

DEPARTMENT OF THE ARMY  
PUBLIC WORKS BUSINESS CENTER  
HEADQUARTERS, FORT BRAGG GARRISON COMMAND (AIRBORNE)  
INSTALLATION MANAGEMENT AGENCY  
FORT BRAGG, NORTH CAROLINA

FINAL

DECISION DOCUMENT

FOR RESOURCE CONSERVATION AND RECOVERY ACT  
REMEDIAL ACTION

SOLID WASTE MANAGEMENT UNIT 4 and 18, (DSERTS #FTBR004)  
FORT BRAGG, NORTH CAROLINA

14 August 2004

Prepared for:

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## **1.0 BASIS AND PURPOSE OF RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) REMEDIAL ACTION (RA) .**

a. This decision document describes the selected RA to be performed at Solid Waste Management Units (SWMUs) 4 and 18 as part of the Fort Bragg Installation Restoration Program (IRP). This action will satisfy RCRA Facility Investigation (RFI), U.S. Environmental Protection Agency (EPA) and the State of North Carolina Department of Environment and Natural Resources (NCDENR) requirements.

b. Based on the results of sampling events performed during previous investigations United States Geological Survey (USGS) RFI Report 1998; Science Application International Corporation Extended RFI Reports 2000-2002), which performed extensive sampling of surface and sub-surface soils, groundwater, surface water, and stream-bed sediments; Fort Bragg has selected Long-term monitoring (LTM) of wells, historically exhibiting groundwater contaminant levels of chlorinated organic compounds (chloroform, chloromethane, and tetrachloroethane) in excess of North Carolina Groundwater Protection Standards and institutional controls documented in the Base Master Plan as it's selected remedy for the site. The SWMU is an old abandoned un-permitted solid waste landfill, which under North Carolina Solid Waste Rules, 15A North Carolina Administrative Code (NCAC) 13A, cannot be given a designation of No Further Action (NFA) if exceedance of any groundwater action levels is determined. In any criteria applied to determining the Selected Remedy of the site, groundwater monitoring is mandated based on North Carolina 2L (NC2L) requirements, 15A NCAC 2L.0100 and .0200. Long-term monitoring will occur every nine months for a total of five sampling events. This cycle was chosen to best fit funding and contracting obstacles. Once four consecutive sampling events establish no exceedance of the North Carolina Groundwater Protection Standards for the above listed constituents, a NFA determination would be requested. The LTM will continue until no analytes exceed NC 2L standards. Concurrence by North Carolina Solid Waste is required for any selected remedy of un-permitted solid waste landfill and for termination of selected remedy. The LTM will ensure that levels found during the investigation phase are not increasing and that contaminants are not migrating past the sentinel wells.

### **1.1 INTRODUCTION.**

a. In August of 2002, a Supplemental RCRA Facility Investigation (SRFI)/Corrective Measures Study (CMS), at SWMUs 4 and 18, was performed. Groundwater sampling, and surface and subsurface soil sampling was performed to determine environmental conditions at the SWMUs. The SRFI/CMS Report was prepared in consideration of RCRA Permit No. NC 8210020121 issued to Fort Bragg, RFI Guidance, and guidance for RCRA Corrective Action.

b. Solid Waste Management Units 4 and 18 consists of the following: Solid Waste Management Unit 4 is an abandoned landfill covering an area of approximately 10 acres. Solid Waste Management

Unit 18 consists of two fire protection training pits, which overlie a northern section of SWMU 4. One oil/water separator (OWS 6-9273) serves effluent from the fire protection training pits. This OWS is active and was not investigated as part of the SWMU 4 and 18 RFI. All OWS on the installation of Fort Bragg are identified as SWMU 35 in the RCRA Part "B" Hazardous Waste Permit. A heating oil underground storage tank (UST) serviced the fire station immediately north of SWMU 18 which was removed in 2004. Previous investigations identified various potential contaminant sources associated with the landfill and the un-lined fire protection training pits at SWMUS 4 and 18. As SWMU 18 is located within SWMU 4, this document will serve as the Decision Document (DD) for both SWMUs. From 1966 to 1978, the fire training pits consisted of sand-lined shallow berms. In 1978, the sand-lined basins were replaced with 75-foot-wide concrete-lined pits that were used until 1993. The RFI investigated past releases from the sand-lined basins prior to 1978. No releases/overfills were documented after the 1978 upgrade work. The concrete-lined washracks are currently being used to wash Fort Bragg fire equipment. The UST will remain to service the fire station with heat until the site is up-graded to natural gas in the future. The SWMUs are identified in Figure 1.

**1.2 AREA OF INVESTIGATION.** Solid Waste Management Units 4 and 18 are located on the Fort Bragg Military Installation, Cumberland County, North Carolina, southeast of the intersection of Knox Street and Honeycutt Road, in the southeastern cantonment area. Honeycutt Road bounds the SWMUs 4 and 18 investigation area to the north. Solid Waste Management Units 4 and 18 are bounded to the east by Beaver Creek adjacent to SWMU 103, to the south by an engineered drainage ditch, and to the west by Knox Street. Twenty-one monitoring wells were constructed throughout the SWMUs 4 and 18 area to determine groundwater contamination levels.

**1.3 NATURE OF CURRENT PROPERTY USE.** Solid Waste Management Units 4 and 18 are located in an area occupied by a Fort Bragg Fire Station and fire protection training pits. The ground surface in the portion of SWMUs 4 and 18 east of the SWMUs is covered with grass and poorly grown sparse trees indicative of the poor soil conditions from buried debris in the abandoned landfill. The portion of SWMUs 4 and 18 south and west of the SWMUs is moderate to dense forest and is located within the Green Belt area of Fort Bragg with no construction allowed. The land use at SWMUs 4 and 18 and surrounding area is industrial with no current plans to change the land use. In the heavily forested areas south of SWMUs 4 and 18 (designated as open space and transition) are wetlands and habitat for the endangered red-cockaded woodpecker. No schools, playgrounds, churches, or hospitals are located within 1,500 ft of the site.

**2.0 JUSTIFICATION AND PURPOSE OF CORRECTIVE ACTION.** The EPA has provided risk based corrective action guidance that specifies the major components to be considered in selecting a corrective action. These include the following threshold criteria: (1) protect human health and the environment and the management of wastes; (2) attain

media cleanup standards set by the implementing agency (e.g., NCDENR); (3) control the source of the releases so as to reduce or eliminate, to the extent practicable, further releases that might pose a threat to human health and the environment; (4) comply with any applicable standards for management of wastes; and (5) other factors. Corrective action alternatives meeting the threshold criteria are then balanced against the following: (1) long-term reliability and effectiveness; (2) reduction of toxicity, mobility, or volume of wastes; (3) short-term effectiveness; (4) implementability; and (5) cost.

**2.1 LOCATION AND MISSION OF FORT BRAGG.** The U.S. Army Military Reservation at Fort Bragg was established in 1918 as the major logistic, training, and mobilization deployment center for the XVIII Airborne Corps and 82d Airborne Division, which is part of the U.S. Army's mobile infantry, assault, and armored forces. It is also home to the Army's largest support command (1st COSCOM) and the Special Operations Command. Fort Bragg occupies about 161,500 acres in southeastern North Carolina. Approximately 92,000 acres are designated for field maneuvers, exercises, firing ranges, impact areas, and parachute drop zones. The cantonment area, in the eastern part of Fort Bragg, occupies 11,000 acres and includes about 4,800 buildings. Most military maintenance and production facilities, supply facilities, operation and training facilities, various community facilities, and family and troop housing are in the cantonment area. Pope Air Force Base borders Fort Bragg north of the cantonment area.

**2.2 SITE INFORMATION.** Solid Waste Management Units 4 and 18 consist of two sites within an area of approximately 10 acres.

a. The landfill at SWMU 4 reportedly was active from early 1961 to 1966. Based on historical information, landfill four was a general-purpose landfill. The types of waste disposed in the unlined landfill were not recorded, but materials encountered during the excavation of test pits and soil borings during the 1998 USGS investigation included metal scraps, wood fragments, tin and steel drink cans, glass bottles, cooking oil cans, paint cans, insecticide and medical bottles, cardboard, household debris, and dining facility garbage. Landfill debris was observed at depths exceeding 11 feet. Typical landfill practices at the time of operation of SWMU 4 consisted of spreading and burning of the landfill materials prior to burial. Burned material was observed during test pit installations. The thickness of the cover varies from one to four feet. (See Figure 1 for SWMU location.)

b. Solid Waste Management Unit 18 consists of two fire protection training pits that overlie the northern section of SWMU 4. From 1966 to 1978, the fire training pits consisted of sand-lined shallow berms. In 1978 the sand-lined basins were replaced with 75-foot-wide concrete-lined pits that were used until 1993. Drains were installed in both pits to discharge residual un-burned oil into an OWS at building 6-9273. Fuel was ignited regularly in the pits and extinguished during the fire protection training exercises. The SWMU investigation was based on

spills prior to the 1978 construction. Since 1993, the site has been used as a wash rack for Fort Bragg Fire Department equipment (See Figure 1 for SWMU location.)

### **3.0 SURFACE WATER AND TOPOGRAPHY.**

a. An east-west trending ridge divides Fort Bragg into two drainage sub-basins. The northern sub-basin drains into the Little River; the southern sub-basin drains into tributaries of Cross Creek and Rockfish Creek. Little River, Cross Creek, and Rockfish Creek are tributaries of the Cape Fear River, which is east of Fort Bragg.

b. Surface runoff at SWMUs 4 and 18 drains into the Beaver Creek drainage system along the eastern and southern boundaries of SWMUs 4 and 18. Contamination found in Beaver Creek was determined to be associated with SWMU 103 and not SWMUs 4 and 18. Beaver Creek leaves the Fort Bragg Installation and enters the Public Works Commission watershed for the city of Fayetteville in a location known as Bonnie Doone Lake.

c. Surface water is not used as a source of drinking water on the Fort Bragg installation. During times of drought, water impoundments are used to supplement the source of Fort Bragg drinking water, the Little River. Several impoundments are present at Fort Bragg and include Young Lake and McFayden Pond in the northern portion of the cantonment area, Lake Arthur in the northwestern corner of the installation, McKellars Pond beyond the western edge of the cantonment area, and Smith Lake and Texas Pond in the southeastern part of the cantonment area. The closest impoundment to SWMUS 4 and 18 is an unnamed pond, located approximately two miles to the southeast, below the confluence of Big Branch and Beaver Creeks, which is not used to supplement the water system.

### **3.1 SITE GEOLOGY.**

a. Geologic units in the Fort Bragg area, from oldest to youngest, consist of the Carolina Slate Belt rocks, which comprise the basement rock, the Cape Fear Formation, and the Middendorf Formation. Carolina Slate Belt rocks, which underlie the younger sedimentary rocks, are of Precambrian and Cambrian age and are composed of metavolcanic, metasedimentary, and igneous rock (USGS 1996). The elevation of the top of basement rock ranges from 180 ft above sea level at Southern Pines (USGS 1996), near the western edge of the military reservation, to 110 ft below sea level near the confluence of the Cape Fear River and Rockfish Creek (USGS 1996). The Cape Fear and Middendorf Formations overlie the basement rock and saprolite. These formations are part of the generally southeastward dipping and thickening wedge of sediments that constitutes the Atlantic Coastal Plain deposits. These formations generally are considered to be representative of an upper delta-plain environment (USGS 1996).

b. The soils within the Fort Bragg cantonment area are the result of weathering of the unconsolidated sandy sediments of the Coastal Plain. The soils range from moderately to excessively well drained. Soils in upland areas are sandy, acidic, low in organic matter, and have low fertility. The upland soils have brittle, loamy or clayey subsoils associated with Blaney, Gilead, and Lakeland soil types. Soils in low-lying areas typically have a heavier texture (containing more organic and clayey material) than upland soils. Soils in low-lying areas are poorly drained, resulting in swampy areas along streams. Johnston loam typically is found in low-lying areas of Fort Bragg (USGS 1996). Because many of these soils have similar properties, transition zones between the soil types are not always apparent.

### **3.2 HYDROLOGY AND PUBLIC WATER SUPPLIES.**

a. Fort Bragg currently draws an average of 8.5 million gallons of water each day from the Little River. Fort Bragg also has the option to purchase up to three million gallons per day from the City of Fayetteville to meet emergency needs. Fort Bragg operates five public water systems that are permitted for operation by the state of North Carolina. The primary water treatment plant has a 16 million gallon per day capacity. The water treatment plant treats and supplies drinking water to the entire cantonment area, Simmons Army Airfield, the Central Vehicle Wash Facility, and all of Pope Air Force Base.

b. Water supplies for the City of Fayetteville, which is southeast of Fort Bragg, are obtained from the Cape Fear River and impoundments along the Cross Creek and Little Cross Creek, which drain the southeastern part of Fort Bragg. The water supply for the Town of Spring Lake, adjacent and northeast of Fort Bragg, is purchased from the City of Fayetteville and Harnett County.

c. An east-to-west trending ridge divides Fort Bragg into two drainage sub basins. The northern sub basin drains into Little River; the southern sub basin drains into tributaries of Cross Creek and Rockfish Creek. Surface runoff at SWMU 9, which is in the southern sub basin, drains into the north and south fork of a Beaver Creek tributary. Beaver Creek flows into Cumberland Creek, a tributary of the Cape Fear River, which is east of Fort Bragg. Streams located on the military reservation generally are low gradient and, in many areas, have poorly defined channels, which grade into swampy areas. Streambeds consist of unconsolidated materials, typically silt or clay.

d. The Fort Bragg area is underlain by three freshwater aquifers: the saprolite-basement, Cape Fear, and Middendorf aquifers. The saprolite-basement rock aquifer is below the Cape Fear Formation, and its depth ranges from 140 ft below land surface (BLS) in low-lying parts of the cantonment area to 300 ft or more BLS in the central and western parts of Fort Bragg. The saprolite-basement aquifer is

generally assumed to yield little water, and no supply wells in this area are known to solely tap this aquifer. The Cape Fear aquifer is composed of the Cape Fear Formation, which is primarily clay interbedded with silt and silty sand under confined conditions. The uppermost 5 to 10 ft of the Cape Fear Formation in the Fort Bragg area form the Cape Fear confining unit. This confining unit restricts vertical movement of water between the overlying sediments and the silty-sand units of the Cape Fear aquifer. Several wells on the Fort Bragg reservation are screened in this aquifer. East of Fort Bragg, the Cape Fear aquifer is used for public and industrial water supplies (USGS 1996).

e. The Middendorf aquifer primarily consists of coarse- to fine-grained silty or clayey sands with interbedded light-gray to tan clays. The interbedded and discontinuous clay layers in this aquifer support local perched water zones. Perched water zones in the Fort Bragg area generally are within 20 ft of land surface, and groundwater in these perched zones is under unconfined conditions and referred to as the "surficial aquifer." The saturated thickness of the water table within a perched water zone is typically only a few feet. Many of the perched water zones dry out during the growing season and are not a reliable source of water supply.

f. Groundwater in the lower part of the Middendorf aquifer is commonly under confined or semiconfined conditions, as determined by interbedded clay layers, whereas groundwater in the upper part of the Middendorf aquifer is under unconfined conditions. The potentiometric surface of the aquifer is as much as 80 ft BLS in upland areas of the military reservation and near land surface along perennial streams (discharge areas for the Middendorf aquifer).

g. The sandy soils, which cover most of Fort Bragg and the Sand Hills hydrologic area, are leached beds of the Middendorf Formation. These sands are highly permeable and allow rapid infiltration of precipitation, which is the primary source of groundwater recharge.

### **3.3 POTENTIAL RECEPTORS AND SENSITIVE AREAS.**

a. Surface runoff at SWMUs 4 and 18 appears to generally flow south into Beaver Creek, along the southern boundary of SWMUs 4 and 18. Groundwater locally flows to the south towards Knox Street. Some of this groundwater may discharge into Beaver Creek. There are family housing areas within 500 to 750 ft of SWMUs 4 and 18, across Honeycutt Road to the north and east of Beaver Creek.

b. In the heavily forested areas south of SWMUs 4 and 18 (designated as open space and transition) are wetlands and habitat for the endangered red-cockaded woodpecker. No schools, playgrounds, churches, or hospitals were noted within 1,500 ft of the site.

#### 4.0 SUMMARY OF SITE RISKS.

a. Aluminum, semi-volatile organic compounds (SVOCs), iron, beryllium, and arsenic were detected in surface soil above North Carolina residential risk-based standards. Benzene, methylene chloride, 1,4-dichlorobenzene, Aroclor 1248, delta-BHC, lindane, total petroleum hydrocarbons, cyanide, and six metals (aluminum, iron, arsenic, beryllium, barium, and chromium) were identified in subsurface soil at concentrations that exceeded North Carolina industrial standards. Various chemicals were detected in groundwater exceeding NC 2L regulatory standards including vinyl chloride, aluminum, antimony, chromium, iron, lead, manganese, mercury, vanadium, zinc, gross alpha, and gross beta. Dieldrin and iron exceeded North Carolina surface water quality standards in surface water. The same levels of dieldrin and iron were found in an upgradient sample taken in Beaver Creek and the RFI determined the contamination is unlikely to be from the SWMU 4 and 18 source but more likely from residential and golf course applications. High levels of iron were determined to be naturally occurring throughout the installation. No analytes exceeded regulatory limits in streambed sediment.

b. Soils. The RFI Investigations determined the low concentrations of contaminants (aluminum, semi-volatile organic compounds (SVOCs), iron, beryllium, and arsenic) do not represent a significant threat to human health and the environment, given current and reasonably anticipated future land use, and that no additional investigations are required. A high-voltage power line runs through the site making it unsuitable for future development.

c. Groundwater. The RFI investigations document that chlorinated organic compounds (COCs) (chloroform, chloromethane, and tetrachloroethane) are present in levels exceeding NC 2L groundwater standards. The presence of degradation products found during the 2002 groundwater-sampling event suggests the low levels of residual COCs are naturally attenuating. The clay layer of the Cape Fear Formation that underlies the site will confine the low level of residual contamination to the surficial aquifer. Groundwater is not used a source of drinking water on the Installation. The Fort Bragg IRP restricts groundwater use at areas adjacent to SWMUs. North Carolina Department of Environment and Natural Resources has imposed mandatory restrictions on the installation of any new irrigation wells within the Fort Bragg Cantonment Area. Installation of any type of groundwater well requires work plan and construction review by the IRP Team. Under current and reasonably anticipated future land-use conditions, the contaminants do not provide an unacceptable risk to human health and the environment while Fort Bragg retains its groundwater restriction for drinking or irrigation use. Ground water monitoring is required of any site with exceedance of North Carolina 2L groundwater standards.

**4.1 EVALUATION OF CORRECTIVE ACTION TECHNOLOGIES.** A no-action with groundwater monitoring alternative and five categories of corrective action technologies were identified for the soil and groundwater: (1) Source removal, (2) institutional controls (land-use restrictions and physical barriers/signs), (3) capping, (4) native soil cover, and (5) groundwater monitoring. The technologies were evaluated using the screening criteria of effectiveness, implementability, and cost. The no-action alternative provides a baseline against which other technologies can be compared. Under the no-action alternative, no further action would be taken to mitigate risks posed by materials in the landfill. Groundwater monitoring would be performed to document contaminant concentrations. This alternative has the lowest associated cost. The acceptability of the no-action alternative is judged in relation to the assessment of known site risks and by comparison with other corrective action technologies. The no-action alternative is not considered viable because it provides no reliable or effective method for protecting human health from groundwater contamination; therefore, the no-action alternative has been eliminated from further evaluation.

a. Source Removal would excavate the buried waste and contaminated soils. Proper disposal of the buried waste, site and safety health plans, and remedial actions would be the greatest cost. Groundwater would require monitoring until action levels drop below 2L groundwater standards. This would be the most expensive of actions with a cost exceeding \$6.8M. Investigation has determined the waste extends into the groundwater and employing this method would not achieve reuse of the land. As this landfill is within the existing Greenbelt of the installation with no planned construction projects; this alternative was removed from consideration.

b. Land use restrictions include actions taken to restrict access to contaminated areas to protect human health based on the criteria of long-term reliability and effectiveness; reduction of toxicity, mobility, or volume of wastes; short term effectiveness, implementability; and cost. Land-use restrictions would include controls implemented through the BMP. Restrictions would be documented in the BMP. The DD and the survey plat will be added to the BMP as the selected remedy of the SWMU. Physical barriers could include installation of chain-link fencing and placement of signs or markers around the landfill boundaries or contaminated areas. The low levels of contaminants found in the landfill and present land use at the site make this scenario impracticable and not cost effective; therefore, this technology (fencing/signs) has been removed from further consideration. Land use restrictions could be implemented for a no cost action in the BMP, therefore; land use restrictions documented in the BMP has been retained for future consideration. The BMP is the local planning and zoning document referenced by all future construction activities. The Office of Master Planning and the base Environmental Office will be responsible for enforcing land use controls when consulted for all military construction projects.

c. Capping would include placing a low-permeability clay cover on the landfill. Placement of the clay cap would require a state-approved erosion control plan and silt fencing around the perimeter of the site. The capped area would be seeded with grass to minimize erosion of the area. The clay cap would minimize infiltration into the buried debris and minimize the potential for human exposure to the buried waste. The depth of the waste is unknown and is considered to be below the water table; therefore, the effectiveness of a low-permeability cap to prevent leaching is uncertain. Current land uses at the landfill does not necessitate installation of a low-permeability cap. For these reasons, the low-permeability cap has been eliminated from further evaluation.

d. Placement of a native soil cover on the landfill would minimize inadvertent human exposure to buried waste, minimize transport of contaminants through surface water runoff and air dispersion, and allow the methane within the landfill to dissipate. A minimum cover for permitted landfills under NCDENR regulations is 18- to 24-in thick with native vegetation to minimize erosion. Some native soil cover is present over part of the landfill. As with the cap, current land uses, pine, and scrub oak trees impose impediments to placement of a native soil cover. The cover could be used to treat hot spots within the landfill with existing little or no ground cover. Placement of the native cover would require a state approved soil erosion control plan and installation of silt fencing around the perimeter of the site. Current land uses at the landfill does not necessitate installation of a native soil cover and based on soil sample analysis of the site, this technology was eliminated from further consideration.

e. Groundwater monitoring would include sampling and analysis of site monitoring wells to monitor contaminant concentration trends or to verify that hazardous constituents leaching from buried waste are not posing a threat to human health. Groundwater monitoring is effective, readily implementable, and can be a cost-effective method for monitoring changes in the site conditions and providing an early warning to prevent potential human exposure to contaminated groundwater. North Carolina regulations do not allow NFA for landfills if groundwater levels exceed any of the NC 2L standards; therefore, groundwater monitoring is required by regulatory statutes and has been retained for further consideration.

## **5.0 SELECTED CORRECTIVE REMEDIAL ACTION.**

a. Soil analytes indicate low levels of SVOCs exceed North Carolina soil standards. Analytical results from groundwater samples collected in June 2001 and August 2002 indicate the absence of most chemicals of concern other than chlorinated organic chemicals (chloroform, chloromethane, and tetrachloroethane). The analytes detected, however, were at concentrations above the North Carolina 2L Standards. There is no exposure pathway to pose a threat to human health or the environment other than groundwater. Groundwater is not

currently used as a source of drinking water on Fort Bragg. As long as Fort Bragg adheres to this practice and does not use groundwater near SWMUS 4 and 18 as a water-supply source, any potential risk posed by groundwater contaminants should be alleviated. North Carolina regulations do not allow NFA for landfills or SWMUs if groundwater levels exceed any of the NC 2L standards; therefore, groundwater monitoring is required.

b. Based on the results of the most recent sampling event and previous investigations, Fort Bragg has selected land use restrictions and long-term monitoring (LTM) of wells, historically exhibiting groundwater contaminant levels in excess of North Carolina Groundwater Protection Standards, every nine months for a total of five sampling events, as it's selected remedy for this site. The LTM will document that groundwater contamination is not migrating from the source area and is naturally attenuating. Once four consecutive sampling events establish no exceedance of the North Carolina Groundwater Protection Standards for these constituents, a NFA determination would be requested. Land-use restrictions for the site will be included in the BMP at a no-cost remedy. Anticipated annual cost for each sampling event is \$47,000.00, for a projected lifecycle cost of \$235,000 for LTM of groundwater from SWMUS 4 and 18.

**6.0 CONCLUSION.** Groundwater in the cantonment area is not used as a source of drinking water. As long as Fort Bragg adheres to this practice and does not use groundwater near SWMUS 4 and 18 as a water-supply source, risk posed by groundwater contaminants should be alleviated. As long as SWMUs 4 and 18 remains wooded or industrial, and land use restrictions are in place and documented in the BMP to prevent soil disturbance, risks associated to human health and the environment, with contaminants in soil should be alleviated. Once four consecutive sampling events establish no exceedance of the North Carolina Groundwater Protection Standards for these constituents, a NFA determination would be requested. Long-term monitoring will continue until no analyte exceed NC 2L standards. The DD will be made available for public review on the Fort Bragg website <http://www.bragg.army.mil/envbr>.



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## ACRONYMS

AMSL	above mean sea level
BGS	below ground surface
BLS	below land surface
BMP	Base Master Plan
CMS	Corrective Measures Study
COC	constituent of concern
COPC	constituent of potential concern
CY	calendar year
DOD	U.S. Department of Defense
EPA	U.S. Environmental Protection Agency
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
IMAC	interim maximum acceptable concentration
IRP	Installation Restoration Program
MCL	maximum contaminant level
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
O&M	operations and maintenance
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
PWBC	Public Works Business Center
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
Redox	oxidation-reduction potential
RFI	RCRA facility investigation
RGO	remedial goal option
SCM	site conceptual model
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCLP	Toxicity Characteristic Leaching Procedure
TPH	total petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VOC	volatile organic compound

Figure 1, Site Map

### SWMUs 4 & 18 Vicinity Map / Fort Bragg, NC

