areas. Husky Brook and Lafetra Creek are classified predominantly as fresh water riverine, emergent wetland, and forested/shrub wetland. Husky Brook Lake is classified as a fresh water pond. Several CWA wetland areas are identified on the USFWS National Wetland Inventory. Most of Shrewsbury Creek and Wampum Brook are classified as fresh water forested/shrub wetland, and the open water in the golf course in the eastern portion of the CWA is classified as a fresh water pond.

Surface water bodies in the vicinities of the seven landfill sites include:

- FTMM-03: Bordered by Lafetra Creek to the north and Mill Creek to the east;
- FTMM-04: Mill Creek bisects the west-central portion of the site;
- FTMM-05: Bordered by Mill Creek and Parkers Creek to the west;
- FTMM-12: Bordered by Husky Creek to the north;
- FTMM-14: Bordered by Husky Creek to the south;
- FTMM-18: Adjacent to Parkers Creek to the north; and
- FTMM-25: Bordered by Shrewsbury Creek to the north.

2.6.1.5 Soils

According to the Monmouth County Soil Survey (U.S. Department of Agriculture [USDA], 2008), much of the MP is covered by urban, developed land with disturbed soils, whereas the CWA is covered by less urban land complexes than the MP. Surface soils near the MP and CWA generally consist of sandy loams ranging in depth from 9 to 12 inches. The surface soils are underlain by sandy loam, sandy clay loam, or loam that may grade to loamy sand at a depth of approximately 5 feet bgs. Some areas at the MP and CWA are covered by impermeable surfaces such as roads, parking lots, and buildings.

2.6.1.6 Climate

The climate in the Fort Monmouth area is typically humid subtropical and is impacted by continental and oceanic influences. The proximity to the Atlantic Ocean tends to minimize seasonal temperature fluctuations as compared to interior regions of the state. Based on data obtained from the National Weather Service, the temperature at FTMM ranges from 20 degrees Fahrenheit (^{o}F) to 90^{o}F (average of 57^{o}F), and precipitation averages 42 inches per year. Winter is typically cold with occasional nor'easters (a storm that mainly affects the northeastern part of the United States)., resulting in rain along the coast; springs are mild, with the average temperature in the 50's and common thunderstorms; summers are hot and humid, with rare hurricanes; and autumns are similar to spring in terms of temperature and precipitation, although unpredictable weather is common.

2.6.1.7 Topography, Geology, and Hydrogeology of the Seven Sites

FTMM-03

FTMM-03 is located in a floodplain. The ground surface topography is flat, with ground surface elevations of less than 20 feet amsl. The site gently slopes to the north and east, discharging runoff via overland flow to adjacent Lafetra Creek and Mill Creek. The landfill soil cover material ranges in thickness from 0 to 48 inches bgs and averages 20 inches thick. The soil cover is composed primarily of silty sand to sandy silt. Deeper soil to a depth of approximately 10 feet bgs is also composed of silty sand to sandy silt with trace to some gravel, underlain by clay. The depth to groundwater at FTMM-03 ranges from 2 to 12 feet bgs. Groundwater migrates in a north-northwesterly direction toward Lafetra Creek; the calculated average horizontal advective groundwater seepage velocity ranges from 0.08 to 0.48 feet per day (30 to 175 feet per year).

FTMM-04

FTMM-04 is located in the floodplain of Mill Creek. The ground surface topography is flat, with ground surface elevations of less than 20 feet amsl. The landfill soil cover material ranges in thickness from 6 to 46 inches bgs and averages 32 inches thick. Soil to a depth of at least 24 feet bgs at FTMM-04 is comprised of brown, fine to coarse sand with fine gravel and root fragments and green/gray/black sandy silt and clay. The depth to groundwater typically ranges from approximately 5 to 10 feet bgs. Groundwater east of Mill Creek migrates toward the west (i.e., toward Mill Creek); the calculated average horizontal advective groundwater seepage velocity is 0.48 foot per day (175 feet per year).

FTMM-05

FTMM-05 is located adjacent to Mill Creek, Lafetra Creek, and Parkers Creek. The ground surface topography is flat, with elevations of less than 20 feet amsl. The landfill soil cover material ranges in thickness from 0 to 72 inches bgs and averages 24 inches thick. The soil cover is composed primarily of topsoil and tan and brown silty sand with root fragments. Deeper soil is composed of greenish, orange, and gray sandy clay with a trace of gravel. The depth to groundwater at FTMM-05 ranges from 6 to 11 feet bgs. Groundwater migrates in a westerly to northwesterly direction toward Mill and Parkers Creeks; the calculated average horizontal advective groundwater seepage velocity is 0.22 ft/day (82 feet per year).

FTMM-12

FTMM-12 is located adjacent to Husky Brook and is bisected by a storm water outfall and drainage ditch that is a tributary to Husky Brook. The ground surface topography is flat, with elevations of less than 20 feet amsl. Landfill cover material thicknesses range from 0 to 48 inches and average 24 inches. The fill material underlying the soil cover is composed of green to brown sand with little silt and clay to a depth of 4 to 10 feet bgs. Native soil encountered below the fill consisted of brown to black fine sand, silt, and clay with organic material. The depth to groundwater at FTMM-12 ranges from 2 to 10 feet bgs. Groundwater migrates in a northern/northwestern direction toward Husky Brook; the calculated average advective horizontal groundwater seepage velocity is 0.51 to 0.62 foot per day (186 to 226 feet per year).

FTMM-14

FTMM-14 is located southeast of Mill and Parker Creek and immediately north and adjacent to Husky Brook. The ground surface topography is flat, with elevations of less than 20 feet amsl. Landfill cover material thickness range from 6 to 78 inches and average 30 inches. The soil cover is composed primarily of greenish-gray, silty, coarse to fine sand with little clay and gravel. Deeper

soil is composed of greenish, orange, and gray sandy clay with a trace of gravel. The depth to groundwater at FTMM-14 ranges from 6 to 8 feet bgs. Groundwater migrates in a southerly direction towards Husky Brook; the calculated average horizontal advective groundwater seepage velocity is 0.02 to 0.06 ft/day (7 to 22 feet per year).

FTMM-18

A tidal marsh adjoins the northern portion of FTMM-18. The ground surface topography is flat with elevations of less than 20 feet amsl. The landfill soil cover material ranges in thickness from 0 to 60 inches and averages 28 inches. The soil cover is composed primarily of topsoil, silty sand, and olive-brown-gray clay. Deeper soil is primarily composed of gray to dark gray, silty sand and green clay. The depth to groundwater at FTMM-18 ranges from 4 to 8 feet bgs. Groundwater beneath the site migrates toward the adjacent Parkers Creek; the calculated average advective horizontal groundwater seepage velocity is 0.16 to 0.19 foot per day (58 to 69 feet per year).

FTMM-25

The ground surface elevation at FTMM-25 located in the southwestern corner of the CWA ranges from 30 to 60 feet amsl. The landfill soil cover material ranges in thicknesses from 1 to 30 inches bgs and averages 20-inches. Deeper soil is composed primarily of sands and silty sands that extend to depths of 5 to 10 feet bgs, and are underlain by silty clay to the total investigated depth of 17 feet bgs. The depth to groundwater at FTMM-25 ranges from 7 to 14 feet bgs. Groundwater on both sides of Shrewsbury Creek is estimated to migrate toward the creek; The calculated average advective horizontal groundwater seepage velocity is 0.11 ft/day (41 feet per year).

2.6.2 Summary and Findings of Site Investigations

The following subsections describe environmental investigation activities for soil, groundwater, surface water, and sediments for each of the seven landfill sites covered by this ROD.

2.6.2.1 FTMM-03 Environmental Investigations

Soil

A total of 425 near-surface soil samples were collected from 205 borings from September to November 1998. The samples were collected between 6 and 12 inches bgs except for the volatile organic compounds (VOCs) samples which were collected at approximately 24 inches bgs. Concentrations of four VOCs, seven semi-volatile organic compounds (SVOCs), six pesticides, one polychlorinated biphenyl (PCB), and 16 metals exceeded their current NJDEP Residential Direct Contact Soil Remediation Standard (RDCSRS) and/or USEPA Regional Screening Level (RSL) in at least one soil sample. These compounds were evaluated as constituents of potential concern (COPC) for soil in the human health risk assessment (HHRA).

Groundwater

Between 1995 and 2010, 13 groundwater monitoring wells were installed at FTMM-03 to investigate and monitor contaminants in groundwater. From 1997 through 2004, groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. In 2005, the NJDEP approved discontinuing analyses for SVOCs, pesticides, PCBs, and metals because contaminant concentrations were consistently below NJDEP GWQS. The wells continued to be sampled quarterly for VOCs between 2005 and 2009, and samples collected thereafter were analyzed for VOCs and metals. The sampling data from the most recent eight quarters (November 2009 to

August 2011), the August 2013 Baseline Sampling Event (BSE), and the 2014 Annual Sampling Event (ASE) were evaluated as being representative of recent conditions. NJDEP subsequently agreed to discontinue the groundwater long-term monitoring (LTM) program since concentrations were below the GWQS. Only VOCs were evaluated as COPC for groundwater in the HHRA.

Surface Water

To determine whether site-related contamination had impacted nearby surface waters, quarterly sampling was performed from October 1996 to September 2010. During the most recent eight quarters of surface water sampling (December 2008 to September 2010), tetrachloroethene (PCE) was the only VOC that exceeded NJDEP Surface Water Quality Standard (SWQS). However, it was determined that the PCE concentrations exceeding the SWQS originated from an offsite source and upstream of FTMM-03. No COPC were identified in the surface water for evaluation in the HHRA.

Sediment

Sediment sampling was conducted in April 2000 in Lafetra Creek to evaluate PCB-related impacts to stream sediments associated with FTMM-03. No PCBs were detected in the 25 samples above the NJDEP and USEPA criteria. No COPC were identified in sediment for evaluation in the HHRA.

2.6.2.2 FTMM-04 Environmental Investigations

Soil

A total of 66 near-surface soil samples were collected from 63 borings in March 1998. The samples were collected between 6 and 12 inches bgs except for the VOCs samples, which were collected at approximately 24 inches bgs. No VOCs exceeded NJDEP RDCSRSs or USEPA RSLs. Concentrations of seven SVOCs, nine metals, and two pesticides exceeded their current NJDEP RDCSRS and/or USEPA RSL in at least one soil of 66 samples. SVOCs, metals, and pesticides were evaluated as COPC in soil in the HHRA.

Groundwater

Between 1994 and 1999, four groundwater monitoring wells were installed at FTMM-04 to investigate and monitor contaminants in groundwater. From 1997 through 2004, groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Upon approval from the NJDEP, analyses for VOCs, SVOCs, pesticides, and PCBs was discontinued beginning in 2005 because contaminant concentrations were consistently below NJDEP GWQS. The wells continued to be sampled quarterly for metals between 2005 and 2011. The sampling data from the most recent eight quarters (November 2009 to August 2011) and August 2013 BSE supported the conclusion that detected concentrations of metals are representative of background conditions despite exceedances of NJDEP and/or USEPA Tapwater RSL. Following the recommendations in the August 2013 BSE results, NJDEP subsequently agreed to discontinue the groundwater LTM program since groundwater concentrations were below GWQS. No COPC were identified in the groundwater for evaluation in the HHRA.

Surface Water

To determine whether site-related contamination had impacted nearby surface waters, quarterly sampling was performed from October 1996 to September 2010. During the most recent

eight quarters of surface water sampling (March 2007 to September 2010), PCE was the only VOC that exceeded NJDEP SWQS. However, it was determined that PCE concentrations exceeding the SWQS originated from an offsite source and upstream of FTMM-04. No COPC were identified in the surface water for evaluation in the HHRA.

Sediment

Sediment samples collected from Mill Creek, adjacent to FTMM-04 in 2000 and 2010, and analyzed for PCBs and VOCs, SVOCs, pesticides, PCBs, and metals resulted in no detections above the NJDEP RDCSRS. No COPC were identified in the sediment for evaluation in the HHRA.

2.6.2.3 FTMM-05 Environmental Investigations

Soil

A total of 296 near-surface soil samples were collected from 254 borings during April-December 1998. The samples were collected between 6 and 12 inches bgs except for the VOCs samples, which were collected at approximately 24 inches bgs. Concentrations of two VOCs, eight SVOCs (all of which are PAHs), seven pesticides, one PCB, and 15 metals exceeded their current NJDEP RDCSRS and/or USEPA RSL in at least 1 of 183 samples. Concentrations of five PAHs, two pesticides, one PCB, and eight metals exceeded their NJDEP NRDCSRS and/or USEPA Industrial RSL in at least one soil sample. These compounds were evaluated as COPCs in the HHRA.

Groundwater

Between 1994 and 1998, four groundwater monitoring wells were installed at FTMM-05 to characterize and monitor contaminants in groundwater. Nine additional monitoring wells were installed at the site in 1999. From 1997 through 2004, groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Upon approval from the NJDEP, analyses for SVOCs, pesticides, and PCBs was discontinued in 2003 because contaminant concentrations were consistently below NJDEP GWQS. The wells continued to be sampled quarterly for VOCs and metals between 2005 and 2011. Additional groundwater sampling occurred in August 2013 and December 2014. The sampling data from the most recent eight quarters (November 2009 to August 2011), the August 2013 BSE, and the 2014 ASE were evaluated as being representative of recent conditions. During this period, concentrations of six VOCs and 17 metals exceeded the NJDEP GWQS and/or USEPA Tapwater RSL in at least one sample. Metals were not considered a COPC based on the small number of background exceedances. Only VOCs were evaluated as a COPC for groundwater in the HHRA. Based on the recommendations in the August 2013 BSE Report, NJDEP agreed only select wells should be sampled for VOC analyses on an annual basis.

Surface Water

To determine whether site-related contamination had impacted nearby surface waters, quarterly sampling was performed from October 1996 to September 2010. During the most recent eight quarters of surface water sampling (December 2008 to September 2010), two VOCs exceeded either the NJDEP SWQS or the USEPA human health criteria. However, it was determined that VOCs originated from an offsite source and upstream of FTMM-05. No COPC were identified in the surface water for evaluation in the HHRA.

Sediment

Sediment samples were collected from Mill Creek, adjacent to FTMM-05 in 2000 to evaluate PCB-related impacts to stream sediments associated with FTMM-05. One PCB was detected in one sample below the NJDEP RDCSRS and the USEPA Residential RSL. No COPC were identified in sediment for evaluation in the HHRA.

2.6.2.4 FTMM-12 Environmental Investigations

Soil

A total of 193 near-surface soil samples were collected from 143 borings from March 1998 to September 1999 and analyzed for VOCs, metals, SVOCs, pesticides, and PCBs. Concentrations of two VOCs, six SVOCs (all of which are polynuclear aromatic hydrocarbons [PAHs]), two pesticides, and 13 metals exceeded their current NJDEP RDCSRS and/or USEPA RSL in at least 1 of 193 soil samples. Concentrations of five PAHs and four metals exceeded their NJDEP NRDCSRS and/or USEPA Industrial RSL in at least one soil sample. These compounds were evaluated as COPC for soil in the HHRA.

Groundwater

Quarterly groundwater monitoring was performed from 1997 to 2011 from a network of up to 16 wells and were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals through August 2004. As agreed to by the NJDEP in November 2004, select wells were analyzed for metals and pesticides and PCBs; and VOCs and SVOCs were eliminated from the sampling program starting in February 2005. In March 2009, the groundwater monitoring wells were only sampled for metals. Additional groundwater sampling occurred in August 2013. Historic exceedances of metals except for lead are attributed to background water quality. The August 2013 sampling was conducted for lead analysis only, and lead was not detected. Following the recommendations in the August 2013 BSE Report, NJDEP agreed to discontinue the groundwater LTM program since concentrations were below the GWQS. No COPC were identified in the groundwater for evaluation in the HHRA.

Surface Water

Quarterly surface water sampling was conducted at four locations in Husky Brook adjacent to FTMM-12 from October 1996 through September 2010. The most recent eight quarters of surface water monitoring data were determined to be representative of recent conditions. Concentrations of VOCs and metals detected upstream of FTMM-12 were similar to concentrations detected downstream of the site. This comparison indicated that FTMM-12 is not significantly impacting VOC or metal concentrations in Husky Brook. No COPCs were identified in the surface water for evaluation in the HHRA.

Sediment

One PCB was detected in 1 of 25 sediment samples collected for the FTMM-12 in April 2000 at a concentration slightly above than the NJDEP RDCSRS and the USEPA Residential RSL for soil. The detected PCB concentration did not exceed the NJDEP NRDCSRS or USEPA Industrial RSL for soil. The PCB detection occurred upstream of FTMM-12, and is not associated with this site. No COPC were identified in the sediment for evaluation in the HHRA.

2.6.2.5 FTMM-14 Environmental Investigations

Soil

A total of 124 near-surface soil samples were collected from 119 borings during December

1998 to January 1999. Samples were analyzed for VOCs, metals, SVOCs, pesticides, and PCBs. Concentrations of seven SVOCs (all of which were PAHs), one pesticide, and seven metals exceeded their NJDEP RDCSRS and/or USEPA Residential RSL in at least 1 of 124 soil samples. These compounds were evaluated as COPC for soil in the HHRA.

Groundwater

Quarterly groundwater sampling was performed from June 1997 to August 2011 from a network of up to nine monitoring wells. Concentrations of one VOC (1,4-dichlorobenzene) and 18 metals exceeded their NJDEP GWQS and/or the USEPA Tapwater RSL in at least one sample collected between November 2009 and August 2011. Groundwater samples were also collected in August 2013 for VOC analyses; no VOCs exceeded the GWQS. Following the recommendations based on the August 2013 BSE results, NJDEP subsequently agreed to discontinue the groundwater LTM program since concentrations were below the GWQS. No COPCs were identified in the groundwater for evaluation in the HHRA.

Surface Water

Quarterly surface water sampling was conducted at four locations in Husky Brook associated with FTMM-14 from October 1996 through September 2010. The most recent eight quarters of surface water monitoring data were evaluated as being representative of recent conditions. Concentrations of VOCs and metals detected upstream of FTMM-14 were similar to concentrations detected downstream of the landfill in Husky Brook. This comparison indicated that FTMM-14 is not significantly impacting VOC or metal concentrations in Husky Brook. No COPC were identified in the surface water for evaluation in the HHRA.

Sediment

One PCB was detected in 1 of 25 sediment samples collected for the FTMM-14 in April 2000 at a concentration slightly above than the NJDEP RDCSRS and the USEPA Residential RSL for soil. The detected PCB concentration did not exceed the NJDEP NRDCSRS or USEPA Industrial RSL for soil. The PCB detection occurred upstream of FTMM-14, and is not associated with this site. No COPCs were identified in the sediment for evaluation in the HHRA.

2.6.2.6 FTMM-18 Environmental Investigations

Soil

Soil samples collected in 1999 were analyzed for VOCs, metals, SVOCs, pesticides, and PCBs. Concentrations of six SVOCs (all of which are PAHs) and six metals exceeded their NJDEP RDCSRS and/or USEPA RSL in at least 1 of 65 soil samples. Concentrations of four PAHs, and one metal exceeded their NJDEP NRDCSRS and/or USEPA Industrial RSL in at least one soil sample. PAHs and metals were evaluated as COPC for soil in the HHRA.

Groundwater

Quarterly groundwater sampling was performed from June 1997 to August 2011 and in August 2013, using a network of up to 10 monitoring wells. Concentrations of six VOCs and 17 metals exceeded the NJDEP GWQS and/or the USEPA Tapwater RSL in at least one sample. Following the recommendations in in the August 2013 BSE Report, NJDEP agreed that sampling should be limited to four select wells for VOCs on an annual basis. Two VOCs and one metal were evaluated as COPCs for groundwater in the HHRA. The other VOCs and metals which exceeded

groundwater comparison criteria were not considered to be COPCs because the detections were either isolated and anomalous, or they did not exceed their groundwater comparison criteria during the most recent sampling events.

Surface Water

Quarterly surface water samples were collected upstream, adjacent to, and downstream of FTMM-18 from October 1996 to September 2010. PCE concentrations that exceeded the NJDEP SWQS were detected upstream of FTMM-18 and were determined not to be site-related. No COPCs were identified in the surface water for evaluation in the HHRA.

Sediment

Sampling was conducted in Parkers Creek in April 2000 to evaluate PCB-related impacts to stream sediments associated with FTMM-18. One PCB (Aroclor 1254) was detected in two of eight samples. The concentration in one sample was slightly above the NJDEP RDCSRS for total PCBs and the USEPA Residential RSL for Aroclor 1254. The PCB concentration in the other sample was below comparison criteria. There are multiple storm sewer outlets at Parkers Creek upstream of the two sample locations that may be a source of PCBs. However, the detection could not be definitively attributed to upstream sources and therefore was considered a sediment COPC that was potentially site-related and was evaluated in the HHRA.

2.6.2.7 FTMM-25 Environmental Investigations

Soil

Soil samples collected in 1998 were analyzed for VOCs, metals, SVOCs, pesticides, and PCBs. Concentrations of six SVOCs (all of which are PAHs), two pesticides, two PCBs, and 10 metals exceeded their NJDEP RDCSRS and/or USEPA RSL in at least one soil sample. Concentrations of four PAHs and two metals exceeded their NJDEP NRDCSRS and/or USEPA Industrial RSL in at least one soil sample. COPCs in soil that were evaluated in the HHRA included six PAHs, two PCBs, and five metals.

Groundwater

Groundwater monitoring was performed at FTMM-25 from December 1997 to July 2011 using a network of up to four monitoring wells; additional baseline monitoring was performed in August 2013. Eleven metals were detected at concentrations exceeding their NJDEP GWQS and/or the USEPA Tapwater RSL. Following the recommendations in the August 2013 BSE Report, NJDEP agreed that the groundwater LTM program should be discontinued since groundwater concentrations were below GWQS. Two metals were evaluated as COPCs in the groundwater for the HHRA. The other metals which exceeded groundwater comparison criteria were not considered to be COPCs because the detections were either isolated and anomalous, or they did not exceed their groundwater comparison criteria during the most recent sampling events.

Surface Water

A surface water sampling event conducted at Shrewsbury Creek was performed in June 2010. The PAHs detected were likely not related to the landfill and detected metal concentrations were similar to those found in background samples. No COPCs were identified in the surface water for evaluation in the HHRA.

Sediment

Sampling was conducted in April 2000 in Shrewsbury Creek to evaluate potential PCB-related impacts to sediments. No PCBs were detected in the samples collected at and downstream of FTMM-25. No COPCs were identified in the sediment for evaluation in the HHRA.

2.7 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

2.7.1 Current and Potential Land Use of the Seven Sites

The seven sites have been inactive landfills since their respective closure dates (see Figure 4). The anticipated land use for the seven landfills is passive open space (Edaw, Inc., 2008). Land planned for use as "open space" is expected to remain undeveloped, with only occasional maintenance activities (e.g., grounds keeping), utility work associated with underground or overhead utilities that may be present within the site boundary, and recreational activity (e.g., hiking and biking on established trails).

2.7.2 Groundwater and Surface Water Uses

Neither groundwater nor surface water are used as a drinking water source by current outdoor workers or indoor workers at FTMM, because municipal water is provided for use. Surface water at FTMM is not currently used for recreational purposes.

2.8 SUMMARY OF SITE RISKS

An HHRA evaluation of the potential risk from human exposure to contaminants in soil, surface water, sediment, and groundwater was conducted as part of the RI at each of the seven landfill sites. The HHRAs evaluated exposure of current/future outdoor workers, future utility workers, and future recreational users to COPCs in soil, groundwater, and sediment through dermal contact, incidental ingestion, and inhalation of particulates.

No COPCs were identified in surface water at any of the seven landfill sites. Therefore, further evaluation of surface water in the HHRAs was not conducted and no unacceptable risks were expected from human exposure to surface water. Groundwater at FTMM is not used as a drinking water source, because municipal water is provided for use. Therefore, there are no current exposures to groundwater. The following sections summarize the HHRA results for each site.

2.8.1 FTMM-03 Summary of Site Risks

No COPCs were identified for surface water or sediment at FTMM-03; these media were not further evaluated in the HHRA. Site risk based on current and future land use as passive open space for current/future outdoor workers, utility workers, or future recreational users were less than the risk ranges of 1×10^{-4} to 1×10^{-6} for carcinogenic and non-carcinogenic hazard goal of 1 and when above these ranges remedial actions may be required. The results are summarized as follows:

- For outdoor workers exposed to soil at FTMM-03, the cumulative carcinogenic risk of 7×10^{-5} is less than 1×10^{-4} to 1×10^{-6}. The cumulative non-carcinogenic hazard is 0.5, which is less than the cumulative hazard goal of 1.
- For utility workers exposed to soil at FTMM-03, the cumulative carcinogenic risk of 8×10^{-7} is less than 1×10^{-4}. The cumulative non-carcinogenic hazard is 0.2, which is less than the cumulative hazard goal of 1.

- For recreational users exposed to soil at FTMM-03, the cumulative carcinogenic risk of 2×10^{-5} is less than 1×10^{-4} to 1×10^{-6} The cumulative non-carcinogenic hazard is 0.08, which is less than the cumulative hazard goal of 1.
- Lead in soil was evaluated separately from the other constituents. The calculated non-carcinogenic hazards are 0.1, 0.08, and 0.04 for outdoor workers, utility workers, and recreational users, respectively. Lead hazards at FTMM-03 are less than the hazard goal of 1.
- For utility workers exposed to groundwater through dermal contact and incidental ingestion, the cumulative carcinogenic risk for all wells is 2×10^{-10}, which is less than 1×10^{-4}. The cumulative non-carcinogenic hazard for all wells is 0.05, which is less than the cumulative hazard goal of 1.

2.8.2 FTMM-04 Summary of Site Risks

No COPCs were identified for groundwater, surface water, or sediment at FTMM-04; these media were not further evaluated in the HHRA. Site risk based on current and future land use as passive open space for current/future outdoor workers, utility workers, or future recreational users were less than the risk ranges of 1 x 10-^{4} to 1×10^{-6} for the carcinogenic and non-carcinogenic hazard goal of 1. When above these ranges remedial actions may be required. The results are summarized as follows:

- For outdoor workers exposed to soil at FTMM-04, the cumulative carcinogenic risk of 4×10^{-5} is less than 1×10^{-4}. The cumulative non-carcinogenic hazard for outdoor workers was initially calculated as 25, which is above the cumulative hazard goal of 1. The non-carcinogenic hazard consisted almost entirely of the hazard associated with exposure to thallium in soil. The hazard associated with the other non-carcinogens in soil was 1 for outdoor workers if thallium was not included in the cumulative risk. Based on qualitative evaluation of the thallium present at the site, the cumulative hazard of 1 is expected to be more representative of expected site conditions and therefore thallium was not identified as a COC in soil at FTMM-04.
- For recreational users exposed to soil at FTMM-04, the cumulative carcinogenic risk of 8×10^{-6} is less than 1×10^{-4}. The cumulative non-carcinogenic hazard for recreational users was initially calculated as 4, which is above the cumulative hazard goal of 1. The non-carcinogenic hazard consisted almost entirely of the hazard associated with exposure to thallium in soil. The hazard associated with the other non-carcinogens in soil was 0.1 for recreational users if thallium was not included in the cumulative risk. Based on qualitative evaluation of the thallium present at the site, the cumulative hazard of 1 is expected to be more representative of expected site conditions and therefore thallium was not identified as a COC in soil at FTMM-04.

2.8.3 FTMM-05 Summary of Site Risks

No COPCs were identified for surface water or sediment at FTMM-05; these media were not further evaluated in the HHRA. Site risk based on current and future land use as passive open space for current/future outdoor workers, utility workers, or future recreational users were less than the risk ranges of 1 x 10-^{4} to 1×10^{-6} for the carcinogenic and non-carcinogenic hazard goal of 1 and when above these ranges remedial actions may be required. The results are summarized

as follows:

- For outdoor workers exposed to soil at FTMM-05, the cumulative carcinogenic risk of 4×10^{-5} is within the cumulative risk goal of 1×10^{-4} to 1×10^{-6}. The cumulative non-carcinogenic hazard is 0.9, which is less than the cumulative hazard goal of 1.
- For utility workers exposed to soil at FTMM-05, the cumulative carcinogenic risk of 6×10^{-7} is less than the cumulative risk goal of 1×10^{-4} to 1×10^{-6}. The cumulative non-carcinogenic hazard is 0.3, which is less than the cumulative hazard goal of 1.
- For recreational users exposed to soil at FTMM-05, the cumulative carcinogenic risk of 1×10^{-5} is within the cumulative risk goal of 1×10^{-4} to 1×10^{-6}. The cumulative non-carcinogenic hazard is 0.1, which is less than the cumulative hazard goal of 1.
- Lead in soil was evaluated separately from the other constituents. The calculated non-carcinogenic hazards are 0.4, 0.2, and 0.1 for outdoor workers, utility workers, and recreational users, respectively. Lead hazards at FTMM-05 are less than the hazard goal of 1.
- For utility workers exposed to groundwater, the cumulative carcinogenic risks for all wells is 8×10^{-9}, which is less than the cumulative risk goal of 1×10^{-4} to 1×10^{-6}. The cumulative non-carcinogenic hazard for all wells is 0.04, which is less than the cumulative hazard goal of 1.

2.8.4 FTMM-12 Summary of Site Risks

No COPCs were identified for groundwater, surface water, or sediment at FTMM-12; these media were not further evaluated in the HHRA for FTMM-12. Site risk based on current and future land use as passive open space for current/future outdoor workers, utility workers, or future recreational users were less than the risk ranges of 1×10^{-4} to 1×10^{-6} for the carcinogenic and non-carcinogenic hazard goal of 1. When above these ranges remedial actions may be required. The results are summarized as follows:

- For outdoor workers exposed to soil at FTMM-12, the cumulative carcinogenic risk of 3×10^{-5} is within the cumulative risk goal of 1×10^{-4} to 10^{-6} for soil. The cumulative non-carcinogenic hazard is 0.4, less than the cumulative hazard goal of 1.
- For utility workers exposed to soil at FTMM-12, the cumulative carcinogenic risk of 3×10^{-7} is less than the cumulative risk goal of 1×10^{-4} to 10^{-6} for soil. The cumulative non-carcinogenic hazard is 0.1, less than the cumulative hazard goal of 1.
- For recreational users exposed to soil at FTMM-12, the cumulative carcinogenic risk of 8×10^{-6} is within the cumulative risk goal of 1×10^{-4} to 10^{-6} for soil. The cumulative non-carcinogenic hazard is 0.06, which is less than the cumulative hazard goal of 1.
- Lead was evaluated separately from the other constituents. The calculated non-carcinogenic hazards are 0.09, 0.05, and 0.03 for outdoor workers, utility workers, and recreational users, respectively. Lead hazards at FTMM-12 are less than the hazard goal of 1.

2.8.5 FTMM-14 Summary of Site Risks

No COPCs were identified for groundwater, surface water, or sediment at FTMM-04; these

media were not further evaluated in the HHRA for FTMM-14. Site risk based on current and future land use as passive open space for current/future outdoor workers, utility workers, or future recreational users were less than the risk ranges of 1×10^{-4} to 1×10^{-6} for the carcinogenic and non-carcinogenic hazard goal of 1 and when above these ranges remedial actions may be required. The results are summarized as follows

- For outdoor workers exposed to soil at FTMM-14, the cumulative carcinogenic risk of 4×10^{-5} is within the cumulative risk goal of 1×10^{-4} to 10^{-6} for soil. The cumulative non-carcinogenic hazard is 0.3, less than the cumulative hazard goal of 1.
- For utility workers exposed to soil at FTMM-14, the cumulative carcinogenic risk of 5×10^{-7} is less than the cumulative risk goal of 1×10^{-4} to 10^{-6} for soil. The cumulative non-carcinogenic hazard is 0.09, less than the cumulative hazard goal of 1.
- For recreational users exposed to soil at FTMM-14, the cumulative carcinogenic risk of 1×10^{-5} is within the cumulative risk goal of 1×10^{-4} to 10^{-6} for soil. The cumulative non-carcinogenic hazard is 0.04, which is less than the cumulative hazard goal of 1.

2.8.6 FTMM-18 Summary of Site Risks

No COPCs were identified for surface water at FTMM-18; surface water was not further evaluated in the HHRA for FTMM-18. Site risk based on current and future land use as passive open space for current/future outdoor workers, utility workers, or future recreational users were less than the risk ranges of 1 x 10-^{4} to 1×10^{-6} for the carcinogenic and non-carcinogenic hazard goal of 1. When above these ranges remedial actions may be required. The results are summarized as follows:

- For outdoor workers exposed to soil at FTMM-18, the cumulative carcinogenic risk of 2×10^{-5} is within the cumulative risk goal of 1×10^{-4} to 1×10^{-6} for soil. The cumulative non-carcinogenic hazard is 0.1, which is less than the cumulative hazard goal of 1.
- For utility workers exposed to soil at FTMM-18, the cumulative carcinogenic risk of 3×10^{-7} is less than the cumulative risk goal of 1×10^{-4} to 1×10^{-6} for soil. The cumulative non-carcinogenic hazard is 0.04, which is less than the cumulative hazard goal of 1.
- For recreational users exposed to soil at FTMM-18, the cumulative carcinogenic risk of 7×10^{-6} is within the cumulative risk goal of 1×10^{-4} to 1×10^{-6} for soil. The cumulative non-carcinogenic hazard is 0.02, which is less than the cumulative hazard goal of 1.
- For utility workers exposed to groundwater, the cumulative carcinogenic risks for all wells of 2×10^{-7} is less than the cumulative risk goal of 1×10^{-4} to 1×10^{-6} for groundwater. The cumulative non-carcinogenic hazard for all wells is 0.09, which is less than the cumulative hazard goal of 1.
- For outdoor workers exposed to sediment, the cumulative carcinogenic risk of 2×10^{-7} is below the cumulative risk goal of 1×10^{-4} to 1×10^{-6} for sediment. The cumulative non-carcinogenic hazard is 0.01, which is less than the cumulative hazard goal of 1.
- For recreational users exposed to sediment, the cumulative carcinogenic risk of 3×10^{-8} is below the cumulative risk goal of 1×10^{-4} to 1×10^{-6} for sediment. The

cumulative non-carcinogenic hazard of 0.002 does not exceed the cumulative hazard goal of 1.

2.8.7 FTMM-25 Summary of Site Risks

No COPCs were identified for surface water or sediment at FTMM-25; these media were not further evaluated in the HHRA for FTMM-25. Site risk based on current and future land use as passive open space for current/future outdoor workers, utility workers, or future recreational users were less than the risk ranges of 1 x 10-^{4} to 1 x 10^{-6} for the carcinogenic and non-carcinogenic hazard goal of 1. When above these ranges remedial actions may be required. The results are summarized as follows:

- For outdoor workers exposed to soil at FTMM-25, the cumulative carcinogenic risk of 3 x 10^{-5} is less than 1 x 10^{-4}. The cumulative non-carcinogenic hazard is 0.3, which is less than the cumulative hazard goal of 1.
- For utility workers exposed to soil at FTMM-25, the cumulative carcinogenic risk of 3 x 10^{-7} is less than 1 x 10^{-4}. The cumulative non-carcinogenic hazard is 0.1, which is less than the cumulative hazard goal of 1.
- For recreational users exposed to soil at FTMM-25, the cumulative carcinogenic risk of 1 x 10^{-5} is less than 1 x 10^{-4}. The cumulative non-carcinogenic hazard is 0.04, which is less than the cumulative hazard goal of 1.
- Lead in soil was evaluated separately from the other constituents. The calculated non-carcinogenic hazards are 0.6, 0.3, and 0.2 for outdoor workers, utility workers, and recreational users, respectively. Lead hazards at FTMM-25 are less than the hazard goal of 1.
- For utility workers exposed to groundwater, no carcinogenic analytes were identified as COPCs in groundwater. The cumulative non-carcinogenic hazard for any wells is 0.01, which is less than the hazard goal of 1.

2.8.8 Ecological Risks

A Baseline Ecological Evaluation ([BEE], Shaw, 2012) was performed at the MP and CWA to fulfill requirements set forth in NJDEP's TRSR (N.J.A.C. 7:26E-5.3). The objective of the BEE was to determine whether potential ecological impacts were negligible or whether more site-specific ecological evaluation was warranted. The BEE concluded that exceedances of ecological screening criteria have been sufficiently evaluated and addressed for ecological consideration and that no additional ecological evaluation was necessary. In an August 27, 2012 letter, the NJDEP accepted the 2012 BEE report's recommendations and conclusions and concurred that no further evaluation of ecological risk is required at any of the seven landfills.

2.9 REMEDIAL ACTION OBJECTIVES

The remedial action objective (RAO) for the landfill sites addressed in this ROD is not to mitigate chemical exposures but rather to protect future users from potential safety hazards associated with surfical construction/demolition debris.

2.10 SELECTED REMEDY

This ROD represents the selected remedy for landfill sites FTMM-03, FTMM-04, FTMM-05, FTMM-12, FTMM-14, FTMM-18, and FTMM-25 located at FTMM. Although there is no CERCLA risk, and therefore no need for a CERCLA action, a vegetated soil cover will be placed over the landfills to address safety concerns for future use, and the soil cap will be placed consistent with the applicable NJDEP regulations. LUCs to maintain the soil cover and prevent residential land use will be implemented at the landfills. A passive methane mitigation system will be installed to address potential safety concerns due to the proximity of residential houses to the FTMM-14 landfill. The two 100-foot-long trench systems will be located within the landfill boundary and vented to the surface in 25 foot centers. The intent of this passive venting system is in lieu of continued methane monitoring after the installation of the vegetative soil cover. The location of the venting system shall be installed to correspond with sampling points M14SG10 and M14SG 9 and extend in a northeasterly direction parallel to the residential houses. The location of the venting system may require adjustment during installation due to the existences of high pressure gas main and the individual gas main service connections for each housing unit.

Containment is considered by USEPA to be a highly effective way to remediate historic landfills in many cases. USEPA has identified containment as a presumptive remedy for historic landfills because it repeatedly has been shown to be effective at treating similar wastes at other CERCLA sites. USEPA developed presumptive remedies to streamline the selection of cleanup methods for certain categories of sites by narrowing the consideration of cleanup methods to treatment technologies or remediation approaches that have a proven track record in the Superfund program. The Army, as lead agency, has determined that it is appropriate to apply the presumptive remedy of capping for these seven landfills based on the soil and contaminant characteristics found at the site, and the guidance provided in the directive, Presumptive Remedy for CERCLA Municipal Landfill Sites, USEPA OSWER Directive No. 9355.0-49FS (September 1993). Further information on the selection of presumptive remedies for landfills at military installations is presented in the directive, *Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills, EPA OSWER Directive No. 9355.0-67FS.*

Restrictions on groundwater use will be placed on the groundwater at FTMM-05 and FTMM-18 to address exceedances of water quality standards at these landfills.

2.10.1 Summary of the Rationale for the Selected Response Action

The placement of a vegetative cover and implementation of LUCs are appropriate responses for these seven landfill sites. Since no risk to human health or the environment is present at the sites, the response action is not necessary to prevent chemical exposures, but rather to provide safety protection from future exposure to solid waste at the landfills for future use.

2.10.2 Detailed Description of the Implementation of Selected Remedy

To address safety concerns, a vegetated soil cover will be placed over the landfill area after the landfill is regraded. The conceptual design for the vegetated soil cover is shown on **Figure 12**. The vegetated soil cover will be placed consistent with the applicable NJDEP regulations. Additional soil will be added to the existing soil cover to provide a minimum of two feet of clean soil between the ground surface and landfilled debris. The use of a vegetated soil cover will offer safety protection to future users from exposure to landfill debris and will also control surface water runoff and erosion.

LUCs to maintain the soil cap and prevent residential land use will also be implemented at the landfills. The Army will prepare a LUCIP to set forth the manner in which the ICs will be implemented, document the location of the EC, and identify the procedural responsibilities including landfill cover inspections, monitoring and reporting, and long-term management requirements.

The Army will be responsible for documenting and implementing the LUCs, which is expected to occur through the filing of a deed notice at the time of property transfer. The Army will also be responsible to conduct reviews to ensure that the LUCs remain protective of human health and the environment. When the property is transferred out of federal control, the LUCs would be incorporated into the title and the new owner would be responsible for complying with the LUCs. Although the Army may later transfer its procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Army would retain ultimate responsibility for remedy integrity.

In addition, CEAs will be established at FTMM-05 and FTMM-18 to prevent access to and use of the groundwater underlying these landfills. ICs in the form of CEAs will be implemented and will remain in place until NJDEP GWQS are achieved at the site. CEA ensures groundwater in the area is restricted until standards are achieved.

2.10.3 Summary of the Estimated Costs for the Selected Remedy

The Army will be responsible for documenting and implementing the LUCs, which is expected to occur through the filing of a deed notice, and will also be responsible to conduct reviews to ensure that the LUCs remain protective of human health and the environment. When the property is transferred to private ownership, the LUCs will be incorporated into the title and the new owner will be responsible for complying with the LUCs. Although the Army may later transfer its procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Army shall retain ultimate responsibility for remedy integrity.

The costs associated with the installation of the landfill covers and the implementation and O&M of LUCs are summarized in **Table 3**.

2.11 STATUTORY DETERMINATIONS

The selected remedy satisfies the statutory requirements of CERCLA §121 and the NCP, as described below.

2.11.1 Protection of Human Health and the Environment

There were no unacceptable risks to human health and the environment, as defined by the CERCLA, for the current and reasonably anticipated future use of the seven landfill sites which is passive open space at FTMM. Human exposure to site soils will be controlled by the placement and maintenance of a vegetative soil cap and maintenance of LUCs at the sites. In addition, IC in the form of a CEA will be established and implemented for FTMM-05 and FTMM18 and will remain in place until NJDEP GWQS are achieved at the sites.

2.11.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The selected remedy complies with the chemical- and action-specific ARARs described below.

Chemical-Specific ARARs

The GWQS (N.J.A.C. 7:9C-1.7(c), Appendix Table 1) are the only chemical-specific ARARs applicable to this ROD, and only apply to groundwater at FTMM-05 and FTMM-18. Groundwater at these two sites will be monitored bi-annually until such time it is determined that the following GWQS have been attained through natural attenuation:

Compound	Medium	USEPA Maximum Contaminant Level (µg/L)	NJDEP GWQS (µg/L)
Landfill FTMM-05			
Tetrachloroethene	Groundwater	5	1
Trichloroethene	Groundwater	5	1
Landfill FTMM-18			
Benzene	Groundwater	5	1

Action-Specific ARARs

At the seven landfill sites, the vegetated soil cover will be placed consistent with N.J.A.C. 7:26E-5.2(d).

TABLE 3
ESTIMATED COSTS FOR SELECTED REMEDY

CAPITAL COSTS	**FTMM-03**	**FTMM-04**	**FTMM-05**	**FTMM-12**	**FTMM-14**	**FTMM-18**	**FTMM-25**
➢ **Land Use Controls**	**$63,000**	**$62,000**	**$63,000**	**$63,000**	**$63,000**	**$69,000**	**$31,000**
• LUC Implementation Plan	$25,000	$25,000	$25,000	$25,000	$25,000	$30,000	$25,000
• Update Master Planning Maps	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$0
• Contingency (25%)	$13,000	$12,000	$13,000	$13,000	$13,000	$14,000	$6,000
➢ **Landfill Cover**	**$1,537,000**	**$374,000**	**$741,000**	**$1,470,000**	**$1,438,000**	**$882,000**	**$460,000**
• Design and Construction	$26,000	$113,000	$180,000	$270,000	$270,000	$180,000	$126,000
• Soil Cover Installation	$1,505,000	$180,000	$407,000	$900,000	$870,000	$520,000	$236,000
• Geotechnical Borings	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000
• Contingency (25%)	$385,000	$75,000	$148,000	$294,000	$290,000	$176,000	$92,000
TOTAL CAPITOL COSTS	**$1,922,000**	**$436,000**	**$804,000**	**$1,530,000**	**$1,501,000**	**$951,000**	**$491,000**
PERIODIC COSTS							
TOTAL PRESENT VALUE PERIODIC COSTS [a/]	**$0**	**$0**	**$237,000**	**$0**	**$0**	**$217,000**	**$119,000**
O&M COSTS							
TOTAL PRESENT VALUE O&M COSTS [a/]	**$90,000**	**$90,000**	**$90,000**	**$90,000**	**$90,000**	**$90,000**	**$90,000**
TOTAL PRESENT VALUE BY SITE [a/]	**$2,075,000**	**$526,000**	**$1,131,000**	**$1,620,000**	**$1,591,000**	**$1,258,000**	**$700,000**
TOTAL PRESENT VALUE ALL SITES							**$8,901,000**

[a/] Discounted rate of 1.90% applied to these values. 30-Year, Real Discount Rate from White House Office of Management and Budget, Circular A-94 Appendix C, Revised December 2013

2.11.3 Cost-Effectiveness

The selected remedy meets the statutory requirement for a cost-effective remedy. The costs are presented Table 3.

2.11.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

As determined by the project stakeholders, active remediation is not required to achieve the safety goals developed for these seven sites. Consequently, the selected remedy does not employ treatment to eliminate contaminants present at the site. The selected remedy satisfies the criteria for long-term effectiveness by preventing unacceptable exposures to site soils through maintenance of a vegetative cover. Permanent reduction of risks will be accomplished through enforcement of LUCs at the sites. The Army will be responsible for documenting and implementing the LUCs, which is expected to occur through the filing of a deed notice at the time of property transfer, and would also be responsible to conduct reviews to ensure that the LUCs remain protective of human health and the environment. When the property is transferred out of federal control, the LUCs would be incorporated into the title and the new owner would be responsible for complying with the LUCs. Although the Army may later transfer its procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Army would retain ultimate responsibility for remedy integrity.

2.11.5 Preference for Treatment as a Principal Element

The selected remedy does not address principal threats posed by the sites through the use of treatment technologies because there are no principal threats at these seven sites. It was determined that active remediation is not needed at the sites to achieve the RAOs. The selected response action is protective of human health and the environment. In addition, chemical concentrations present in site media do not warrant treatment.

2.11.6 Five-Year Review Requirements

Because this response action will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unrestricted exposure, statutory reviews will be conducted every five years after initiation of the remedy to ensure it is, or will be, protective of human health and the environment, until such time it may be determined that the sites qualify for unrestricted use. Five-year reviews will be conducted in compliance with CERCLA §121(c) and the NCP §300 .430(f)(5)(iii).

SECTION 3 - RESPONSIVENESS SUMMARY

3.1 PUBLIC ISSUES AND LEAD AGENCY RESPONSES

The final component of the ROD is the Responsiveness Summary. The purpose of the Responsiveness Summary is to provide a summary of the stakeholders' comments, concerns, and questions about the selected response action for the seven sites and the Army's responses to these concerns.

Based on the lack of public comments, the community appears to be in support of the selected response action. All comments and concerns summarized below have been considered by the Army and NJDEP in selecting the final remedy for the seven landfills.

A newspaper notification inviting public comment on the Proposed Plan appeared in the Asbury Park Press on February 6, 2017 and February 7, 2017. The public notice summarized the Proposed Plan and the preferred alternative. The notice also identified the time and location of the public meeting and specified a public comment period as well as the address to which written comments could be sent. Public comments were accepted from February 8, 2017 to March 9, 2017. The newspaper notification identified the Monmouth County Library, Eastern Branch, 1001 Route 35, Shrewsbury, New Jersey 07702 as the location of the FTMM Environmental Restoration Program Information Repository. The public notice and Proposed Plan were also posted on the FTMM Environmental Restoration website.

The public meeting was held on March 2, 2017 from 7:30 p.m. to 9:00 p. m. at Building 455 at Fort Monmouth, Oceanport Ave, Oceanport, New Jersey. At this meeting, representatives from FTMM and the USACE presented the Proposed Plan and were available to answer questions concerning the seven landfills and the preferred remedy. The complete attendance list and newspaper notification are included in Attachment 2.

3.1.1 Summary of Comments Received During the Public Meeting on the Proposed Plan and Agency Responses

One comment specific to the selected remedy for the seven landfills was received during the public meeting held on March 2, 2017. Transcripts from the public meeting were completed and submitted into the FTMM Environmental Restoration Program Information Repository for the site. The comment received on the selected remedy is summarized as follows:

Comment 1: When is the proposed construction going to start and how long do you anticipate it to take for all the landfills?

Reply: The Army is going to start construction on the landfill covers next fall and anticipates that construction will be completed on all landfills in one year.

3.1.2 Summary of Comments Received During the Public Comment Period on the Proposed Plan and Agency Responses

No written comments were received during the public comment period.

SECTION 4 - REFERENCES

AECOM. 2012. Draft Final Vapor Intrusion Site Investigation Report, Main Post and Charles Wood Area, OACSIM – U.S. Army Fort Monmouth, Oceanport, New Jersey. Prepared for the U.S. Army Corps of Engineers, Baltimore District. August.

Dooley, J.H., 2001. Baseline Concentrations of Arsenic, Beryllium, and Associated Elements in Glauconite and Glauconite Soils in the New Jersey Coastal Plain. New Jersey Geological Survey. Trenton, New Jersey.

EDAW, 2008. Fort Monmouth Reuse and Redevelopment Plan. Prepared for Fort Monmouth Economic Revitalization Planning Authority, September.

Groundwater & Environmental Services, Inc., (GES). 1999. Remedial Action Work Plan Addendum, Building 699, Main Post Area, Fort Monmouth, New Jersey. Prepared for the Fort Monmouth Directorate of Public Works. June.

NJDEP. 2014. Final Baseline Groundwater Sampling Report (August 2013) Remedial Investigation/Feasibility Study/Decision Documents. July 3.

NJDEP. 2015. Letter Re: November 26, 2014 Response to Comments on the Final Baseline Ground Water Sampling Report (August 2013). February 5.

NJDEP. 2010. Groundwater Quality Standards. New Jersey Administrative Code Title 7 Chapter 9C. July 22.

Shaw. 2012. Final Baseline Ecological Evaluation, Fort Monmouth Main Post & Charles Wood Area. Monmouth County, New Jersey. May.

Tetra Tech, 2011. Remedial Investigation Report Addendum, CW-3A Landfill. Fort Monmouth, New Jersey. U.S. Army Garrison Fort Monmouth, Main Post, Fort Monmouth, New Jersey. Prepared for: U.S. Army, Office of the Assistant Chief of Staff for Installation Management, Fort Monmouth, New Jersey. December 2011.

USACE. 2001. Standard Scopes of Work for HTRW Risk Assessments. U.S. Army Corps of Engineers, Washington, DC. Pamphlet No. 200-1-15. December 15.

U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). Update of the Initial Installation Assessment of Fort Monmouth and Subinstallations: Charles Wood Area and Evans Area. Prepared by J.D. Bonds, J.K Sherwood, and K.A. Decker, Environmental Science and Engineering, Inc, Prepared for U.S. Army Communications-Electronics Command, Fort Monmouth, NJ, and U.S. Army Toxic and Hazardous Material Agency, Aberdeen Proving Ground, MD. June.

USDA. 2008. Soil Survey of Monmouth County, New Jersey. Soil Conservation Service. April.

USEPA. 1989. Risk Assessment Guidance for Superfund (RAGS), Volume 1 – Human Health

USEPA. 1996. Appplication of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills, USEPA OSWER Directive No. 9355.0-67FS. Office of Solid Waste and Emergency Management. December.

Versar, 2005. Remedial Action Progress Report M-2 Landfill Site. U.S. Army Installation Fort Monmouth, Fort Monmouth, New Jersey. Directorate of Public Works, August.

Weston, 1995. Final Site Investigation - Main Post and Charles Wood Areas, Fort Monmouth, New Jersey, December.

Zapecza, O. 1989. Hydrogeologic Framework of the New Jersey Coastal Plain. U.S. Geological Survey Professional Paper 1404-B. U.S. Government Printing Office, Washington, DC.

ATTACHMENT 1

LIST OF FIGURES

Figure 1 – Fort Monmouth Location

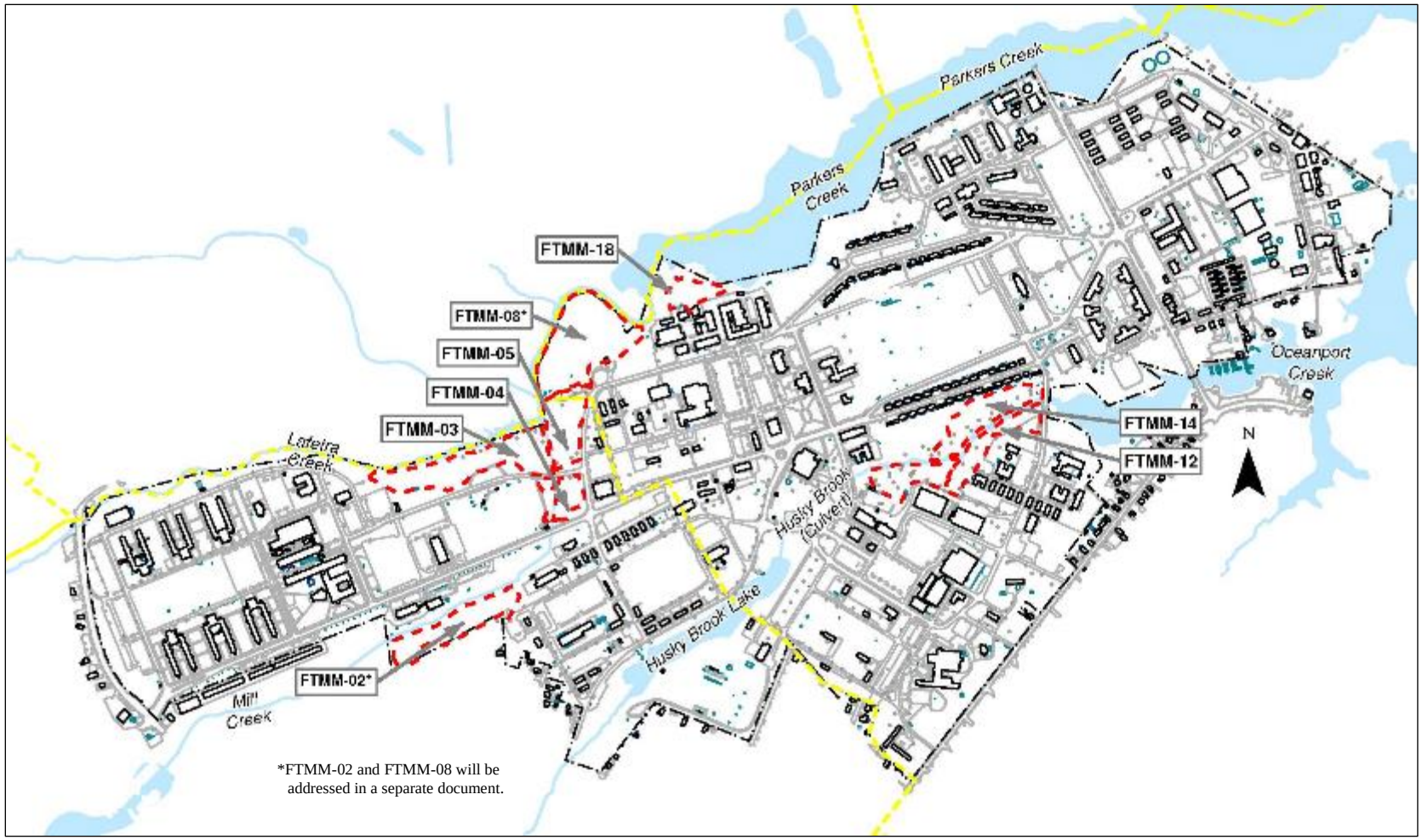

Figure 2 – Main Post Landfill Locations

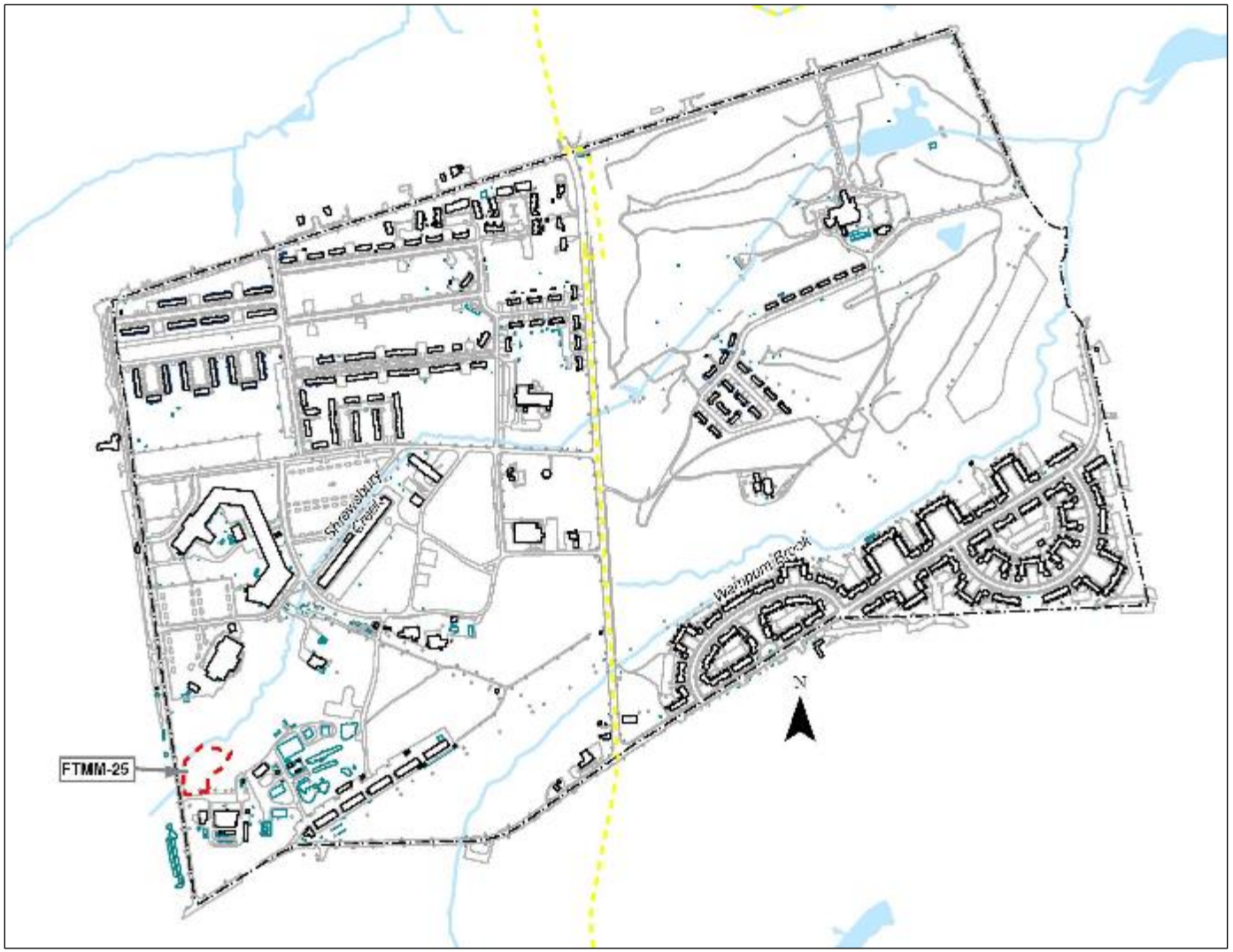

Figure 3 – Charles Wood Area Landfill Location

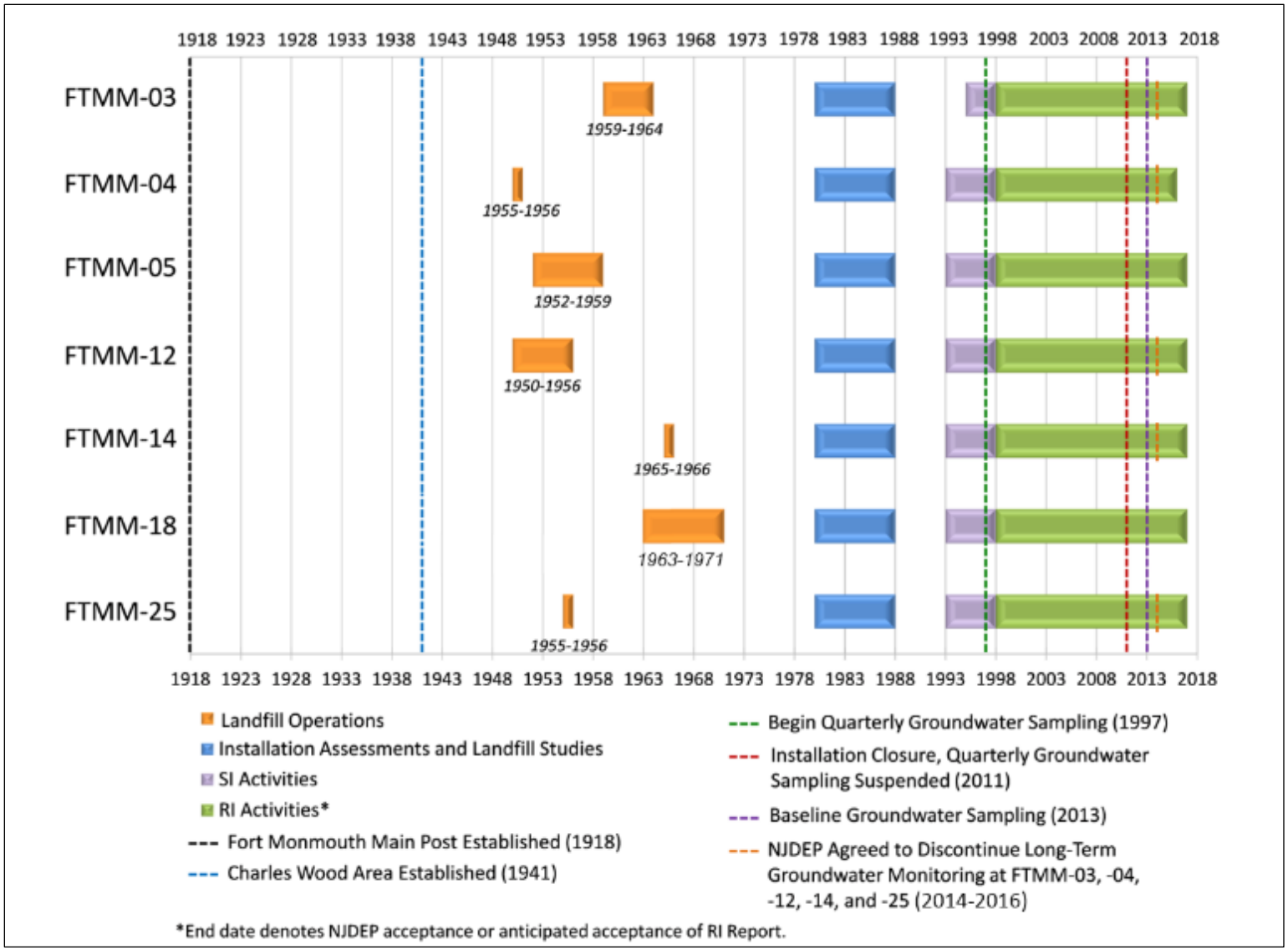

Figure 4 – Timeline of Significant Events

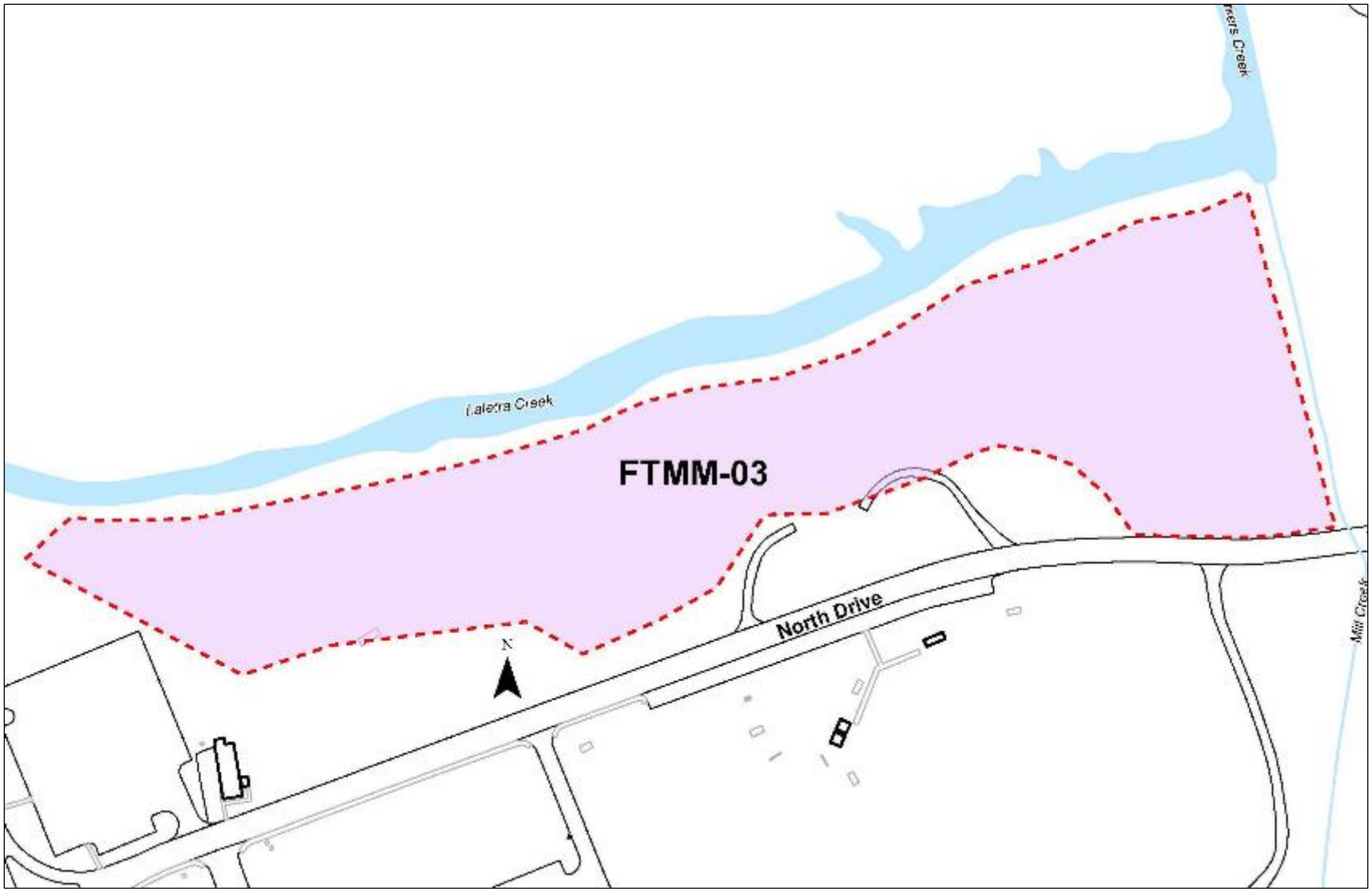

Figure 5 – FTMM-03 Site Boundary and Layout

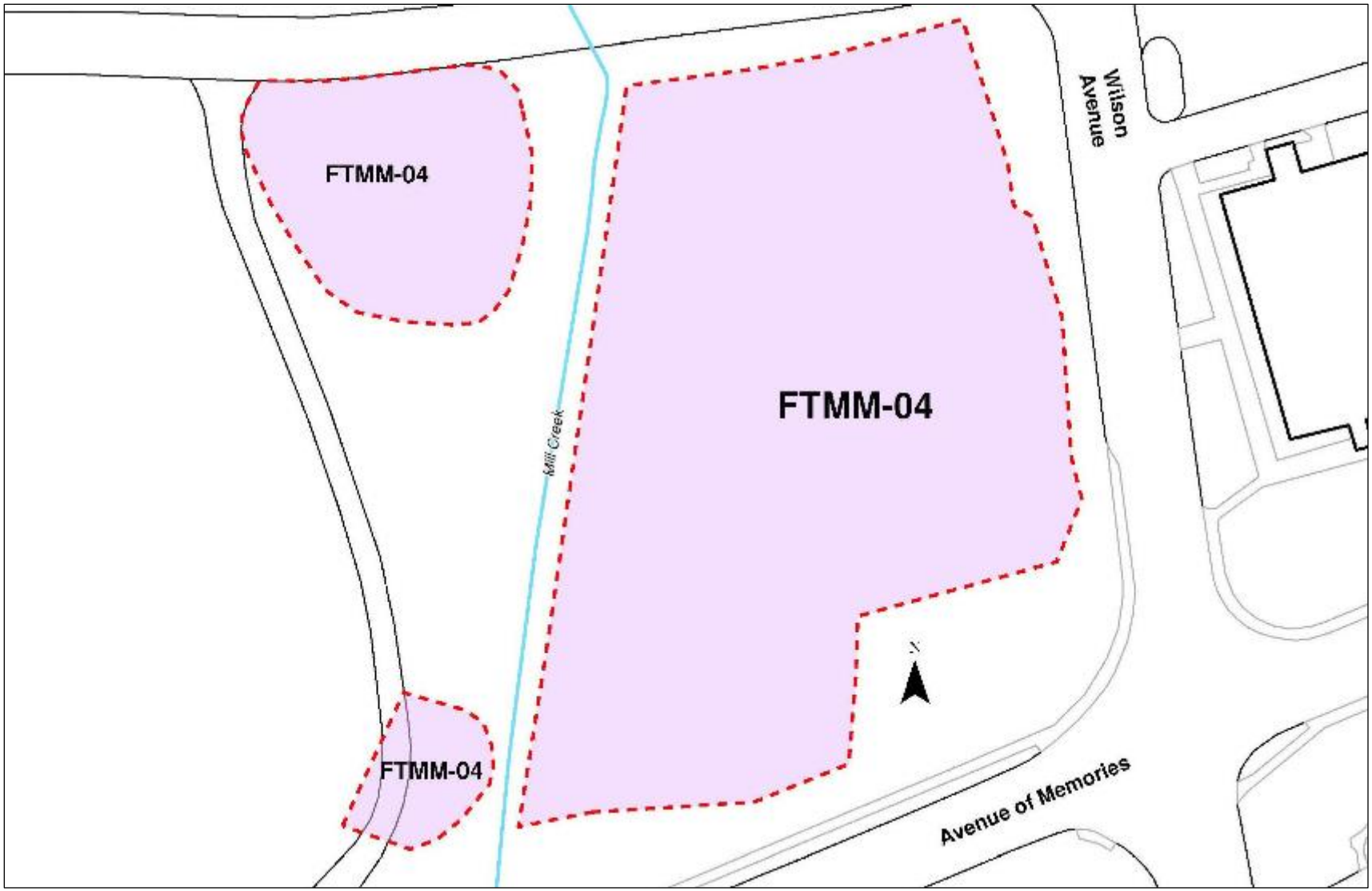

Figure 6 – FTMM-04 Site Boundary and Layout

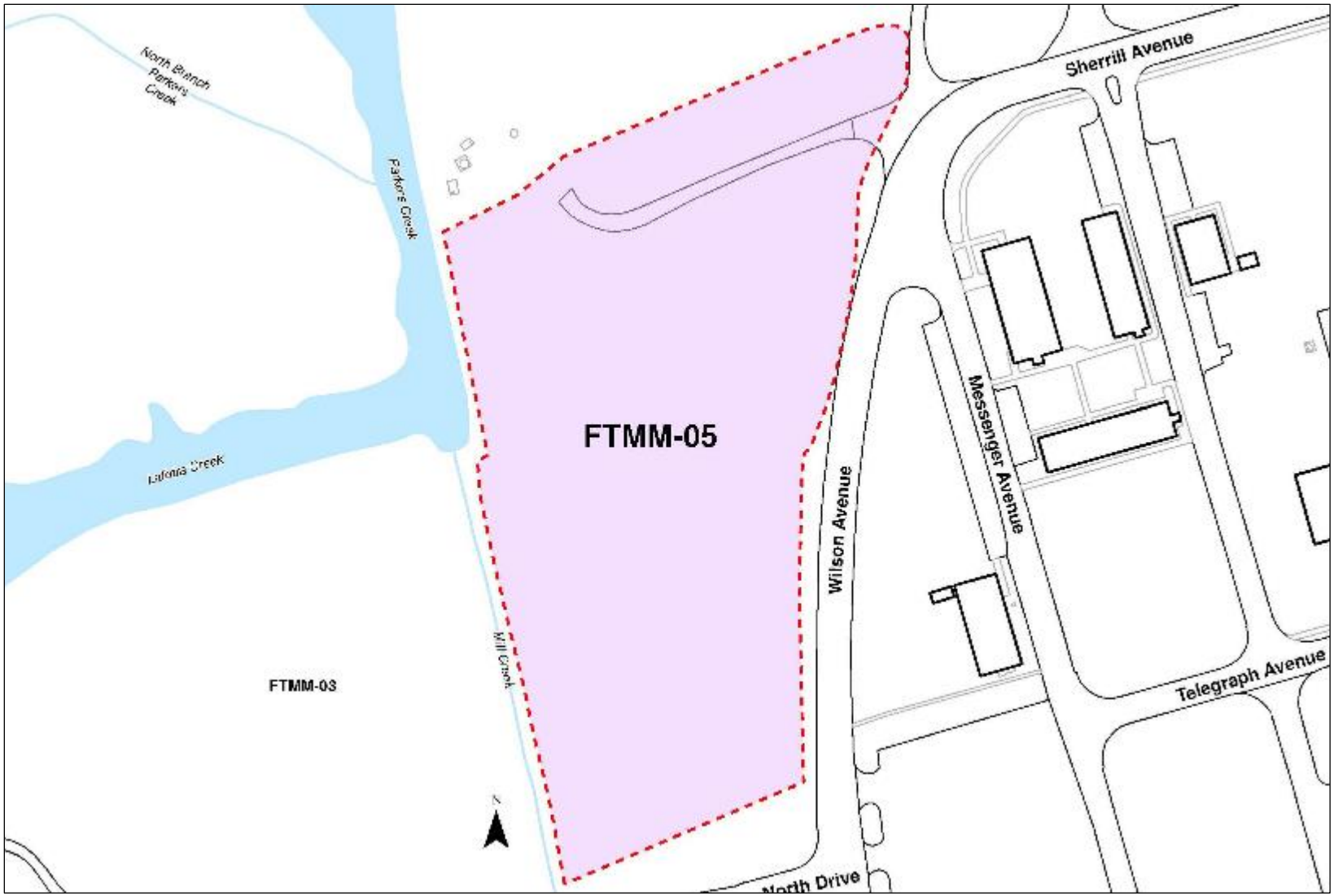

Figure 7 – FTMM-05 Site Boundary and Layout

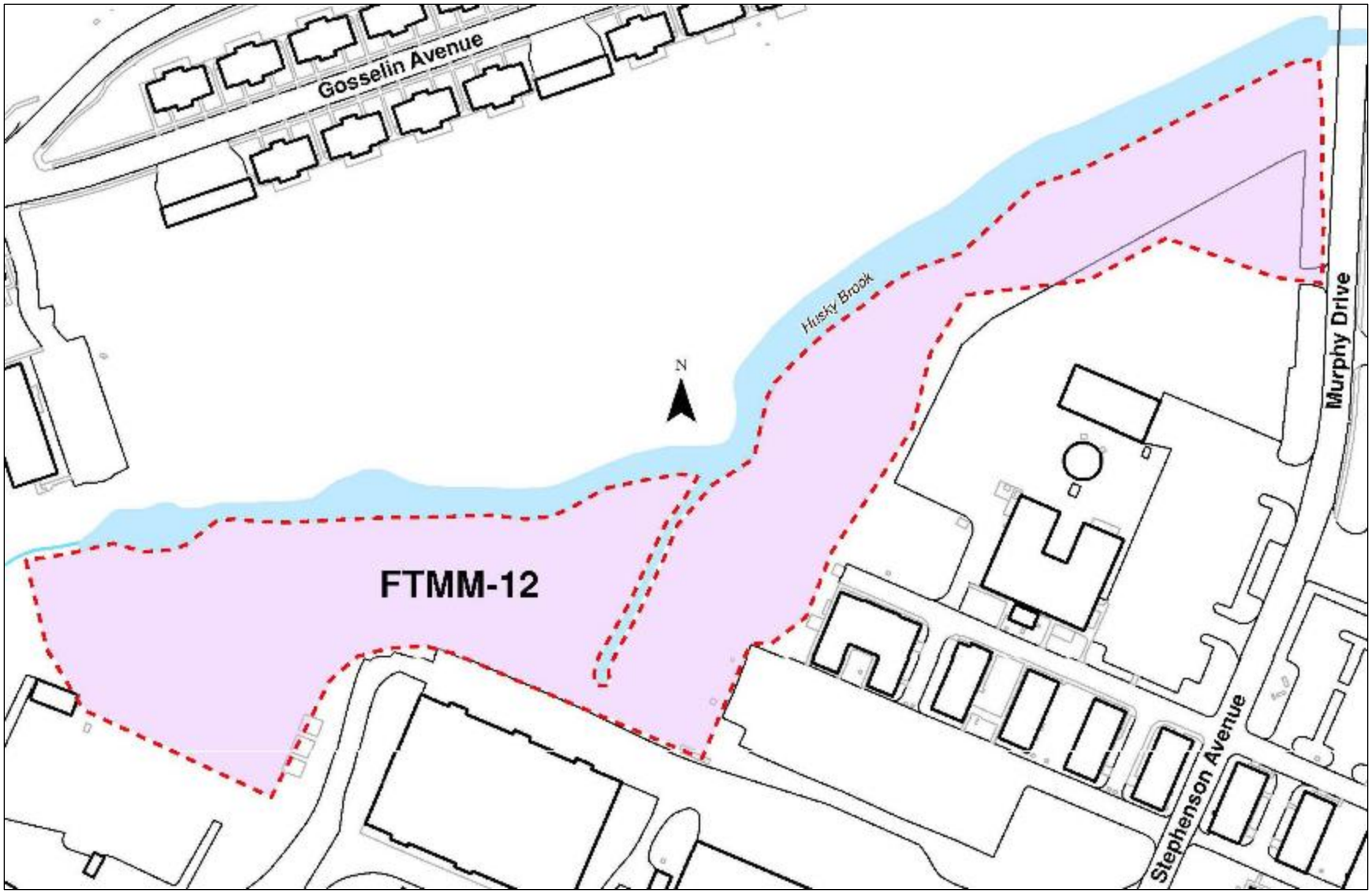

Figure 8 – FTMM-12 Site Boundary and Layout

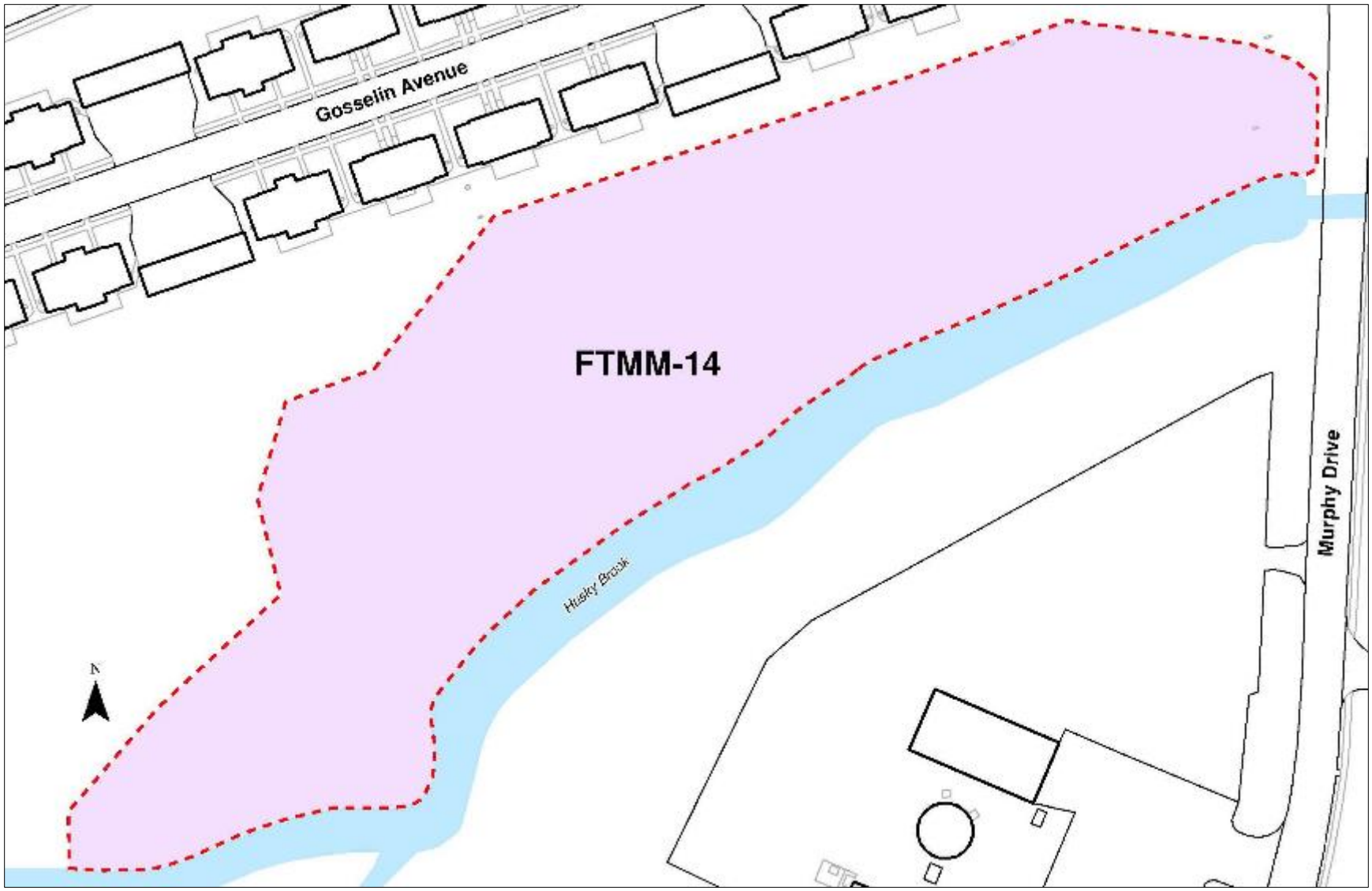

Figure 9 – FTMM-14 Site Boundary and Layout

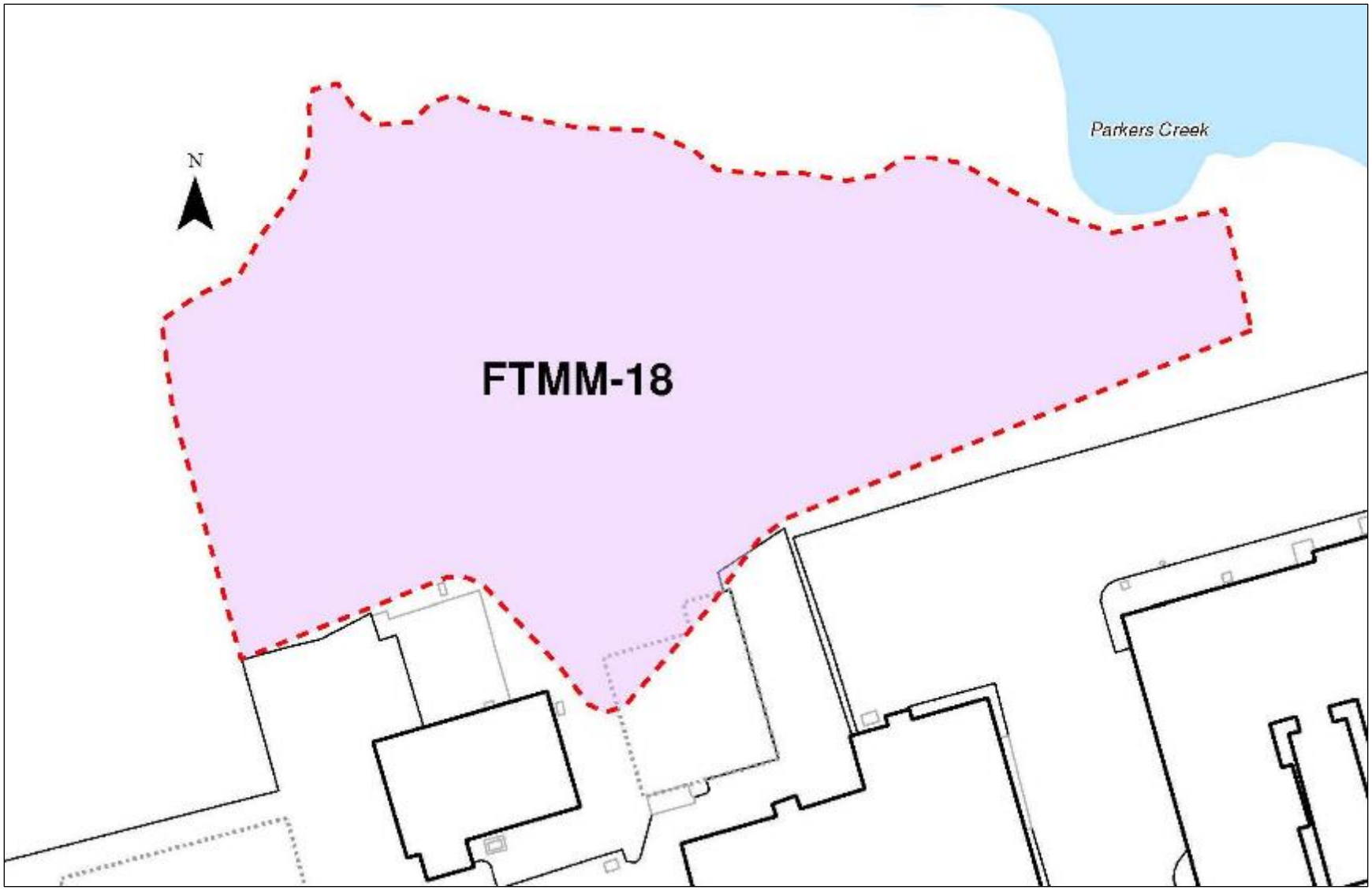

Figure 10 – FTMM-18 Site Boundary and Layout

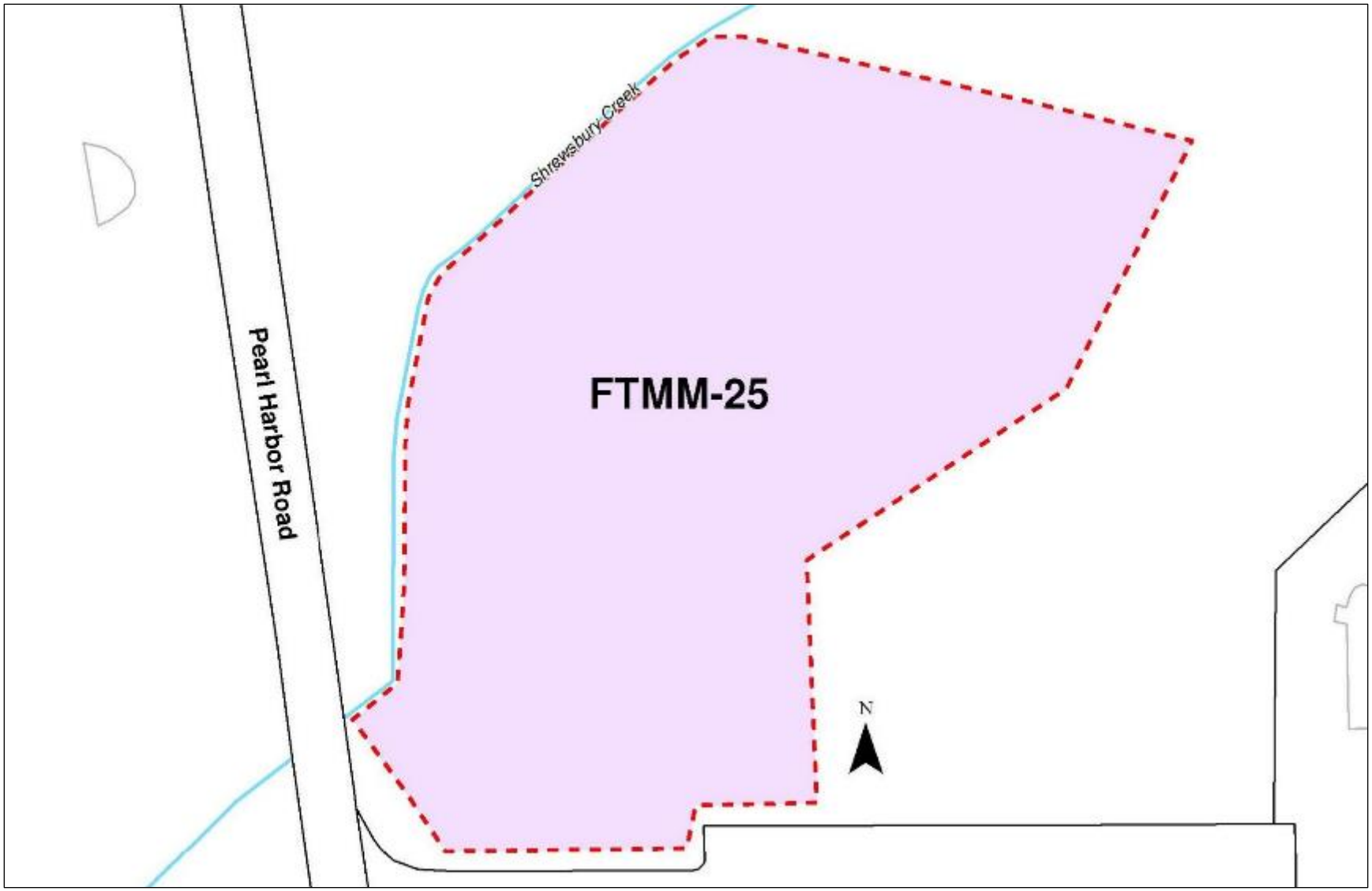

Figure 11 – FTMM-25 Site Boundary and Layout

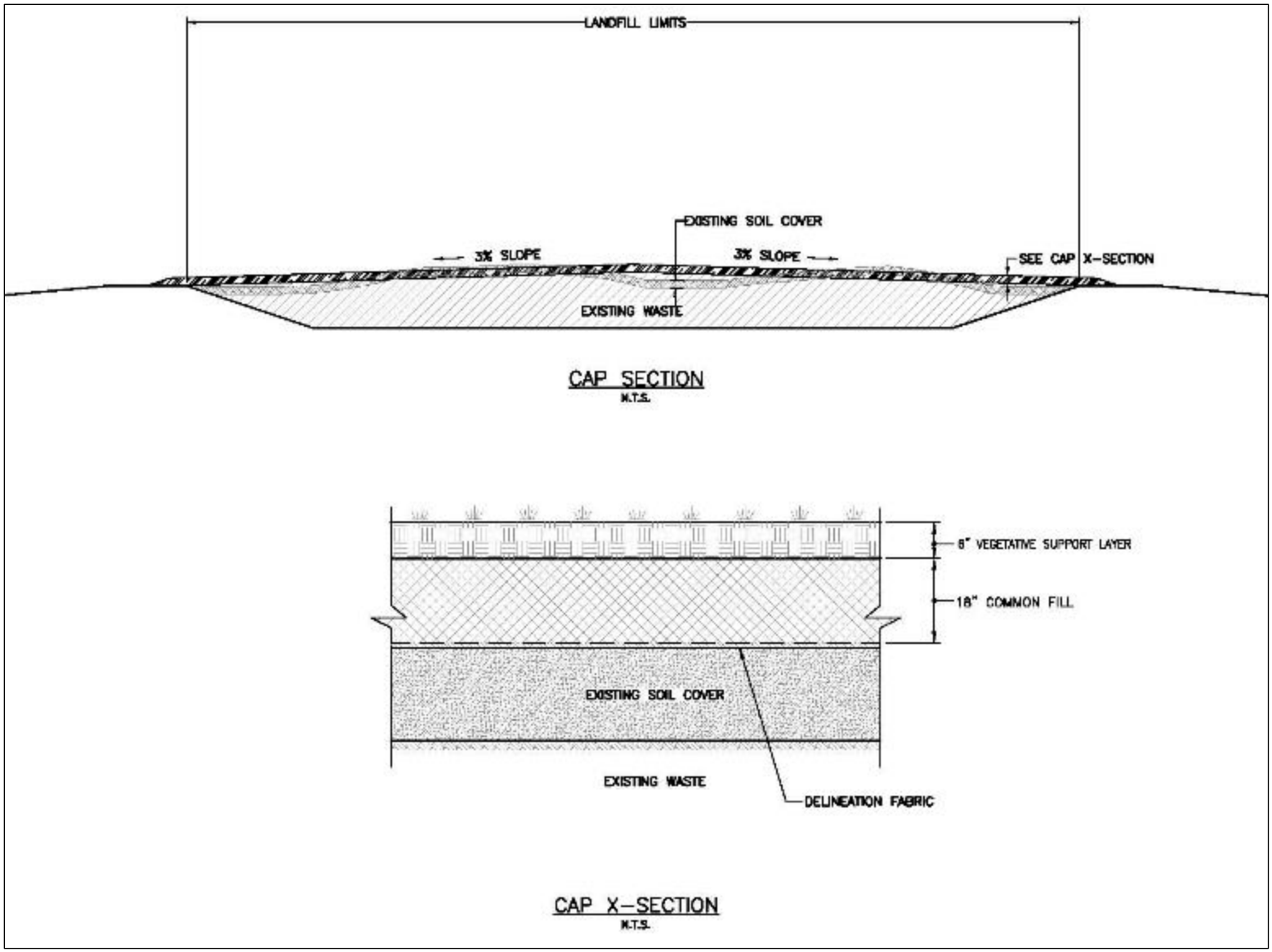

Figure 12 – Landfill Cover System Design

ATTACHMENT 2

Certificate of Publication for Public Notice and Public Meeting Record

AFFIDAVIT OF PUBLICATION

Publisher's Fee $112.20 Affidavit $35.00

State of New Jersey } **SS.**
Monmouth/Ocean Counties

Personally appeared Denise Carney

Of the **Asbury Park Press,** a newspaper printed in Freehold, New Jersey and published in Neptune, in said County and State, and of general circulation in said county, who being duly sworn, deposeth and saith that the advertisement of which the annexed is a true copy, has been published in the said newspaper 2 times, once in each issue as follows:

02/06/17, 02/07/17 **A.D 2017**

Denise Carney

Sworn and subscribed before me, this 7 day of February, 2017

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NOTARY PUBLIC, STATE OF NEW JERSEY
MY COMMISSION EXPIRES
NOV. 19 2019

Ad Number: 0001907830

Ad Number: 0001907830 Run Dates: 02/06/17, 02/07/17

OTHER HEADINGS

PUBLIC NOTICE

U.S. Army Corps of Engineers, NY District, Releases Proposed Plan for Landfill Sites FTMM-03, FTMM-04, FTMM-05, FTMM-12, FTMM-14, FTMM-18, and FTMM-25

The U.S. Army Corps of Engineers New York District and the U.S. Army Engineering and Support Center, Huntsville (USAESCH), has prepared a Proposed Plan for seven former landfills at Fort Monmouth (FTMM) in Oceanport, Monmouth County, New Jersey. The U.S. Army is the lead agency for FTMM in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Executive Order 12580. New Jersey Department of Environmental Protection (NJDEP) is the state support agency under the National Contingency Plan for FTMM.

The Proposed Plan describes the preferred alternative of a vegetated two-foot soil cover which will be installed to provide safety protection from future exposure to solid waste at the landfills for future non-residential users, and provides the rationale for this preference.

Remedial investigations performed in 2014 and 2015 concluded that risks to human health and the environment from soil at the landfills are within acceptable ranges for the current and future intended land use which consists of passive open spaces. Although there is no CERCLA risk, and therefore no need for a CERCLA action, the vegetated soil cover will be placed over the landfills to address safety concerns for future non-residential use, consistent with the NJDEP Solid Waste requirements. Institutional Controls to maintain the soil cap and prevent residential land use will be established on each landfill.

The Proposed Plan, the Remedial Investigation reports that support it, and the full public record for the Site, are available for review at the Monmouth County Library, Eastern Branch, 1001 Route 35, Shrewsbury NJ 07702. The Proposed Plan is also posted on the FTMM Environmental Restoration Program website (http://www.pica.army.mil/ftmonmouth/)

The New York District invites public comment on the Proposed Plan. Written comments will be accepted during a 30-day comment period starting February 8, 2017 and ending March 9, 2017. All comments must be postmarked by March 9 and mailed to the address below (or emailed by March 9 to william.r.colvin18.civ@mail.mil):

BRAC Environmental Coordinator
OACSIM - U.S. Army Fort Monmouth
Attn: Mr. William Colvin
P.O. Box 148, Oceanport, NJ 08641
(732) 380-7064

A public meeting on the Proposed Plan will be held on March 2, 2017 at 7 p.m. Building 455 at Fort Monmouth, Oceanport Ave, Oceanport, NJ. The public is invited to attend and provide oral comments on the Proposed Plan at that time.

($112.20)

0001907830-01

U.S. ARMY FORT MONMOUTH

IN RE:	
PROPOSED PLAN FOR SEVEN LANDFILL SITES	TRANSCRIPT OF: PROCEEDINGS

Thursday, March 2, 2017
U.S. Army Fort Monmouth
Wade Avenue, Building 455
Oceanport, New Jersey
7:30 p.m.

P R E S E N T:

WILLIAM COLVIN - BRAC Environmental Coordinator

CRIS GRILL - Parsons

FRANK ACCORSI - Parsons

JAMES T. MOORE - U.S. Army Corps of Engineers

Job No. NJ2544808

MR. COLVIN: All right. It's about 7:30 on the -- for the public meeting we're having for the seven landfills at Fort Monmouth. We have Cris Grill of Parsons, Frank Accorsi of Parsons, Jim Moore of the Corps of Engineers, and I'm Bill Colvin, the environmental coordinator for Fort Monmouth.

The public has arrived. We have one person here right now. We're going to begin the presentation. I guess I can call you by your first name.

MR. BLANAR: Dr. Blanar to you.

(Laughter.)

MR. COLVIN: Well, good evening, and welcome to our public meeting. I'm Bill Colvin, the environmental coordinator for the Army at Fort Monmouth. Tonight we're presenting the proposed plan for seven landfills. Restoration work is being done by the Corps of Engineers, and we'd ask that you save your questions and comments until the presentation is completed. Following the presentation, you will have the opportunity to provide comments and ask questions on the proposed plan for the landfills. That's the purpose of the meeting.

Cris Grill, the senior project manager with Parsons, one of the contractors the Corps has

contracted for the Fort Monmouth Restoration Program will present the work performed to date and the work plan for the landfills. Cris.

MS. GRILL: Thanks, Bill. Tonight's agenda -- some of the items we're gonna cover is the proposed plan and project team overview, site background, remedial investigation results, summary of risks at the seven landfills, preferred remedial alternatives for the seven landfills, components of the remedial measures for selected landfills may include public participation and questions and public comments.

So the proposed plan presents the preferred alternative for seven former landfills at Fort Monmouth, and they include FTMM-03, -04, -05, -12, -14, -18, and -25. The U.S. Army Corps is the lead agency under CERCLA, and the NJDEP is the state support agency for Fort Monmouth.

This figure shows six of the seven landfills are located on the Main Post area, and they include M-03, M-04, M-05, M-12, M-14, and M-18. The seventh landfill is located on the Charles Wood area, and that is FTMM-25.

Remedial investigations have been conducted in 2014 and '15 for each of the landfills

and it consisted of review of previous investigations and sampling results, comparison of concentrations to the NJDEP criteria for the soil, groundwater, surface water and sediment, and conducting a human health risk assessment.

The risk assessment is evaluation of the potential adverse health effects caused by exposure to contaminants in the soil, groundwater, surface water and sediment.

Overall, the risk assessment showed no unacceptable risk to human health in the environment was found at the landfills for the current and future intended use, which is passive open space.

Although there is no CERCLA risk and no need to take an action, a vegetated soil cover will be installed on each landfill to provide safety protection from potential exposure to solid waste for future nonresidential users.

Land use controls to maintain the soil cover and prevent residential land use will be implemented through A LUCIP.

Site Background: This figure shows background information for each of the landfills, including landfill operations, which are shown by the orange box, it also includes the various

investigations conducted for each landfill and the associated dates, and the various investigations include Landfill Assessment and Studies, which is the blue box, Site Investigation Activities, which is the purple box, and RI Activities, which is the green box.

The bluish-green dashed line is the Corlies groundwater sampling which was started in about 1997 for all the landfills. Corlies sampling continued all the way up through 2011 and was temporarily suspended when the base closed. Sampling resumed in 2013, and each dashed line on the landfills, which is an orange dashed line indicates those are the landfills that the DEP agreed to discontinue long-term monitoring of the groundwater at.

The next slide is a table that shows the sample collection history for soil, groundwater, surface water and sediment collected at each landfill and it includes the number of samples collected and the date sampled.

Remedial Investigation Results: The next seven slides are a summary of the RI results for the seven landfills. So the first one is FTMM-03 and it began operation from 1959 to 1964. The final RI

report was submitted to the DEP in February of 2016. For soil: Four VOCs, seven SVOCs, one PCB, and 16 metals were evaluated in the risk assessment. For groundwater: The last eight sampling rounds were evaluated as representative of recent conditions in the risk assessment and included three VOCs; NJDEP agreed to discontinue long-term monitoring of the groundwater in 2016 since concentrations were below criteria. For surface water: No contamination was originating from the landfill. And sediment: No PCBs were detected in the samples above the NJDEP criteria.

FTMM-04 operated from 1955 to 1956. The final RI report was submitted to the DEP in July of 2016. For soil: Seven SVOCs, nine metals and two pesticides were evaluated in the risk assessment. For groundwater: The last eight sampling rounds were evaluated as representative of recent conditions for the risk assessment; however, no compounds were evaluated in the risk assessment; the NJDEP agreed that metal concentrations are representative of background and to discontinue long-term monitoring in 2014. Surface water: No contamination originating from the landfill. And sediment: No VOCs, SVOCs, pesticides, PCBs or metals were detected in the

samples above the NJDEP criteria.

FTMM-05 operated from 1952 to 1959. The final RI report was submitted to the DEP in August of 2015. For soil: Two VOCs, six SVOCs, two pesticides and 13 metals were evaluated in the risk assessment. For groundwater: Most recent sampling data indicates VOCs are present above the NJDEP criteria and sampling at select wells for VOCs will continue annually. Surface water: No contamination originating from FTMM-05 were found. And sediment: No PCBs detected in samples above the NJDEP criteria.

FTMM-12 operated from 1950 to 1956. The RI report was submitted to the DEP in August of 2015. For soil: Two VOCs, eight SVOCs, seven pesticides, one PCB and 15 metals evaluated in the risk assessment. For groundwater: The last eight sampling rounds evaluated as representative of recent conditions for the risk assessment; no compounds evaluated in the risk assessment; and the NJDEP agreed to discontinue groundwater sampling in 2014 since the concentrations are below the criteria. Surface water: No contamination originating from FTMM-12. And for sediment: One PCB detected above the NJDEP criteria, but it was located upstream and not associated with the landfill.

FTMM-14 is located across from M-12 landfill. FTMM-14 operated from 1965 to 1966. The RI report was submitted to the DEP in July of 2015. Soil: Seven SVOCs, one pesticide, and seven metals evaluated in the risk assessment. Groundwater: Last eight sampling rounds evaluated is representative of recent conditions for the risk assessment; no compounds evaluated in the risk assessment; NJDEP agreed to discontinue monitoring in 2014 since concentrations were below the criteria. Surface water: No contamination originating from FTMM-14. Sediment: One PCB detected above the NJDEP criteria was located upstream but was not related to FTMM-14.

FTMM-18 operated from 1963 to 1971. The report was submitted to the NJDEP in October of 2015. Soil: Six SVOCs, two PCBs, and five metals were evaluated in the risk assessment. Groundwater: Most recent sampling data indicates VOCs are present above the New Jersey criteria; sampling for VOCs at select wells will continue annually. Surface water: No contamination originating from the landfill. Sediment: One PCB detected slightly above the criteria at two locations and was evaluated in the risk assessment.

FTMM-25 operated from 1955 to 1956. The

final RI report was submitted to the DEP in August of 2016. Soil: Six SVOCs and five metals were evaluated in the risk assessment. For groundwater: The last eight sampling rounds evaluated as representative of recent conditions for the risk assessment; NJDEP agreed that metal concentrations are representative background and agreed to discontinue monitoring in 2014. Surface water: No contamination originating from FTMM-25 was found. And sediment: No PCBs detected in the samples above the NJDEP criteria.

Summary of Risks at the Seven Landfills: The risk assessment evaluated risks from human exposure to contaminants in the soil, groundwater, surface, and sediment at each of the landfills.

The USEPA regional screening levels for soil and groundwater were used for comparison purposes because the Army was assigned to perform a CERCLA-compliant remedial investigation in human health risk assessment. The RSLs were used to identify those contaminants that are contaminants of potential concern.

These COPCs were evaluated in the risk assessment. No COPCs were determined to be contaminants of concern at any of the landfills; no

COPCs were identified in the surface water; the risk assessment evaluated exposure of current/future outdoor workers, future utility workers, and future recreational users to the COPCs in soil, groundwater, and sediment through dermal contact, incidental ingestion, and/or inhalation of particulates. Groundwater at Fort Monmouth is not used as a source of drinking water since municipal water is provided.

The risk assessment found no unacceptable potential risk to: Current/future outdoor workers or utility workers or future recreational users from exposure to soil; current/future utility workers from exposure to groundwater; and current/future outdoor workers or recreational users from exposure to sediment.

Overall, the risk to human health in the environmental from the soil, groundwater, and sediment are within the CERCLA ranges for the current and future intended land use, which is passive open space.

A baseline ecological evaluation was conducted at Fort Monmouth to assess whether the presence of constituents of concern in the sediment, surface water, soil and groundwater has the potential for adverse effects to the wildlife. It was

concluded that constituents at Fort Monmouth are unlikely to have adverse effects on the wildlife or their habitats and additional ecological assessment was not warranted. In August of 2012, the DEP accepted the baseline ecological risk assessment report and recommendations and conclusions and concurred that no additional evaluation of ecological risk was required.

Preferred Remedy Alternative for the Seven Landfills: A vegetated soil cover will be placed over each area consistent with the NJDEP solid waste regulations. Additional soil will be added to the existing soil cover to have a minimum of two feet of soil between the ground surface and the landfill debris. The vegetated soil cover will offer safety protection to nonresidents from potential future exposure to solid waste at the landfill, and also control surface water runoff and erosion.

The next slide shows the landfill cover system design. The first figure shows the landfill will be graded with a 3 percent slope to promote positive surface water runoff.

The second slide is a cross-section of the cover, and it includes a delineation fabric placed over the existing soil cover followed by 18

inches of certified clean fill, followed by six inches of certified clean topsoil that's seeded.

In addition to the soil cover, a LUCIP will be prepared to implement the LUCs, which are maintaining the soil cover and prevent residential land use; document the location of the engineering control, which is the soil cover; and it will also identify procedural responsibilities, including cover inspections and maintenance, monitoring and reporting and long-term management requirement.

The Army will be responsible for documenting and implementing the LUCs through filing of a deed notice at the time of the property transfer. The new owner will be responsible for complying with the LUCs; however, the Army will retain ultimate responsibility for the remedy integrity of the landfills.

Components of the remedial measures for select landfills may include institutional controls in the form of a CEA will be established for groundwater at FTMM-05 and FTMM-18 and will remain in place until the groundwater quality standards are achieved. Methane gas mitigation systems, walking paths, access roads, parking areas, and maintenance inspections of landfill caps may also be included.

MR. COLVIN: All right. Thanks, Chris.

Any part of selected remedy is public participation, so it's great that you turned out tonight, and I thank you for that.

We have posted the preferred -- the proposed plan on the Fort Monmouth website. We placed it in the Fort Monmouth Environmental Restoration Program information repository, and that's in the Monmouth County Library here in Shrewsbury. We also having copies of the proposed plan and tonight's presentation on the table in the back of the of room if you'd like to have one for reference.

Comments and questions from the public and the Army's responses will be placed in the decision document which will be added to the public information repository, and comments will be accepted through next Thursday. That's March 9th.

At this time, we'll open the meeting to public questions and comments on the proposed plan for seven landfills. Each person will have five minutes for their questions and comments. Before you ask your questions or provide your comments we'd ask that you please state your name and your town of residence.

After you've asked your questions and made your comments, we'll respond to them. We will also respond to written comments we receive tonight. Forms are available in the back of the room with the rest of the information. And tonight's comments, questions, and responses pertaining to the proposed plan will be included in the decision document along with written responses that are mailed and emailed to us.

Is there anybody from the public that wishes to ask a question, make a comment?

Yes, sir. Go right ahead. You can stand up at the....

MR. BLANAR: Thank you. Ed Blanar, from Monmouth Junction, New Jersey, B-l-a-n-a-r.

When is proposed construction going to start and how long do you anticipate it to take for all the landfills?

MR. COLVIN: We're going to start next fall and we plan for a year to have the construction completed at the landfills.

MR. BLANAR: I also want to say thank you all for your hard work. It looks like you've done a lot of work here to get this far and I appreciate that you all took the time to come and

present this to the public. Thank you.

MR. COLVIN: We certainly appreciate your interest and attendance tonight.

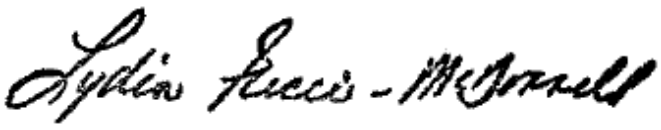
That concludes our presentation, and thank you very much. It's about quarter to eight.

(Proceedings concluded at 7:45 p.m.)

CERTIFICATE

I, LYDIA F. McDONNELL, a Certified Shorthand Reporter and Notary Public of the State of New Jersey, do hereby certify that the foregoing is a true and accurate transcript of the proceedings as taken stenographically by and before me at the time, place and on the date hereinbefore set forth.

I DO FURTHER CERTIFY that I am neither a relative nor employee nor attorney nor counsel of any of the parties to this action, and that I am neither a relative nor employee of such attorney or counsel, and that I am not financially interested in the action.



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