

Descriptions of RIP and RC Sites

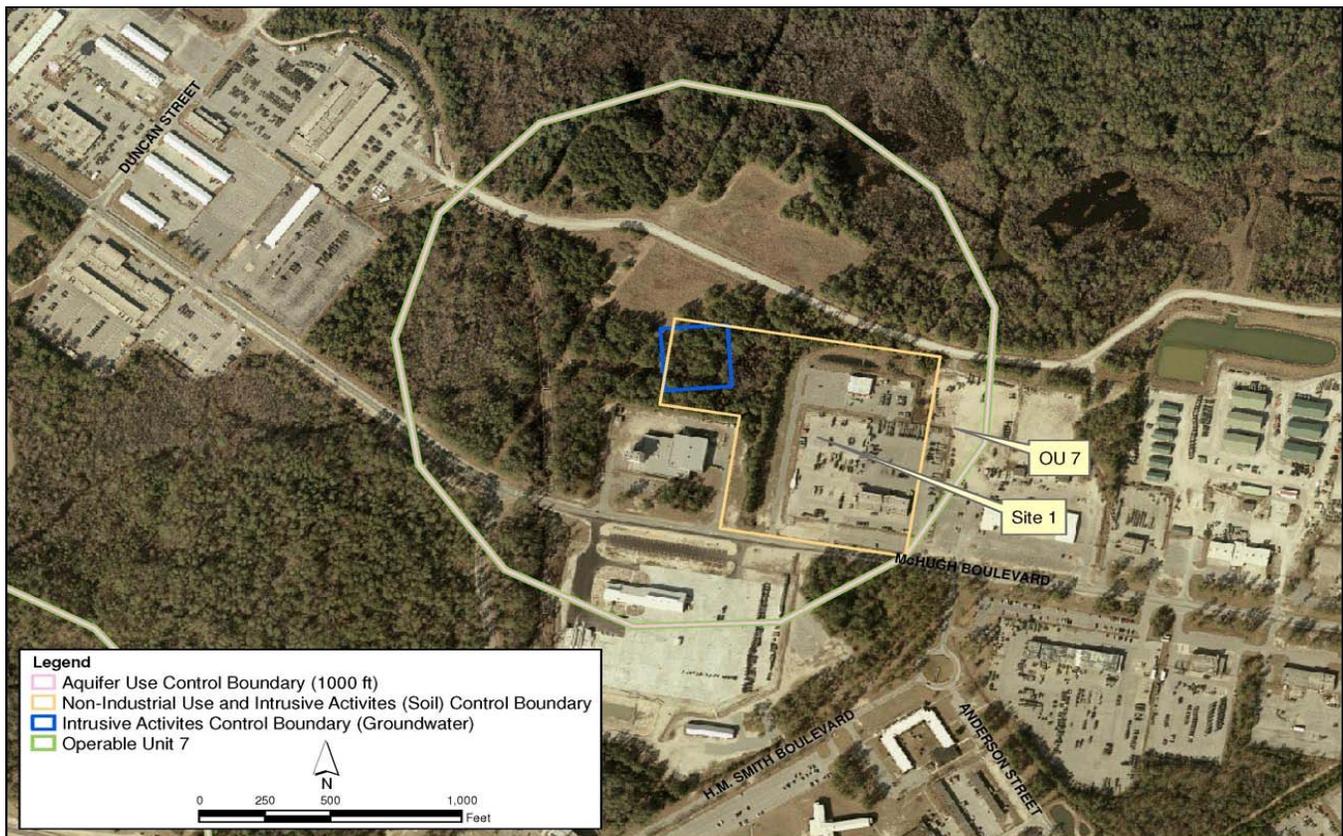
The following sections discuss the site history for the 61 IRP sites and 17 MMRP Sites which are in the RIP and RC phase of the CERCLA process. Remedies are in-place (e.g., groundwater treatment, LTM, and/or LUCs) for 22 of the IRP sites. Response is complete with NFA for 39 IRP sites and 17 MMRP sites.

8.1 IRP RIP Sites

8.1.1 Site 1 (OU 7)—French Creek Liquids Disposal Area

Site 1, the French Creek Liquids Disposal Area, covers approximately 8 acres located within OU 7 on the Mainside of the Base (**Figure 8-1**). OU 7 consists of three sites (Sites 1, 28, and 30) that have been grouped together into one OU because of their similar characteristics of suspected waste (POL) and geographic location. Site 1 has been used by several different mechanized, armored, and artillery units since the 1940s. Reportedly, liquid wastes generated from vehicle maintenance were routinely poured onto the ground surface. The wastes were reported to be primarily POL; however, battery acid was also reportedly disposed of. The suspected POL and battery acid disposal areas lie in the northern and southern portions of the Site. The estimated quantity of POL waste disposed at the areas is between 5,000 and 20,000 gallons, and the quantity of battery acid waste is between 1,000 and 10,000 gallons. Currently, Site 1 continues to serve as a vehicle and equipment maintenance and staging area.

FIGURE 8-1
IRP Site 1, Operable Unit 7



Previous investigations are listed in **Table 8-1** and the LUC Summary is presented in **Table 8-2**.

TABLE 8-1
Previous Investigations Summary, IRP Site 1

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCI-EAST-MCB CAMLEJ. Results indicated that waste POL and used battery acid could potentially migrate to groundwater and surface water; and thus recommended that a Confirmation Study be conducted.
Confirmation Study (ESE, 1984-1987)	1984 - 1987	A Confirmation Study was conducted to further investigate the findings of the IAS. Field activities included groundwater, surface water, and sediment sampling for VOCs, metals, and O&G. Groundwater samples collected from the surficial aquifer identified the presence of chlorinated VOCs, metals, and O&G.
Soil Assessment (1991)	1991	A soil assessment was completed for an area in the southern portion of the site in support of a potential MILCON project. Samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Analytical results identified metals constituents at levels generally consistent with background concentrations.
Groundwater Study (1993)	1993	To determine current site conditions during scoping of the RI/FS groundwater sampling was conducted. Samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Analytical results identified metals constituents at concentrations generally consistent throughout the site.
RI/FS (Baker, 1995)	1994 - 1995	An RI was completed to assess the nature and extent of contamination that may have resulted from previous disposal practices. Field activities consisted of a site survey, and soil and groundwater sampling for VOCs, SVOCs, pesticides/PCBs, metals, and TPH. VOCs and metals were detected in groundwater and soil. Potential human health risks were identified for future child and adult residents due to exposure to metals in groundwater. Minimal ecological risks were identified for terrestrial receptors due to exposure from metals. Remedial alternatives for groundwater were evaluated during preparation of the FS.
PRAP (1995) and ROD (Baker, 1996)	1995 - 1996	A PRAP was issued to solicit public input on the preferred alternative (LTM and LUCs) and a public meeting was held. The Final ROD was issued and signed in October 1996 followed by initiation of LTM.
RIP and RACR (CH2M HILL, 2002)	1996 - 2002	Groundwater LTM was initiated in 1996 and included sampling of eight monitoring wells twice a year for VOCs analysis. In 2001, the concentrations of VOCs were below the cleanup levels for at least four consecutive quarters. A RACR was prepared to document the completion of LTM. LUCs were implemented in 2001 and updated in 2002.

TABLE 8-2
Land Use Control Summary, IRP Site 1

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	16.6	July 2002	February 2002
Intrusive Activities Control Boundary (Groundwater)	1.5		
Aquifer Use Control Boundary (1,000 feet)	79.2		

8.1.1.1 Future Activities

LUCs are in-place to prohibit non-industrial use.

8.1.2 Site 2 (OU 5)—Former Nursery/Daycare Center

Site 2, the Former Nursery/Daycare Center, encompasses approximately 5 acres just inside the Main Gate in the northeast portion of the Base (**Figure 8-2**). From 1945 to 1958, an onsite building was used for storing, handling, and dispensing pesticides. Chemicals known to have been used at Site 2 include chlordane, 4,4'-DDT, diazinon, and 4,4'-DDD. Chemicals known to have been stored include dieldrin, lindane, malathion, and silvex. A preliminary soil sampling investigation conducted in 1982 indicated the presence of pesticides, resulting in the transfer of the daycare center to another location.

FIGURE 8-2
IRP Site 2, Operable Unit 5



Previous investigations are listed in **Table 8-3** and the LUC Summary is presented in **Table 8-4**.

TABLE 8-3
Previous Investigations Summary, IRP Site 2

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCEAST-MCB CAMLEJ. The potential for adverse impacts was identified from pesticides that could potentially migrate to groundwater and surface water and additional investigation was recommended.
Confirmation Study (ESE,1990)	1984 - 1990	A Confirmation Study was conducted to verify the presence of contaminants. Field activities included groundwater, surface water, soil, and sediment sampling for VOCs, pesticides, and herbicides. Analytical results indicated the presence of pesticides and VOCs in environmental media. Further characterization of groundwater and supplemental surface water and sediment investigations were recommended.

Previous Investigation/Action	Date	Activities
Geophysical Investigation (Baker,1992)	1991 - 1992	A surface geophysical investigation was performed to establish the source of groundwater contamination. No anomalies that could serve as sources (i.e., tanks or drums) of groundwater contamination were identified. However, an atypical subsurface feature was detected. The data from this anomaly was not conclusive to ascertain whether or not it was a tank, large diameter utility line or other buried structure.
RI/FS (Baker, 1994)	1993 - 1994	An RI was conducted to characterize potential environmental impacts and threats to human health resulting from previous site activities. A geophysical investigation and soil gas survey were conducted and soil, groundwater, surface water, and sediment samples were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, herbicides, and metals. Unacceptable human health risks were identified due to the presence of pesticides in soil and VOCs in groundwater. Potential unacceptable risks to ecological receptors were also identified due to the presence of pesticides in sediment and soil. A TCRA was recommended for soil and remedial alternatives for groundwater were evaluated in the FS.
TCRA (OHM, 1995)	1994 - 1995	Based on the findings of the RI, a TCRA was recommended for removal of pesticide-contaminated soil to achieve industrial land use. The TCRA included the excavation and offsite treatment of pesticide-contaminated soil and concrete. A total of 1,049 tons of pesticide-contaminated soil was excavated and sent for offsite disposal.
PRAP and ROD (Baker, 1994)	1994	A PRAP was issued to solicit public input on the preferred alternative (LTM and LUCs) and a public meeting was held. The Final ROD was issued and signed in September 1994.
RIP and LTM Closeout Report (CH2M HILL, 2008)	1995 - 2008	Groundwater LTM was initiated in 1995 and included annual sampling of six shallow monitoring wells for VOC analysis. In 2007, groundwater concentrations fell below cleanup levels for four consecutive events, LTM was discontinued, and an SC Report was submitted. LUCs were implemented in 2001 and updated in 2002 and 2008.

TABLE 8-4
Land Use Control Summary, IRP Site 2

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Updates
Non-Industrial Use Control Boundary (Soil)	3.3	September 2008	June 2009

8.1.2.1 Future Activities

LUCs will be maintained to prohibit non-industrial use within the extent of the former soil removal action areas where pesticides remain in soil above levels that allow for UU/UE.

8.1.3 Site 3 (OU 12)—Old Creosote Plant

Site 3, the Old Creosote Plant, encompasses approximately 5 acres on the Mainside of the Base (**Figure 8-3**). The Creosote Plant reportedly operated from 1951 to 1952 to supply treated lumber during construction of the MCI-EAST-MCB CAMLEJ Railroad. An onsite sawmill, reportedly located in the northern portion of the Site, supplied cut timbers for the creosote treatment.

FIGURE 8-3
IRP Site 3, Operable Unit 12



Previous investigations are listed in **Table 8-5** and the LUC Summary is presented in **Table 8-6**.

TABLE 8-5
Previous Investigations Summary, IRP Site 3

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCI-EAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at Site 3, and it was concluded that no further assessment was necessary. However, the USEPA requested an additional investigation to determine whether hazardous waste contamination existed.
SI (1991)	1991	An SI was conducted to confirm the presence or absence of contamination at Site 3. Field activities included soil, groundwater and sediment sampling. The analytical results identified SVOCs in soil and groundwater, and an RI was proposed.

TABLE 8-5
Previous Investigations Summary, IRP Site 3

Previous Investigation/Action	Date	Activities
RI/FS (Baker, 1996)	1994 - 1996	An RI was conducted to characterize the nature and extent of contamination discovered during the SI. Field activities included installation of monitoring wells, and the collection of soil and groundwater samples. PAHs (primarily naphthalene) were identified in both soil and groundwater. Fuel constituents, such as ethylbenzene and xylenes, were also detected in soil and groundwater. Potential unacceptable human health risks were identified due to PAHs in soils and VOCs and PAHs in groundwater. No unacceptable ecological risks were identified. In 1996, an FS was prepared to screen remedial alternatives for addressing soil and groundwater contamination.
PRAP (1996) and ROD (Baker, 1997; 2000)	1996 - 2000	A PRAP was issued in 1996 to solicit public input on the preferred alternative (source removal with onsite biological treatment of PAH-contaminated subsurface soils, LTM, and LUCs) and a public meeting was held. The Final ROD was issued and signed in 1997. However, a pilot scale treatability study conducted in 1998 indicated that biological treatment of soils was not effective. As a result, an Amended ROD was signed in June 2000, identifying soil excavation with offsite disposal, LTM, and LUCs as the preferred remedial alternative. The current CSM is shown on Figure 8-4 .
RIP	1997 - present	The selected remedy for soil identified in the Amended ROD was conducted as an NTCRA in 2000, during which 3,295 tons of PAH-contaminated soil was removed to achieve industrial cleanup levels. Groundwater LTM for VOCs and SVOCs was implemented in 1997 and is ongoing. LUCs were implemented in 2001 and updated in 2002. If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed.

TABLE 8-6
Land Use Control Summary, IRP Site 3

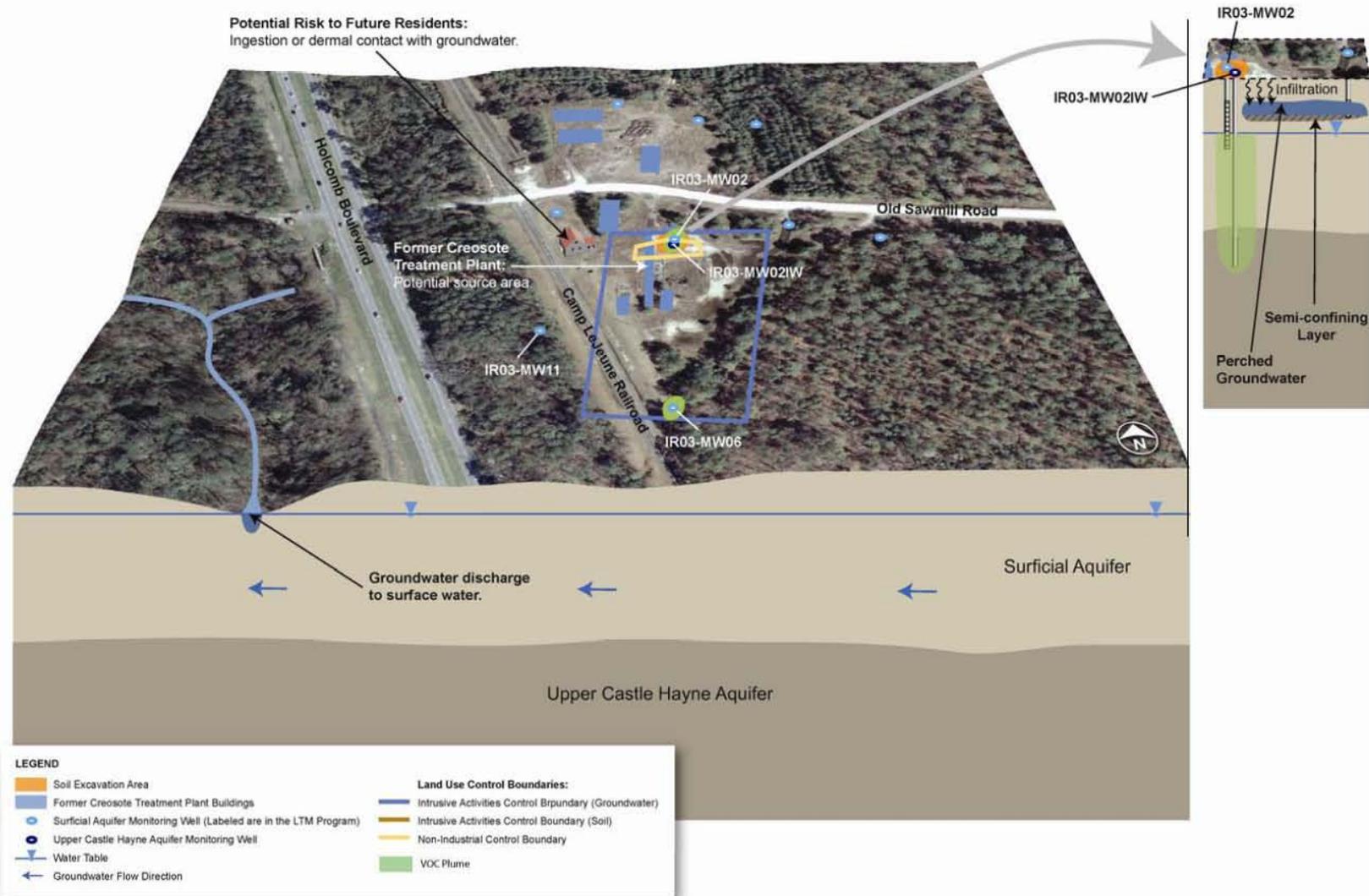
LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	0.14	July 2002	February 2002
Intrusive Activities Control Boundary (Soil)	0.14		
Intrusive Activities Control Boundary (Groundwater)	4.1		
Aquifer Use Control Boundary (1,000 feet)	134.1		

8.1.3.1 Future Activities

LUCs will be maintained to prohibit soil intrusive activities and prohibit non-industrial use within the extent of the former soil removal action areas where PAHs remain in soil above levels that allow for UU/UE. LTM is ongoing to monitor the concentrations of VOCs and SVOCs in groundwater, and LUCs are in-place to prohibit groundwater intrusive activities and aquifer use until cleanup levels are achieved.

If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed. Base Master Planning maintains current groundwater plume data in GIS, and all construction projects on-Base go through environmental review.

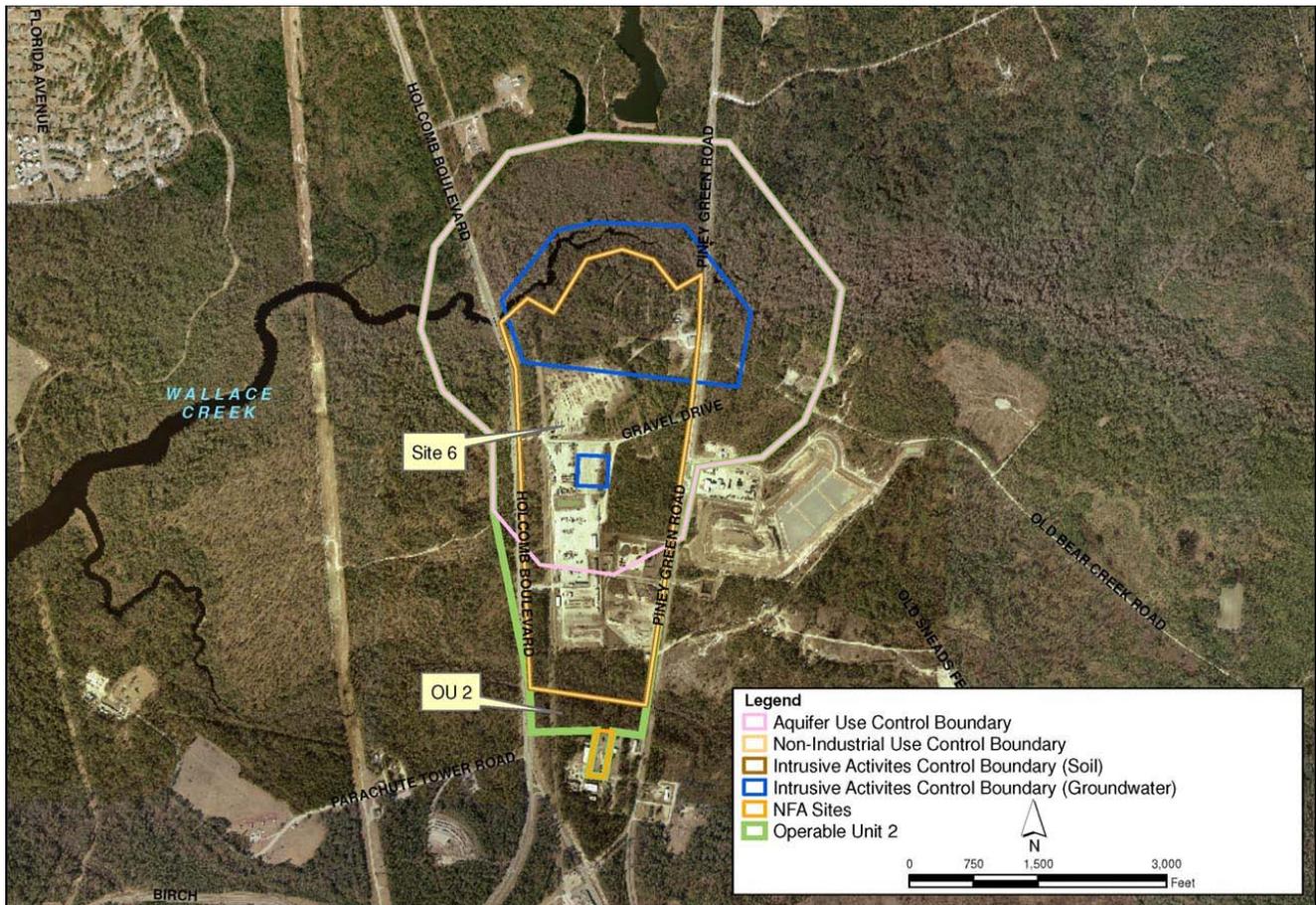
FIGURE 8-4
 Site 3 Conceptual Site Model
 FY 2013 Site Management Plan
 MCIEAST-MCB CAMLEJ
 North Carolina



8.1.4 Site 6 (OU 2)—Lots 201 and 203

Site 6 is located within OU 2, approximately 2 miles east of the New River and 2 miles south of State Route 24 (Figure 8-5). OU 2 consists of three sites (Sites 6, 9, and 82) that have been grouped together because of their proximity to one another. Site 6 covers an area of approximately 177 acres that incorporates Storage Lots 201 and 203, a wooded area between the storage lots, and a ravine. From the 1940s to the late 1980s, Site 6 was used for disposal and storage of wastes and supplies, including pesticides transformers containing PCBs, solvents, electrolytes, and waste oils. Currently, Lot 201 is used to store military equipment, vehicles, hydraulic oils, and other “non-hazardous” supplies. Most of Lot 203 remains an open field; 21 acres were temporarily used by the DRMO for metal staging operations between 2001 and 2012.

FIGURE 8-5
IRP Site 6, Operable Unit 2



Previous investigations are listed in Table 8-7 and the LUC Summary is presented in Table 8-8.

TABLE 8-7
Previous Investigations Summary, IRP Site 6

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCI-EAST-MCB CAMLEJ. Wastes present reportedly originated from dumping and storage activities and the IAS recommended that a Confirmation Study be conducted to verify the presence of contamination.

TABLE 8-7
Previous Investigations Summary, IRP Site 6

Previous Investigation/Action	Date	Activities
Confirmation Study (1987)	1984 - 1987	Field activities including soil, groundwater, surface water, and sediment sampling, were conducted to verify the presence or absence of contamination. Soil samples were analyzed for pesticides, and all other media were analyzed for VOCs and pesticides. Low levels of pesticides were detected in soil samples. Groundwater samples collected from shallow monitoring wells revealed low levels of VOCs and benzene.
Soil Gas Survey (1989)	1989	A soil gas survey was conducted to identify the presence of VOCs that may potentially affect personnel working within Lot 203. No imminent hazards were identified with the results of the survey.
RI/FS (Baker, 1993)	1992 - 1993	Field activities consisted of a preliminary site survey, a geophysical survey, a soil investigation including drilling and sampling, a groundwater investigation including monitoring well installation and sampling, drum waste sampling, test pit investigation, a surface water and sediment investigation, and an aquatic and ecological survey. Pesticides/PCBs, VOCs, SVOCs, and metals were identified in soil, groundwater, surface water, and sediment across the OU. The HHRA identified potential human health risks due to exposure to soil and groundwater. Potential adverse ecological impacts were identified for Wallace Creek and Bear Head Creek. The FS developed and screened remedial alternatives for addressing groundwater and soil contamination.
PRAP and ROD (Baker, 1993)	1993	A PRAP was to solicit public input on the preferred alternative (soil removal, groundwater extraction and treatment, LTM, and LUCs) and a public meeting was held. The Final ROD was issued and signed in September 1993.
RIP	1994 - present	The selected remedy identified in the ROD was conducted as a TCRA in 1994, during which twenty drums containing DDT were removed and contaminated soil was excavated. A second TCRA was conducted from 1995 to 1996 to remove more than 2,655 yd ³ of drums, batteries, and communications wire. Groundwater extraction and treatment and LTM for VOCs was implemented in 1996 and is ongoing. LUCs were implemented in 2001 and updated in 2002. The current CSM is shown on Figure 8-6 .
Chlorobenzene Summary Report (CH2M HILL, 2010)	2008 - 2010	To identify the potential source of chlorobenzene contamination and delineate the extent in groundwater, an SSI was conducted. During vegetation clearing activities, MD was discovered and an Explosives Safety Submission (ESS) was submitted to remove and dispose of the MD. The geophysical survey results indicated the presence of several linear features, potentially representing trenches containing metallic debris. Chlorobenzene concentrations in groundwater continue to fluctuate, the dissolved chlorobenzene is migrating downgradient, and the chlorobenzene plume has not been fully delineated vertically and horizontally. The potential source of the chlorobenzene is likely disposal trenches and test pitting and additional groundwater delineation was recommended.
Basewide Vapor Intrusion Evaluation (CH2M HILL, AGVIQ, 2009)	2007 – 2009	A Basewide Vapor Intrusion Study was conducted to determine if complete or significant exposure pathways exist for vapor intrusion into buildings. At OU 2, no buildings were identified within 100 feet of a monitoring well containing VOC concentrations above NCGWQS. If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed.

TABLE 8-7
Previous Investigations Summary, IRP Site 6

Previous Investigation/Action	Date	Activities
Chlorobenzene Test Pitting Investigation Technical Memorandum (CH2M HILL, 2012)	2010-2012	As a follow-up to the recommendations of the Chlorobenzene Summary Report, test pitting to investigate the large geophysical anomalies and soil sampling were conducted. 12 test pit excavations were completed and cultural debris, MD, drums, buckets, communication batteries, communication wires, and scrap metal were uncovered. At Test Pit 10, two drums were uncovered resulting in elevated breathing zone measurements and the soil results indicated chlorobenzene concentrations at 70,000,000 micrograms per kilogram ($\mu\text{g}/\text{kg}$). Additional monitoring wells were also installed and site-wide groundwater samples were collected to further investigate the extent of chlorobenzene in groundwater. Recommendations are to complete the delineation of chlorobenzene in groundwater, assess the distribution of chlorobenzene in vadose zone soil, and update LUCs, as necessary.
AM and TCRA (CH2M HILL, 2011)	2011	An AM documented the decision for a TCRA to address the buried drums and chlorobenzene-impacted soil discovered during test pitting activities. The TCRA was conducted in May 2011. Approximately 42 yd ³ of soil and debris were removed. Confirmation samples were collected in the excavated area and analytical results indicated that concentrations of chlorobenzene were still present in soil above industrial screening levels. The site was restored with clean backfill and further investigation of chlorobenzene in soil via passive soil gas and soil sampling and an evaluation of the current RIP was recommended.

TABLE 8-8
Land Use Control Summary, IRP Site 6

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	206.75	July 2002	February 2002
Intrusive Activities Control Boundary (Soil)	206.75		
Intrusive Activities Control Boundary (Groundwater)	99.4		
Aquifer Use Control Boundary (1,000 feet)	404.91		

8.1.4.1 Future Activities

A supplemental investigation is ongoing at Site 6 to delineate the nature and extent of chlorobenzene contamination. Due to the ongoing investigation, it was recommended that LTM at Site 6 be discontinued until the chlorobenzene investigation has been completed, at which time the remedy for Site 6 will be revisited to ensure continued protection of human health and the environment. LUCs will be maintained to prohibit groundwater intrusive activities and aquifer use until cleanup levels are achieved. LUCs are also in-place to prohibit soil intrusive activities and non-industrial use within the extent of the former soil removal action areas where VOCs, pesticides, PCBs, and metals remain in soil above levels that allow for UU/UE.

If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed. Base Master Planning maintains current groundwater plume data in GIS, and all construction projects on-Base go through environmental review.

8.1.5 Site 16 (OU 8)—Former Montford Point Burn Dump

Site 16, the Former Montford Point Burn Dump, encompasses approximately 4 acres in the Montford Point area of the Base (**Figure 8-7**). The Montford Point Burn dump was open from approximately 1958 to 1972, although unauthorized dumping subsequently occurred. Trash from the surrounding housing area and buildings is suspected to have been burned and then covered with soil at Site 16. Records indicate that building debris, garbage, tires, and small amounts of waste oils were disposed of at the site. Materials, including asbestos insulating material for pipes, were also dumped on the surface. The quantity of asbestos material was estimated at less than 1 yd³, and mitigation was completed. Currently, Site 16 is vacant.

FIGURE 8-7
IRP Site 16, Operable Unit 8



Previous investigations are listed in **Table 8-9** and the LUC Summary is presented in **Table 8-10**.

TABLE 8-9
Previous Investigations Summary, IRP Site 16

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Research indicated that unauthorized dumping of asbestos posed a possible health threat and recommended an investigation or removal be completed. Corrective measures were undertaken to remove the asbestos material.
RI/FS (Baker, 1996)	1994 - 1996	An RI was conducted to assess the nature and extent of contamination. Field activities included a site survey, soil, groundwater, surface water, and sediment sampling. Minimal potential human health risks were identified for future residents due to the presence of PCBs in the soil. However, the maximum detected PCB concentration (2.1 parts per million [ppm]) was below the recommended cleanup level for PCBs of 10 to 25 ppm for industrial areas. No unacceptable ecological risks were identified for terrestrial or aquatic receptors.

Previous Investigation/Action	Date	Activities
PRAP and ROD (Baker, 1996)	1996	A Final PRAP was issued to solicit public input on the preferred alternative (no RA) and a public meeting was held. The ROD for OU 8 was signed on September 30, 1996. Minimal risks were identified in the RI; therefore, no RAs were required in the ROD.
RIP	2001 - 2002	Although the ROD did not require RA, for conservativeness LUCs were implemented by the Base in 2001 and updated in 2002 due to the site's past use as a dump.
Explanation of Significant Difference (ESD) (CH2M HILL, 2012)	2012	An ESD was submitted in 2012 to document the LUCs as the remedy including the addition of an intrusive activities control boundary for soil to prevent exposure to waste in-place.

TABLE 8-10
Land Use Control Summary, IRP Site 16

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Intrusive Activities Control Boundary (Soil)	2.1	Proposed	--
Non-Industrial Use Control Boundary (Soil)	2.1	July 2002	February 2007
Intrusive Activities Control Boundary (Groundwater)	0.169		
Aquifer Use Control Boundary (1,000 feet)	60.2		

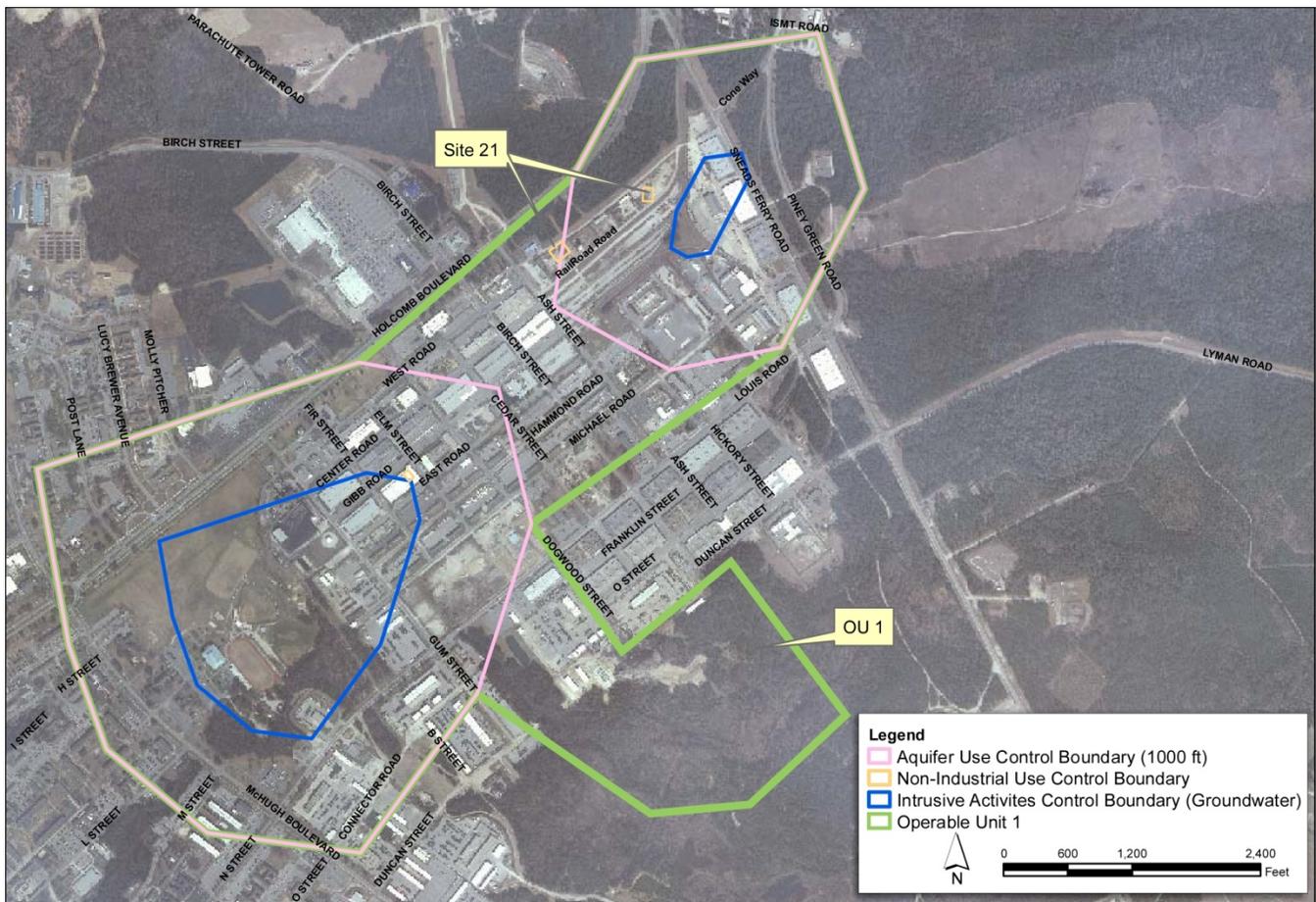
Future Activities

Because the waste remains in-place, the LUCs prohibiting aquifer use, intrusive activities for groundwater, and non-industrial land use will be maintained and the intrusive activities for soil LUC will be implemented in FY 2012.

8.1.6 Site 21 (OU 1)—Transformer Storage Lot 140

Site 21, the Transformer Storage Lot 140, covers approximately 10 acres within OU 1, and is 1 mile east of the New River and 2 miles south of State Route 24 (**Figure 8-8**). OU 1 consists of three sites (Sites 21, 24, and 78) that have been grouped together into one OU because of their proximity to one another. From 1950 to 1951, a pit located in the northern portion of Site 21 was used as a drainage receptor for oil from transformers. Surface discharge of transformer oils was also reported. The quantity of oil disposal is unknown. The pit reportedly measured 25 to 30 feet long by 6 feet wide and 8 feet deep. In 1958, a pest control shop was moved from Building 712 (Site 2) to Building 1105, located in the southern portion of Site 21. From 1958 to 1977, Building 1105 was used for pesticide mixing and as a cleaning area for pesticide application equipment. Overland discharge of wastewater generated during cleaning operations was documented. The estimated quantity of wastewater discharged was approximately 350 gallons per week in 1977.

FIGURE 8-8
IRP Site 21, Operable Unit 1



Previous investigations are listed in **Table 8-11** and the LUC Summary is presented in **Table 8-12**.

TABLE 8-11
Previous Investigations Summary, IRP Site 21

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Research indicated that past site operations may have impacted soil, groundwater, and surface water and recommended an additional investigation.
Confirmation Study (1987)	1984 - 1987	The Confirmation Study included soil and groundwater investigations. Analytical results confirmed the presence of pesticides/PCBs in soils.
RI/FS (Baker, 1994)	1994	An RI was conducted to assess the nature and extent of contamination. Field activities included groundwater, soil, sediment, and surface water sampling. No potential risks to human health were identified. Potential ecological risks were identified based on exposure to pesticides and PCBs in soil at Site 21. An FS was completed, which developed and screened remedial alternatives for addressing soil contamination at three separate areas on the site.
PRAP and ROD (Baker, 1994)	1994	A PRAP was issued to solicit public input on the preferred alternative (excavation and offsite disposal to address soil contamination) and a public meeting was held. The Final ROD was issued in September 1994.
ESD (Baker, 1995)	1995	Before implementing the soil remedy, an ESD was issued to revise the cleanup level for PCBs to the Federal PCB action level for industrial sites due to the industrial nature of site activities.
RIP	1995 - 2002	The removal action identified in the ROD was performed in 1995, and approximately 650 tons of pesticide-contaminated soil and 161 tons of PCB-contaminated soil were excavated and disposed offsite. Because the removal action was only considered protective for industrial site use, LUCIP was completed in 2001 that restricted development to industrial land use. LUCs were implemented as part of OU 1 in 2001 and amended in 2002.

TABLE 8-12
Land Use Control Summary, IRP Site 21

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	0.815	July 2002	February 2002

8.1.6.1 Future Activities

LUCs will be maintained to prohibit non-industrial use within the extent of the former soil removal action areas where pesticides and PCBs remain in soil above levels that allow for UU/UE.

8.1.7 Site 28 (OU 7)—Hadnot Point Burn Dump

Site 28, the Hadnot Point Burn Dump, is located within OU 7 on the Mainside of the Base. OU 7 consists of three sites (Sites 1, 28, and 30) that have been grouped together into one OU because of their unique characteristics of suspected waste (POL) and geographic location (**Figure 8-9**). Site 28 operated from 1946 to 1971 as a burn area for a variety of solid wastes generated on the Base and covers approximately 17 acres. Industrial waste, trash, oil-based paint, and construction debris were reportedly burned and then covered with soil. In 1971, the burn dump ceased operations and was graded and seeded with grass. The total volume of fill within the dump is estimated to be between 185,000 and 375,000 yd³. Currently, most of Site 28 is used for recreation and physical training exercises.

FIGURE 8-9
IRP Site 28, Operable Unit 7



Previous investigations are listed in **Table 8-13** and the LUC Summary is presented in **Table 8-14**.

TABLE 8-13
Previous Investigations Summary, IRP Site 28

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The IAS concluded potential impact to surface water due to past disposal practices and recommended an additional investigation to determine the boundaries of the disposal area and verify the presence of hazardous wastes.
Confirmation Study (1987)	1984 - 1987	The Confirmation Study included groundwater, surface water, sediment, and fish tissue investigations. Metals detected in groundwater, surface water, and sediment were determined to be related to past site activities. Additionally, VOCs and O&G were detected in groundwater samples.
RI/FS (1994)	1994 - 1995	An RI was conducted to further characterize the nature and extent of contamination. RI field activities consisted of a site survey, soil, groundwater, surface water, and sediment sampling, and an aquatic and ecological survey. Low levels of VOCs were detected in soil and metals in groundwater. Potential human health risks were identified due to the presence of metals in soil and sediment, and the presence of metals and VOC in groundwater. The concentrations of metals in soil were just above the screening criteria; therefore, the risks associated with exposure to soils were deemed low. No unacceptable ecological risks were identified. Remedial alternatives for groundwater were evaluated during preparation of the FS, submitted in July 1995.
PRAP (1995) and ROD (Baker, 1996)	1995 - 1996	A PRAP was issued to solicit public input on the preferred alternative (LTM and LUCs) and a public meeting was held. The Final ROD was issued and signed in October 1996 followed by initiation of LTM.
RIP and RACR (CH2M HILL, 2002)	1996 - 2002	Groundwater LTM was initiated in 1996 and included sampling of eight monitoring wells twice a year for VOCs and metals analysis. In 2001, the concentrations of VOCs were below the cleanup levels for at least four consecutive quarters. A RACR was prepared to document the completion of LTM. LUCs were implemented in 2001 and updated in 2002.

TABLE 8-14
Land Use Control Summary, IRP Site 28

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	17.3	July 2002	February 2002
Intrusive Activities Control Boundary (Groundwater)	2.6		
Aquifer Use Control Boundary (1,000 feet)	92.5		

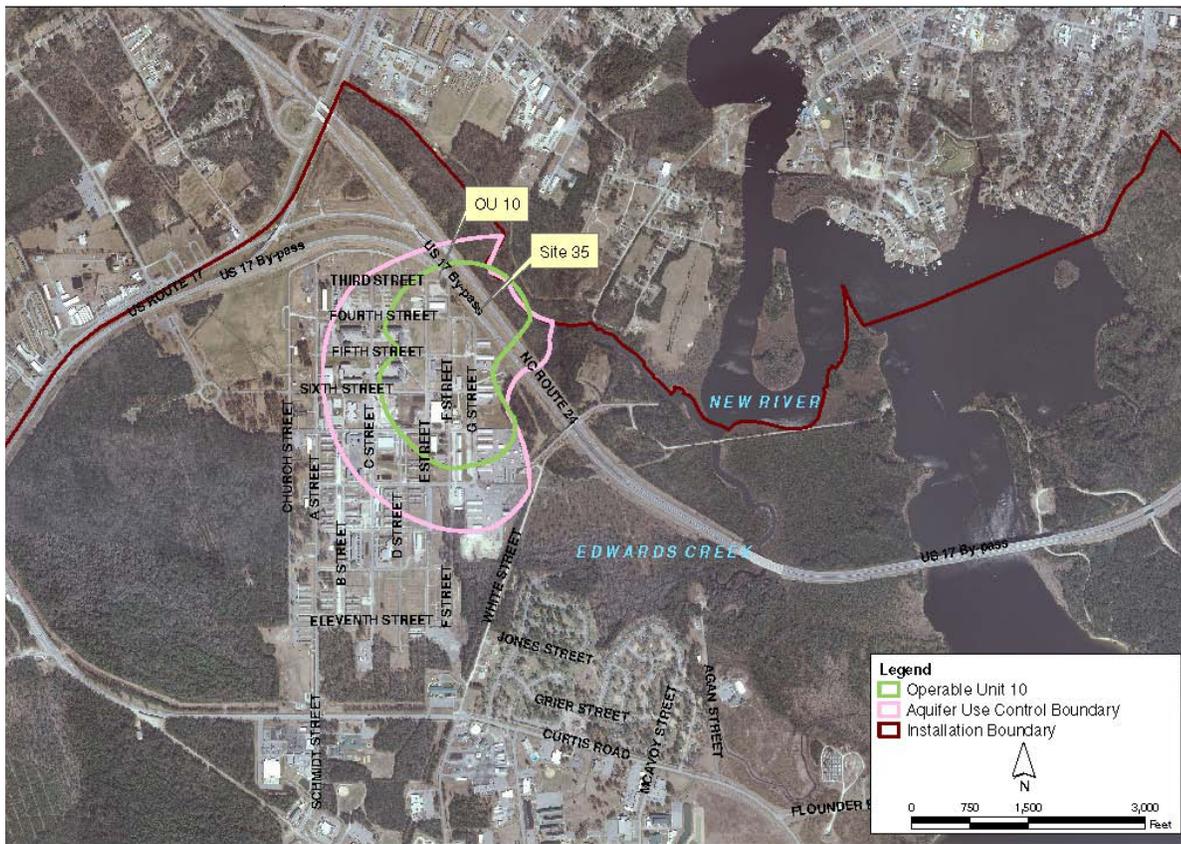
8.1.7.1 Future Activities

LUCs are in-place to prohibit non-industrial use.

8.1.8 Site 35 (OU 10)—Camp Geiger Area Fuel Farm

Site 35, formerly the Camp Geiger Area Fuel Farm, is located within Camp Geiger, in the northwest portion of the Base and covers approximately 45 acres (Figure 8-10). The fuel farm was composed of five 15,000-gallon ASTs, underground fuel transmission lines, a pump house, a fuel unloading pad, an oil-water separator (OWS), and a distribution island. The ASTs were installed in 1945 as part of the original Camp Geiger construction. The fuel farm was active until it was decommissioned in the spring of 1995 to make way for the construction of the United States Highway 17 Bypass. During the active life of the fuel farm, several releases of fuel occurred. A vehicle maintenance garage (former Building TC474) and weapons cleaning area were also present at Site 35. Currently an armory, several warehouses, general storage buildings, and troop barracks occupy the area.

FIGURE 8-10
IRP Site 35, Operable Unit 10



Previous investigations are listed in Table 8-15 and the LUC Summary is presented in Table 8-16.

TABLE 8-15
Previous Investigations Summary, IRP Site 35

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Due to potential for petroleum hydrocarbon impacts from historical site activities and recorded spills, the site was recommended for further investigation.
Confirmation Study (ESE, 1985)	1985	Soil, groundwater, sediment, and surface water samples were collected to delineate contamination. Results indicated that all media were potentially impacted by previous site activities.
Focused FS (NUS Corporation, 1990)	1990	Soil, groundwater, surface water, and sediment samples were collected to evaluate a 1990 petroleum release. Risks to human health or the environment and interim measures (IMs) to remediate the area were evaluated. Although no unacceptable risks were found, remediation was recommended because petroleum hydrocarbon levels exceeded cleanup standards.
Comprehensive Site Assessment (Law, 1992)	1991 - 1992	Soil and groundwater samples were collected to identify the source, nature, and extent of petroleum hydrocarbon impacts. Petroleum hydrocarbon related contamination was found in soil (generally located at or below groundwater table) and in shallow groundwater. CVOC contamination was found in shallow and intermediate groundwater.
IRA RI/ FS (Baker, 1994)	1993 - 1994	Additional sampling and excavation of a shallow trench along Brinson Creek were conducted to support selection of an IRA to address soil contamination. Soil samples were collected for petroleum hydrocarbons. Analytical results identified three areas of petroleum hydrocarbon contamination in the soil, which corresponded to past unauthorized discharges of fuel products.
IROD (Baker, 1994)	1994 - 1997	An Interim PRAP was submitted to address soils and was followed by an IROD. The selected remedy was excavation and offsite disposal of contaminated soil. From 1995 to 1997 approximately 15,700 tons of petroleum hydrocarbon contaminated soil was excavated and shipped offsite for disposal or recycling. Confirmatory sampling was conducted and revealed concentrations below clean-up goals. The site was restored and a Closeout Report was completed in 1997.
RI (Baker, 1995)	1994 - 1995	A soil gas survey, and soil, groundwater, surface water, and sediment sampling was conducted to evaluate the nature and extent of contamination and potential risks to human health and the environment. Results revealed soil and groundwater contamination; the extent of groundwater contamination was not delineated. The HHRA concluded that the overall site risk was above the acceptable risk range and the ERA concluded that contamination had the potential to affect the integrity of ecological receptors.
Interim FS (Baker, 1995)	1995	The Interim FS addressed groundwater impacts and identified RAs for a focused area near the fuel farm, a known source of groundwater contamination. Although the extent of groundwater contamination was not adequately defined during the RI, an Interim FS was deemed necessary because groundwater contamination in the vicinity of the Fuel Farm was a known source of ongoing contamination to Brinson Creek.
Interim ROD (Baker, 1995)	1995	An Interim PRAP was submitted to address shallow groundwater and was followed by an IROD. The IROD was issued based on the Interim FS for remediation of surficial groundwater near the fuel farm. In Situ Air sparging was the selected remedy for shallow groundwater and the 100-foot trench was installed in 1998.
Supplemental Groundwater Investigation (SGI) (Baker, 1996)	1995 to 1996	Soil, groundwater, surface water, and sediment samples were collected to fill data gaps from the RI and support the air sparging pilot study. Contamination was identified in groundwater and sediment. The supplemental HHRA concluded that the overall future site risk was above the acceptable risk range.

Previous Investigation/Action	Date	Activities
Draft In situ Air Sparging Treatability Study (Baker, 1996)	1996	A pilot study was conducted for <i>in situ</i> air sparging in the shallow aquifer. Groundwater, soil, and sediment sampling results indicated that air sparging had limited effectiveness for VOC removal, and no further investigation was recommended.
Closeout Report (OHM, 1997)	1995 - 1997	In response to the interim ROD, a removal action for petroleum hydrocarbon soil was initiated. Approximately 15,700 tons of contaminated soil was removed from the former fuel farm area.
LTM (CH2M HILL, 2005)	1999 - 2004	Groundwater samples were collected, quarterly in 1999 and semiannually from 2000 to 2004, to assess seasonal changes in contaminant distribution. LTM was discontinued in 2004 when a SRI was initiated.
Natural Attenuation Evaluation (NAE) (CH2M HILL, Baker, CDM, 2003)	1998 - 2002	Seasonal changes, plume stability, and presence of natural degradation were evaluated to determine if the natural attenuation process could reduce groundwater contamination to levels of compliance. Groundwater and surface water samples were collected and analyzed for VOCs, metals, and NAIPs. Results indicated natural attenuation was degrading CVOCs but biological degradation appeared stalled in some locations.
Hot Spot Characterization (Baker, 2003)	2002 - 2003	Characterization was completed to delineate any continuing sources. Field activities included soil and groundwater sampling for VOCs, SVOCs, volatile petroleum hydrocarbon (VPH), extractable petroleum hydrocarbon (EPH), and Total Organic Carbon (TOC). Based on the analytical results, one shallow hot spot was co-mingled with petroleum hydrocarbons, and a deeper, larger hot spot was identified.
Technical Evaluation (CH2M HILL, 2003)	2003	A Technical Evaluation was conducted to develop and evaluate RA alternatives for groundwater. ISCO via modified Fenton's Reagent followed by potassium permanganate was recommended for TCE removal. <i>In situ</i> air sparging with vertical wells was recommended for the petroleum hydrocarbon contamination.
Pilot Study (CH2M HILL, 2006)	2003 - 2005	The Pilot Study evaluated the effectiveness of ISCO for the remediation of TCE-impacted groundwater. Final results revealed that TCE was reduced by 80 to 98 percent and total VOCs were reduced by 72 to 85 percent within the pilot study area.
SRI (CH2M HILL, 2009)	2005 - 2008	Soil, groundwater, surface water, and sediment samples were collected to delineate extent of contamination. VOCs exceeded criteria and presented unacceptable risks in groundwater.
NTCRA (CH2M HILL, 2008)	2006 - 2008	After the submittal of an EE/CA in 2007, an AM was prepared to document ERD as the preferred NTCRA to address CVOCs in groundwater. ERD via injection of EVO and lactate using direct-push technology was implemented. The results indicated minimal contaminant reduction based on limited distribution of substrate and limited microbial bioavailability.
FS (CH2M HILL, 2009)	2009	Remedial alternatives to address CVOC-impacted groundwater were assessed including, no action, MNA, ERD with bioaugmentation, ISCO, and <i>in situ</i> air sparging.
PRAP and ROD (CH2M HILL, 2009)	2009	A PRAP was issued in April 2009 to solicit public input on the preferred alternative (in situ air sparging using a horizontal well, LTM and MNA, and LUCs) and a public meeting was held. Questions received during the public meeting were general inquiries and no comments were received during the public comment period. The Final ROD was issued and signed in November 2009. The site CSM is shown on Figure 8-11 .
Basewide Vapor Intrusion Evaluation (CH2M HILL, AGVIQ, 2009 and CH2M HILL, 2011)	2007 – 2011	Site 35 was included in the phased Basewide vapor intrusion evaluation to determine if complete or significant exposure pathways exist for vapor intrusion into buildings. No unacceptable risks were identified from indoor air related to vapor intrusion; therefore, it was concluded that vapor intrusion is not a current significant pathway of concern for any of the buildings located in the vicinity of Site 35. The report recommended subslab soil gas and indoor air monitoring at 1 building with previous exceedances of Base-specific soil gas screening levels every 5 years until 3 rounds indicate no unacceptable risks. If new buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed.

Previous Investigation/Action	Date	Activities
RIP and IRACR (Shaw, 2011)	2010 - 2011	The RD was completed for in situ air sparging using a horizontal well, LTM and MNA, and LUCs. The horizontal well was installed and air sparging was initiated in FY 2010 to address VOCs in groundwater. LUCs were also finalized to prohibit aquifer use until cleanup levels for UU/UE are achieved. Groundwater LTM and MNA for VOCs and NAIPs was initiated in 2011 to evaluate the effectiveness of the system and monitor plume migration. An IRACR was submitted in 2011.

TABLE 8-16
Land Use Control Summary, IRP Site 35

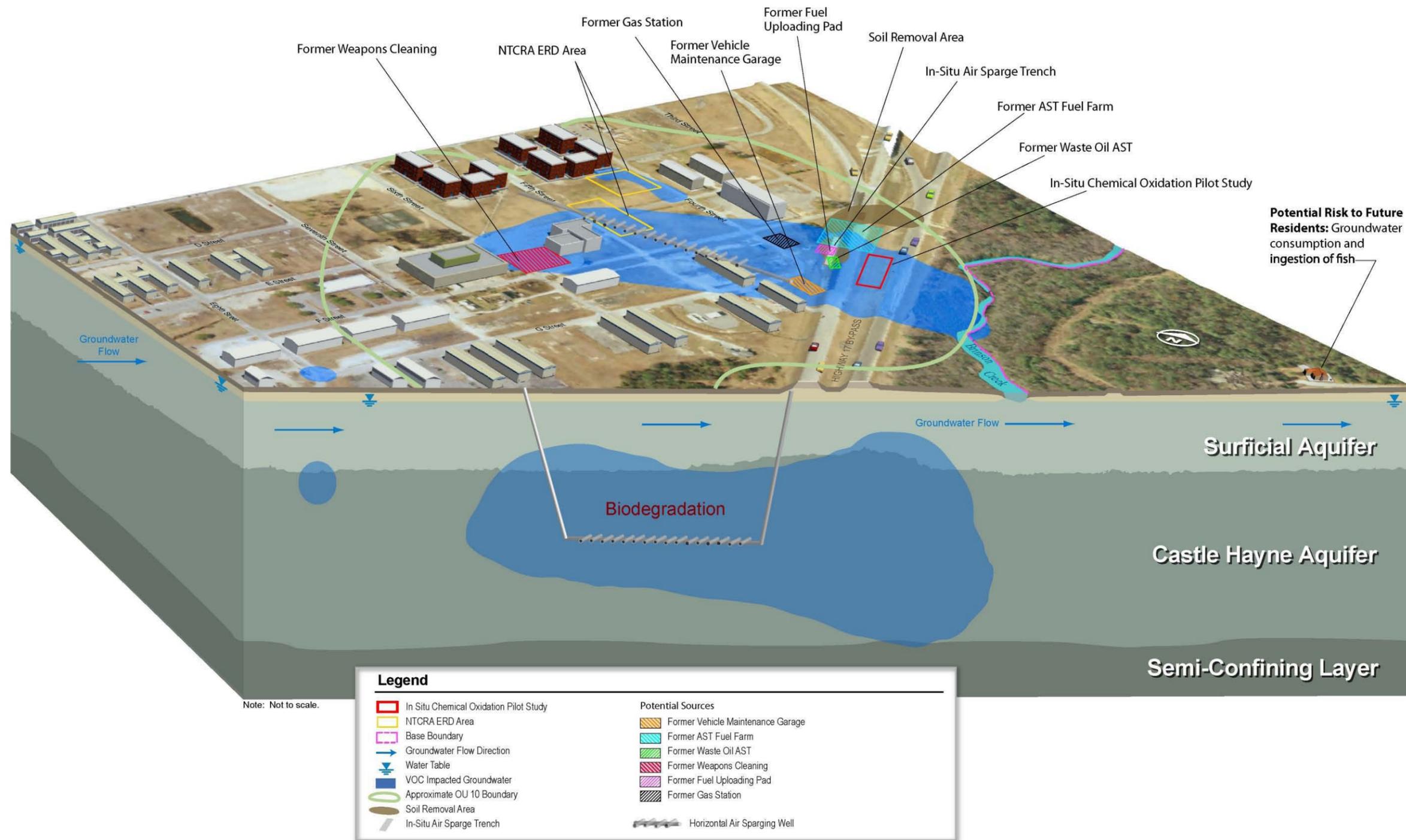
LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Aquifer Use Control Boundary	178.6	May 2010	August 2010

8.1.8.1 Future Activities

The MNA will be continued to monitor migration of VOC contamination. LUCs will be maintained to prohibit aquifer use until cleanup levels are achieved. If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed. Base Master Planning maintains current groundwater plume data in GIS, and all construction projects on-Base go through environmental review.

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FIGURE 8-11
 Site 35 Conceptual Site Model
 FY 2013 Site Management Plan
 MCIEAST-MCB CAMLEJ
 North Carolina

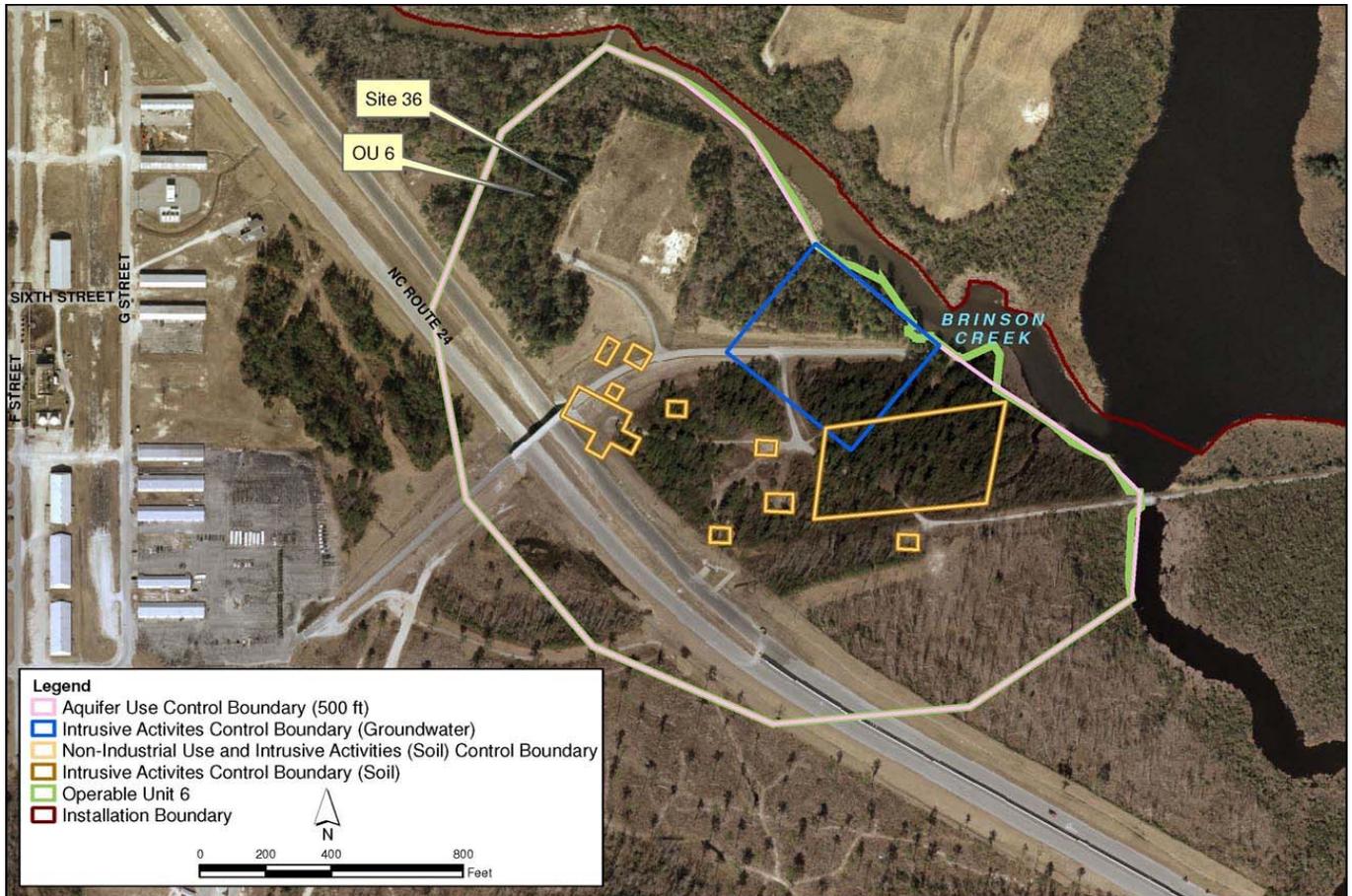


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8.1.9 Site 36 (OU 6)—Camp Geiger Dump Area Near Sewage Treatment Plant

Site 36, the Camp Geiger Dump Area, encompasses approximately 20 acres within OU 6 in the northwest portion of the Base (**Figure 8-12**). OU 6 covers approximately four sites (Sites 36, 43, 44, and 54) that have been grouped together into one OU because of the similar characteristics of material disposed and geographic location. Site 36 is reported to have been used for the disposal of municipal wastes and mixed industrial wastes including trash, waste oils, solvents, and hydraulic fluids that were generated at MCAS New River. The dump was active from the late 1940s to the late 1950s and covers approximately 5 acres. Most of the material was burned and buried.

FIGURE 8-12
IRP Site 36, Operable Unit 6



Previous investigations are listed in **Table 8-17** and the LUC Summary is presented in **Table 8-18**.

TABLE 8-17
Previous Investigations Summary, IRP Site 36

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. A Confirmation Study was recommended due to the indication that hazardous substances were disposed of.
Confirmation Study (1987)	1984 - 1987	A Confirmation Study was conducted to verify the presence of potential contaminants in groundwater, surface water, and sediment. An RI/FS was recommended to further characterize VOCs and metals in groundwater.

Previous Investigation/Action	Date	Activities
RI (Baker, 1996)	1994 - 1996	To further characterize the nature and extent of contamination an RI was conducted. Field activities included the installation of additional monitoring wells and the collection of soil, groundwater, surface water, and sediment samples. Potential human health risks were identified due to exposure to lead, PAH's, pesticides, and PCBs in soil and VOCs in groundwater. Minimal potential ecological risks were identified for aquatic receptors at Site 36.
TCRA (1997)	1997	A TCRA was conducted to remove PCB-contaminated surface soil at concentrations posing an imminent threat to human health and the environment. Approximately 92 tons of regulated PCB-contaminated soils and 148 tons of non-regulated soils were excavated.
Post-RI Groundwater Monitoring	(1998-present)	A post-RI monitoring program consisting of quarterly groundwater and surface water sampling was initiated. Monitoring was implemented to determine if MNA could be a viable remedial alternative for VOCs in groundwater and to evaluate plume movement. Annual groundwater and semi-annual surface water sampling is currently conducted at Site 36 in accordance with the ROD, RD, and LTM optimization report.
FS (Baker, 1998; 2002)	1998 - 2002	Based on the results of the RI, FSs were completed in 1998 and 2002 to evaluate remedial alternatives to mitigate risks from lead, PAHs, and pesticides in soil and VOCs in groundwater. The preferred alternative was excavation and offsite disposal for soil and MNA for groundwater.
IRA (Shaw, 2003)	2003	An EE/CA was presented at a public meeting for completing an interim response removal action. Excavation and off-site disposal of PAH and pesticide-contaminated soil was the selected NTCRA. A total of 1,630 tons of soil was removed from four areas within the south central portion of the site. The NTCRA was completed before the Final ROD was issued.
PRAP (Baker, 2002) and ROD (Baker, 2005)	2002 - 2005	A PRAP was issued to solicit public input on the preferred alternative (excavation and off-site disposal and LUCs for soil and MNA and LUCs for groundwater) and a public meeting was held. The Final ROD was issued and signed in July 2005.
RIP and IRACR (CH2M HILL, 2005; 2007)	1998 - present	LTM of groundwater and surface water for VOCs and NAIIPs was initiated in 1998. An RD was completed for OU 6 in 2005 to document the LUC implementation and maintenance actions and LTM activities for MNA at Site 36. LUCs were implemented in 2005. In 2007, an IRACR was completed to document the RIP. The CSM is shown on Figure 8-13 .

TABLE 8-18
Land Use Control Summary, IRP Site 36

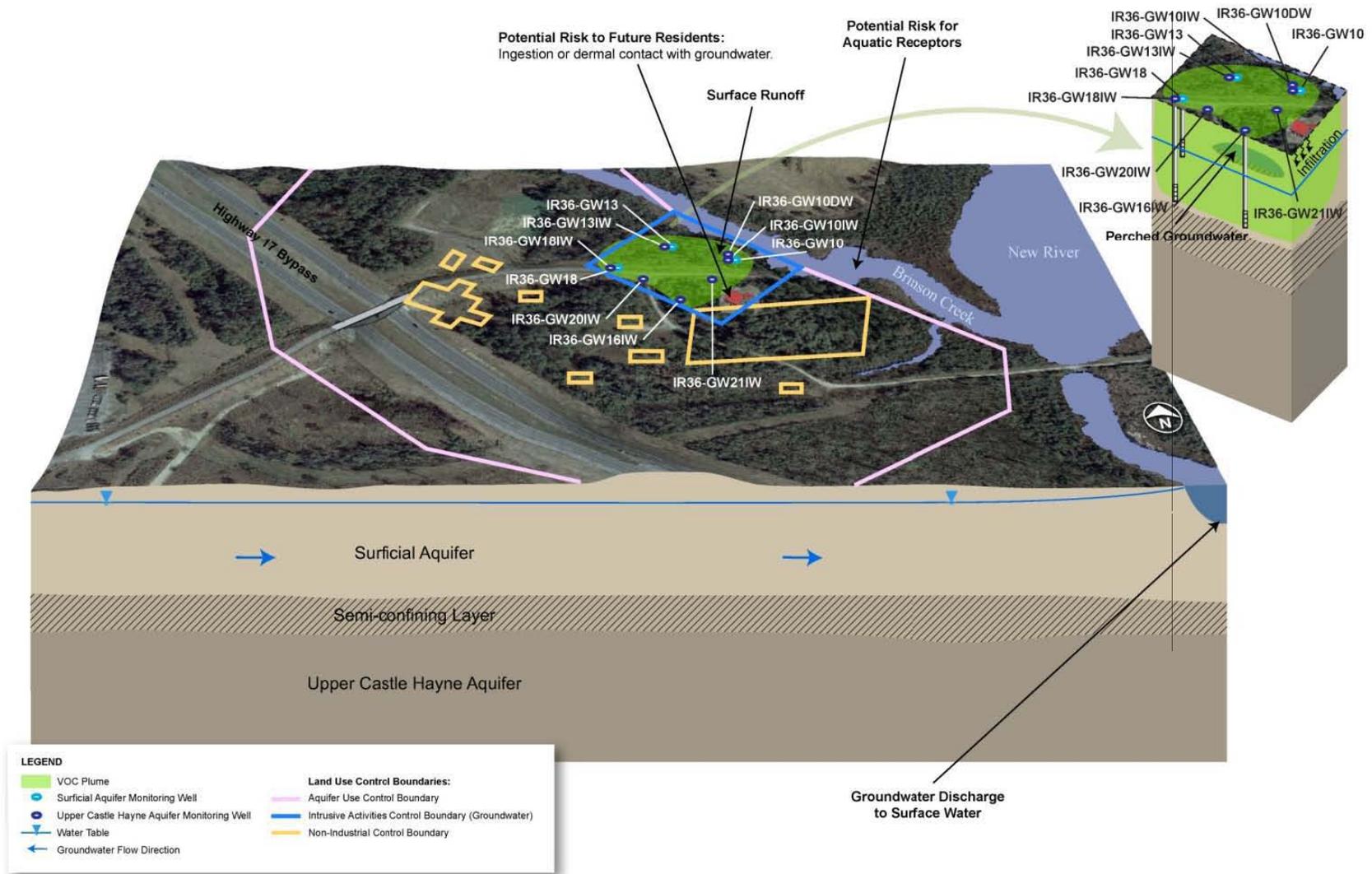
LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	4.8	September 2005	February 2007
Intrusive Activities Control Boundary (Soil)	4.8		
Intrusive Activities Control Boundary (Groundwater)	4.8		
Aquifer Use Control Boundary (1,000 feet)	64.8		

8.1.9.1 Future Activities

The groundwater and surface water MNA will be continued to monitor the VOC plume and migration. LUCs will be maintained to prohibit groundwater intrusive activities and aquifer use until cleanup levels are achieved. LUCs are also in-place to prohibit soil intrusive activities and non-industrial use within the extent of former soil removal action areas where PAHs, PCBs, and/or lead remain in soil above levels that allow for UU/UE.

If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed. Base Master Planning maintains current groundwater plume data in GIS, and all construction projects on-Base go through environmental review.

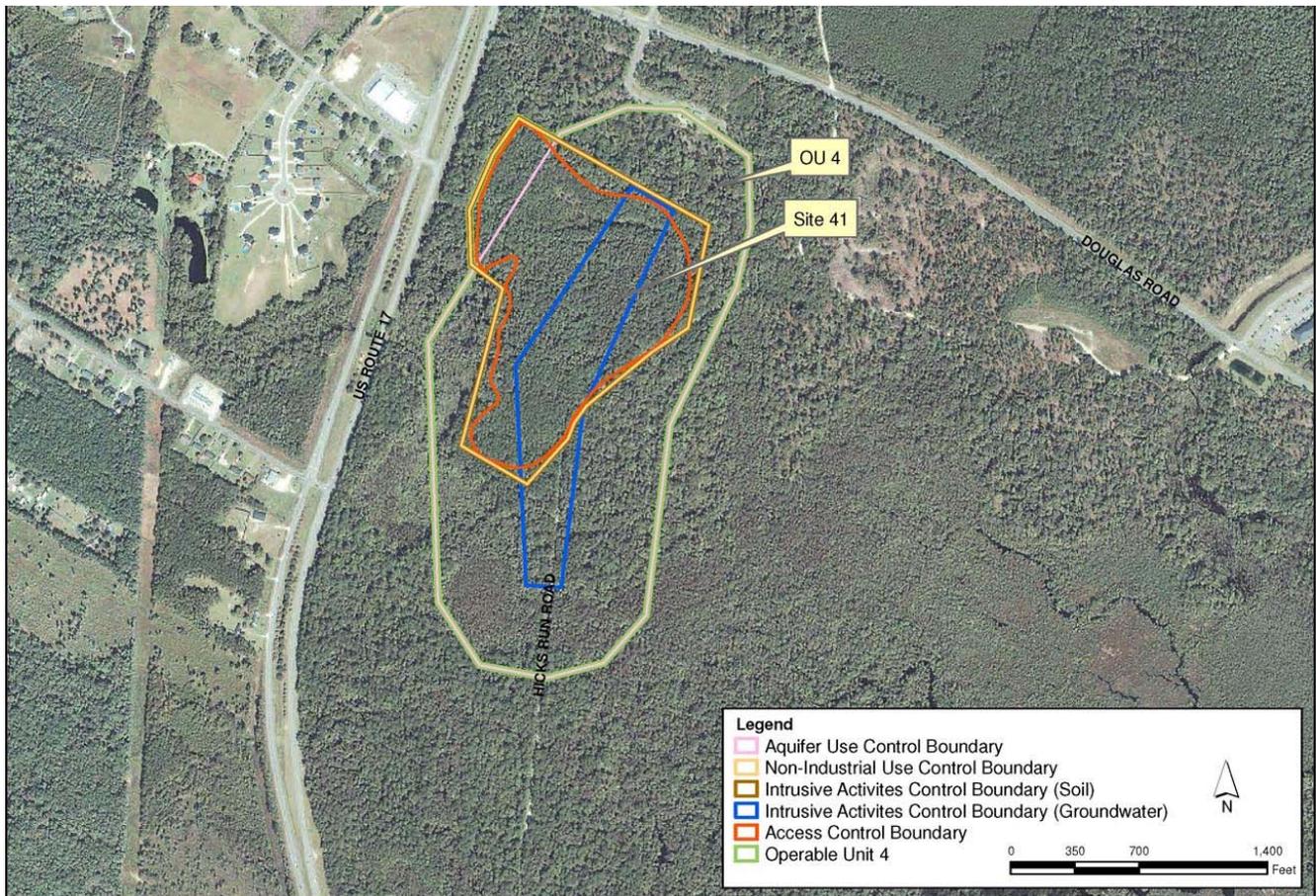
FIGURE 8-13
 Site 36 Conceptual Site Model
 FY 2013 Site Management Plan
 MCIEAST-MCB CAMLEJ
 North Carolina



8.1.10 Site 41 (OU 4)—Camp Geiger Dump near Former Trailer Park

Site 41, the Camp Geiger Dump near the Former Trailer Park, encompasses approximately 37 acres within OU 4 in the Camp Geiger area of the Base (**Figure 8-14**). OU 4 consists of two sites (Sites 41 and 74) that have been grouped together based on the unique characteristic of suspected waste (CAs). Construction debris, POL compounds, solvents, batteries, ordnance, chemical training agents, and, in 1964, mirex (a pesticide), was reportedly disposed at Site 41. The debris was reportedly burned and graded over with soil. The dump area contains an estimated 110,000 yd³ of waste. The amount of solvents and oil disposed was estimated to be between 10,000 and 15,000 gallons; and the quantity of mirex was estimated at several tons.

FIGURE 8-14
IRP Site 41, Operable Unit 4



Previous investigations are listed in **Table 8-19** and the LUC Summary is presented in **Table 8-20**.

TABLE 8-19
Previous Investigations Summary, IRP Site 41

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The IAS concluded that disposal of industrial wastes and pesticides could impact groundwater and recommended an additional investigation to verify the presence of hazardous wastes.
Confirmation Study (1987)	1984 - 1987	The Confirmation Study included groundwater, surface water, and sediment investigations. O&G and phenols were detected in groundwater, surface water, and sediment samples. VOCs, metals, and one nitroaromatic were detected in groundwater samples.

Previous Investigation/Action	Date	Activities
RI/FS (Baker, 1995)	1993 - 1995	To further characterize the nature and extent of contamination an RI was conducted. Field activities included a geophysical investigation, soil, groundwater, surface water, and sediment sampling, and an aquatic and ecological survey. The geophysical investigation indicated that the site contained a significant amount of buried construction debris. Although there was reported history of CA disposal, no chemical surety degradation compounds were detected in soil. Potential human health risks were identified due to exposure to metals in groundwater and seep surface water. Minimal potential ecological risks were identified for aquatic receptors at Site 41. An FS was prepared which developed and screened remedial alternatives for addressing soil, groundwater, and surface water contamination.
PRAP and ROD (Baker, 1995)	1995	A PRAP was issued to solicit public input on the preferred alternative (LTM to monitor contaminant migration and LUCs) and a public meeting was held. The Final ROD was issued and signed in December 1995.
RIP and RACR (CH2M HILL, 2006)	1997 - 2008	LTM was initiated in 1997 and included sampling of five monitoring wells and eight surface water and sediment locations twice a year for analysis of VOCs, metals, total dissolved solids (TDS), and total suspended solids (TSS). In 2005 the groundwater cleanup levels were achieved and LTM was discontinued. LUCs were implemented in 2001 and updated in 2002. A RACR was prepared to document the completion of LTM. A fence was installed around the perimeter of the site in 2008 to restrict access.

TABLE 8-20
Land Use Control Summary, IRP Site 41

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary	36.6	July 2002	February 2002
Intrusive Activities Control Boundary (Groundwater)	16.4		
Intrusive Activities Control Boundary (Soil)	36.6		
Aquifer Use Control Boundary (500 feet)	86.4		
Access Control Boundary	30		

8.1.10.1 Future Activities

The LUCs to prohibit intrusive activities, aquifer use, and non-industrial use at the site are protective of human health and the environment because exposure to waste that could result in unacceptable risks are being controlled. Perimeter fencing also restricts access to the waste area.

8.1.11 Site 43 (OU 6)—Agan Street Dump

Site 43, the Agan Street Dump, encompasses approximately 14 acres within OU 6 in the operations area of MCAS New River (**Figure 8-15**). OU 6 consists of four sites (Sites 36, 43, 44, and 54) that have been grouped together into one OU because of the similar characteristics of material disposed and geographic location. An abandoned sewage treatment plant (STP) is adjacent to the site. The Agan Street Dump reportedly received inert material such as construction debris and trash. Sludge from the former STP was also reportedly dumped onto the ground surface of Site 43; however, it is not clear when disposal operations took place.

FIGURE 8-15
IRP Site 43, Operable Unit 6



Previous investigations are listed in **Table 8-21** and the LUC Summary is presented in **Table 8-22**.

TABLE 8-21
Previous Investigations Summary, IRP Site 43

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The IAS concluded that waste quantities at the site, regardless of their nature, were minor; therefore, a Confirmation Study was not recommended. However, the USEPA requested an additional investigation to determine whether hazardous waste contamination existed.
SI (1991)	1991	An SI was conducted to determine the presence or absence of hazardous waste contamination. Field activities included soil, groundwater, surface water, and sediment sampling. The SI identified PAHs in surface soil, carbon disulfide and metals in groundwater, benzoic acid and metals in surface water, and PAHs and pesticides in sediment. Further characterization as part of an RI/FS was recommended.
RI/FS (Baker, 1995; 2002)	1995 - 2002	To further assess contamination at the site an RI field investigation was initiated. Field activities included a site survey and soil, groundwater, surface water, and sediment sampling. Samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Exploratory test pits completed as part of the soil investigation identified miscellaneous debris associated with the disposal of construction material from the nearby housing area. Potential human health risks were identified for current and future receptors due to exposure to soils. Minimal potential ecological risks were identified. Based on the findings of the RI, a removal action for PAH-contaminated soil was recommended in the revised OU 6 FS.
IRA (1995; 2003)	1995	IRAs were conducted at Site 43 for surficial metallic debris and PAH-contaminated soil in 1995 and 2003, respectively. Approximately 7.3 tons of metallic debris was removed for recycling and a total of 1,477 tons of soil was excavated.
PRAP and ROD (Baker, 2002; 2005)	2002 - 2005	The preferred alternative, Excavation and Off-Site Disposal and LUCs for soil, for Site 43 was presented in the PRAP in 2002. A public notice of availability, public comment period, and public meeting were held to solicit community input on the preferred alternative. The Excavation and Off-Site Disposal for soil was completed in 2003 during the IRA. Therefore, LUCs for soil were selected as the remedy for Site 43 as documented in the ROD for OU 6, signed in July 2005.
RIP and IRACR (CH2M HILL, 2007)	2005 - 2007	Soil LUCs were implemented in 2005, and an IRACR was completed to document the RIP.

TABLE 8-22
Land Use Control Summary, IRP Site 43

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	0.14	September 2005	February 2007
Intrusive Activities Control Boundary (Soil)	13.2		

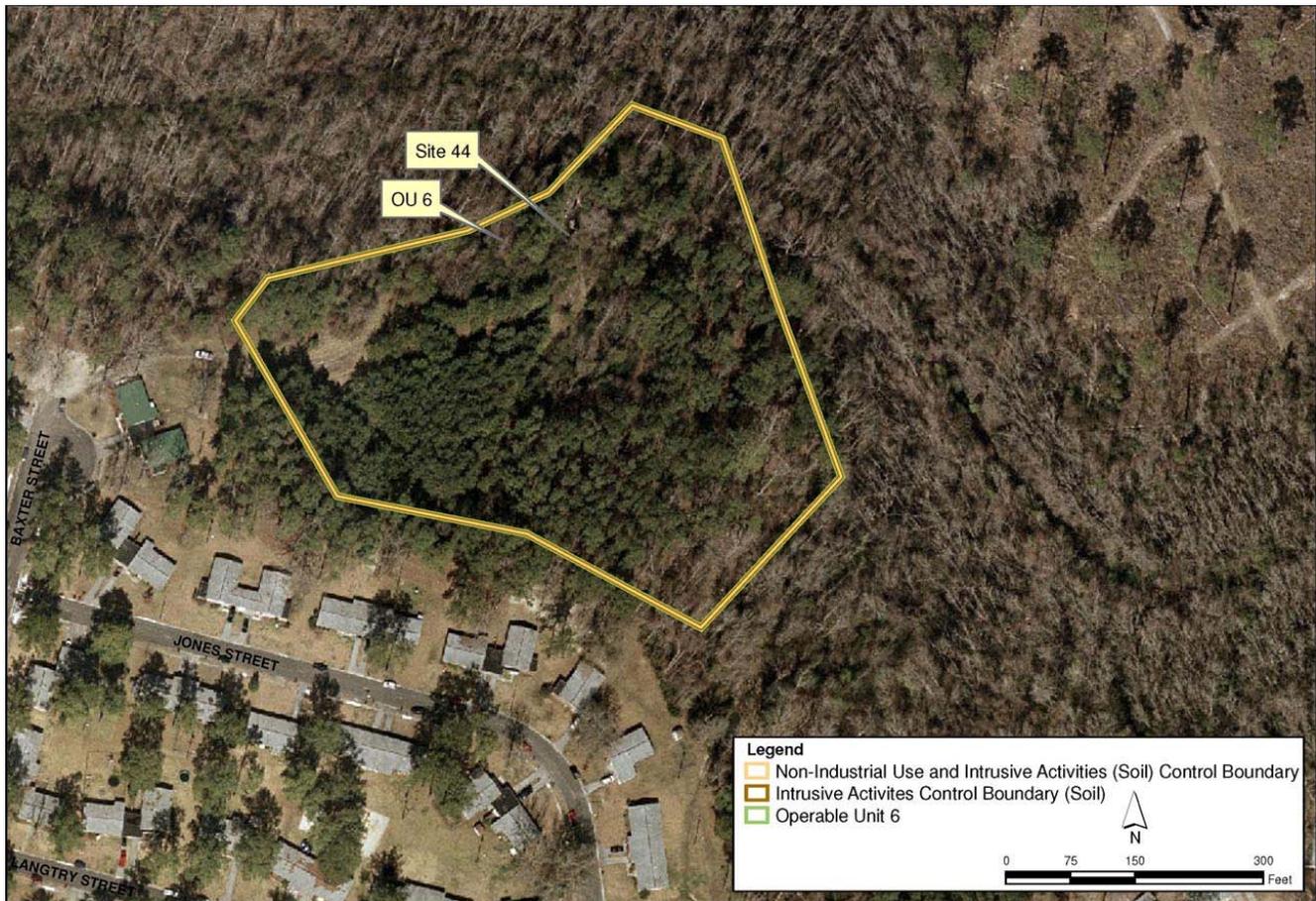
8.1.11.1 Future Activities

LUCs will be maintained to prohibit soil intrusive activities and non-industrial use within the extent of former soil removal action areas where PAHs remain in soil above levels that allow for UU/UE.

8.1.12 Site 44 (OU 6)—Jones Street Dump

Site 44, the Jones Street Dump, encompasses approximately 6 acres within OU 6 in the operations area of MCAS New River (**Figure 8-16**). OU 6 consists of four sites (Sites 36, 43, 44, and 54) that have been grouped together into one OU because of the similar characteristics of material disposed and geographic location. Site 44 was reportedly in operation during the 1950s. Although the quantity of waste is not known, debris, cloth, lumber, and paint cans were reportedly disposed of at the site.

FIGURE 8-16
IRP Site 44, Operable Unit 6



Previous investigations are listed in **Table 8-23** and the LUC Summary is presented in **Table 8-24**.

TABLE 8-23
Previous Investigations Summary, IRP Site 44

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Due to the negligible quantity of inert material reportedly disposed at Site 44, a Confirmation Study was not recommended. However, the USEPA later requested an additional investigation to determine whether hazardous waste contamination existed.
SI (1991)	1991	An SI was conducted to verify the presence or absence of contamination. Field activities included soil, groundwater, surface water, and sediment sampling. The analytical results identified PAHs, pesticides, and metals in soil; VOCs, PAHs, and metals in groundwater; VOCs and metals in surface water; and pesticides and metals in sediment. Based on these results, an RI was proposed.
RI/FS (Baker, 1995 and 2002)	1995 - 2002	An RI was completed to characterize the nature and extent of contamination and potential impacts to human health and the environment. Field activities included a site survey and soil, groundwater, surface water, and sediment sampling. No unacceptable risks to human health or the environment were identified, and therefore no action was recommended in the FS.
PRAP and ROD (Baker, 2002 and 2005)	2002 - 2005	Although no action was recommended during the FS, for conservativeness, MCIEAST-MCB CAMLEJ identified potential risks based on the OU 6 sites formerly used for waste disposal. Therefore, LUCs were the preferred alternative presented in the PRAP in 2002. A public notice of availability, public comment period, and public meeting were held to solicit community input on the preferred alternative. LUCs were selected as the remedy for Site 44 as documented in the ROD for OU 6, signed in July 2005.
RIP and IRACR (CH2M HILL, 2007)	2005 - 2007	An RD was completed for OU 6 in September 2005 to document the LUC implementation. A Final OU 6 IRACR was completed in August 2007 to document the RIP at Site 44 (LUCs).

TABLE 8-24
Land Use Control Summary, IRP Site 44

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Intrusive Activities Control Boundary (Soil)	5.6	September 2005	February 2007
Non-Industrial Use Control Boundary	5.6		

8.1.12.1 Future Activities

LUCs will be maintained to prohibit soil intrusive activities and non-industrial use in the former waste disposal area.

8.1.13 Site 54 (OU 6)—Crash Crew Fire Training Burn Pit

Site 54, the Crash Crew Fire Training Burn Pit, covers approximately 1 acre near the southwest end of Runway 5-23 within the MCAS New River operations area (**Figure 8-17**). OU 6 consists of four sites (Sites 36, 43, 44, and 54) that have been grouped together into one OU because of the similar characteristics of material disposed and geographic location. The site has served as the fire training burn pit since the mid-1950s. The former Crash Crew Fire Training Burn Pit was 90 feet in diameter and situated at the center of this site. Originally, fire training was conducted on the ground surface within a bermed area using jet propulsion (JP)-type fuel, which was stored in an 8,000-gallon UST, northwest of the burn pit. An OWS, located approximately 100 feet southeast of the burn pit, was used for temporary storage and collection of the spent fuel. In 1975, a lined burn pit was constructed and was used until 1999. Beginning in August 2000, the burn pit was converted to a training area that employs clean-burning fuels with operational and engineering controls. It is estimated that nearly 500,000 gallons of POL may have been used at Site 54.

FIGURE 8-17
IRP Site 54, Operable Unit 6



Previous investigations are listed in **Table 8-25** and the LUC Summary is presented in **Table 8-26**.

TABLE 8-25
Previous Investigations Summary, IRP Site 54

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. It was concluded that waste fuels, oils, and solvents may remain in the soil and recommended an additional investigation to verify the presence of hazardous wastes.
Confirmation Study (1987)	1984 - 1987	A Confirmation Study was conducted to verify the presence or absence of hazardous waste. Field activities included groundwater and sediment investigations. Due to the presence of low levels of petroleum compounds, further characterization was recommended.
RI (Baker, 1995 and 2002)	1995 - 2002	An RI was conducted to further characterize contamination at the site. Field activities included a site survey and soil and groundwater sampling. The RI identified potential risks from lead, SVOCs, and VOCs in groundwater. A Revised FS (the original FS only included Site 36) was completed for OU 6. Based on the findings of the RI, the FS recommended no action at Site 54.
Post-RI Monitoring (2002)	1998 - 2002	The post-RI monitoring program at Site 54 began in 1998 consisting of quarterly groundwater sampling. Based on the groundwater data collected following the IRA conducted in 2001, it was determined that lead, SVOCs and VOCs no longer posed an impact to the groundwater. Subsequently, groundwater monitoring was discontinued in 2002.
IRA (2001)	2001	An IRA for the UST, POL-contaminated soils, and construction debris from the former burn pit was completed at Site 54 in 2001. The removal area was 128 feet long by 96.5 feet wide and extended 9 feet bgs to the depth of groundwater. Construction activities also included a new concrete lined fire training area and two propane tanks.
FS (Baker, 2002)	2002	Based on the results of the IRA and post-RI groundwater monitoring, it was determined that lead, SVOCs, and VOCs no longer impacted the groundwater; therefore, no action was identified during the FS.
PRAP and ROD (Baker, 2002 and 2005)	2002 - 2005	Although no action was recommended during the FS, for conservativeness, MCIEAST-MCB CAMLEJ identified potential risks based on the OU 6 sites formerly used for waste disposal. Therefore, LUCs was the preferred alternative presented in the PRAP in 2002. A public notice of availability, public comment period, and public meeting were held to solicit community input on the preferred alternative. LUCs were selected as the remedy for Site 54 as documented in the ROD for OU 6, signed in July 2005.
RIP and IRACR (CH2M HILL, 2007)	2005 - 2007	An RD was completed for OU 6 in 2005 to document the LUC implementation and maintenance actions at Site 54. A Final OU 6 IRACR was completed to document the RIP (LUCs).

TABLE 8-26
Land Use Control Summary, IRP Site 54

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	0.29	September 2005	February 2007
Intrusive Activities Control Boundary (Soil)	0.29		

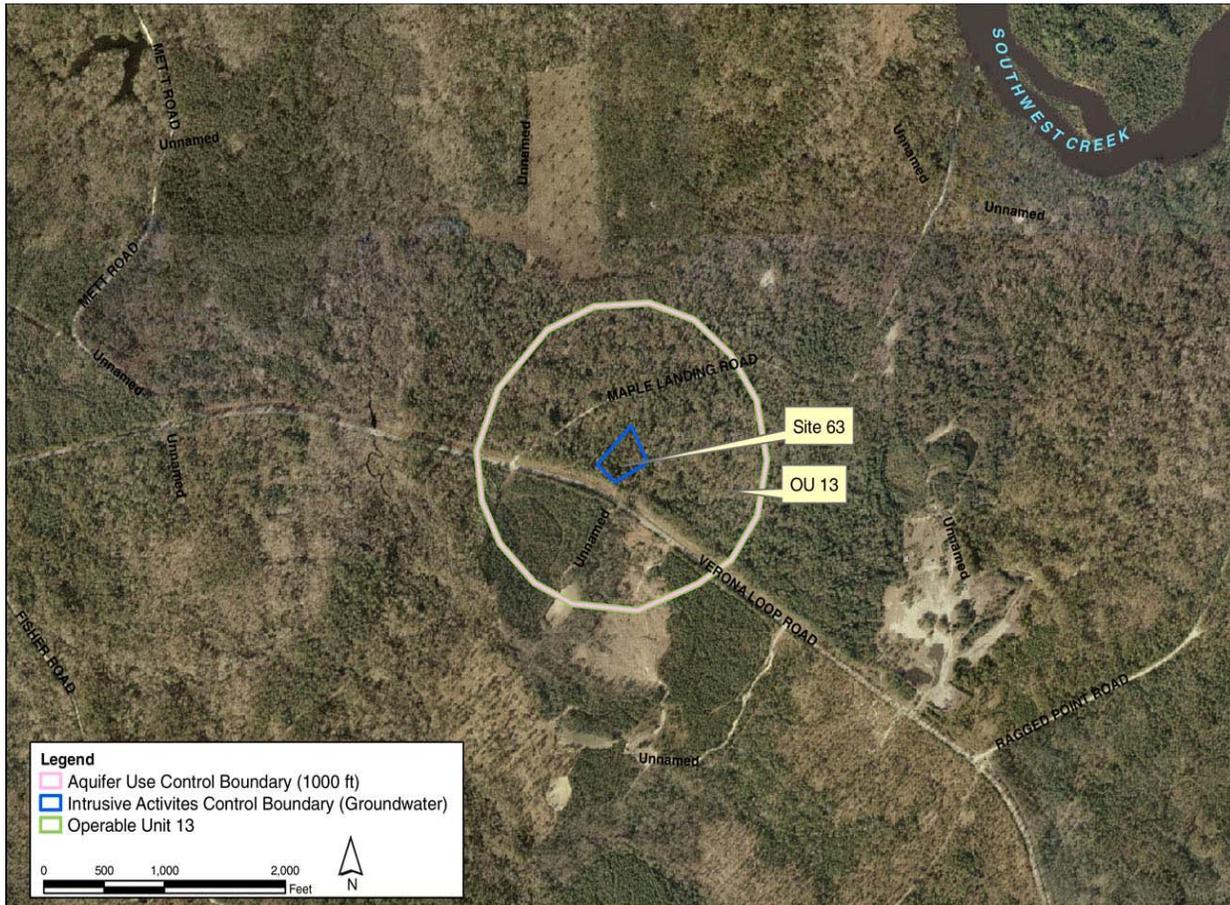
8.1.13.1 Future Activities

LUCs will be maintained to prohibit soil intrusive activities and non-industrial use.

8.1.14 Site 63 (OU 13)—Verona Loop Dump

Site 63, the Verona Loop Dump, encompasses approximately 5 acres, nearly 2 miles south of the MCAS New River operations area (**Figure 8-18**). The area reportedly received bivouac wastes generated during training exercises. No hazardous wastes were reportedly disposed of at Site 63. Currently, training exercises, maneuvers, and recreational hunting frequently take place in the area.

FIGURE 8-18
IRP Site 63, Operable Unit 13



Previous investigations are listed in **Table 8-27** and the LUC Summary is presented in **Table 8-28**.

TABLE 8-27
Previous Investigations Summary, IRP Site 63

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The quantities of waste reportedly disposed of at the site, whether hazardous or not, were insignificant and it was concluded that no further assessment was necessary. However, the USEPA requested an additional investigation to determine whether hazardous waste contamination existed.
SI(Baker, 1994)	1994	An SI was conducted to determine whether hazardous waste contamination existed. Field activities included soil, groundwater, surface water, and sediment sampling for VOCs, SVOCs, pesticides/PCBs, and metals. Fill materials were encountered in soils, confirming that disposal of waste materials occurred at the site. The analytical results identified metals and organic compounds detected in soil and groundwater samples. Based on these findings, the SI recommended further evaluation.

Previous Investigation/Action	Date	Activities
RI (Baker, 1996)	1995-1996	An RI was conducted to evaluate the nature and extent of contamination and potential risks to human health and the environment. Field activities consisted of a site survey and soil, groundwater, surface water, and sediment sampling. Samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. No unacceptable human health or ecological risks were identified.
PRAP and ROD (Baker, 1996 and 1997)	1996 - 1997	A PRAP was issued to solicit public input on the preferred alternative (no action) and a public meeting was held. The Final ROD was issued and signed in April 1997.
RIP	2001 - 2002	Although the ROD did not require RA, for conservativeness the Base implemented LUCs in 2001 and updated them in 2002.
ESD (CH2M HILL, 2012)	2012	An ESD was submitted in 2012 to document the LUCs as the remedy including the addition of a non-industrial use control and an intrusive activities control boundary for soil to prevent exposure to waste in-place.

TABLE 8-28
Land Use Control Summary, IRP Site 63

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Intrusive Activities Control Boundary (Soil)	5	Proposed	--
Non-Industrial Use Control Boundary (Soil)	5	July 2002	February 2002
Intrusive Activities Control Boundary (Groundwater)	2		
Aquifer Use Control Boundary (1,000 feet)	100.1		

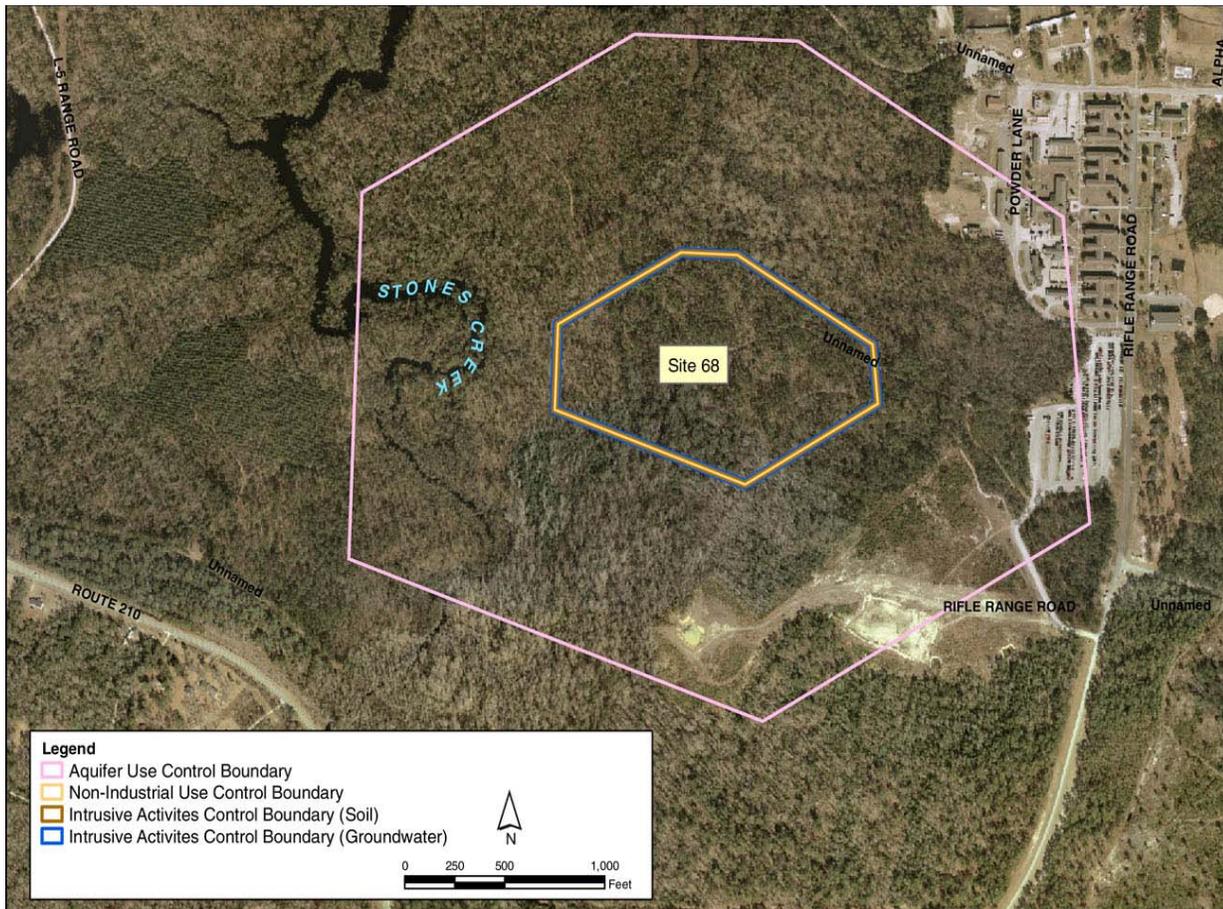
8.1.14.1 Future Activities

LUCs will remain in-place to restrict groundwater intrusive activities and aquifer use and the intrusive activities control and non-industrial use control LUCs will be implemented in FY 2013.

8.1.15 Site 68 (Pre-RI)—Rifle Range Dump

Site 68, the Rifle Range Dump, covers approximately 4 acres and is located in the Rifle Range Area of the Base (**Figure 8-19**). From 1942 to 1972, this area was used as a disposal site for various types of wastes, including garbage, building debris, waste treatment sludge, and solvents. The depth of the fill area is approximately 10 feet and the amount of material deposited has been estimated to be 100,000 yd³. The amount of solvents disposed at Site 68 was estimated to be between 1,000 and 2,000 gallons.

FIGURE 8-19
IRP Site 68



Previous investigations are listed in **Table 8-29** and the LUC Summary is presented in **Table 8-30**.

TABLE 8-29
Previous Investigations Summary, IRP Site 68

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Organic compounds were identified in potable supply wells, located upgradient from the site. Even though these wells are located upgradient from the site, it was suspected that continuous pumping may have drawn contaminants to the wells. Based on these findings, the IAS recommended an additional investigation.
Site Summary Report (ESE, 1990)	1984 - 1990	Monitoring wells were installed and groundwater samples were collected for VOCs analysis from the monitoring wells and potable supply wells in 1984 and again in 1986. No constituents of potential concern (COPCs) were detected in groundwater samples collected from these wells.
Pre-RI Screening Study (Baker, 1998)	1995 - 1998	A Pre-RI screening study was conducted to determine whether contamination was present at the site. Field activities included soil, groundwater, surface water, and sediment sampling. Pesticide/PCBs were detected in soil samples, VOCs and metals were detected in groundwater samples, and pesticides and metals were detected in sediment. No unacceptable human health risks were identified and no further RA was recommended.
NFA Decision Document (DD) (2001)	2001	The Final NFA DD was completed May 8, 2001, which stated that all investigations or activities for the IRP for Site 68 are complete.
RIP	2001 - Present	Although no RA was required, for conservativeness, the Base implemented LUCs in 2001 and updated them in 2002, due to the site's history as a dump.

TABLE 8-30
Land Use Control Summary, IRP Site 68

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	26.9	July 2002	February 2007
Intrusive Activities Control Boundary (Soil)	26.9		
Intrusive Activities Control Boundary (Groundwater)	26.9		
Aquifer Use Control Boundary (1,000 feet)	202.8		

8.1.15.1 Future Activities

LUCs will be maintained to prohibit soil intrusive activities and non-industrial use, groundwater intrusive activities, and aquifer use.

8.1.16 Site 73 (OU 21)—Courthouse Bay

Site 73, the Amphibious Vehicle Maintenance Facility covers approximately 14 acres located along the northwest shore of Courthouse Bay (**Figure 8-20**). The Amphibious Vehicle Maintenance Facility was constructed in 1946. Maintenance activities were historically conducted in the former Building A3 located southeast of the current Building A47. Used motor oil and battery acid resulting from maintenance activities were reportedly discharged directly to the ground surface northeast of former Building A3. Between 1983 and 1989, Building A3 was demolished and a new building was constructed. Based on the nature of maintenance activities conducted and CVOCs identified in groundwater, it is likely that other hazardous substances including chlorinated solvents, were also disposed of in this area. Ten USTs containing various petroleum hydrocarbon products (diesel fuel, gasoline, and/or waste oil) were formerly located at Site 73 to support the operations. All USTs except A47-1 have been removed (approximate location of A47-1 is within the footprint of the former maintenance building). UST A47-1 is currently not in use and is believed to be closed in-place. NCDENR issued NFA for five of the USTs (A47-2, A47-4, A47-5, A-2, and A-10/SA26). Investigations are currently being completed under the UST Program for four of the USTs (A47-3, UST-A47/SA21, A12-1, and A12-2). Significant development of the Courthouse Bay area surrounding Site 73 has occurred in the last 10 to 15 years and the current land use is industrial.

FIGURE 8-20
IRP Site 73, Operable Unit 21



Previous investigations are listed in **Table 8-31** and the LUC Summary is presented in **Table 8-32**.

TABLE 8-31
Previous Investigations Summary, IRP Site 73

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCI-EAST-MCB CAMLEJ. A review of historical records, aerial photographs, and field inspections found that an estimated 400,000 gallons of waste oil was discharged directly onto the ground surface. Approximately 20,000 gallons of waste battery acid was also reportedly disposed in the area. Therefore, Site 73 was recommended for additional study.
Confirmation Study (ESE, 1985)	1985	To confirm the presence or absence of contamination groundwater samples were collected in areas where washing had occurred, or locations of existing or suspected former USTs. Results indicated that shallow groundwater was impacted by VOCs and metals.
UST Investigations (1993)	1991 - 1993	Between 1991 and 1993, several UST investigations were completed, which included the collection of soil and groundwater samples in the vicinity of several USTs at the site. Analytical results identified TPH and benzene, toluene, ethylbenzene, and total xylenes (BTEX) compounds in soil and groundwater.
Preliminary Investigation (1994)	1994	A soil gas survey and groundwater screening program was conducted. The analytical results identified nine AOCs at Site 73, segregated by potential sources of contamination.
RI (Baker, 1997)	1997	Surface soil, subsurface soil, groundwater, sediment, and surface water samples, and benthic and aquatic species were collected to evaluate the nature and extent of contamination and potential risks to human health and the environment. Several VOCs were identified as COCs in groundwater and the HHRA identified potential risk to future receptors. The ERA identified a potential risk to terrestrial receptors due to contaminants in soil and surface water.
SGI and FS (Baker, 1998)	1998	Groundwater sampling was conducted for further delineation. Results indicated that natural attenuation was occurring. The shallow benzene plume was stable and decreasing in concentration; and the shallow CVOC AOC had not changed in shape or size but was not fully delineated. The SGI concluded that additional delineation was necessary and recommended a NAE. Remedial alternatives were developed and presented in an FS to mitigate the potential for direct exposure and to treat impacted groundwater.
Groundwater Modeling Report (Baker, 1998)	1998	Groundwater modeling was conducted to predict the fate and transport of CVOCs. The results indicated that natural degradation was occurring in the deep aquifer zone and that intermediate and deep groundwater was discharging to Courthouse Bay and the New River.
LTM Optimization Report (CH2M HILL, 2005)	2000-2005	LTM of CVOCs and benzene in shallow, intermediate, and deep groundwater was conducted to verify the plumes were stable and not expanding. Because of ongoing investigations at Site 73 LTM was discontinued.
NAE Study (CH2M HILL, Baker, CDM, 2002)	2002	A study was conducted to evaluate the extent and rate of natural attenuation. Benzene was the only fuel-related compound detected in the shallow and intermediate aquifer zones; it was degrading by natural, <i>in situ</i> processes and was not discharging to Courthouse Bay. Reduced levels of TCE, cis-1,2-dichloroethene (DCE), and VC and their patterns of occurrence in the shallow aquifer zone, were indicative of natural attenuation, but the potential for VC to discharge into Courthouse Bay was identified. TCE, cis-1,2-DCE, and VC were identified in the intermediate aquifer zone but were considered not likely discharging to Courthouse Bay. Additional delineation was recommended to verify the extent of impacts.

Previous Investigation/Action	Date	Activities
Technology Evaluation (Baker, 2003)	2003	Potential remedial options were evaluated for treatment of intermediate groundwater with TCE concentrations above 1,000 micrograms per liter ($\mu\text{g/L}$) ("hot spot" area). Five treatment technologies (ISCO using permanganate, abiotic reduction using colloidal iron injection, ERD promoted by Hydrogen Release Compound (HRC), bio-augmentation, sparging with hydrogen, cometabolic sparging with air and propane, or sparging with ozone using horizontal wells) were evaluated based on effectiveness, site constraints, depth of the contaminant mass, presence of underground utilities, land use, and cost. Hydrogen sparging delivered via a HDD well was recommended.
Hydrogen Sparging Pilot Study (MicroPact, Baker, 2006)	2003 - 2006	A 900-foot-long horizontal well with 400 feet of screened area was installed to a depth of 85 feet bgs in the "hot spot" area. Approximately 40 hydrogen injections were completed in 2004 and 2005. The average TCE concentration decreased by approximately 35 percent and the average total VOC concentration decreased by approximately 8 percent.
Phase 2 Pilot Study (AGVIQ, CH2M HILL, 2008)	2008	A pilot study was conducted to evaluate air and ozone sparging for removal of CVOCs present in the "hot spot" area using the existing HDD well. Results indicated that TCE concentrations in the intermediate aquifer zone decreased by 75 percent with ERD and sparging being the primary treatment mechanisms.
SRI (CH2M HILL, 2009)	2006 - 2009	An SRI was completed to summarize the nature and extent of impacts and potential risks to human health and the environment. Primary COCs identified were VOCs (TCE, cis-1,2-DCE, 1,1-DCE, VC, and benzene) within the Castle Hayne aquifer. Soil samples were collected to delineate the extent of petroleum-related impacts. No significant source of free-phase petroleum was identified; however, an area of petroleum hydrocarbon-impacted soil was delineated in the area corresponding with historic waste oil discharge. The source of contamination was likely from multiple surficial spills associated with maintenance activities that occurred before the concrete-paved parking area was constructed.
FS (CH2M HILL, 2009)	2009	Potential remedial alternatives were identified to address CVOCs in groundwater and petroleum hydrocarbon impacted soil. Four remedial alternatives were selected for detailed comparative analysis: (1) no action, (2) MNA, (3) ERD using existing horizontal well and downgradient ERD injections, and (4) air sparging with downgradient ERD injections.
PRAP and ROD (CH2M HILL, 2009)	2009	A PRAP was issued in April 2009 to solicit public input on the preferred alternative (in situ air sparging using the horizontal well, downgradient ERD injections, LTM for MNA, and LUCs) and a public meeting was held. Questions received during the public meeting were general inquiries and no comments were received during the public comment period. The Final ROD was issued and signed in November 2009. The site CSM is shown on Figure 8-21 .
Basewide Vapor Intrusion Evaluation (CH2M HILL, AGVIQ, 2009 and CH2M HILL, 2011)	2007 – 2011	Site 73 was included in the phased Basewide vapor intrusion evaluation to determine if complete or significant exposure pathways exist for vapor intrusion into buildings. No unacceptable risks were identified from indoor air related to vapor intrusion; therefore, it was concluded that vapor intrusion is not a current significant pathway of concern for any of the buildings located in the vicinity of Site 73. However, during operation of the air sparge system, subslab soil gas and indoor air sampling was conducted to evaluate the potential for vapor intrusion. The air sparge system was discontinued in 2012 and follow-up subslab soil gas monitoring is being conducted. If new buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed.

Previous Investigation/Action	Date	Activities
RIP and IRACR (Shaw, 2011)	2009-2011	The RD was prepared for in situ air sparging by the horizontal well, downgradient ERD injections, LTM and MNA, and LUCs. In FY 2010, the horizontal well was initiated for air sparging to treat the highest VOC concentrations in groundwater and LUCs were finalized to prohibit aquifer use and exposure to soil until cleanup levels for UU/UE are achieved. Quarterly groundwater LTM and MNA for analysis of VOCs and NAIPs was initiated in 2010 to evaluate the effectiveness of treatment and monitor plume migration. ERD injections were completed in June 2011 and an IRACR was submitted. The air sparge system was discontinued in 2012 based on TCE concentrations in groundwater reduced below the cleanup level, the ERD biobarrier in-place, and the potential for air sparging to impact vapor intrusion at adjacent buildings.

TABLE 8-32
Land Use Control Summary, IRP Site 73

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Intrusive Activities Control Boundary (Soil)	0.8096	September 2010	August 2010
Aquifer Use Control (1,000 feet)	47.063		

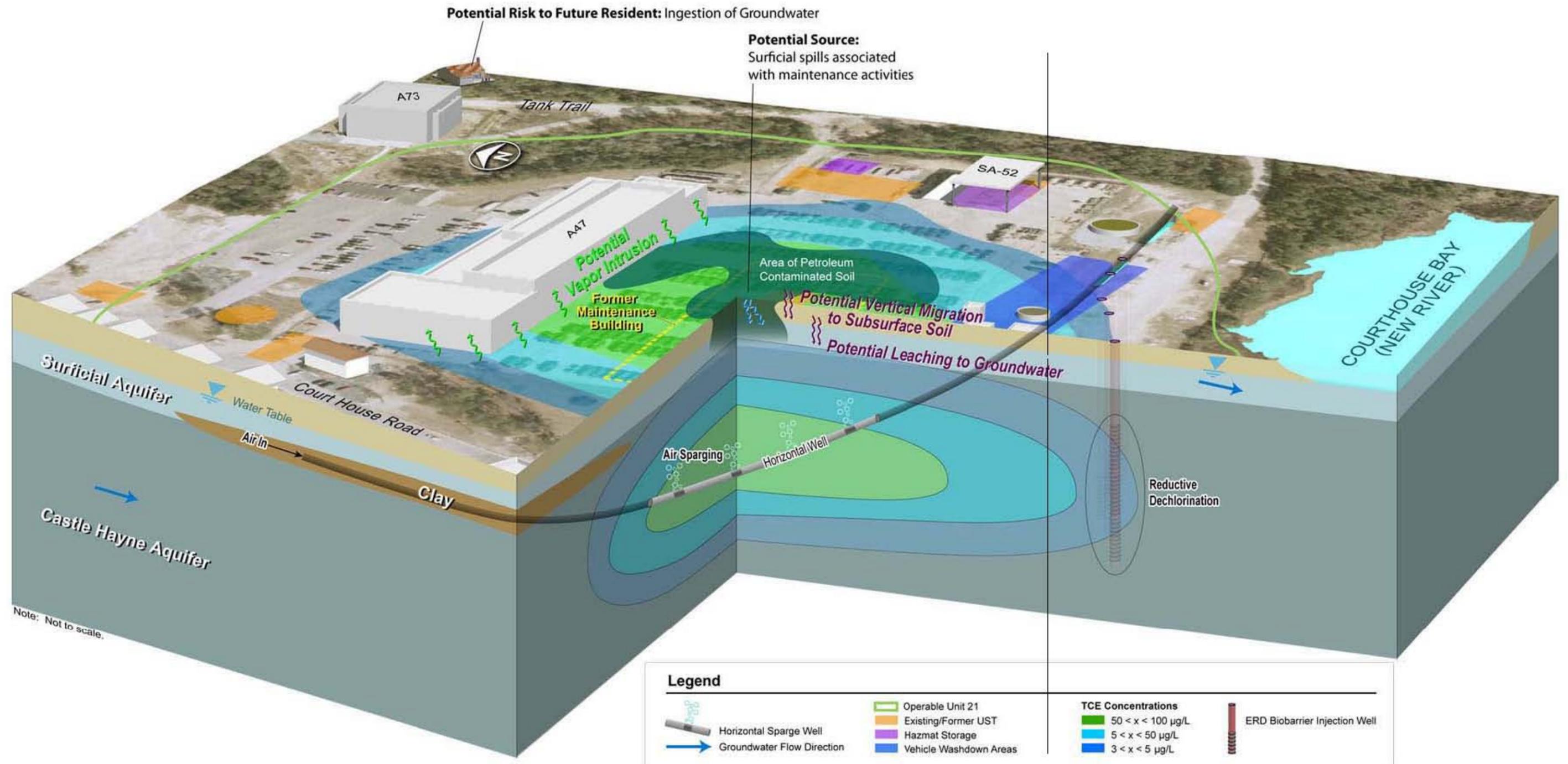
8.1.16.1 Future Activities

MNA will be continued to monitor reduction and migration of VOC contamination. LUCs will be maintained to prohibit aquifer use until cleanup levels are achieved. LUCs are also in-place to prohibit intrusive activities where soil contamination remains in-place above concentrations that allow for UU/UE.

If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed. Base Master Planning maintains current groundwater plume data in GIS, and all construction projects on-Base go through environmental review.

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FIGURE 8-21
 Site 73 Conceptual Site Model
 FY 2013 Site Management Plan
 MCIEAST-MCB CAMLEJ
 North Carolina

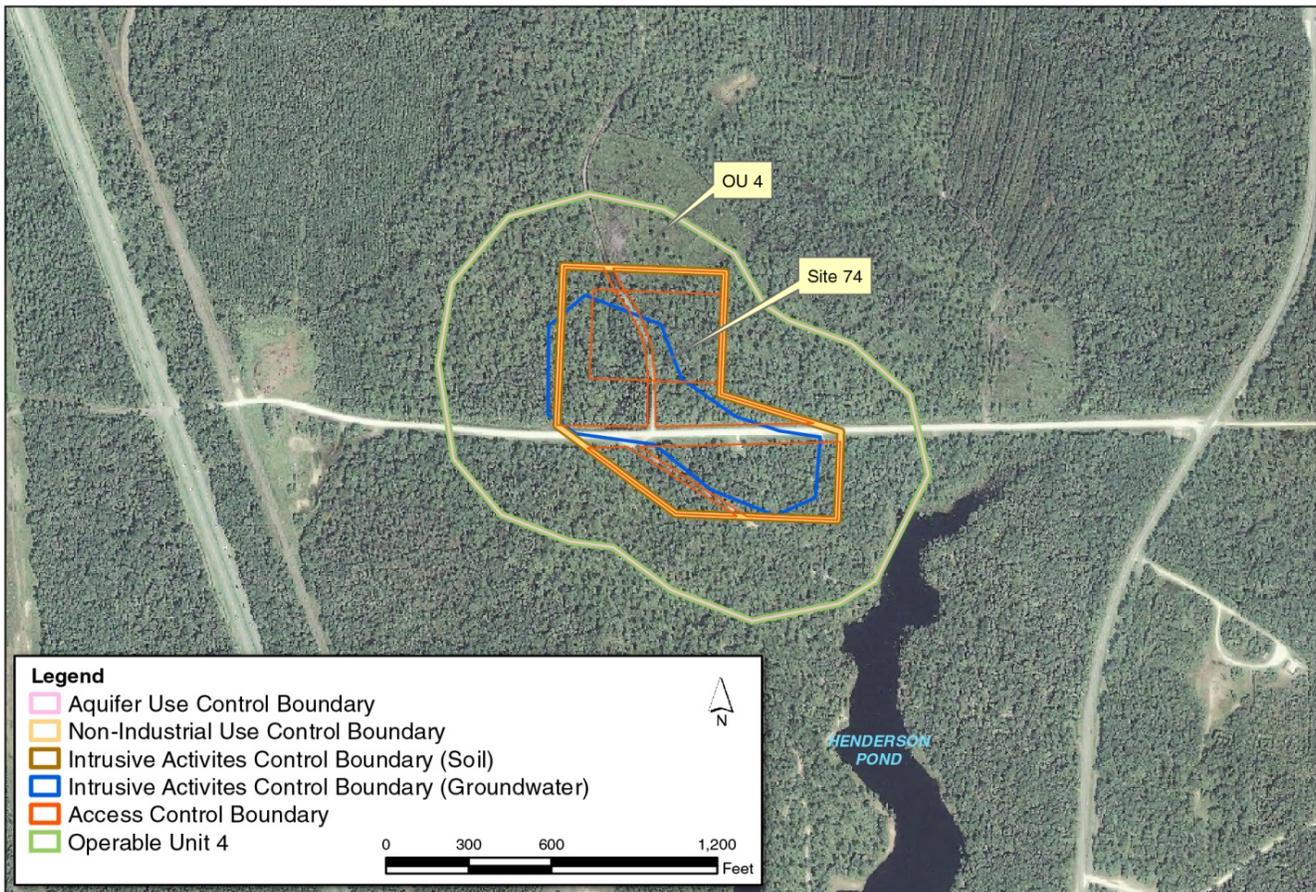


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8.1.17 Site 74 (OU 4)—Mess Hall Grease Dump Area

Site 74, the Mess Hall Grease Dump, was used from the early 1950s through the early 1960s and covers approximately 24 acres within OU 4 (**Figure 8-22**). OU 4 consists of two sites (Sites 41 and 74) that have been grouped together based on the unique characteristic of suspected waste. Grease from the mess hall at Site 74 was reportedly disposed of in trenches. It was also reported that drums containing PCBs and pesticide-soaked bags were buried near the grease pit. Estimates of quantities include 1,100 gallons of PCB oil, 50 to 500 gallons of DDT, and 2,200 gallons of drummed pesticides. One internal memorandum reports chemical training agents in the form of test kits were reportedly disposed at Site 74. A former Pest Control Area was also reportedly located in the southeastern portion of the Site.

FIGURE 8-22
IRP Site 74, Operable Unit 4



Previous investigations are listed in **Table 8-33** and the LUC Summary is presented in **Table 8-34**.

TABLE 8-33
Previous Investigations Summary, IRP Site 74

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The IAS concluded that disposal of industrial wastes and pesticides could impact groundwater and recommended an additional investigation to verify the presence of hazardous wastes.
Confirmation Study (1987)	1984 - 1987	The Confirmation Study included groundwater, surface water, and sediment investigations. O&G and phenols were detected in groundwater, surface water, and sediment samples. VOCs, metals, and one nitroaromatic were detected in groundwater samples.

Previous Investigation/Action	Date	Activities
RI/FS (Baker, 1995)	1993 - 1995	To further characterize the nature and extent of contamination an RI was conducted. Field activities included a geophysical investigation, soil, groundwater, surface water, and sediment sampling, and an aquatic and ecological survey. The geophysical investigation indicated that the site contained a significant amount of buried construction debris. Although there was reported history of CA disposal, no chemical surety degradation compounds were detected in soil. Potential human health risks were identified due to exposure to metals in groundwater and seep surface water. Minimal potential ecological risks were identified for aquatic receptors at Site 41. An FS was prepared which developed and screened remedial alternatives for addressing soil, groundwater, and surface water contamination.
PRAP and ROD (Baker, 1995)	1995	A PRAP was issued to solicit public input on the preferred alternative (LTM to monitor contaminant migration and LUCs) and a public meeting was held. The Final ROD was issued and signed in December 1995.
RIP and RACR (CH2M HILL, 2006)	1997 - 2011	LTM was initiated in 1997 and included sampling of five monitoring wells and eight surface water and sediment locations twice a year for analysis of VOCs, metals, TDS, and TSS. In 2005 the groundwater cleanup levels were achieved and LTM was discontinued. LUCs were implemented in 2001 and updated in 2002. A RACR was prepared to document the completion of LTM. A fence was installed around the perimeter of the site in 2008 to restrict access and additional fencing was installed in 2011 along both sides of the access road leading to Henderson Pond.
Confirmatory Sampling (CH2M HILL, 2012)	2012	Soil samples were collected from beneath the access road area through Site 74 leading to the proposed Henderson Pond and Hickory Pond recreational area to evaluate potential risks to human health and the environment. The samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. The HHRS indicated that exposure to soil by the most likely potential receptors, construction workers, was not expected to result in any unacceptable risks. Future residential (and potentially recreational) exposure to SVOCs and pesticides in soil may result in unacceptable risk to human health. Additionally, ecological exposure to pesticides/PCBs soil may pose a potential risk. However, any exposures other than by construction workers are unlikely because the soil is beneath 0.5 to 1 foot of gravel and LUCs are in place to prevent intrusive activities and residential development.

TABLE 8-34
Land Use Control Summary, IRP Site 74

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	23.8	July 2002	February 2002
Intrusive Activities Control Boundary (Groundwater)	13.9		
Intrusive Activities Control Boundary (Soil)	23.8		
Aquifer Use Control Boundary (500 feet)	71.2		
Access Control Boundary	20.5	August 2011	

8.1.17.1 Future Activities

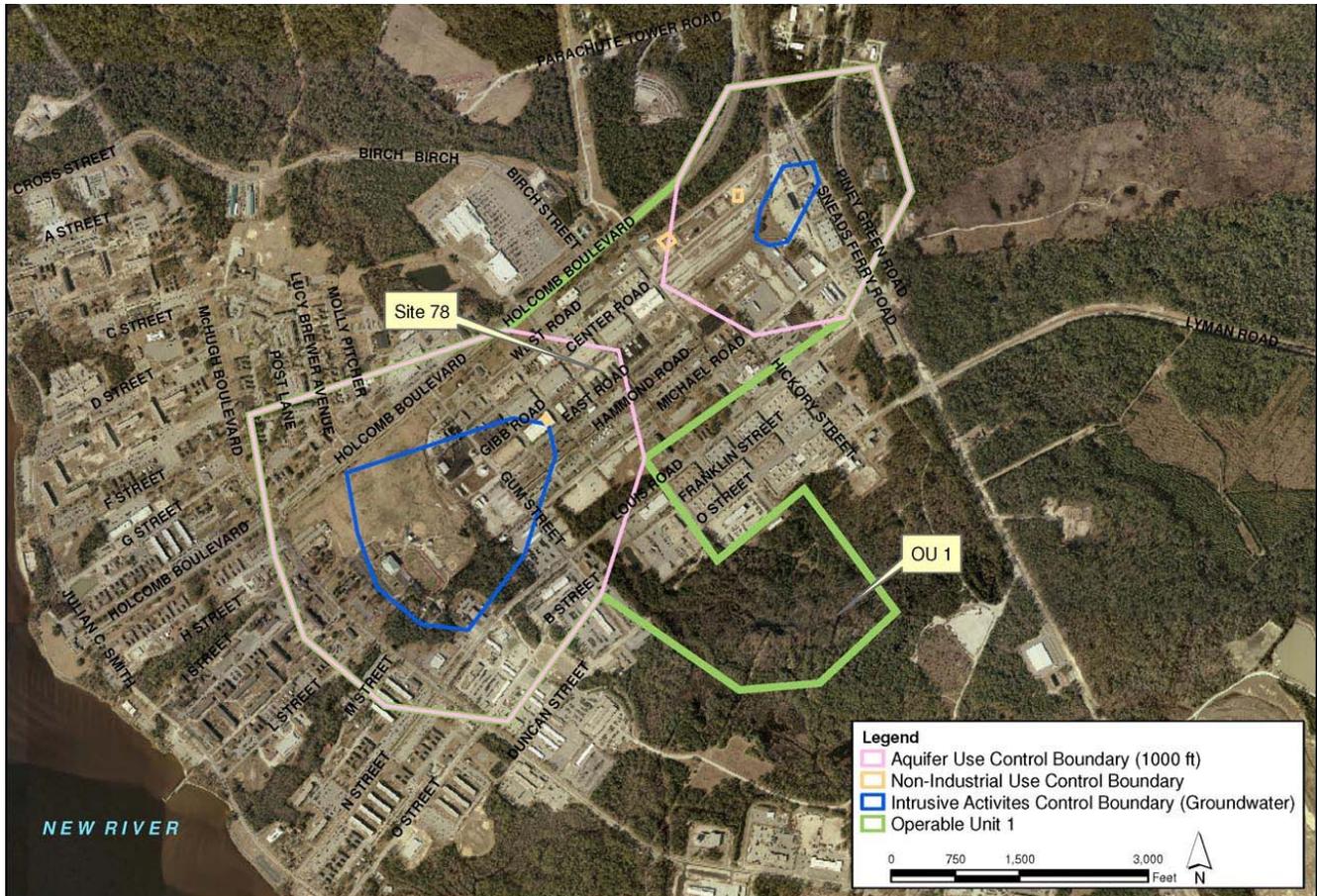
The LUCs to prohibit intrusive activities, aquifer use, and non-industrial use at the site are protective of human health and the environment because exposure to waste that could result in unacceptable risks are being controlled. Perimeter fencing also restricts access to the waste area.

8.1.18 Site 78 (OU 1)—Hadnot Point Industrial Area

Site 78, the HPIA, covers approximately 590 acres and is located within OU 1, one mile east of the New River and two miles south of State Route 24 (**Figure 8-23**). OU 1 consists of three sites (Sites 21, 24, and 78) that have been grouped together into one OU because of their proximity to one another. The HPIA, constructed in the late 1930s, was the first developed area at MCIEAST-MCB CAMLEJ. The HPIA consists of maintenance shops, warehouses, painting shops, printing shops, auto body shops, and other small industrial facilities. Due to the industrial nature of the site, many spills and leaks have occurred over the years. Most of these spills and leaks have consisted of petroleum-related products and solvents from USTs and drums.

FIGURE 8-23

IRP Site 78, Operable Unit 1



Previous investigations are listed in **Table 8-35** and the LUC Summary is presented in **Table 8-36**.

TABLE 8-35
Previous Investigations Summary, IRP Site 78

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The IAS recommended additional investigations based on historical operations in HPIA.
Interim RI/Interim FS/Interim PRAP/Interim ROD for Surficial Aquifer (Baker, 1992)	1984 - 1992	Several investigations were conducted to evaluate the nature and extent of the threat to human health and the environment caused by the release or threatened release of hazardous substances, pollutants, or contaminants. Field events included a geophysical survey and groundwater and soil sampling. Elevated levels of organic compounds (primarily PCBs, pesticides, and VOCs) and inorganic compounds (metals) were identified throughout OU 1 in various media. Potential unacceptable human health risks were identified due to VOCs in groundwater. The preferred alternative for addressing the shallow groundwater VOC contamination was groundwater extraction and treatment systems to prevent migration of the VOC plumes in the shallow groundwater at Site 78 North and Site 78 South and LUCs to prevent exposure to groundwater. The Interim ROD was signed on September 23, 1992.
RI/FS and PRAP and ROD (Baker, 1994)	1984 - 1994	Additional investigations and risk assessments were conducted to define the nature and extent of contamination in soil and groundwater. Potential ecological risks were identified based on exposure to pesticides and PCBs in soil. Potential human health risks were identified for future residents due to exposure to VOCs in groundwater at Site 78. The Final ROD for addressing soil and groundwater at OU 1 was signed September 15, 1994. The selected remedy was excavation and offsite disposal of pesticide and PCB-contaminated soil to achieve industrial cleanup levels, continuation and expansion of the groundwater extraction/treatment systems at Site 78 North and Site 78 South, LTM, and LUCs.
ESD (Baker, 1995)	1995	An ESD was issued to revise the cleanup level for PCBs to the Federal PCB action level for industrial sites due to the industrial nature of site activities.
Notice of Non-significant Changes (USMC, 1997)	1997	A Notice of Non-significant Changes was submitted which identified ROD changes including removal of heptachlor epoxide, metals, TSS, TDS, and O&G from the LTM Program.
Optimization Study (Radian, 2000)	2000	The optimization study recommended shutting down operation of the Site 78 South system in the short-term and shutting down the Site 78 North system when mass removal from recovery wells reached asymptotic levels. The recommendations were not implemented.
NAE (2002)	2001 - 2002	Based on the findings of the LTM sampling, an NAE was conducted to further delineate the contaminant plume and to determine whether natural attenuation of chlorinated VOCs was occurring. Field activities included groundwater sampling for VOCs. The NAE concluded that there was evidence for natural attenuation processes occurring at the site.
Oxygen Release Compound (ORC) and HRC Pilot Study (CH2M HILL, 2005)	2003 - 2005	Two pilot studies were initiated to evaluate effectiveness of <i>in situ</i> technologies to remediate chlorinated compounds in groundwater. The pilot study performed at Site 78 North included injection of ORC into groundwater at locations with vinyl chloride concentrations higher than 1,000 milligrams per liter (mg/L). The pilot study performed at Site 78 South included the injection of HRC, into groundwater at locations with TCE concentrations greater than 1,000 mg/L. The Final Pilot Study report, concluded that the concentration of vinyl chloride in groundwater at Site 78 North was reduced by 25 to 50 percent and that the concentration of TCE in groundwater at Site 78 South was reduced by an order of magnitude at the majority of wells, but dechlorination was not complete and appeared to stall at the DCE daughter product.
RIP	1995 - present	The soil excavation to remove pesticide and PCB-contaminated soils was completed in 1995. The groundwater extraction and treatment systems at Site 78 North and South have been in operation since 1995. Groundwater LTM for VOCs and NAIPs was implemented in 1995 and is ongoing on a quarterly and annual basis. LUCs were implemented in June 2001 and updated in July 2002 to prohibit soil and groundwater use at Site 78. The current CSM is shown on Figure 8-24 .

Previous Investigation/Action	Date	Activities
HPIA Evaluation (CH2M HILL, 2010)	2009 - 2010	An extensive Groundwater Investigation was conducted across the HPIA to assess the current chlorinated VOC and petroleum hydrocarbon impacts and identify any data gaps. The report recommended expansion of the LTM program and LUC boundaries and treatment system optimization.
Plume Delineation (Rhêa, 2011)	2009 - 2011	A field screening was conducted to further delineate VOCs in groundwater. Analytical results suggested that VOC contamination was present outside of the current LUC boundaries and recovery well and LTM network. Further investigation to confirm these results was recommended.
Basewide Vapor Intrusion Evaluation (CH2M HILL, AGVIQ, 2009 and CH2M HILL, 2011)	2007 – 2012	Site 78 was included in the phased Basewide vapor intrusion evaluation to determine if complete or significant exposure pathways exist for vapor intrusion into buildings. No unacceptable risks were identified from indoor air related to vapor intrusion; therefore, it was concluded that vapor intrusion is not a current significant pathway of concern for any of the buildings located in the vicinity of Site 78. The report recommended subslab soil gas and indoor air monitoring at 2 buildings with previous exceedances of Base-specific soil gas screening levels every 5 years until 3 rounds indicate no unacceptable risks. Additionally, groundwater monitoring was recommended near 1 building to evaluate potential future impacts from potential plume migration. Vapor intrusion mitigation systems were installed in 3 additional buildings (8 were previously installed under the UST program) within the HPIA from November 2011 to February 2012 and system startup was conducted in February and March 2012 to reduce the possibility of vapor migration into the buildings. If new buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed.
Hadnot Point Construction Area Risk Evaluation Update (CH2M HILL, 2012)	2012	During a MILCON PA/SI for the Hadnot Point Construction Area (HPCA) (CH2M HILL, 2010) located within the HPIA of Site 78, potentially unacceptable risks were identified based on future residential exposure to PAHs and metals in surface soil and ecological exposure to metals in surface water and sediment located in a drainage feature. Additional risk evaluation was recommended and an ecological site survey was conducted. The evaluation concluded that concentrations of PAHs and metals detected in surface soil appear to be ubiquitous in nature and are present across the HPCA with no identified source; the potential human health risks were based on a reasonable maximum exposure (RME), assuming direct contact with the highest concentrations whereas the central tendency exposure (CTE), based on more realistic exposure duration, soil ingestion rates, and average concentrations were within USEPA's acceptable ranges; and overall, risks to ecological receptors from exposure to surface soil, sediment, and surface water at the HPCA are considered low and that significant impacts to receptor populations are unlikely. Based on these conclusions, NFA was recommended in the HPCA.

TABLE 8-36
Land Use Control Summary, IRP Site 78

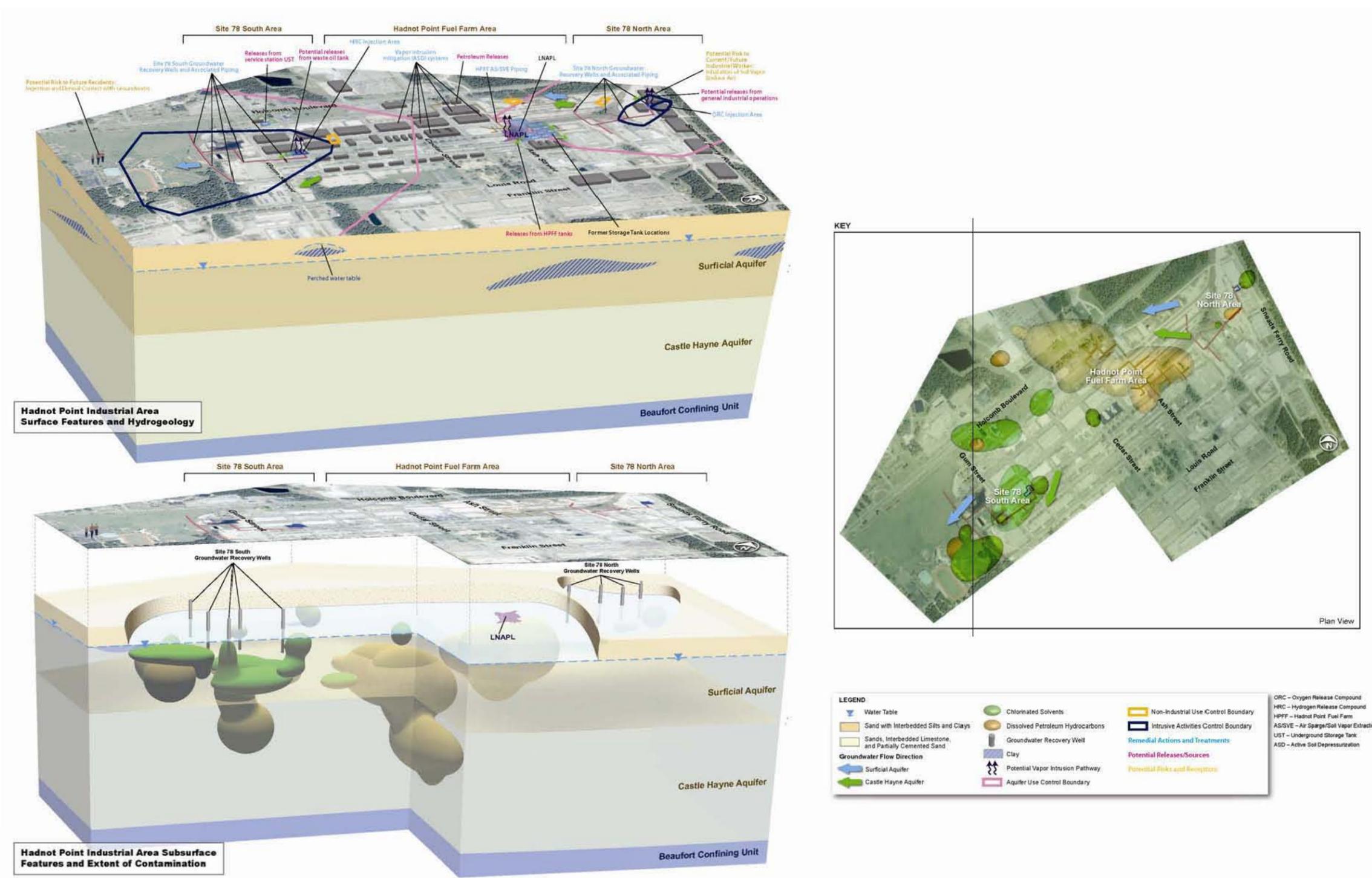
LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	0.815	July 2002	February 2002
Intrusive Activities Control Boundary (Groundwater)	102.28		
Aquifer Use Control Boundary (1,000 feet)	501.54		

8.1.18.1 Future Activities

The groundwater extraction and treatment systems at Site 78 North and South, LTM, and LUCs will be maintained. Additional groundwater evaluation for VOCs and metals is ongoing and the remedy, including LUCs and LTM, will be updated based on the results. A Treatability Study will be conducted in FY 2013 to evaluate potential alternative treatment technologies.

If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed. Base Master Planning maintains current groundwater plume data in GIS, and all construction projects on-Base go through environmental review.

FIGURE 8-24
 Site 78 Conceptual Site Model
 FY 2013 Site Management Plan
 MCIEAST-MCB CAMLEJ
 North Carolina



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8.1.19 Site 80 (OU 11)—Paradise Point Golf Course Maintenance Area

Site 80, the Paradise Point Golf Course Maintenance Area, encompasses approximately 3 acres northwest of Brewster Boulevard within OU 11 (**Figure 8-25**). OU 11 consists of two sites (Sites 7 and 80) that have been grouped together into one OU because of their similar disposal history and proximity to one another. Information regarding past maintenance procedures at Site 80 is unknown; however, the facility is currently in operation. Golf course maintenance operations which include the machine shop (a potential source of waste oils) and the routine spraying of pesticides and herbicides may have contributed to potential contamination at this site. It is unknown when the wash pad was constructed, and what the exact procedure was for cleaning the maintenance equipment prior to the construction of the wash pad. The facility is currently in operation as a maintenance facility for the Base golf course.

FIGURE 8-25
IRP Site 80, Operable Unit 11



Previous investigations are listed in **Table 8-37** and the LUC Summary is presented in **Table 8-38**.

TABLE 8-37
Previous Investigations Summary, IRP Site 80

Previous Investigation/Action	Date	Activities
SI(Halliburton/NUS, 1991)	1991	An SI was conducted to determine the presence or absence of contamination at Site 80. Field activities included soil, groundwater, surface water, and sediment sampling for VOCs, SVOCs, pesticides/PCBs, herbicides, and TPH (surface water and sediment only). The analytical results identified pesticides and PCBs in soil, low level VOCs in groundwater and petroleum hydrocarbons in surface water. Based on these results, an RI was proposed.
RI (Baker, 1996)	1994 - 1996	An RI was completed to characterize the nature and extent of contamination and potential impacts to human health and the environment. Field activities consisted of a site survey, soil and groundwater sampling. Samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Pesticides were detected in soil samples. Low levels of pesticides, SVOCs, and metals were detected in groundwater. Potential unacceptable human health risks were identified due to the presence of pesticides in soil. No unacceptable ecological risks were identified.
TCRA (1996)	1996	Based on the potential human health risk identified in the RI, a TCRA was recommended to remove soil contaminated with pesticides to industrial levels. In July 1996, approximately 988 tons of contaminated soil was excavated and transported off-site to a disposal facility.
PRAP (1996) and ROD (Baker, 1997)	1996 - 1997	A PRAP was issued in November 1996 to solicit public input on the preferred alternative (no RAs) and a public meeting was held. The Final ROD for OU 11 (Sites 7 and 80) was issued and signed in August 1997.
RIP	2007 - present	Although the ROD did not require RA, the soil remediation goals for the TCRA were based on industrial risk-based concentrations; to protect human health and the environment, the Base implemented LUCs in May 2007 to prohibit future exposure to surface and subsurface soil within the site boundary, including the previous soil removal action area.
ESD (CH2M HILL, 2012)	2012	An ESD was submitted in 2012 to document the LUCs as the remedy at Site 80.

TABLE 8-38
Land Use Control Summary, IRP Site 80

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	3.2	May 2007	February 2007
Intrusive Activities Control Boundary (Soil)	3.2		

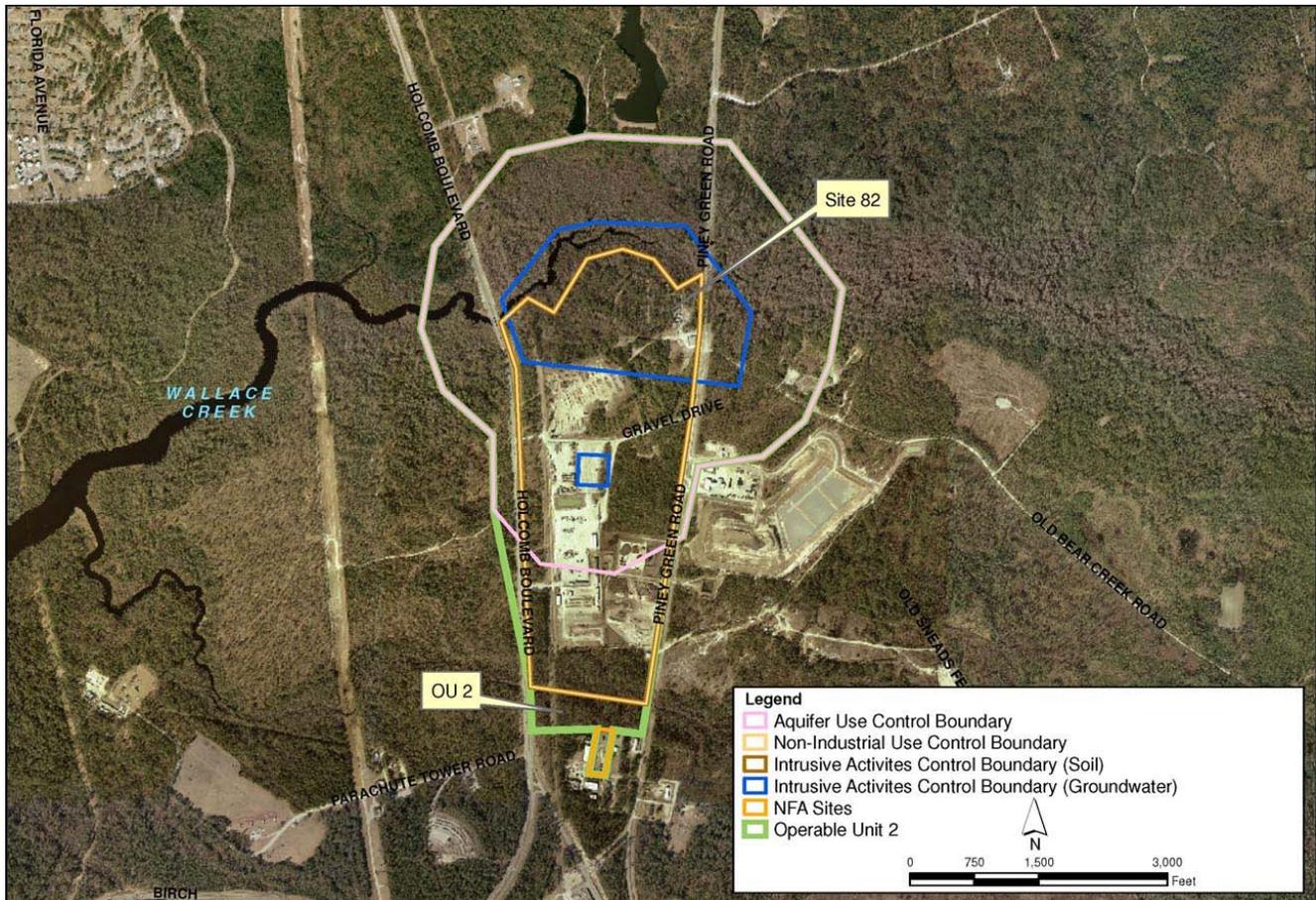
8.1.19.1 Future Activities

LUCs are in-place to prohibit soil intrusive activities and prohibit non-industrial use within the extent of the former soil removal action areas where pesticides remain in soil above levels that allow for UU/UE.

8.1.20 Site 82 (OU 2)—Piney Green Road VOC Area

Site 82, the Piney Green Road VOC Area, covers approximately 30 acres and is located within OU 2 (Figure 8-26). OU 2 covers approximately 210 acres and consists of three sites (Sites 6, 9, and 82) that have been grouped together because of their proximity to one another. Before the late 1980s, much of the site was reportedly used for storage, disposal, and handling of potentially hazardous waste and material. Site 82 was identified during the Confirmatory Sampling at Site 6 in 1986, when Site 82 was randomly littered with debris including spent ammunition casings, and empty or rusted drums. Some of the drums were marked as “lubrication oil” and “anti-freeze.”

FIGURE 8-26
IRP Site 82, Operable Unit 2



Previous investigations are listed in **Table 8-39** and the LUC Summary is presented in **Table 8-40**.

TABLE 8-39
Previous Investigations Summary, IRP Site 82

Previous Investigation/Action	Date	Activities
SI (Halliburton/NUS,1991)	1991	An SI was conducted to determine the presence or absence of contamination. Field activities included soil, groundwater, surface water, and sediment sampling. VOCs were detected in surface water samples, which were considered attributable to activities conducted at Site 82.

Previous Investigation/Action	Date	Activities
RI/FS and PRAP and ROD (Baker,1993)	1992 - 1993	An RI was completed to characterize the nature and extent of contamination and potential impacts to human health and the environment. Field activities included a preliminary site survey, a geophysical survey, soil, groundwater, surface water and sediment sampling. Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Potential unacceptable human health risks were identified for current and future receptors due to exposure to soil and groundwater. Potential adverse ecological impacts were identified for Wallace Creek and Bearhead Creek. The FS was completed to address PCB and pesticide contaminated soil and VOC contaminated groundwater. The PRAP for OU 2 was submitted for public review and comment in August 1993. The preferred alternative was excavation and offsite disposal of pesticide and PCB contaminated soil to industrial cleanup levels, SVE to address vadose zone VOC contamination, groundwater extraction and treatment to address VOCs, LTM, and LUCs. The Final ROD for OU 2 was issued and signed in September 1993.
RIP	1994 - present	The soil excavation to remove pesticide- and PCB-contaminated soil was completed in 1994 and 1995. The SVE system operated for 6 months in 1996 to remediate residual VOC contamination in the vadose zone. The groundwater extraction and treatment system began full-scale operation in July 1996. Groundwater and surface water LTM began in 1997 and is ongoing. LUCs were implemented in 2001 and updated in 2002. The current CSM is shown on Figure 8-27 .
Groundwater Pilot Study (CH2M HILL,2008)	2007 - 2008	In February 2007, a groundwater pilot study was initiated at Site 82 to evaluate the performance of ERD via EVO and lactate injection and to determine whether it is a viable alternative to supplement, enhance, or replace the current groundwater extraction and treatment system. After the treatment system was turned off to implement the study, higher concentrations were identified elsewhere. Although the location of the Pilot Study was not optimal, the study demonstrated that ERD is a viable remedial technology for contaminant mass removal.
Supplemental Source Investigation (Rhêa, 2011)	2008 - 2011	The SSI was initiated to identify additional potential sources of chlorinated VOC contamination in groundwater at Site 82. During vegetation clearing activities, MD was discovered and an ESS was submitted to remove and dispose of the MD. An ESS Amendment was also submitted for OU 2 to complete the SSI. A geophysical survey, monitoring well installation, groundwater sampling, and test pitting was conducted. Soil samples collected from the test pits and groundwater samples were analyzed for VOCs. Cis-1,2-DCE, TCE, PCE, ethylbenzene, and PCA were detected at concentrations exceeding screening criteria.
Basewide Vapor Intrusion Evaluation (CH2M HILL, AGVIQ, 2009)	2007 – 2011	A Basewide Vapor Intrusion Study was conducted to determine if complete or significant exposure pathways exist for vapor intrusion into buildings. At OU 2, no buildings were identified within 100 feet of a monitoring well containing VOC concentrations above NCGWQS. If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed.

TABLE 8-40
Land Use Control Summary, IRP Site 82

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	206.75	July 2002	February 2002
Intrusive Activities Control Boundary (Soil)	206.75		
Intrusive Activities Control Boundary (Groundwater)	99.4		
Aquifer Use Control Boundary (1,000 feet)	404.91		

8.1.20.1 Future Activities

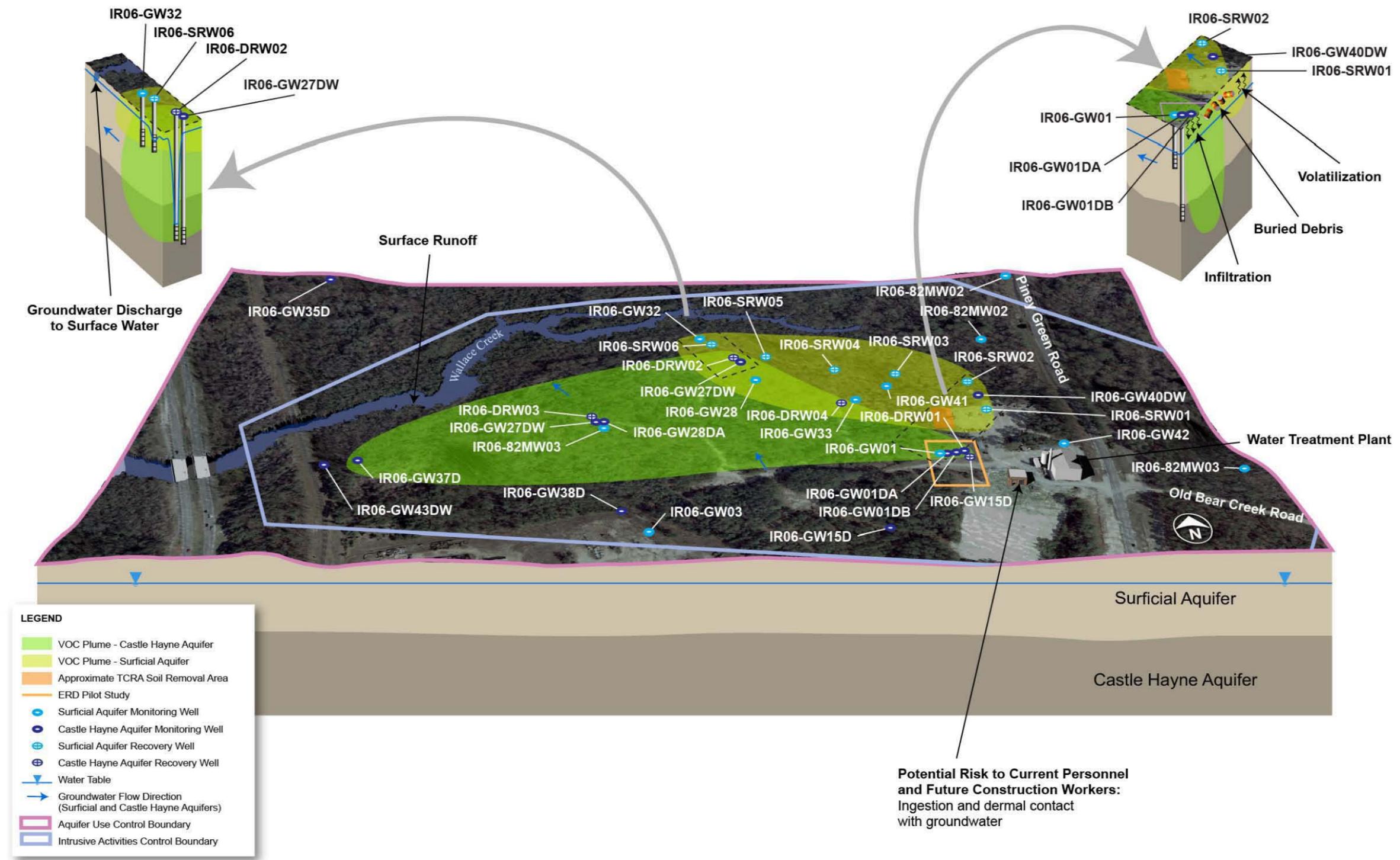
The groundwater extraction and treatment system, LTM, and LUCs will be maintained. A supplemental investigation is planned in FY 2012-2013 to further evaluate source areas and further delineate the vertical and lateral extent of contamination based on recent LTM data. Additional groundwater evaluation for metals is also ongoing. The remedy, including LUCs and LTM, may be updated based on the additional investigation results.

If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed. Base Master Planning maintains current groundwater plume data in GIS, and all construction projects on-Base go through environmental review.

Because MD was discovered and remains on-site, the OU 2 area is also being investigated under the MMRP as UXO-22 (Section 3.2.2).

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FIGURE 8-27
 Site 82 Conceptual Site Model
 FY 2013 Site Management Plan
 MCIEAST-MCB CAMLEJ
 North Carolina



Potential Risk to Current Personnel and Future Construction Workers:
 Ingestion and dermal contact with groundwater

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8.1.21 Site 84 (OU 19)—Building 45

Site 84, Building 45, covers approximately 5 acres just south of State Route 24, one mile west of the Main Gate (Figure 8-28). The property was purchased by the federal government in 1941 and Building 45 was a former electric substation, where transformers reportedly containing PCBs were used and possibly stored. The building was constructed by the Navy soon after purchasing the property, and leased to Tidewater Electric, who operated the building through 1965. In 1965, Building 45 was converted to a maintenance facility for large machinery. While no official operational history exists for the building and the surrounding property, former employees recalled that site activities included PCB transformer maintenance, recycling, and onsite disposal of spent transformer casings. A transformer was discovered near a wooded area and additional transformers (approximately 20), potentially containing PCB dielectric oil, were discovered near the woods of the powerhouse. Maintenance personnel at Building 45 have previously indicated that additional transformers may still be buried in areas near a former lagoon; however, an excavation is reported to have been performed by Public Works Center personnel and no waste materials were discovered. Portions of the site were recently developed with a photovoltaic farm.

FIGURE 8-28

IRP Site 84, Operable Unit 19



Previous investigations are listed in **Table 8-41** and the LUC Summary is presented in **Table 8-42**.

TABLE 8-41
Previous Investigations Summary, IRP Site 84

Previous Investigation/Action	Date	Activities
UST Investigation	1992	During a UST Investigation conducted in 1992, low levels of PCBs were detected in a soil sample collected from the area where a transformer was discovered.
Pre-RI Screening Study (1995)	1995 - 1998	A Pre-RI Screening study was conducted to analyze the nature and extent of contamination. Field activities included soil, groundwater, surface water, and sediment sampling. Samples were analyzed for PCBs. PCBs were detected at levels above 500 parts per billion (ppb) in soil collected from around the lagoon, and in surface water and sediment (above 1,000 ppb) collected from within the lagoon. Based on the results of the Pre-RI, a Draft EE/CA was prepared to present removal action options for the NTCRA of PCB-contaminated sediments and soil at Site 84. The EE/CA was not finalized and the removal action was delayed to allow for more complete PCB delineation at the site.
UST Removal (1999)	1999	In July 1999, a 500-gallon UST used for storing heating oil was removed in the vicinity of Building 45. Confirmatory soil samples identified petroleum hydrocarbons in the soil. The UST removal report concluded that the detected petroleum hydrocarbons might not be from the UST, rather it was suggested that the contamination might have come from other unidentified source(s), based on the long industrial operation history at Building 45.
Building 45 Removal (1999)	1999	Concrete sampling and surface soil sampling was conducted at Building 45 in August 1999 in preparation for razing and offsite disposal of material from the aboveground portions of Building 45. Analytical results identified PCBs in the concrete. As a result, the aboveground portion of Building 45 was removed between August and September 1999, with the foundation left in place.
RI/FS (Baker, 2002)	2001 - 2002	An RI was conducted to assess the nature and extent of contamination and potential human health and environmental impacts of the site. Field activities included soil and groundwater investigation. Potential unacceptable human health risks were identified due to the presence of PCBs and PAHs in surface soil and pesticides and metals in groundwater. Potential unacceptable ecological risks were identified due to the presence of pesticides, PCBs, and metals in soils and VOCs, SVOCs, and PCBs in sediments. The Final RI recommended completion of a NTCRA to remove surface soils surrounding Building 45, in the lagoon area, and in the midfield area as well as remove the Building 45 foundation materials. The Final FS was completed in June 2002, which developed and screened remedial alternatives for addressing soil contamination.
PRAP and EE/CA (2002)	2002	A PRAP was issued in 2002 to solicit public input on the preferred alternative for soil and groundwater contamination and a public meeting was held. Excavation and landfill disposal was the preferred alternative for soil recommended in the PRAP. Owing to the national debate between USEPA and DoD regarding enforcement issues of the LUCs, the Navy decided not to implement the preferred alternative from the PRAP. Accordingly an AM proposing removal actions was developed to address sediment and soil contamination.
Phase I NTCRA (2002)	2002	Based on the recommendations of previous documents, an NTCRA was completed to remove the remaining building foundation at Building 45 and some surrounding PCB-contaminated soil. 4,857 tons of non-hazardous PCB-contaminated soil and 142 tons of petroleum-contaminated soil were removed from the site.
Phase II NTCRA (2004)	2002 - 2004	Excavation and offsite disposal of contaminated soil and lagoon sediments was completed. Approximately 12,000 tons of contaminated soil/sediment was removed from the site. However remediation goals were not met as the Phase II NTCRA uncovered additional areas of contamination.

Previous Investigation/Action	Date	Activities
Supplemental Investigation (Rhēa, 2006)	2005 - 2006	A Supplemental Investigation was conducted and the geophysical investigation uncovered two underground pipes originating from the area of former Building 45. One of the pipes corresponded to the location of a concrete-encased steel pipe partially excavated during the Phase II NTCRA. PCB concentrations in soil samples collected from both pipes were less than 10 milligrams per kilogram (mg/kg) and the pipes were left in-place. A confirmation groundwater sample collected during the investigation indicated no exceedances of the NCGWQS.
Phase III NTCRA and Construction Closeout Report (CCR) (Rhēa, 2007)	2006 - 2007	The Phase III NTCRA was conducted to remove additional PCB-contaminated soil to the south and west of the previous NTCRA locations. Complete excavation was deemed impractical in areas with buried, active utility and communication lines. In these areas, a 2-foot thick vegetative soil cover was placed over the PCB-contaminated soil.
Amended FS, PRAP, and ROD (Rhēa, 2008 and 2009)	2008 - 2009	The Amended FS was prepared to evaluate remedial alternatives to address PCB soil contamination and the PRAP was completed followed by a public meeting and public comment period to solicit community input on the preferred alternative: removal of PCB-contaminated soil and LUCs. The ROD was signed in 2009 and removal of PCB-contaminated soil and LUCs were identified as the Selected Remedy.
RIP and RACR (Rhēa, 2010)	2002 – 2010	Three NTCRAs were conducted from 2002 through 2006 to remove PCB-contaminated soil and a soil cover has been put in-place across the site. In 2009, LUCs were implemented in the extent of PCB soil contamination greater than 10 mg/kg to restrict intrusive activities and a fence and signs were installed to restrict access. LUCs were also implemented to prohibit non-industrial use in the extent of PCB soil contamination greater than 1 mg/kg.

TABLE 8-42
Land Use Control Summary, IRP Site 84

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Non-Industrial Use Control Boundary (Soil)	4.6	May 2009	March 2010
Access Control Boundary	0.14		
Intrusive Activities Control Boundary (Soil)	0.55		

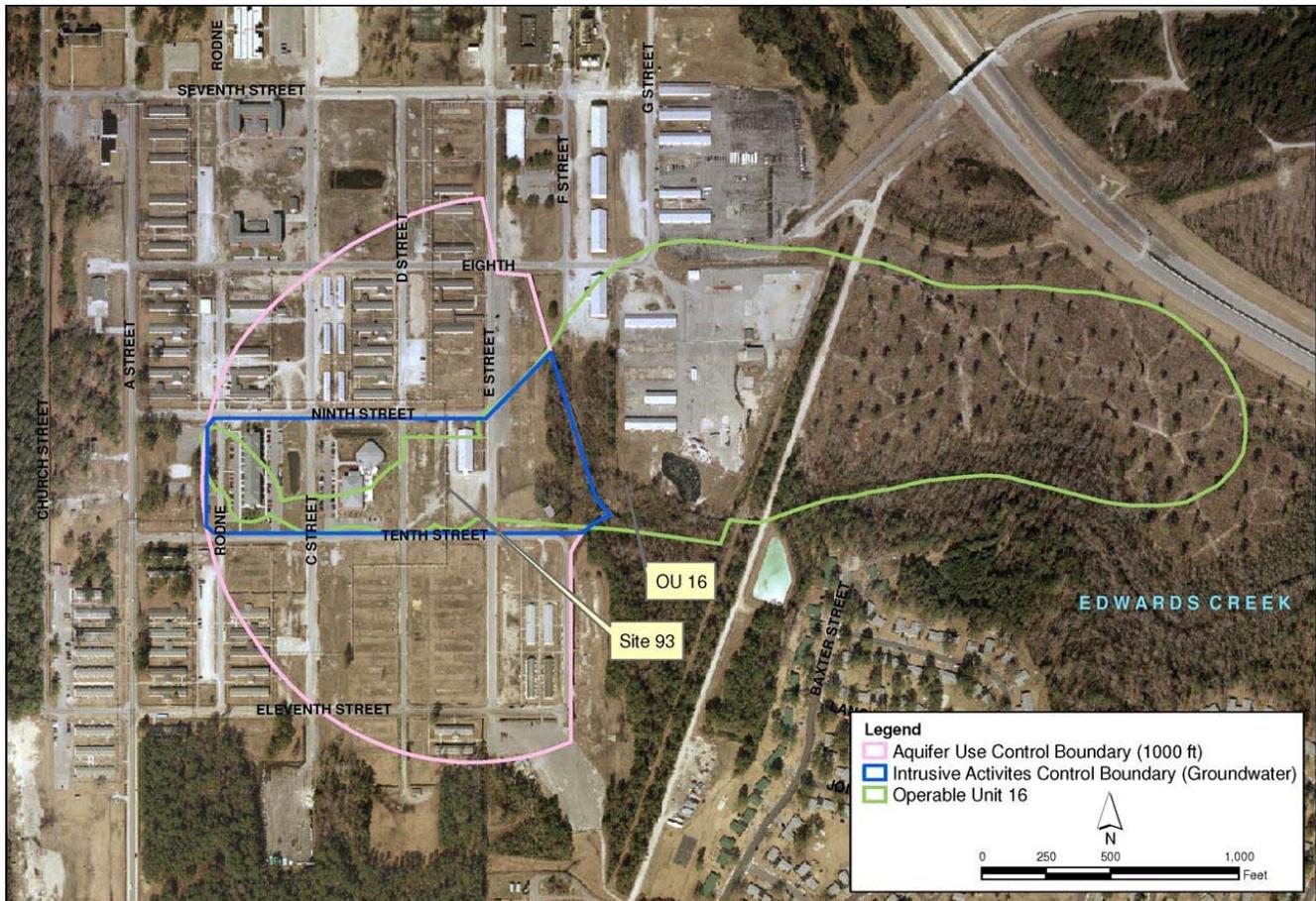
8.1.21.1 Future Activities

LUCs are in-place to prohibit soil intrusive activities and prohibit non-industrial use within the extent of the former soil removal action areas where PCBs remain in soil above levels that allow for UU/UE. A fence and signs were also installed to restrict access.

8.1.22 Site 93 (OU 16)—Building TC-942

Site 93, Building TC-942, covers approximately 16 acres and is located at the intersection of Ninth and “E” Streets in the Camp Geiger section of MCAS New River (**Figure 8-29**). OU 16 consists of two sites (Sites 89 and 93) that have been grouped together because of their proximity to one another and unique characteristic of suspected waste (solvents). The buildings in this portion of Camp Geiger were constructed during the Korean War and currently function as classrooms, barracks, and supply rooms for the Marine Infantry School. Historical records indicate that a 550-gallon UST storing waste oil was previously located on Site 93, off the southwest corner of Building TC-942. The UST was permanently closed in December 1993.

FIGURE 8-29
IRP Site 93, Operable Unit 16



Previous investigations are listed in **Table 8-43** and the LUC Summary is presented in **Table 8-44**.

TABLE 8-43
Previous Investigations Summary, IRP Site 93

Previous Investigation/Action	Date	Activities
Geotechnical Investigation (R.E. Wright, 1996)	1995 - 1996	To determine the presence or absence of contamination at the site, a geotechnical investigation and environmental screening were conducted near the barracks area. Field activities included soil and groundwater sampling. Soil samples were analyzed for O&G and halogenated solvents. Groundwater samples were analyzed for VOCs, SVOCs and metals. O&G, naphthalene, and PCE were detected in soil samples. Chlorinated VOCs, SVOCs, and metals were detected in groundwater samples.
RI (Baker, 1998)	1996 - 1998	An RI was conducted to characterize the nature and extent of soil and groundwater contamination at OU 16. Field activities included the collection of soil and groundwater samples analyzed for VOCs. Groundwater analytical results identified chlorinated VOC contamination (primarily TCE) concentrated in the surficial aquifer within the immediate area of the former UST. Potential unacceptable human health risks were identified due to exposure to PCE and cis-1,2-DCE in groundwater. No potential unacceptable ecological risks were identified.
NAE	2001	In 2001, a preliminary NAE was conducted to determine whether natural site conditions would encourage the natural attenuation process of degrading chlorinated VOCs. The results indicated limited natural attenuation was occurring and the reductive dechlorination process appeared to be stalling, indicating that the reduced state of the aquifer is not enough to encourage optimal dechlorination.
Additional Plume Characterization (Baker, 2002)	2002	Additional plume characterization activities were conducted in 2002 to further delineate groundwater contamination, and provide additional data to support the selection of an active remedial system. Field activities included groundwater sampling. The primary plume appeared related to the former UST area, with smaller "hot spot" areas downgradient. The results indicated horizontal migration of groundwater contamination had been minimal since 1995; however, vertical migration was observed.
SSI (2005)	2004 - 2005	An SSI was conducted to determine the current conditions of groundwater contamination in the surficial aquifer, and collect additional data to support the selection of a remedial alternative. Groundwater samples were collected from boring locations at three depths, and analyzed for VOCs and NAIPs. Once the groundwater screening results were analyzed, additional permanent monitoring wells were installed in order to complete the horizontal and vertical delineation of the shallow groundwater contamination.
FS (CH2M HILL, 2005)	2005	In November 2005, the Final FS was completed for Site 93, which developed and screened remedial alternatives for addressing groundwater contamination (PCE, TCE, 1,2-DCE, PCA, and vinyl chloride).
PRAP and ROD (CH2M HILL, 2006)	2006	A PRAP was issued to solicit public input on the preferred alternative (ISCO via permanganate injections, MNA, and LUCs) and a public meeting was held. The final Site 93 ROD was issued and signed in October 2006.
RIP and IRACR (Shaw, 2009)	2006 - present	Phased ISCO injections were conducted from 2006 through 2008. After reviewing the baseline and follow-up data, it was determined that the ISCO treatment was not cost effective and would be suspended and MNA initiated. Groundwater LTM for VOCs and NAIPs was initiated in 2008, upon completion of the ISCO injections. LUCs to prohibit aquifer use and restrict intrusive activities within the extent of groundwater VOC contamination were established in 2009. An IRACR was prepared in 2009 to document the remedy was implemented and is operational. The current CSM is shown on Figure 8-30 .
Basewide Vapor Intrusion Evaluation (CH2M HILL, AGVIQ, 2009)	2007 - 2011	Site 93 was included in the phased basewide vapor intrusion investigation to determine if complete or significant exposure pathways exist for vapor intrusion into buildings. No current vapor intrusion impacts were identified for any of the buildings located in the vicinity of Site 93. If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed.

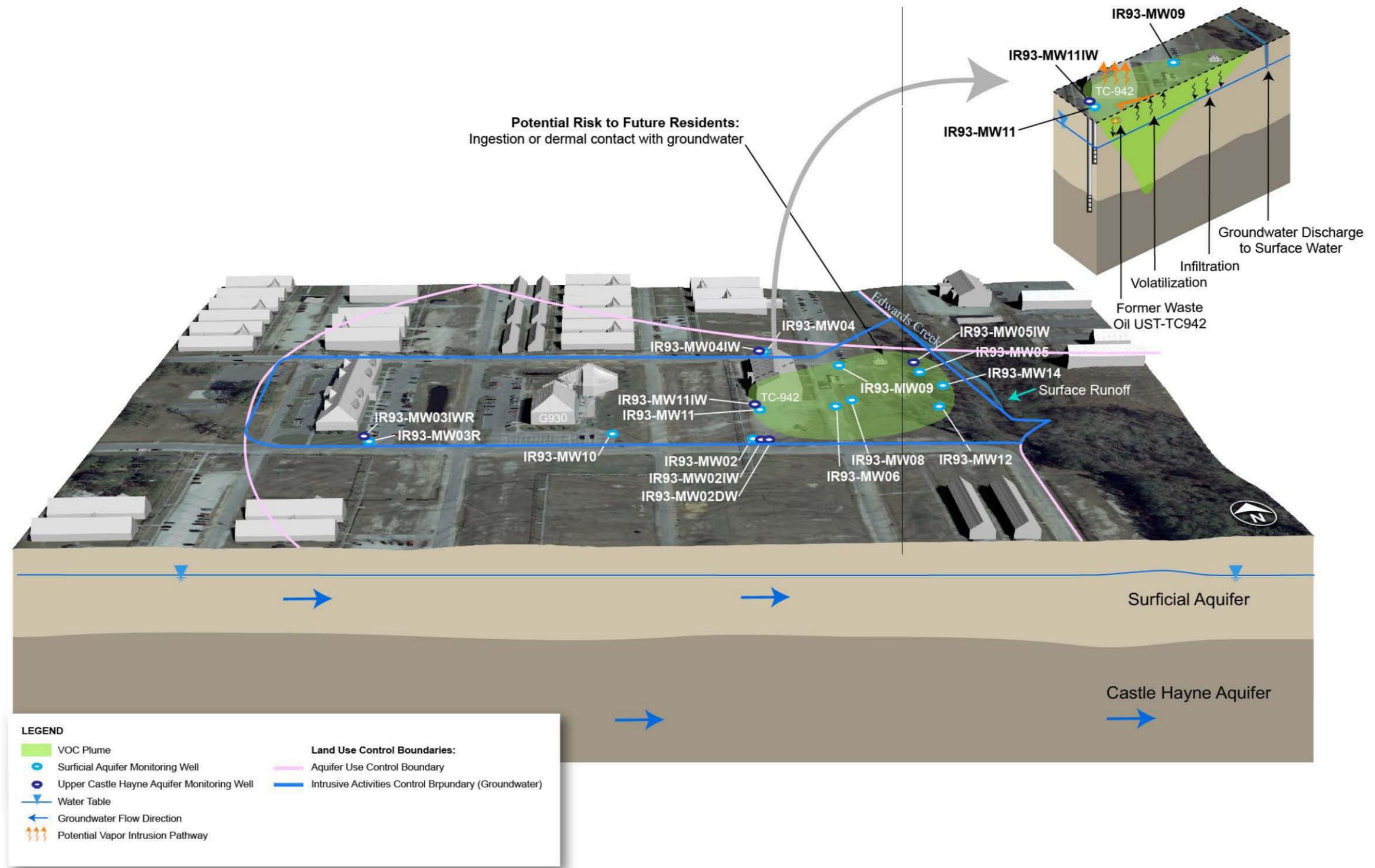
TABLE 8-44
Land Use Control Summary, IRP Site 93

LUC Boundary	Estimated Area (Acres)	Most Current LUCIP Date	Onslow County Registration Date
Intrusive Activities Control Boundary (Groundwater)	16.1	December 2006	July 2009
Aquifer Use Control Boundary (1,000 feet)	40.8		

8.1.22.1 Future Activities

LTM is ongoing to monitor MNA of VOCs in groundwater and potential migration. LUCs are in-place to prohibit groundwater intrusive activities and aquifer use until cleanup levels are achieved. If buildings are planned for construction in the vicinity of the VOC groundwater plume, the potential for a vapor intrusion pathway will be evaluated and mitigated if needed. Base Master Planning maintains current groundwater plume data in GIS, and all construction projects on-Base go through environmental review.

FIGURE 8-30
 Site 93 Conceptual Site Model
 FY 2013 Site Management Plan
 MCIEAST-MCB CAMLEJ
 North Carolina



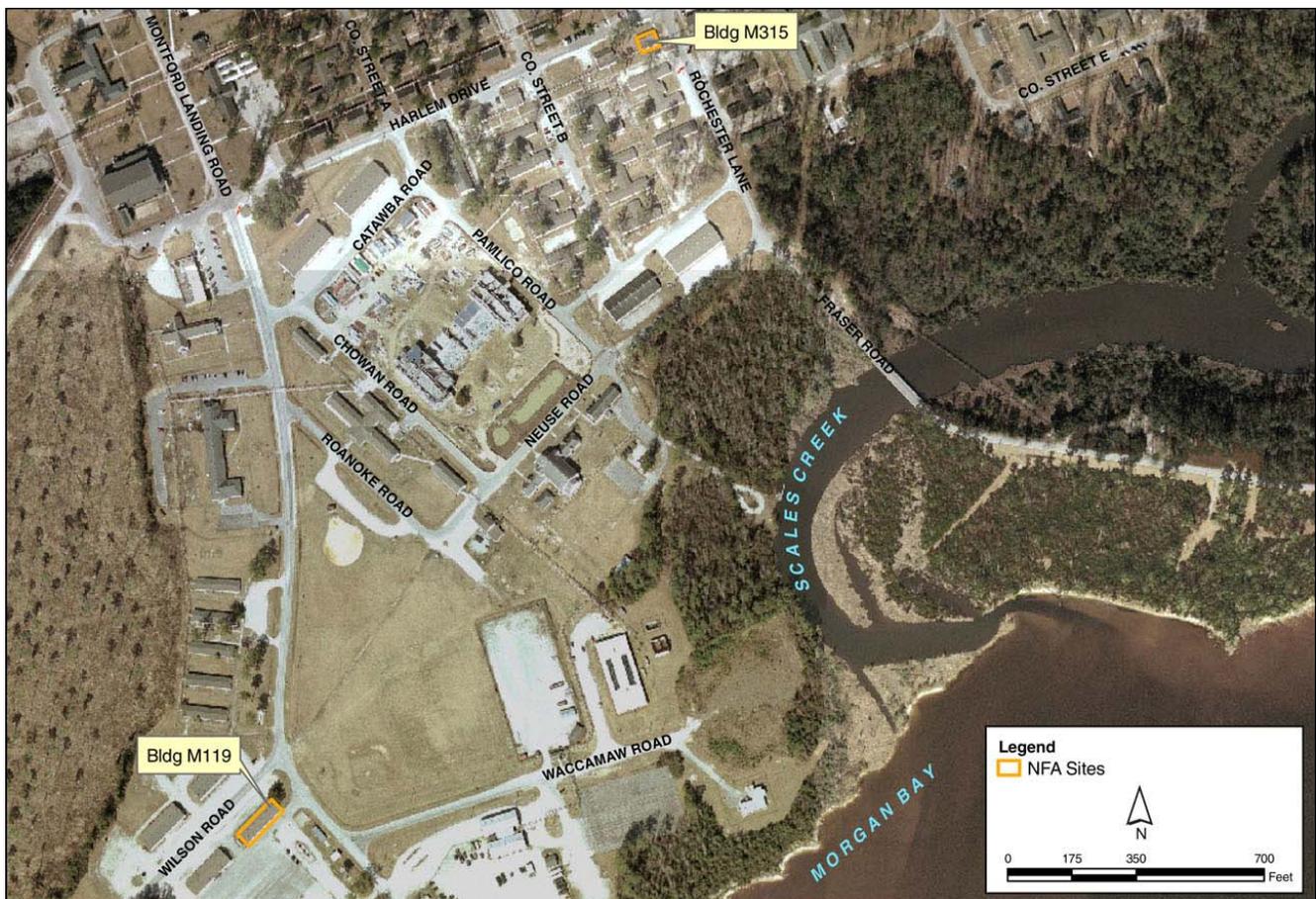
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8.2 IRP RC Sites

8.2.1 Montford Point Buildings M119 and M315

The Montford Point PA site encompasses less than half an acre and includes Buildings M119 and M315, located in the Montford Point portion of the Base (**Figure 8-31**). Building M119 was constructed in 1943 as a Gun Shed; most likely storing Howitzers. Over the years the building has been renovated, and has been used as a classroom and vehicle repair shop. There are several fuel oil tanks that are used for heating this building. Known chemicals/compounds that were used or stored in Building M119 include solvents, waste oils, gasoline, and vehicle repair related materials. Potential vehicle repair related materials used or stored at this building may include paint and paint thinners, parts cleaning wastes (solvents and parts washers), automotive batteries, automotive oils, and shop cleaning wastes (floor cleaning wastes, absorbents used for spills or leaks and shop rags). Building M315 was thought to be a former dry cleaning facility. However, no records were located that indicated past dry cleaner operations. Rather, the building was used as a laundry pick-up facility until the 1980s.

FIGURE 8-17
Montford Point (Buildings M119 and M315)



Previous investigations are listed in **Table 8-45**.

TABLE 8-45
Previous Investigations Summary, Montford Point (Buildings M119 and M315)

Previous Investigation/Action	Date	Activities
PA/SI (Baker, CH2M HILL, 2006)	2002 - 2006	A PA/SI was conducted between 2002 and 2004 to identify sites that may have used, stored, or handled potentially hazardous materials and evaluate potential risks to human health and the environment. Buildings M119 and M315 at Montford Point were identified and soil and groundwater samples were collected for VOCs, SVOCs, pesticides/PCBs, and metals. The PA/SI recommended further investigation of metals in groundwater at both buildings.
ESI (CH2M HILL, 2010)	2010	The ESI was conducted to confirm the results of the PA/SI and document the basis for recommendation of NFA where appropriate. Upon further review by the Partnering Team in 2009, it was determined that the isolated detections of iron and lead in groundwater did not warrant additional investigation.
No Action DD (CH2M HILL, 2010)	2010	The Final NFA DD was signed in December 2010.

8.2.2 MCAS New River Buildings SAS113, AS116, and AS119

The MCAS New River site encompasses less than half an acre and includes Buildings SAS113, AS116, and AS119, located in the northwest portion of the Base (**Figure 8-32**).

FIGURE 8-32
MCAS New River Buildings SAS113, AS116, and AS119



Building SAS113 is located 100 feet west of Bancroft Road and consists of a covered four-bay open metal structure, constructed on a 6-inch thick slab. Building SAS113 was constructed in 1986 as a vehicle support area when surrounding buildings were converted into automotive hobby shops. A new automotive hobby shop opened at MCAS New River in 2009 and Building SAS113 is no longer actively used. The waste disposal practices are also unknown.

MCAS New River Building AS116 is a one-story metal frame building attached to a brick building on Bancroft Street. Fencing surrounds the building, with access from Bancroft Street only. Building AS116 was constructed to replace a temporary wooden building in 1954 and to provide the MCAS New River with vehicle maintenance facilities. From 1979 to 1981, Building AS116 served as a hazardous materials and flammables storage area. In the early 1980s, a new complex was constructed for the Combat Vehicle Maintenance Shop, and Building AS116 was converted into an automotive hobby shop along with Buildings SAS113 and AS114. A new automotive hobby shop was opened at the MCAS New River in 2009, and Building AS116 has since been used as a storage facility.

Building AS119 is a single-story metal frame building located approximately 200 feet east of White Street. Building AS119 was constructed in 1963 as an automotive vehicle maintenance facility with parts storage, service bays, and exterior service or wash rack. Records indicate that during remodeling work performed in

1988, a number of structures, including a boiler and plumbing fixtures, were removed from the building. An existing oil heater and associated piping and valves were replaced and a new fuel oil AST was installed. Currently, the building is used as a storage and vehicle maintenance facility.

Previous investigations are listed in **Table 8-46**.

TABLE 8-46

Previous Investigations Summary, MCAS New River Buildings SAS113, AS116, and AS119

Previous Investigation/Action	Date	Activities
PA/SI (2006)	2001 - 2006	A PA/SI was conducted between 2002 and 2004 to identify sites that may have used, stored, or handled potentially hazardous materials and evaluate potential risks to human health and the environment. Based on the analytical results, further investigation of groundwater at Buildings SAS113, AS116, and AS119 due to the presence of metals was recommended. Although the PA/SI also recommended further investigation of soils at Building AS119 due to the presence of SVOCs, pesticides, and metals, concentrations were below background and/or regulatory screening criteria and the IRP Partnering Team concluded no further investigation of soil was necessary.
ESI (CH2M HILL, 2010)	2009 - 2010	The ESI was conducted to confirm the presence or absence of elevated metals concentrations detected during the PA/SI. Although metals were detected at concentrations exceeding screening levels at two of the three buildings, no unacceptable risks to human health or the environment were identified. The ESI concluded that NFA was necessary. In 2009, the IRP Partnering Team concurred with this conclusion.
No Action DD (CH2M HILL, 2010)	2010	The Final NFA DD was signed in December 2010.

8.2.3 Hadnot Point Industrial Area Buildings 1120, 1409, and 1512

The HPIA site encompasses less than half an acre and includes Buildings 1120, 1409, and 1512, located in the HPIA. Building HP1120 is located between Hammond Road, Birch Street, and Ash Street (**Figure 8-33**). It was constructed as an automobile hobby shop in 1955 with additions to the building constructed in 1964 and 1969. Building HP1120 has historically been used for auto body repair and painting.

Building HP1409 is located on Gibb Road. The building was constructed in 1943 and was used as the Upholstery and Carpenter shop in the late 1940s. Since that time, Building HP1409 has been used as a classroom, Public Works storage, and a furniture repair shop.

Building HP1512 was historically located between Buildings HP1504 and HP1503 on Hammond Road. The operational history of the building is unknown; however, it is assumed that it was used as an automotive repair support structure for the series of vehicle maintenance buildings in the surrounding area. Building HP1512 is no longer present. The date of demolition is unknown.

FIGURE 8-33
Hadnot Point Industrial Area (Buildings 1120, 1409, and 1512)



Previous investigations are listed in **Table 8-47**.

TABLE 8-47
Previous Investigations Summary, Hadnot Point Industrial Area (Buildings 1120, 1409, and 1512)

Previous Investigation/Action	Date	Activities
PA/SI (2006)	2001 - 2006	A PA/SI was conducted between 2002 and 2004 to identify sites that may have used, stored, or handled potentially hazardous materials and evaluate potential risks to human health and the environment. Field activities included soil and groundwater investigations. The analytical results indicated that there was no impact to the area from past site operations and no further investigation was recommended at the buildings. In 2002, the IRP Partnering Team concurred with this conclusion.

8.2.4 Site 4—Sawmill Road Construction Debris Dump

Site 4, the Sawmill Road Construction Debris Dump, encompasses approximately 0.3 acre located on the Mainside of the Base (Figure 8-34). The dates of operation are unknown, but Site 4 was reportedly used for surface disposal of construction debris including asphalt, old bricks, and concrete.

FIGURE 8-34
IRP Site 4



Previous investigations are listed in **Table 8-48**.

TABLE 8-48
Previous Investigations Summary, IRP Site 4

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at Site 4, and no further assessment was recommended.
Confirmatory Site Assessment (CH2M HILL, 2011)	2009 - 2011	To verify the presence or absence of contamination, a Confirmatory Site Assessment is underway due to its history as a dump. Soil and groundwater sampling for VOCs, SVOCs, and metals was completed. Based on the results, no human health or ecological risks were identified and NFA was recommended.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.5 Site 7 (OU 11)—Tarawa Terrace Dump

Site 7, the Tarawa Terrace Dump, encompasses approximately 5 acres within OU 11. OU 11 consists of two sites (Sites 7 and 80) that have been grouped together into one OU because of their similar disposal history and proximity to one another (**Figure 8-35**). Site 7 is a former dump that was used during the construction of the Base housing located in Tarawa Terrace. Precise years of operation are unknown, but it has been reported that the dump was closed in 1972. Historical records do not indicate that hazardous materials were disposed at this facility; only construction debris, water treatment plant filter media, and household trash.

FIGURE 8-35
IRP Site 7, Operable Unit 11



Previous investigations are listed in **Table 8-49**.

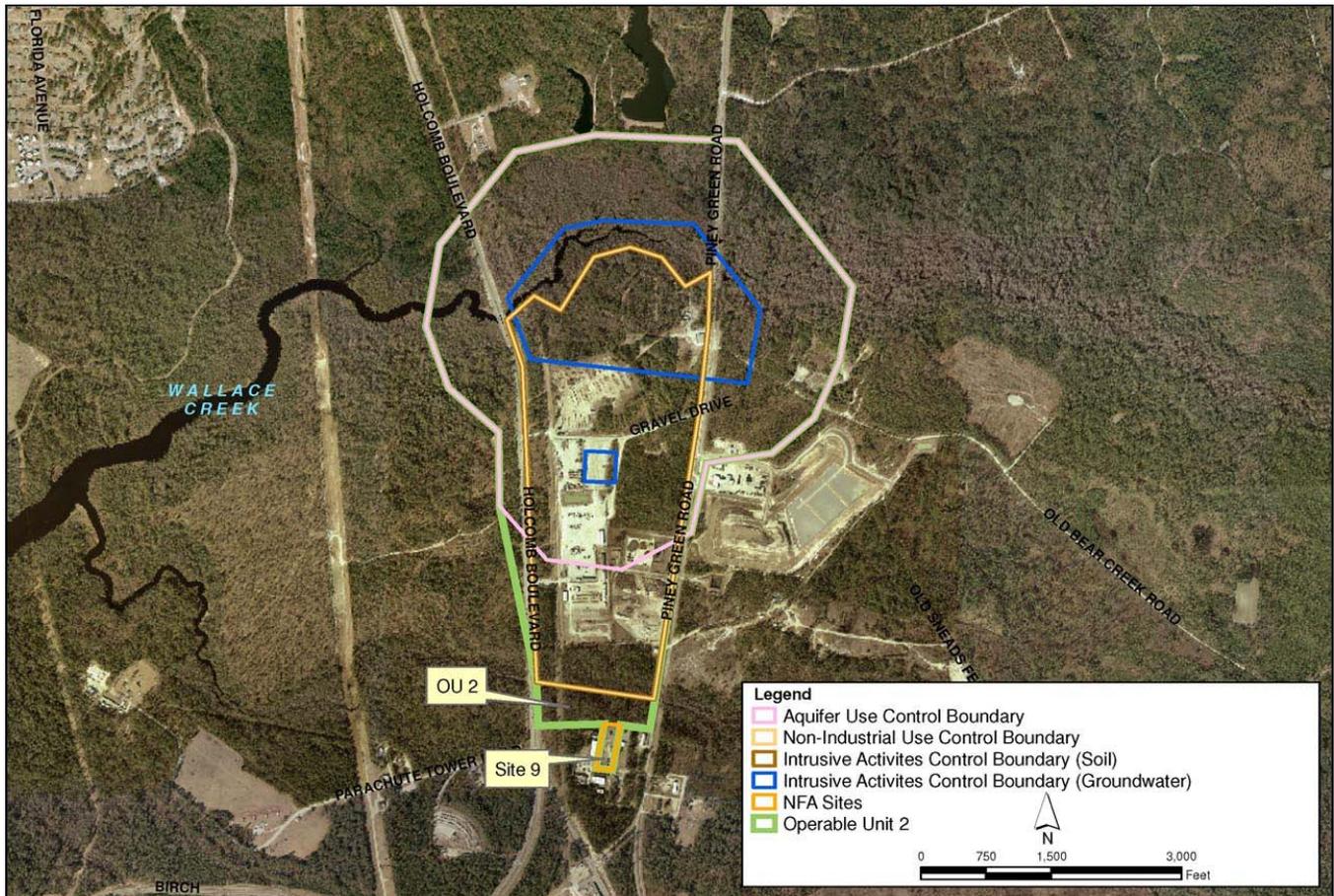
TABLE 8-49
Previous Investigations Summary, IRP Site 7

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The quantity of any waste reportedly disposed of at the site was insignificant and did not warrant further investigation.
SI (Halliburton/NUS, 1991)	1991	To determine the presence or absence of site related contamination, an SI was conducted. Field activities included soil and groundwater investigations. Samples were analyzed for SVOCs, VOCs, pesticides/PCBs, and metals. The analytical results identified SVOCs and pesticides in soil and groundwater. Based on these results, an RI was proposed.
RI (Baker, 1996)	1994 - 1996	An RI was completed to characterize the nature and extent of contamination and potential impacts to human health and the environment. Field activities included a site survey, soil, groundwater, surface water, and sediment sampling, a habitat evaluation, and an earthworm bioaccumulation study. Samples were analyzed for VOAs, SVOAs, pesticides/PCBs, and metals. No site-related contamination and no unacceptable risks were identified to human health and the environment.
PRAP (1996) and ROD (Baker, 1997)	1996 - 1997	Based on the findings of the RI, a PRAP was issued in 1996 to solicit public input on the preferred alternative (no RA) and a public meeting was held. The Final ROD was issued and signed in August 1997, and the site was closed with NFA.

8.2.6 Site 9 (OU 2)—Fire Fighting Training Pit at Piney Green Road

Site 9, the Fire Fighting Training Pit at Piney Green Road, encompasses approximately 2.6 acres in the Mainside area of the Base. From the early 1960s to 1981, training exercises were conducted in an 800 -ft² unlined fire training pit, located in the southern area of the site (**Figure 8-36**). In 1981 the pit was lined with asphalt and an OWS was installed next to the pit; and in 2002 the pit was lined with concrete. Flammable liquids including solvents, used oil, and contaminated fuels were used as accelerants during the training exercises. In addition, approximately 30,000 to 40,000 gallons of JP-4 and JP-5 fuels were burned in the training pit. Four 500-gallon ASTs were located near the training area but are no longer present. The site is still currently used as a fire training facility with a concrete-lined pit.

FIGURE 8-36
IRP Site 9, Operable Unit 2



Previous investigations are listed in **Table 8-50**.

TABLE 8-50
Previous Investigations Summary, IRP Site 9

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. An estimated 30,000 gallons per year of used oil, solvents, and contaminated fuels were burned during training exercises. Based on its findings, the IAS recommended that a Confirmation Study be conducted to verify the presence of contamination and determine whether migration was occurring.
Confirmation Study (ESE, 1987)	1984 - 1987	A Confirmation Study was conducted to confirm the presence of contamination discovered during the IAS. Field activities included soil, groundwater, sediment, and surface water sampling. Chromium, lead, phenols, and ethylene dibromide were detected in groundwater samples.
RI (Baker, 1993)	1992 - 1993	An RI was conducted to further investigate AOCs at OU 2. Field activities consisted of a preliminary site survey and soil and groundwater sampling for VOCs, SVOCs, pesticide/PCBs, and metals. Analytical results did not reveal extensive contamination. Soil and groundwater samples collected during the RI did not reveal extensive contamination at Site 9 and no potential sources of contamination were identified.
PRAP and ROD (Baker, 1993)	1993	A PRAP was issued in August 1993 to solicit public input on the preferred alternative (no RA) and a public meeting was held. The Final ROD for OU 2 was issued and signed in September 1993 and the site was closed with NFA.
Removal Action (2000)	2000	A new POL Fire Training Pit was completed in 2000. The new training facility employed a petroleum source for burning operations and the pit was lined with high-temperature concrete. During the installation of the new facility, POL-contaminated soil was excavated and removed from the site.

8.2.7 Site 10 (Pre-RI)—Original Base Dump

Site 10, the Original Base Dump, is located on the Mainside of the Base (**Figure 8-37**). Site 10 was approximately 5 to 10 acres in size during full operation of the landfill and was reportedly used for construction debris and as a burn dump during construction of the Base, prior to 1950.

In 2012, the Base implemented soil industrial LUCs for conservativeness based on the Sites history as a dump.

FIGURE 8-37
IRP Site 10



Previous investigations are listed in **Table 8-51**.

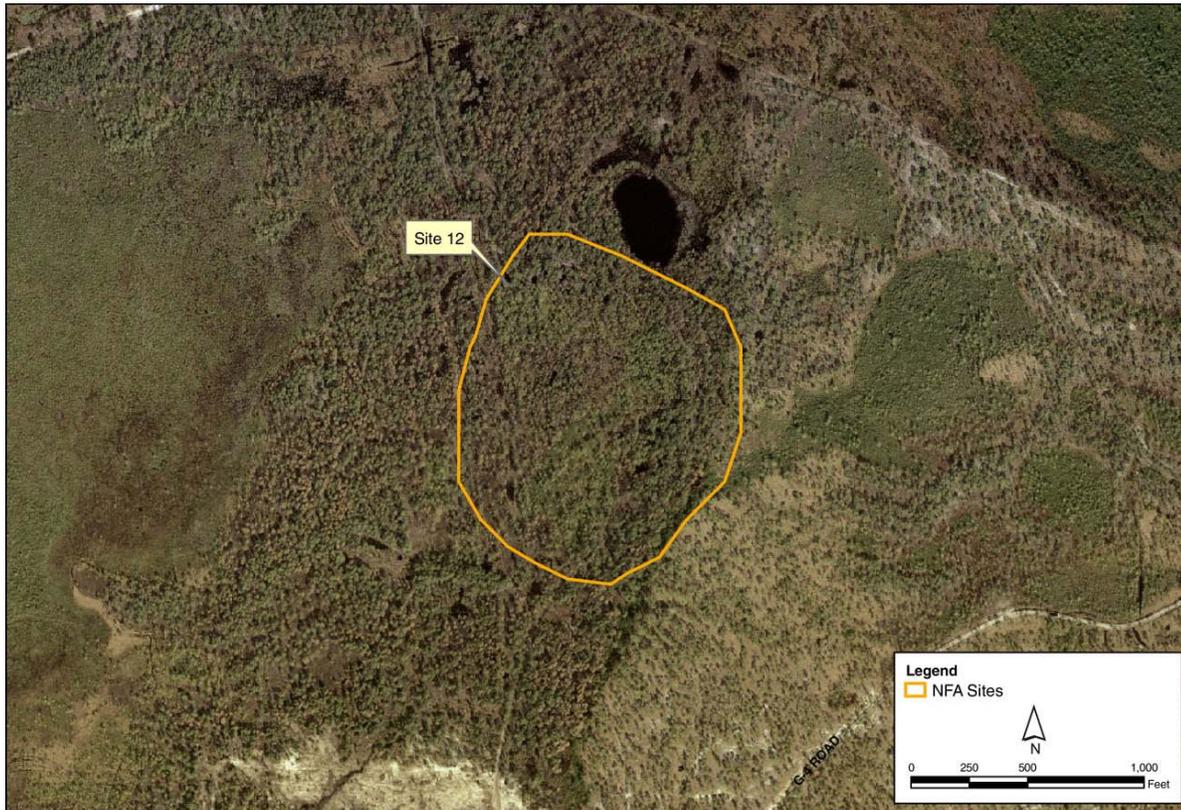
TABLE 8-51
Previous Investigations Summary, IRP Site 10

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. During investigation it was determined that the site did not require further investigation. However, the site was added to the IRP in 1994 when it was reported that two marines developed skin rashes after contacting a heavy oily material that may have been at the site.
SI (Baker, 2001)	1998 - 2001	An SI was conducted to verify the presence or absence of contamination. Field activities included a site survey and soil, groundwater, surface water, and sediment sampling. No unacceptable risks to human health were identified. The ERA identified minimal potential risks from metals in surface water. Based on the findings, the Final SI recommended NFA.
No Action DD (CH2M HILL, Baker, 2005)	2005	A Final NFA DD was completed May 12, 2005.

8.2.8 Site 12 (Pre-RI)—EOD Detonation Area

Site 12, the EOD Detonation Area, covers approximately 8 to 10 acres, located on the Mainside of the Base (**Figure 8-38**). Since the early 1960s, Site 12 has operated as an EOD detonation area. Ordnance is disposed by burning or detonating when it is found to be inert, unserviceable, or defective. Materials disposed at Site 12 include ordnance, colored smokes, and white phosphorous. Any undestroyed residues are typically less than 1 pound. Because Site 12 is an active range, it now falls under the Navy's Active Range Program.

FIGURE 8-38
IRP Site 12



Previous investigations are listed in **Table 8-52**.

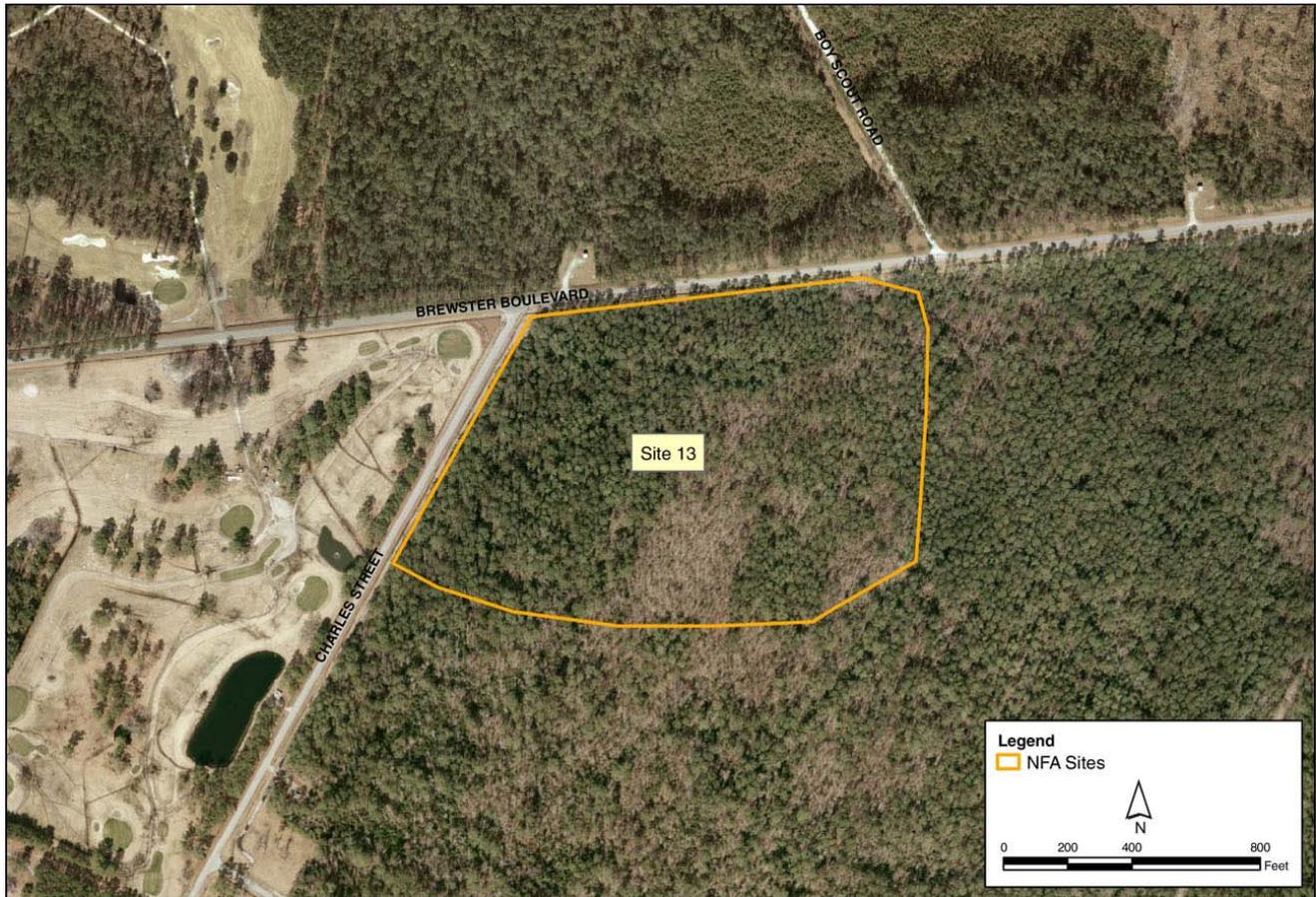
TABLE 8-52
Previous Investigations Summary, IRP Site 12

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The quantity of any waste reportedly disposed of at the site was insignificant and did not warrant further investigation. However, during a disposal exercise in 1992, an explosive crater (approximately 8 feet deep) uncovered an oily sheen and a suspected petroleum odor was noted.
Pre-RI Screening Study (1998)	1995 - 1998	An RI was initiated to assess the nature and extent of contamination. During the Pre-RI field investigation, EOD personnel stated that disposal of small arms ammunition was carried out by piling up the rounds, sometimes inside a crater from a past disposal, dousing the pile with diesel fuel, and exploding the pile with a small explosive. EOD personnel also stated that the range had been used for a brief time as a target range for aircraft to drop "dummy" bombs onto. Soil and groundwater samples were collected and analytical results indicated that soil and groundwater had not been impacted by site activities. As a result, the Pre-RI recommended SC.
No Action DD (2001)	2001	The Final NFA DD was completed May 8, 2001.

8.2.9 Site 13—Golf Course Construction Dump Site

Site 13, the Golf Course Construction Dump Site, encompasses approximately 10 acres in the Paradise Point area of the Base (**Figure 8-39**). In 1944, Site 13 was reportedly used for surface disposal of construction debris including clippings, branches, and asphalt associated with golf course construction.

FIGURE 8-39
IRP Site 13



Previous investigations are listed in **Table 8-53**.

TABLE 8-53
Previous Investigations Summary, IRP Site 13

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at the site, and the IAS concluded that NFA was necessary.
Limited Site Assessment (Osage, 2008)	2008	An LSA was conducted to substantiate the NFA status. Representative soil and groundwater samples were collected from across the site and analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. The soil and groundwater analytical results indicated no compounds were detected above regulatory screening levels and the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.10 Site 15 (SWMU 46)—Montford Point Burn Landfill Area

Site 15, the former Montford Point Burn Landfill Area operated between 1948 and 1958 and was used for the disposal of sewage treatment sludge and other materials, including litter, metal, asphalt, and sand (**Figure 8-40**). Surface wastes in this area were investigated under the RCRA program as SWMU 46. Upon removal of surface wastes, Site 15 was transferred to the IRP on December 28, 2007. The site covers approximately 24 acres and the waste disposal area is 2 acres.

In 2012, the Base added soil industrial LUCs for conservativeness, based on the Sites history as a dump.

FIGURE 8-40
IRP Site 15



Previous investigations are listed in **Table 8-54**.

TABLE 8-54
Previous Investigations Summary, IRP Site 15

Previous Investigation/Action	Date	Activities
CSI (Baker, 2001; 2002)	1997 - 2002	A Phase I CSI was conducted in 1997 and recommended a Phase II CSI, which was performed in 2002. Together the CSIs included soil sampling for metals and SVOCs, groundwater sampling for metals, and a geophysical survey to identify the location of the buried waste. The results indicated that an anomaly consistent with a small landfill was present in the central portion of the site.
RFI (CH2M HILL/Baker, 2005)	2004 - 2005	An RFI was conducted to further identify the waste locations and evaluate potential contamination. The RFI consisted of additional geophysical testing, test pit trenching, surface and subsurface soil sampling, installation of one monitoring well, and groundwater sampling. Soil samples were analyzed for VOCs, SVOCs, metals, and pesticides and groundwater was analyzed for metals. The RFI concluded that metals in surface soil and metals and pesticides in the landfill posed potential risks to human and ecological receptors. It was recommended that surface mounds and contaminated surface soil should be managed as RCRA waste and the landfill waste be managed under CERCLA as Site 15.
Site Reconnaissance and Soil Sampling (CH2M HILL, 2006)	2006	Mound and surface soil sampling for VOCs, SVOCs, pesticides/PCBs, and RCRA metals was conducted to identify the area for removal. Pesticides and metals that exceeded screening criteria were identified for IMs removal.
IM (Shaw, 2007)	2007	Removal of three mounds and a surface soil area to a depth of 1 foot bgs was conducted. A total of 1,039 tons of soil and debris were removed and confirmation soil sampling indicated pesticide and metal concentrations below screening criteria.
PA/SI (CH2M HILL, 2010)	2009-2010	A field investigation was completed at Site 15 in support of the potential Camp Johnson MILCON project. Field activities included soil and groundwater sampling for VOCs, SVOCs, pesticides/PCBs, and metals, and the excavation of test pits for waste delineation. Buried waste was not encountered in the test pits, with the exception of small inert pipes and metal. Potentially unacceptable human health risks were identified based on chromium in groundwater at one location. Potentially unacceptable ecological risks were identified for one surface soil and three subsurface soil areas based on pesticides, PCBs, and metals. Additional sampling and risk assessment were recommended.
ESI (CH2M HILL, 2012)	2011 - 2012	An ESI was conducted to further assess the nature and extent of contaminants and evaluate potential risks to human health and the environment. Field activities included soil and groundwater sampling for VOCs, SVOCs, Pesticides/PCBs, and metals. Exposure to surface and subsurface soil would not result in unacceptable risks to human health. Although potentially unacceptable risks were identified due to future residential exposure to SVOCs (primarily benzo(a)pyrene) in groundwater; benzo(a)pyrene was detected in only 1 of 8 samples, was not detected in the duplicate sample, and the concentration was below the MCL. No significant ecological risks were identified from exposure to surface soil. For subsurface soil, potential risks to lower and upper trophic level receptors could occur if the lead and pesticides in subsurface soil is exposed. However, given the lack of deep-dwelling earthworms, limited burrowing activity, unlikelihood for excavation in the waste disposal area, and the relatively small area exposed by occasional tree falls, exposure to subsurface soils is unlikely. Based on these conclusions, NFA was recommended.

8.2.11 Site 18—Watkins Village (E) Site

Site 18, Watkins Village (E) Site, includes approximately 1 acre in the Paradise Point area of the Base (**Figure 8-41**). From 1976 to 1978, construction materials and debris were reportedly buried at Site 18.

FIGURE 8-41
IRP Site 18



Previous investigations are listed in **Table 8-55**.

TABLE 8-55
Previous Investigations Summary, IRP Site 18

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at Site 18, and no further assessment was recommended.
Confirmatory Site Assessment (Osage, 2011)	2009-2011	To verify the presence or absence of contamination, a Confirmatory Site Assessment was conducted due to the site's history as a dump. Field activities included soil and groundwater sampling for VOCs, SVOCs, herbicides, pesticides/PCBs, and metals. Metals were detected in soil at concentrations exceeding regulatory screening criteria and background; however, no human health or ecological risks were identified and the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.12 Site 19—Naval Research Laboratory Dump

Site 19, the Naval Research Laboratory Dump, is located within the Former Naval Research Laboratory boundary which encompasses approximately 4 acres located on the Mainside of the Base. From 1947 to 1976, the Naval Research Laboratory was located in the area of the Pest Control Shop (**Figure 8-42**). Activities at the laboratory included using radionuclides (Iodine 131) for metabolic studies on small animals. From 1956 to 1960, approximately 100 dogs were disposed of. Because Iodine 131 has a half-life of only 8 days, potential for residual radiological contamination was considered to be negligible. In November 1980, Strontium-90 beta buttons were found while grading a parking lot. The area was surveyed, and contaminated items were recovered. Soil samples were obtained and the site was cleaned of radioactive substances. Five 55-gallon drums of soil and animal residues were collected along with 499 beta buttons and appropriately disposed offsite.

FIGURE 8-42
IRP Site 19



Previous investigations are listed in **Table 8-56**.

TABLE 8-56
Previous Investigations Summary, IRP Site 19

Previous Investigation/Action	Date	Activities
Report of Radiological Affairs Technical Assistance Visit (NEESA, 1981)	1981	Based on the discovery of beta buttons (self-illuminating markers containing strontium-90 used on Naval vessels to light pathways and entrances) an evaluation of former burial pits was conducted. Approximately 500 Beta buttons, animal carcasses, and 160 pounds of soil contaminated with strontium-90 were removed. The contaminated material was stored in an onsite building until it was transported to the Nuclear Regulatory Commission for disposal. The former burial area was radiologically surveyed <i>in situ</i> for beta contamination and soil samples were collected from the burial site and sent to Naval Energy and Environmental Support Activity (NEESA) for isotope analysis. Results confirmed that the contamination was removed and that the site was available for unrestricted use.
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Based on historical documentation, Site 19 was identified as a potential hazard to human health and the environment based on past use as a dump and radiological site use. Based on the results of the 1981 radiological investigation and the small quantity of waste reportedly buried, Site 19 was not recommended for further investigation.
Focused SI (CH2M HILL, 2008)	2007	The Focused SI was initiated to evaluate the presence or absence of chemical impacts to human health and the environment in support of future MILCON activities. Surface soil, subsurface soil, and groundwater samples were collected and analyzed for VOCs, SVOCs, Pesticides/PCBs and metals. Metals, VOCs, SVOCs, and pesticides/PCBs were detected in soil and groundwater at levels exceeding screening criteria. An HHRA was recommended to confirm that no unacceptable risk is present.
Radiological Survey (NAVSEADDET, 2007)	2007 - 2008	Radiological Affairs Service Office (RASO) collected surface and subsurface soil samples from the former burial pit area. Laboratory analysis for strontium-90 did not detect radioactivity above natural background levels in any of the soil samples.
Wallace Creek ESI (CH2M HILL, 2010)	2009 - 2010	An HHRS and an ERS were performed on the data that was collected during the Focused SI in 2007, and no unacceptable risks to human health or ecological risk receptors were identified. Therefore, the site was closed with NFA.
No Action DD (CH2M HILL, 2011)	2011	The Final NFA DD was signed in November 2011.

8.2.13 Site 20—Naval Research Lab Incinerator

Site 20, the Naval Research Lab Incinerator, is located within the Former Naval Research Laboratory boundary which encompasses approximately 4 acres located on the Mainside of the Base (**Figure 8-43**). From 1947 to 1976, the Naval Research Laboratory was located in the area of the Pest Control Shop. Activities at the laboratory included using radionuclides (Iodine 131) for metabolic studies on small animals. From 1956 to 1960, Site 20 was used for the incineration of burnable wastes.

FIGURE 8-43
IRP Site 20



Previous investigations are listed in **Table 8-57**.

TABLE 8-57
Previous Investigations Summary, IRP Site 20

Previous Investigation/ Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Site 20 was identified as a potential hazard to human health and the environment based on past use as an incinerator and the potential for radiological contamination from past activities at the Laboratory. Due to the small quantity of waste reportedly burned, NFA was recommended.
Radiological Survey (NAVSEADDET, 2007)	2007	RASO collected samples from the concrete pad for analysis of Strontium-90. No radioactivity was detected above natural background levels. No unacceptable risks were expected to future site workers.

Previous Investigation/ Action	Date	Activities
Focused SI (CH2M HILL, 2008)	2007 - 2008	The Focused SI was initiated to evaluate the presence or absence of impacts to human health and the environment to support future MILCON activities. Surface soil, subsurface soil, and groundwater samples were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Metals, VOCs, SVOCs, and pesticides/PCBs were detected in soil and groundwater at levels exceeding screening criteria. As a result, confirmatory sampling for TCE and an HHRA were recommended.
Radiological Investigation (Aleut World Solutions, LLC, 2009)	2008 - 2009	The Navy requested a more detailed radiological investigation to be performed. Radiological surveying and surface and subsurface soil samples were collected within the footprint of the former incinerator for analysis of Sr-90 and Ra-226. Two soil samples were reported slightly above natural background levels for Sr-90; however, no radioactivity was detected above background for Ra-226. Based upon the results, no unacceptable risks were expected to future site workers.
Wallace Creek ESI (CH2M HILL, 2010)	2009 - 2010	An HHRS and an ERS were performed on the data that was collected during the Focused SI in 2007, and no unacceptable risks to human health or ecological receptors were identified. Confirmatory sampling was also conducted, and TCE was not detected. Therefore, the site was closed with NFA.
No Action DD (CH2M HILL, 2011)	2011	The Final NFA DD was signed in November 2011.

8.2.14 Site 23—Roads and Grounds Building 1105

Site 23, the Roads and Grounds Building 1105, is located in the HPIA, within the boundaries of IRP Site 78, covering less than a half of an acre (Figure 8-44). In 1958, the Pest Control Shop, moved its activities to Building 1105. From 1958 until 1977, Building 1105 was used for storage of insecticides and herbicides, while mixing of the chemicals was performed at Lot 140 (IRP Site 21). Storage and handling procedures at Building 1105 were reportedly adequate to prevent any large spills and to ensure a current safe working environment. Chemicals reportedly stored in Building 1105 included chlorinated hydrocarbons such as DDT and chlordane as well as diazinon, malathion, lindane, mirex, 2,4-D, dalapon, and dursban.

FIGURE 8-44
IRP Site 23



Previous investigations are listed in **Table 8-58**.

TABLE 8-58
Previous Investigations Summary, IRP Site 23

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Although the site had been listed as a potential hazardous waste site, no spills or disposal of materials had been reported and no further assessment was recommended.
Confirmatory Site Assessment (CH2M HILL, 2011)	2009 - 2011	To verify the presence or absence of contamination, a Confirmatory Site Assessment was conducted to determine impacts of previous pesticide and herbicide storage. Field activities included collection of soil samples for SVOCs, VOCs, pesticides, herbicides, and metals. No pesticides or herbicides were detected above screening criteria; however, VOCs were detected in groundwater and potential human health risks were identified attributable to Site 78; therefore, the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

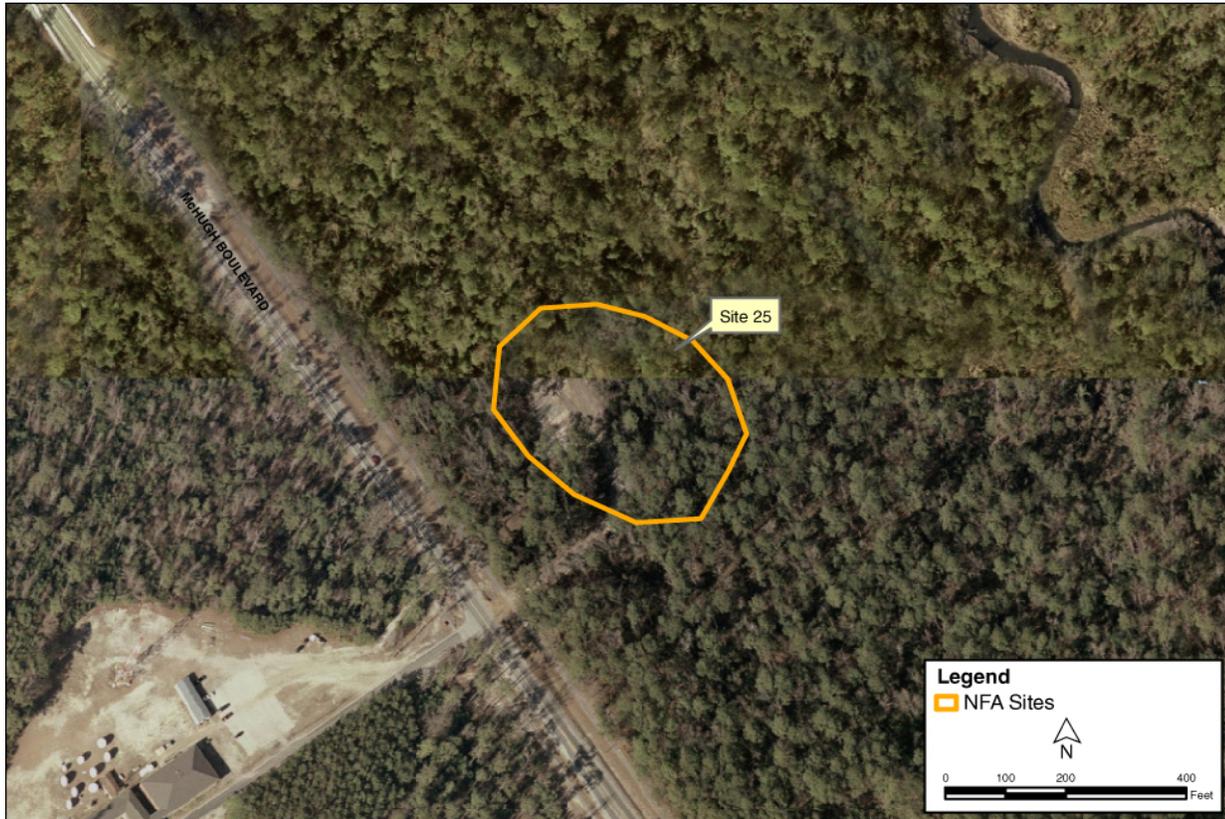
TABLE 8-59
Previous Investigations Summary, IRP Site 24

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Research indicated that past site operations may have impacted groundwater and surface water and recommended an additional investigation.
Confirmation Study (ESE, 1987)	1984 - 1987	The Confirmation Study included groundwater, surface water, and sediment investigations. Analytical results identified the presence of metals in groundwater, surface water, and sediment. However, the detected concentrations in surface water and sediment did not exceed regulatory standards.
RI/FS (Baker, 1994)	1994	RI field activities included a site survey, groundwater, soil, sediment, and surface water sampling. Analytical results identified pesticides and metals in soil and groundwater. Potential unacceptable human health risks were identified due to pesticides in groundwater. No unacceptable ecological risks were identified. An FS was developed to screen remedial alternatives for addressing groundwater contamination.
PRAP and ROD (Baker, 1994)	1994	The PRAP was submitted for public review and comment in July 1994. The Final ROD was signed in September 1994. The selected remedial alternative was LTM for groundwater.
LTM	1996 - 1997	LTM was implemented in 1996 and discontinued in 1997 after evaluating the analytical results collected over four consecutive quarters that indicated no pesticides or metals concentrations in groundwater exceeded the cleanup levels. In 2001, the LTM Report documented the completion of LTM.

8.2.16 Site 25—Base Incinerator

Site 25 encompasses approximately half an acre on the Mainside of the Base. From 1940 to 1960, Site 25 operated as the Base Incinerator, burning trash and classified materials (**Figure 8-46**). Potential materials present at the site include burned trash, ashes, and melted glass.

FIGURE 8-46
IRP Site 25



Previous investigations are listed in **Table 8-60**.

TABLE 8-60
Previous Investigations Summary, IRP Site 25

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCI-EAST-MCB CAMLEJ. Site 25 was identified based on past use as an incinerator. However, historical records indicated that non hazardous materials were disposed of (i.e. trash and glass) and NFA was recommended.
Focused SI (CH2M HILL, 2008)	2007 - 2008	To evaluate the presence or absence of chemical impacts to human health and the environment in order to support future MILCON activities, soil and groundwater samples were collected and analyzed for VOCs, SVOCs, Pesticides/PCBs, and metals. Arsenic was detected in surface soil samples above screening levels, and an HHRA was recommended.
Wallace Creek ESI (CH2M HILL, 2009)	2009 - 2010	An HHRS and an ERS were performed on the data that was collected during the Focused SI in 2007, and no unacceptable risks to human health or ecological receptors were identified. Therefore, the site was closed with NFA.
No Action DD (CH2M HILL, 2011)	2011	The Final NFA DD was signed in November 2011.

8.2.17 Site 30 (OU 7)—Sneads Ferry Road Fuel Tank Sludge Area

Site 30, the Sneads Ferry Road Fuel Tank Sludge Area, is located within OU 7 on the Mainside of the Base and covers approximately 1 acre (**Figure 8-47**). OU 7 consists of three sites (Sites 1, 28, and 30) that have been grouped together into one OU because of their unique characteristics of suspected waste (POL) and geographic location. Site 30 was reportedly used by a private contractor in 1970 to clean out two 12,000-gallon emptied fuel storage tanks when the contents of the tanks were converted from leaded gasoline to unleaded gasoline. Sludge and/or washout was reportedly drained from the tanks and disposed of along a tank trail which intersects Sneads Ferry Road. The composition of the waste is unknown, but it may have contained cleansing compounds and possibly diluted tetraethyl lead. An estimated minimum of 600 gallons was reportedly disposed.

FIGURE 8-47
IRP Site 30, Operable Unit 7



Previous investigations are listed in **Table 8-61**.

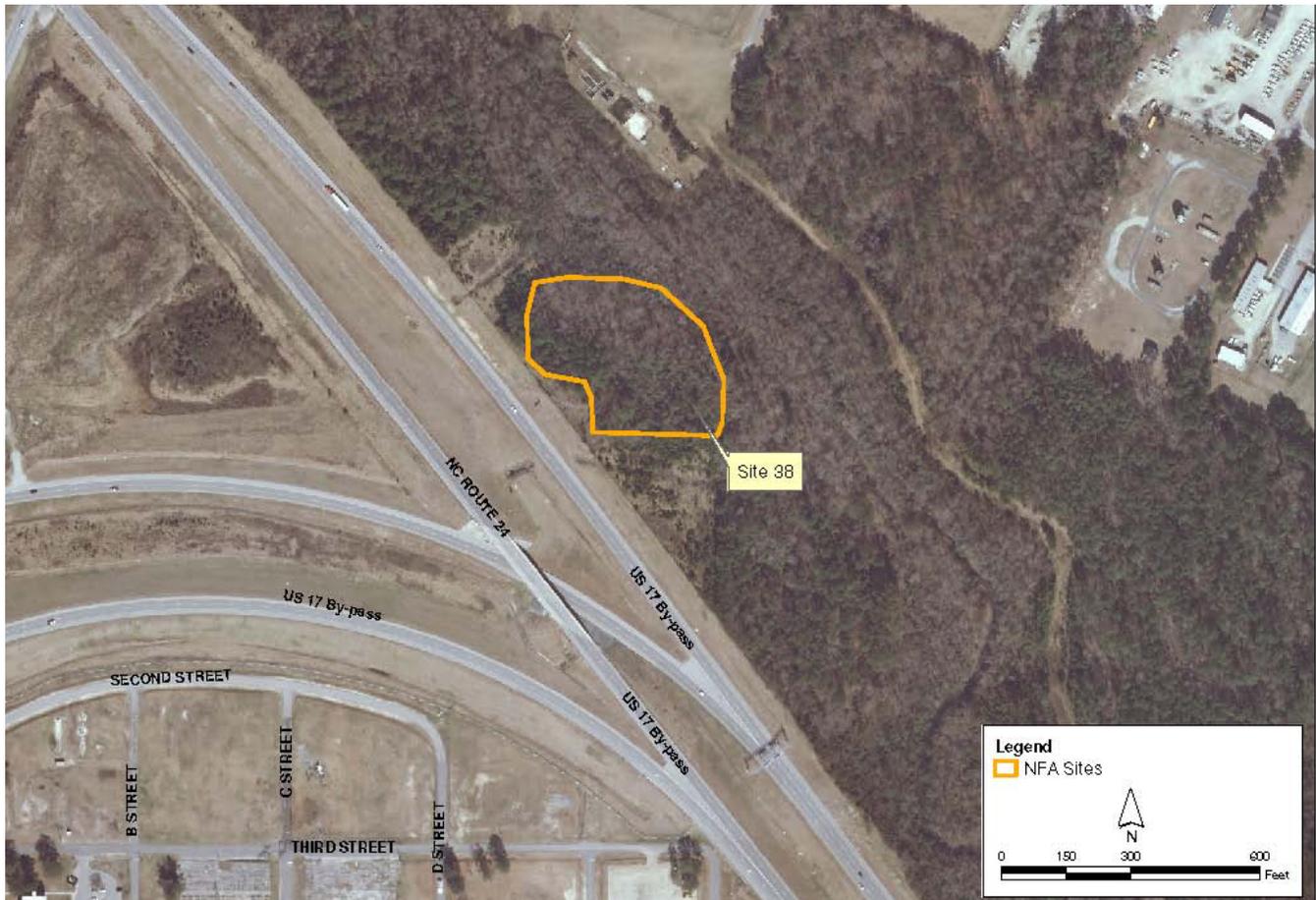
TABLE 8-61
Previous Investigations Summary, IRP Site 30

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The IAS concluded that sludge deposits could potentially impact groundwater and recommended an additional investigation to determine the boundaries of the impacted area and verify the presence of hazardous wastes.
Confirmation Study (ESE, 1987)	1984 - 1987	Confirmation Study field activities included groundwater, surface water, and sediment investigations. Analytical results identified O&G in the disposal area and in stream bed sediments as well as lead in groundwater.
RI (Baker, 1994)	1994	To further characterize the nature and extent of contamination an RI was conducted. Field activities consisted of a site survey and soil, groundwater, surface water, and sediment sampling. No unacceptable human health or ecological risks were identified at Site 30.
PRAP (1995) and ROD (Baker, 1996)	1995 - 1996	The PRAP was submitted for public review and comment in July 1995. The Final ROD was signed in May 1996 and due to the absence of contamination the site was closed with NFA.

8.2.18 Site 38—Camp Geiger Construction Dump

Site 38, the Camp Geiger Area Surface Dump, encompasses approximately 3 acres in the Camp Geiger area of the Base (**Figure 8-48**). The dates of operation are unknown, but Site 38 was reportedly used for surface disposal of construction debris and branches. During the IAS, evidence of dumping activities was observed.

FIGURE 8-48
IRP Site 38



Previous investigations are listed in **Table 8-62**.

TABLE 8-62
Previous Investigations Summary, IRP Site 38

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at Site 38, and concluded that no further assessment was necessary.
Confirmatory Site Assessment (CH2M HILL, 2011)	2010-2011	To verify the presence or absence of contamination due to the site's history as a dump, confirmatory sampling was conducted. Soil and groundwater samples were collected and analyzed for VOCs, SVOCs, and metals. No unacceptable risks to human health or the environment were identified and the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.19 Site 40—Camp Geiger Area Borrow Pit

Site 40, the Camp Geiger Area Borrow Pit, encompasses approximately 22 acres (**Figure 8-49**). Starting in 1969, Site 40 was reportedly used for disposal of auto parts and metal. The former borrow pit dump was reported to have covered an area of approximately 4 to 5 acres within Site 40.

FIGURE 8-49
IRP Site 40



Previous investigations are listed in **Table 8-63**.

TABLE 8-63
Previous Investigations Summary, IRP Site 40

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. Site 40 was identified as being a waste disposal site for automobile parts and scrap metal. Site 40 was recommended for NFA because there was insufficient evidence that hazardous substances were associated with the site.
PA/SI (CH2M HILL, 2009)	2008 - 2009	A PA/SI was conducted to characterize potential contamination at Site 40 based on potential MILCON projects in the vicinity. Field activities included soil, groundwater, surface water, and sediment sampling and test pitting to delineate the former dump area. Samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. No wastes were encountered and no risks to human health or the environment were identified. The site was closed with NFA.
NFA DD (2010)	2010	The Final NFA DD was signed in August 2010.

8.2.20 Site 42—Building 705 BOQ Dump

Site 42, the Building 705 Bachelor Officers Quarters (BOQ) Dump, encompasses approximately 2.8 acres located in the MCAS New River portion of the Base (**Figure 8-50**). From 1950 to 1960, Site 42 was reportedly used for surface disposal of debris including trees, tree stumps, and boards.

FIGURE 8-50
IRP Site 42



Previous investigations are listed in **Table 8-64**.

TABLE 8-64
Previous Investigations Summary, IRP Site 42

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at Site 42 and no further assessment was recommended.
Confirmatory Site Assessment (CH2M HILL, 2011)	2009-2011	To verify the presence or absence of contamination due to the site's history as a dump, confirmatory sampling was conducted in FY 2009. Soil and groundwater samples were collected and analyzed for VOCs, SVOCs, and metals. Based on the results, no unacceptable human health or ecological risks were identified and the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.21 Site 46—MCAS Main Gate Dump

Site 46, the MCAS Main Gate Dump, encompasses less than 1 acre in MCAS New River, in the northwest portion of the Base (**Figure 8-51**). From 1958 to 1962, Site 46 was reportedly used for disposal of construction and demolition debris.

FIGURE 8-51
IRP Site 46



Previous investigations are listed in **Table 8-65**.

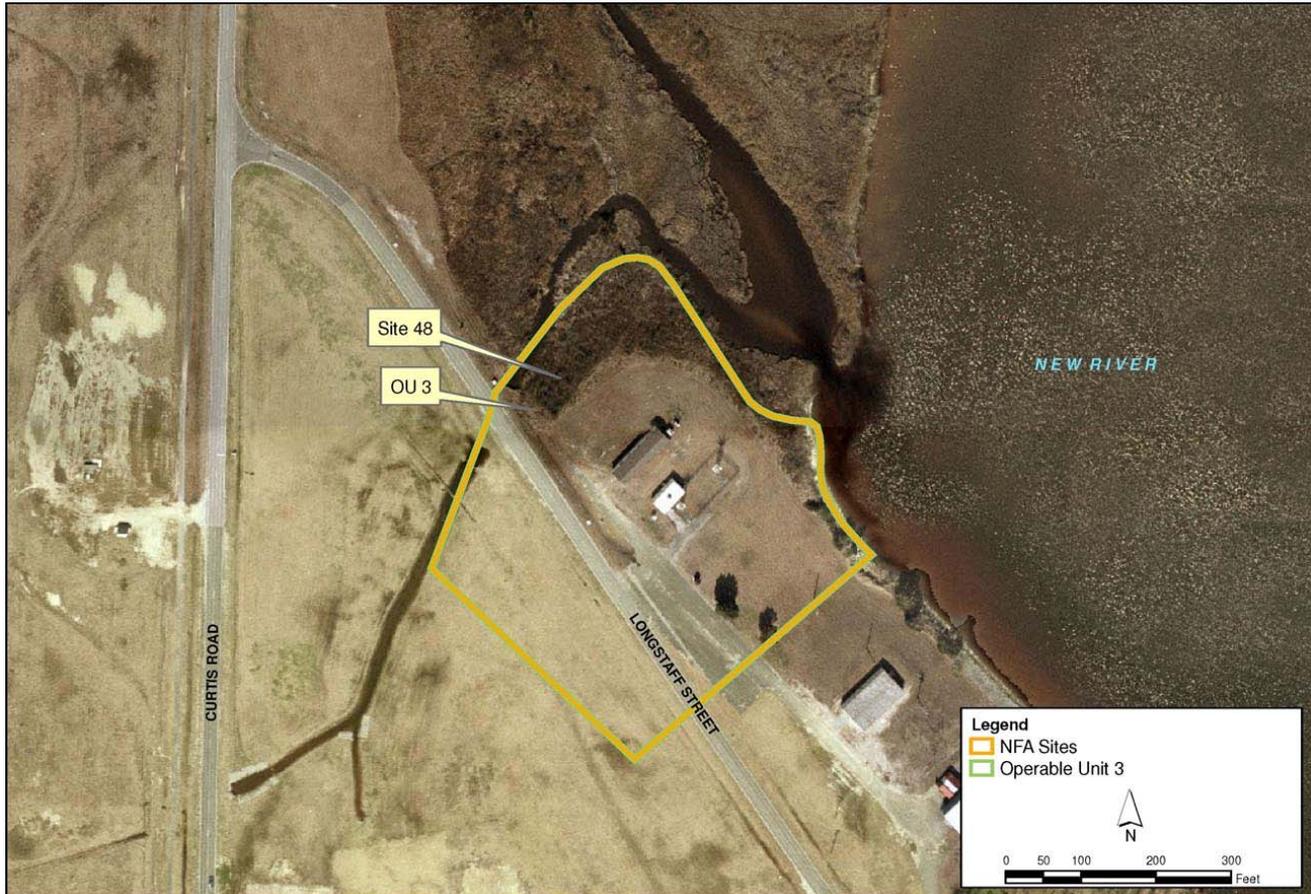
TABLE 8-65
Previous Investigations Summary, IRP Site 46

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at Site 46 and no further assessment was recommended.
Confirmatory Site Assessment (Osage, 2011)	2009-2011	To verify the presence or absence of contamination due to the site’s history as a dump, confirmatory sampling was conducted. Soil and groundwater samples were collected and analyzed for VOCs, SVOCs, herbicides, pesticides, and metals. No unacceptable risks to human health or the environment were identified and the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.22 Site 48 (OU 3)—MCAS Mercury Dump

Site 48, the MCAS Mercury Dump, encompasses approximately 5 acres within MCAS New River, in the northwest portion of the Base. Building AS-804 was constructed in 1955 and was used as the Administration Office and Photographic Lab from 1955 to 1990 (**Figure 8-52**). From 1956 to 1966, mercury was drained from radar units and disposed in small quantities behind the building. It was reported that approximately 1 gallon of mercury per year over a 10-year period was disposed in this manner.

FIGURE 8-52
IRP Site 48, Operable Unit 3



Previous investigations are listed in **Table 8-66**.

TABLE 8-66
Previous Investigations Summary, IRP Site 48

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. An estimated 1,000 pounds of mercury was possibly dispersed over approximately 20,000 ft ² adjacent to the New River. It was concluded that mercury disposal practices could potentially impact the New River and recommended a Confirmation Study to verify the presence of mercury.
Confirmation Study (ESE, 1987)	1984 - 1987	A Confirmation Study was conducted to verify the presence of mercury. Field activities included soil and sediment investigations. Low levels of mercury were identified in both media, and further characterization was recommended.

Previous Investigation/Action	Date	Activities
Supplemental Characterization (1991)	1991	A Supplemental Characterization Investigation was conducted based on results of the confirmation study. Field activities included surface water and sediment sampling. Mercury was not detected in any samples collected during the investigation. The risk evaluation identified several metals (not mercury) as COPCs.
RI (1992)	1992	To further characterize the nature and extent of contamination a RI was conducted. Field activities included a geophysical investigation and soil, groundwater, surface water, and sediment sampling. The geophysical investigation did not identify any objects associated with mercury disposal, and analytical results did not identify mercury in any media sampled. Pesticides and metals were detected in surface soil samples. Low levels of organics and metals were detected in groundwater and surface water samples, and pesticides, PAHs, and metals were detected in sediment samples. No potential unacceptable human health or ecological risks were identified.
PRAP and ROD (Baker, 1993)	1993	A PRAP was issued to solicit public input on the preferred alternative (no action) and a public meeting was held. The Final ROD was issued and signed in September 1993. Because no RAs were required in the ROD, the site was closed with NFA.

8.2.23 Site 51—MCAS Football Field

Site 51, the MCAS Football Field, encompasses approximately 20 to 30 acres in MCAS New River, in the northwest portion of the Base. Site 51 was reportedly the site of empty container disposal between approximately 1967 and 1968 (**Figure 8-53**). Paint cans and hydraulic fluid cans were reportedly disposed.

FIGURE 8-53
IRP Site 51



Previous investigations are listed in **Table 8-67**.

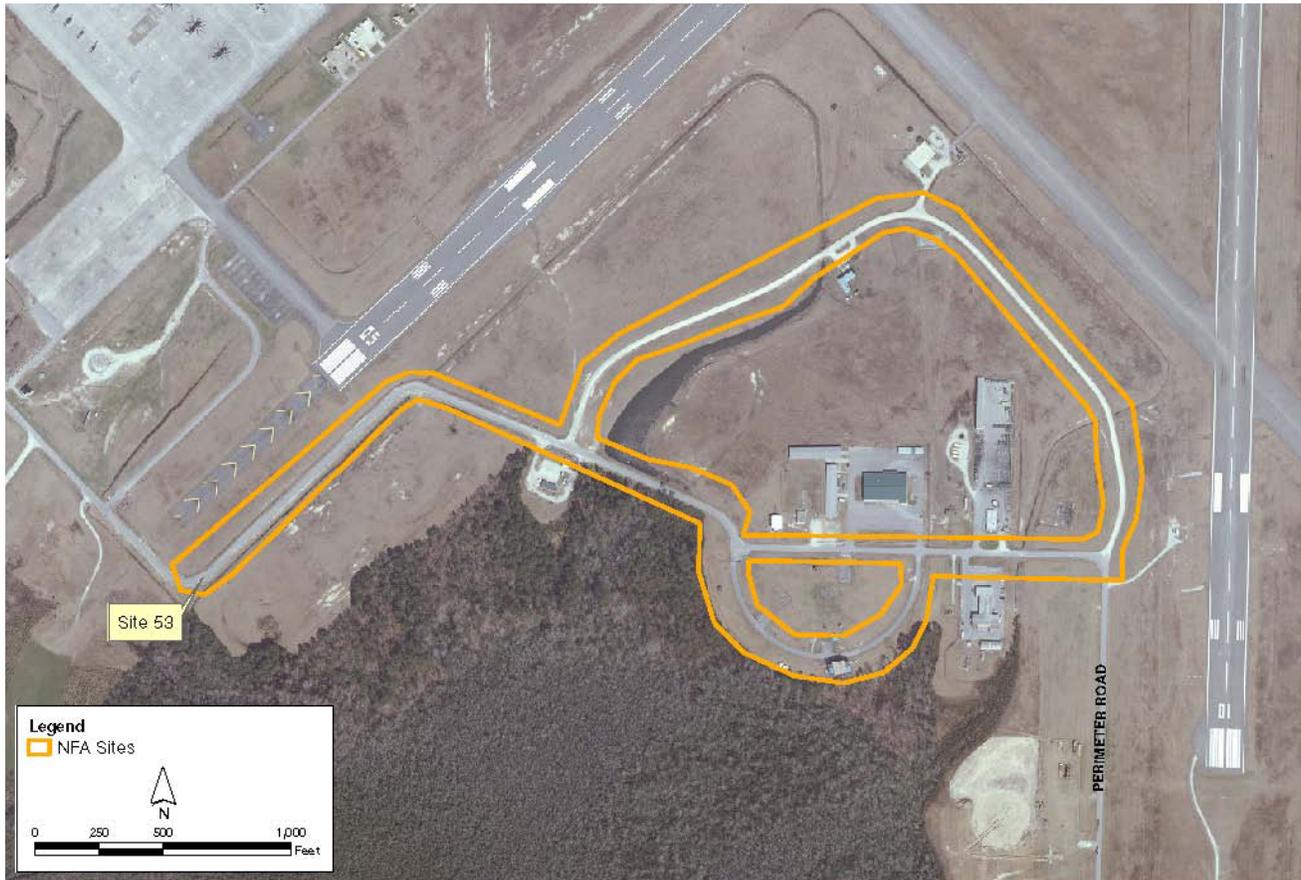
TABLE 8-67
Previous Investigations Summary, IRP Site 51

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The quantity of any waste reportedly disposed of at IRP Site 51 was determined to be insignificant and did not warrant further investigation.
Confirmatory Site Assessment (Osage, 2011)	2009-2011	To verify the presence or absence of waste, confirmatory sampling was conducted. Soil and groundwater samples were collected and analyzed for SVOCs, VOCs, pesticides/PCBs, and metals. No unacceptable risks were identified to human health or the environment and the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.24 Site 53—MCAS Warehouse Building 3525 Area

IRP Site 53, the MCAS Warehouse Building 3525 Area, encompasses approximately 3 miles of roadway in MCAS New River, in the northwest portion of the Base (Figure 8-54). From 1970 to 1975, liquid wastes were sprayed on the unimproved dirt roads in the vicinity of IRP Site 53 to control dust. The liquid waste mixture reportedly contained crankcase waste oil, JP fuels, and paint thinners.

FIGURE 8-54
IRP Site 53



Previous investigations are listed in Table 8-68.

TABLE 8-68
Previous Investigations Summary, IRP Site 53

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The quantity of any waste reportedly disposed of at IRP Site 53 was determined to be insignificant and did not warrant further investigation.
Confirmatory Site Assessment (CH2M HILL, 2011)	2009-2011	To verify the presence or absence of waste, confirmatory sampling was conducted. Soil and groundwater samples were collected and analyzed for SVOCs, VOCs, PCBs, and metals. Potential human health risks were identified from arsenic groundwater at one temporary well location. A permanent monitoring well was installed, a groundwater sample was collected to confirm the results, and arsenic was not detected. Therefore, the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.25 Site 55—Air Station East Perimeter Dump

IRP Site 55, the Air Station East Perimeter Dump, encompasses approximately 6 acres in MCAS New River, in the northwest portion of the Base (**Figure 8-55**). From the 1950s to the 1960s, IRP Site 55 was reportedly used as a disposal area for barrels, tires, trash, metal planking, and telephone poles. The area is currently used as a marina and recreation area by the Air Station.

FIGURE 8-55
IRP Site 55



Previous investigations are listed in **Table 8-69**.

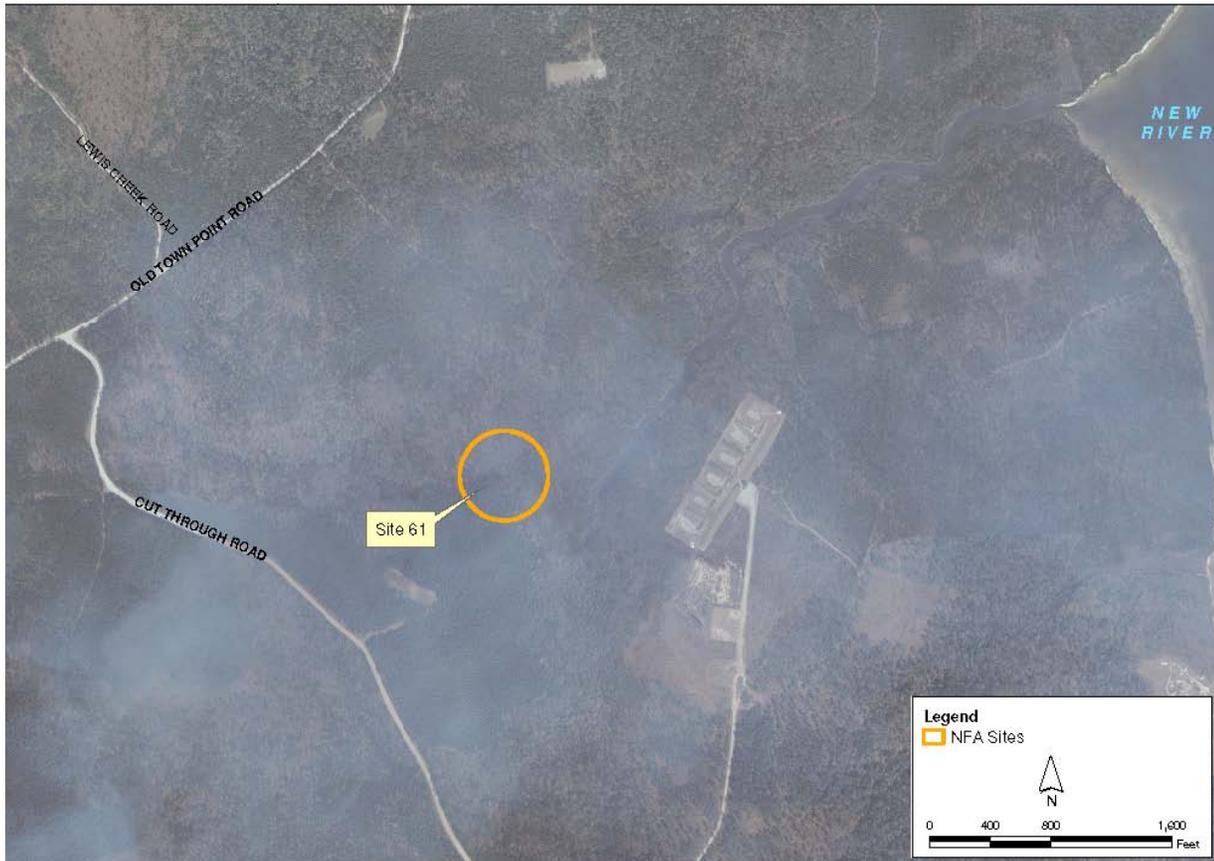
TABLE 8-69
Previous Investigations Summary, IRP Site 55

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at IRP Site 55, and no further assessment was recommended.
Confirmatory Site Assessment (CH2M HILL, 2011)	2009-2011	To verify the presence or absence of contamination due to the site's history as a dump, confirmatory sampling was conducted. Groundwater and soil samples were collected and analyzed for SVOCs, VOCs, pesticides/PCBs, herbicides, and metals and no unacceptable risks to human health or the environment were identified. The site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.26 Site 61—Rhodes Point Road Dump

IRP Site 61, the Rhodes Point Road Dump, encompasses approximately 8 to 10 acres, located nearly 5 miles south of the MCAS New River operations area (**Figure 8-56**). The exact dates of operation are unknown; however, it was reported that IRP Site 61 has been used as a disposal area for wastes generated during bivouac exercises. The site is currently used for war games, so site access/use is restricted.

FIGURE 8-56
IRP Site 61



Previous investigations are listed in **Table 8-70**.

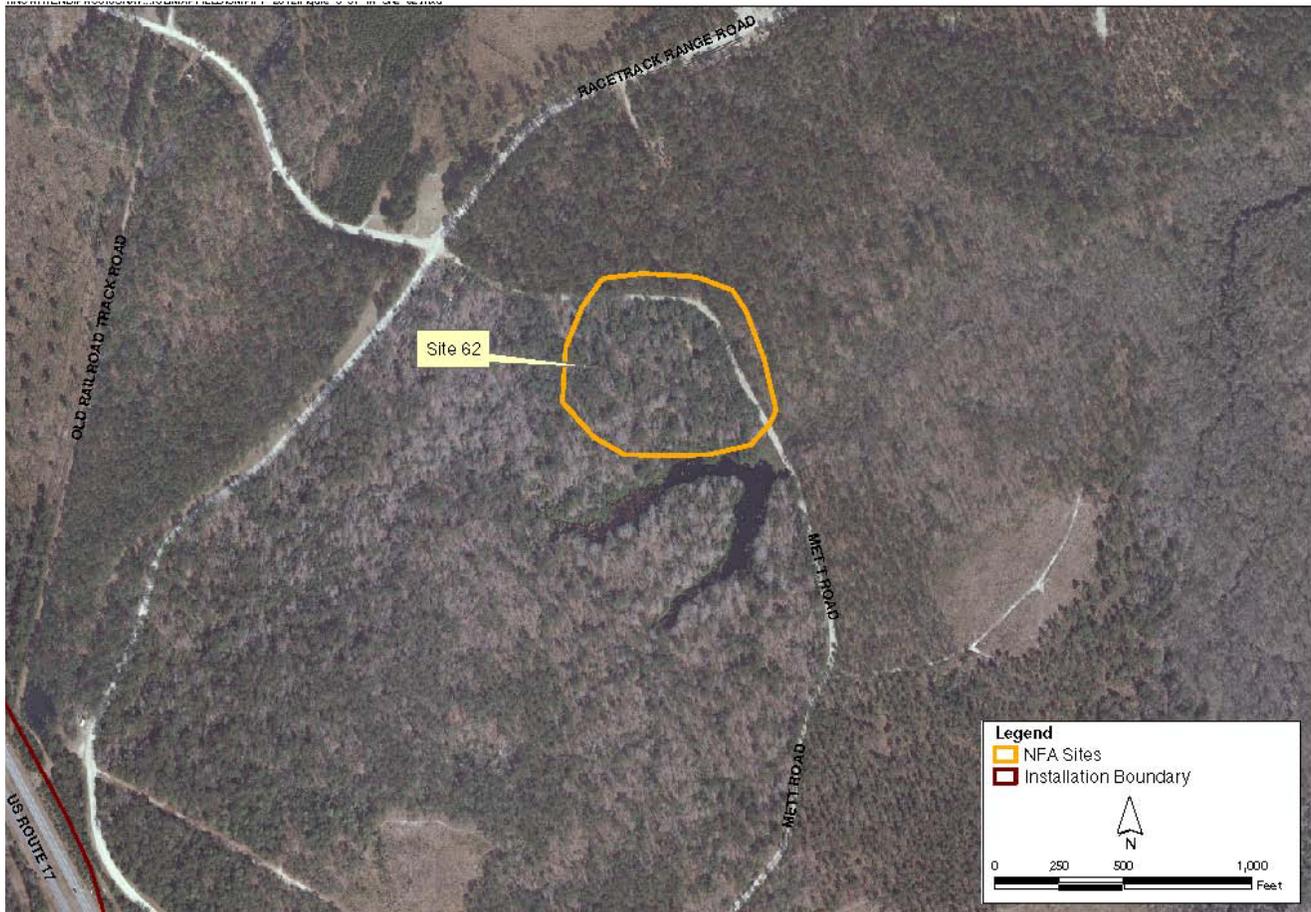
TABLE 8-70
Previous Investigations Summary, IRP Site 61

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at IRP Site 61, and no further assessment was recommended.
Confirmatory Site Assessment (CH2M HILL, 2011)	2009-2011	To verify the presence or absence of waste, confirmatory sampling was conducted. Soil and groundwater samples were collected and analyzed for SVOCs, VOCs, PCBs, and metals. Potential human health risks were identified from arsenic groundwater at one temporary well location. A permanent monitoring well was installed, a groundwater sample was collected to confirm the results, and arsenic was detected below regulatory criteria and background. Therefore, the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.27 Site 62—Race Course Area Dump

IRP Site 62, the Race Course Area Dump, encompasses approximately 1 to 2 acres, nearly 2 miles south of the MCAS New River operations area (**Figure 8-57**). The exact dates of operation are unknown; however, it was reported that IRP Site 62 has been used as a disposal area for wastes generated during bivouac exercises. The site is currently used for war games, so site access/use is restricted.

FIGURE 8-57
IRP Site 62



Previous investigations are listed in **Table 8-71**.

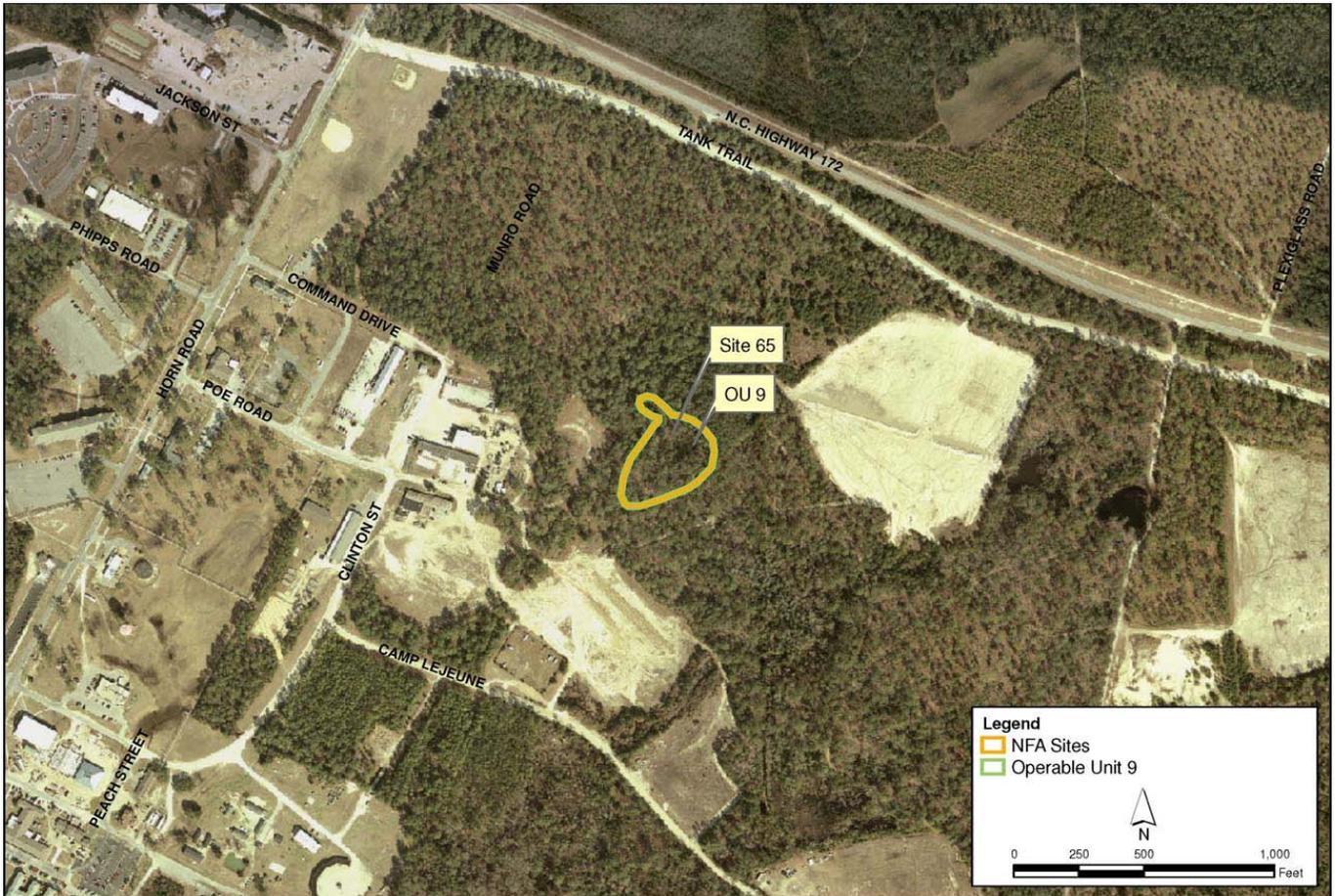
TABLE 8-71
Previous Investigations Summary, IRP Site 62

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at IRP Site 62, and no further assessment was recommended.
Confirmatory Site Assessment (CH2M HILL, 2011)	2009-2011	To verify the presence or absence of contamination due to the site's history as a dump, confirmatory sampling was completed. Soil and groundwater samples were analyzed for VOCs, SVOCs, and metals. No unacceptable risks to human health or the environment were identified. The site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.28 Site 65 (OU 9)—Engineer Area Dump

Site 65, the Engineer Area Dump, is located in the Courthouse Bay area of MCIEAST-MCB CAMLEJ and covers approximately 2 acres (**Figure 8-58**). Two separate disposal areas have been reported at Site 65, a battery acid disposal area and a liquid disposal area. The liquids that have been disposed are reported to have been POL types. In addition, the dump was used to burn construction debris. The dump was in operation from at least 1958 until 1972.

FIGURE 8-58
IRP Site 65, Operable Unit 9



Previous investigations are listed in **Table 8-72**.

TABLE 8-72
Previous Investigations Summary, IRP Site 65

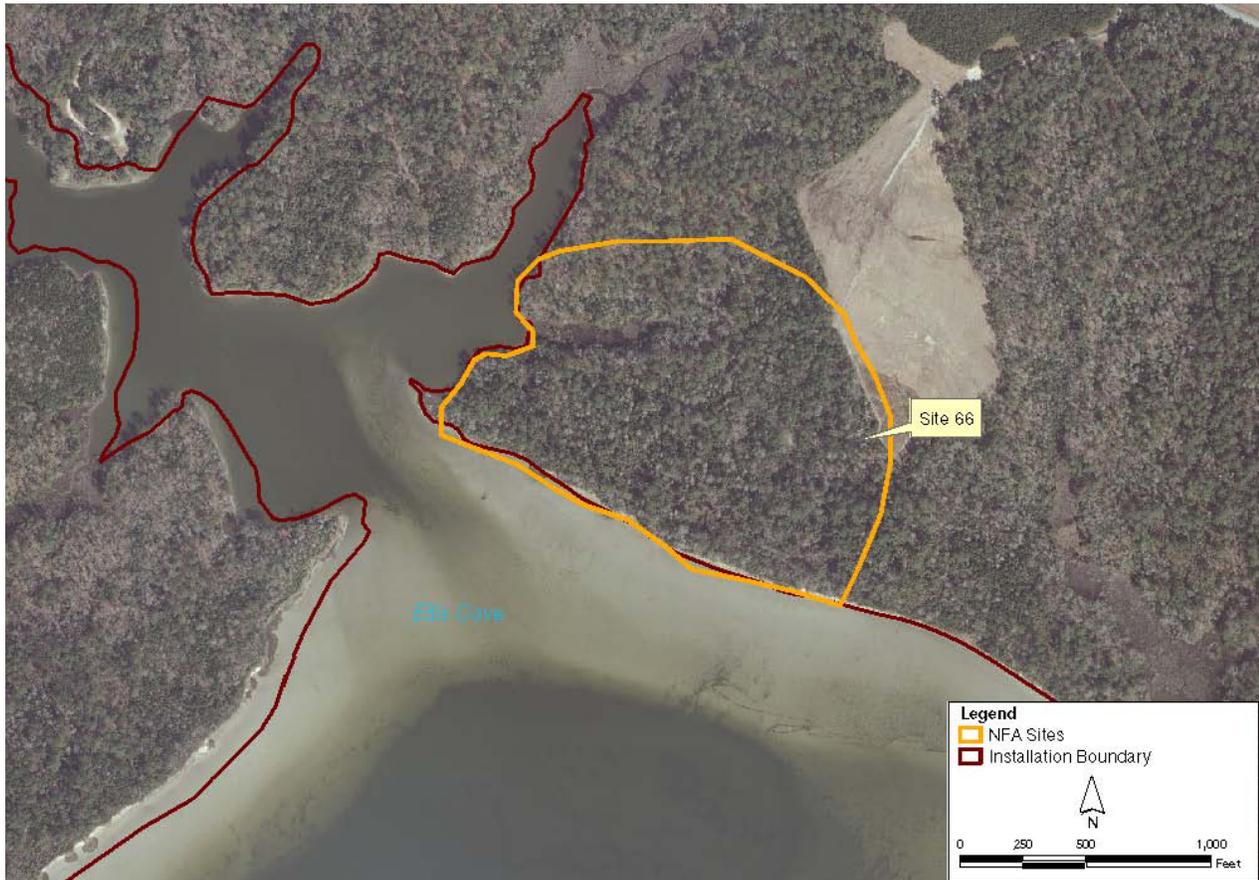
Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. No hazardous wastes were reportedly disposed of at the site, and no further assessment was recommended. However, the USEPA requested an additional investigation to determine whether hazardous waste contamination existed.
SI (Baker, 1991)	1991	An SI was conducted to verify the presence or absence of contamination. Field activities included soil, groundwater, surface water, and sediment sampling. Fill materials were encountered in site soils, confirming that waste material was disposed of at the site. Pesticides and metals were detected in groundwater and sediment samples. Based on these findings, the SI recommended further evaluation.

Previous Investigation/Action	Date	Activities
RI (Baker,1995)	1995	An RI was conducted to evaluate the nature and extent of contamination and potential risks to human health and the environment. Field activities included soil, groundwater, surface water, and sediment sampling, and ecological investigations. Findings from the RI indicated that there were no releases of hazardous substances from the waste disposal areas and no unacceptable human health or ecological risks were identified.
Post-RI Monitoring (Baker, 2001)	2001	Several discarded containers were discovered near the site in 2001. The containers were heavily corroded and no materials were observed in the containers. Groundwater, soil, surface water, and sediment were collected to determine if surrounding media had been impacted by potential releases. Analytical results indicated there were no effects caused by the containers.
PRAP and ROD (Baker, 2001)	2002	A PRAP was issued to solicit public input on the preferred alternative (no action) and a public meeting was held. The Final ROD was issued and signed in September 2001. The ROD for Site 65 stipulated that no additional RA or monitoring was required.

8.2.29 Site 66—AMTRAC Landing Site and Storage Area

IRP Site 66, the Amphibious Tractors (AMTRAC) Landing Site and Storage area, encompasses approximately 40 acres in the Courthouse Bay area of the Base (Figure 8-59). Beginning in the 1950s, IRP Site 66 was utilized for vehicle maintenance during training activities. Exact operations are unknown; however, it is likely that vehicle maintenance operations resulted in release of POL, and battery acid.

FIGURE 8-59
IRP Site 66



Previous investigations are listed in **Table 8-73**.

TABLE 8-73
Previous Investigations Summary, IRP Site 66

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCEAST-MCB CAMLEJ. Although spills of POL had likely occurred at IRP Site 66, the quantity was insignificant and did not warrant further investigation.
Confirmatory Site Assessment (CH2M HILL, 2011)	2009-2011	To verify the presence or absence of contamination, confirmatory sampling was conducted. Groundwater, soil, sediment, and surface water samples were collected and analyzed for SVOCs, VOCs, and metals. Potential ecological risks were identified from metals in surface water. Confirmation surface water sampling was conducted and the metals were not detected. Therefore, the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.30 Site 67—Engineer’s TNT Burn Site

IRP Site 67, Engineer’s Trinitrotoluene (TNT) Burn Site, encompasses approximately 7 acres located in the Courthouse Bay area of the Base (**Figure 8-60**). In 1951, IRP Site 67 was reportedly used for TNT disposal. Deep pits (2- to 3-feet deep) were dug and unwanted TNT was opened and burned. Complete consumption of all TNT was reported during these procedures.

FIGURE 8-60
IRP Site 67



Previous investigations are listed in **Table 8-74**.

TABLE 8-74
Previous Investigations Summary, IRP Site 67

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The quantity of any waste reportedly disposed of at IRP Site 67 was insignificant and did not warrant further investigation.
Confirmatory Site Assessment (CH2M HILL, 2010)	2009-2010	To verify the presence or absence of contamination due to the site’s history, confirmatory sampling was completed in FY 2010. Soil and Groundwater samples were analyzed for TNT and breakdown products. 2-Amino-4,6-DNT was detected in groundwater at one temporary well location. The concentration was below regulatory screening criteria; therefore, the site was closed with NFA.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in July 2012.

8.2.31 Site 75 (Pre-RI)—MCAS Basketball Court Site

Site 75, the MCAS Basketball Court Site, encompasses approximately 1 acre and is located in the MCAS New River operations area (**Figure 8-61**). Site 75 was reportedly a drum burial area that was used in the early 1950s. The excavation area was an oval-shaped pit approximately 90 feet long by 70 feet wide and was sufficiently deep to have encountered the water table. An estimated 75 to 100 55-gallon drums were placed in this pit. The drums reportedly contained a chloroacetophenone tear gas solution used for training. Additional organic chemicals, such as chloroform, carbon tetrachloride, benzene, and chloropicrin, may have been present in the solution.

FIGURE 8-61
IRP Site 75



Previous investigations are listed in **Table 8-75**.

TABLE 8-75
Previous Investigations Summary, IRP Site 75

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The IAS concluded that degradation of buried drums could result in the release of suspected materials into the groundwater, potentially impacting water supply wells within the area. Based on these findings, the IAS recommended additional investigation.
Pre-RI Screening Study (Baker, 1995)	1995	A Pre-RI screening study was conducted to determine whether contamination was present at the site. Field activities included a geophysical investigation and soil and groundwater sampling. The geophysical survey did not detect any major subsurface anomalies that could have been the suspected drums. SVOCs, pesticides, and metals were detected in soil samples and metals were detected in groundwater samples. No potential, unacceptable ecological risks were identified, and the Pre-RI recommended NFA.
NFA DD (CH2M HILL, 2001)	2001	The Final NFA DD was completed May 8, 2001.

8.2.32 Site 76 (Pre-RI)—MCAS Curtis Road Site

Site 76, the MCAS Curtis Road Site, is located in the MCAS New River operations area and covers approximately 3 acres (**Figure 8-62**). There are several base housing units to the immediate north of the Site 76 study area. The site was reportedly used as a drum disposal area on two occasions in 1949. The estimated area of the disposal unit is a quarter-acre, and approximately 25 to 75 55-gallon drums were allegedly disposed at this site. The drums reportedly contained a chloroacetophenone tear gas solution used for training similar to that allegedly buried at Site 75. Additional organic chemicals, such as chloroform, carbon tetrachloride, benzene, and chloropicrin, may have been present in the solution.

FIGURE 8-62
IRP Site 76



Previous investigations are listed in **Table 8-76**.

TABLE 8-76
Previous Investigations Summary, IRP Site 76

Previous Investigation/Action	Date	Activities
IAS (WAR, 1983)	1983	The IAS was conducted to identify potential hazardous sites at MCIEAST-MCB CAMLEJ. The IAS concluded that degradation of buried drums could potentially result in the release of suspected materials into groundwater. Based on these findings, the IAS recommended an additional investigation.
Pre-RI Screening Study (Baker, 1998)	1995 - 1998	A Pre-RI screening study was conducted to determine whether contamination was present at the site. Field activities included a geophysical investigation, soil, and groundwater sampling. The geophysical survey did not detect any major subsurface anomalies that could have been the suspected drums. VOCs, SVOCs, and pesticides were detected in soil samples. Metals were detected in groundwater samples. No unacceptable human health risks were identified due to the presence of metals in groundwater. As a result, the Pre-RI recommended NFA.
Additional Groundwater Sampling (Baker, 1999)	1999	In response to an agency comment and because metals were previously detected above screening criteria, groundwater was resampled in October 1999. Only aluminum and iron were detected above screening criteria and no unacceptable human health risks were identified.
NFA DD (CH2M HILL, 2001)	2001	The Final NFA DD was completed May 8, 2001.

8.2.33 Site 85—Former Camp Johnson Battery Dump

Site 85 covers approximately 5 acres of heavily vegetated land (**Figure 8-63**) in the Camp Johnson area of the MCIEAST-MCB CAMLEJ. During the 1950s Site 85 was used for battery disposal. The site was discovered in 1992 when decomposed batteries used in military communication equipment during the Korean War war were unearthed as a roadway was being widened. Discarded charcoal canisters from air purifying respirators and battery packs were also discovered throughout the site.

FIGURE 8-63
IRP Site 85



Previous investigations are listed in **Table 8-77**.

TABLE 8-77
Previous Investigations Summary, IRP Site 85

Previous Investigation/Action	Date	Activities
Pre-RI Screening Study (Baker, 1998)	1995 - 1998	A Pre-RI was initiated to assess the nature and extent of contamination. Field activities included a site survey, installation of temporary monitoring wells, and soil and groundwater sampling. Metals were detected in soil and groundwater samples collected near battery piles and a Baseline Risk Assessment identified potential risks to human receptors. The Pre-RI recommended an EE/CA for the battery piles and associated soil.
EE/CA (Baker, 1999)	1999	An EE/CA was prepared to evaluate remedial alternatives for metals in soil and groundwater at Site 85. The three alternatives were institutional controls (ICs), excavation and on-Base disposal, and treatment (<i>ex-Situ</i> soil washing). A public notice was issued and public meeting was held in October 1998. The recommended alternative in the EE/CA included removal of soil and batteries through a NTCRA, followed by re-evaluation of groundwater.

Previous Investigation/Action	Date	Activities
AM (Baker, 1999)	1999	An AM was completed to propose excavation with on-Base disposal as the NTCRA to address metals in soil and the battery piles.
NTCRA (OHM, 2000)	2000	The NTCRA was conducted and 158 tons of soil and debris were removed from 16 separate battery pile locations. Confirmation soil sampling was conducted.
LTM (Baker, 2002)	2001-2002	Groundwater LTM was initiated in July 2001 and included sampling of five monitoring wells on a quarterly basis for metals analysis. In July 2002, the concentrations of metals were below the cleanup levels for at least four consecutive quarters and LTM was discontinued at Site 85.
NFA DD (Baker, 2005)	2005	Based on results of previous investigations at Site 85, no further RA was recommended. USEPA and NCDENR concurred with NFA status.
PA/SI (CH2M HILL, 2010)	2009-2010	To characterize potential environmental impacts associated with the past use of Site 85, a PA/SI was initiated. Field activities included test pitting and collection of soil and groundwater samples for metals analysis. Four test pits were excavated from 2 to 6 feet bgs; batteries were identified at the surface of each test pit, but were not observed deeper than 2ft bgs. A battery sample was collected for metals analysis. Lead and mercury were detected at concentrations in exceedance of EPA maximum toxicity values. The batteries and soil were placed in separate 55-gallon drums and removed from the site. Several metals were detected in soil and groundwater at concentrations exceeding screening criteria. Potential unacceptable risks were identified in groundwater due to exposure to chromium and unacceptable risks for ecological were identified due to exposure to select metals in soil. Further assessment of soil and groundwater was recommended.
ESI (CH2M HILL, 2011)	2010-2011	To assess the nature and extent of metals in soil at Site 85, an ESI was initiated. Field activities included composite surface soil, discrete surface soil, and groundwater sampling. Samples were analyzed for select metals. No unacceptable human health or ecological risks were identified during risk assessments. Based on the results of the PA/SI and ESI, the NFA decision was confirmed.
No Action DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in March 2012.

8.2.34 Site 87 (Pre-RI)—MCAS Officers' Housing Area

Site 87, the MCAS Officers' Housing Area site (formerly Site A), is located on the west bank of the New River and covers less than 1 acre (**Figure 8-64**). The area was identified in 1986 when waste was identified eroding out of a cut bank along the New River near an officers' housing area. The materials were tentatively identified as hospital wastes. Various hospital waste materials were noted, including hypodermic needles and vials of white powder that were believed to contain a chlorine-based substance. No information was available regarding the volume of the waste or the mode of disposal and it is unclear how the materials got into the river bank.

FIGURE 8-64
IRP Site 87



Previous investigations are listed in **Table 8-78**.

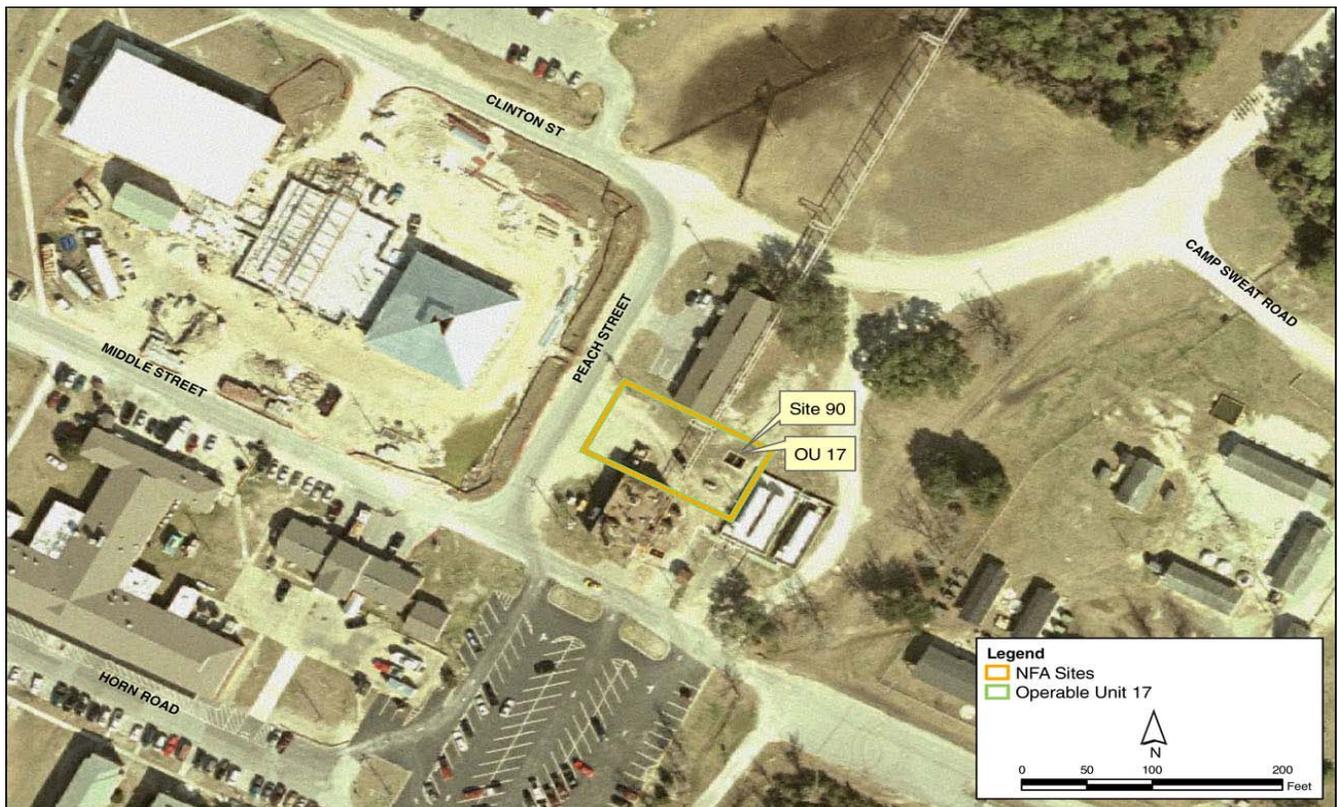
TABLE 8-78
Previous Investigations Summary, IRP Site 87

Previous Investigation/Action	Date	Activities
Pre-RI Screening Study (Baker, 1998)	1995 - 1998	A Pre-RI was initiated to assess the nature and extent of contamination. Field activities included a site survey, exploratory test pits, and soil, groundwater, surface water, and sediment sampling. No potential unacceptable human health or ecological risks were identified. As a result, the Pre-RI recommended NFA.
Confirmatory Groundwater Sampling (Baker, 1999)	1999	One groundwater sample collected during the Pre-RI detected PCP above the screening criteria and the location was sampled again in 1999. No PCP was detected.
NFA DD (CH2M HILL, 2001)	2001	The Final NFA DD was completed May 8, 2001.

8.2.35 Site 90 (OU 17)—Building BB-9

Site 90, Building BB-9, encompasses approximately 6 acres within OU 17, in the southeast portion of the Base in the Courthouse Bay Complex (**Figure 8-65**). OU 17 consists of three sites (Sites 90, 91, and 92) that have been grouped together based on the unique characteristic of suspected waste. All three sites were formerly part of the UST program, but were transferred to the IRP because petroleum related contamination was not identified. Site 90 is a former UST basin where three 1,000-gallon steel USTs, containing heating oil, were previously located between a dry cleaning distribution facility and a heating plant. The USTs were removed in March 1993. Dry-cleaning processes were performed at this location for an unknown period of time, but were subsequently discontinued. During the years that dry cleaning operations were conducted at this location, a 250-gallon AST was located onsite.

FIGURE 8-65
IRP Site 90, Operable Unit 17



Previous investigations are listed in **Table 8-79**.

TABLE 8-79
Previous Investigations Summary, IRP Site 90

Previous Investigation/Action	Date	Activities
Focused RI (Baker, 1999)	1997 - 1999	A Focused RI was conducted to assess the nature and extent of contamination at OU 17. Field activities included a site survey and soil and groundwater sampling. Analytical results identified the presence of toluene in soil samples and PCE and chloroform were detected in groundwater. Potential unacceptable human health risks were identified due to the presence of PCE in groundwater. Additional groundwater sampling was conducted in 1999 and 2000. Only TCE was detected above screening criteria at one location and there is no evidence of a large scale PCE impact of the area and NFA was recommended.
PRAP and ROD (Baker, 2001)	2001	A Final PRAP was issued in July 2001 to solicit public input on the preferred alternative (no RAs) and a public meeting was held. The Final ROD was issued and signed on September 30, 2001.

8.2.36 Site 91 (OU 17)—Building BB-51

Site 91, Building BB-51, encompasses approximately 8 acres within OU 17, in the southeast portion of the Base in the Courthouse Bay Complex (**Figure 8-66**). OU 17 consists of three sites (Sites 90, 91, and 92) that have been grouped together based on the unique characteristic of suspected waste. All three sites were formerly part of the UST program, but were transferred to the IRP because petroleum related contamination was not identified. Site 91 is currently used by the Marine Corps School of Engineering to train personnel. The site is a former UST basin where two 300-gallon steel USTs, used to store waste oil, were previously located northeast of Building BB-51. The USTs were removed in August 1992. At the time of the UST closure, TPH contamination was detected in the soil samples.

FIGURE 8-66
IRP Site 91, Operable Unit 17



Previous investigations are listed in **Table 8-80**.

TABLE 8-80
Previous Investigations Summary, IRP Site 91

Previous Investigation/Action	Date	Activities
Focused RI (Baker, 1997)	1997	A Focused RI was conducted to assess the nature and extent of contamination at OU 17. Field activities included a site survey and soil and groundwater sampling. Potential risks to human health were identified from chloroform, arsenic, iron, and manganese in groundwater. Chloroform and iron were determined not to be site related.
Supplemental Groundwater Investigation (Baker, 1999)	1999	Additional groundwater sampling was conducted in 1999 to confirm the presence of VOCs or SVOCs. Post-RI monitoring was recommended.
Post-RI Groundwater Monitoring (Baker, 2001)	2000 - 2001	Post-RI groundwater monitoring was initiated in July 2000, and included quarterly groundwater sampling for VOCs, SVOCs, iron, and arsenic. The results indicated that the constituents detected were naturally occurring and not site related.
PRAP and ROD (Baker, 2001)	2001	A Final PRAP was issued in July 2001 to solicit public input on the preferred alternative (no RAs) and a public meeting was held. The Final ROD was issued and signed in September.

8.2.37 Site 92 (OU 17)—Building BB-246

Site 92, formerly Building BB-246, is located within OU 17, in the southeast portion of the Base in the Courthouse Bay Complex and covers approximately 1 acre (**Figure 8-67**). OU 17 consists of three sites (Sites 90, 91, and 92) that have been grouped together based on the unique characteristic of suspected waste. All three sites were formerly part of the UST program, but were transferred to the IRP because petroleum related contamination was not identified. Site 92 is a former UST basin where one 1,000-gallon steel UST, containing gasoline, were previously located. The UST was installed in 1980, deactivated in 1989, and removed in January 1994. A subsequent SI identified the presence of chlorinated hydrocarbons in the groundwater.

FIGURE 8-67
IRP Site 92, Operable Unit 17



Previous investigations are listed in **Table 8-81**.

TABLE 8-81
Previous Investigations Summary, IRP Site 92

Previous Investigation/Action	Date	Activities
Focused RI (Baker, 1997)	1997	A Focused RI was conducted to assess the nature and extent of contamination at OU 17. Field activities at Site 92 included a site survey and soil and groundwater sampling. Potential human health risks were identified from acetone, arsenic, and iron in soil and chloroform in groundwater. However, the concentrations were either comparable with background or reflective of the sample decontamination process.
Post-RI Groundwater Monitoring (Baker, 2001)	2000 - 2001	Based on the findings of the Focused RI, Post-RI groundwater monitoring was conducted quarterly for VOCs, SVOCs, iron, arsenic, and manganese. The results indicated that the constituents detected were naturally occurring and not site related.
PRAP and ROD (Baker, 2001)	2001	A Final PRAP was issued in July 2001 to solicit public input on the preferred alternative (no RAs) and a public meeting was held. The Final ROD was issued and signed in September 2001.

8.2.38 Site 94 (OU 18)—PCX Service Station

Site 94, the PCX Service Station, covers approximately 2 acres and is located within the HPIA on the Mainside of the Base within the western portion of Site 78 (OU 1) (**Figure 8-68**). PCX Service Station is an active facility, providing refueling services for private vehicles, and consists of a single-story brick structure flanked by three concrete pump islands on two sides. Historical records indicate that two 10,000-gallon and two 30,000-gallon USTs storing various grades of gasoline were installed during the 1950s. The USTs and associated petroleum-contaminated soil were removed in January 1995. During subsequent phases of investigation, free phase hydrocarbons and chlorinated organic contaminants were detected in groundwater. Soil and groundwater contamination resulting from the petroleum releases at the site is currently being remediated under NCDENR’s UST program.

FIGURE 8-68
IRP Site 94, Operable Unit 18



Previous investigations are listed in **Table 8-82**.

TABLE 8-82
Previous Investigations Summary, IRP Site 94

Previous Investigation/Action	Date	Activities
Groundwater Investigation (OHM, 2000)	2000	An Investigation was conducted to evaluate groundwater conditions. Analytical results identified VOCs (primarily BTEX and methyl tert-butyl ethylene [MTBE]) and PAHs at concentrations exceeding NCGWQS. A December 1, 2000, letter from the Base to NCDENR requested the transfer of the PCX Service Station to the IRP, which resulted in the subsequent CERCLA investigation activities.
RI Baseline Groundwater Sampling (CH2M HILL, 2003)	2003	To obtain the most current groundwater quality data, a baseline groundwater sampling event was conducted. Samples were analyzed for VOCs and several VOCs exceeded screening criteria.
RI (CH2M HILL, 2005)	2004 - 2005	An RI was conducted to further evaluate contamination near Site 94. Field activities included soil and groundwater sampling for SVOC and VOC analysis. Potential unacceptable human health risks were identified due to VOCs in groundwater. No potential unacceptable ecological risks were identified. The Final RI concluded that groundwater contamination was determined to be from an upgradient source and will be addressed as part of Site 78.
PRAP and ROD (CH2M HILL, 2006)	2006	The PRAP was issued to solicit public input on the preferred alternative (no RAs) and a public meeting was held. The ROD for OU 18 was issued for NFA and signed in August 2006.

8.2.39 Site 95—Dipping Vat Sites

IRP Site 95, the Dipping Vat sites, consists of three separate areas, which are identified by their locations (Jaybird Road, Magnolia Road, and Lyman Road), and encompass a total of approximately 4 acres (**Figure 8-69**). The IRP Site 95 dipping vats were in operation from approximately 1900 through 1960 and were used to submerge livestock in a pesticide solution consisting of arsenic and synthetic pesticides, such as DDT and toxaphene. The dipping vats were discovered during an archaeological review of MCIEAST-MCB CAMLEJ. The dipping vats were approximately 25 to 30 feet long, 4 to 5 feet deep, and 2.5 to 3.5 feet wide, each able to hold approximately 1,500 to 2,000 gallons of dipping solution. A drip pad, approximately 12-feet by 15-feet, was constructed at the exit of each vat. Holding pens, approximately 50-feet by 50-feet, were also associated with the dipping vats.

FIGURE 8-69
IRP Site 95



Previous investigations are listed in **Table 8-83**.

TABLE 8-83
Previous Investigations Summary, IRP Site 95

Previous Investigation/Action	Date	Activities
Initial Assessment (Baker, 2004)	2004	Vats were initially identified during an archaeological investigation of the Base. Following their discovery, an initial assessment was performed on two of the three dipping vat sites (Jaybird Road and Magnolia Road), which included soil sampling for pesticides and metals. Arsenic exceeded screening criteria, and additional assessment was recommended. The third site (Lyman Road) was identified after the initial investigation.

Previous Investigation/Action	Date	Activities
SI (CH2M HILL, 2007)	2006 - 2007	Based on results from the Initial Assessment an SI field investigation was conducted. Field activities included soil and groundwater sampling for VOCs, SVOCs, pesticides/PCBs, and metals. An HHRS was completed and did not identify any unacceptable risks to human health at the Jaybird Road and Lyman Road Sites; therefore, NFA was recommended at these two locations. Potential risks to human health and the environment were identified from arsenic in soil at the Magnolia Road location and a removal action was recommended.
EE/CA (Rhēa, 2010)	2010	An EE/CA was prepared to evaluate alternatives for the NTCRA at the Magnolia Road site. The three alternatives were no action, excavation and off-site disposal, and <i>in situ</i> phytoremediation. A public notice was issued and public meeting was held in February 2010 to present the EE/CA. No written questions or comments were received.
AM (CH2M HILL, 2010)	2010	An AM was completed to propose excavation with off-site disposal as the NTCRA to address the arsenic contaminated soil.
NTCRA (Rhēa, 2010)	2010	The NTCRA was conducted and a second vault was identified and removed from beneath the original dipping vat at the depth of the water table. Confirmation soil sampling was conducted to confirm arsenic concentrations below the cleanup level. A permanent monitoring well was installed to conduct groundwater sampling for arsenic. Arsenic concentrations in soil and groundwater were below NC standards and/or background and the site was closed with NFA.
No Action DD (CH2M HILL, 2011)	2011	The Final NFA DD was signed in November 2011.

8.3 MMRP RC Sites

8.3.1 UXO-01—Former Live Hand Grenade Course (ASR #2.23)

The Former Live Hand Grenade Course encompasses approximately 10 acres on the Mainside of the Base (Figure 8-70). The Live Hand Grenade Course was established under Camp Training Order Number 7-1945, dated March 19, 1945, and was disestablished in March 1946 and no longer used for the firing of live ammunition. During operation of the site, munitions used included fragmentation, offensive, and practice grenades.

FIGURE 8-70
MMRP Site UXO-01, ASR #2.23



Previous investigations are listed in **Table 8-84**.

TABLE 8-84
Previous Investigations Summary, MMRP Site UXO-01, ASR #2.23

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2009)	2008 - 2009	A field investigation was conducted to identify the presence and nature of MC contamination and evaluate the number and density of anomalies that represent potential subsurface MEC. Field activities included soil and groundwater sampling and 10 percent DGM. Samples were analyzed for explosives, metals, and perchlorate. No unacceptable risks to human health or the environment were identified in site media. 249 geophysical anomalies were identified at the site, and an intrusive investigation of subsurface anomalies was recommended.
ESI (CH2M HILL, 2012)	2011 - 2012	An ESI was conducted to further investigate the 249 geophysical anomalies identified during the PA/SI. An intrusive investigation was conducted and no MEC or MPPEH was identified and NFA was recommended.

8.3.2 UXO-02—Unnamed Explosive Range (ASR #2.201)

Site UXO-02, the Unnamed Explosive Range, encompasses approximately 127 acres along the west bank of the New River in the Rifle Range Area of the Base (**Figure 8-71**). UXO-02 encompasses IRP Site 69 (Section 5.1.3). UXO-02 was used as an explosive range from 1973 to 2002; however, the types of munitions employed at this range are unknown.

FIGURE 8-71
MMRP Site UXO-02, ASR #2.201



Previous investigations are listed in **Table 8-85**.

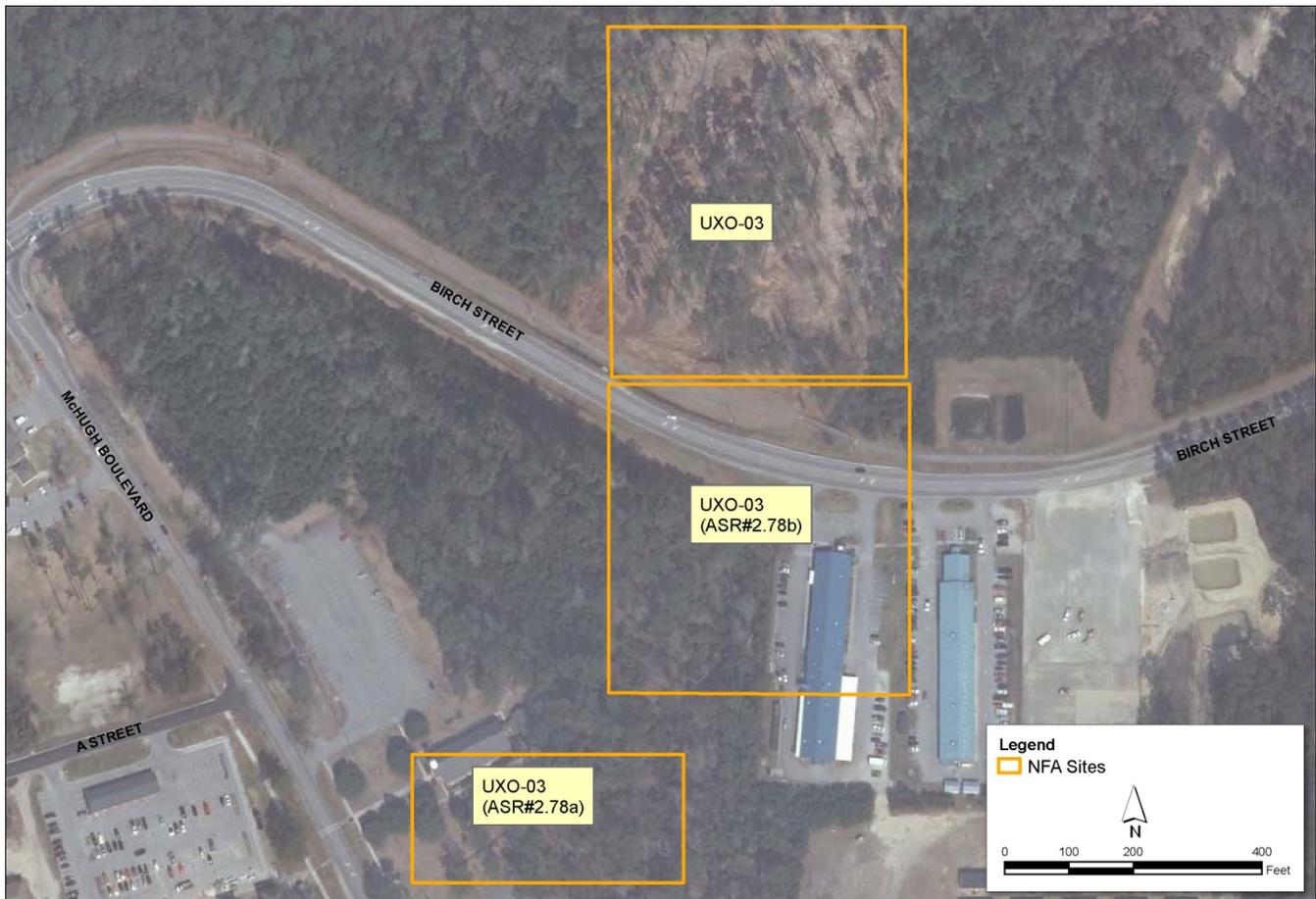
TABLE 8-85
Previous Investigations Summary, MMRP Site UXO-02, ASR #2.201

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2012)	2009 - 2012	To identify the presence and nature of MC contamination and evaluate the number and density of anomalies that represent potential subsurface MEC, field activities were conducted (concurrently with Site 69 field activities [Section 6.1.2]). Soil, groundwater, surface water, and sediment samples were collected and analyzed for explosives, metals, and perchlorate. Approximately 1,100 geophysical anomalies were identified during digital geophysical mapping (DGM), potentially representing subsurface MEC. Potential unacceptable risks to human health and the environment were identified due to exposure to metals in groundwater and pesticides in soil and sediment. Further investigation of groundwater and geophysical anomalies was recommended.
Draft ESI (CH2M HILL, 2012)	2011 - 2012	An ESI was conducted at UXO-02, including Site 69, to further investigate potential unacceptable risks identified during the UXO-02 PA/SI and Site 69 Supplemental Investigation. Field activities included an intrusive anomaly investigation, monitoring well installation, and soil, groundwater, surface water, and sediment sampling for pesticides, metals, and/or explosives analyses. No unacceptable human health or ecological risks were identified from potential exposure to soil, surface water, sediment, or metals in the surficial aquifer groundwater. NFA is recommended for the portion of UXO-02 located outside of the Site 69 perimeter fence. The remaining environmental impacts to be further assessed are associated with potential risks from exposure to waste and the VOC groundwater plume associated with Site 69.

8.3.3 UXO-03—Practice Hand Grenade Course (ASR #2.78a and #2.78b)

Site UXO-03, the former Practice Hand Grenade Course including the northern boundary area, covers approximately 12 acres of wooded and developed land (**Figure 8-72**). The site contains two former range areas (ASR Area 2.78a and ASR Area 2.78b), located along Birch Street, north of the Hadnot Point area. The northern boundary area was identified to be addressed as part of UXO-03 based on the uncertainty associated with historical range boundaries and planned MILCON. Site UXO-03 was used as the practice hand grenade range between 1953 and 1959. Although the specific types of munitions used at the site are unknown, the proximity to adjacent buildings and activities would substantiate the likely use of practice munitions. It was therefore determined to be unlikely that pyrotechnics or high-explosive munitions were used at the site.

FIGURE 8-72
MMRP Site UXO-03, ASR #2.78a and #2.78b



Previous investigations are listed in **Table 8-86**.

TABLE 8-86
Previous Investigations Summary, MMRP Site UXO-03, ASR #2.78a and #2.78b

Previous Investigation/Action	Date	Activities
Focused SI, Northern Boundary (CH2M HILL, 2008)	2008	A Focused SI was conducted within the northern boundary area to evaluate the potential for MEC and environmental impacts based on planned MILCON activities adjacent to the identified UXO-03 boundary. Soil and groundwater samples were collected and analyzed for explosives and metals. No exceedances of screening criteria and background were identified in soil or groundwater. A 10 percent DGM survey was also conducted and identified 189 geophysical anomalies representing potential subsurface MEC/MPPEH. A spent pyrotechnic signaling device was discovered on the ground surface during the investigation. Further investigation of the anomalies was recommended.
ESI, Northern Boundary (CH2M HILL, 2011)	2009-2011	An ESI was conducted within the northern boundary area including 100 percent DGM and intrusive anomaly investigation (except the wetland areas). 368 geophysical anomalies were identified and one MEC item and 19 MPPEH items were found during the intrusive investigation.
PA/SI (CH2M HILL, 2011)	2007-2011	A PA/SI was conducted to assess the potential presence and nature of site-related impacts to human health and the environment. Field activities included DGM and intrusive anomaly investigation over 11 percent of the accessible UXO-03 area; and surface and subsurface soil sampling, groundwater sampling, and surface water and sediment sampling in an unnamed drainage feature in the northern boundary area. The samples were analyzed for explosives and metals. There were no unacceptable risks to human health or the environment over that of background concentrations from exposure to site media based on current and potential future use. 68 geophysical anomalies were identified and three MPPEH items (a flare and small arms ammunition) were found during the intrusive investigation. Based on the results of northern boundary area investigations and the PA/SI, no munitions or MD related to high explosives or hand grenades were found. The only munitions or MD found within UXO-03 was a flare on the ground surface and flares have been found in other areas of the Base and are not necessarily related to the use of the site as a hand grenade range. Small arms ammunition was found, but does not pose an excessive risk to those who may come into contact with it. Therefore, NFA was recommended.
NFA DD (CH2M HILL, 2012)	2012	The Final NFA DD was signed in August 2012.

8.3.4 UXO-04—Knox Trailer Park

Site UXO-04, Knox Trailer Park, encompasses approximately 134 acres in the northern portion of the Base (**Figure 8-73**). The Knox Trailer Park area began as a Civilian Conservation Corps Camp in 1941, responsible for eliminating the source of endemic malaria by draining all surrounding wetlands. This was accomplished by ditching, using dynamite, and spraying diesel oil on water surfaces as a larvicide. Additionally, a dog-training school was located in the southernmost area of the site from 1942 to 1946. The dogs were subjected to overhead rifle and machine gun fire and explosions of charges of dynamite and TNT to simulate battlefield conditions. It has also been reported that the research facilities at Camp Knox conducted testing on body armor during World War II (WW II) through the early 1950s. The research was likely performed indoors, and the amount of ammunition expended for testing purposes is expected to be minimal. From the early 1950s until 2006, the area has been used for residential housing. Sometime between 1974 and 1976, an EOD technician responded to the discovery of UXO in the Knox Trailer Park area. A bulldozer operator uncovered a live WW II MK-II high-explosive hand grenade while conducting excavation activities. A visual inspection of the Knox Trailer Park was conducted in November 2002 by the Base's EOD team, and no UXO was discovered.

FIGURE 8-73
MMRP Site UXO-04



Previous investigations are listed in **Table 8-87**.

TABLE 8-87
Previous Investigations Summary, MMRP Site UXO-04

Previous Investigation/Action	Date	Activities
ESI (CH2M HILL, 2009)	2005 - 2009	A phased field investigation was conducted to identify the presence and nature of MC contamination and evaluate the number and density of anomalies that represent potential subsurface MEC. Field activities included a geophysical survey, intrusive investigation, soil, groundwater, sediment and surface water sampling. Samples were analyzed for VOCs, SVOCs, pesticides/PCBs, explosives, perchlorate, and metals. No munitions-related material that would indicate historical site use as an active range was found, and the sources of all other geophysical anomalies were found to be scrap-metal. No potential unacceptable human health or ecological risks were identified. As a result, the site was recommended for NFA and removal from the MMRP. The ESI Report was submitted in 2009 documenting the NFA decision.
NFA DD (2010)	2010	The Final NFA DD was signed in August 2010.

8.3.5 UXO-05—Mini Anti-Tank Range (ASR #2.7a, #2.7b, and #2.7c)

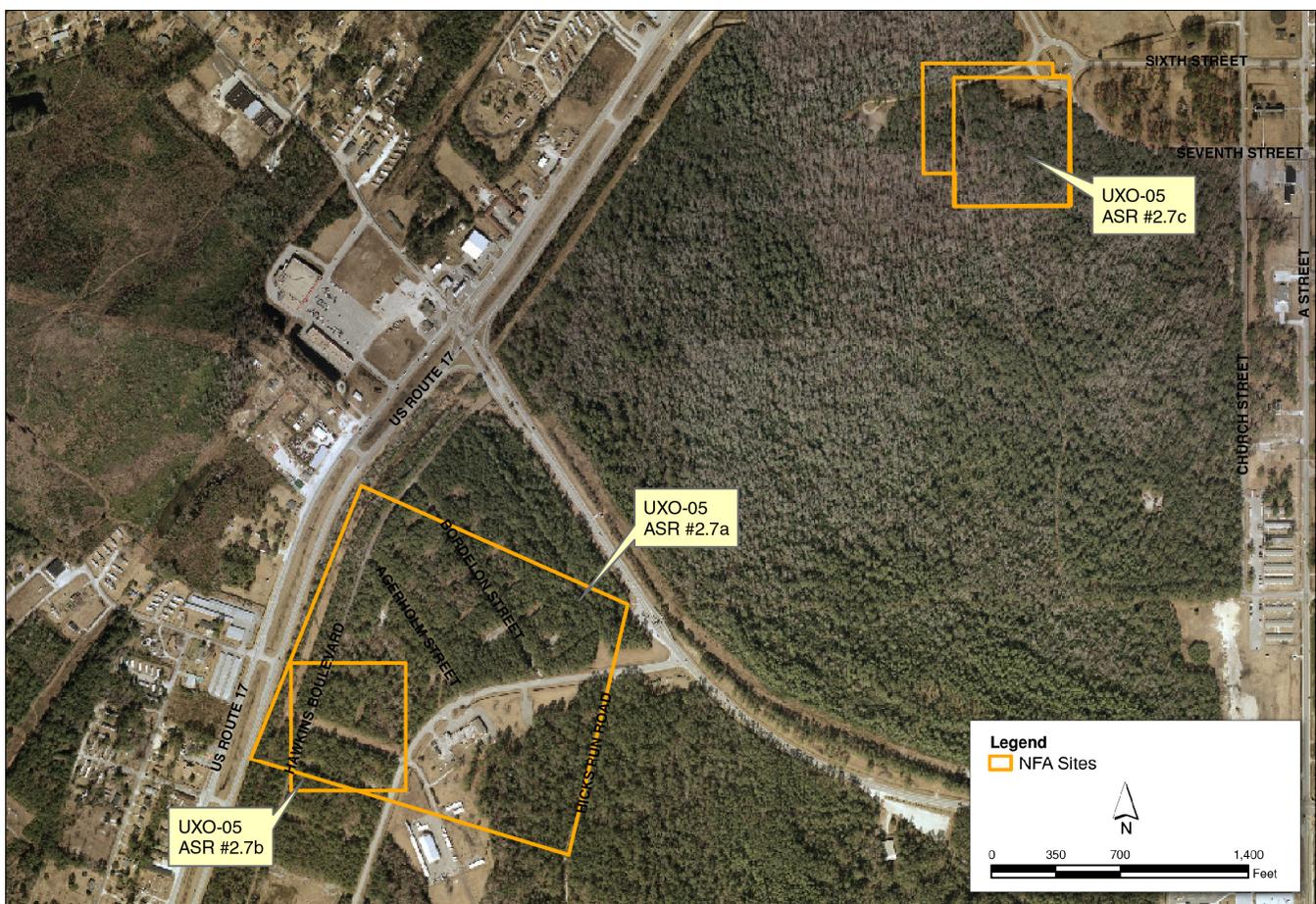
Site UXO-05 consists of three areas that cover approximately 70 acres. Two areas (ASR #2.7a and #2.7b) overlap and are located at the main entrance of the New River Air Station, just south of the intersection of Curtis Road and United States Highway 17 (**Figure 8-74**). The other area of Site UXO-05 (ASR #2.7c) is located north of ASR #2.7a and #2.7b in the Camp Geiger area. Site UXO-05 was used as the Miniature Anti-Tank Range between 1942 and 1944. Small arms (.22 caliber rifles) were fired at a moving target car located on a transverse track.

A 500-gallon UST was located at the former Building CG1, located in the southern portion of ASR #2.7a. The tank (UST-CG1-1) was installed in 1985 and reportedly contained used oil until it was removed in February 1994.

The northern area of Site UXO-05 (ASR #2.7c) overlaps a portion of MMRP Site UXO-01 (Section 3.2.3), the Former B-3 Gas Chamber (ASR #2.79b), which is currently undergoing further SI due to the potential for subsurface MEC based on geophysical anomalies identified during initial PA/SI activities.

FIGURE 8-74

MMRP Site UXO-05, ASR #2.7a, #2.7b, and #2.7c



Previous investigations are listed in **Table 8-88**.

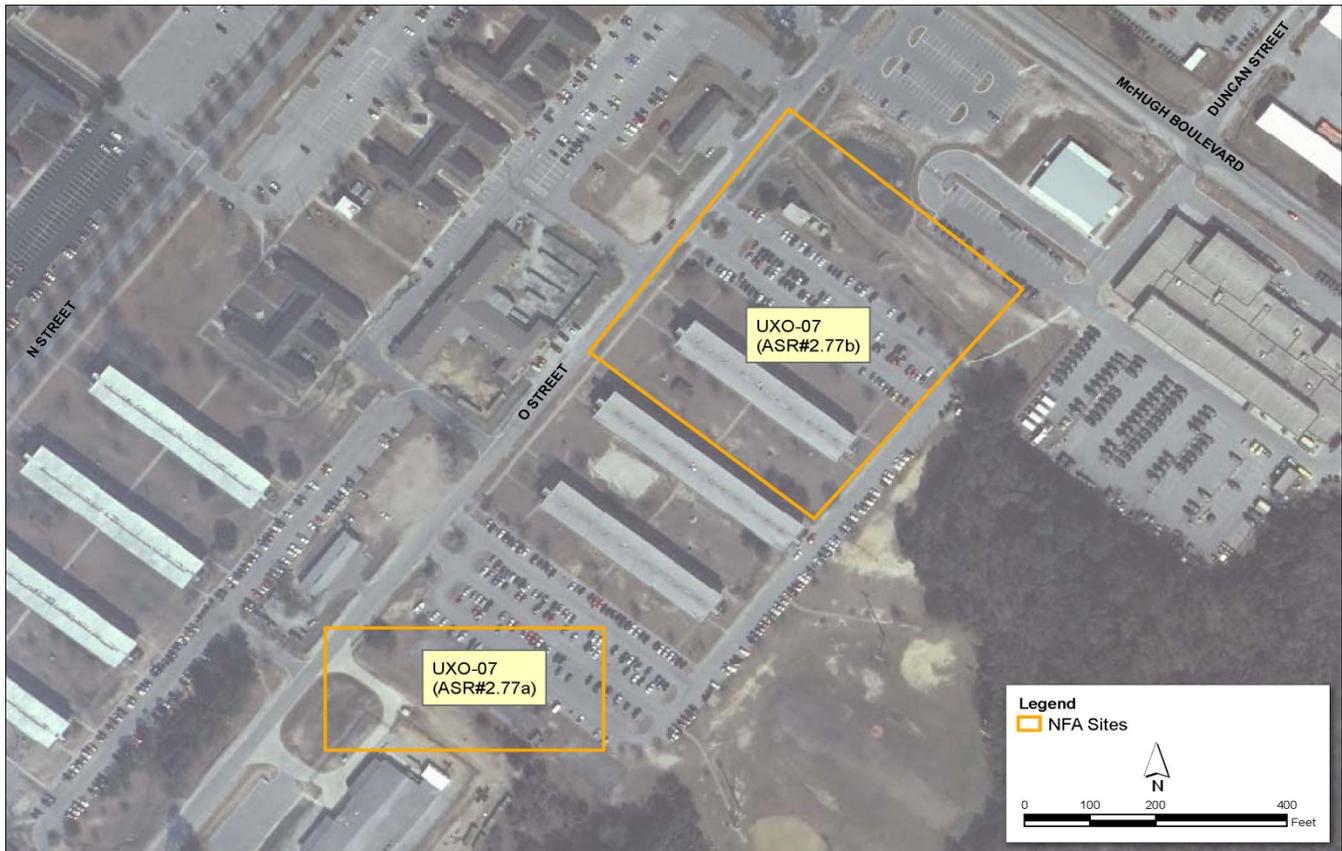
TABLE 8-88
Previous Investigations Summary, MMRP Site UXO-05

Previous Investigation/Action	Date	Activities
Limited Site Assessment Former UST CG1-1 (Law and Catlin, 2000)	2000	In February 1994, the 500-gallon used oil UST was removed from the vicinity of Building CG1. Post removal soil samples exceeded action levels for O&G; as a result, four shallow monitoring wells were installed within a 40 foot radius of the UST location and groundwater samples were collected and analyzed for VPH and EPH, VOCs, SVOC, chromium, and lead. Benzene, p-isopropyl toluene, and bis(2-ethylhexyl)phthalate were detected at concentrations exceeding NCGWQS but below gross contaminant levels. Soil samples collected during well installation did not exceed NC SSLs. Based on these results, the site was issued NFA status by NCDENR in July 2000.
Onslow County Water and Sewer Authority Focused PA/SI (Arcadis, 2007)	2007	A focused PA/SI was conducted to evaluate the potential presence of MEC and impacted soil or groundwater within a proposed water line easement traversing ASR #2.7a of Site UXO-05. To characterize the subsurface conditions, DGM, soil sampling, and groundwater sampling was conducted. Samples were analyzed for VOCs, SVOCs, TPH- Diesel-Range Organics (DRO), TPH- Gasoline-Range Organics (GRO), pesticides, PCBs, metals, TOC, Total Organic Halogen (TOH), perchlorate, and explosives residues. No unacceptable risks to construction workers were identified.
PA/SI (CH2M HILL, 2009)	2008 - 2009	<p>A PA/SI was conducted at Site UXO-05 to assess the potential presence and nature of site-related impacts to human health and the environment. Field activities included surface and subsurface soil sampling, groundwater sampling, and surface water and sediment sampling. The samples were analyzed for explosives residue, perchlorate, SVOCs, and metals. No unacceptable risks to human health or the environment over that of background concentrations from exposure to site media were identified and NFA was recommended.</p> <p>The geophysical anomalies identified in the northern area of Site UXO-05 (ASR #2.7c) are attributed to Site UXO-01 and will be addressed as part of Site UXO-01.</p>
NFA DD (2009)	2009	The Final NFA DD was signed in October 2009.

8.3.6 UXO-07—Practice Hand Grenade Course (ASR #2.77a and #2.77b)

Site UXO-07, the Practice Hand Grenade Course, encompasses approximately 2 acres in the HPIA (**Figure 8-75**). UXO-07 was reportedly used as a range in 1953. The types of munitions employed at the site are unknown; however, based on the name of the site it is assumed that practice hand grenades were used.

FIGURE 8-75
MMRP Site UXO-07, ASR #2.77a and #2.77b



Previous investigations are listed in **Table 8-89**.

TABLE 8-89
Previous Investigations Summary, MMRP Site UXO-07, ASR #2.77a and #2.77b

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2012)	2009 - 2012	A field investigation was conducted to identify the presence and nature of MC contamination and evaluate the number and density of anomalies that represent potential subsurface MEC. Field activities included soil, groundwater, surface water, and sediment sampling and 10 percent DGM. Samples were analyzed for SVOCs, explosives, metals, and perchlorate. Metals detections exceeded screening criteria in all media except surface water. Nitrobenzene and perchlorate detections also exceeded screening criteria in groundwater. No unacceptable human health or ecological risks were identified during the HHRS and ERS. 1,118 geophysical anomalies were present at the site, and an intrusive investigation was recommended.
ESI (CH2M HILL, 2012)	2011 - 2012	An ESI was conducted to address the PA/SI recommendations to intrusively investigate the sources of geophysical anomalies identified as representing potential subsurface MEC. No MEC items were found. The MPPEH items that were excavated were inspected, certified, and verified as MDAS. Based on the environmental and MEC investigation results, NFA is recommended at Site UXO-07.

8.3.7 UXO-08—2.36-inch Bazooka Range, Base CS Chamber, and NBC Training Trail (ASR #2.182), and D-7 Gas Chamber (ASR #2.80)

Located within the boundaries of IRP Site 78, Site UXO-08 encompasses approximately 144 acres in the HPIA (Figure 8-76). Areas within UXO-08 include the 2.36-inch Bazooka Range, the D-7 Gas Chamber, and the Base Chemical Smoke (CS) Chamber and Nuclear, Biological, and Chemical (NBC) Training Trail. The Range Identification and PA Report (USACE, 2001) identified the D-7 Gas Chamber as being located at Building 756. The D-7 Gas Chamber is estimated to have been used from 1953 to 1961, and is thought to have primarily used tear gas. Base maps and the Range Identification and PA Report indicate that the operation of the Base CS Chamber and NBC Training Trail took place from 1985 to 1987. The amount of chemical stimulants used during the facilities operation is unknown. Reports have indicated the presence of a suspected firing range, designated as the MCIEAST-MCB CAMLEJ Cantonment 2.36-inch Bazooka Range. Retired Base EOD personnel have reported the findings of bazooka rounds on several occasions and at various locations within Parade Grounds during the 1970s and 1990s.

FIGURE 8-76
MMRP Site UXO-08, ASR #2.182 and ASR #2.80



Previous investigations are listed in Table 8-90.

TABLE 8-90

Previous Investigations Summary, MMRP Site UXO-08, ASR #2.182 and ASR #2.80

Previous Investigation/Action	Date	Activities
Focused PA/SI (CH2M HILL, 2010)	2009-2011	In support of MILCON activities for the HPCA, Post Office Intersection Area, and Fitness Center; soil, groundwater, surface water, and sediment sampling was conducted, along with 100 percent DGM. Samples were analyzed for VOCs, SVOCs, explosives, perchlorate, and metals. No unacceptable human health or ecological risks were identified in site media in the Fitness Center and Post Office Intersection Area. In the HPCA, potential unacceptable human health and ecological risks were identified from exposure to metals and PAHs in a drainage area and in soil. These risks are likely attributable to the industrial area and will be addressed as part of Site 78. Approximately 900 anomalies were identified in the MILCON areas and further investigation was recommended.
PA/SI (CH2M HILL, 2011)	2007 - 2011	To identify the presence and nature of MC contamination and evaluate the number and density of anomalies that could represent potential subsurface MEC, a field investigation was conducted. Field activities included soil, groundwater, surface water, and sediment sampling for explosives, metals, perchlorate, VOCs, SVOCs, and pesticides/PCBs, 100 percent DGM, and 10 percent intrusive investigation in MILCON areas. Based on the results from the PA/SI, NFA is recommended for Site UXO-08. No unacceptable human health or ecological risks from historical munitions activities were identified. Potential ecological risks identified in surface water and sediment resulted from historical industrial activities and will be addressed as part of the five year review for Site 78. NFA was recommended at UXO-08.

8.3.8 UXO-09—F-9, Triangulation Range (ASR #2.83)

Site UXO-09 encompasses approximately 3 acres in the HPIA (**Figure 8-77**). The F-9 Triangulation Range area was established in or prior to 1953. As reported in the ASR Report, interviews with base personnel indicate that the range was used for M-1 rifle target practice. Base personnel also indicated that the original range was most likely 100 feet wide and approximately 25 to 50 feet long, and may have contained a large dirt berm as a bullet stop. Based on interviews with base personnel, former munitions use was limited to small arms ammunition.

FIGURE 8-77
MMRP Site UXO-09, ASR #2.83



Previous investigations are listed in **Table 8-91**.

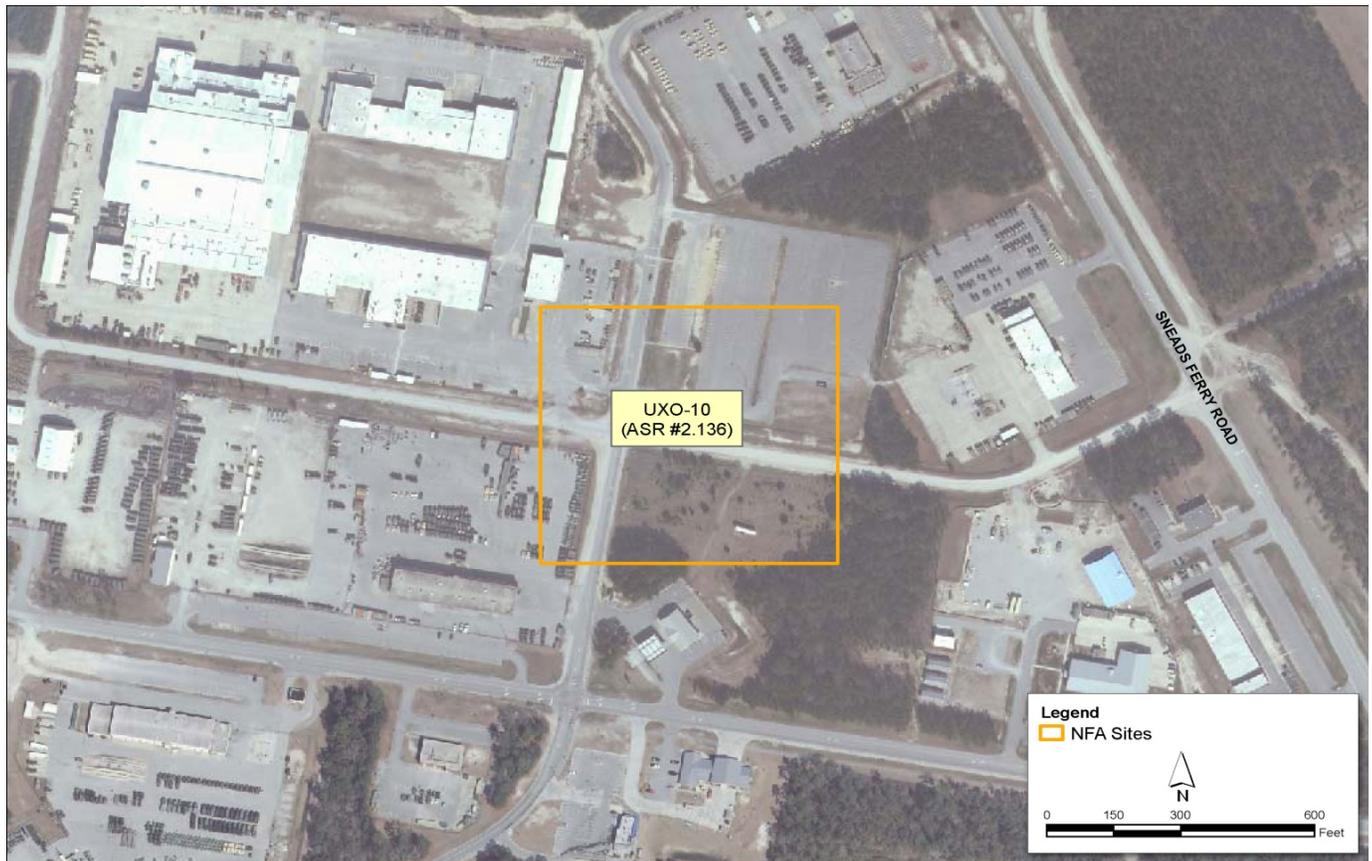
TABLE 8-91
Previous Investigations Summary, MMRP Site UXO-09

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2009)	2008 - 2009	A PA/SI was conducted to assess the potential presence and nature of site-related impacts to human health and the environment. Field activities included surface and subsurface soil sampling and groundwater sampling. The samples were analyzed for explosives residue, perchlorate, and total metals. No unacceptable risks to human health or the environment from exposure to site media were identified based on current and potential future land uses at Site UXO-09 and NFA was warranted.
NFA DD (2010)	2010	The Final NFA DD was signed in August 2010.

8.3.9 UXO-10—D-11A, Flame Tank and Flame Thrower Range (ASR #2.136)

Site UXO-10, the Flame Tank and Flame Thrower Range, encompasses approximately 10 acres on the Mainside of the Base (**Figure 8-78**). UXO-10 was reportedly used as a range from 1970 to 1977. The types of munitions used at the range include flame throwers and small arms blank ammunition, which was reportedly used on tanks for demonstration purposes. Demolitions (C-4), white smoke grenades, white phosphorous hand grenades, and flame thrower weapons and blank ammunition for small arms were also used on the course.

FIGURE 8-78
MMRP Site UXO-10, ASR #2.136



Previous investigations are listed in **Table 8-92**.

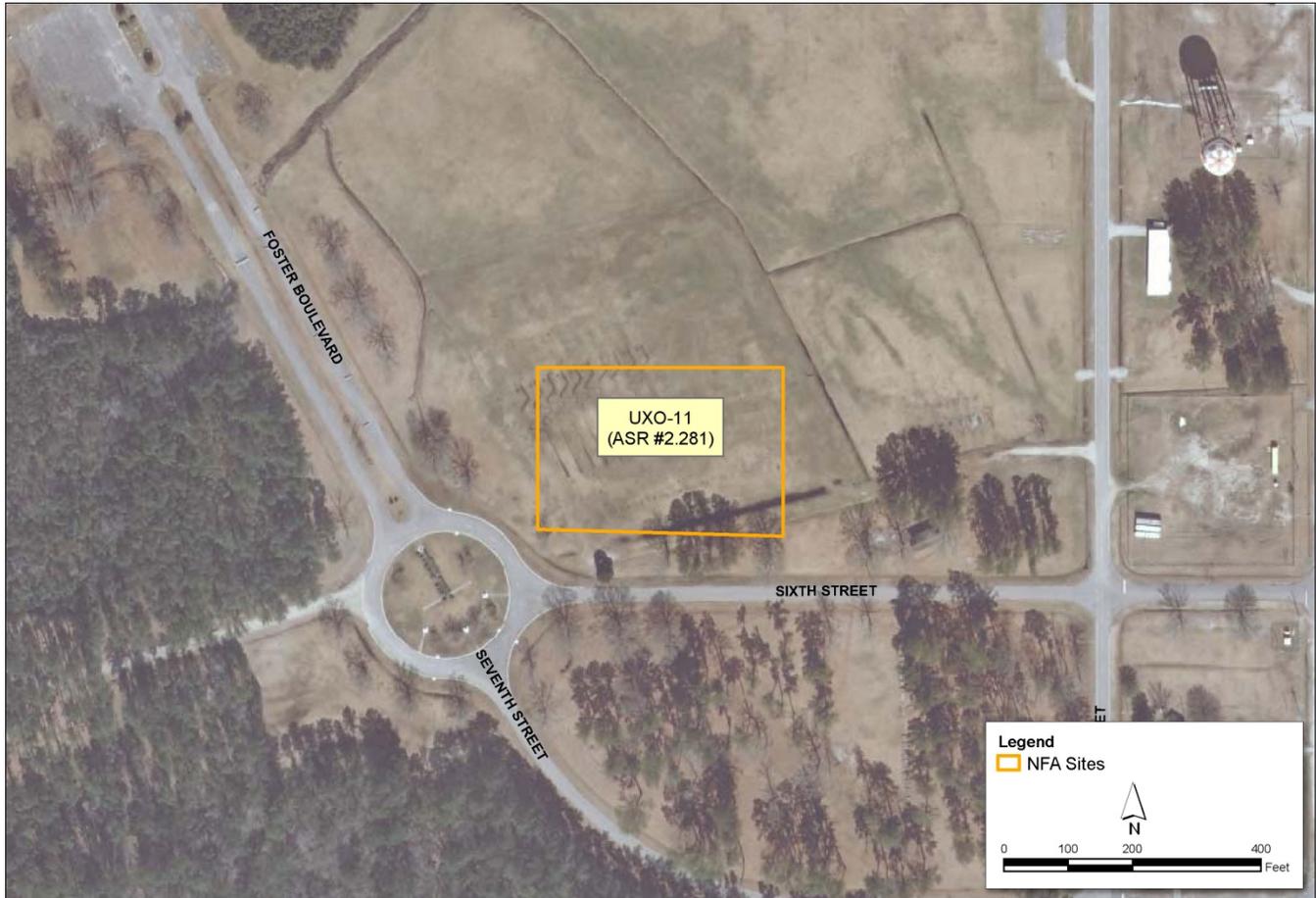
TABLE 8-92
Previous Investigations Summary, MMRP Site UXO-10, ASR #2.136

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2011)	2009 - 2011	A field investigation was conducted to identify the presence and nature of MC contamination and evaluate the number and density of anomalies that represent potential subsurface MEC. Field activities included soil and groundwater sampling and 10 percent DGM. Samples were analyzed for VOCs, SVOCs, TPH, explosives, metals, and perchlorate. No unacceptable human health or ecological risks were identified. 1,228 geophysical anomalies were present at the site, and an intrusive investigation was recommended.
ESI (CH2M HILL, 2012)	2011 - 2012	An ESI was conducted to further investigate geophysical anomalies identified during the PA/SI. Field activities consisted of an intrusive investigation. Two MPPEH items were identified; however, no MEC or MPPEH containing explosive material was identified and NFA was recommended.

8.3.10 UXO-11—B-5, Practice Hand Grenade Course (ASR #2.281)

Site UXO-11, the Practice Hand Grenade Course, encompasses approximately 2 acres located in Camp Geiger in the northwest portion of the Base (**Figure 8-79**). UXO-11 was reportedly used as a range in 1953. The types of munitions employed at the site are unknown; however, it is assumed that practice hand grenades were used.

FIGURE 8-79
MMRP Site UXO-11, ASR #2.281



Previous investigations are listed in **Table 8-93**.

TABLE 8-93
Previous Investigations Summary, MMRP Site UXO-11, ASR #2.281

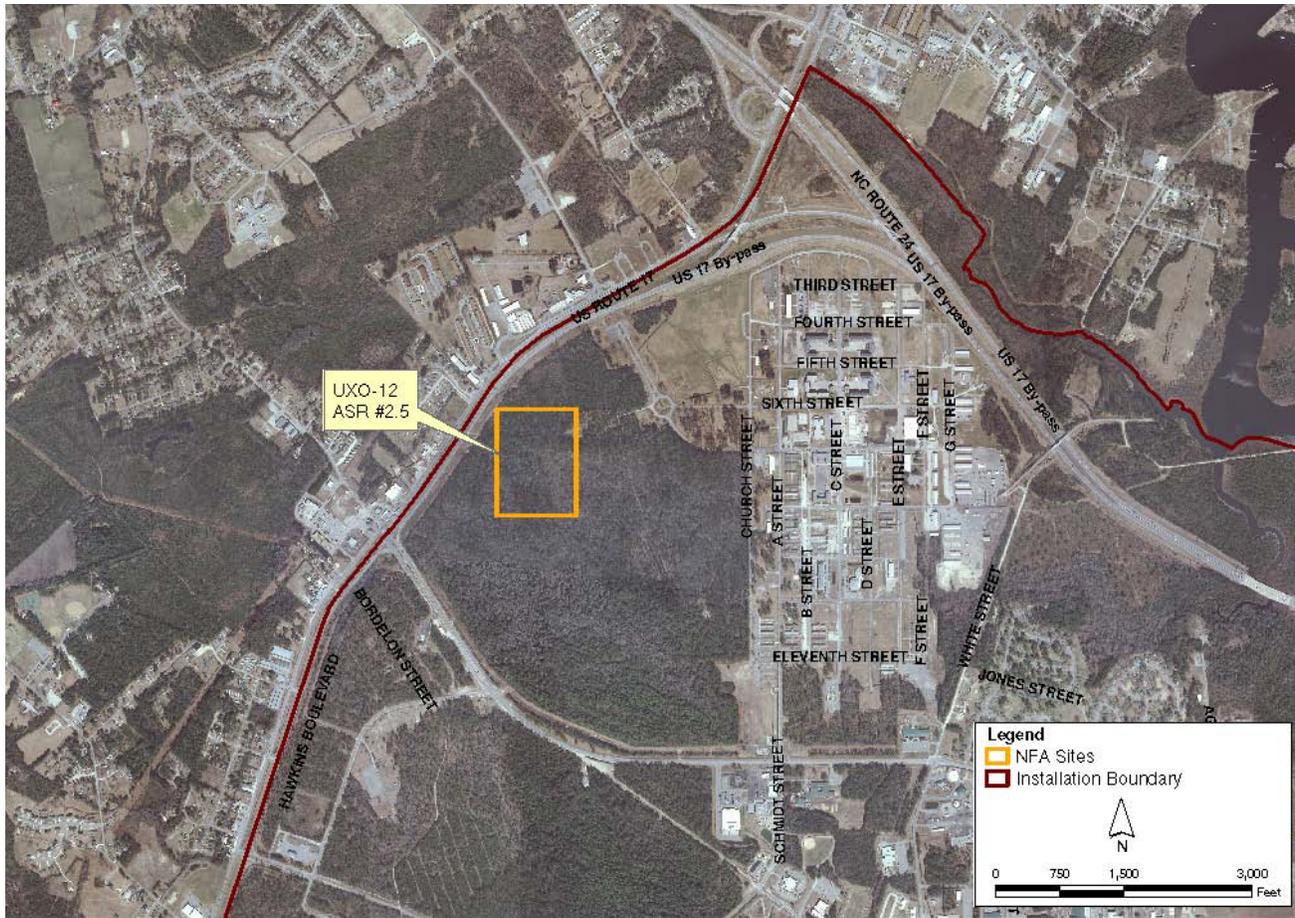
Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2011)	2009 - 2011	A field investigation was conducted to identify the presence and nature of MC contamination and evaluate the number and density of anomalies that represent potential subsurface MEC. Field activities included soil, groundwater, surface water, and sediment sampling and 10 percent DGM. Samples were analyzed for explosives, metals, and perchlorate. Explosives were detected in site media; however, no unacceptable human health or ecological risks were identified. 70 geophysical anomalies were present at the site, and an intrusive investigation was recommended.

Previous Investigation/Action	Date	Activities
ESI (CH2M HILL, 2012)	2011 - 2012	<p>An ESI was conducted to further evaluate the geophysical anomalies identified during the PA/SI. Additional investigation was also recommended to delineate the extent of identified impacts related to MC and to delineate chromium in surface and subsurface soil. Field activities included an intrusive investigation and soil sampling for chromium and explosives. An HRS and ERS were conducted to evaluate data collected during the PA/SI and the ESI. No unacceptable human health or ecological risks were identified due to exposure to site media. No MEC items were identified during the intrusive investigation and six MPPEH items (including inert training hand grenades and small arms casings) were removed from the site for disposal. These results indicate that the potential for encountering unidentified subsurface MEC at Site UXO-11 is likely to be low. NFA was recommended.</p>

8.3.11 UXO-12—1,000-inch Range (ASR #2.5)

Site UXO-12, the 1,000-inch Range, encompasses approximately 30 acres generally located west of Camp Geiger, in the northwest portion of the Base (**Figure 8-80**). The 1,000-inch range was established under Camp Training Order Number 7-1945, dated March 19, 1945, and was disestablished in March 1946 and no longer used for the firing of live ammunition. During operation of the site, munitions used included small caliber munitions (.30 caliber weapons firing). The site is being investigated as part of Site UXO-18 (Section 3.2.14) because it is located within the boundaries of the former B-6 small arms ranges.

FIGURE 8-80
MMRP Site UXO-12, ASR #2.5



Previous investigations are listed in **Table 8-94**.

TABLE 8-94
Previous Investigations Summary, MMRP Site UXO-12, ASR #2.5

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2011)	2009 - 2011	A field investigation was conducted to identify the presence or absence of contamination at the site. An XRF survey was conducted and surface water, sediment, and soil samples were collected and analyzed for select metals. No unacceptable human health or ecological risks were identified and the site was closed with NFA.
NFA DD (2010)	2010	The Final NFA DD was signed in November 2011.

8.3.12 UXO-13—Naval Regional Medical Center

Site UXO-13, the Naval Regional Medical Center, encompasses approximately 176 acres located on the Mainside of the Base (**Figure 8-81**). No known historic live fire activities were conducted within this area; rather it was designated as a “Maneuver Training Area” used to train troops in non-live fire operations. UXO-13 was administratively closed on March 24, 2004, due to no known historic live-fire activities on this range.

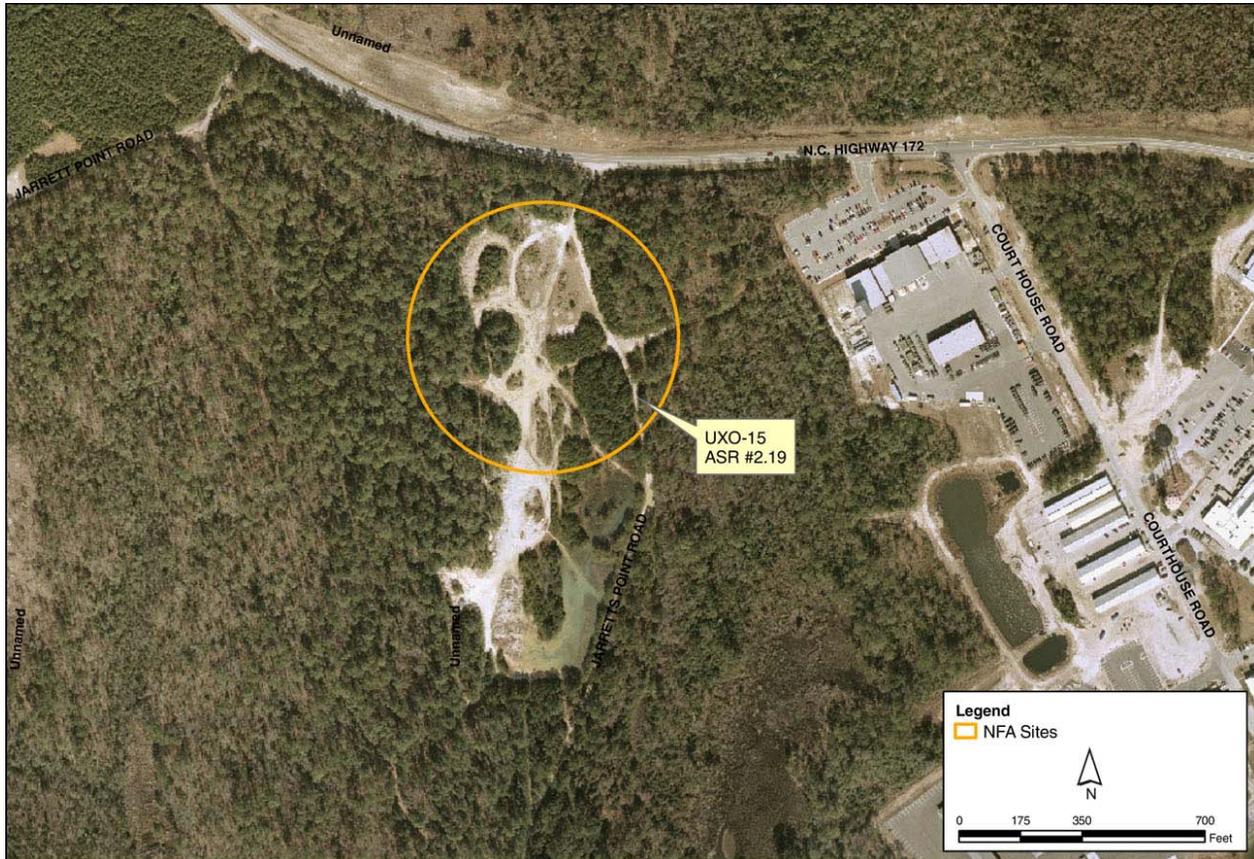
FIGURE 8-81
MMRP Site UXO-13



8.3.13 UXO-15—1,000-inch Range (ASR #2.19)

The Former 1,000-inch Range (ASR #2.19) comprises approximately 9 acres and is located in the northern portion of the Courthouse Bay Amphibious Area where a MILCON project is proposed (**Figure 8-82**). Small arms, including M1 rifles and .30- and .45-caliber pistols were typically fired at the 1,000-inch ranges. The 1,000-inch Range was disestablished on March 19, 1946, and is no longer used for firing live ammunition. The Courthouse Bay Amphibious Area (including the Former 1,000-inch Range) is currently used by the Amphibian Assault Battalion to evaluate track vehicle performance as part of the Joint College Training Area.

FIGURE 8-82
MMRP Site UXO-15, ASR #2.19



Previous investigations are listed in **Table 8-95**.

TABLE 8-95
Previous Investigations Summary, MMRP Site UXO-15, ASR #2.19

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2010)	2008 - 2010	In support of proposed MILCON activities, a field investigation was conducted to identify the presence and nature of MC contamination. Field activities included soil sampling for metals and perchlorate. Arsenic and antimony were detected at levels exceeding screening criteria; however, no MC-related contamination was identified in soil. No potential unacceptable human health or ecological risks were identified and NFA was recommended.
NFA DD (2010)	2010	The Final NFA DD was signed in August 2010.

8.3.14 UXO-16—Gun Positions 41A and 41B (ASR #2.212)

Site UXO-16, also referred to as Former Gun Positions 41A and 41B, encompasses approximately 4 acres in the Stone Bay area of the Base. UXO-16 was first established during WW II as a training ground and was also used during the Korean War-era as a training ground (**Figure 8-83**). Howitzers were reportedly positioned at Site UXO-16 and fired 105-mm and 155-mm munitions into the K-2 and G-10 Impact Areas; other munitions suspected to be used at Site UXO-16 include 4.2-inch, 81-mm, 120-mm, 175-mm, 4.2-inch, and 8-inch munitions.

FIGURE 8-83
MMRP Site UXO-16, ASR #2.212



Previous investigations are listed in **Table 8-96**.

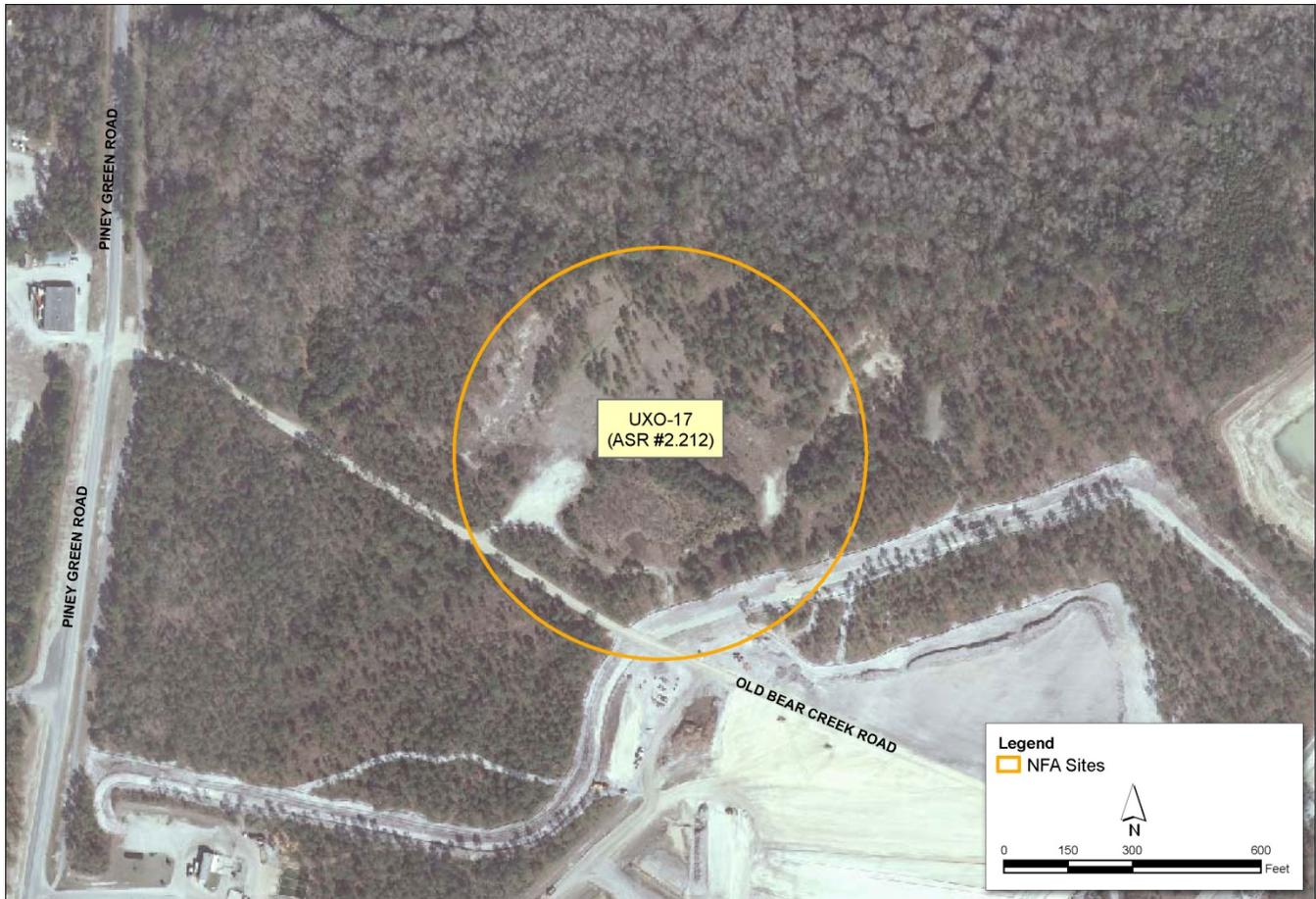
TABLE 8-96
Previous Investigations Summary, MMRP Site UXO-16, ASR #2.212

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2009)	2008 - 2009	In support of proposed MILCON activities, a field investigation was conducted to identify the presence and nature of MC contamination and evaluate the number and density of anomalies that represent potential subsurface MEC. Field activities included DGM and soil and groundwater sampling for explosives, perchlorate, and metals. A total of 895 geophysical anomalies potentially representing subsurface MEC were identified and intrusively investigated. All items were found to be MD or cultural debris (CD). No further MEC investigations were recommended; however, because it is not possible to provide 100 percent assurance that all MEC items were removed, training and on-call support during construction activities were recommended. No MC-related contamination was identified in site media. No unacceptable risks to human health or the environment were identified. NFA was recommended.
NFA DD (2010)	2010	The Final NFA DD was signed in August 2010.

8.3.15 UXO-17—Firing Position #2 (ASR #2.212)

Site UXO-17, Firing Position #2, encompasses approximately 16 acres in the Mainside area of the Base. UXO-17 was a gun position used for military training, which fired into the G-10 impact area (Figure 8-84). As a result of the usage and type of training conducted at the site, there should be no discarded military munitions, although ammunition packaging, range residue, barbwire, and buried garbage may be present. Firing Position #2 covers 16 acres and was reportedly used from the 1950s through at least 1985. 105-mm and 155-mm Howitzer guns were used at this site.

FIGURE 8-84
MMRP Site UXO-17, ASR #2.212



Previous investigations are listed in **Table 8-97**.

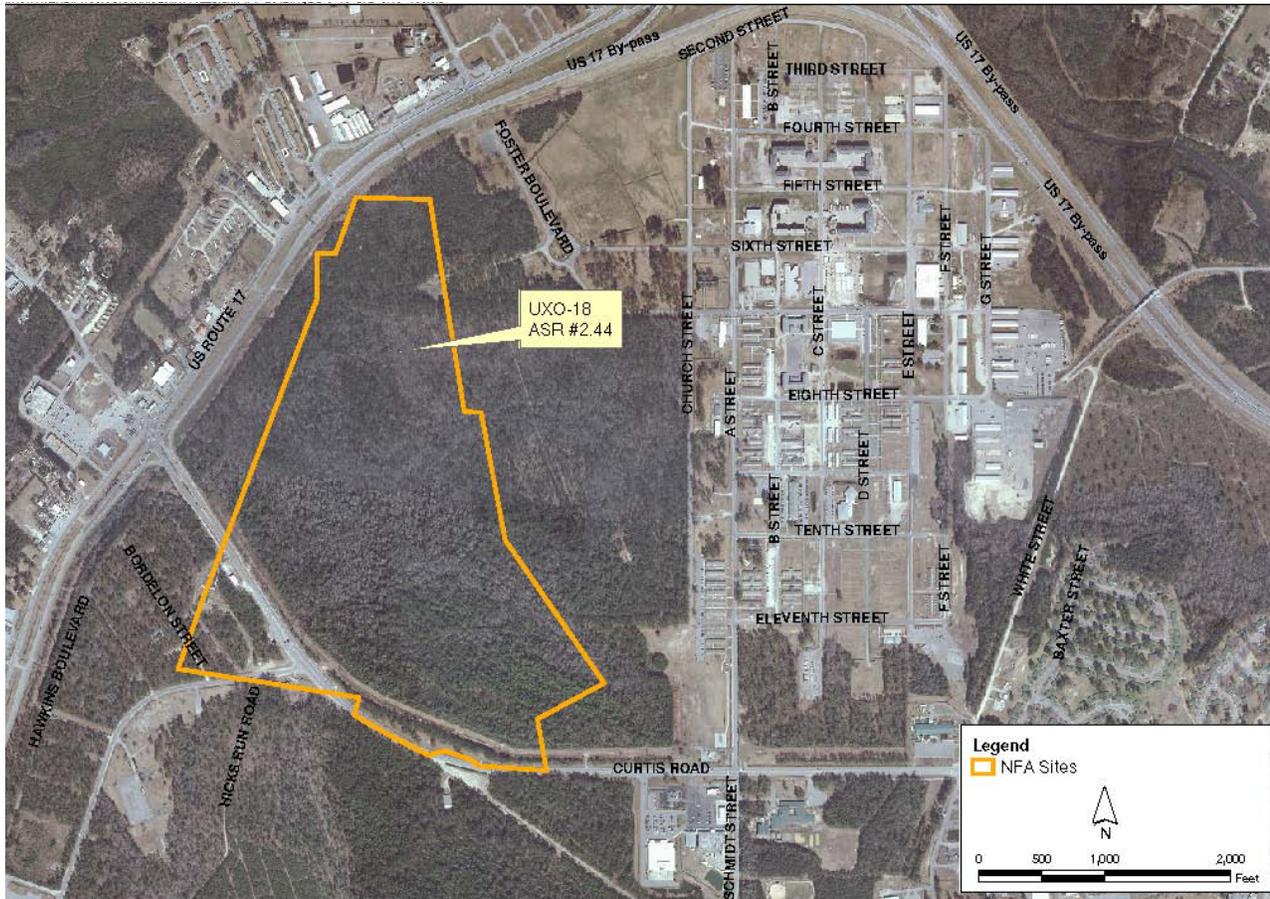
TABLE 8-97
Previous Investigations Summary, MMRP Site UXO-17, ASR #2.212

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2012)	2008 - 2011	<p>The PA/SI was completed in three phases. Phase I consisted of 100 percent DGM and intrusive investigation of a 4-acre area in the center of the site and environmental sampling of soil and groundwater. Phase II consisted of 9 percent DGM and intrusive investigation of the surrounding 12 acres and environmental sampling of soil and groundwater. Phase III consisted of groundwater sampling in the vicinity of a buried leaking drum discovered and removed during Phase I.</p> <p>Approximately 31.5 percent of Site UXO-17 was surveyed yielding a total of 1,992 geophysical anomalies and 21 saturated response areas potentially representing subsurface MEC. Intrusive investigation resulted in the identification of one MEC and 279 MPPEH items. The MEC item was determined to be DMM associated with the historical use as a firing position. Other MPPEH was consistent with the site's use for training. Other than DMM, the firing position and surrounding training area were not determined to be a source of MEC. Based on the estimated 263,500 pounds of other debris items (concrete, metal drums, and scrap metal) encountered, it is likely that portions of the site were used for disposal. The risk screening results indicated that exposure to soil, sediment, surface water, and groundwater would not result in unacceptable human health or ecological risks. Based on these results and because the site will be used as an above grade expansion area for the Base landfill, potentially covering any remaining subsurface debris, no further investigation was recommended. Prior to MILCON proceeding at the site, all site personnel conducting subsurface/intrusive activities were recommended to receive "3R" munitions awareness training for recognizing, retreating, and reporting potential MEC hazards. On-call construction support was also recommended for inspection and disposal of suspected MEC/MPPEH that may be unearthed.</p>

8.3.16 UXO-18—B-6, 50-foot Small Arms Range (ASR #2.44)

Site UXO-18, covers approximately 176 acres and consists of several small ranges (**Figure 8-85**). The B-6 ranges were used between 1950 and 1961. Twenty-five target stations were reportedly used for .22 caliber (rifle and pistol) ammunition and 10 target stations were used for .32, .38, and .45 caliber (pistol) ammunition. The B-6 ranges, located north of Curtis Road and Hicks Run Road, were identified for closure. Site UXO-12 (Section 3.2.11) is located within the boundaries of the former B-6 small arms ranges and is being investigated as part of Site UXO-18.

FIGURE 8-85
MMRP Site UXO-18, ASR #2.44



Previous investigations are listed in **Table 8-98**.

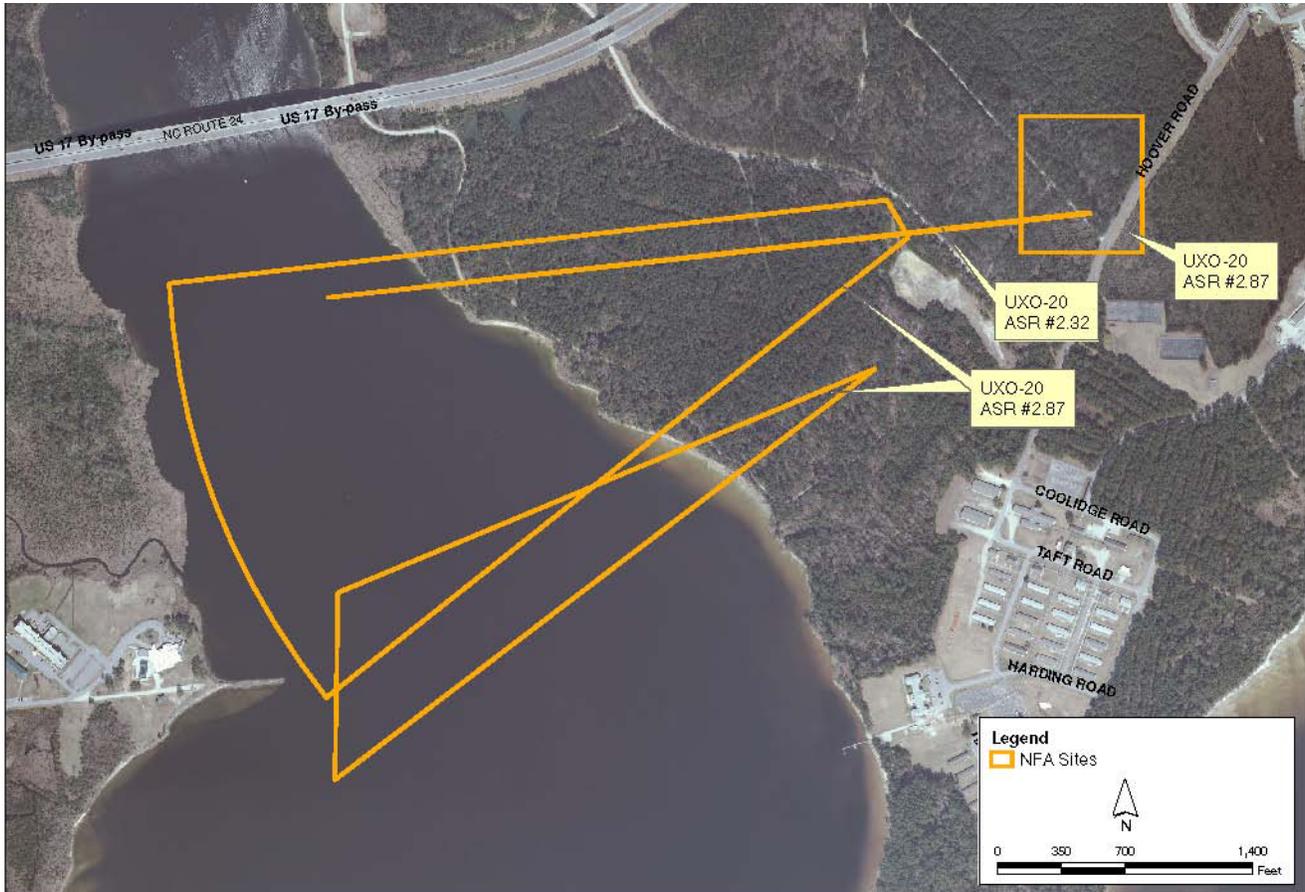
TABLE 8-98
Previous Investigations Summary, MMRP Site UXO-18, ASR #2.44

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2011)	2010 - 2011	A field investigation was conducted to identify the presence or absence of contamination at the site. An XRF survey was conducted and surface water, sediment, and soil samples were collected and analyzed for select metals. No unacceptable human health or ecological risks were identified and the site was closed with NFA.
NFA DD (2010)	2010	The Final NFA DD was signed in November 2011.

8.3.17 UXO-20—1,000-inch Range Montford point (ASR #2.32) A-1, 50-foot .22 Caliber Range (ASR #2.87)

Site UXO-20, includes two former small arms ranges in the Camp Johnson (Montford Point) area covering approximately 75 acres (**Figure 8-86**). The 1,000-inch Range (ASR #2.32) was used from the 1940s until the mid-1950s as a Familiarization Range for .30 caliber Browning automatic rifles. The A-1, 50-foot .22 Caliber Range (ASR #2.87) was used during the 1950s and is believed to have been inactive since 1957 and is adjacent to and overlapping the 100-inch range delineation.

FIGURE 8-86
MMRP Site UXO-20, ASR #2.32 and #2.87



Previous investigations are listed in **Table 8-99**.

TABLE 8-99
Previous Investigations Summary, MMRP Site UXO-20, ASR #2.32 and #2.87

Previous Investigation/Action	Date	Activities
PA/SI (CH2M HILL, 2011)	2009 - 2011	In support of potential MILCON activities within the Camp Johnson area, a field investigation was conducted in FY 2009. Groundwater and soil samples were collected and analyzed for select metals. Although arsenic was detected above screening levels throughout the range area, no unacceptable human health or ecological risks were identified in site media. Based on the results of the PA/SI, the site was closed with NFA.
NFA DD (2010)	2010	The Final NFA DD was signed in November 2011.