



Programmatic Environmental Assessment Final

**Fort Campbell Weapons Modernization Fielding
at Fort Campbell, Kentucky**

Prepared for:

**U.S. Army Corps of Engineers
Louisville District**

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FINAL

FINDING OF NO SIGNIFICANT IMPACT (FONSI)
FT. CAMPBELL WEAPONS MODERNIZATION FIELDING
FT. CAMPBELL, KENTUCKY

CEQ UNIQUE ID NUMBER: PEAX-007-21-001-1755005314

Pursuant to the procedural provisions of the National Environmental Policy Act of 1969 (NEPA) (42 United States [U.S.] Code Section 4321 et seq.) and Department of Defense National Environmental Policy Act Implementing Procedures, 30 June 2025 and Army Regulation 200-1, *Environmental Protection and Enhancement, Department of Defense National Environmental Policy Act Implementing Procedures*, the Army has prepared this Programmatic Environmental Assessment (PEA) to support weapon systems modernization stationing, fielding, and operations at Ft. Campbell, Kentucky. The PEA is attached and incorporated by reference.

The Army Modernization Strategy (AMS), introduced in 2019 and amended in 2021, supports the National Defense Strategy and describes how the Army will transform into a multi-domain force by 2035; integrated across all domains of warfare – land, sea, air, space, and cyberspace. As part of the AMS effort, the six additional weapon systems evaluated in the PEA will be fielded at multiple military bases across the U.S. (Army 2023). The proposed action describes the range of requirements and resources to analyze potential effects of stationing, fielding, operating, and maintaining up to six additional weapon systems developed as part of the AMS at Ft. Campbell.

Purpose and Need (PEA § 1.4 and § 1.5) – The Army has experienced a doctrinal change from prior years. Army forces need equipment and weapon systems that can compete and overcome the power of our near-peer adversaries. The proposed action is needed to enable soldiers, equipment, and weapon systems to be readily available to rapidly deploy to any contingency of operations around the world. The Systems stationed and fielded at Ft. Campbell will improve soldier safety and lethality, and the success of the mission (Army 2023).

The Army, as part of the AMS, proposes to potentially station and field one or more of the following systems at Ft. Campbell:

- Indirect Fire Protection Capability (IFPC) Battalion (BN)
- M10 Booker Combat Vehicle (M10 Booker)¹
- Long-Range Hypersonic Weapon (LRHW) System

¹ On June 11, 2025, the Army officially announced the cancellation of the M10 Booker program. Since some M10 Booker Combat Vehicles currently remain in the final stages of production and may be accepted/fielded by the Army in the future, this NEPA document includes analysis of potential environmental effects associated with the stationing, fielding, and operating of the M10 Booker. This inclusion also provides preliminary analysis for a possible future light armored vehicle that could be developed to meet the Army's need for a light armored vehicle system.

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- Mid-Range Capability (MRC) Weapon System
- High-Power Directed Energy (HP-DE) System (comprised of High-Energy Laser [HEL] and High-Power Microwave [HPM] systems)
- Multi-Domain Task Force (MDTF)

Fielding the IFPC, M10 Booker, LRHW, MRC, HP-DE, and MDTF will enhance the Army's ability to defeat advanced and future threats, provide new capabilities to Ft. Campbell soldiers and integrate with new and existing systems (Army 2023).

The proposed action, presented in Alternatives #1, #2, and #3 and the no action alternative (Alternative #4), were initially considered (PEA § 2.1 to § 2.4, pages 2-1 to 2-15; Table 2-1). No alternatives were eliminated from initial consideration. Therefore, the proposed action of the three alternatives and the no action alternative (Alternative #4) were carried forward for further evaluation.

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

Proposed Action (PEA § 2.1 and § 2.3) – The proposed action is to analyze, from a programmatic perspective, the potential effects of fielding up to six additional weapon systems at Ft. Campbell, and to identify potential site-specific supplemental analysis needed to inform a future fielding decision. Each proposed weapon system has previously been analyzed at the programmatic level to establish appropriate requirements for potential implementation at a broad range of Joint Force bases. Each proposed weapon system presents its own requirements for storage, logistics, training, operation, maintenance, staffing, and associated soldier's families to be integrated into the Ft. Campbell base infrastructure and surrounding communities.

The proposed action does not include the consideration of training activities. When the training doctrine requirements are developed, they will be compared against installation-specific on-going training to determine if additional environmental analysis could be required.

An IFPC BN could be fielded and stationed at Ft. Campbell as part of the 2019 AMS, amended in 2021, in Fiscal Year (FY)31. This BN will provide defense against cruise missiles, rockets, and unmanned aircraft systems (UAS) to fixed and semi-fixed sites, initially with kinetic weapons and, potentially in the future, in directed energy effectors such as high energy lasers and microwaves. Physically, the IFPC would be sited as part of an existing Ft. Campbell Air Defense Artillery Battery with administrative functions and barracks located in existing Buildings 6911 and 6912 with the Tactical Equipment Maintenance Facility (TEMF) located at existing buildings 7005 and 7006.

The M10 Booker System (also referred to as Mobile Protected Firepower) could be fielded and stationed at Ft. Campbell in FY27. The M10 Booker would provide the Army's Infantry Brigade Combat Teams with an Armored Infantry Support Vehicle that is a highly mobile, multi-terrain, tracked vehicle with direct-fire capabilities. Proposed temporary M10 Booker Support Facilities

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include barracks in existing Building 7096 (~ 8 acres), a TEMF in existing Building 6525 (~ 12 acres), and 4 administrative buildings (~ 12 acres).

The LRHW System could be fielded and stationed at Ft. Campbell as part of the 2019 AMS amended in 2021 in FY25 or later. The LRHW may be fielded at Ft. Campbell as an element of a Full MDTF or as an individual Battery (BTRY). The system could be transported between locations by Air Force C-17 and be road-mobile for transport on base/installations. Approximately 60 to 90 soldiers are required to oversee LRHW maintenance, operations, and training.

The MRC Weapon System may be fielded and stationed at Ft. Campbell as part of the 2019 AMS in FY25 or later. The MRC BTRY is a component of the Long-Range Fire BN and would provide mid-range missile capabilities that allow the Army to respond against peer adversaries in a more challenging environment and can be integrated into a Full MDTF. Approximately 70 to 100 soldiers are required to oversee MRC maintenance, operations, and training. If fielded as a BTRY, the MRC would occupy one Company Operations Facility and have space provided at a TEMF/motor pool. Barracks and support facilities for the soldiers would be required. If fielded with a Full MDTF, the MRC would have facilities within the Long-Range Fires Battalion (LRFB).

The Army may field and station HP-DE Systems, more specifically known as the HEL and HPM, within the IFPC BN or BTRY at Ft. Campbell as part of the 2019 AMS by FY35. The IFPC HP-DE would be issued at the platoon level within an IFPC BTRY. The HEL or HPM platoon soldiers would transition from the IPFC kinetic energy systems with no growth of the BN associated with fielding of the HP-DE.

Depending on future needs and operational requirements, the Army may field and station a MDTF at Ft. Campbell as part of the 2019 AMS in the 2025-2030 timeframe. The MDTF is built around a Field Artillery Brigade structure and requires installations and facilities including airspace, communication and cyber capabilities; soldiers; weapon systems and infrastructure. There are two MDTF formations, Full and Base. Full MDTF includes the IFPC, the LRHW, and the MRC and requires approximately 93 acres for all facilities and over 3,000 soldiers. The Base MDTF would involve less weapon systems and would require about 18 acres for all facilities and 400 soldiers.

Alternative #1: IFPC and M10 Booker (PEA § 2.1.1, § 2.3.2, and § 2.3.3) – The M10 Booker would be fielded and stationed at Ft. Campbell in FY27, followed by the IFPC in FY31. As described in the proposed action above, and as detailed in Table 2-1 of the PEA, both actions would entail a mix of new construction and repurposing of existing facilities and capabilities to meet the specified physical criteria for each system.

Alternative #2: IFPC Only (PEA § 2.1.2 and § 2.3.2) – Only the IFPC and associated soldiers would be fielded and stationed at Ft. Campbell in FY31. New construction and repurposed

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facilities necessary to support the IFPC are listed in Table 2-1 of the PEA and are summarized above in the description of the proposed action.

Alternative #3: Up to Four Additional New Weapon Systems (PEA § 2.1.3, § 2.3.2, § 2.3.3, § 2.3.4, § 2.3.5, § 2.3.6, and § 2.3.7) – Up to four additional new weapon modernization systems, including the LRHW, MRC, HP-DE, and MDTF, would be fielded and stationed at Ft. Campbell beginning FY25 and continuing through the FY30 timeframe.

Alternative #4: No Action (PEA § 2.1.4) – The no action alternative serves as a baseline against which the effects of the alternatives can be evaluated. The weapon systems would not be stationed and/or fielded at Ft. Campbell. Although the no action alternative would eliminate unavoidable adverse, short-term and long-term effects associated with the alternatives, it would not meet the objectives of the AMS, and it would not fulfill the purpose and need.

ENVIRONMENTAL CONSEQUENCES

Based on the description of proposed action and alternatives, it was determined that implementation of the proposed action or alternatives could have the following Environmental Consequences.

Air Quality (PEA § 3.1, § 4.1.1, § 4.2.1, § 4.3.1, and § 4.4.1) – For the proposed action, all activities were conservatively estimated and assumed to occur in one year to provide a worst-case scenario of emissions. Air emissions associated with the proposed construction and heating activities were modeled using Air Conformity Applicability Modeling (ACAM) software.

Alternative 1, fielding the IFPC and M10 Booker would include the construction of new facilities, and the installation of portable generators and boilers. The annual net change in estimated criteria pollutant emissions associated with Alternative 1 would be less than the insignificance indicators of 100 tons per year (tpy) for volatile organic compounds (VOCs) and nitrogen oxides (NOx) and 250 tpy for all other criteria pollutants. A General Conformity Determination would not be applicable. All criteria pollutant emissions would be insignificant and would not cause or contribute to an exceedance of National Ambient Air Quality Standards (NAAQS). Alternative 1 would have an insignificant impact on Air Quality.

For Alternative 2, fielding the IFPC would include the construction of new facilities, and the installation of portable generators and boilers. The annual net change in estimated criteria pollutant emissions associated with Alternative 2 would be less than the insignificance indicators of 100 tpy for VOCs and NOx and 250 tpy for all other criteria pollutants. A General Conformity Determination would not be applicable. All criteria pollutant emissions would be insignificant and would not cause or contribute to an exceedance of NAAQSs; therefore, Alternative 2 would have an insignificant impact on Air Quality.

For Alternative 3, fielding the LRHW, MRC, HP-DE, and MDTF would include the construction of new facilities, and the installation of portable generators and boilers. The annual net change in

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estimated criteria pollutant emissions associated with Alternative 3 would be less than the insignificance indicators of 100 tpy for VOCs and NO_x and 250 tpy for all other criteria pollutants. A General Conformity Determination would not be applicable. All criteria pollutant emissions would be insignificant and would not cause or contribute to an exceedance of NAAQSs; therefore, Alternative 3 would have an insignificant impact on Air Quality.

Under Alternative 4, baseline conditions would remain unchanged and there would be no impact on air quality.

Air Space (PEA § 3.2, § 4.1.2, § 4.2.2, § 4.3.2, and § 4.4.2) – An impact to airspace would be considered significant if the proposed action violates Federal Aviation Administration (FAA) safety regulations or causes a substantial infringement of general aviation or commercial flight, or if new construction was proposed in an Air Installations Compatible Use Zone (AICUZ).

The proposed action does not include any IFPC, M10 Booker, or MDTF training activities. When the training doctrine requirements are developed, they will be compared against installation-specific on-going training to determine if additional environmental analysis could be required.

Current IFPC training requirements are projected to require vertical airspace control height to 45,000 feet and projected MDTF training requirements require vertical airspace control height to 60,000 feet. Should Ft. Campbell implement training for these systems, additional NEPA analysis would likely be required because projected IFPC and MDTF vertical airspace control heights exceed existing special use restrictions.

For Alternative 1, fielding and stationing of IFPC and M10 Booker equipment, facilities and personnel would have no significant impact on Ft. Campbell Airspace.

For Alternative 2, fielding and stationing of IFPC equipment, facilities and personnel would have no significant impact on Ft. Campbell airspace.

For Alternative 3, fielding and stationing of MDTF equipment, facilities and personnel would have no significant impact on Ft. Campbell Airspace.

Under Alternative 4, baseline conditions would remain unchanged; therefore, no impact on air space.

Biological Resources (PEA § 3.3, § 4.1.3, § 4.2.3, § 4.3.3, and § 4.4.3) – The proposed action includes the fielding up to six additional weapon systems at Ft. Campbell, including those identified in Alternatives 1, 2, and 3.

The protection and management of biological resources within Ft. Campbell are regulated by the U.S. Fish & Wildlife Service (USFWS), Kentucky Department of Fish and Wildlife Resources (KDFWR) and the Tennessee Wildlife Resources Agency (TWRA). Formal written requests and

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follow-up consultation were made to the USFWS, KDFWR, and TWRA for information pertaining to the presence of special status species within the area of the proposed action.

Regarding biological resources, the footprints of Alternatives 1 and 2 are proposed within the cantonment area, which consists mainly of developed land and various buildings, roads, and facilities, while Alternative 3 involves the following sites:

- Destiny Full MDTF 93-acre site, nearly 100% deciduous forest
- Mabry Full MDTF 93-acre site, nearly 100% deciduous forest
- Sabre Full MDTF 93-acre site, 70% deciduous forest, 30% mowed meadow/grasses
- NCB1 and 2, Base MDTF 18-acre sites, 90% deciduous forest, 10% mowed meadow/grasses

Construction noise and increased human activity could cause some fauna to move to less active areas either temporarily or permanently. Construction would require cutting and clearing of forest land. The alteration of vegetation is expected to have a less than significant effect on local ecosystems and communities. The cleared areas would require annual cutting activities to ensure the training lanes are adequately maintained to meet the training requirements of the soldiers assigned to train at the new facilities. Several state and federally listed bird species and state-listed plant species are known to inhabit Ft. Campbell properties. Construction activities and tree removal of large, open forested and grassed areas may adversely affect federally protected species and state-listed species.

Tree clearing should not be initiated until consultation with USFWS is complete. The installation must follow seasonal mowing and tree removal restrictions and management plans to avoid and/or minimize effects to protected species.

No surface waters would be directly or indirectly impacted; therefore, no impact to the federally endangered Pink mucket (pearlymussel) is anticipated.

The installation must comply with federal law, Army policy and guidance, and its own plans and programs, including compliance with the Endangered Species Act (ESA) and Integrated Natural Resource Management Plans (INRMPs), and consult with USFWS as required in order minimize effects to listed species.

Under Alternative 1, the fielding of IFPC and the M10 Booker would entail a mix of new construction and repurpose of existing facilities and capabilities to meet the specified physical criteria for each system within the cantonment area. For the initial siting of the M10 Booker, only repurposing of existing facilities is proposed. Plans for a permanent M10 Booker Support Site propose new construction in a grassy area/mowed grassed area that is utilized for hay lease, which may serve as habitat for state-listed sparrow species. However, this area is already

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disturbed by hay leasing. To minimize effects to state-listed species, existing seasonal mowing restrictions and management plans should be followed to have less than significant effects on biological resources. No surface waters would be directly or indirectly impacted; therefore, no impact to the federally endangered Pink mucket is anticipated.

Under Alternative 2, with only the IFPC being constructed, impacts would be less than Alternative 1. Construction is proposed within already-developed areas with existing paved surfaces and building footprints.

Under Alternative 3, extensive tree clearing of up to 297 acres of land across up to four different sites would occur. The forested areas are potential habitat for listed bat species, bald eagles, and migratory birds. As such, to reduce the potential to disturb the species, tree clearing would occur during the winter season (October 1 through March 31). Tree clearing would be conducted under the supervision of the Conservation Branch at Ft. Campbell.

Under Alternative 4, baseline conditions would remain; therefore, there would be no effect on biological resources.

Cultural Resources (PEA § 3.4, § 4.1.4, § 4.2.4, § 4.3.4, and § 4.4.4) –The proposed action includes the fielding and stationing of up to six additional weapon systems at Ft. Campbell, including those identified in Alternatives 1, 2 and 3. For all activities, prior to ground disturbance and construction/renovation, Ft. Campbell will follow Section 106 of the NHPA to allow for adequate evaluation of historic properties and the effects of the proposed undertaking on those properties. Notification of preparation of an EA/compliance with NEPA and letters soliciting public comments have been submitted by the Directorate of Public Works (DPW) – Environmental Division to the Tennessee Historic Commission and Kentucky Heritage Council. Notification letters have also been submitted to the following Federally recognized tribes: Absentee Shawnee of Oklahoma, Cherokee Nation of Oklahoma, Coushatta Tribe of Louisiana, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Kialegee Tribal Town, Muscogee Creek Nation of Oklahoma, Shawnee Tribe, Thlopthlocco Tribal Town, United Keetowah Band. Upon finalization of preferred alternative and project footprint(s) Ft. Campbell will initiate consultation under Section 106 of the NHPA with the Federally recognized tribes and appropriate SHPO.

There are 128 known historic cemeteries on Ft. Campbell, and those cemeteries are monitored on an annual rotation. During the monitoring, the location is verified, photographs taken, pedestrian survey conducted, and site dimensions verified. Prior to ground disturbing activities, the Ft. Campbell Archaeological Database and monitoring documentation will be reviewed to verify the location of cemeteries and, if needed, revise the area of disturbance to avoid the cemetery. If a survey is required to verify the location of the cemetery, a survey will be conducted, and the appropriate State Historic Preservation Office (SHPO) will be consulted. If a survey is not

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required, best management practices (BMPs) could include on-site monitoring during ground disturbing activities to allow for a less than significant impact to the known site.

The Ft. Campbell Integrated Cultural Resources Management Plan (ICRMP) outlines how the Section 106 process will be implemented at the facility including consultation and a comment period for the Advisory Council on Historic Preservation, SHPO, and Federally Recognized Tribes.

Under Alternative 1, the fielding of IFPC and the M10 Booker would occur within the cantonment area. Within this area, are known NRHP eligible and potentially eligible sites as well as a Historic District. These sites include above ground (historic) and archaeological and some have been determined to be eligible by the appropriate SHPO. As the footprint(s) for these facilities have yet to be established, an impact by this undertaking has not been determined or concurred with by the appropriate SHPO. During the planning of the facilities, the proposed footprint will be reviewed against the Ft. Campbell Archaeological Database to ensure that resources are not present and / or a survey has been conducted.

If a survey is required, an archaeological survey will be conducted and the appropriate SHPO contacted / consulted. Additionally, if a building is to be renovated and the building is 50 years or older and has not been surveyed, the building will be reviewed for eligibility determination under the NHPA.

Alternative 2 would result in the same potential impacts as Alternative 1.

Alternative 3 would result in the same potential impacts as Alternative 1.

Under Alternatives 1 through 3, prior to ground disturbance and/or completing a design of a facility, the Army will ensure that potential effects to historic structures are considered prior to finalizing the design, allowing for adequate evaluation, and seek concurrence of the proposed undertaking in accordance with 36 CFR 800.11 from the appropriate SHPO.

Under Alternative 4, baseline conditions would remain; therefore, there would be no effect to cultural resources.

Electromagnetic Spectrum (PEA § 3.5, § 4.1.5, § 4.2.5, § 4.3.5, and § 4.4.5) – The proposed action includes the fielding and stationing of up to six additional weapon systems at Ft. Campbell, including those identified in Alternatives 1, 2 and 3. Electromagnetic spectrum impacts would be considered significant if the proposed action utilized electromagnetic systems that would interfere or conflict with existing electromagnetic systems or aircraft operations, or existing Ft. Campbell electromagnetic systems would interfere or conflict with planned electromagnetic systems to be used as part of the proposed action. The proposed action for this PEA does not include any IFPC, M10 Booker, or MDTF training activities. When training doctrine requirements are developed, they will be compared against installation-specific ongoing training to determine if additional environmental analysis could be required. Should training

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requirements potentially impact electromagnetic spectrum use, additional NEPA analysis would be required.

For Alternative 1, fielding and stationing of IFPC and M10 Booker equipment, facilities and personnel would have no significant impact on Ft. Campbell Electromagnetic Spectrum use.

Similarly, Alternative 2, fielding and stationing of IFPC equipment, facilities and personnel would have no significant impact on Ft. Campbell Electromagnetic Spectrum use.

For Alternative 3, fielding and stationing of MDTF equipment, facilities and personnel would have no significant impact on Ft. Campbell Electromagnetic Spectrum use. Although the MDTF training doctrine requirements are under development and not available at this time, current training requirements would include High Power Directed Energy systems with the potential to impact other electromagnetic systems currently in use at Ft. Campbell. Therefore, additional NEPA analysis would likely be required.

Under Alternative 4, baseline conditions would remain unchanged and there would be no impact on the Electromagnetic Spectrum at Ft. Campbell.

Geological and Soil Resources (PEA § 3.6, § 4.1.6, § 4.2.6, § 4.3.6, and § 4.4.6) – For the proposed action and alternatives, effects on geology and soils would be adverse if the action alters the lithology, stratigraphy, and geological structure that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or change the soil composition, structure or function within the environment. Projects disturbing between 5,000 square feet (sf) and 1 acre of soil generally require a Stormwater Pollution Prevention Plan (SWPPP), which would include BMPs to reduce and minimize impacts associated with stormwater runoff, erosion, sedimentation, and pollutants. Applicable permits would be obtained and BMPs would be implemented based on site-specific conditions. Potential temporary impacts to soils would be controlled and avoided by using appropriate BMPs and soil stabilization/revegetation techniques following construction activities.

Disturbance to soils from routine construction projects within the cantonment area would be expected but would be kept to the minimum necessary to complete the work and would be confined to the final site boundaries. During construction, heavy equipment would be used to move and compact soils and remove debris in construction and paved areas. Site preparation for new structures and paved areas would require clearing and grading. Erosion Prevention/Sediment Control (EPSC) and grading plans required as part of the SWPPP would be prepared to identify site grading, drainage patterns, and runoff velocities affecting receiving waters. These plans would provide information regarding beginning and ending of excavation activities, establish the degree and length of finished slopes, specify the disposal of excess material, and the necessity of obtaining borrow material. Berms, diversions, sediment control, erosion control, and other stormwater practices would be incorporated into EPSC plans for land disturbing activities.

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The presence of karst terrain, including sinkholes, would affect the design and construction of any fixed structures. Karst features including open sinkholes require protection under the Kentucky Cave Protection Act (KCPA). Ft. Campbell currently maintains a 100 feet (ft) vegetated setback from karst features that is more protective than the 70 ft buffer required under the KCPA. The use of fertilizers, pesticides, other chemicals is prohibited within 100 ft of these features. Fueling operations should also be conducted at least 100 ft from these features. Timber removal also has provisions for protection of karst resources under the Forest Conservation Act Kentucky Revised Statutes (KRS) 149.330.

As much of Ft. Campbell is prone to sinkhole formation, construction projects sited in sinkhole topography would be required to address sinkhole related issues by designing facilities that address instability associated with development in this topography. Many sinkholes in the cantonment area are currently designated/permitted as Underground Injection Control (UIC) Class V wells.

Alternative 1 could have significant but mitigable impacts to soils resulting from construction activities. During construction, heavy equipment would be used to move and compact soils and remove debris in construction and paved areas. Soil disturbance could also result in increased erosion potential from loss of groundcover and exposure of bare soils to precipitation and runoff. Potential temporary impacts to soils would be controlled and avoided using appropriate BMPs and soil stabilization/revegetation techniques following construction activities. The IFPC footprint may impact one sinkhole.

Alternative 2 would result in similar impacts to karst issues and soils as for Alternative 1.

Alternative 3 would result in very similar, though greatly increased, impacts as presented for Alternative 1 with the addition of numerous buildings and large footprints for any one of the three, 93-acre MDTF sites. Should only the Base MDTF be fielded, there would be a moderate increase over Alternative 1 due to the moderate footprint of one of the two 18-acre Base MDTF sites.

Under Alternative 4, neither soils nor bedrock will be affected. The area will remain as it is currently developed.

Hazardous and Toxic Materials and Wastes (PEA § 3.7, § 4.1.7, § 4.2.7, § 4.3.7, and § 4.4.7)

– Construction and renovation associated with repurposing existing infrastructure / supporting facilities may require the use of hazardous materials by contractor personnel. Project contractors would comply with federal, state, and local environmental laws and would employ affirmative procurement practices when economically and technically feasible. All hazardous materials and construction debris generated by the construction would be handled, stored, and disposed of in accordance with federal, state, and local regulations and laws. Permits for handling and disposal of hazardous materials would be the responsibility of the contractor conducting the work.

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Construction activities would also generate minimal quantities of solid wastes, which may include but are not limited to concrete, electrical equipment, steel scrap wire, and packing materials. Contractors would be directed to recycle materials to the maximum extent possible, thereby reducing the amount of debris disposed of in landfills. Materials not suitable for recycling would be taken to a landfill permitted to handle construction debris wastes. The amount of waste generated by the alternatives would not have a significant impact to the operating life of the landfill.

In the event of a fuel spill during construction, the contractor would be responsible for its containment, clean up, and related disposal costs. The contractor would have sufficient spill supplies readily available on the pumping vehicle and/or at the site to contain any spillage. In the event of a contractor related release, the contractor would contact Hazardous Materials Control Center and take appropriate actions to correct its cause and prevent future occurrences.

There are known Environmental Restoration Program (ERP) sites located within areas proposed for use by the IFPC and M10 Booker facilities. If ground disturbance is required, the locations of ERP sites would be verified prior to construction. If a site has on-going investigation or remediation, the footprint will be modified or moved, or a worker safety plan would be prepared to ensure that people are protected from potentially contaminated soils and/or groundwater.

If renovation activities are to occur, the ACM inventory would be reviewed and if ACM is present within the buildings, it will be removed prior to renovations. Kentucky requires that it be notified before any asbestos project according to their regulation, 401 Kentucky Administrative Regulation (KAR) 58:025. Tennessee requires that it be notified in advance when any regulated ACM is removed in accordance with (IAW) Chapter 1200-03-11-02 of their Hazardous Air Contaminants Amendment. Notifications will include the type of work and amount of ACM to be removed. The ACM would be collected, containerized, inventoried, and disposed of within a designated area of the Ft. Campbell solid waste landfill, which is inspected by state regulators.

With the increase in personnel associated with the stationing, an increase in the generation of municipal solid waste (MSW) is anticipated. The increase in MSW would be associated with the additional food, housing, and commercial waste (e.g., paper and plastic). MSW would be collected and transported off the installation for disposal at the Bi-County landfill.

By verifying the location of ERPs and enacting associated mitigation measures, if required, the impact would be less than significant. Additionally, as the landfill has capacity to receive and manage additional wastes (including asbestos-containing material [ACM]) appropriately, no impact is anticipated.

Under Alternative 2, the impacts would be less than those described for Alternative 1 as there would be less construction and, therefore, less waste generated.

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Under Alternative 3, the impacts would be greater than those described for Alternative 1 as there would be an increase in construction/renovation activities, increasing the potential for contact with active ERP sites, and the amount of MSW due to the increase in personnel. Prior to construction or ground disturbance, the footprint of the newly constructed facilities would need to be reviewed against the delineated site boundaries of active ERP sites. If ERP sites are present within the footprint, the footprint will be modified or moved, or a worker safety plan would be prepared to ensure that people are protected from potentially contaminated soils and/or groundwater. As the Bi-County Landfill has ample capacity to meet the demands of MSW disposal from the additional personnel under this alternative, no significant impact is anticipated.

Under Alternative 4, none of the construction and/or renovation activities would occur. Therefore, there would be no effect on or from hazardous materials or waste resulting from the construction or increase in MSW associated with the siting of the systems.

Human Health and Safety (PEA § 3.8, § 4.1.8, § 4.2.8, § 4.3.8, and § 4.4.8) – For the proposed action, impacts on human health and safety (HH&S) are evaluated for their potential to jeopardize the health and safety of installation personnel as well as the surrounding public. Impacts might arise from physical changes in the work environment, demolition and construction activities, introduction of demolition and construction -related risks, and risks created by either direct or indirect workforce and population changes related to proposed activities.

No significant long-term adverse construction-related HH&S effects would be anticipated as a result of the implementation of the proposed action. Construction and renovation activities would be temporary. Short term impacts to HH&S from construction activities would be less than significant. Installation safety plans and SOPs would be followed to mitigate associated hazards from construction activities. Use of appropriate personal protective equipment (PPE), safety equipment, dust control methods, and work zone or hazard demarcation would reduce risk of injury or exposure of workers and other personnel.

Activities such as maneuvering, loading, and unloading heavy equipment involve safety hazards similar to those associated with construction. Soldiers would be trained to ensure safe operating procedures are followed to avoid hazards. Training activities would follow all relevant SOPs and safety requirements.

The public would have no access to the construction activities associated with the proposed action. Dust generation from the construction activities would likely be limited to on-base exposure and would be kept in check using dust suppression methods.

Alternatives 1 and 2 would result in the same potential impacts from construction-related activities as the proposed action.

Alternative 3 would result in the same kind of potential impact from construction-related activities as the proposed action. Since the scale of construction activities, when compared to

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Alternatives 1 or 2, would be notably greater for the Full MDTF and moderately greater for the Base MDTF, the potential for impacts to human health and safety, though still low, would be greater.

Under Alternative 4, baseline conditions would remain unchanged and there would be no impact on HH&S.

Land Use (PEA § 3.9, § 4.1.9, § 4.2.9, § 4.3.9, and § 4.4.9) – For the proposed action, potential land use impacts are anticipated related to the conversion of land currently designated for agricultural leases within the proposed consolidated footprint of the M10 Booker site and of land designated for forestry and timber harvest within the footprint of the Sabre1 parcel. The specific impacts are outlined in further detail below Alternatives 1 and 3.

Under Alternative 1, minor short term land use impacts are expected during renovations and construction for the IFPC and M10 Booker sites. Land use designations would require modification. The Proposed consolidated footprint for the future M10 Booker site is an active agricultural lease and would require lease revocation prior to construction. Revenue lost would be \$10.00/acre at proposed consolidated footprint. Impacts to forestry and logging potential would be minimal for the IFPC and M10 Booker sites as there are few to no trees located there.

Under Alternative 2, fewer acres of land would be impacted and no modifications to land use designations would be required. Therefore, no land use impacts are anticipated in association with Alternative 2.

Conversely, Alternative 3 would require more land to be impacted than Alternative 1. Approximately 18 acres of the Sabre1 parcel are part of an active agricultural lease and would require lease revocation prior to construction. Revenue lost would be \$162.20/acre or approximately \$2,920. The remaining approximately 75 acres of the Sabre1 parcel is wooded and clearing would be required for construction. As a result, Ft. Campbell would need to prioritize this acreage for timber removal in accordance with the Ft. Campbell Forest Management Plan.

Under Alternative 4, baseline conditions would remain unchanged and there would be no impact on land use.

Noise (PEA § 3.10, § 4.1.10, § 4.2.10, § 4.3.10, and §4.4.10) – For calculating estimated noise impacts associated with the proposed action and alternatives, noise from each type of anticipated equipment was calculated using the Federal Highway Administration (FHWA) Roadway Construction Noise Model to the noise sensitive areas of concern. Typical sound pressure levels at relevant receptor distances for planned construction activities and equipment are shown in the PEA in Table 4-2 on page 4-7.

Weapon system noise is unknown at this time and must be determined to perform an accurate assessment should these weapons systems be fielded at Ft. Campbell. However, training

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activities are not part of this proposed action, and additional studies will be performed in accordance with the selected action or alternative.

Alternative 1, fielding the IFPC and M10 Booker, would result in minor, temporary effects on the noise environment during the construction phase. All construction operations would occur during the day, Monday through Friday, with no construction operations on weekends nor in the evenings or nights. Using the Inverse Square Law of Noise Propagation noise levels would be reduced by 6 dB as the source distance is doubled (e.g., at 50 ft -6 dB, 100 ft -12 dB, at 200 ft -18 dB, at 400 ft -24 dB, and at 800 ft -30 dB). Residents are located approximately 680 ft from nearest the construction site and using the Inverse Square Law of Noise, noise levels are anticipated to be less than significant and short-term in nature.

For Alternative 2, fielding only the IFPC would utilize existing facilities, resulting in temporary construction noise at levels likely to be below ambient levels in residential areas within Ft. Campbell and off-post.

Alternative 3 would require additional construction beyond what is proposed under Alternative 1. Construction activities would result in temporary noise from operational equipment for site grading, trenching, building construction, application of architectural coatings and paving. Construction noise levels are expected to be below ambient levels outside the installation boundaries as described above. Additional studies must be done to determine the additional aircraft support required for the implementation and operations of these new weapon systems and update the ICUZ noise contours to determine if the noise zones will increase in acreage and noise receivers.

Under Alternative 4, the soundscape would remain as the baseline and no additional military noise would be contributed.

Socioeconomics (PEA § 3.11, § 4.1.11, § 4.2.11, § 4.3.11, and § 4.4.11) – An increase in personnel would be required to adequately staff the proposed action. Although many of the personnel may be reassigned from existing Ft. Campbell operations, a significant proportion would represent new personnel to the post and provide a moderate long-term positive impact on the Ft. Campbell local economy in terms of increased income and consumer spending. Additionally, although detailed plans and cost estimates have not been completed, these projects could be expected to provide appreciable new construction work that would provide a significant temporary positive impact on the local Ft. Campbell economy.

However, the new personnel – accompanied or unaccompanied – would increase demand on the existing constrained housing market – barracks and family housing on-post, and off-post rentals and owner-occupied housing. New accompanied personnel could include children increasing demand for on-post and off-post schools, as well as child-care. Since there is limited availability of on-post housing, the number of additional children to be enrolled in on-post schools may be

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limited enough to be accommodated by existing Department of Defense Education Activity (DoDEA) Ft. Campbell Modernization planning.

If a decision is made to implement the proposed action, a more specific evaluation of personnel staffing should be conducted to determine the actual number of new personnel to Ft. Campbell and their potential impact on Ft. Campbell on-post and off-post housing and schools.

For Alternative 1, fielding the IFPC and M10 Booker would involve renovation and/or demolition and new construction of facilities to house IFPC and M10 Booker personnel and equipment. The IFPC and M10 Booker would be staffed with approximately 735 and 400 soldiers respectively. Most of the M10 Booker personnel and many of the IFPC personnel may be re-assigned from existing Ft. Campbell staff, so there would be a limited number of new Army personnel to be newly located at Ft. Campbell. If a decision is made to implement Alternative 1, a more specific evaluation of IFPC and M10 Booker personnel staffing should be conducted to determine the actual number of new personnel to Ft. Campbell and their potential impact on Ft. Campbell on-post and off-post housing and schools.

Alternative 2, fielding the IFPC only, would result in a lower amount of temporary positive impact to the local Ft. Campbell for renovation and/or construction of IFPC facilities, without those of the M10 Booker. Potential long-term impact of new IFPC personnel on the local economy and on local housing and schools would be the same. If a decision is made to implement Alternative 2, a more specific evaluation of IFPC personnel staffing should be conducted to determine the actual number of new personnel to Ft. Campbell and their potential impact on Ft. Campbell on-post and off-post housing and schools.

For Alternative 3, fielding the Full MDTF at Ft. Campbell would involve the introduction of 3,000 soldiers and significant new vehicles and equipment at one of three 93-acre undeveloped proposed sites with significant new construction. If half the Full MDTF personnel transfer from existing Ft. Campbell positions, 1,500 new personnel would need on-post and off-post housing and schools. Army studies suggest approximately one-third would be unaccompanied personnel, leaving approximately 1,000 new personnel requiring family housing. This additional demand would likely consume remaining on-post family housing and put additional strain on the off-post local housing market, as well as both on-post and off-post school systems. If the SABRE1 Full MDTF site were selected, approximately 18 acres of agricultural lease revenue would be lost at \$165.20 per acre (approximately \$2,974 annual revenue), plus the associated impact on the local agricultural economy.

Under Alternative 4, baseline conditions would remain; therefore, no beneficial or negative impacts to the economic conditions on and off of Ft. Campbell would occur.

Transportation and Traffic (PEA § 3.12, § 4.1.12, § 4.2.12, § 4.3.12, and § 4.4.12) – Implementation of the proposed action would require a significant increase in staffing of

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personnel. Individual components of the proposed action are discussed in additional detail in the alternatives below.

For Alternative 1, fielding the IFPC and M10 Booker would involve approximately 735 and 400 soldiers respectively, plus a large number of vehicles and equipment with the IFPC. Although many of these personnel may be re-assigned from existing Ft. Campbell staff, they would be concentrated at their proposed siting locations (Site 1 and 6 on PEA Figure 1-3), near the 2-44 Air Defense Artillery (ADA) for the IFPC (PEA Figure 2-1) and southeast of the Campbell Army Airfield (CAAF) for the M10 Booker (PEA Figures 2-2 and 2-3). Should a decision to field the IFPC proceed, existing degraded level of service (LOS) ratings at two nearby intersections (Air Assault and A Shau Valley; Screaming Eagle and A Shau Valley), on-street parking congestion on A Shau Valley near Airborne, and existing intersection control issues on Normandy at Wickham and at Screaming Eagle would require additional traffic analysis and mitigation. Although fielding the M10 Booker would involve fewer personnel and vehicles, existing on-street parking congestion on 49th, 51st and 56th Streets, plus existing pavement conditions in the vicinity would require additional evaluation to avoid exacerbating existing problem areas.

Due to size and/or weight restrictions, transportation of IFPC or M10 Booker equipment by off-post public roads could require state Department of Transportation permits. Even if delivered to Ft. Campbell by air or rail, on-post movements by road could similarly require approval from the Ft. Campbell Directorate of Public Works.

Fielding the IFPC only for Alternative 2 would require additional traffic analysis and mitigation to avoid impacting existing traffic issues at nearby intersections (Air Assault and A Shau Valley; Screaming Eagle and A Shau Valley), on-street parking congestion on A Shau Valley near Airborne, and existing intersection control issues on Normandy at Wickham and at Screaming Eagle.

For Alternative 3, fielding the Full MDTF at Ft. Campbell would involve the introduction of 3,000 soldiers and significant new vehicles and equipment at one of three 93-acre proposed sites. Although many of the personnel may be reassigned from existing Ft. Campbell operations, a significant proportion would represent new personnel to the post and add to existing daily traffic volume in the vicinity of the selected site and to a lesser extent, to on-post and off-post housing. The potential DESTINY1 and SABRE1 sites (PEA Figure 1-3 Sites 2 and 5, and Figures 2-4 and 2-6) are relatively remote from the cantonment area and other existing operations. Additional traffic at these locations could be mitigated via suitable site design measures such as separate turn lane entrances/exits and intermittent turn signalization. The potential MABRY1 site (PEA Figure 1-3, Site 3, and Figure 2-5) is somewhat more centrally located, near some existing traffic congestion near A Shau Valley and Airborne, and adjacent to the existing railroad terminal, drainage and a former landfill, requiring a more complicated entry/exit design.

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Due to size and/or weight restrictions, transportation of MDTF components (equipment/systems) by off-post public roads could require state Department of Transportation permits. Even if delivered to Ft. Campbell by air or rail, on-post movements by road could similarly require approval from the Ft. Campbell Directorate of Public Works.

Under Alternative 4, the number of vehicles would remain the same on Ft. Campbell; therefore, there would be no impact to transportation or traffic.

Utilities (PEA § 3.13, § 4.1.13, § 4.2.13, § 4.3.13, and § 4.4.13) – Under the proposed action, the need for utilities would be notably increased to accommodate the additional systems.

Although current capacities should be able to accommodate the new systems, reconfiguring the utilities to the proposed sites would require moderate cost and effort. Individual components of the proposed action are discussed in additional detail in the alternatives below.

For Alternative 1, due to the availability of all the various utilities in the proposed siting for the IFPC and M10 Booker there would be no notable impact to expansion of utility infrastructure. Current capacities should easily accommodate the new systems. A potential beneficial impact on the utilities systems is that they would be continually upgraded to meet the expected future growth of the installation due to the addition of these weapons systems in conjunction with the supporting staff and operations. The operator for each utility would obtain the number of people planned in the development in order to specifically calculate the needed loads. Temporary interruption in utility service may occur during construction/renovation at the proposed sites for IFPC and M10 Booker. Such service interruptions would be temporary and would cease upon project completion. Use of existing utility trenches is encouraged whenever possible.

For Alternative 2, similar to Alternative 1, there would be no notable impact to the expansion of utility infrastructure, and the interruptions would be limited to just the proposed IFPC site area.

Considering Alternative 3, utility availability is not as robust for the three proposed Full MDTF sites. As this alternative includes the weapons systems of Alternative 1, plus the addition of up to four additional systems, the need for utilities would be notably increased to accommodate the additional systems. Of the three Full MDTF sites, the remoteness of available utilities is greatest for Destiny (Figure 2-4), second greatest for Sabre (PEA Figure 2-6), and least for Mabry (PEA Figure 2-5). If only a Base MDTF is stationed at one of the two 18-acre sites (PEA Figure 2-7), the utility need would be adjusted down respectively, and utilities are somewhat available from nearby development. Current capacities should be able to accommodate, however bringing the utilities to the proposed site would incur a moderate cost and effort.

Water Resources (PEA §3.14, § 4.1.14, § 4.2.14, § 4.3.14, and § 4.4.14) – During construction activities associated with the proposed action and alternatives, the potential to impact water resources is present; however, the impact would be mitigated through implementation of BMPs. Construction activities, either individually or collectively, would be covered under a general stormwater construction permit that would specify the BMPs to be used to control erosion on,

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and stormwater runoff from, construction sites. Adhering to the requirements of the permit would limit impacts on water resources. Any construction that would convert pervious land to impervious land would increase the quantity of stormwater runoff but not the amount of stormwater reaching surface waters if proper BMPs are in place. Energy Independence and Security Act (EISA) Section 438 requires that federal facility development projects of 5,000 sf or more maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of stormwater flow. Additional quantities of stormwater from new impervious surfaces would be retained onsite through the use of detention or infiltration.

Alternative 1 does not include activities that would modify or directly affect existing surface water features, and there is no anticipated direct effect or indirect modification of substrates and turbidity of surface water features.

For Alternative 2, similar to Alternative 1, there would be no direct impacts to surface water features. During construction, the potential for construction activities to impact water resources is present; however, the impact would be mitigated through implementation of BMPs.

For Alternative 3, similar to Alternative 1, there would be no direct impacts to surface water features. One of the sites designated for DESTINY is located adjacent to a suspect surface water feature. If this alternative was to move forward, a wetland delineation and hydrologic determination will need to be completed prior to construction to determine the presence of any unmapped wetlands or limits of surface waters. One of the sites designated for MABRY is located adjacent to a suspect surface water feature. If this alternative was to move forward, a wetland delineation and hydrologic determination will need to be completed prior to construction to determine the presence of any unmapped wetlands or limits of surface waters. One of the sites designated for SABRE is located adjacent to a suspect surface water feature. If this alternative was to move forward, a wetland delineation and hydrologic determination will need to be completed prior to construction to determine the presence of any unmapped wetlands or limits of surface waters. If any unmapped features within the project area are impacted, a jurisdictional determination should be completed utilizing the most recent definition of Waters of the United States (WOTUS) prior to any clearing, filling, or modifications. If waters are designated as jurisdictional, the post would then obtain authorization or a permit to fill in or modify under the Clean Water Act (CWA). If wetland features are impacted, the appropriate permit or authorization under the CWA will be obtained prior to construction. If wetlands are potentially impacted, a Finding of No Practicable Alternative (FONPA) may also be required.

Under Alternative 4, there would be no modification of or sediment deposition into surface water waters. Therefore, there would be no impact.

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PUBLIC NOTICE

A public notice was posted in the Leaf Chronicle, the Steward County Standard, the Kentucky New Era, and the Cadiz Record initiating a 30-day public comment period from 18 December 2025 through 17 January 2026. To facilitate public review, a Notice of Public Comment Period and a hard copy of the Draft PEA and FONSI was also made available in the following public libraries: Christian County Library, Robert F. Sink Library, John L. Street Library, Steward County Public Library, and Clarksville-Montgomery County Public Library.

The Notice of Public Comment Period and Draft PEA and FONSI was also posted on the Ft. Campbell Facebook page. Additionally, the Notice of Public Comment Period and Draft PEA and FONSI, and Final PEA and FONSI were made available to stakeholders and the public on the Ft. Campbell website. During this time nine agency comments were received.

MITIGATION AND MONITORING

Based on the analysis presented in the PEA, the proposed action would not likely result in environmental impacts; therefore, no mitigation or monitoring is proposed. Future NEPA analysis for specific actions tiering off the PEA may identify mitigation/monitoring requirements at that time.

FINDING OF NO SIGNIFICANT IMPACT

Based on review of the facts and analysis summarized above and contained within the PEA, I conclude implementation of the proposed action or Alternatives #1, 2, 3, or 4 (no action) or the Fort Campbell Weapons Modernization Fielding PEA would not have a significant impact on the natural or human environment and, therefore, an environmental impact statement is not required. This fulfills the analysis requirements of NEPA, Department of Defense National Environmental Policy Act Implementing Procedures, 30 June 2025, and Army Regulation 200-1, *Environmental Protection and Enhancement*.

__Original signed May 12,2026__

Date: _____

JAMES M. SNOWDEN
COL, AV
Commanding

CERTIFICATION RELATED TO PAGE LIMITS

The content of this PEA has been tailored to ensure that the environmental analysis remains focused on the most relevant issues and critical considerations, consistent with the intent of the page-limit guidance and the agency's professional judgment. Accordingly, I certify that this PEA satisfies NEPA's procedural requirements within the prescribed timeline and demonstrates compliance with applicable page-limit standards.

Original Certification signed 18 May 2026

Daniel L. Eton,
Fort Campbell NEPA Program Manager

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Acronyms and Abbreviations

ACM	asbestos-containing material
ACUB	Army’s Compatible Use Buffer
ADA	Air Defense Artillery
AICUZ	Air Installations Compatible Use Zones
AMS	Army Modernization Strategy
APZ	Accident Potential Zone
AQCR	Air Quality Control Regions
AR	Army Regulation
ARAC	Army Radar Approach Control
ARNG	U.S. Army National Guard
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practices
BN	Battalion
BTRY	Battery
C&DD	Construction and Demolition Debris
CAA	Clean Air Act
CAAF	Campbell Army Airfield
CFR	Code of Federal Regulations
CLP	City Light and Power
CWA	Clean Water Act
CZ	Clear Zone
dB	decibels
dBA	decibels, A-weighted
dBC	decibels, C-weighted
dBp	decibels, peak, unweighted
DIVARTY	Division Artillery
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DPW	Directorate of Public Works
E3	Electromagnetic Environmental Effects
EISA	Energy Independence Security Act
EMI	electromagnetic interference
EO	Executive Order

EPSC	Erosion Prevention/Sediment Control
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communication Commission
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
Ft.	Fort
FTC	Fort Campbell
FY	Fiscal Year
GHz	gigahertz
HAP	hazardous air pollutant
HAZCOM	Hazardous Communication
HEL	High-Energy Laser
HH&S	human health and safety
HP-DE	High-Power Directed Energy
HPM	High-Power Microwave
HQ	Headquarters
IAW	in accordance with
ICRMP	Integrated Cultural Resources Management Plan
ICUZ	Installation Compatible Use Zone
IFPC	Indirect Fire Protection Capability
INRMP	Integrated Natural Resources Management Plan
IPaC	Information for Planning and Consultation
IPS	Installation Planning Standards
ISW	industrial solid waste
KAR	Kentucky Administrative Regulation
KCPA	Kentucky Cave Protection Act
KDEP	Kentucky Department for Environmental Protection
KDFWR	Kentucky Department of Fish and Wildlife Resources
KPDES	Kentucky Pollutant Discharge Elimination System
KSNPC	Kentucky State Nature Preserves Commission
LBP	lead-based paint
LOS	levels-of-service
LRFB	Long-Range Fires Battalion

LRHW	Long-Range Hypersonic Weapon
LRPF	Long Range Precision Fire
LUPZ	land use planning zone
M10 Booker	M10 Booker Combat Vehicle
MBTA	Migratory Bird Treaty Act
MCF	million cubic feet
MDTF	Multi-Domain Task Force
mgd	million gallons per day
MGS	Mobile Gun System
MILCON	Military Construction
mm	millimeter
MOA	military operations area
MRC	Mid-Range Capability
MS4	Municipal Separate Storm Sewer System
MSD	material safety data
MSL	mean sea level
MSW	municipal solid waste
MTR	military training route
MW	Megawatts
N/A	Not Applicable
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NO _x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NZ	Noise Zones
OSHA	Occupational Safety and Health Administration
PCBs	polychlorinated biphenyls
PEA	Programmatic Environmental Assessment
PM	particulate matter
POV	privately owned vehicle

PPE	personal protective equipment
PPOC	Pollution Prevention Operations Center
RCRA	Resource Conservation and Recovery Act
RFI	radio-frequency interference
SDZ	Surface Danger Zone
SHPO	State Historic Preservation Officer
SME	Subject Matter Expert
SOP	standard operating procedure
SPEC	Special Education
SUA	special-use airspace
SWMP	Storm water Management Plan
SWMU	solid waste management units
SWPPP	Stormwater Pollution Prevention Plans
TBD	to be determined
TDEC	Tennessee Department of Environment and Conservation
TEMF	Tactical Equipment Maintenance Facility
tpy	tons per year
TSCA	Toxic Substances Control Act
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
UAS	Unmanned Aircraft Systems
UIC	Underground Injection Control
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USAR	U.S. Army Reserve
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UXO	unexploded ordnance
VOC	Volatile Organic Compound
WMF	Weapons Modernization Fielding
WOTUS	Waters of the United States
WWTP	wastewater treatment plant
X	Components specified with each system

1.0 Purpose and Need for Action

1.1 Introduction

The National Environmental Policy Act of 1969 (NEPA) (42 United States [U.S.] Code Section 4321 et seq.) requires federal agencies to consider potential environmental impacts prior to undertaking a course of action. In accordance with NEPA, Department of Defense National Environmental Policy Act Implementing Procedures, 30 June 2025 and Army Regulation 200-1, *Environmental Protection and Enhancement*, the Army has prepared this Programmatic Environmental Assessment (PEA) to support weapon systems modernization stationing, fielding, and operations at Ft. Campbell, Kentucky. The proposed action (**Section 2.1**) describes the range of requirements and resources to analyze potential effects of stationing, fielding, operating, and maintaining up to six additional weapon systems developed as part of the Army Modernization Strategy (AMS) at Fort (Ft.) Campbell.

The AMS, introduced in 2019 and amended in 2021, supports the National Defense Strategy and describes how the Army will transform into a multi-domain force by 2035; integrated across all domains of warfare – land, sea, air, space, and cyberspace. As part of the AMS effort, the six additional weapon systems evaluated in the PEA will be fielded at multiple military bases across the U.S. (Army, 2023).

The 2022 National Defense Strategy (Department of Defense 2022) identifies four, top-level defense priorities that the Department of Defense must pursue to strengthen deterrence:

- Defend the homeland.
- Deter strategic attacks against the United States, our Allies, and our partners.
- Deter aggression and be prepared to prevail in conflict when necessary.
- Ensure our future military advantage, build a resilient Joint Force and defense ecosystem.

This PEA evaluates the potential environmental effects on the human and natural environment that could result from stationing and fielding of up to six weapons systems described in three action alternatives at Ft. Campbell, Kentucky. If the conclusion of this assessment is that one or more of the action alternatives would result in no significant impact to the resources evaluated, the Army will issue a Finding of No Significant Impact (FONSI). If the selected alternative would result in a significant impact, the Army may decide to draft a Notice of Intent to prepare an Environmental Impact Statement.

1.2 Background

Ft. Campbell supports one of the largest military populations in the Army and across the Department of Defense (DoD). The present-day mission of Ft. Campbell is to support and train the 101st Airborne Division (Air Assault), the 5th Special Forces Group (Airborne), and other units located on the Installation, in preparation for a variety of assigned combat and combat-related missions. This mission includes the support and training of U.S. Army Reserve (USAR) and U.S. Army National Guard (ARNG) units. Provisions for the safety and security of all personnel are critical to the military operation. Ft. Campbell is an active Installation Management Command installation with approximately 30,000 military and civilian personnel, and up to 85 USAR and dual status civilian ARNG personnel on the Installation.

The mission of the 101st Airborne Division is to employ its unique capabilities to deploy in 18 hours worldwide, to destroy enemy armed forces, and to control land area including populations and resources. The air assault capabilities and aviation assets greatly enhance the division's worldwide mission. Primary weapon systems are the Apache helicopter, Hellfire Missile System, Mark 19 Grenade Launcher, M119A3 105-millimeter (mm) Howitzer, M777A2 155 mm howitzer, and Avenger Air Defense System.

Ft. Campbell's primary mission is to advance combat readiness of the 101st Airborne Division and non-divisional units posted at the Installation through training, mobilization, and deployment. Deployable military resources include combat-equipped soldiers, tactical vehicles, weapons and ammunition, and logistical equipment to sustain thousands of soldiers in a tactical environment for an extended period of time.

To fulfill its mission to advance combat readiness, Ft. Campbell maintains 48 live-fire ranges, 3 dudded impact areas, 51 training areas, 5 drop zones, 93 artillery firing points, 51 maneuver areas, a special operations training center, and two airfields. Campbell Army Airfield (CAAF) is the Army's largest airfield, covering 2,500 acres and served as a secondary landing site for the National Aeronautics and Space Administration. These facilities constitute the majority of the Installation (approximately 90,000 acres) west of the airfields and cantonment area.

The purpose of the PEA is to analyze, from a programmatic perspective, the potential effects of the proposed action to field additional weapon systems at Ft. Campbell (**Section 2.1**), and to identify potential site-specific supplemental analysis needed to inform a future fielding decision at Ft. Campbell. The Army may anticipate further analysis will be needed to meet site-specific NEPA requirements. If so, tiering off this PEA to examine site-specific actions related to the proposed action and alternatives addressed in the PEA will be completed.

1.3 Location

Ft. Campbell is in southwestern Kentucky and north-central Tennessee in portions of four counties: Montgomery and Stewart counties in Tennessee, and Christian and Trigg counties in Kentucky. The Installation is approximately 8 miles north of Clarksville, Tennessee, and 17 miles south of Hopkinsville, Kentucky (**Figure 1-1**). The Installation comprises approximately 105,347 total acres of land. Approximately two-thirds of the acreage are located in Tennessee with the remainder in Kentucky.

The cantonment area, in Montgomery and Christian counties, occupies approximately 14,000 acres traversing in a north-south direction along the eastern part of the Installation adjacent to U.S. Highway 41-A. Approximately 40 percent of the cantonment area landmass is within Christian County, Kentucky, and the remaining 60 percent is within Montgomery County, Tennessee. The cantonment area includes Installation administrative facilities, military support functions, military classroom training facilities, plant maintenance, supply storage, community facilities, family housing, unaccompanied personnel housing, medical, and outdoor recreation, as well as two functional airfields (**Figure 1-2**).

1.4 Purpose of the Action

The Army, as part of the AMS, proposes to potentially station and field one or more of the following systems at Ft. Campbell:

- M10 Booker Combat Vehicle (M10 Booker)
- Long-Range Hypersonic Weapon (LRHW) System
- Mid-Range Capability (MRC) Weapon System
- Indirect Fire Protection Capability (IFPC) Battalion (BN)
- High-Power Directed Energy (HP-DE) System (comprised of High-Energy Laser [HEL] and High-Power Microwave [HPM] systems)
- Multi-Domain Task Force (MDTF)

Fielding the M10 Booker, LRHW, MRC, IFPC, HP-DE, and MDTF will enhance the Army's ability to defeat advanced and future threats, provide new capabilities to Ft. Campbell soldiers and integrate with new and existing systems (Army, 2023). The location of the potential sites as well as alternate sites being considered to house these weapon systems are illustrated generally on **Figure 1-2** and in greater detail on **Figure 1-3**.

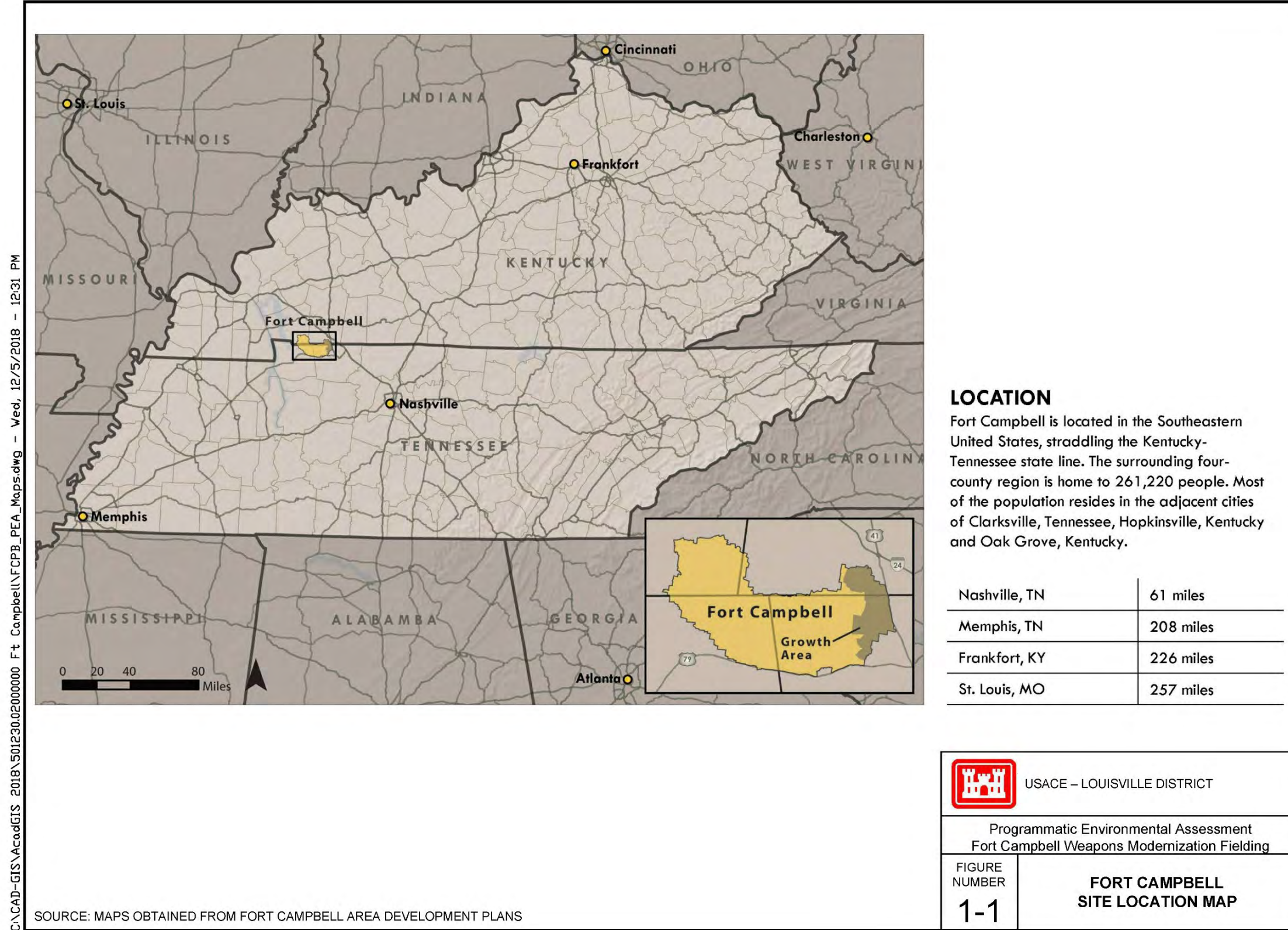


Figure 1--1 Site Location

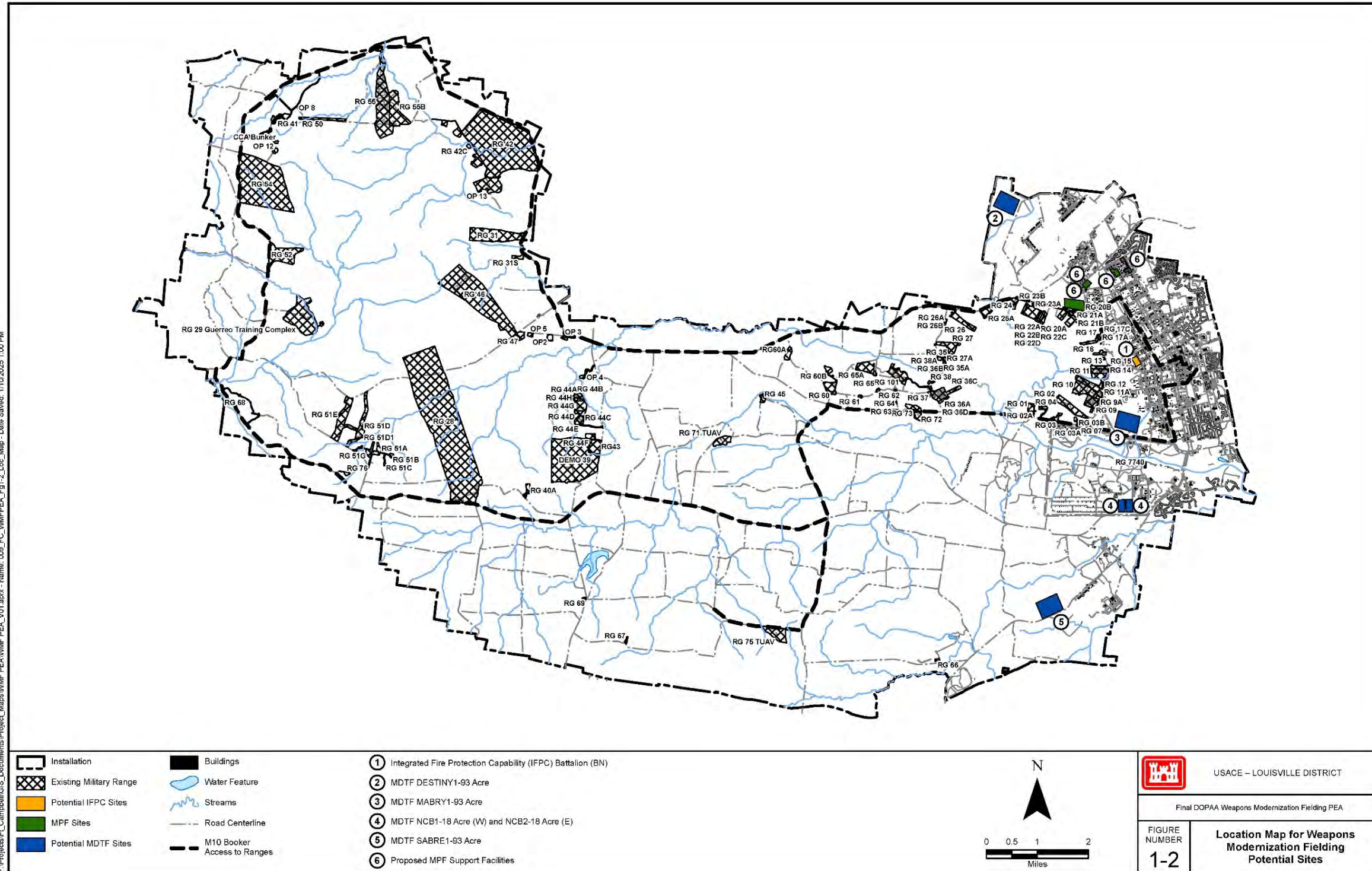


Figure 1--2 Location Map for Weapons Modernization Fielding Potential Sites

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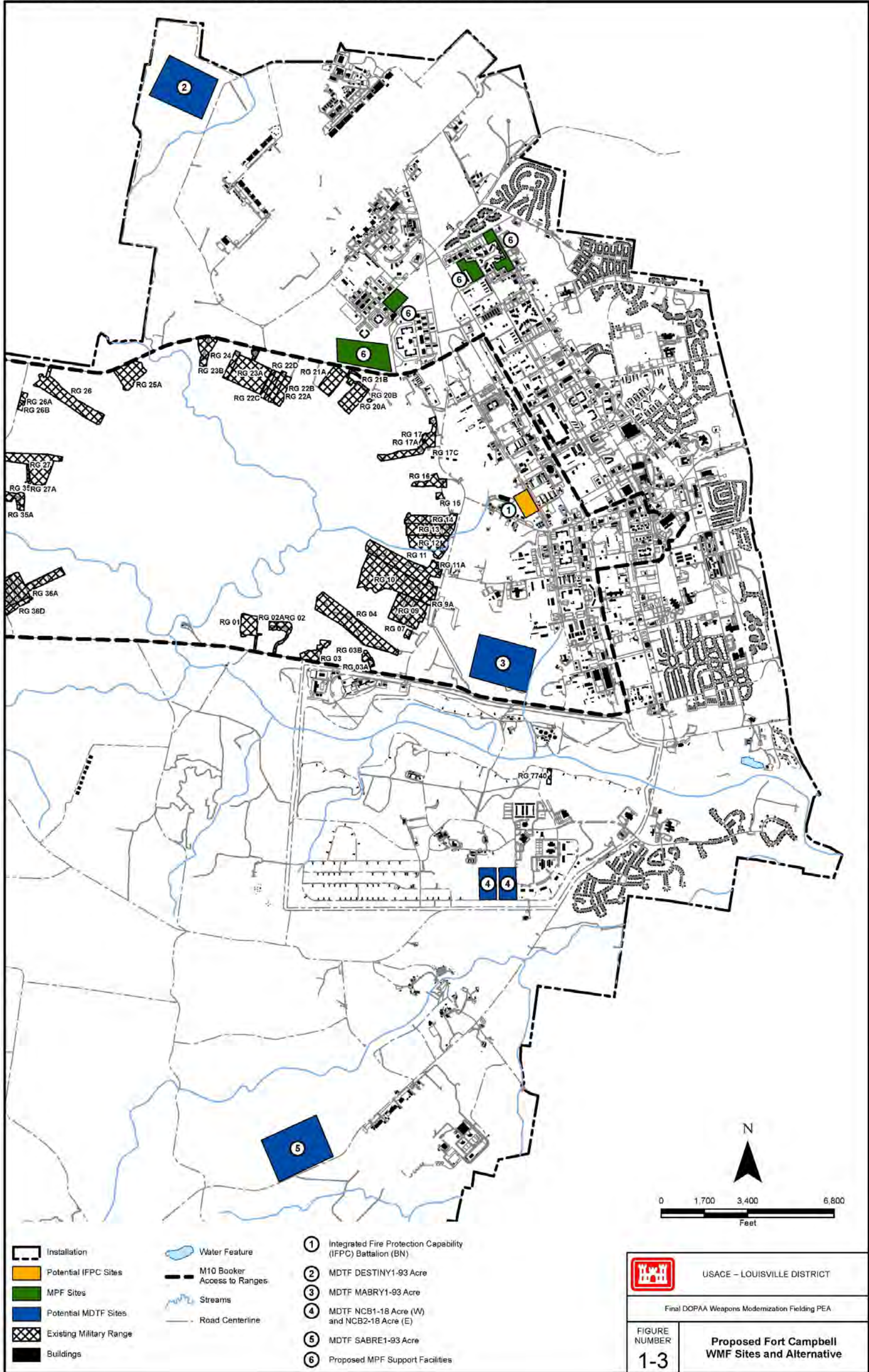


Figure 1--3 Proposed Fort Campbell WMF Sites and Alternative

1.5 Need for the Action

The Army has experienced a doctrinal change from prior years. Army forces need equipment and weapon systems that can compete and overcome the power of our near-peer adversaries. The proposed action is needed to enable soldiers, equipment, and weapon systems to be readily available to rapidly deploy to any contingency of operations around the world. The Systems stationed and fielded at Ft. Campbell will improve soldier safety and lethality, and the success of the mission (Army, 2023).

1.6 Scope of the PEA

This PEA has been prepared under NEPA (42 U.S. Code [USC] Section 4321 et seq), Department of Defense National Environmental Policy Act Implementing Procedures, 30 June 2025, and Army Regulation 200-1, *Environmental Protection and Enhancement*. The regulations require that prior to implementing any major action, the federal agency must evaluate the proposal's potential environmental effects as well as notify and involve the public in the agency decision-making process.

The objectives of the PEA are as follows:

- Analyze primary means of implementation of each of the proposed weapon systems at Ft. Campbell.
- Evaluate the facilities and staffing necessary to support stationing, operation, training, and maintenance of each weapon system and the need for renovation, demolition, and new construction on Ft. Campbell.
- Identify the associated potential effects for each system on Ft. Campbell environmental resources.
- Determine the need for additional specific environmental studies or analysis necessary to streamline a future NEPA action to station each weapon system at Ft. Campbell.

1.7 Relevant Laws and Regulations

NEPA establishes procedural requirements for all federal government agencies for proposed agency action. The Army's NEPA regulation provides the Army regulatory requirements for implementing NEPA. NEPA directs federal agencies to evaluate and incorporate an understanding of the potential effects of its proposed actions into its decision-making processes, and to disclose the effects of its proposed actions to the public and officials who must make decisions concerning the proposal.

In accordance with the Department of Defense National Environmental Policy Act Implementing Procedures, 30 June 2025, “DoD will maximize the use of proven strategies to complete the environmental review process efficiently...” promoted through “Use of programmatic analyses, when practical, to eliminate redundancies in future project/program analyses and reduce mission delays.” Regulations encourage the use of programmatic documents, when appropriate, accompanied by “tiered” supplemental documents that focus on site-specific issues, eliminating unnecessary duplicative site-specific analyses and repetitive discussions of the same issues. Many of these authorities are addressed in various sections throughout this PEA when relevant to particular environmental resources and conditions.

- NEPA of 1969, 42 USC 4321 et seq, as amended
- Department of Defense National Environmental Policy Act Implementing Procedures, 30 June 2025
- Interagency Cooperation – Endangered Species Act of 1973, as amended, 50 Code of Federal Regulations (CFR) 402
- Endangered Species Act of 1973, 16 USC §1531 et seq., as amended
- National Historic Preservation Act of 1966, 16 USC §470 et seq., as amended
- Protection of Historic Properties, 36 CFR Part 800
- Rivers and Harbors Act of 1899, 33 USC 408
- Executive Order 11988 - Floodplain Management (1977)
- Executive Order 11990 - Protection of Wetlands (1977)
- Executive Order 14154, Unleashing American Energy (2025)
- Section 508 of the Rehabilitation Act of 1973, 29 USC 794d
- The Migratory Bird Treaty Act of 1918 (MBTA), 16 USC 703–712
- The Bald and Golden Eagle Protection Act, 16 USC 668-668c
- Clean Water Act of 1972, 33 USC §1251, et seq., as amended
- Environmental Protection and Enhancement, Army Regulation 200-1

A decision on whether to proceed with the proposed action rests on numerous factors such as mission requirements, schedule, availability of funding, and environmental considerations. In addressing environmental considerations, Ft. Campbell is guided by statutes, regulations, and Executive Orders (EO) that establish standards and provide guidance on environmental and natural resources management and planning.

1.8 Cooperating Agency, Public and Intergovernmental Coordination/Consultations

The NEPA requirements help ensure environmental information is made available to the public during the decision-making process and prior to an action’s implementation. EO 12372, Intergovernmental Review of Federal Programs, requires federal agencies to cooperate with and consider territorial and local views when implementing a federal proposal.

As mandated by the Department of Defense National Environmental Policy Act Implementing Procedures, 30 June 2025, a public engagement is required to inform the public and provide the PEA for review and comment. For this PEA, public engagement includes notifying state and federal agencies, Federally Recognized Tribes, elected officials, and the public about the proposed action and no action alternatives; soliciting agency and public comments on the PEA; providing responses to public comments and the basis for the final decision analysis; and ultimately informing the public of the Army’s conclusions and findings. The decision document includes a response to the comments received.

1.8.1 Cooperating Agency

No cooperating agencies were identified for the alternatives evaluated in this PEA (Army, 2023).

1.8.2 Agencies

- Tennessee Department of Environment and Conservation
- Tennessee Wildlife Resources Agency
- Kentucky Department of Fish and Wildlife
- Kentucky Energy and Environment Cabinet
- Clarksville-Montgomery Regional Planning Commission
- City of Oak Grove – Public Works
- Hopkinsville-Christian County Planning Commission
- U.S. Fish and Wildlife Service – Kentucky Ecological Services Field Station
- U.S. Fish and Wildlife Service – Tennessee Ecological Services Office
- U.S. Army Corps of Engineers (USACE) – Nashville District
- U.S. Environmental Protection Agency – Region 4
- Tennessee Historic Commission – State Historic Preservation Office
- Kentucky Heritage Council – State Historic Preservation Office

1.8.3 Federally Recognized Tribes

- Absentee Shawnee of Oklahoma
- Cherokee Nation of Oklahoma
- Coushatta Tribe of Louisiana

- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Kialegee Tribal Town
- Muscogee Creek Nation of Oklahoma
- Shawnee Tribe
- Thlopthlocco Tribal Town
- United Keetoowah Band

1.8.4 Newspapers

The notification process provides these stakeholders with the opportunity to provide comments regarding the proposed action. Coordination with these agencies will be presented in the PEA. A Notice of Public Comment Period for the Draft PEA and FONSI was published in the following newspapers for a period of no less than 7 days, initiating a 30-day public review period from 18 December 2025 to 17 January 2026:

- The Leaf Chronicle – Clarksville, Tennessee
- Stewart County Standard – Dover, TN
- Kentucky New Era – Hopkinsville, Kentucky
- Cadiz Record – Cadiz, Kentucky

1.8.5 Public Libraries

To facilitate public review, a Notice of Public Comment Period and a hard copy of the Draft PEA and FONSI was also made available in the following public libraries:

- Christian County Library – Hopkinsville, Kentucky
- Robert F. Sink Library – Ft. Campbell, Kentucky
- John L. Street Library – Cadiz, Kentucky
- Stewart County Public Library – Dover, Tennessee
- Clarksville-Montgomery County Public Library – Clarksville, Tennessee

The Notice of Public Comment Period and Draft PEA and FONSI was also posted on the Ft. Campbell Facebook page. Additionally, the Notice of Public Comment Period, Draft PEA and FONSI, and Final PEA and FONSI were available to stakeholders and the public on the following Garrison website:

<https://home.army.mil/campbell/about/Garrison/dpw/environmental/public-review-documents>.

During the 30-day public review period, public comments may be received. The Notice of Public Comment Period and comments received are included in the Final PEA.

2.0 Proposed Action and Alternatives

2.1 Proposed Action

This section describes the alternatives being evaluated in this PEA, including the no action alternative.

The proposed action is to analyze, from a programmatic perspective, the potential effects of fielding up to six additional weapon systems at Ft. Campbell, and to identify potential site-specific supplemental analysis needed to inform a future fielding decision. Each proposed weapon system has previously been analyzed at the programmatic level to establish appropriate requirements for potential implementation at a broad range of Joint Force bases. Each proposed weapon system presents its own requirements for storage, logistics, training, operation, maintenance, staffing, and associated soldier's families to be integrated into the Ft. Campbell base infrastructure and surrounding communities.

The Army may anticipate further analysis would be required to meet site-specific NEPA requirements. If so, tiering off the site-specific environmental analysis from this PEA is expected to enable development of an action-specific analysis focused on those resource areas where the proposed site(s) require additional analysis of site-specific considerations and potential effects.

A detailed description of each system's physical needs is provided below:

2.1.1 Alternative 1 – IFPC and M10 Booker

Under Alternative 1, M10 Booker would be fielded and stationed at Ft. Campbell in Fiscal Year (FY) 27, followed by the IFPC in FY31. As detailed in **Table 2-1**, both actions would entail a mix of new construction and repurposing of existing facilities and capabilities to meet the specified physical criteria for each system.

2.1.2 Alternative 2 – IFPC Only

Under Alternative 2, only the IFPC and associated soldiers would be fielded and stationed at Ft. Campbell in FY31, without the M10 Booker. New construction and repurposed facilities necessary to support the IFPC are listed in **Table 2-1**.

2.1.3 Alternative 3 – Up to Four Additional New Weapon Systems

Under Alternative 3, up to four additional new weapon modernization systems (beyond those in Alternatives 1 or 2) would be fielded and stationed at Ft. Campbell beginning in FY25 and continuing through the 2030 timeframe, including:

- Long-Range Hypersonic Weapon (LRHW) System
- Mid-Range Capability (MRC) Weapon System
- High-Power Directed Energy (HP-DE) System
- Multi-Domain Task Force (MDTF).

Table 2-1 details the means of meeting the physical criteria for each system. Subsequent sections provide additional detail on these systems.

2.1.4 Alternative 4 – No Action

The no action alternative serves as a baseline against which the effects of the alternatives can be evaluated. The weapon systems would not be stationed and/or fielded at Ft. Campbell. Although the no action alternative would eliminate unavoidable adverse, short- and long-term effects associated with the alternatives, it would not meet the objectives of the AMS and it would not fulfill the purpose and need.

Table 2-1 Weapons Systems Characteristics

Components	Indirect Fire Protection Capability (IFPC) Battalion	M10 Booker Combat Vehicle (M10 Booker/Mobile Protected Firepower)	High-Power Directed Energy (HP-DE) System	Multi-Domain Task Force (MDTF) – Full (includes IFPC, Long-Range Hypersonic Weapon [LRHW] System and Mid-Range Capability [MRC] Weapon System)	Multi-Domain Task Force (MDTF) - Base	Long-Range Hypersonic Weapon (LRHW) System	Mid-Range Capability (MRC) Weapon System
Alternative	1 and 2	1	3	3	3	3	3
Timing	FY31	FY27	TBD	TBD	TBD	TBD	TBD
System Support Type *	MDTF or ADA	Infantry BN	MDTF, ADA or IFPC BN	No supporting unit required	No supporting unit required	LRPF BN	LRPF BN
Number of Personnel	735	400	0	3,000	400	90	100
Source							
Fielded together or separately?						Yes	Yes
Estimated Footprint	Not specified	Not specified	Part of IFPC	93 acres	18 acres	~2 acres	~2 acres
Installation Support Type:							
Brigade Headquarters (HQ)				1	1		
Battalion HQ	1	1		4	1		
Battery/Company Operations Facilities	6	5		22	8	1	1
Tactical Equipment Maintenance Facility	1	1		3		1	1
HQ and HQ Company		1					
M10 Booker Company		3					
All Domain Operations Center				1	1		
Forward Support Company	1	1					
Secure Compartmentalized Intelligence Facility				1	1		
Supply Support Area				1			
RF Lab				1	1		
Anechoic Chamber				1	1		
High Altitude Balloon Storage				1	1		
UAS Facility				1	1		
Simulator Buildings							
Organizational Classrooms							
Paved Vehicle Parking							
Unaccompanied Personnel Housing	X	X		X	X	X	X
Dining Facilities	X	X		X	X	X	X
Storage Buildings							
Loading/Unloading Docks and Ramps							
Ranges							
Weapons Storage at Ammunition Supply Point	X	X		X		X	X

Components	Indirect Fire Protection Capability (IFPC) Battalion	M10 Booker Combat Vehicle (M10 Booker/Mobile Protected Firepower)	High-Power Directed Energy (HP-DE) System	Multi-Domain Task Force (MDTF) – Full (includes IFPC, Long-Range Hypersonic Weapon [LRHW] System and Mid-Range Capability [MRC] Weapon System)	Multi-Domain Task Force (MDTF) - Base	Long-Range Hypersonic Weapon (LRHW) System	Mid-Range Capability (MRC) Weapon System
Alternative	1 and 2	1	3	3	3	3	3
Equipment:							
Tracked Vehicles		45					
Joint Light Tactical Vehicle and High-Mobility Multiple Purpose Wheeled Vehicle	100						
Trucks	190					12	14
Trailers	140					5	5
Portable Generators	165					8	16
Environmental Control Units						8	
Radars	25						
Kinetic Launchers	50						
Training Facilities:	Emplaced, similar to PATRIOT	Similar to Abrams or Stryker MGS, 70 miles trails to be create at Ft. Campbell	Emplaced	Combination of IFPC, LRHW, and MRC training land requirements, and/or UAS launch facilities.		Emplaced	Emplaced
Live Fire Capabilities:	C-sUAS Live (Missile Simulated)	Similar to Abrams or Stryker MGS Ranges 28 and 31	Live Fire if Airspace Available	Live Fire for non-kinetic systems (Electronic Warfare and Cyber) Otherwise Simulated	Live Fire for non-kinetic systems (Electronic Warfare and Cyber) Otherwise Simulated	Simulated	Simulated
Airspace:							
Airfield to land and operate C-17 and C5 Aircraft							
Controlled Airspace Type	Type A	Type D	Type A and Type C	Type C	Type C	Type B	Type B
Vertical Height Control (feet)	45,000	25,000	60,000	60,000	60,000	60,000	60,000

System Support Types:

ADA–Air Defense Artillery Battalion

DIVARTY–Division Artillery

HQ– Headquarters

LRPF–Long Range Precision Fire

MGS-Mobile Gun System

TBD–To be determined

X-Components specified with each system

2.2 Screening Criteria

To be considered a viable alternative for fielding and stationing at Ft. Campbell, each weapon system must meet specified physical screening criteria established for each system. These criteria are summarized as follows and detailed in **Section 2.3**. Collectively, the physical screening criteria establish the scope of potential effects on Ft. Campbell and vicinity natural and human environments. Specific environmental resource effects and the need for further NEPA analysis will depend heavily on whether each weapon system’s physical criteria can be met with existing Ft. Campbell facilities or would require new construction and operations (Army, 2023).

Ft. Campbell will provide additional NEPA documentation if it is found that further analyses are necessary in the future.

Presence of Supported or Supporting Units (Unit or Brigade Type): The installation must have the specified supporting unit present or provide initial or collective training for the different Weapon Modernization Systems. Collocation with supported forces enhances training and effectiveness of the supporting unit and is desired for initial fielding actions.

Required Training Lands: The installation must have adequate space in its training lands to support the minimum requirements for emplacement, operation, and training for each Weapon Modernization Systems as designated in Army Training Doctrine.

Live-Fire Capability: The installation must have adequate live-fire ranges available to support the minimum requirements for weapon systems training, as designated in TC 25-8 and gunnery tables, or the capability to simulate live fire. Soldiers must be able to qualify on the systems.

Airspace: The installation must have or have access to an airfield facility and flight line capable of accommodating a C-5 and C-17 aircraft necessary to deploy assets. The installation must have adequate protected airspace, both laterally and vertically, as specified for each Weapon Modernization System. The airspace must overlay the ground footprint of ranges where training would occur, extend vertically as specified for each system (**Table 2-1**) and maintain the following control type:

- Type A–Tactics and weapons of the assessed air defense systems may require training using aerial targets that will be detected, tracked, engaged, and destroyed. Targets must be free to maneuver in a manner similar to an enemy threat. The air defense systems must be free to bring all sensors and weapons to bear on the target.
- Type B–Tactics and weapons of the assessed long-range integrated fire systems may require restricted airspace to high altitudes to contain the trajectory of any live fire using these systems.
- Type C–Transmission of high-power electromagnetic energy requires controlled airspace to ensure the safety of non-participating aircraft.

- Type D–Tactics and weapons of the assessed long-range direct fire systems may require restricted airspace to high altitudes to contain the trajectory of any live fire using these systems.

Activity within the controlled airspace must be contained by visual monitoring by the governing range control or land/airspace governing agency or with radar so non-participating aircraft can be detected. The controlling agency must have communications capability to warn and prevent the entry of non-participating aircraft or suspend system operations if a non-participating aircraft is detected within the protected airspace.

Installation Support Infrastructure: The installation must either (1) have adequate infrastructure and/or cantonment area facilities for administrative, maintenance, motor pool, housing, and personnel support; (2) have the ability to provide interim facilities; or (3) have the space, funding, and ability to provide this adequate infrastructure and/or cantonment area facilities by the fielding deadline.

2.3 Detailed Description of the Alternatives

The Army proposes to station and field up to six of the new weapon systems at Ft. Campbell that are described in this section. **Table 2-1** provides a detailed summary of the physical screening criteria for each proposed Weapon Modernization System for fielding at Ft. Campbell.

2.3.1 Proposed Action

The proposed action is described in **Section 2.1** and meets the selection standards outlined in **Section 2.2**, to analyze potential environmental effects, from a programmatic perspective, allowing for the fielding of up to six additional weapon systems at Ft. Campbell, and identify potential site-specific supplemental analysis needed to inform a future fielding decision at Ft. Campbell.

2.3.2 Indirect Fire Protection Capability

The Army proposes fielding and stationing of an IFPC BN at Ft. Campbell as part of the 2019 AMS amended in 2021 in FY31. The IFPC BN will provide defense against cruise missiles, rockets, and unmanned aircraft systems (UAS) to fixed and semi-fixed sites such as an airfield or forward operation base. The planned IFPC BN structure is a Headquarters and Headquarters Battery (BTRY), a Field Support Company, three IFPC BTRYs, and a counter small UAS BTRY. The IFPC BNs and BTRYs would initially field with kinetic weapon in a missile and launcher configuration similar to the Patriot system. Future IFPC configurations may include directed energy effectors such as high energy lasers and microwaves (**Section 2.3.4**).

Fielding the IFPC at Ft. Campbell is included as part of both Alternatives 1 and 2 included in **Section 2.1**. Physically, the IFPC would be sited as part of an existing Ft. Campbell Air Defense

Artillery Battalion (2-44 ADA on **Figure 2-1**). For Alternatives 1 and 2, the IFPC would be sited as shown on **Figure 2-1** with IFPC Administrative functions and Barracks located in existing Buildings 6911 and 6912, and the IFPC Tactical Equipment Maintenance Facility located at existing Buildings 7005 and 7006 (and adjacent surface storage).

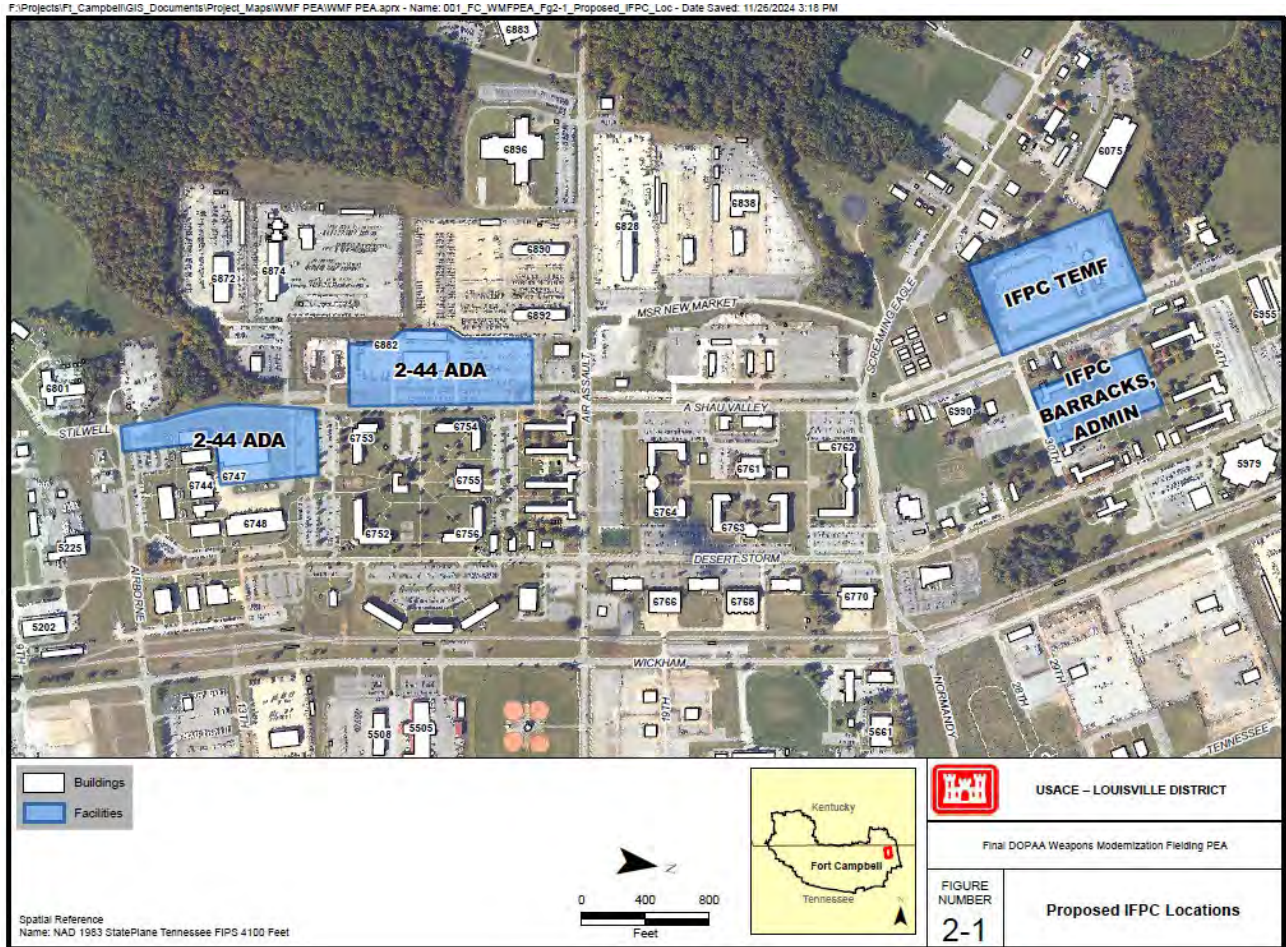


Figure 2-1 Proposed IFPC Location

2.3.3 M10 Booker

The Army may field and station the M10 Booker System at Ft. Campbell as part of the 2019 AMS amended in 2021 in FY27 under Alternative 1. Although this system may not proceed to mass production and employment, the existing units will likely need a home base for testing and evaluation. The M10 Booker (also referred to as Mobile Protected Firepower) provides protected, long-range, precision direct-fire capability to neutralize enemy prepared positions and bunkers as well as defeat heavy machine guns and armored vehicle threats during offensive operations or when conducting defensive operations against attacking enemies. The M10 Booker would provide the Army’s Infantry Brigade Combat Teams with an Armored Infantry Support Vehicle that is a highly mobile, multi-terrain, tracked vehicle with direct-fire capabilities.

Operation, storage, transport, and training requirements for the M10 Booker are similar to those of the Abrams tank and Stryker MGSs.

The location of proposed M10 Booker Support Facilities is shown as Site 6 on **Figure 1-2** and **Figure 1-3**. Several additional courses of action would be considered for addressing the access of the M10 Booker to the ranges. These courses of action include building new tank trails in the existing “fire breaks”, using existing roads with protective (rubber) treads, and building trails on previously disturbed land along the Ft. Campbell perimeter security fence. Construction and operation of the proposed new tank training trails are not addressed in this proposed action and would be addressed in a separate NEPA review. Current estimates of the length of all the tank training trails to be developed in the future is approximately 70 miles. A view of the proposed temporary M10 Booker Support Facilities including barracks and the temporary M10 Booker Tactical Equipment Maintenance Facility (TEMF) and administrative Support Facilities is provided on **Figure 2-2**.

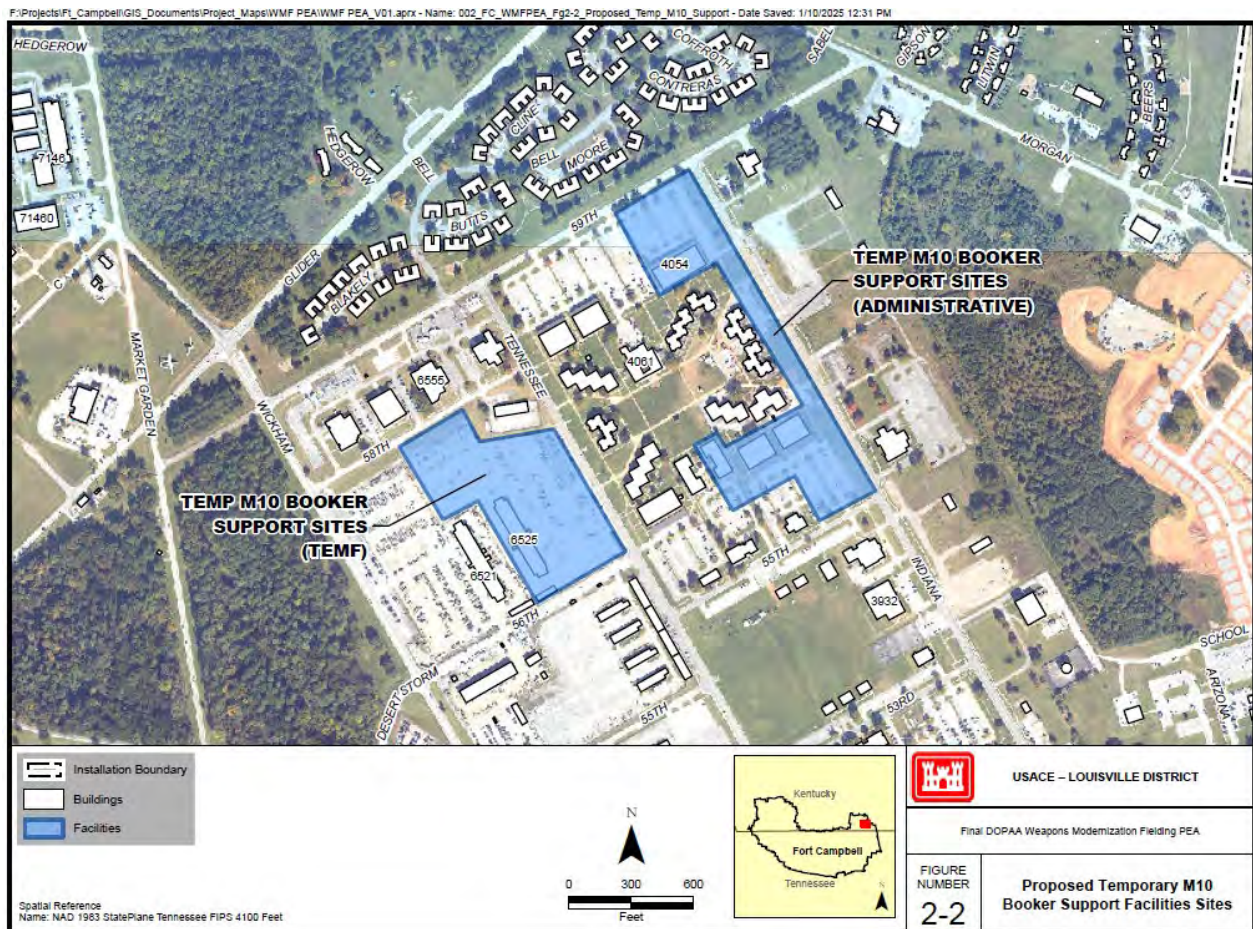


Figure 2-2 Detailed View of Proposed Temporary M10 Booker TEMF and Administrative Facilities Sites

The proposed temporary support facilities include:

- M10 Booker Barracks in existing Building 7096 (~ 8 acres).
- M10 Booker TEMF in existing Building 6525 (~ 12 acres).
- M10 Booker Administrative Buildings (4 buildings total, ~ 12 acres total).

Proposed permanent M10 Booker support facilities would be located as shown on **Figure 2-3**. These facilities would be constructed under a future Military Construction (MILCON) project.

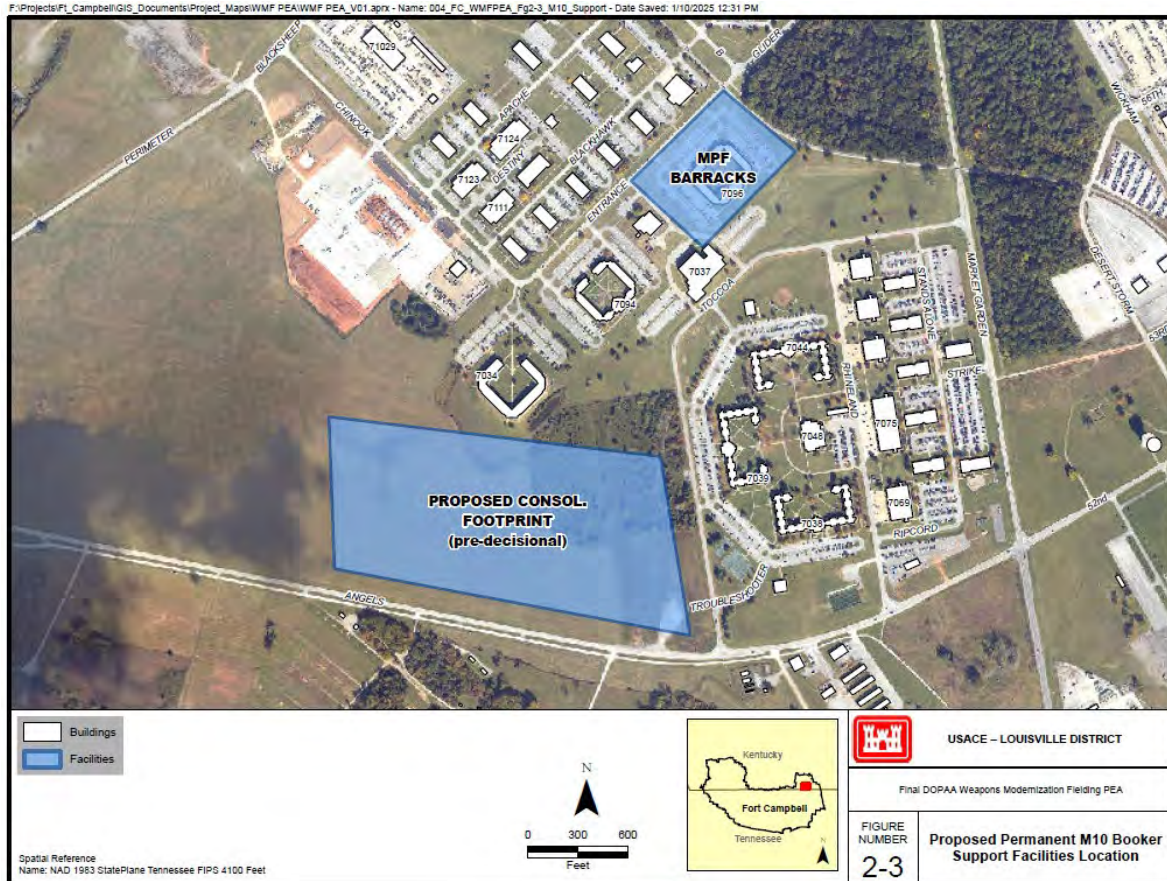


Figure 2--3 Proposed Permanent M10 Booker Support Facilities Location

2.3.4 High-Powered Directed Energy Systems

The Army may field and station the HEL and HPM within the IFPC BN or BTRY (**Sections 2.3.2 and 2.3.5**) at Ft. Campbell as part of the 2019 AMS amended in 2021 by FY35 as part of Alternative 3. These HEL and HPM are collectively referred to as the HP-DE systems. The IFPC HP-DE would be issued at the platoon level within an IFPC BTRY. The HEL or HPM platoon soldiers would transition from IFPC kinetic energy systems with no growth of the BN associated with fielding of the HP-DE. The IFPC HEL is a truck mounted, 300-kilowatt laser that protects against rocket, artillery, mortar, UAS, and subsonic cruise missile threats. Its primary objective is to protect U.S. soldiers, allies, equipment, and buildings/facilities by denying, degrading,

damaging, or destroying threat ordnance or missiles by the heating action of the laser. The IFPC HPM is a ground-based system that can be loaded onto available trailers or other load handling vehicles and use a variety of prime movers for mobility purposes. It has a primary objective of protecting U.S. soldiers, allies, equipment, and buildings/facilities by denying, degrading, damaging, or destroying the sensitive electronics of an adversary threat. The IFPC HPM provides defense from counter small UAS (particularly groups and swarms) by sending out an electromagnetic pulse to disable/destroy electrical components of threat equipment.

2.3.5 Multi-Domain Task Force

Under Alternative 3, the Army may field and station an MDTF at Ft. Campbell as part of the 2019 AMS amended in 2021 in the 2025-2030 timeframe. The MDTF is built around a Field Artillery Brigade structure and requires installations and facilities including airspace, communication, and cyber capabilities; soldiers; weapon systems; and infrastructure. There are two MDTF formations (see **Table 2-1**). The Full MDTF includes the IFPC (**Section 2.3.2**), the LRHW (**Section 2.3.6**) and the MRC (**Section 2.3.7**) and requires approximately 93 acres for all facilities and over 3,000 soldiers. The Base MDTF would involve less weapon systems and would require about 18 acres for all facilities and 400 soldiers.

Three potential 93-acre sites for the Full MDTF formation are shown as Sites 3, 4 and 5 on **Figures 1-2** and **1-3** and described below (Fort Campbell [FTC], 2021).

DESTINY1 – DESTINY1 is a 93-acre “green” site (Site 2, **Figures 1-2** and **1-3**) located to the west of CAAF, in Kentucky, outside the cantonment area, and on the Installation boundary as shown on **Figure 2-4**. It is centered on LAT/LONG 36.683/-87.514. The site has approximately 73 acres of trees and the remainder is grass and scrub brush covered but not a part of any agricultural lease. No buildings exist on the site. Drainage generally flows to the south to Dry Fork Creek (East). Topography is generally level. Development of the site to accommodate the full MDTF, including administrative buildings, barracks, a Dining Facilities Administration Center (due to remoteness), TEMFs, and roads, would require a MILCON project. If selected, the site would be prioritized in Ft. Campbell’s Forestry Program for timber removal.

MABRY1 – MABRY1 is a 93-acre “green” site (Site 3, **Figures 1-2** and **1-3**) located north of Mabry Road on the Tennessee side of the cantonment area as shown on **Figure 2-5**. It is centered on LAT/LONG 36.621/-87.469. The Ft. Campbell rail loading yard is to the west. The site is mostly trees with several gravel/dirt access roads. No buildings exist on the site. Drainage generally flows to the south to conveyances leading to Little West Fork Creek. Topography slopes to the east and south. Development of the site to accommodate the full MDTF, including

administrative buildings, barracks, TEMFs, and roads, would require a MILCON project. If selected, the site would be prioritized in Ft. Campbell’s Forestry Program for timber removal.

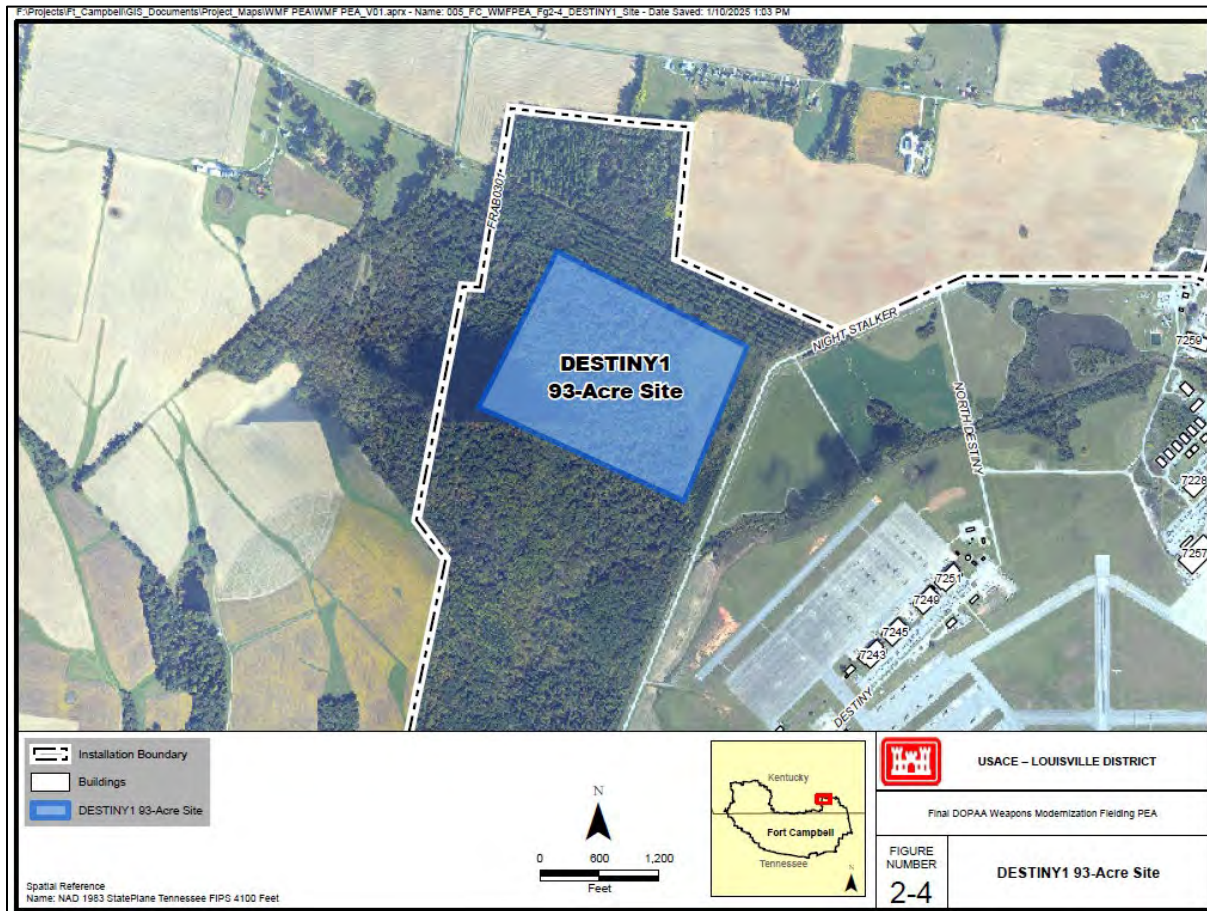


Figure 2--4 DESTINY1 93-Acre Site

SABRE1 – SABRE1 is a 93-acre “green” site (Site 5, **Figures 1-2** and **1-3**) located northwest of 101st Airborne Road and immediately west of Sabre Army Heliport on the Tennessee side of the Installation outside the cantonment area as shown on **Figure 2-6**. It is centered on LAT/LONG 36.569/-87.496. The site is mostly trees (approximately 75 acres) with several gravel/dirt access roads. Approximately 18 acres of this site is associated with a crop/agricultural lease. No buildings exist on the site. Drainage generally flows to the north to Fletcher’s Fork Creek. Topography slopes to the north. Development of the site to accommodate the full MDTF, including administrative buildings, barracks, a Dining Facilities Administration Center, TEMFs, and roads, would require a MILCON project. If selected, the site would be prioritized in Ft. Campbell’s Forestry Program for timber removal.

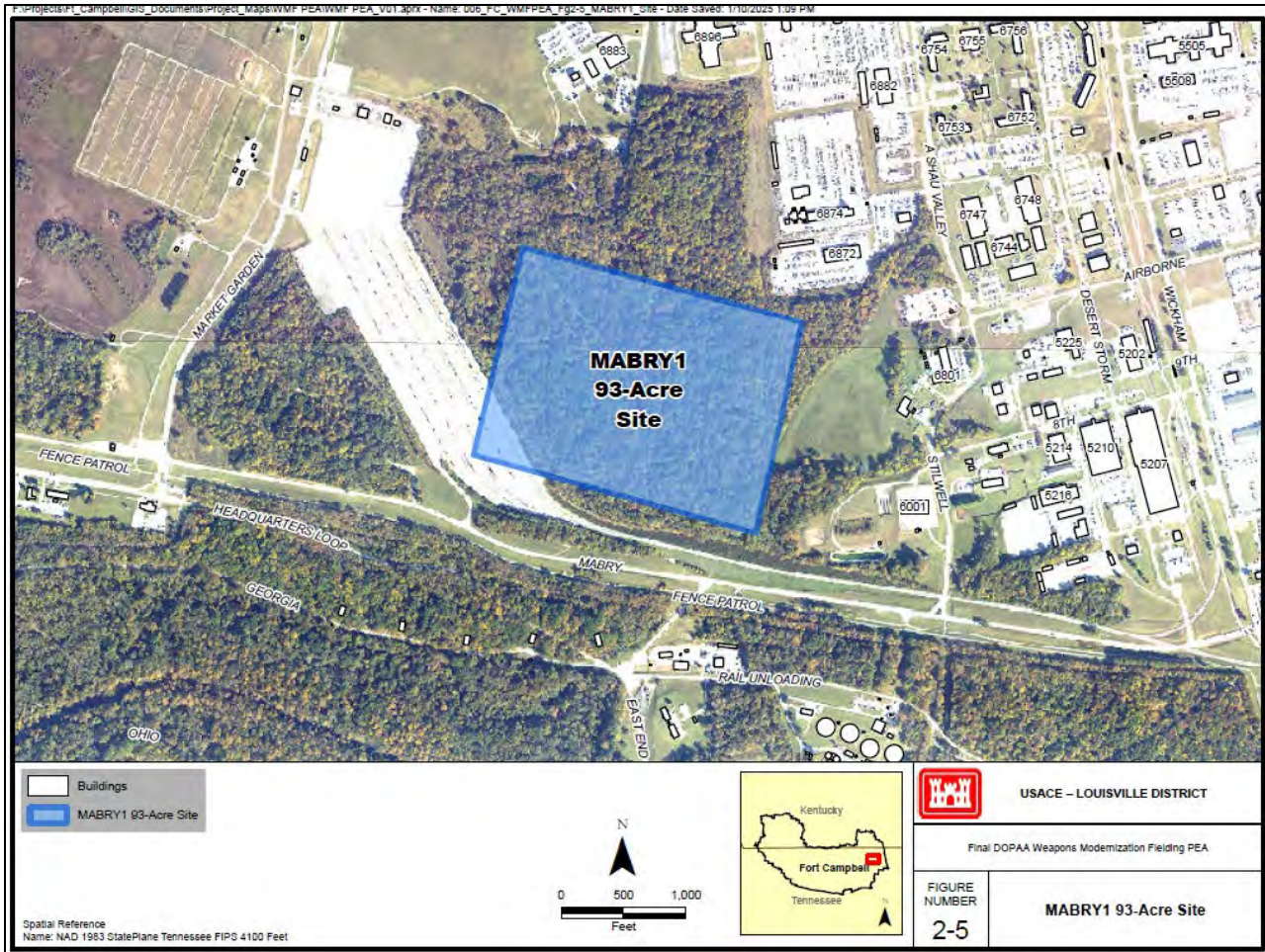


Figure 2--5 MABRY1 93-Acre Site

Two (formerly three but one site on the south end of the runway has been removed from consideration) candidate sites for the Base MDTF have been identified as Site 5 (two adjacent 18-acre parcels) on **Figures 1-2** and **1-3** and described below (FTC, 2021).

NCB1 and NCB2 – NCB1 and NCB2 are two adjacent 18-acre “green” sites (Site 4, **Figures 1-2** and **1-3**) located in the Clarksville Base (Tennessee) section of Ft. Campbell and in the cantonment area as shown on **Figure 2-7**. The area has been used for training and currently has Cold War Era Bunkers adjacent to the site. NCB1 is centered on LAT/LONG 36.597/-87.469 and NCB2 is centered on LAT/LONG 36.597/-87.472. The sites are generally tree stands with possible sinkholes. No buildings exist on the site. Drainage generally flows to the south to conveyances leading to Fletcher’s Fork. Development of either of the sites to accommodate the base MDTF, including administrative buildings, barracks, a TEMF, and roads, would require a MILCON project. If selected, the site would be prioritized in Ft. Campbell’s Forestry Program for timber removal.

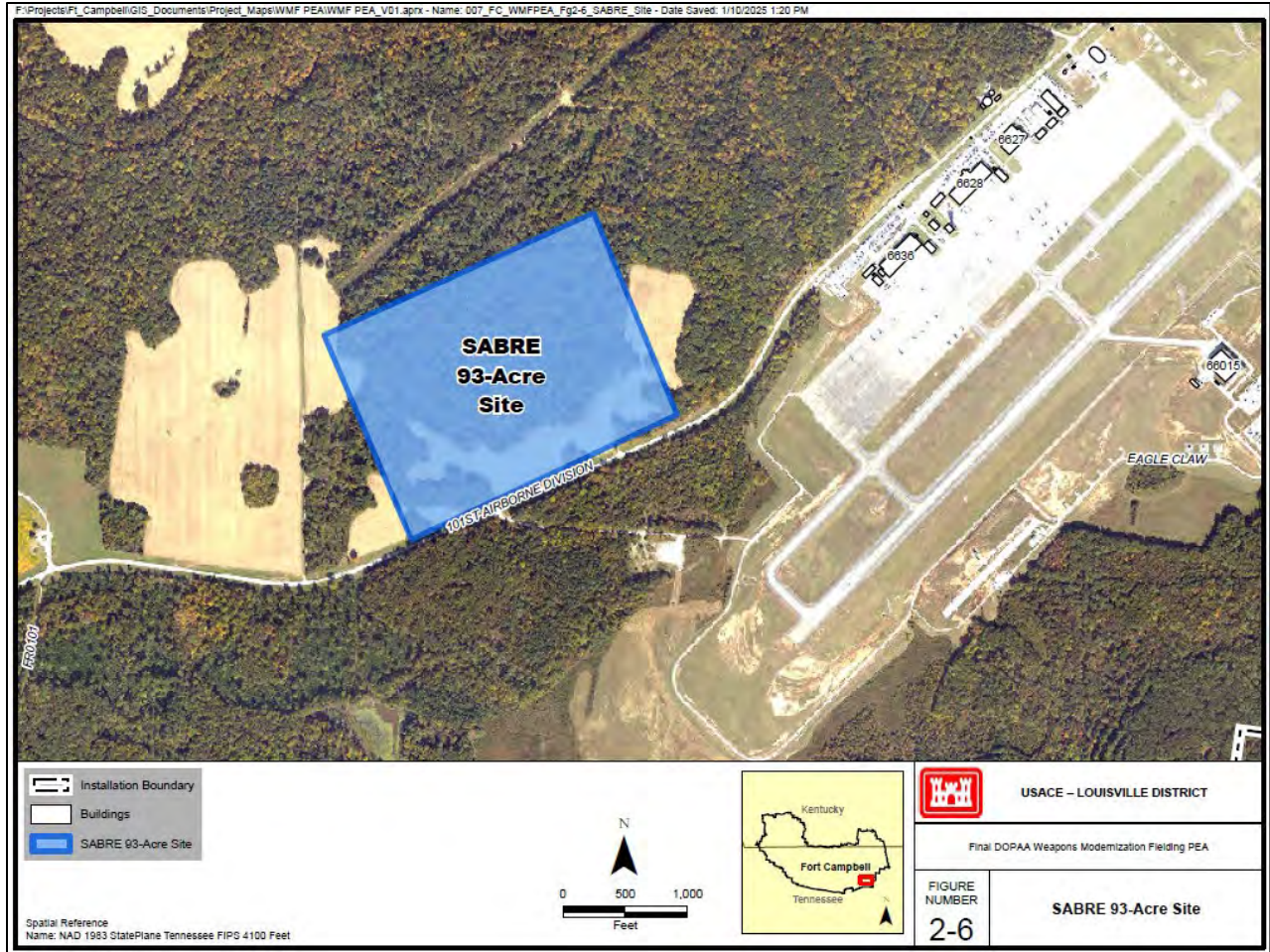
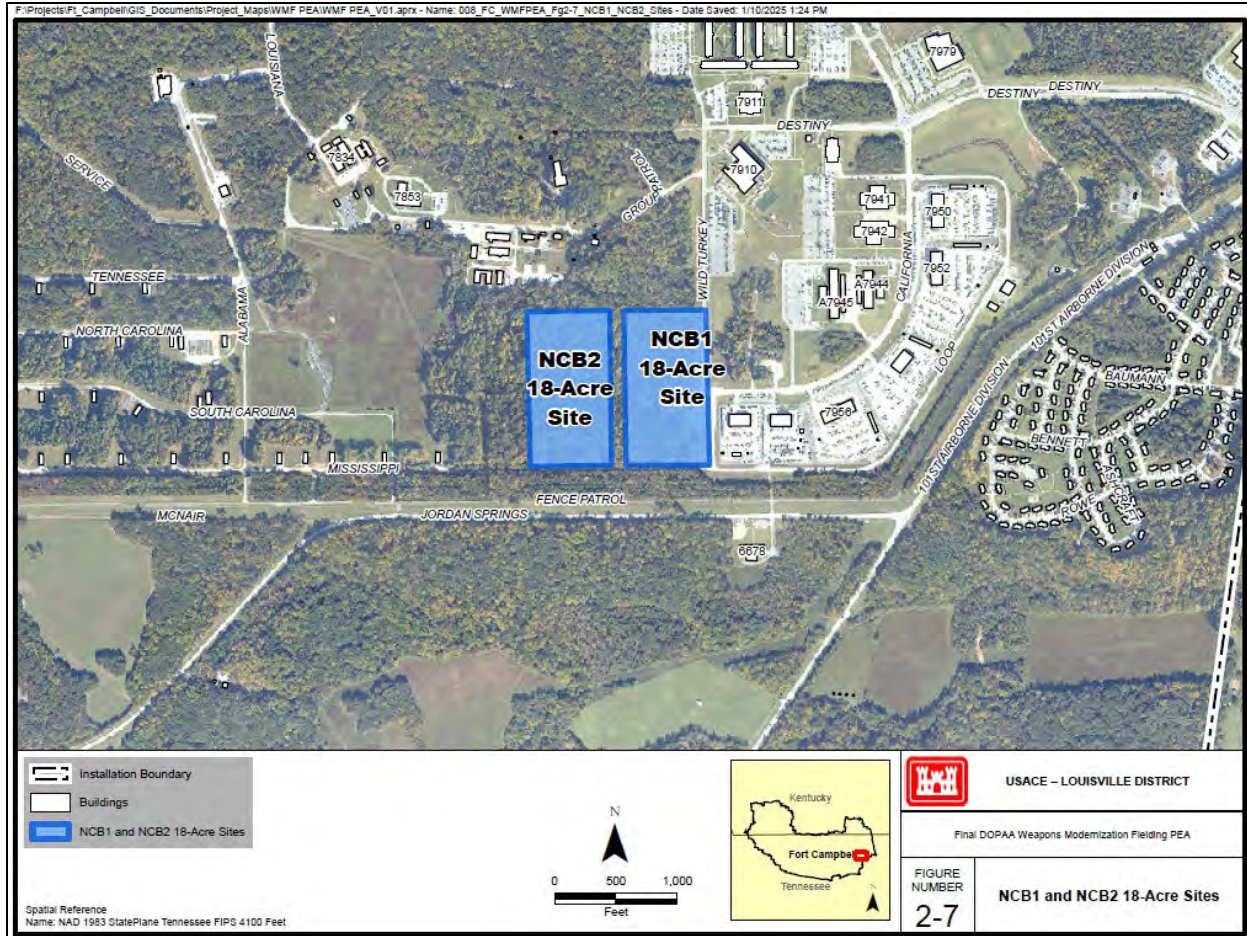


Figure 2--6 SABRE 93-Acre Site

2.3.6 Long-Range Hypersonic Weapon System

Under Alternative 3, the Army may field and station the LRHW at Ft. Campbell as part of the 2019 AMS amended in 2021 in FY25 or later. The LRHW may field to Ft. Campbell as an element of a Full MDTF (**Section 2.3.5**) or as an individual BTRY. The system could be transportable between locations by Air Force C-17 and be road-mobile for transport on base/installations. Approximately 60-90 soldiers are required to oversee LRHW maintenance, operations, and training.



2.3.7 Mid-Range Capability Weapon System

Under Alternative 3, the Army may field and station the MRC Weapon System at Ft. Campbell as part of the 2019 AMS amended in 2021 in FY25 or later. The MRC BTRY is a component of the Long-Range Fire BN and would provide mid-range missile capabilities that allow the Army to respond against peer adversaries in a more challenging environment and can be integrated into a Full MDTF (**Section 2.3.5**). Approximately 70 to 100 soldiers are required to oversee MRC maintenance, operations, and training. If fielded as a BTRY, the MRC would occupy one Company Operations Facility and have space provided at a TEMF/motor pool. Barracks and support facilities for the soldiers would be required. If fielded with a Full MDTF, the MRC would have facilities within the Long-Range Fire Battalion (LRFB).

2.4 Alternatives Eliminated from Further Consideration

None identified at this time.

3.0 Affected Environment

3.1 Air Quality

Air quality is regulated by the U.S. Environmental Protection Agency (USEPA) per the Clean Air Act (CAA) (42 USC § 7401 et seq.). The CAA established National Ambient Air Quality Standards (NAAQS) for the criteria pollutants: particulate matter (measured as both particulate matter with a diameter less than or equal to 10 microns [PM10] and particulate matter with a diameter less than or equal to 2.5 microns [PM2.5]), sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, and lead. These standards are designed to protect public health and welfare. Individual states or air agencies may establish their own ambient air quality standards. Most air pollutants originate from human-made sources, including mobile sources (e.g., cars, trucks, buses burning fossil fuels) and stationary sources (e.g., factories, refineries, power plants), as well as indoor sources (e.g., some building materials and cleaning solvents). Air pollutants are also released from natural sources such as volcanic eruptions and forest fires. Lead has been greatly reduced in ambient air with the elimination of its use in fuel. There are no sources of lead associated with the proposed action.

Depending on the installation's location and whether it is considered a "major source" of air pollutants, the CAA may require permitting before construction or demolition commences. Geographic areas that are in compliance with the NAAQS are designated as attainment areas. Areas that do not meet NAAQS for criteria pollutants are designated "nonattainment areas" for that pollutant. Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are also required to adhere to maintenance plans to ensure continued attainment. If the installation is located in a nonattainment or maintenance area, a conformity applicability analysis is required to determine whether or not the action would exceed the established de minimis thresholds for the subject pollutant(s).

Air Quality Control Regions (AQCRs) are federally designated areas that are required to meet and maintain federal ambient air quality control standards. Regions may include nearby locations of the same state or nearby states that share the same air pollution problems. Areas that lie within the AQCRs are regulated under the authority of the CAA and may be designated by the USEPA as attainment or nonattainment. These designated areas within the AQCR are required to comply with the NAAQS. Through the CAA, Congress has stated that the prevention and control of air pollution belongs at the state and local level. Within Kentucky, the Kentucky Department for Environmental Protection (KDEP), Division for Air Quality administers the CAA on behalf of the USEPA. The portion of Ft. Campbell in Kentucky is located within the Paducah-Cairo Interstate AQCR. Within Tennessee, the Tennessee Department of Environment and

Conservation (TDEC), Division of Air Pollution administers the CAA. The portion of Ft. Campbell in Tennessee is located within the Middle Tennessee Intrastate AQCR.

Typical Army installation activities governed by the CAA include use, maintenance, and inspection of vehicles; operation of boilers; some training activities; air emissions monitoring fuel storage and distribution; surface coating and use of ozone depleting chemicals; and prescribed burns. Industrial point sources of criteria pollutants and volatile organic compounds (VOCs) in the four-county region surrounding Ft. Campbell currently include a steam plant, a printing company, metals facilities, and a quarrying company. Ft. Campbell is considered a major source under the Title V program.

Air pollutant emissions are generated at Ft. Campbell mainly through combustion of fossil fuels (heating plants and motorized vehicles). Lesser contributions are made from paint spray booth, woodworking shops, welding, transfer vapor emission, storage tanks, road dust emissions, road paving, stationary internal combustion engines, degreasing, pesticide/herbicide applications, wildfires and prescribed burning, aircraft dust during takeoffs and landings, and dust from training activities and firing ranges. All nonexempt stationary emission sources within the installation are regulated under an air quality permit program administered by both Kentucky and Tennessee environmental agencies.

Ft. Campbell is located in an attainment area for the ozone, PM_{2.5}, and PM₁₀ NAAQS. As long as Ft. Campbell remains in an attainment area, the General Conformity Rule is not applicable to projects proposed for the cantonment area.

In addition to the NAAQS for criteria pollutants, national standards exist for hazardous air pollutants (HAPs), which are regulated under Section 112(b) of the 1990 CAA Amendments. The National Emission Standards for Hazardous Air Pollutants regulate HAP emissions from stationary sources (40 CFR Part 61). HAPs emitted from mobile sources are called Mobile Source Air Toxics. Mobile Source Air Toxics are compounds emitted from highway vehicles and non-road equipment that are known or suspected to cause cancer or other serious health and environmental effects. The final Tier 3 Motor Vehicle Emission Standards were published on 28 April 2014 (Federal Register Volume 79, No. 81, pp.23414- 23886, 2014) and established both tailpipe and evaporative emission standards for nonroad vehicles to reduce a variety of pollutants, including the primary Mobile Source Air Toxics. Unlike the criteria pollutants, there are no NAAQS for benzene and other HAPs. The primary control methodologies for these pollutants for mobile sources involve reducing their content in fuel and altering the engine operating characteristics to reduce the volume of pollutant generated during combustion.

3.2 Air Space

The Federal Aviation Administration (FAA) manages all airspace within the United States and its territories. The FAA recognizes the military’s need to conduct certain flight operations and training within airspace that is separated from that used by commercial and general aviation.

Airspace is defined in vertical and horizontal dimensions and by time. Airspace is a finite resource that must be managed to achieve equitable allocation among commercial, general aviation, and military needs. The FAA has established various airspace designations to protect aircraft while operating near and between airports and while operating in airspace identified for defense-related purposes. Flight rules and air traffic control procedures govern safe operations in each type of designated airspace. Most military operations are conducted within designated special-use airspace (SUA) and follow specific procedures to maximize flight safety for both military and civil aircraft.

Special-Use Airspace permits activities that either must be confined because of their nature or require limitations on aircraft that are not a part of those activities. Prohibited and restricted areas are regulatory SUAs. They are established in Federal Aviation Regulation Part 73 (14 CFR 73) through the rulemaking process of the Administrative Procedures Act (5 USC 551-702).

Warning areas, military operations areas (MOAs), alert areas, and controlled firing areas are non-regulatory SUAs. The FAA may designate these types of SUAs without resort to the procedures demanded of the Administrative Procedures Act (USAEC, 2021).

Military operations in the United States that pose a significant danger to non-participating aircraft are conducted in the SUA category of restricted areas. Each restricted area has specified minimum and maximum altitudes. Restricted areas contain airspace identified by an area on the surface of the Earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. The penetration of restricted areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants (FAA, 2025).

Restricted areas may have specific operating hours or may be in effect 24 hours per day. Air Traffic Control (ATC) facilities are designated for each restricted area and control entry into the area. Appropriate contact information for the ATC facility is provided in aeronautical publications such as charts or electronic databases.

Other military operations and training over and near Army installations are normally executed in the SUA categories of MOAs and military training routes (MTRs). These types of airspace are not exclusive use by the military, and the pilots of both military and non-military aircraft are responsible for safe flight and collision avoidance.

Restricted areas (SUAs or MOAs) are complimentary to surface danger zones (SDZs) which are designated areas associated with training ranges that are designed to contain projectiles, fragments, and debris from firing or detonation of weapons, ensuring safety during training exercises. SDZ analysis would establish lateral and height restrictions associated with each weapons training system. (See **Section 3.8** Human Health and Safety.) SDZ height restrictions would be incorporated into airspace restrictions for that lateral footprint.

To address land use with respect to noise and safety associated with aircraft operations, the DoD requires military departments to establish an Air Installations Compatible Use Zones (AICUZ) program. The goal of AICUZ is to promote compatible land use on and around air bases by providing information concerning aircraft operations, noise exposure, and accident potential to local governments and base planners to reduce the potential for aircraft mishaps in populated areas. Airfield safety zones are established under AICUZ to minimize the number of people who would be injured or killed if an aircraft crashed. Three safety zones are designated at the end of all active runways: Clear Zone (CZ), Accident Potential Zone (APZ) I, and APZ II. The CZ represents the most hazardous area. The APZs are outside of the CZs. The APZ I is located immediately beyond the CZ and has a high potential for accidents. The APZ II is immediately beyond APZ I and has measurable potential for accidents.

The DoD and FAA also identify a complex series of imaginary planes and transition surfaces, known as the Hazards to Aircraft Flight Zone, that together define the airspace needed to remain free of obstructions around an airfield. The Hazards to Aircraft Flight Zones typically include structure height restrictions that vary by surface and distance from the runway.

Ft. Campbell has both fixed- and rotary-wing airfield facilities. The CAAF is capable of handling all U.S. Air Force (USAF) airlift assets. Golden Eagle, a Forward Landing strip is also capable of handling both C-130 and C-17 aircraft. Rotary-wing aircraft use the CAAF, Destiny Heliport, Sabre Army Airfield, and numerous landing zones located throughout the training areas. These facilities allow Ft. Campbell to meet operational deployments and mobilization in minimal time. Remote landing strips for rotary-wing aircraft are scattered throughout the eastern portion of the installation.

In addition to airfield operations, Ft. Campbell conducts numerous training activities on the western portion of the post that includes live-fire training of various types that could affect

airspace use and safety above those training ranges and nearby on and off the post. As a result, Ft. Campbell has adopted and implements a range of special use airspace restrictions, shown in **Figure B-1** including:

- R3701 – The immediate vicinity of the CAAF, ground surface to 5,000 mean sea level (MSL). Controlled by Ft. Campbell Army Radar Approach Control (ARAC).
- R3702 A – The area surrounding the remaining of the base perimeter, ground surface to 10,000 MSL. Controlled by the FAA, Memphis Air Route Traffic Control Center (ARTCC) with Notice to Airmen (NOTAM) 24 hours in advance.
- R3702 B – The area surrounding the remaining of the base perimeter, ground surface 10,000 to 22,000 MSL. Controlled by the FAA, Memphis ARTCC with NOTAM 24 hours in advance.
- R3702 C – The area surrounding the remaining of the base perimeter, ground surface 22,000 to 27,000 MSL. Controlled by the FAA, Memphis ARTCC with NOTAM 24 hours in advance.
- Campbell MOA 1 – Inner zone controlled during specific military activities off-post, 500 AGL to 10,000 MSL. Controlled by ARAC.
- Campbell MOA 2 – Outer zone controlled during specific military activities off-post, 500 AGL to 10,000 MSL. Controlled by ARAC.

R3701 covers a small section in the eastern portion of Ft. Campbell training/range area, while R3702 covers the western training/range area up to three different elevations. Operations occur almost daily in both SUAs. In 2021, there was an annual total of 2,050 sorties (rotary-wing) in R3701 averaging less than 6 per day. In 2021, the annual total was 48,279 sorties (fixed- and rotary-wing) averaging 132 per day (Defense Centers for Public Health, 2023).

Ft. Campbell has also established AICUZ associated with each aircraft runway to restrict operations in hazardous areas as shown on **Figure B-2**. Structure height restrictions would apply to other airfield imaginary surfaces extending from Ft. Campbell aircraft operations.

3.3 Biological Resources

Protection and management of biological resources is mandated by a number of laws, regulations, and guidance. The Endangered Species Act (ESA) of 1973 (16 USC 1531 et. seq.) regulates the protection of Federally listed species. Section 7 of the ESA dictates that Federal actions should not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. The MBTA of 1918 (16 USC 703-712) protects migratory birds, their eggs, feathers or nests, making it illegal to hunt, pursue, wound, kill, possess or transport any migratory bird, nest, egg, or part thereof (U.S. Fish and Wildlife Service [USFWS], 2012). There are currently 836 bird species protected by the MBTA, two of which are also protected under the Bald and Golden Eagle

Protection Act (BGEPA) of 1940 (16 USC 668-668c). The BGEPA provides for the protection of the bald eagle, the national emblem, and the golden eagle (*Aquila chrysaetos*) by prohibiting the taking, possession, and commerce of such birds.

In addition, protection and management of biological resources within Ft. Campbell are regulated by the Kentucky Department of Fish and Wildlife Resources (KDFWR) and the Tennessee Wildlife Resources Agency (TWRA). Formal written requests and follow-up consultation were made to the USFWS, KDFWR, and TWRA for information pertaining to the presence of special status species within the area of the proposed action (copies of correspondences with these regulatory agencies are included in **Appendix C**).

Local Ecosystems and Communities

The proposed action is located in the eastern portion of the Ft. Campbell installation. Alternatives 1 and 2 are proposed within the cantonment area, *which consists mainly of developed land and various buildings, roads, and facilities*. Alternative 3 involves the following sites:

- Destiny Full MDTF 93-acre site, nearly 100% deciduous forest
- Mabry Full MDTF 93-acre site, nearly 100% deciduous forest
- Sabre Full MDTF 93-acre site, 70% deciduous forest, 30% mowed meadow/grasses
- NCB1 and 2, Base MDTF 18-acre sites, 90% deciduous forest, 10% mowed meadow/grasses

Special Status Species and their Habitats

The USFWS IPaC (Information for Planning and Consultation) tool was accessed to gather data on federally listed species. There is the potential for 10 federally listed species under the ESA to be located within the region of influence associated with the action. These species include: Indiana bat (*Myotis sodalis*), Gray bat (*Myotis grisescens*), Northern Long-eared bat (*Myotis septentrionalis*), Pink mucket (pearlymussel) (*Lampsilis abrupta*), Littlewing Pearlymussel (*Pegias fabula*), Whooping Crane (*Grus americana*), Short's Bladderpod (*Physaria globosa*), and Price's Potato-bean (*Apios priceana*). Additionally, there are two species, with the potential to be within the area that are listed as proposed; these are the Tricolored bat (*Perimyotis subflavus*) and Monarch butterfly (*Danaus plexippus*) (USFWS, 2025). No other endangered, threatened, or proposed species are known to or may occur in the project area. No critical habitat has been designated or proposed for Ft. Campbell.

For each special status species that has the potential to occur in the area evaluated for the proposed action, information is provided below in **Table 3-1**.

Table 3--1 Federally Listed Species Potentially Present within Project Area

Species	Status	Occurrence	Critical Habitat Present
Northern long-eared bat (<i>Myotis septentrionalis</i>)	Federally Endangered	Known to Occur	No
Indiana bat (<i>Myotis sodalists</i>)	Federally Endangered	Known to Occur	No
Gray bat (<i>Myotis grisescen</i>)	Federally Endangered	Known to Occur	No
Pink mucket (pearlymussel) (<i>Lampsilis abrupta</i>)	Federally Endangered	Potential to Occur	No
Price's Potato-bean (<i>Apios priceana</i>)	Federally Threatened	Potential to Occur	No
Monarch butterfly (<i>Danaus plexippus</i>)	Federally Proposed Endangered	Potential to Occur	No
Tri-colored bat (<i>Perimyotis subflavus</i>)	Federally Proposed endangered	Known to Occur	No
Littlewing Pearlymussel (Pegias fabula)	Federally Endangered	Potential to Occur	No
Short's Bladderpod (<i>Physaria globosa</i>)	Federally Endangered	Potential to Occur	No
Whooping Crane (<i>Grus americana</i>)	Federally Listed Experimental population, Non-essential	Potential to Occur	No
Henslow's sparrow (<i>Centronyx henslowii</i>)	DoD Species at Risk	Known to Occur	N/A
Bachman's sparrow (<i>Peucaea aestivalis</i>)	DoD Species at Risk	Known to Occur	N/A
Lark Sparrow (<i>Chondestes grammacus</i>)	State Threatened	Known to Occur	N/A

The Bachman's Sparrow is an endemic, DoD Species at Risk bird that is seasonally present on the installation. This species is associated with a wide variety of habitat types on Ft. Campbell and has strict habitat requirements consisting of a high volume of grasses and forbs, and some scattered trees and shrubs with an open under-story on dry, upland sites. Installation populations occur within and adjacent to the Impact Area. Several live fire ranges have populations due to the frequent fires that simulate the habitat favored by the sparrow. Mowing during the breeding season may limit reproductive capacity through death of the adults or young. The installation has seasonal management restrictions to ensure installation actions do not directly or indirectly impact this species (FTC, 2020a).

The Henslow's Sparrow is a DoD Species at Risk and a potential candidate species under the ESA. The bird is one of the fastest declining songbirds in North America and is no longer considered common anywhere due to habitat loss and fragmentation. The sparrow is rarely encountered on grassland fragments less than 250 acres. Ft. Campbell actively monitors and

manages habitat utilized by this species on Ft. Campbell. Seasonal mowing restrictions during the breeding season are imposed at the installation.

Kentucky State Nature Preserves Commission (KSNPC) Natural Heritage Program and/or the TDEC Division of Natural Heritage have listed the Bachman's sparrow as endangered, and the Lark Sparrow as threatened. Henslow's Sparrow, which occupies most grasslands on Ft. Campbell, is identified by the KSNPC as a species of special concern and is tracked in Tennessee due to declining populations in the state. A full list of State Endangered, Threatened, and Rare Species and their presence within the Ft. Campbell installation can be found in Appendix H.

The bald eagle is afforded protection under the Bald and Golden Eagle Protection Act 16 USC 668-668d which continues many of the restrictions contained within the USFWS species recovery plan. A nesting pair of eagles were recorded in February 2017 just north of Lake Kyle with two eaglets confirmed in April 2018 (FTC, 2020a). The Fish and Wildlife Program implemented management controls to reduce impacts to the nesting pair in accordance with the Army's bald eagle guidance.

Gray bats forage on Ft. Campbell from approximately April through September. Nine hundred forty gray bats were captured on the installation during surveys conducted between 1999 and 2017. Most perennial and some intermittent streams on Ft. Campbell provide suitable foraging habitat for gray bats, and they have been identified in seven of the nine subwatersheds on Ft. Campbell (primarily Fletcher's Fork, Piney Fork, Jordan, and Saline creeks watersheds). No caves providing suitable summer or winter roost habitat for gray bats are known to exist on the installation. Past surveys of the two known caves on Ft. Campbell have found no use by Indiana bats or gray bats. Because gray bats occasionally roost in man-made structures that provide conditions similar to caves, 17 concrete bridges on the installation were inspected to determine presence of roosting bats. No gray bats were observed roosting under the bridges. The Gray Bat Recovery Plan recommends maintaining forested shorelines and riparian zones near gray bat maternity colonies (FTC, 2020a).

The Indiana bat has been documented in very low numbers on Ft. Campbell during mid-April through September. Between 1998 and 2017, eight adult males and one juvenile male were captured on the installation. No caves or mines providing suitable winter habitat for Indiana bats are known on the installation. However, caves used by Indiana bats are located within 5 miles. Results of several years of intensive, installation-wide mist net surveys suggest that small numbers of solitary male Indiana bats may occasionally inhabit Ft. Campbell during summer and the spring/autumn migration periods. No female Indiana bats have been captured and no

maternity colonies have been identified on the installation. No Critical Habitat for the Indiana bat has been designated by the USFWS on Ft. Campbell. Forest habitat is essential to the survival of the Indiana bat. Indiana bats utilize forested areas as roosting and foraging habitat in the spring, summer, and fall. Forested corridors between summer roosts and foraging habitat are important; Indiana bats may avoid open fields to travel along forested corridors, even if it increases commuting distance. Large-scale clear-cutting or other forms of extensive tree removal eliminate Indiana bat maternity and foraging habitat, and remove corridors between caves and foraging habitat, leaving the bats vulnerable to predation. Removal of riparian forest may also result in degradation of water quality and elimination of prey species (FTC, 2020a).

Northern long-eared bats were first documented on Ft. Campbell in 1998. No Critical Habitat has been designated for the bat on Ft. Campbell. Current information indicates northern long-eared bats may be present on Ft. Campbell during spring, summer and autumn while migrating between summer habitat and local winter hibernacula. Seventy-three bats have been recorded since 1998 from all four counties that comprise the installation. Although the majority of captures have been males (47), 16 females and 9 juveniles have been captured, which suggests the installation supports maternity colonies or roosts. No maternity roosts have been recorded on the installation from roost surveys conducted from 2016-2017. The northern long-eared bat shares similar habitat conditions as the Indiana bat and forests on Ft. Campbell appear to provide suitable spring, summer, and fall roosting and foraging habitat. Woodlands currently occupy nearly 49,000 acres on Ft. Campbell, about 50 percent of the installation's total area. The forests consist primarily of deciduous (hardwood) communities, although pine plantations are predominant in the southwest part of the installation. Oak and oak-hickory upland forest and bottomland hardwood forest types common on Ft. Campbell are similar to forests where Indiana bats are typically found in other parts of the United States. Suitable roost trees and foraging habitat on Ft. Campbell may be used during summering bats and by spring migrants from local hibernacula. Morgamie Cave, located in Stewart County, Tennessee has a wintering record of a northern long-eared bat. No other hibernacula existing within the boundaries of Ft. Campbell. Morgamie Cave was gated by the Ft. Campbell Cultural Resource Management Program in the early 2000's to protect Native American relics. Cave access is controlled by the Ft. Campbell Fish and Wildlife Program due to the annual wintering bat counts, condition surveys, and white nose syndrome counts (FTC, 2020a).

Ft. Campbell does not support federally listed plant species; however, the installation does have 20 State-listed species. Locations of regionally rare State-listed plant species are buffered. These buffered locations vary in size, based on the size of the plant population and the presence of suitable habitat. With habitat improvement, plant numbers generally increase. These buffered

locations have not created significant cumulative restrictions to land use. Endangered plants do, on occasion, require some effort to ensure that training events resulting in earth disturbance do not impact listed species and candidates.

3.4 Cultural Resources

Cultural resources that are historic properties are one component of the human environment considered under federal law. Sites, buildings, structures, objects, or districts, including Traditional Cultural Properties containing enough significance and integrity to be listed on the National Register of Historic Places (NRHP), are defined as historic properties that are protected under the National Historic Preservation Act (NHPA) of 1966, as amended. These cultural resources generally become eligible for consideration as a historic property after reaching 50 years of age. Section 106 of the NHPA requires that every federal agency “take into account” how each undertaking could affect historic properties. US Army complies with 36 CFR Part 800 (Protection of Historic Properties), the implementing regulations to Section 106 of the NHPA. In addition, the Ft. Campbell Integrated Cultural Resources Management Plan (ICRMP) outlines how the Section 106 process will be implemented at the facility including consultation and a comment period for the Advisory Council on Historic Preservation, State Historic Preservation Officer (SHPO), and Federally Recognized Tribes. Other federal laws that the facility complies with, such as the Native American Graves and Repatriation Act and the Archaeological Resources Protection Act, consider impacts to cultural resources that may or may not meet the NRHP criteria to be considered a historic property under the NHPA. The ICRMP outlines the various statutes and regulatory framework governing protection and documentation of our heritage (FTC, 2022). Buildings, structures and properties that have achieved significance within the past 50 years, will need to be reanalyzed once reaching 50 years of age.

For this project, this document seeks to identify cultural resources present and to evaluate potential effects to historic properties including those cultural resources that are significant enough for inclusion in the NRHP.

As of 2022, 1,870 archaeological sites have been identified within the installation’s boundaries and of those, 40 are eligible for listing under the NRHP, 223 are potentially eligible, and 269 have not yet been assessed. Twelve archaeological surveys have been conducted within the installation, however, of the approximately 69,000 acres available for survey, 8,000 acres (roughly 12 percent) remains to be surveyed. Additionally, 389 aboveground resources have been evaluated with concurrence of the eligibility listing in the NRHP by the appropriate SHPO. Of the 389, six are eligible for listing under the NRHP and 12 potentially eligible. A Historic District, the Clarksville Base Historic District, is located within the installation. The district contains structures that were originally part of a Naval base associated with the development and

maintenance of the nuclear arsenal beginning in the 1950's. The district is bound by Mabry Road to the north, Jordan Springs Road to the south, 101st Airborne Division Road to the east, and McNair Road to the west. A Programmatic Agreement between Ft. Campbell and the Tennessee SHPO documenting the process where the structures within the district can be maintained and new facilities constructed utilizing an abbreviated consultation process is under development. The six above ground resources that have been determined to be eligible with concurrence by the appropriate SHPO are: Facility 1541 (Durrett House), Facility 5001 (Parish House/CG Quarters), Facility 6081 (Childers' House), Enoch Tanner (Wickham) Statue, the State Line Marker, and Lincoln Elementary School (Building 3709).

3.5 Electromagnetic Spectrum

The electromagnetic spectrum is the full range of electromagnetic radiation, organized by frequency or wavelength. The spectrum is divided into separate bands, with different names for the electromagnetic waves within each band. From low to high frequency these are: radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays. The electromagnetic waves in each of these bands have different characteristics, such as how they are produced, how they interact with matter, and their practical applications (Mehta, 2011 and NASA, 2025).

Radio waves are electromagnetic waves within the frequencies 30KHz – 300 gigahertz (GHz) and include microwaves at the higher frequency end of the radio wave band. Mobile phones, phone mast antennas (base stations), Digital Enhanced Cordless Telecommunications cordless phones, Wi-Fi, Wireless Local Area Network, Worldwide Interoperability for Microwave Access, and Bluetooth have carrier wave frequencies within the microwave band of the electromagnetic spectrum and are pulsed/modulated. Most Wi-Fi computers use 2.45GHz (carrier wave), the same frequency as microwave ovens (WifiinSchools, 2018). Critical military operations utilize this portion of the electromagnetic spectrum for communications and for radar in air traffic control.

Local radio communications users are assigned specific channels to avoid conflicts and interference between users. Other electromagnetic interference (EMI), also called radio-frequency interference (RFI) when in the radio frequency spectrum, is a disturbance generated by an external source that affects an electrical circuit by electromagnetic induction, electrostatic coupling, or conduction. The disturbance may degrade the performance of the circuit or even stop it from functioning. In the case of a data path, these effects can range from an increase in error rate to a total loss of the data. Both human-made and natural sources generate changing electrical currents and voltages that can cause EMI: ignition systems, cellular network of mobile phones, lightning, solar flares, and auroras (northern/southern lights). EMI frequently affects AM

radios. It can also affect mobile phones, FM radios, and televisions, as well as observations for radio astronomy and atmospheric science (Sue, 1981, DoD, 2020; Coil, 2024).

EMI can also be used intentionally for radio jamming, as in electronic warfare. A directed-energy weapon is a ranged weapon that damages its target with highly focused energy in the electromagnetic spectrum without a solid projectile, including lasers, microwaves, particle beams, and sound beams. Potential applications of this technology include weapons that target personnel, missiles, vehicles, and optical devices. High-power directed energy systems, particularly those using light (i.e., lasers), have particularly long range as they are unaffected by gravity, wind, and Coriolis force, and are limited only by beam diffraction and spread, and absorption or scattering by intervening atmospheric contents. High-power microwave systems, because of their longer wavelengths than high-energy lasers, have a larger beam-size so can affect multiple targets at once (GAO, 2023 and Military and Aerospace Electronic, 2024). Because of their location at the high-frequency end of the radio wave band, their use has greater potential to result in EMI in existing electromagnetic systems.

EMI in and between civilian and military use of commercial electronic equipment is prevented/controlled by compliance with radiated emissions standards for electromagnetic compatibility of the Federal Communication Commission (FCC) and similar international standard-setting organizations. On a high-level basis, the FCC also assigns specific sections (bands) of the electromagnetic spectrum for specific uses, whereas specific uses/users within a band are controlled locally. Systems developed by or for the military are subject to the provisions of the DoD Electromagnetic Environmental Effects (E3) Program, DoD Instruction 3222.03. The E3 Program establishes broad responsibilities across the DoD to control E3 by design, rather than relying on after-the-fact remedial measures. The Program flows down an array of additional requirements, standards, procedures and tools to be used for specific types of systems and EMI for implementation in equipment design development and in the field at designated sites to maintain safety from hazards of electromagnetic radiation to fuel, ordnance and personnel.

Ft. Campbell routinely uses a wide range of communications systems in daily operations and radar in air traffic control. Range control monitors radio communications with down-range training operations, assigning specific radio channels to specific users to avoid conflict. Air traffic control monitors fixed wing and rotary wing air traffic using radar to control movement and maintain safety across aircraft operations. Any changes in electromagnetic spectrum use would be reviewed and coordinated with the Installation Spectrum Office.

3.6 Geological and Soil Resources

Ft. Campbell is located within the physiography of the Western Highland Rim of Tennessee, which surrounds the Pennyroyal Plateau in Kentucky. The Pennyroyal Plateau is underlain primarily by bedrock of Mississippian age. The bedrock dips uniformly and gently to the north-northeast at a slope of approximately 15 feet per mile. The uppermost formation on Ft. Campbell is the Ste. Genevieve Limestone, which overlies St. Louis Limestone. Beneath these formations are the older Warsaw Limestone, Fort Payne Formation, and Chattanooga Shale. The depth to bedrock ranges from 7 to 98 feet, except for outcrops along the slopes of Little West Fork Creek in the southeastern portion of the installation. Topographic figures are provided as **Figure D-3** through **D-5**.

The St. Genevieve Limestone measures less than 95 feet in thickness depending on the degree of local weathering and is described as light to medium gray, medium to coarse grained, thickly bedded, locally fossiliferous limestone with some chert. The underlying St. Louis Limestone measures over 385 feet in thickness (Klemic and Ulrich, 1967). This rock formation is described as darker gray, often thickly bedded, and dolomitic in part.

A predominant set of joints in the rock are oriented parallel bedding with a second set of joints oriented perpendicular to bedding. The intersecting joint sets and fractures in the limestone promote preferential, solutional weathering along these joints and the development of karst conditions (USACE, 1994).

Solutional weathering of the uppermost rocks results in gently rolling topography with numerous closed topographic depressions generally referred to as sinkholes. Sinkholes are an indicator of karstic regions (or simply “karst”). The north and northeastern sections of the installation, east of the Casey Creek Subwatershed and north of the Little West Fork Subwatershed, are regarded as a highly karstic area. This area is characterized by thin soils, open sinkholes, large springs, and some caves (USACE, 1994). The entirety of Ft. Campbell in Kentucky is listed as having a “High” hydrogeologic sensitivity to impact from surface runoff to sinkholes (Ray et al., 1994).

Ft. Campbell is located in Seismic Risk Category II and Seismic Design Category D (FEMA, 2020). Permanent structures should be designed and constructed as appropriate for this designation (ASCE, 2017).

At most locations, the limestone bedrock is overlain by a thick overburden consisting of residual soil developed in place by weathering of a cherty limestone parent material. The residuum consists of red clayey silt with a high plasticity and lesser amounts of silt, fine chert, and limestone fragments. Soil test borings made in 1941 and 1978 indicate the clay residuum is between 26 and 33 feet thick in the cantonment area and 49 feet thick just west of the main

cantonment area. The thickness of the residuum continues to increase toward the west and is greatest on the hills, where it is up to 98 feet thick (FTC, 2020b).

Twenty-three soil mapping units occur on Ft. Campbell (see Integrated Natural Resources Management Plan [INRMP] Figure 6; Ft. Campbell, 2020). Soil types are primarily silt loam, with some types containing clay or gravel. Major soil associations include Pembroke-Crider, Nicholson, and Dickson-Mountview. Pembroke-Crider soils are found in areas identified as barrens on the eastern portion of the installation. Nicholson soils are found on ridges, plateaus, and slopes adjacent to streams. Dickson-Mountview soils are found on gently rolling plains that constitute most of the installation. Specific characteristics of soil types are described in Table 2 of the INRMP (FTC, 2020b).

Control of soil erosion is a challenge at Ft. Campbell. Three soil types that cover 52 percent of the total installation acreage are highly erodible. A large proportion of the maneuver space is located on highly erodible soils. Activities that disturb soil (e.g., excavation, use of tracked vehicles, cultivation, and firebreaks) potentially result in substantial soil erosion without proper control and restoration efforts. Three of the soil types on Ft. Campbell are hydric or contain hydric inclusions and may be associated with wetlands. Wetlands are addressed in **Section 3.14, Water Resources**. Fifteen of the soils on Ft. Campbell are classified by the Natural Resources Conservation Service as prime farmland. Prime farmland soils cover approximately 60 percent of the installation and underlie numerous land uses including impact areas, ranges, drop zones, training areas, agricultural fields, native grasslands, and forests (FTC, 2020b).

Eroded soils may restrict use of land by hindering passage of soldiers on foot and vehicles, ultimately potentially leading to closure of training areas for rehabilitation. Erosion that results in runoff of sediment-laden water to streams potentially affects aquatic biota. Finally, sediment is a primary factor in streams that are categorized by the states of Tennessee and Kentucky as not supporting of designated uses.

3.7 Hazardous and Toxic Materials and Wastes

Hazardous materials are defined by 49 CFR 171.8 as “a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce.... The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table”.

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments, as: “a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious

characteristics may (A) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.” Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances.

Special hazards include asbestos-containing material (ACM) and lead-based paint (LBP).

USEPA is given authority to regulate special hazard substances by the Toxic Substances Control Act (TSCA). Asbestos is also regulated by USEPA under the CAA, and the Comprehensive Environmental Response, Compensation, and Liability Act. Other hazards include radon, polychlorinated biphenyls (PCBs), and unexploded ordnance (UXO).

Hazardous material use and management at Ft. Campbell is regulated under the regulations noted above as well as Chapter 9 – Materials Management within Army Regulation (AR) 200-1. The regulations require personnel using hazardous materials to be trained in the application, management, handling, and storage of material; know the location of material safety data (MSD) for all hazardous materials that they are using; and wear the correct personal protective equipment (PPE) required for materials that are being used.

Hazardous Waste

Hazardous waste generated at Ft. Campbell is associated with waste streams generated by site operations and maintenance of aircraft, vehicles, buildings, grounds maintenance, and various other equipment on the installation. These waste streams include spent cleaning solvents, waste oils, spent fuels, corrosion/descaling liquids, waste paints, medical, and UXO. It should be noted that none of the weapon systems of the proposed action would require the addition of per- or polyfluoroalkyl substance (PFAS) based firefighting foams at Ft. Campbell.

Ft. Campbell is a Large Quantity Generator of Hazardous Waste. Ft. Campbell generated 59.56 tons of waste in 2023 which included but not limited to paint, waste oils, oil filters, and spent cleaning materials (USEPA, 2025). Hazardous Materials are managed and stored at the Hazardous Materials Control Center also known as the Pollution Prevention Operations Center (PPOC). All units/activities that store hazardous materials and generate associated wastes are required to establish a Hazardous Communication (HAZCOM) Program in accordance with AR 385-10.

Asbestos

Asbestos is regulated by the USEPA with the authority promulgated under Occupational Safety and Health Administration (OSHA) 29 USC 669, et seq. Section 112 of the CAA regulates

emissions of asbestos fibers to ambient air. ACM is potentially present in pipe insulation, cement pipe, floor tile, floor tile adhesive, roof patching sealant, wall board in mechanical closets, wall and ceiling texture, and wall board panels. ACM is managed as a Special Waste and is transported to FC Woodlawn Construction Demolition Landfill for disposal in accordance with Tennessee Department of Environmental and Conservation.

Ft. Campbell has an Asbestos Management Plan and is relayed and implemented through Environmental Protocol Sheets in the Environmental Handbook (FTC 2024). The Directorate of Public Works (DPW) maintains an information repository that includes the location and classification of ACM information and is updated until all known ACM is removed from facilities known to contain ACM (USACE, 2020).

Solid Waste

The solid waste, including municipal solid waste (MSW) and industrial solid waste (ISW) is managed through the ISW Management Program. The program also includes a recycling program; recycled materials include aluminum, batteries, cardboard, cooking oil, pallets, paper, plastics (1 and 2), printer cartridges, steel, and wood/yard wastes. Ft. Campbell has three locations where staff and on-base residents can drop off recyclable material (FTC, 2024). In FY23, approximately 30 percent of MSW waste was diverted from a landfill through recycling. All recycling and solid waste collection and transportation are conducted by a contractor and transported off the installation for proper separation and for solid waste, disposal.

MSW is collected and transported off the installation for disposal at the Bi-County landfill. The landfill is located within Tennessee and therefore operates and complies with the Solid Waste Management Act of 1991 (Tennessee Administrative Code §68-211-101 et seq.). The landfill is designated as a Class I landfill which allows the landfill to receive non-hazardous waste such as household, approved special wastes (such as ACM) and commercial wastes. The landfill is positioned on 550 acres of land, with 53 acres available for disposal. The landfill has at least seven years of capacity remaining (Bi-County, 2025).

All construction and demolition debris generated on Ft. Campbell is disposed of at the Woodlawn Construction Demolition Landfill. Landfill dump tickets are issued to prevent the unauthorized use of the government landfill and provide quality assurance.

Environmental Restoration Program

The Department of Defense's Environmental Restoration Program (ERP) aims to address and remediate environmental contamination resulting from military activities. This program focuses on cleaning up hazardous waste sites on military installations and former bases to protect human

health and the environment. The ERP encompasses various phases, including site assessment, remedial action planning, and execution of cleanup efforts. The program operates under federal and state regulations, prioritizing transparency and community involvement. The ultimate goal is to restore affected sites to safe and usable conditions while ensuring compliance with environmental laws and regulations. Areas within Ft. Campbell have been designated as a solid waste management unit (SWMU) as defined under RCRA. A SWMU is defined as an area (or facility) that has stored and/or utilized hazardous constituents with the potential to migrate, regardless of whether the unit was intended for the management of solid and/or hazardous waste. These areas or units typically include but are not limited to landfills, waste piles, surface impoundments, land treatment areas, underground or above ground waste storage tanks, and drum storage areas. Fort Campbell has approximately 300 SWMUs and are located adjacent and within the cantonment area and the eastern portion of the base (US Army, 2014). See Appendix G for exhibit noting the location of the SWMUs. More than 75 percent have been identified as requiring no further action and the remainder are either undergoing long-term monitoring and/or land use controls or corrective action.

3.8 Human Health and Safety

A safe environment is one in which the risks to workers, the public, the environment or property are recognized and effectively mitigated in order to eliminate the potential for death or serious bodily injury or illness, harm to the environment or property damage.

Hazards to human health and safety (HH&S) can come in many forms. Hazards from construction and renovation activities are many and can include falls from heights, struck-by incidents, electrocution, caught-in/between hazards, hazardous materials, respiratory hazards, ergonomic hazards noise-induced hearing loss, heat stress and weather-related hazards and slips, trips and falls (at Ground level). The hierarchy of controls, i.e., substitution/elimination, engineering controls, administrative controls and PPE, is applied in order to mitigate risks from hazards. Common PPE found on construction sites include gloves, protective eyewear, safety shoes, high visibility clothing, hard hats, and hearing protection and administrative controls such as standard operating procedures (SOPs), awareness training, warning signs, and safety fencing are designed to reduce risks associated with these hazards.

Noise levels on construction sites from heavy equipment and power tools commonly fall within the range of 80 to 120 A-weighted decibels (dBA). Newer equipment may include built-in mitigations, such as improved mufflers or insulated cabs, to reduce noise exposure (OSHA, 2011). Noise can become potentially hazardous to human health at above 85 dBA, depending on exposure time, and may require hearing protection for mitigation. Short-term increases in noise near construction sites would be temporary and largely within the main cantonment area. Noise

abatement measures such as hearing protection and other mitigations to reduce noise exposure to acceptable levels should reflect applicable federal, state or local regulation and the recommendations of the National Institute for Occupational Safety and Health (NIOSH) as well as any applicable installation noise management plans and SOPs. Noise impacts are more fully discussed in **Section 3.10**.

Construction and renovation activities can generate dust, which contributes to the dispersal of particulate matter (PM) from the site. Dust control measures can be implemented to reduce PM exposure, including watering soils prior to or during ground disturbance, covering or stabilizing exposed soils or stockpiles when not in use, and implementing reduced speed limits. Many states have fugitive dust rules that would apply to construction activities within the installation. Use of an appropriate filtering facepiece (“dust masks”) can be effective in reducing a worker’s exposure to the inhalable fraction of the PM dispersed from the site.

3.9 Land Use

Land use refers to real property classifications that indicate either a natural condition (i.e., natural/scenic, conservation, preservation, unimproved, undeveloped) or developed by human activity (i.e., residential, commercial, industrial, agricultural, institutional, recreational). Land use planning objectives are two-fold: 1) to ensure orderly growth and 2) to ensure compatible uses among adjacent property parcels. Tools supporting land use planning include written master plans/management plans and zoning regulations. In appropriate cases, the locations and extent of proposed actions need to be evaluated for their potential effects on project sites and adjacent land uses. The significant factor affecting a proposed action in terms of land use is its compliance with any applicable land use or zoning regulations.

Ft. Campbell’s Real Property Vision Plan identified five distinct planning goals that would guide future plan development. Of these five goals, two particularly apply to the proposed action (FTC, 2012). They are:

- 1) Enduring, Adaptable, Sustainable Installation – Create environments with compact development that incorporate historic preservation and respect the existing natural resources.
- 2) Supports Mission Readiness and Power Project Capabilities – Acknowledge the primacy of the installation’s mission by ensuring protection and preservation of the airfield, designing efficient mission campuses and maintaining a road system that supports mission requirements.

Installation Planning Standards (IPS) capture Ft. Campbell’s guidelines for development of sustainable and efficient facilities. IPS provide a clear set of guidelines to ensure that the

installation’s vision and planning objectives for development are achieved (FTC, 2018b). Land use surrounding Ft. Campbell is compatible with the installation’s operations.

Ft. Campbell encompasses 104,664 acres. The installation consists of training and maneuver areas (approximately 63,049 acres), range and impact areas (26,638 acres), and built-up areas. Covering approximately 15,000 acres, the built-up area consists of the cantonment area (Administrative Area (9,371 acres), (Sabre Heliport (2,280 acres), the former Clarksville Base (2,600 acres), CAAF AB03 Green space (726 acres) and SWMUs.

The current land uses within Ft. Campbell are shown in **Figures 1-3**, and **2-1** through **2-7**. Land use for these sites varies as shown in the following table.

Table 3--2: Proposed Action Area(s) Land Use Categories

Description of Site/Facilities	Current Land Use Designation
IFPC Administrative functions and Barracks located in existing Buildings 6911 and 6912	Unaccompanied Housing
IFPC Tactical Equipment Maintenance Facility located at existing Buildings 7005 and 7006 (and adjacent surface storage)	Maintenance
M10 Booker Barracks in existing Building 7096, 4 additional Bldgs. for Administrative functions	Unaccompanied Housing
M10 Booker TEMF in existing Building 6525 and adjacent parking lot	Maintenance and Community Facilities (parking lot)
Destiny Full MDTF 93-acre site, almost completely wooded	Open Area/Buffer
Mabry Full MDTF 93-acre site, nearly 100% wooded	Supply/Storage
Sabre Full MDTF 93-acre site, 70% wooded, 30% cropland	Supply/Storage

3.10 Noise

Noise is generally defined as undesirable or unwanted sound that interferes with communication, is intense enough to damage hearing, is annoying to humans, or alters behaviors of wildlife or domestic animals. Human response to noise varies according to the source type, characteristics of the source, distance between source and receptor, receptor sensitivity, and time of day. Noise effects on wildlife generally involves more basic instincts- “Is the sound a threat that requires a flight or fight response?” Sound is measured with instruments that record instantaneous sound levels in decibels (dB); decibels characterize sound levels sensed by the ear. “A-weighted” decibels (dBA) incorporate an adjustment of the frequency content of a sound to represent the way in which the average human ear responds to a sound event. Other sound weightings can be created to characterize sound levels specific to other species potentially affected by a noise event. Sound levels analyzed in this PEA are A weighted or unweighted.

The Federal government has established noise guidelines and regulations for the purpose of protecting humans from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. Guidelines and regulations that are relevant to this PEA are described below. DoD policy is to “minimize effects on the human environment resulting from noise, while maintaining military readiness” (DoDI 4715.13 DoD Operational Noise Program, 28 January 2020). Army Regulation 200-1, Environmental Protection and Enhancement (2007) establishes land use compatibility guidelines for various types of military training noise types, including small arms training, large weapon firing, aircraft noise, and ground vehicle operations. Each element of the proposed action has unique noise aspects that will be addressed separately.

The project study area for the purpose of assessing the effects of the proposed action is displayed in **Figure 1-2**. The current noise environment for Ft. Campbell includes existing small arms firing activities, large weapon (weapons with a bore size greater and 20 mm) operations, tracked and wheeled vehicle operations, helicopter operations, and fixed-wing aircraft operations.

AR 200-1 establishes three Noise Zones (NZ) and a land use planning zone (LUPZ) as a guideline for determining compatible levels of noise exposure with land uses. **Table 3-3** lists the noise zone, and the corresponding small arms noise levels, large caliber weapons noise level, predicted percent of the human population highly annoyed, and the compatibility for land use.

Table 3--3: Noise Zone Classification and Compatibility for Noise Sensitive Land Uses

Noise Zone	Small Arms Impulsive Noise level (dB ^P *)	Large Weapon Impulsive Noise Level (dBC)	Aircraft Noise (DNL, dBA)	Percent Population Highly Annoyed	Land Use Compatibility Rating
LUPZ	NA	57-62	60-65	9-15%	N/A
I	<87	<62	<65	<15%	Compatible
II	87-104	62-70	65-75	15-39%	Normally not compatible
III	>104	>70	>75	>39%	Not compatible

* The primary metric for small arms is the peak sound pressure level, L_{pk} or dB^P. This metric describes the peak instantaneous sound level for an impulsive event such as weapon expenditures.
 Note: dB^P = decibels, peak, unweighted; dBC = decibels, C-weighted; DNL = Day-Night Average Sound Level; dBA = decibel, A-weighted; LUPZ = Land Use Planning Zone; N/A = Not Applicable

The Army’s Compatible Use Buffer (ACUB) Program created land conservation partnerships between the Army and outside organizations to protect land from development that is incompatible with the military mission. Title 10, Section 2684a of the USC allows the Department of Defense to enter into agreements to establish buffer areas through conservation

easements and installation boundaries. A figure within Appendix G displays the ACUB easements adjacent to Ft. Campbell installation boundaries.

The existing noise environment of the WMF proposed action study area is primarily Noise Zones I and II for all noise categories listed in **Table 3-2**, with the exceptions of training areas for small arms, large weapons, tracked vehicles and aircraft operate. These areas are in Noise Zone III. The majority of the land exposed to operational noise is contained within the boundary of Ft. Campbell. Ft. Campbell’s Air Installations Compatible Use Zone Study (2023) describes the existing aircraft noise contours for the Ft. Campbell airfield area (Defense Centers for Public Health, 2023). **Figure D-6** shows the current levels of noise associated with operations on Ft. Campbell.

3.11 Socioeconomics

Socioeconomics are the basic attributes and resources associated with the human environment, particularly population and economic activity. Population levels are affected by regional birth and death rates, as well as immigration and emigration, which are often related to regional employment availability. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these two fundamental socioeconomic indicators may be accompanied by changes in other components, such as housing availability and the provision of public services. Socioeconomic data at the county, state, and national levels permit the characterization of baseline conditions in the context of regional, state, and national trends (USAEC, 2021).

Activities at military installations that can affect regional socioeconomics include construction project expenditures; employment changes; procurement of goods and services; and salaries (Soldiers, civilians, and contractors). As the Army increases or decreases either expenditures or employment at an installation, these impacts are felt within the region by businesses, local governments, and individuals. Installation changes through expenditures from construction projects or an increase or decrease in employee populations could result in varying degrees of economic impact, depending on the economic diversity and size of the regional economy and population. Construction activity could result in temporary increases in jobs, income, and sales due to increased spending in a given region. Impacts from stationing actions can manifest themselves as a loss or gain in jobs; change in real estate demand; change in demand for educational and other services; or change in state or local tax revenue. These potential impacts would vary depending on the local affected environment (USACE, 2023).

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, seeks to protect children from disproportionately incurring environmental health or safety risks that might

arise as a result of federal policies, programs, activities, and standards. Such risks to health and safety are attributable to products or substances that a child would be likely to come in contact with or ingest. Several of the proposed sites are located in the vicinity of on-base residential areas, schools, commercial or recreational centers where children would be present. Children could be subjected to greater risk of accidents from increased local activity (primarily traffic) which would be routinely managed by on-base traffic management measures, and does not present risk from products or substances attributable to that increased activity. Therefore, no increased risks to children as described in the EO are anticipated and no further discussion of this topic is included in this PEA.

Ft. Campbell supports approximately 30,100 active-duty military personnel and 51,480 family members, with another 6,422 civilian employees and 2,179 contract employees as of 4th Quarter, FY23 (MOS, 2025). On-post housing includes unaccompanied soldier barracks and family housing, with approximately 66 percent of soldiers and families residing off-post in the surrounding communities. Ft. Campbell implements an Agricultural Outlease Program, which generates modest revenue for the Army and supports the local agricultural economy.

Ft. Campbell is located in Christian and Trigg Counties in Kentucky and Montgomery and Stewart Counties in Tennessee. The two primary urban centers nearest Ft. Campbell are Clarksville, Tennessee (2023 population of 189,098) approximately 8 miles southeast, and Hopkinsville, Kentucky (2023 population of 30,727) approximately 17 miles north (MOS, 2025). See Appendix E for socioeconomic tables. **Table E-1** through **E-4** provide summary level socioeconomic data for each county, respectively (2018 – 2022 U.S. Census Bureau, American Community Survey). **Figure D-7** shows census tracts in the immediate vicinity of Ft. Campbell. Examination of census tract data within and closest to Ft. Campbell, included in **Tables E-2** through **E-4**, provides more granular characterization of socioeconomic conditions in the immediate vicinity of Ft. Campbell. The data indicates that the more heavily populated tracts within and in the immediate vicinity of Ft. Campbell contain significantly higher percentages of people of color, low income, and unemployed than the respective state and national averages. The more sparsely populated Trigg County, Kentucky and Stewart County, Tennessee reflect typical rural conditions for these states.

Competition for housing is an ongoing issue for junior enlisted soldiers at Ft. Campbell and Montgomery County School District is working to keep up with increasing student enrollment, but capacity is strained in some areas because of the population growth (US Army, 2022).

Ft. Campbell has 4,457 military family housing units on-post located in 21 neighborhoods in the cantonment area available to active-duty, Reserve, single or unaccompanied military members,

military retirees, DoD employees, contractors, and non-active Guard and Reserve members. Approximately 94 percent of the on-post family housing is reported to be occupied. Off-post housing consists predominantly of single-family homes, with the remainder a mix of duplex and multiplex units, apartments and mobile homes. A 2022 Housing Requirements Market Analysis prepared for the DA estimated a 3,498 accompanied community housing deficit in 2027 (Niehaus, 2023). On-post barracks for unaccompanied personnel is approximately 10,000 personnel with an occupancy rate of approximately 85 percent (USACE, 2023). Off-post unaccompanied housing availability is projected to be a deficit of 319 units in 2027 (Niehaus, 2023).

Currently, Ft. Campbell operates six schools on-post (four elementary, one middle school, and one high school) with a capacity of approximately 4,010 students, with actual enrollment of approximately 3,380 students. The middle school is being replaced with a new middle school in August 2025 increasing capacity to approximately 4,130 students. Actual enrollment is expected to be around 3,700 students when full-day pre-kindergarten opens in August 2025. The Department of Defense Education Activity has completed a planning charrette and intends to advertise and award contracts for a parametric charrette, design and construction of a \$50M Ft. Campbell Modernization FY 2028 MILCON with anticipated completion in FY2031. Among the modernization improvements is a building addition to accommodate growing Special Education/SPED enrollment, increasing overall capacity by about 100 students for an overall capacity of 4,229 students by 2031.

County public school districts serve the educational needs of off-post accompanied personnel families. In total, the four county districts have 72 schools with a 2021-2022 student enrollment of 49,819. The Montgomery County School District is the largest with 42 public schools and 37,680 enrolled. Montgomery County School District is working to keep up with increasing student enrollment, but capacity is strained in some areas because of population growth. School districts receive federal impact aid funding for military dependents enrolled. See **Figure D-7** for census tracts within and around Ft. Campbell.

3.12 Transportation and Traffic

Transportation and traffic refer to organized means of moving people and commodities. Principal transportation systems include automobiles and trucking via highways, commercial and military air carriers, waterway and maritime shipping, and railroads. Movement of people by privately owned vehicles (POVs) on a local or regional scale is related to traffic and circulation. The location and availability of transportation system hubs and their capacities can affect or be affected by installation activities. The smooth flow of traffic and the adequacy of on post and off

post road networks to move people efficiently contribute materially to the quality of the human environment on and in the vicinity of the installation.

Major transportation systems at Ft. Campbell include roads, air and rail. Major highways in the vicinity include Interstate 24 (I-24) just north of the post traversing the region in a northwest-southeast direction. US-41A is a four-lane highway that runs generally north-south between Hopkinsville and Clarksville adjacent to the eastern boundary of the installation. US Highway 79 runs east-west along the southern border of the installation. Tennessee State Highway 120 borders the western edge of the post.

Ft. Campbell's Main Gate (Gate 4) is accessible from US-41A. Ft. Campbell has 12 access points, most of which are along US-41A. The T.C. Freeman (Gate 4), Gate 7, Gate 10, Sabre I and Sabre II gates are open 24 hours. T.C. Freeman and Gate 7 have Visitor Control Centers. Within the installation, numerous paved roads support the transportation system within the cantonment area. Principal arterial roads include Wickham, Screaming Eagle, Indiana, Bastogne, Air Assault, Market Garden, 101st Airborne Division, Angels, Tennessee, and Thunder Boulevard. The majority of the post consists of training ranges west of the cantonment area accessed by security gates on Angels Road, Mabry Road, 101st Airborne Division Road, and Gate 7 Road. As the WMF PEA scope does not include training, fielding and staffing of the proposed WMF systems would not affect downrange traffic/transportation.

Ft. Campbell has both fixed- and rotary-wing airfield facilities. The CAAF is capable of handling all USAF airlift assets. Golden Eagle, a Forward Landing strip is also capable of handling both C-130 and C-17 aircraft. Rotary-wing aircraft use the CAAF, Destiny Heliport, Sabre Army Airfield, and numerous landing zones located throughout the training areas. These facilities allow Ft. Campbell to meet operational deployments and mobilization in minimal time. Remote landing strips for rotary-wing aircraft are scattered throughout the eastern portion of the installation. The CAAF and Golden Eagle have the capability to receive and mobilize WMF equipment by air.

Ft. Campbell also has a rail spur and railhead connecting at Hopkinsville, Kentucky and the CSX Transportation rail system, terminating on-post at the Campbell Rail Operations Center bounded by Mabry Road and Market Garden Road. The rail system could also be utilized to receive and ship WMF equipment.

The 101st Airborne Division constructed an approximately 6-acre barge loading facility on a former USACE recreational area on the Cumberland River 10 miles south of Ft. Campbell. Nashville District USACE prepared an Environmental Assessment for the construction and operation of the facility. The facility is used for transportation of unit equipment to national

training centers and coincides with maintaining and advancing the training mission. The barge facility could also be utilized to receive and ship WMF equipment.

All proposed WMF sites are located in the eastern portion of Ft. Campbell near existing airfield operations or near the cantonment area as shown in **Figure 1-3**. A comprehensive traffic study was conducted in 2023 including traffic counts and level-of-service (LOS) analysis of major arteries and intersections. Most LOS ratings were generally acceptable (LOS A or B) with a few intersections at LOS C or D on Screaming Eagle, Wickham, Indiana and Bastogne. Problem areas include congestion associated with on-street parking in several commercial areas, arterial service to on-post housing and associated family amenities (e.g., schools and recreational centers), and several signalized intersections. Road pavement conditions are generally rated “POOR” to “FAIR”. Local traffic congestion and similar road conditions exist in the vicinity of many of the on-post housing along the eastern border of Ft. Campbell.

3.13 Utilities

Utilities furnish an everyday necessity to the public at large and include provisions of electricity, natural gas, water, telecommunication service, wastewater management services, solid waste management service (non-hazardous), and other essentials. Utility plant operators and maintenance personnel are required to meet applicable federal, state, local or host nation certification requirements for the state or host nation in which they are located. Depending on the service provided, the facilities will also have specific statutory and regulatory requirements for design and operation.

Army policy is to provide safe, reliable, efficient, and life cycle cost-effective utility services that promote the health and welfare of the Soldier, civilians, family members, contractors, and retirees; and that provide the capability for garrisons to accomplish assigned missions. Utilities are typically managed to meet other related Army goals. Examples include cost and environmental impact reductions. All military construction, renovation, and demolition projects have a goal of diverting a minimum of 50 percent of construction and demolition debris (C&DD) waste (determined by weight) from landfills.

The primary regulation guiding utilities management of Army installations is AR 420-1, with environmentally related components also addressed in AR 200-1. Various installation management plans addressing utilities guide installation development, operations, and maintenance of applicable infrastructure systems. An example discussed in AR 200-1 is storm water management plans. Examples discussed in AR 420-1 include installation utilities management plans, water resource management plans, and integrated solid waste management

plans. Utilities-related management plans may also be required by the government for contractor operations.

Some installations have their own facilities for generating electricity, providing drinking water, treating and discharging wastewater, managing solid waste, and providing natural gas. These facilities also have associated distribution and/or collection systems. Most installations rely on utility providers in the nearby community.

This section provides an evaluation of utilities that exist on Ft. Campbell. Utilities furnish an everyday necessity to the public at large and include provisions of electricity, natural gas, water, telecommunication service, wastewater management services, solid waste management service (non-hazardous), and other essentials.

Potable Water

Potable water is supplied to Ft. Campbell from the Boiling Springs aquifer, which has a potential yield of 24.65 million gallons per day (mgd) and is treated in a rapid sand filter treatment plant currently sized to supply up to 6.2 mgd to Ft. Campbell, exceeding the current peak demand of 4.3 mgd. The Drinking Water System is owned, operated, and maintained by a contractor, currently Jacobs-CH2M Hill. The Red River pipeline is no longer operable. The alternate potable water source is a redundant water line near Gate 7 from the Hopkinsville, Kentucky Water Environment Authority. The installation's potable water storage system consists of the following elevated steel storage tanks: one 0.25 million gallon, one 1.0 million gallon, and three 0.5 million gallon. Total water storage capacity at Ft. Campbell is 2.75 million gallons.

Sanitary Sewer and Wastewater System

Sanitary wastewater at Ft. Campbell is treated at a wastewater treatment plant (WWTP) owned, operated, and maintained by Jacobs. The current daily load ranges from approximately 2 to 4 mgd with a rated capacity to effectively treat 6 mgd. The overall condition of the wastewater facilities and infrastructure system also has a Facility Class rating of F3/Q3 due to facility shortfalls in quantity and quality attributed to multiple system deficiencies (US Army, 2022).

Storm Water System

Ft. Campbell manages storm water runoff using natural limestone sinkholes and man-made collection basins to direct runoff into storm sewers and open ditches. Storm water runoff from the cantonment area drains into Little West Fork Creek and one of its primary tributaries, Dry Fork Creek. An installation-wide comprehensive plan which establishes requirements for Stormwater Pollution Prevention Plans (SWPPPs) and best management practices (BMPs) at construction and disturbed sites was implemented in 2016 and is annually reviewed. Ft.

Campbell’s soil profile, more fully discussed in **Section 3.6**, is primarily composed of highly erodible soils making erosion by water one of the biggest challenges at the installation (FTC, 2020a). Storm water is managed under the National Pollutant Discharge Elimination System (NPDES) permitting program. Most states manage their own NPDES programs, including Tennessee and Kentucky, where Ft. Campbell is located. There are permits required for both construction activities and industrial operational activities. Since the project areas for the proposed WMF are located within the borders of Kentucky and Tennessee, both the Kentucky Pollutant Discharge Elimination System (KPDES) and the Tennessee NPDES programs can apply. Construction-related impacts from projects exceeding one acre in size, such as off-site sediment tracking and control, will be required to comply with the Ft. Campbell SWPPP or Storm water Management Plan (SWMP) in addition to the state requirements. Once the construction project is complete, the storm water is controlled under the appropriate state Municipal Separate Storm Sewer System (MS4) General Permit as discussed in the Ft. Campbell SWPPP/SWMP. Projects over 5,000 square feet must meet the requirements of the Energy Independence Security Act (EISA) Water Quality Requirements and consider utilization of Low Impact Development. All projects regardless of size fall under construction BMPs required under the NPDES MS4 Permits. New Development and Redevelopment projects over 1 acre are required to meet runoff reduction and water quality treatment during post construction required by one of the two MS4 permits, one for Kentucky and one for Tennessee. Stormwater runoff diverted into certain subsurface treatment systems or sinkholes will require Underground Injection Control (UIC) Permits.

Solid Waste

All construction and demolition debris generated on Ft. Campbell must be disposed of at the Woodlawn Construction Demolition Landfill. Landfill dump tickets are issued to prevent the unauthorized use of the government landfill and provide quality assurance. All military construction, renovation, and demolition projects have a goal of diverting a minimum of 50 percent of C&DD waste (determined by weight) from landfills.

Energy Systems

Tennessee Valley Authority (TVA) provides electrical power to Ft. Campbell. In 2021, TVA had a total generating capacity of 34,000 Megawatts (MW) of power and the current peak electricity usage within the Ft. Campbell service area was estimated to be two tenths of one percent of available power. In 2021, it was estimated that Ft. Campbell consumes approximately 277,256 MW hours, or 0.02 percent of TVA’s total energy production (US Army, 2022). City Light and Power (CLP) owns, engineers, develops, upgrades, operates, and maintains overhead and

underground high voltage electricity distribution systems, street lighting systems, and power generation facilities for military installations across the U.S. CLP serves as the electric utility owner/operator at Ft. Campbell (CLP, 2023).

Natural Gas

Clarksville Gas and Water supplies natural gas to Ft. Campbell. There is an installation-wide gas distribution system throughout Ft. Campbell. In 2021, Ft. Campbell obtained approximately 50 percent of its energy from natural gas and propane. Clarksville Gas and Water provided an estimated total capacity of 15,256 million cubic feet (MCF)/day to Ft. Campbell. In 2021, Ft. Campbell used approximately 8,491 MCF/day on the coldest days, which equates to approximately 56 percent of total capacity (U.S. Army, 2022b).

Communications Systems

Ft. Campbell communication service is mostly available for the locations identified in the proposed action. In some of the remote sites such as the Alternative 3 Destiny and Sabre 93-acre sites, mobile communications could be relied upon but signal strength might be limited.

3.14 Water Resources

Protection and management of water resources on Ft. Campbell are mandated by various Federal laws, regulations, and guidance. Within the U.S., waters are regulated under Sections 401 (33 USC 1341 et seq.) and 404 (33 USC 1344 et seq.) of the Federal Clean Water Act (CWA). Water features within the proposed action area are also under the jurisdiction of the Division of Water - Kentucky Energy and Environment Cabinet because of state assumption of Section 401 and 404 of the CWA, as well as the Kentucky Division of Water and Tennessee Division of Water Resources because of state assumption of Section 401 and 402 of the CWA.

CWA Section 404 establishes a program to regulate the discharge of dredged or fill material into Waters of the United States (WOTUS), including wetlands. The basic premise of the Section 404 program is that no discharge of dredged or fill material may be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if WOTUS would be significantly degraded. Generally, an activity affecting WOTUS requires coverage under a Section 404 permit, which is reviewed by USACE.

Surface Water

The USFWS National Wetland Inventory (NWI) map does not indicate the presence of any mapped streams within the project area. Several mapped streams are located adjacent to the project area. Once an alternative is selected, a full wetland delineation and stream assessment field visit will occur, resulting in a Waters of the US Report.

Wetlands

Wetlands are defined as areas that are inundated by surface or groundwater with a frequency sufficient to support, and under normal circumstances do or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth/reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas, such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds. Because of Section 401 and 404 CWA assumption from the federal government, the primary governing regulation for freshwater wetlands in the State of Kentucky is the Kentucky Energy and Environment Cabinet, and in Tennessee is TDEC. Ft. Campbell contains approximately 2,533 acres of wetlands.

EO 11990 provides guidance on wetlands management. It is the intent of this EO that Federal agencies implement these requirements through existing procedures, such as those established to implement NEPA. This EO requires each Federal agency to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out that agency's responsibilities for:

- Acquiring, managing, and disposing of Federal lands and facilities;
- Providing Federally undertaken, financed, and assisted construction and improvements; and
- Conducting Federal activities and programs affecting land use, including but not limited to, water and related land resource planning, regulating, and licensing activities.

There are no mapped wetlands present within the project area (USFWS, 2025).

Floodplains

Floodplains are generally areas of low-level ground located on one or both sides of a stream channel that are subject to either regularly periodic or infrequent inundation by floodwaters. The Federal Emergency Management Agency (FEMA) regulates floodplains with standards outlined in 44 CFR 60.3. EO 11988 provides guidance on floodplain management. This EO requires each Federal agency to amend existing regulations or procedures to ensure that the potential effects of any action the agency may take in a floodplain are evaluated and that the agency's planning programs and budget requests reflect consideration of flood hazards and floodplain management. It is the intent behind this EO that Federal agencies implement these requirements through existing procedures, such as those established to implement NEPA.

There are 100-year floodplains (Zone A and AE) located within the eastern portion of the cantonment area and along Dry Fork Creek (FEMA, 2008). None of the proposed areas are

located within a 100-year floodplain. Upon selection of any alternative, the need for any associated floodplain permits would be determined through a floodplain review and be acquired as necessary.

Groundwater

Dye traces performed on Ft. Campbell have shown that two aquifers are present under the installation. One is a shallow aquifer that is recharged by sinkholes, and a deeper aquifer is associated with Boiling, Quarles, and Blue Springs. The bedrock aquifer at Ft. Campbell consists of a zone of active groundwater flow in the shallow consolidated parts of limestone formations that underlie the installation. Typically, this zone is within the upper 150 feet of the bedrock. Much of the porosity in the aquifer results from solution weathering of minor structural features, such as fractures, joints, and bedding planes (USGS, 1996).

Generally, water entering sinkholes and groundwater flows to springs within several drainage basins covering the installation. Springs are found just west of the installation adjacent to Training Area AB03, and in the cantonment area near Gate One, in the Small Arms Impact Area, and in Training Area 14 and Training Area 5. The United States Geological Survey (USGS) has conducted dye trace studies to determine patterns of groundwater flow, and associations of sinkholes and springs.

There are no groundwater features or monitoring wells within the specific project area, therefore, no effect on groundwater resources is expected. However, upon selection of any of the proposed action alternatives, the need for a Groundwater Protection Plan would be determined and implemented. Such plans typically require the identification of potential sources of contamination, establishment of protective measures, and implementation of monitoring programs designed to ensure water quality.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968 (16 USC 1271 et seq.) established a means of evaluating and protecting selected rivers that have particular scenic, recreational, geologic, fish and wildlife, historical, cultural, or other similar unique values. A river may be so designated by either the U.S. Congress or by a state legislature. The nearest designated river, the Obed River, is located approximately 168 miles to the east (NPS, 2025).

4.0 Environmental Consequences

4.1 Alternative 1 – IFPC and M10 Booker

4.1.1 Air Quality

Fielding the IFPC and M10 Booker would include the construction of new facilities, the installation of portable generators and boilers. All activities were conservatively estimated and assumed to occur in one year to provide a worst-case scenario of emissions.

The construction and heating activities in the Air Conformity Applicability Model were used to model emissions. Site grading, trenching, building construction, architectural coating and paving calculations are all included in the construction activity, while the heating activity accounts for the addition and use of boilers. Some assumptions were made to complete these calculations. An assumption of 800 square feet was made for all buildings without a specified building area as this area was provided for two of the structures. It was also assumed that 50% of the area of the range would be graded and that the paved area would equal double the footprint of the buildings. All other values were sourced directly from the Description of Proposed Action and Alternatives.

Criteria pollutant emissions resulting from Alternative 1 are summarized in **Table 4-1**.

Table 4--1: Emissions at Ft. Campbell Associated with Alternative 1

Air Pollutant Emissions Source	VOC Emissions (tpy)	NO _x Emissions (tpy)	CO Emissions (tpy)	PM ₁₀ Emissions (tpy)	PM _{2.5} Emissions (tpy)	SO ₂ Emissions (tpy)	CO ₂ e (metric tpy)
Calendar Year 2026	2.204	6.408	5.311	4.044	0.971	0.795	1,994
Emissions Threshold	100	100	250	250	250	250	68,039
Any Threshold Exceedance?	No	No	No	No	No	No	No

NO_x = Nitrogen oxides

tpy = tons per year

*Steady State

The annual net change in estimated criteria pollutant emissions associated with Alternative 1 would be less than the insignificance indicators of 100 tpy for VOCs and NO_x and 250 tpy for all other criteria pollutants. A General Conformity Determination would not be applicable. All criteria pollutant emissions would be insignificant and would not cause or contribute to an exceedance of NAAQSs. Alternative 1 would have an insignificant impact on Air Quality.

4.1.2 Air Space

An impact to airspace would be considered significant if the proposed action violates FAA safety regulations or causes a substantial infringement of general aviation or commercial flight, or if

new construction was proposed in an AICUZ. Fielding and stationing of IFPC and M10 Booker equipment, facilities and personnel would have no significant impact on Ft. Campbell Airspace. Although the personnel and facility requirements for the IFPC and M10 Booker have been developed, the IFPC and M10 Booker training doctrine requirements are under development and not available at this time. The proposed action for this PEA does not include any IFPC or M10 Booker training activities. When the IFPC and M10 Booker training doctrine requirements are developed, they will be compared against installation-specific ongoing training to determine if additional environmental analysis could be required. Given that current IFPC training requirements are projected to require vertical airspace control height to 45,000 feet (see **Table 2-1**), well above existing special use restrictions, additional NEPA analysis would likely be required.

4.1.3 Biological Resources

Under Alternative 1, the fielding of IFPC and the M10 Booker would entail a mix of new construction and repurposing of existing facilities and capabilities to meet the specified physical criteria for each system within the cantonment area. Construction for the M10 Booker Support Site is proposed in a grassy area/mowed grassed area that is utilized for hay lease, which may serve as habitat for state-listed sparrow species. However, this area is already disturbed for hay leasing. Construction may affect state-listed species. To minimize effects to state-listed species, existing seasonal mowing restrictions and management plans should be followed to have less than significant effects on biological resources.

Trees are potential habitat for listed bat species, bald eagles, and migratory birds. As such, to reduce the potential to disturb the species, tree clearing would occur during the winter season (1 October through 31 March). Tree clearing would be conducted under the supervision of the Conservation Branch at Ft. Campbell.

Construction noise and increased human activity would have short-term effects on fauna. Extensive tree clearing may affect biological resources as well as Special Status Species. Consultation with USFWS would be required once the Alternative is determined as well as the areas of direct and indirect impacts. Tree clearing should not be initiated until consultation with USFWS is complete. USFWS IPaC consultation does not initiate formal consultation with or concurrence from USFWS. Formal consultation must be initiated directly with USFWS.

No surface waters would be directly or indirectly impacted; therefore, no impact to the Pink mucket is anticipated. However, once the alternative is selected, a wetland delineation and stream assessment field visit will occur, resulting in a Waters of the US Report. Potential impacts to water resources and endangered species will be further analyzed using field verified data.

Construction noise and increased human activity would cause some fauna to move to less active areas either temporarily or permanently. Construction would require cutting and clearing of forest land. The alteration of vegetation is expected to have a less than significant effect on local ecosystems and communities. The cleared areas would require annual cutting activities to ensure the training lanes are adequately maintained to meet the training requirements of the soldiers assigned to train at the new facilities. Several state and federally listed bird species and state-listed plant species are known to inhabit Ft. Campbell properties. Construction activities and tree removal may adversely affect federally protected species and state-listed species. The installation must comply with federal law, Army policy and guidance, and its own plans and programs, including compliance with the Endangered Species Act and INRMPs, and consult with USFWS and National Oceanic and Atmospheric Administration (NOAA) as required in order minimize effects to listed species. The installation must follow seasonal mowing and tree removal restrictions and management plans to avoid and/or minimize effects to protected species.

4.1.4 Cultural Resources

The fielding of IFPC and the M10 Booker would occur within the cantonment area. Within this area, are known NRHP eligible and potentially eligible sites as well as a Historic District. These sites include above ground (historic) and archaeological and some have been determined to be eligible by the appropriate SHPO. As the footprint(s) for these facilities have yet to be established, an impact by this undertaking has not been determined or concurred with by the appropriate SHPO. During the planning of the facilities, the proposed footprint will be reviewed against the Ft. Campbell Archaeological Database to ensure that resources are not present and / or a survey has been conducted.

If a survey is required, an archaeological survey will be conducted and the appropriate SHPO contacted / consulted. Additionally, if a building is to be renovated and the building is 45 years or older and has not been surveyed, the building will be reviewed for eligibility determination under the NHPA.

Upon finalization of the footprint, prior to ground disturbance and/or completing a design of a facility, the Army will ensure that potential effects to archaeological and historic structures are considered prior to finalizing the design, allowing for adequate evaluation. The Army will seek concurrence of the proposed undertaking in accordance with 36 CFR 800.11 from the appropriate SHPO.

4.1.5 Electromagnetic Spectrum

Electromagnetic spectrum impacts would be considered significant if the proposed action utilized electromagnetic systems that would interfere or conflict with existing electromagnetic systems or aircraft operations, or existing Ft. Campbell electromagnetic systems would interfere

or conflict with planned electromagnetic systems to be used as part of the proposed action. Fielding and stationing of IFPC and M10 Booker equipment, facilities and personnel would have no significant impact on Ft. Campbell Electromagnetic Spectrum use. Although the personnel and facility requirements for the IFPC and M10 Booker have been developed, the IFPC and M10 Booker training doctrine requirements are under development and not available at this time. The proposed action for this PEA does not include any IFPC or M10 Booker training activities. When the IFPC and M10 Booker training doctrine requirements are developed, they will be compared against installation-specific ongoing training to determine if additional environmental analysis could be required. Should training requirements potentially impact electromagnetic spectrum use, additional NEPA analysis would be required.

4.1.6 Geological and Soil Resources

Effects on geology and soils would be adverse if the action alters the lithology, stratigraphy, and geological structure that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or change the soil composition, structure or function within the environment. Projects disturbing between 5,000 square feet and 1 acre of soil will generally require a SWPPP, which would include BMPs to reduce and minimize impacts associated with stormwater runoff, erosion, sedimentation, and pollutants. Many sinkholes in the cantonment area are currently designated/permitted UIC Class V wells. See **Section 3.13**, Utilities, for a fuller discussion of the stormwater pollution prevention requirements at Ft. Campbell (FTC, 2018a).

Disturbance to soils from routine construction projects within the cantonment area would be expected. During construction, heavy equipment would be used to move and compact soils and remove debris in construction and paved areas. Site preparation for new structures and paved areas would require clearing and grading. Erosion Prevention/Sediment Control (EPSC) and grading plans required as part of the SWPPP would be prepared to identify site grading, drainage patterns, and runoff velocities affecting receiving waters. These plans would provide information regarding beginning and ending of excavation activities, establish the degree and length of finished slopes, specify the disposal of excess material, and the necessity of obtaining borrow material. Berms, diversions, sediment control, erosion control, and other stormwater practices would be incorporated into EPSC plans for land disturbing activities. Disturbed areas would be kept to the minimum necessary to complete the work and would be confined to the final site boundaries.

Alternative 1 could have significant but mitigable impacts to soils resulting from construction activities. During construction, heavy equipment would be used to move and compact soils and

remove debris in construction and paved areas. Soil disturbance could also result in increased erosion potential from loss of groundcover and exposure of bare soils to precipitation and runoff. Site preparation for new structures and paved areas would require clearing and grading. EPSC and grading plans required as part of the SWPPP would be prepared to identify site grading, drainage patterns, and runoff velocities affecting receiving waters. These plans would provide information regarding beginning and ending of excavation activities, establish the degree and length of finished slopes, specify the disposal of excess material, and the necessity of obtaining borrow material. Berms, diversions, sediment control, erosion control, and other stormwater practices would be incorporated into EPSC plans for land disturbing activities. The applicable permits would be obtained and BMPs would be implemented based on site-specific conditions to reduce impacts by applying the following management actions: sediment barriers (silt fence, rock check dams), temporary detention basins, grade stabilization with seed and mulch, and geotextile slope stabilization. Potential temporary impacts to soils would be controlled and avoided using appropriate BMPs and soil stabilization/revegetation techniques following construction activities.

The presence of karst terrain, including sinkholes, would affect the design and construction of any fixed structures. As much of Ft. Campbell is prone to sinkhole formation, construction projects sited in sinkhole topography would be required to address sinkhole related issues by designing facilities that address instability associated with development in this topography.

The IFPC footprint may impact one sinkhole. Karst features including open sinkholes require protection under the Kentucky Cave Protection Act (KCPA) KRS 433.870. Ft. Campbell currently maintains a 100 feet vegetated setback from karst features that is more protective than the 70 feet buffer required under the KCPA. The use of fertilizers, pesticides, other chemicals is prohibited within 100 feet of these features. Fueling operations should also be conducted at least 100 feet from these features. Timber removal also has provisions for protection of karst resources under the Forest Conservation Act KRS 149.330.

4.1.7 Hazardous and Toxic Materials and Wastes

Construction and renovation associated with repurposing existing infrastructure / supporting facilities may require the use of hazardous materials by contractor personnel. Project contractors would comply with federal, state, and local environmental laws and would employ affirmative procurement practices when economically and technically feasible. All hazardous materials and construction debris generated by the construction would be handled, stored, and disposed of in accordance with federal, state, and local regulations and laws. Any underground storage tanks encountered would be reported. If any hazardous material/solid waste issues arise, the

appropriate agencies will be contacted. Permits for handling and disposal of hazardous materials would be the responsibility of the contractor conducting the work.

Construction activities would also generate minimal quantities of solid wastes, which may include but are not limited to concrete, electrical equipment, steel scrap wire, and packing materials. Contractors would be directed to recycle materials to the maximum extent possible, thereby reducing the amount of debris disposed of in landfills. Materials not suitable for recycling would be taken to a landfill permitted to handle construction debris wastes. The proper management and recycling or disposal of construction debris would be the responsibility of construction contractors. The amount of waste generated by the Alternative would not have a significant impact to the operating life of the landfill.

In the event of a fuel spill during construction, the contractor would be responsible for its containment, clean up, and related disposal costs. The contractor would have sufficient spill supplies readily available on the pumping vehicle and/or at the site to contain any spillage. In the event of a contractor related release, the contractor would contact Hazardous Materials Control Center and take appropriate actions to correct its cause and prevent future occurrences.

There are known ERP sites located within areas proposed for use by the IFPC and M10 Booker facilities. Prior to construction, if ground disturbance is required, location of ERP sites would be verified. If a site has on-going investigation or remediation, the footprint will be modified or moved or a worker safety plan would be prepared to ensure that people are protected from potentially contaminated soils and / or groundwater. Any issues encountered regarding sites under Superfund will be reported to the Superfund Branch.

If renovation activities are to occur, the ACM inventory would be reviewed and if ACM is present within the buildings, it will be removed prior to renovations. Kentucky requires that it be notified before any asbestos project (exceptions: non-friable repairs and maintenance, emergency repairs and maintenance, and ordered demolitions) according to their regulation, 401 Kentucky Administrative Regulation (KAR) 58:025. Tennessee requires that it be notified in advance when any regulated ACM is removed in accordance with (IAW) Chapter 1200-03-11-02 of their Hazardous Air Contaminants Amendment. Notifications will include the type of work and amount of ACM to be removed (USACE, 2020). The ACM would be collected, containerized, inventoried, and disposed of within a designated area of the Ft. Campbell solid waste landfill, which is inspected by state regulators.

With the increase in personnel associated with the stationing, an increase in the generation of MSW is anticipated. The increase in MSW would be associated with the additional food,

housing, and commercial waste (e.g., paper and plastic). MSW would be collected and transported off the installation for disposal at the Bi-County landfill.

With verifying the location of ERPs and enacting associated mitigation measures, if required, a less than significant is anticipated. Additionally, as the landfill has capacity to receive and manage additional wastes and wastes generated (including ACM) would be managed appropriately, no impact is anticipated.

4.1.8 Human Health and Safety

Impacts on health and safety are evaluated for their potential to jeopardize the health and safety of Base personnel as well as the surrounding public. Impacts might arise from physical changes in the work environment, demolition and construction activities, introduction of demolition and construction -related risks, and risks created by either direct or indirect workforce and population changes related to proposed Base activities.

No significant long-term adverse construction-related HH&S effects would be anticipated as a result of the implementation of the proposed action. Construction and renovation activities would be temporary. Short term impacts to HH&S from construction activities would be less than significant. Installation of safety plans and SOPs would be followed to mitigate associated hazards from construction activities. Use of appropriate PPE, safety equipment, dust control methods, and work zone or hazard demarcation would reduce risk of injury or exposure of workers and other personnel.

Activities such as maneuvering, loading, and unloading heavy equipment involve safety hazards similar to those associated with construction. Soldiers would be trained to ensure safe operating procedures are followed to avoid hazards. Training activities would follow all relevant SOPs and safety requirements.

The public would have no access to the construction activities associated with the proposed action. Dust generation from the construction activities would likely be limited to on-base exposure and would be kept in check using dust suppression methods.

4.1.9 Land Use

Minor short term land use impacts are expected during renovations and construction for the IFPC and M10 Booker sites. Land use designations would require modification. The Proposed Consol. Footprint for the future M10 Booker site is an active agricultural lease and would require lease revocation prior to construction. Revenue lost would be \$10.00/acre at Proposed Consol. footprint.

Impacts to forestry and logging potential would be minimal for the IFPC and M10 Booker sites as there are few to no trees located there.

4.1.10 Noise

Implementation of Alternative 1 would have minor, temporary effects on the noise environment during the construction phase.

Construction equipment that would be used in the proposed construction and their typical sound pressure levels at relevant receptor distances are shown in **Table 4-2**. The table is a list of the planned construction activities, and the month and year for the start of each activity. Each activity lists the general equipment consistent with that used for air quality analysis (**Section 3.1**). Noise from each type of equipment was calculated using the Federal Highway Administration (FHWA) Roadway Construction Noise Model to the noise sensitive areas of concern.

Table 4--2: Proposed Construction Equipment and Associated Noise

Construction Equipment	LA_{max} dB at 50 feet distance	LA_{max} dB at 5,280 feet
Excavators	80.7	40.2
Graders	85	44.5
Other Construction equipment	n/a	n/a
Rollers	80	39.5
Rubber Tired Dozers	81.7	41.2
Scrapers	83.6	43.1
Tractors/loaders/Backhoes	84	43.5
Cranes	85	40.1
Forklifts	n/a	n/a
Generators	80.6	40.2
Welders	74	33.5
Cement and Mortar Mixers	80	39.5
Pavers	77.2	36.7
Total	n/a	44.5

All construction operations would occur during the day, Monday through Friday, with no construction operations on weekends nor in the evenings or nights. Using the Inverse Square Law of Noise Propagation noise levels would be reduced by 6 dB as the source distance is doubled (e.g., at 50 feet -6 dB, 100 feet -12 dB, at 200 feet -18 dB, at 400 feet -24 dB, and at 800 feet -30 dB). Residents are located approximately 680 feet from nearest the construction site and using the Inverse Square Law of Noise, noise levels are anticipated to be less than significant and short-term in nature.

4.1.11 Socioeconomics

Fielding the IFPC and M10 Booker would involve renovation and/or demolition and new construction of facilities to house IFPC and M10 Booker personnel and equipment. Although detailed plans and cost estimates have not been completed, these projects could be expected to provide appreciable renovation and construction work that would provide a temporary positive impact to the local Ft. Campbell economy. The IFPC and M10 Booker would be staffed with approximately 735 and 400 soldiers respectively. Most of the M10 Booker personnel and many of the IFPC personnel may be re-assigned from existing Ft. Campbell staff, so there would be a limited number of new Army personnel to be newly located at Ft. Campbell. The new personnel and their families would provide a minor long-term positive impact to the Ft. Campbell local economy in terms of increased income and consumer spending. At the same time, the new personnel – accompanied or unaccompanied – would increase demand on the existing constrained housing market – barracks and family housing on-post, and off-post rentals and owner-occupied housing. New accompanied personnel would include children increasing demand for on-post and off-post schools, as well as child-care. Since there is limited availability of on-post housing, the number of additional children to be enrolled in on-post schools may be limited enough to be accommodated by existing DoD EA Ft. Campbell Modernization plans.

If a decision is made to implement the proposed action, a more specific evaluation of IFPC and M10 Booker personnel staffing should be conducted to determine the actual number of new personnel to Ft. Campbell and their potential impact on Ft. Campbell on-post and off-post housing and schools.

4.1.12 Transportation and Traffic

Fielding the IFPC and M10 Booker would involve approximately 735 and 400 soldiers respectively, plus a large number of vehicles and equipment with the IFPC. Although many of these personnel may be re-assigned from existing Ft. Campbell staff, they will be concentrated at their proposed siting locations (Site 1 and 6 on **Figure 1-3**), near the 2-44 ADA for the IFPC (**Figure 2-1**) and southeast of the CAAF for the M10 Booker (**Figures 2-2** and **2-3**). Existing degraded LOS ratings at two nearby intersections (Air Assault and A Shau Valley; Screaming Eagle and A Shau Valley), on-street parking congestion on A Shau Valley near Airborne, and existing intersection control issues on Normandy at Wickham and at Screaming Eagle would require additional traffic analysis and mitigation should a decision to field the IFPC proceed. Although fielding the M10 Booker would involve fewer personnel and vehicles, existing on-street parking congestion on 49th, 51st and 56th Streets, plus existing pavement conditions in the vicinity would require additional evaluation to avoid exacerbating existing problem areas.

Due to size and/or weight restrictions, transportation of IFPC or M10 Booker equipment by off-post public roads could require state Department of Transportation permits. Even if delivered to Ft. Campbell by air or rail, on-post movements by road could similarly require approval from the Ft. Campbell Directorate of Public Works.

4.1.13 Utilities

Due to the excellent availability of all the various utilities in the proposed siting for the IFPC and M10 Booker there will be no notable impact to expansion of utility infrastructure. Current capacities should easily accommodate the new systems. A potential beneficial impact to the utilities systems is that they would be continually upgraded to meet the expected future growth of the installation due to the addition of these weapons systems in conjunction with the supporting staff and operations. The operator for each utility would obtain the number of people planned in the development in order to specifically calculate the needed loads. Temporary interruption in utility service may occur during construction/renovation at the proposed sites for IFPC and M10 Booker. Such service interruptions would be temporary and would cease upon project completion. Use of existing utility trenches is encouraged whenever possible.

4.1.14 Water Resources

Alternative 1 does not include activities that would modify or directly affect existing surface water features, and there is no anticipated direct effect or indirect modification of substrates and turbidity of surface water features.

Construction activities, either individually or collectively, would be covered under a general stormwater construction permit that would specify the BMPs to be used to control erosion on, and stormwater runoff from, construction sites. Adhering to the requirements of the permit would limit impacts on water resources. Any construction that would convert pervious land to impervious land would increase the quantity of stormwater runoff but not the amount of stormwater reaching surface waters if proper BMPs are in place. EISA Section 438 requires that federal facility development projects of 5,000 square feet or more maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of stormwater flow. Additional quantities of stormwater from new impervious surfaces would be retained onsite through the use of detention or infiltration.

4.2 Alternative 2 – IFPC Only

4.2.1 Air Quality

Fielding the IFPC would include the construction of new facilities, the installation of portable generators and boilers. All activities were conservatively estimated and assumed to occur in one year to provide a worst-case scenario of emissions.

Criteria pollutant emissions resulting from Alternative 2 are summarized in **Table 4-3**.

Table 4--3 Emissions at Ft. Campbell Associated with Alternative 2

Air Pollutant Emissions Source	VOC Emissions (tpy)	NO _x Emissions (tpy)	CO Emissions (tpy)	PM ₁₀ Emissions (tpy)	PM _{2.5} Emissions (tpy)	SO ₂ Emissions (tpy)	CO _{2e} (metric tpy)
Calendar Year 2026	1.476	5.555	4.581	2.236	0.917	0.791	1,241
Emissions Threshold	100	100	250	250	250	250	68,039
Any Threshold Exceedance?	No	No	No	No	No	No	No

Note: tpy = tons per year

*Steady State

The annual net change in estimated criteria pollutant emissions associated with Alternative 2 would be less than the insignificance indicators of 100 tpy for VOCs and NO_x and 250 tpy for all other criteria pollutants. A General Conformity Determination would not be applicable. All criteria pollutant emissions would be insignificant and would not cause or contribute to an exceedance of NAAQSs; therefore, Alternative 2 would have an insignificant impact on Air Quality.

4.2.2 Air Space

As noted in **Section 4.1.2**, fielding and stationing of IFPC equipment, facilities and personnel would have no significant impact on Ft. Campbell Airspace. Although the personnel and facility requirements for the IFPC have been developed, the IFPC training doctrine requirements are under development and not available at this time. The proposed action for this PEA does not include any IFPC training activities. When the IFPC training doctrine requirements are developed, they will be compared against installation-specific ongoing training to determine if additional environmental analysis could be required. Given that current IFPC training requirements are projected to require vertical airspace control height to 45,000 feet (see **Table 2-1**), well above existing special use restrictions, additional NEPA analysis would likely be required.

4.2.3 Biological Resources

Under Alternative 2, with only the IFPC being constructed, impacts would be less than Alternative 1. Construction is proposed within already-developed areas with existing paved surfaces and building footprints.

4.2.4 Cultural Resources

Alternative 2 would result in the same potential impacts as Alternative 1.

4.2.5 Electromagnetic Spectrum

As noted in **Section 4.1.5**, fielding and stationing of IFPC equipment, facilities and personnel would have no significant impact on Ft. Campbell Electromagnetic Spectrum use. Although the personnel and facility requirements for the IFPC have been developed, the IFPC training doctrine requirements are under development and not available at this time. The proposed action for this PEA does not include any IFPC training activities. When the IFPC training doctrine requirements are developed, they will be compared against installation-specific ongoing training to determine if additional environmental analysis could be required. Should training requirements potentially impact electromagnetic spectrum use, additional NEPA analysis would be required.

4.2.6 Geological and Soil Resources

This alternative would result in similar impacts to karst issues and soils as for Alternative 1.

4.2.7 Hazardous and Toxic Materials and Wastes

Under Alternative 2, the impacts would be less than those described for Alternative 1 as there would be less construction and therefore less waste generated.

4.2.8 Human Health and Safety

Alternative 2 would result in the same potential impacts from construction-related activities as the proposed action.

4.2.9 Land Use

Less land would be impacted under this Alternative versus Alternative 1; however, the land uses would not require modification; therefore, no impacts are anticipated.

4.2.10 Noise

Fielding only the IFPC would utilize existing facilities, resulting in temporary construction noise at levels likely to be below ambient levels within residential areas within Ft. Campbell and off-post. Weapons system noise from the firing of IFPC is unknown at this time and additional studies must be performed.

4.2.11 Socioeconomics

Fielding the IFPC only would result in a lower amount of temporary positive impact to the local Ft. Campbell for renovation and/or construction of IFPC facilities, without those of the M10 Booker. The IFPC would be staffed with approximately 735 soldiers. Many of the IFPC personnel may be re-assigned from existing Ft. Campbell staff, so there would be a limited number of new Army personnel to be newly located at Ft. Campbell. Potential long-term impact of new IFPC personnel on the local economy and on local housing and schools would be the same. If a decision is made to implement Alternative 2, a more specific evaluation of IFPC personnel staffing should be conducted to determine the actual number of new personnel to Ft. Campbell and their potential impact on Ft. Campbell on-post and off-post housing and schools.

4.2.12 Transportation and Traffic

Fielding the IFPC only would require additional traffic analysis and mitigation to avoid impacting existing traffic issues at nearby intersections (Air Assault and A Shau Valley; Screaming Eagle and A Shau Valley), on-street parking congestion on A Shau Valley near Airborne, and existing intersection control issues on Normandy at Wickham and at Screaming Eagle.

4.2.13 Utilities

Similar to Alternative 1, there will be no notable impact to the expansion of utility infrastructure, and the interruptions would be limited to just the IFPC proposed site area.

4.2.14 Water Resources

Similar to Alternative 1, there will be no direct impacts to surface water features. During construction, the potential for construction activities to impact water resources is present; however, the impact would be mitigated through implementation of BMPs.

4.3 Alternative 3 – Up to Four Additional New Weapons Systems

4.3.1 Air Quality

Fielding the LRHW, MRC, HP-DE, MDTF would include the construction of new facilities, the installation of portable generators and boilers. Construction activities would result in temporary air emissions from site grading, trenching, building construction, application of architectural coatings and paving. All activities were conservatively estimated and assumed to occur in one year to provide a worst-case scenario of emissions.

Criteria pollutant emissions resulting from Alternative 3 are summarized in **Table 4-4**.

Table 4--4 Emissions at Ft. Campbell Associated with Alternative 3

Air Pollutant Emissions Source	VOC Emissions (tpy)	NO_x Emissions (tpy)	CO Emissions (tpy)	PM₁₀ Emissions (tpy)	PM_{2.5} Emissions (tpy)	SO₂ Emissions (tpy)	CO_{2e} (metric tpy)
Calendar Year 2026	2.158	4.452	4.349	6.503	0.347	0.132	3,006
Emissions Threshold	100	100	250	250	250	250	68,039
Any Threshold Exceedance?	No	No	No	No	No	No	No

The annual net change in estimated criteria pollutant emissions associated with Alternative 3 would be less than the insignificance indicators of 100 tpy for VOCs and NO_x and 250 tpy for all other criteria pollutants. A General Conformity Determination would not be applicable. All criteria pollutant emissions would be insignificant and would not cause or contribute to an exceedance of NAAQSs; therefore, Alternative 3 would have an insignificant impact on Air Quality.

4.3.2 Air Space

An impact to airspace would be considered significant if the proposed action violates FAA safety regulations or causes a substantial infringement of general aviation or commercial flight, or if new construction was proposed in an AICUZ. Fielding and stationing of MDTF equipment, facilities and personnel would have no significant impact on Ft. Campbell Airspace. Although the personnel and facility requirements for the MDTF have been developed, the MDTF training doctrine requirements are under development and not available at this time.

The proposed action for this PEA does not include any MDTF training activities. When the MDTF training doctrine requirements are developed, they will be compared against installation-specific ongoing training to determine if additional environmental analysis could be required. Given that current MDTF training requirements are projected to require vertical airspace control height to 60,000 feet (see **Table 2-1**), well above existing special use restrictions, additional NEPA analysis would likely be required.

4.3.3 Biological Resources

Under Alternative 3, extensive tree clearing on up to 297 acres of land across up to four different sites would occur. The forested areas are potential habitat for listed bat species, bald eagles, and migratory birds. As such, to reduce the potential to disturb the species, tree clearing would occur during the winter season (1 October through 31 March). Tree clearing would be conducted under the supervision of the Conservation Branch at Ft. Campbell.

Construction noise and increased human activity would have short-term effects on fauna. Extensive tree clearing may affect biological resources as well as Special Status Species. Consultation with USFWS would be required once the Alternative is determined as well as the areas of direct and indirect impacts. Tree clearing should not be initiated until consultation with USFWS is complete. USFWS IPaC consultation does not initiate formal consultation with or concurrence from USFWS. Formal consultation must be initiated directly with USFWS.

No mapped surface waters would be directly or indirectly impacted; therefore, no impact to the Pink mucket is anticipated. However, once the alternative is selected, a wetland delineation and stream assessment field visit will occur, resulting in a Waters of the US Report. Potential impacts to water resources and endangered species will be further analyzed using field verified data.

Construction noise and increased human activity would cause some fauna to move to less active areas either temporarily or permanently. Construction would require cutting and clearing of forest land. The alteration of vegetation is expected to have a less than significant effect on local ecosystems and communities. The cleared areas would require annual cutting activities to ensure the training lanes are adequately maintained to meet the training requirements of the soldiers assigned to train at the new facilities. Several state and federally listed bird species and state-listed plant species are known to inhabit Ft. Campbell properties. Construction activities and tree removal of large, open forested and grassed areas may adversely affect federally protected species and state-listed species. The installation must comply with federal law, Army policy and guidance, and its own plans and programs, including compliance with the Endangered Species Act and INRMPs, and consult with USFWS and NOAA as required in order minimize effects to listed species. The installation must follow seasonal mowing and tree removal restrictions and management plans to avoid and/or minimize effects to protected species.

4.3.4 Cultural Resources

There are 128 known historic cemeteries on Ft. Campbell and those cemeteries are monitored on an annual rotation. During the monitoring, the location is verified, photographs taken, pedestrian survey conducted and site dimensions verified. Prior to ground disturbing activities, the Ft. Campbell Archaeological Database and monitoring documentation will be reviewed to verify the location of cemeteries and if needed, revise the area of disturbance to avoid any cemeteries. If a survey is required to verify the location of a cemetery, a survey will be conducted and the appropriate SHPO consulted. If a survey is not required, a BMP could include on-site monitoring during ground disturbing activities to allow for a less than significant impact to the known site.

The NCB1 and NCB2 sites are located within the Clarksville Base Historic District. To align with the district's aesthetic, the two facilities would be constructed in a way that ensures their impact on the district is less than significant. Prior to completing design the Army will make a determination of effects on historic properties and provide that determination for concurrence in accordance with 36 CFR 800.11 to the appropriate SHPO for concurrence.

For all activities, prior to ground disturbance and construction/renovation, Ft. Campbell will follow Section 106 of the NHPA to allow for adequate evaluation of historic properties and the effects of the proposed undertaking on those properties.

4.3.5 Electromagnetic Spectrum

Electromagnetic spectrum impacts would be considered significant if the proposed action utilized electromagnetic systems that would interfere or conflict with existing electromagnetic systems or aircraft operations, or existing Ft. Campbell electromagnetic systems would interfere or conflict with planned electromagnetic systems to be used as part of the proposed action. Fielding and stationing of MDTF equipment, facilities and personnel would have no significant impact on Ft. Campbell Electromagnetic Spectrum use. Although the personnel and facility requirements for the MDTF have been developed, the MDTF training doctrine requirements are under development and not available at this time. The proposed action for this PEA does not include any MDTF training activities. When the MDTF training doctrine requirements are developed, they will be compared against installation-specific ongoing training to determine if additional environmental analysis could be required. Given that current MDTF training requirements would include High Power Directed Energy systems with the potential to impact other electromagnetic systems currently in use at Ft. Campbell, additional NEPA analysis would likely be required.

4.3.6 Geological and Soil Resources

This alternative would result in very similar, though greatly increased, impacts as presented for Alternative 1 with the addition of numerous buildings and large footprints for any one of the three, 93-acre MDTF sites. Should only the Base MDTF be fielded, there would be a moderate increase over Alternative 1 due to the moderate footprint of one of the two 18-acre Base MDTF sites.

4.3.7 Hazardous and Toxic Materials and Wastes

Under Alternative 3, the impacts would be greater than those described for Alternative 1 as there would be an increase in construction/renovation activities, potentially increasing the interaction with active ERP sites, and an increase in personnel. Prior to construction or ground disturbance the footprint of the newly constructed facilities would need to be reviewed against the delineated site boundaries of active ERP sites. If ERP sites are present within the footprint, the footprint

will be modified or moved, or a worker safety plan would be prepared to ensure that people are protected from potentially contaminated soils and/or groundwater. Any issues encountered regarding sites under Superfund will be reported to the Superfund Branch. And, as stated with Alternative 1, any underground storage tanks encountered would be reported. If any hazardous material/solid waste issues arise, the appropriate agencies will be contacted. As the Bi-County Landfill has ample capacity to meet the demands of the additional personnel under this alternative, no significant impact is anticipated.

4.3.8 Human Health and Safety

Alternative 3 would result in the same kind of potential impacts from construction-related activities as the proposed action. Since the scale of construction activities, when compared to Alternatives 1 or 2, would be notably greater for the Full MDTF and moderately greater for the Base MDTF, the potential for impacts to human health and safety, though still low, would be greater.

4.3.9 Land Use

This alternative would require more land to be impacted than that of Alternative 1; Approximately 18 acres of the Sabre1 parcel are part of an active agricultural lease and would require lease revocation prior to construction. Revenue lost would be \$162.20/acre or approximately \$2,920.

The remaining approximately 75 acres of the Sabre1 parcel is wooded and would require clearing for Alternative 3. Impacts to forestry and logging potential would be affected in that Ft. Campbell would need to prioritize this acreage for timber removal in accordance with the Ft. Campbell Forest Management Plan.

4.3.10 Noise

This alternative would require additional construction beyond what is proposed under Alternative 1. Construction activities would result in temporary noise from operational equipment for site grading, trenching, building construction, application of architectural coatings and paving. Construction noise levels are expected to be below ambient levels outside the installation boundaries as described above. Weapon system noise is unknown at this time and must be determined for perform an accurate assessment. Additional studies must be done to determine the additional aircraft support required for the implementation and operations of these new weapon systems and update the Installation Compatible Use Zone (ICUZ) noise contours to determine if the noise zones will increase in acreage and noise receivers.

4.3.11 Socioeconomics

Fielding the Full MDTF at Ft. Campbell would involve the introduction of 3,000 soldiers and significant new vehicles and equipment at one of three 93-acre undeveloped proposed sites with significant new construction. Although detailed plans and cost estimates have not been completed, these projects could be expected to provide appreciable new construction work that would provide a significant temporary positive impact to the local Ft. Campbell economy. Although many of the personnel may be reassigned from existing Ft. Campbell operations, a significant proportion would represent new personnel to the post and provide a moderate long-term positive impact to the Ft. Campbell local economy in terms of increased income and consumer spending. If half the Full MDTF personnel transfer from existing Ft. Campbell positions, 1,500 new personnel would need on-post and off-post housing and schools. Army studies suggest approximately one-third would be unaccompanied personnel, leaving approximately 1,000 new personnel requiring family housing. This additional demand would likely consume remaining on-post family housing and put additional strain on the off-post local housing market, as well as both on-post and off-post school systems. If the SABRE1 Full MDTF site were selected, approximately 18 acres of agricultural lease revenue would be lost at \$165.20 per acre (approximately \$2,974 annual revenue), plus the associated impact on the local agricultural economy.

4.3.12 Transportation and Traffic

Fielding the Full MDTF at Ft. Campbell would involve the introduction of 3,000 soldiers and significant new vehicles and equipment at one of three 93-acre proposed sites. Although many of the personnel may be reassigned from existing Ft. Campbell operations, a significant proportion would represent new personnel to the post and add to existing daily traffic volume in the vicinity of the selected site and to a lesser extent, to on-post and off-post housing. The potential DESTINY1 and SABRE1 sites (**Figure 1-3** Sites 2 and 5, and **Figures 2-4** and **2-6**) are relatively remote from the cantonment area and other existing operations. Additional traffic at these locations could be mitigated via suitable site design measures such as separate turn lane entrances/exits and intermittent turn signalization. The potential MABRY1 site (**Figure 1-3**, Site 3, and **Figure 2-5**) is somewhat more centrally located, near some existing traffic congestion near A Shau Valley and Airborne, and adjacent to the existing railroad terminal, drainage and a former landfill, requiring a more complicated entry/exit design.

Due to size and/or weight restrictions, transportation of MDTF components (equipment/systems) by off-post public roads could require state Department of Transportation permits. Even if delivered to Ft. Campbell by air or rail, on-post movements by road could similarly require approval from the Ft. Campbell Directorate of Public Works.

4.3.13 Utilities

Utility availability is not as robust for the three Full MDTF proposed sites. As this alternative includes the weapons systems of Alternative 1, plus the addition of up to four additional systems, the need for utilities will be notably increased to accommodate the additional systems. Of the three full MDTF sites, the remoteness of available utilities is greatest for Destiny (**Figure 2-4**), second greatest for Sabre (**Figure 2-6**), and least for Mabry (**Figure 2-5**). If only a Base MDTF is stationed at one of the two 18-acre sites (**Figure 2-7**), the utility need would be adjusted down respectively, and utilities are somewhat available from nearby development. Current capacities should be able to accommodate, but the additional cost and to bring the utilities to the proposed sites will be a moderate cost and effort.

4.3.14 Water Resources

Similar to Alternative 1, there will be no direct impacts to surface water features.

The DESTINY site has a suspect watercourse adjacent to the site location. Should the DESTINY site be selected for development, surveys would be initiated to determine WOTUS/wetlands impacts. The MABRY site has a suspect watercourse adjacent to the site location. Should the MABRY site be selected for development, surveys would be initiated to determine WOTUS/wetlands impacts. The SABRE site has a suspect watercourse adjacent to the site location draining from the north corner. Should the SABRE site be selected for development, surveys would be initiated to determine WOTUS/wetlands impacts. If any unmapped features within the project area are impacted, a jurisdictional determination should be completed utilizing the most recent definition of WOTUS prior to any clearing, filling, or modifications. If waters are designated as jurisdictional, Fort Campbell would then obtain authorization or a permit to fill in or modify under the CWA. If wetland features are impacted, the appropriate permit or authorization under the CWA will be obtained prior to construction.

For Alternative 3 there are potential direct or indirect impacts to surface water features and/or WOTUS. Sites designated for DESTINY1 and MABRY1 are located adjacent to surface water features. SABRE has suspect surface water features in the north corner. If one of the sites under this alternative was to move forward, a wetland delineation/stream survey will need to be completed prior to construction to determine the presence of any unmapped wetlands or limits of surface waters. Fort Campbell would seek concurrence on the proposed surface water features / WOTUS opinion, and a jurisdictional determination would be completed utilizing the most recent definition of WOTUS prior to any clearing, filling, or modifications. Once the selected sites for the proposed action have been finalized, Fort Campbell will initiate surveys and concurrence to minimize or eliminate any impacts to WOTUS.

During construction, the potential for construction activities to impact water resources is present; however, the impact would be mitigated through implementation of BMPs.

4.4 Alternative 4 - No Action Alternative

4.4.1 Air Quality

Under Alternative 4, baseline conditions would remain; therefore, no impact on air quality.

4.4.2 Air Space

Under Alternative 4, baseline conditions would remain; therefore, no impact on air space.

4.4.3 Biological Resources

Under Alternative 4, baseline conditions would remain; therefore, there would be no effect on biological resources.

4.4.4 Cultural Resources

Under Alternative 4, baseline conditions would remain; therefore, there would be no effect to cultural resources.

4.4.5 Electromagnetic Spectrum

Under Alternative 4, baseline conditions would remain; therefore, no impact on the electromagnetic spectrum.

4.4.6 Geological and Soil Resources

Under the no action Alternative, neither soils nor bedrock will be affected. The area will remain in its current state as a mix of partially developed, undeveloped grassed and forested areas. Natural resources would be managed according to existing valid component plans, applicable federal and state laws, and DoD guidance (e.g., CAM Reg 385-5). Implementation of these plans and policies would take place without integration between component plans, and without overall coordination of natural resources management with the military mission (FTC, 2020a.).

4.4.7 Hazardous and Toxic Materials and Wastes

Under Alternative 4, none of the construction and/or renovation activities would occur. Therefore, there would be no effect on or from hazardous materials or waste resulting from the construction or increase in personnel associated with the siting of the systems.

4.4.8 Human Health and Safety

Under Alternative 4, baseline conditions would remain; therefore, no impact on human health and safety.

4.4.9 Land Use

Under Alternative 4, baseline conditions would remain; therefore, no impact on land use.

4.4.10 Noise

Under Alternative 4, the soundscape would remain as the baseline and no additional military noise would be contributed.

4.4.11 Socioeconomics

Under Alternative 4, baseline conditions would remain; therefore, no beneficial or negative impacts to the economic conditions on and off of Ft. Campbell would occur.

4.4.12 Transportation and Traffic

Under Alternative 4, the number of vehicles would remain the same on Ft. Campbell; therefore, no impact to transportation or traffic.

4.4.13 Utilities

Under Alternative 4, there would be no change to the current utility service or utility demand. Therefore, there would be no impact on utilities.

4.4.14 Water Resources

Under Alternative 4, there would be no modification of or sediment deposition into surface water waters. Therefore, there would be no impact.

5.0 Reasonably Foreseeable Actions

This PEA identifies any unavoidable adverse effects that may occur during implementation of the alternatives to the proposed action or no action alternative and the significance of the potential effects to resources and issues. The Department of Defense National Environmental Policy Act Implementing Procedures, 30 June 2025 state that the Army will continually take steps to ensure that the NEPA program is effective and efficient. Effectiveness of the program will be determined by the degree to which environmental considerations are included on par with the military mission in planning and decision-making. Additionally, the implementing procedures specify the analysis will review whether the environmental effects of the action will have reasonably foreseeable effects and analyze environmental effects from other projects separate in time, or separate in place, or that fall within DoD's regulatory authority. The severity of potential effects would be limited by regulatory compliance for the protection of the human and natural environment.

Past, present, and reasonably foreseeable actions by Ft. Campbell were considered as the U.S. Army has authority to control and manage the actions on the installation and not beyond. as well as in the region were considered. There are no known past or present actions that would likely affect environmental resources in conjunction with the proposed action. Ft. Campbell is anticipating the potential siting/fielding of up to six weapons systems within and near the Cantonment Area of the base in an ongoing Programmatic Environmental Assessment. The impacts associated with the renovations/construction associated with the siting/fielding of some or all of these new weapons systems would include short-term impacts to soil and water resources and long term impacts to biological resources due to loss of habitat. With the implementation of BMPs none of the impacts would be significant and with the distance between the proposed action and the future action along with level of significance, a significant impact to resources through reasonably foreseeable actions is not anticipated. Please see Appendix F.

Appendix A
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This Draft PEA has been prepared under the direction of Ft. Campbell DPW. The individuals who contributed to the preparation are listed below.

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Appendix B
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Appendix C
Interagency and Intergovernmental Coordination for Environmental Planning
Correspondence and Notice of Availability



DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT CAMPBELL
DIRECTORATE OF PUBLIC WORKS
3709 POLK RD, SUITE A
FORT CAMPBELL KY 42223-5617

May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Craig A. Potts
Kentucky Heritage Council
300 Washington Street
Frankfort, Kentucky 40601

Dear Mr. Potts:

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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or Mr. Dan Etson, NEPA Program Manager, at (270) 798-9784 or email daniel.l.etsen.civ@army.mil.

Sincerely,

Clinton Allen
Chief, DPW Conservation Branch

Enclosures

KENTUCKY HERITAGE COUNCIL COVER SHEET FOR SECTION 106 SUBMISSIONS

If you are applying for federal funds or permits, **we want to help you with your project** as early in the process as possible. Our reviewers need up to 30 days to review and provide comments on our submission. **DON'T WAIT!** Visit our webpage and submit your documentation to the INHERIT portal: <https://heritage.ky.gov/compliance/Pages/overview.aspx>.

Contact Nicole via email with questions or concerns: Nicole.Konkol@ky.gov.

SECTION 1: APPLICANT INFORMATION	
Project Applicant:	
Contact Person (name & position):	
Return Address:	
Telephone:	E-mail:
Project Title:	
SECTION 2: AGENCY INFORMATION	
Funding/Permitting Agency:	
Agency Contact Person (name & position):	
Telephone:	E-mail:
SECTION 3: PROJECT LOCATION	
Street Address (or other location):	
City:	County:
Lat (Dec/Deg):	Long (Dec/Deg):
SECTION 4: PROJECT TYPE (please check all that apply)	
Proposed Activity: <input type="checkbox"/> Demolition <input type="checkbox"/> Rehabilitation <input type="checkbox"/> Structural Relocation <input type="checkbox"/> Trails <input type="checkbox"/> New Construction <input type="checkbox"/> Land and/or Building Acquisition <input type="checkbox"/> Sewer/Water Lines <input type="checkbox"/> Roads/Bridges <input type="checkbox"/> Non-Construction Planning/Refinancing <input type="checkbox"/> Other (describe):	
SECTION 5: IDENTIFICATION OF KNOWN HISTORIC PROPERTIES	
OSA Preliminary Site Check #:	
Provide a detailed description of your project. If necessary, include it in your pdf attachments.	
Is there anything over 50 years of age in or visible from the project location? <input type="checkbox"/> Yes <input type="checkbox"/> No	
SECTION 6: ATTACHMENTS - Attach All.	
All documentation should be labeled with the project name or site address.	
<input type="checkbox"/> Clear, current photographs of the project site and anything over 50 years of age in or visible from it. <input type="checkbox"/> Site map/plan indicating the exact location and boundaries of the project area. <input type="checkbox"/> Detailed description of the project (may include plans, scope of work, and other available information.) <input type="checkbox"/> Documentation of prior ground disturbance (e.g. maps, photographs, underground utility plans, etc.) <input type="checkbox"/> Any known information about the history/use of the property and local significance. Results of your Preliminary Records Review from the Site Identification web portal.	

Submit all information via the INHERIT portal. Submission of initial Section 106 documentation to any individual reviewer will delay distribution and review.



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HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT CAMPBELL
DIRECTORATE OF PUBLIC WORKS
3709 POLK RD, SUITE A
FORT CAMPBELL KY 42223-5617

May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Bill Anoatubby
P.O. Box 1548
Ada, OK 74821

Dear Mr. Anoatubby,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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Sincerely,

ALLEN.CLINTON
.B.1390769616

Digitally signed by
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Date: 2025.05.22 16:34:31 -05'00'

Clinton Allen
Chief, DPW Conservation Branch

Enclosures



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3709 POLK RD, SUITE A
FORT CAMPBELL KY 42223-5617

May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Ben Barnes
P.O. Box 189
Miami, OK 74335

Dear Mr. Barnes,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Ms. Stephanie Bryan
5811 Jack Springs Road
Atmore, AL 36502

Dear Ms. Bryan,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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3709 POLK RD, SUITE A
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May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Joe Bunch
P.O. Box 746
Tahlequah, OK 74465

Dear Mr. Bunch,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Jonathan Cernek
P.O. Box 10
Elton, LA 70532

Dear Mr. Cernek,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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3709 POLK RD, SUITE A
FORT CAMPBELL KY 42223-5617

May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Brian Givens
P.O. Box 332
Wetumka, OK 74883

Dear Mr. Givens,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Michell Hicks
P.O. Box 455
Cherokee, NC 28719

Dear Mr. Hicks,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. David Hill
P.O. Box 580
Okmulgee, OK 74447

Dear Mr. Hill,

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FORT CAMPBELL KY 42223-5617

May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Chuck Hoskin Jr.
P.O. Box 948
Tahlequah, OK 74465

Dear Mr. Hoskin,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

The Proposed Action includes a range of requirements and resources in support of stationing, fielding, operating, and maintaining up to six additional weapons systems as part of the Army Modernization Strategy at Fort Campbell. Potential requirements and resources necessary for the support of these systems include construction and renovation of buildings, construction of tank trails, additional housing and associated structure related to increased troop support, utilities upgrades, and others.

The Description of Proposed Action and Alternatives (DOPAA) is attached for your reference and review. The DOPAA includes the descriptions and locations of the proposed weapons modernization fielding systems. The area of influence is wholly located within the installation boundaries. Any comments received based on this preliminary notification will be entered in the administrative record of the EA. A draft of the EA is expected to be published for a 30-day stakeholder and public review in July 2025. Fort Campbell is providing notification of this EA and inviting you to review and provide comments. If there are any questions or additional detail is needed, please contact Dr. Heidi Miller at (270) 412-8174 or by email at heidi.e.miller10.civ@army.mil or Mr. Dan Etson, NEPA Program Manager, at (270) 798-9784 or email daniel.l.etsen.civ@army.mil.

Sincerely,

ALLEN.CLINTON
.B.1390769616

Digitally signed by
ALLEN.CLINTON.B.1390769616
Date: 2025.05.22 16:34:31 -05'00'

Clinton Allen
Chief, DPW Conservation Branch

Enclosures



DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT CAMPBELL
DIRECTORATE OF PUBLIC WORKS
3709 POLK RD, SUITE A
FORT CAMPBELL KY 42223-5617

May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. John Raymond Johnson
2025 South Gordon Cooper Drive
Shawnee, OK 74801

Dear Mr. Johnson,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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DIRECTORATE OF PUBLIC WORKS
3709 POLK RD, SUITE A
FORT CAMPBELL KY 42223-5617

May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. E. Patrick McIntyre Jr.
Clover Bottom Mansion
2941 Lebanon Road
Nashville, TN 37243-0441

Dear Mr. McIntyre,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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or Mr. Dan Etson, NEPA Program Manager, at (270) 798-9784 or email daniel.l.etsen.civ@army.mil.

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Date: 2025.05.22 16:34:31 -05'00'

Clinton Allen
Chief, DPW Conservation Branch

Enclosures



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HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT CAMPBELL
DIRECTORATE OF PUBLIC WORKS
3709 POLK RD, SUITE A
FORT CAMPBELL KY 42223-5617

May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Ryan Morrow
P.O. Box 188
Okemeh, OK 74859

Dear Mr. Morrow,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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Sincerely,

ALLEN.CLINTON
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ALLEN.CLINTON.B.1390769616
Date: 2025.05.22 16:34:31 -05'00'

Clinton Allen
Chief, DPW Conservation Branch

Enclosures



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HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT CAMPBELL
DIRECTORATE OF PUBLIC WORKS
3709 POLK RD, SUITE A
FORT CAMPBELL KY 42223-5617

May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Mr. Craig A. Potts
Kentucky Heritage Council
300 Washington Street
Frankfort, Kentucky 40601

Dear Mr. Potts:

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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or Mr. Dan Etson, NEPA Program Manager, at (270) 798-9784 or email daniel.l.etsen.civ@army.mil.

Sincerely,

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ALLEN.CLINTON.B.1390769616
Date: 2025.05.22 16:34:31 -05'00'

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Enclosures



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3709 POLK RD, SUITE A
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May 22, 2025

SUBJECT: National Environmental Policy Act Notice for the Draft Programmatic Environmental Assessment of the Fort Campbell Weapons Modernization Fielding, Fort Campbell, Christian and Trigg Counties, KY and Montgomery and Stewart Counties, TN.

Ms. Glenna J. Wallace
12705 S. 705 Road
Wyandotte, OK 74370

Dear Ms. Wallace,

Fort Campbell (FC) is preparing a Programmatic Environmental Assessment (EA) in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, 32 Code of Federal Regulations (CFR) Part 361, and Environmental Analysis of Army Actions (Army Regulation [AR] 200-2) and AR 200-1 Environmental Protection and Enhancement to address environmental impacts associated with the support of weapons modernization stationing, fielding, and operations at Fort Campbell, Kentucky. The proposed action is considered an undertaking and activities associated with it will be subject to Section 106 consultation should the project move forward.

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.B.1390769616

Digitally signed by
ALLEN.CLINTON.B.1390769616
Date: 2025.05.22 16:34:31 -05'00'

Clinton Allen
Chief, DPW Conservation Branch

Enclosures

Section 106 Consultation - Weapons Modernization Fielding at Fort Campbell

From Laserfiche Notification <donotreply@laserfiche.com>

Date Fri 6/20/2025 2:45 PM

To Miller, Heidi E CIV USARMY ID-READINESS (USA) <heidi.e.miller10.civ@army.mil>

This email is in response to Weapons Modernization Fielding at Fort Campbell.

The Shawnee Tribe's Tribal Historic Preservation Department concurs that no known historic properties will be negatively impacted by this project. However, there is still potential for the discovery of unknown resources.

We have no issues or concerns at this time. Please continue with the project as planned, but in the event archaeological materials are encountered during construction, use, or maintenance of this location, please re-notify us at that time as we would like to resume immediate consultation under such a circumstance.

If you have any questions, you may contact me via email at Section106@shawnee-tribe.com

Thank you for giving us the opportunity to comment on this project



Erin Paden

TRIBAL HISTORIC PRESERVATIO
SPECIALIST

Office: (918) 542-2441, x140

Email: epaden@shawnee-tribe.com

29 S Hwy 69A

Miami, OK 74354

shawnee-tribe.com

Fort Campbell Weapons Modernization Fielding EA - Project # SHPO0007182

From TN Help <tnhelp@service-now.com>

Date Wed 5/28/2025 12:50 PM

To Miller, Heidi E CIV USARMY ID-READINESS (USA) <heidi.e.miller10.civ@army.mil>



TENNESSEE HISTORICAL COMMISSION

STATE HISTORIC PRESERVATION OFFICE

2941 LEBANON PIKE

NASHVILLE, TENNESSEE 37243-0442

OFFICE: (615) 532-1550

www.tnhistoricalcommission.org

05-28-2025 12:47:02 CDT

Clinton Allen

RE: Department of Defense (DOD), Fort Campbell Weapons Modernization Fielding EA,
Project#: SHPO0007182, Fort Campbell, Montgomery County, Stewart County, TN

Dear Clinton Allen :

At your request, our office has reviewed the above-referenced programmatic environmental assessment (PEA). This review is a requirement of Section 106 of the National Historic Preservation Act for compliance by the participating federal agency or applicant for federal assistance. Procedures for implementing Section 106 of the Act are codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

Based on the information provided, we have no specific comments to provide on the document. Please note that future undertakings that fall under this PEA must be submitted to our office for review under Section 106 of the National Historic Preservation Act.

Your continued cooperation is appreciated.

Sincerely,

E. Patrick McIntyre, Jr.

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

Ref:MSG17864028_OI8VGEVxTyi8ILLpk9z

**Notice of Availability
Proof of Newspaper Posting**

AFFP

Notice of Availability of Draft

Affidavit of Publication

STATE OF KY }
COUNTY OF TRIGG } SS

NOTICE OF AVAILABILITY
DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT:
WEAPONS MODERNIZATION FIELDING AT FORT CAMPBELL

Melanie Miller, being duly sworn, says:

That she is Accounting Clerk of the The Cadiz Record, a newspaper of general circulation, printed and published in Cadiz, Trigg County, KY; that the publication, a copy of which is attached hereto, was published in the said newspaper on the following dates:

December 18, 2025

Publisher's Fee: \$ 54.00

That said newspaper was regularly issued and circulated on those dates.

SIGNED:



Subscribed to and sworn to me this 18th day of December 2025.



The United States Army and Fort Campbell have prepared a Draft Programmatic Environmental Assessment (PEA) for Weapons Modernization Fielding at Fort Campbell. The PEA has been prepared to facilitate compliance with the National Environmental Compliance Act (NEPA) for the stationing, fielding, and maintaining of up to six additional weapon systems developed as part of the Army Modernization Strategy (AMS) at Fort Campbell.

The Draft PEA has resulted in a Draft Finding of No Significant Impact (FONSI). The documents are based on the thorough review of the purpose and need and the potential environmental and socioeconomic impacts. Both documents are available for public review and comment on Fort Campbell's Environmental website, <https://home.army.mil/campbell/index.php/about/Garrison/dpw/environmental> in the Public Review Documents link. Interested persons can also request a mailed or emailed copy using the email or physical addresses below.

The public is encouraged to review and comment on these documents. Public comments must be received no later than 30 days after publication of this notice and can be submitted by e-mail at daniel.l.etson.civ@army.mil, or mailed to: Mr. Dan Etson, NEPA Program Manager & Environmental Engineer, DPW Environmental Division, Compliance Branch, Lincoln Hall, BLDG 3709, Polk Road, Fort Campbell, KY 42223.

(Posting date 18 December 2025)



70150478 71378962

Amanda Norman
Alliant Corporation
320 North Cedar Bluff Road
Suite 2000
Knoxville, TN 37923

AFFP
Notice of Availability of Draft

Affidavit of Publication

STATE OF KY }
COUNTY OF CHRISTIAN } SS

NOTICE OF AVAILABILITY
DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT:
WEAPONS MODERNIZATION FIELDING AT FORT CAMPBELL

Sarah Singleton, being duly sworn, says:

That she is Advertising Consultant of the Kentucky New Era, a daily newspaper of general circulation, printed and published in Hopkinsville, Christian County, KY; that the publication, a copy of which is attached hereto, was published in the said newspaper on the following dates:

December 18, 2025, December 20, 2025

The United States Army and Fort Campbell have prepared a Draft Programmatic Environmental Assessment (PEA) for Weapons Modernization Fielding at Fort Campbell. The PEA has been prepared to facilitate compliance with the National Environmental Compliance Act (NEPA) for the stationing, fielding, and maintaining of up to six additional weapon systems developed as part of the Army Modernization Strategy (AMS) at Fort Campbell.

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(Posting date 18 December 2025)

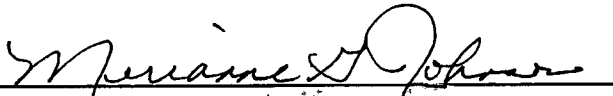
That said newspaper was regularly issued and circulated on those dates.

SIGNED:



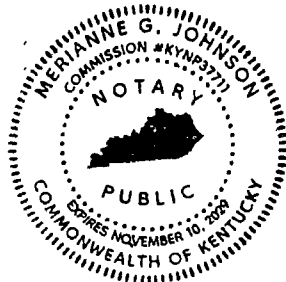
Advertising Consultant

Subscribed to and sworn to me this 20th day of December 2025.



Merianne G. Johnson,

My commission expires: November 10, 2029



70150478 71378953

Amanda Norman
Alliant Corporation
320 North Cedar Bluff Road
Suite 2000
Knoxville, TN 37923

Leaf Chronicle



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NOTICE OF AVAILABILITY DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT: WEAPONS MODERNIZATION FIELDING AT FORT CAMPBELL

The United States Army and Fort Campbell have prepared a Draft Programmatic Environmental Assessment (PEA) for Weapons Modernization Fielding at Fort Campbell. The PEA has been prepared to facilitate compliance with the National Environmental Compliance Act (NEPA) for the stationing, fielding, and maintaining of up to six additional weapon systems developed as part of the Army Modernization Strategy (AMS) at Fort Campbell.

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(Posting date 18 December 2025)

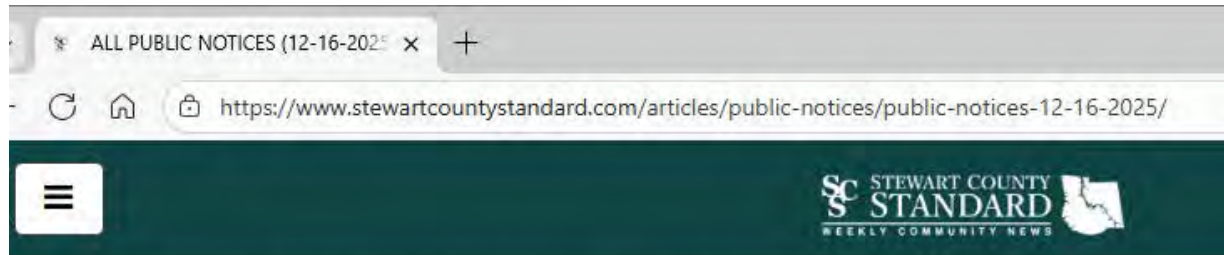
Post Date: 12/18 12:00 AM

RefCode: #CCLRD101137 Print

Post

12:08 PM
12/18/2025

Stewart County Standard



NOTICE OF AVAILABILITY DRAFT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT:

WEAPONS MODERNIZATION FIELDING AT FORT CAMPBELL

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PUBLIC NOTICE

ORDINANCE 507-25 An Ordinance to amend the fiscal year 2025-2026

Annual budget of the Town of Dover

Passed first reading on November 10, 2025

**Substantive Public Comments
Bracketed, Categorized, and Responded
to by the Contractor**

FTC WMF PEA Comments from Public Comment Period			
No.	Agency	Comment	Response
1	TDEC	Confirm no addition of PFAS firefighting foam	The following text was added to the Hazardous Waste subsection under Section 3.7: "It should be noted that none of the weapon systems of the proposed action would require the addition of per- or polyfluoroalkyl substance (PFAS) based firefighting foams at Ft. Campbell".
2	USFWS	Need to initiate official consultation for Endangered Species	Language added to Section 4.1.3, Biological Resources, 3rd paragraph, also Section 4.3.3, 2nd paragraph.
3	USFWS	Add line that IPaC does not count as concurrence	Language added to Section 4.1.3, Biological Resources, 3rd paragraph, also Section 4.3.3, 2nd paragraph.
4	USFWS	Groundwater Protection Plan needed, 1% floodplain required permits - make sure mention of requirements is in the PEA	Language added to Section 3.14 for both floodplain permit and GPP.
5	USFWS	Report USTs if encountered	Language added to Section 4.1.7, 1st paragraph and Section 4.3.7, 1st paragraph.
6	USFWS	Report any superfund issues to superfund branch	The following text was added to Sections 4.1.7, 4th paragraph and 4.3.7, 1st paragraph: "Any issues encountered regarding sites under Superfund will be reported to the Superfund Branch".
7	USFWS	Add language such as, "If any hazardous material/solid waste issues arise, the appropriate agencies will be contacted."	Language added to Section 4.1.7, 1st paragraph and Section 4.3.7 1st paragraph.
8	KY EEC NP	Kentucky nature preserves ETR list: Go to the Kentucky Biological Assessment Tool to obtain a Standard Occurrence Report for information regarding listed species known within your project area	This is already discussed and included as a reference under Section 3.3 Biological Resources, subsection Special Status Species and their Habitats, and in Appendix H
9	USACE-LRN	Confirm presence or lack of presence of surface waters	Added language in Section 4.1.3, 4th paragraph, 4.3.3, 3rd paragraph, also 4.3.14, that once an alternative is selected, a full wetland delineation and stream assessment field visit will occur, resulting in a Waters of the US Report. Potential impacts to water resources and endangered species will be further analyzed using field verified data.

TDEC: Tennessee Department of Environment and Conservation

USFWS: United States Fish and Wildlife Service

KY EEC NP: Kentucky's Energy and Environment Cabinet, Office of Kentucky Nature Preserves

USACE-LRN: United States Army Corp of Engineers, Nashville District

Appendix D
Figures Referenced within Document

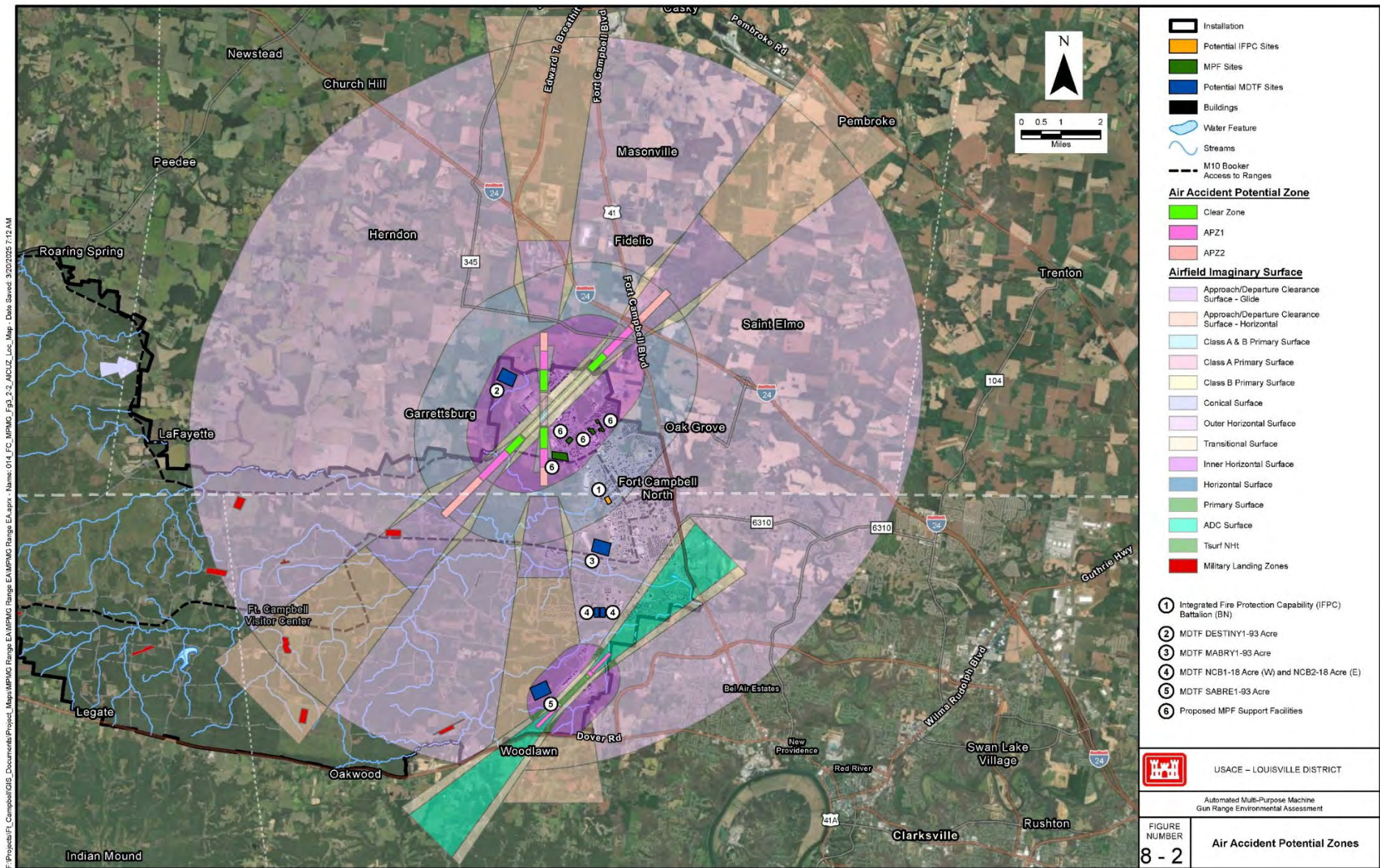


Figure D-2 Air Accident Potential Zone with Proposed Action Locations at Fort Campbell

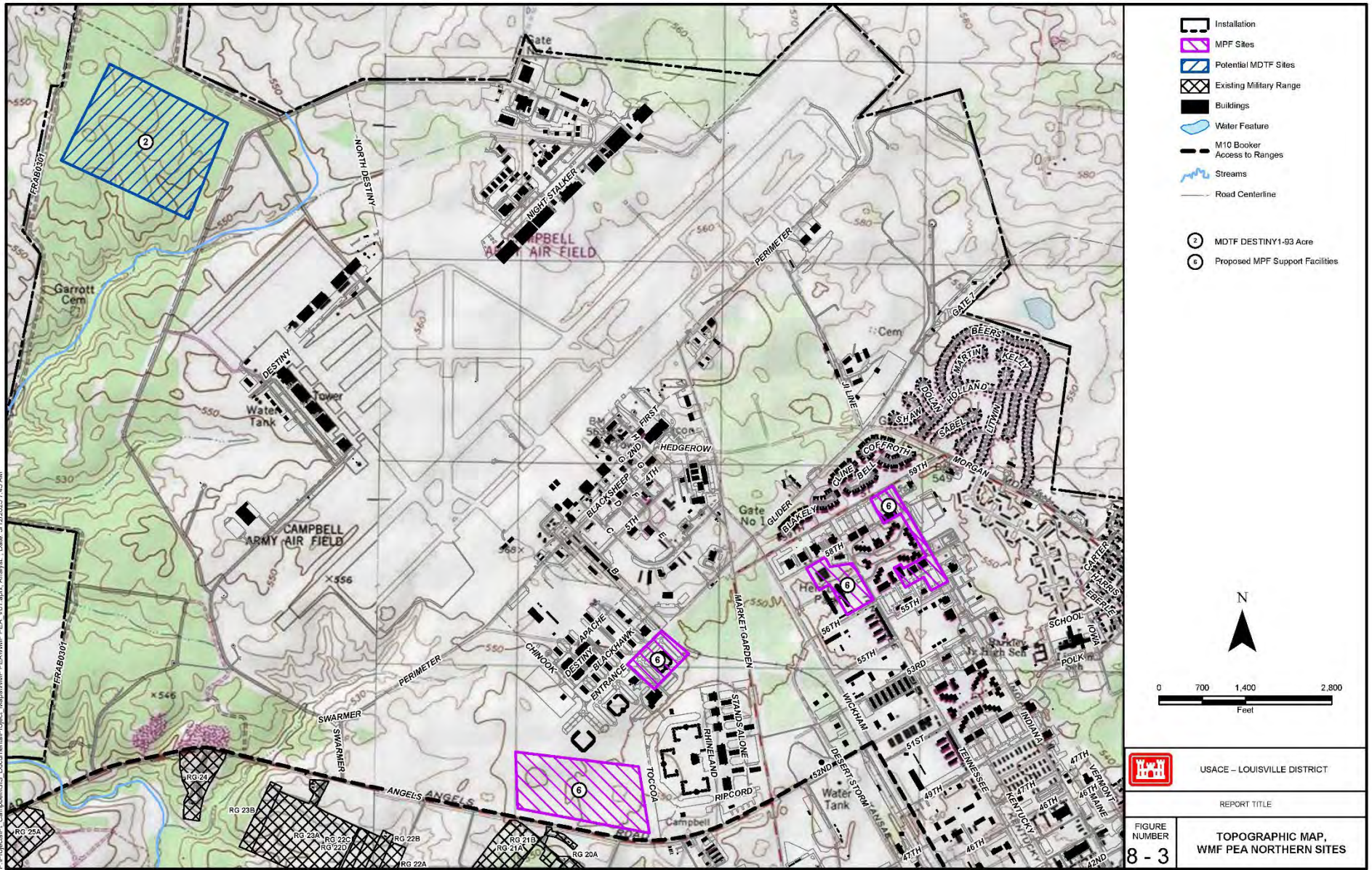
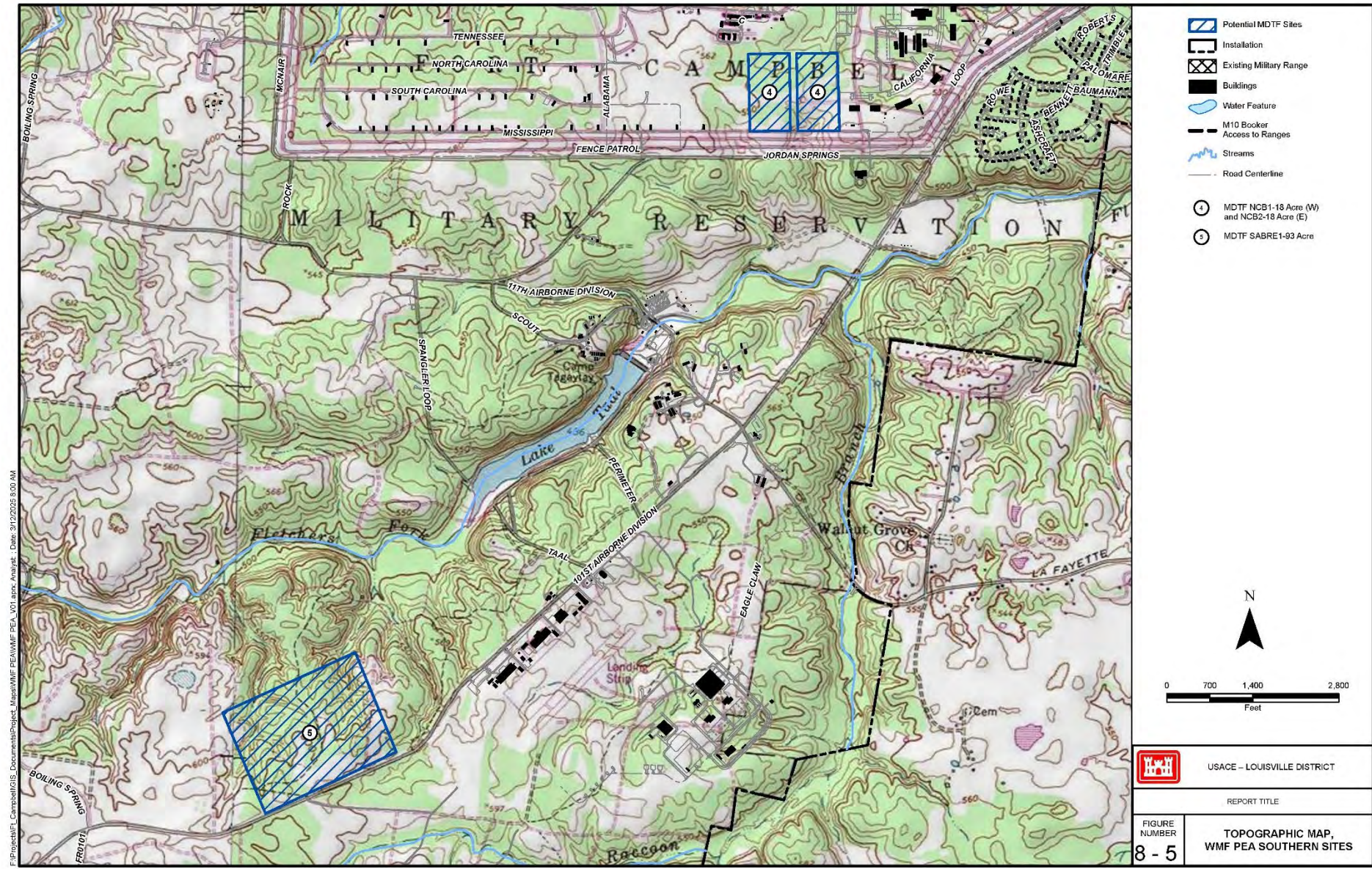


Figure D-3 Northern Area of Fort Campbell with Proposed Action Locations - Topographic Map



Figure D-4 Central Area of Fort Campbell with Proposed Action Locations - Topographic Map



F:\Project\GIS Documents\Project_Maps\WMF_PEA\WMF_PEA_V01.aprx_Analyst_1 Date: 3/12/2025 8:00 AM

Figure D-5 Southern Area of Fort Campbell with Proposed Action Locations - Topographic Map

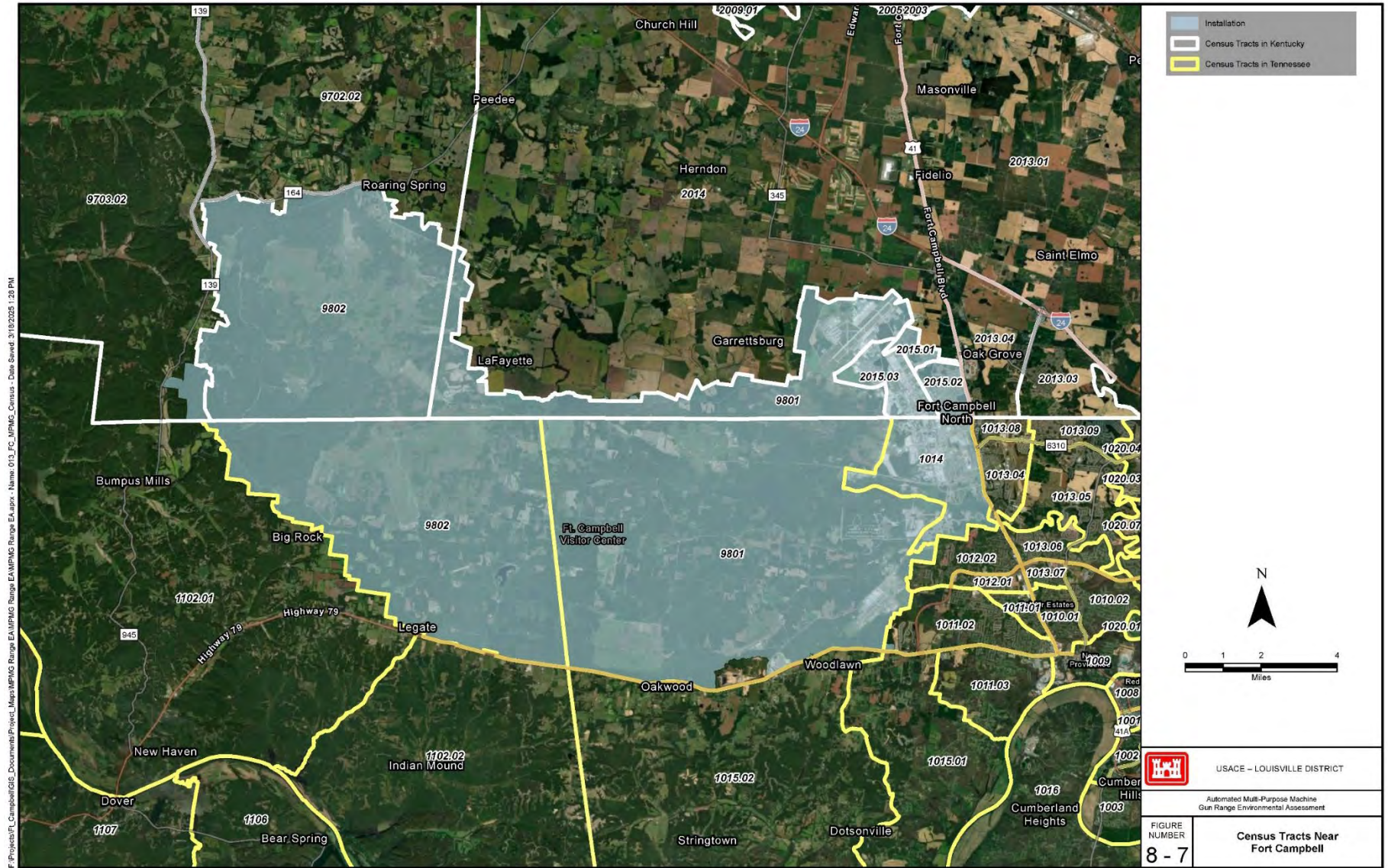


Figure D-7 Census Tracts on and Surrounding Fort Campbell

Appendix E
Socioeconomic Characteristics Tables

Table E-1: Socioeconomic Characteristics for Montgomery County, Tennessee (2018 – 2022 ACS, Tract 9801)

Census Tract	Location	Population	Median Income	People of Color	Percentile in State	Percentile in USA	Low Income	Percentile in State	Percentile in USA	Unemployment Rate	Percentile in State	Percentile in USA
9801	Montgomery County, TN	222,305	\$67,890	34%	na	na	11.8%	na	na	5.4%	na	na
1014	Fort Campbell	7,382	\$22,049	41%	75	59	38%	58	67	15%	90	91
1013.08	adjacent	4,024	\$27,475	59%	83	72	44%	67	74	4%	51	51
1013.04	adjacent	4,780	\$22,805	63%	85	74	48%	74	79	6%	63	62
1013.05	adjacent	6,603	\$29,094	57%	82	71	33%	49	59	9%	76	77
1013.06	adjacent	5,147	\$24,853	47%	77	64	40%	60	69	13%	88	88
1012.02	adjacent	4,617	\$24,506	49%	79	66	37%	57	66	8%	73	74
1011.02	adjacent	10,073	\$21,226	47%	77	63	41%	62	70	5%	60	59
1011.01	nearby	2,869	\$25,429	51%	80	67	38%	57	66	5%	61	61
1011.03	nearby	2,546	\$26,994	31%	68	50	40%	60	69	5%	62	61
1015.01	adjacent	3,870	\$27,696	18%	54	36	45%	69	75	5%	57	56
1015.02	adjacent	3,702	\$34,855	17%	51	33	12%	12	21	6%	66	65
Kentucky Average	na	na	na	16%	na	na	37%	na	na	6%	na	na
Tennessee Average	na	na	na	28%	na	na	35%	na	na	6%	na	na
USA Average	na	na	na	39%	na	na	31%	na	na	6%	na	na

Legend:

≥ State Average
≥ USA Average
≥ Both State and USA Average
≥ 76 Percentile

Table E-1: Socioeconomic Characteristics for Christian County, Kentucky (2018 – 2022 ACS, Tract 9801)

Census Tract	Location	Population	Median Income	People of Color	Percentile in State	Percentile in USA	Low Income	Percentile in State	Percentile in USA	Unemployment Rate	Percentile in State	Percentile in USA
9801	Christian County, KY	72,766	\$48,920	32%	na	na	16.7%	na	na	7.6%	na	na
2015.01	Fort Campbell	4,349	\$16,019	64%	95	74	55%	79	85	13%	86	87
2015.02	Fort Campbell	4,115	\$13,665	51%	93	67	68%	91	93	14%	89	90
2015.03	Fort Campbell	4,859	\$29,126	37%	87	56	0%	0	0	0%	0	0
2014	adjacent	3,445	\$38,572	20%	74	38	27%	36	50	1%	28	25
2013.04	adjacent	2,933	\$18,551	51%	93	67	56%	80	85	8%	72	73
Kentucky Average	na	na	na	16%	na	na	37%	na	na	6%	na	na
Tennessee Average	na	na	na	28%	na	na	35%	na	na	6%	na	na
USA Average	na	na	na	39%	na	na	31%	na	na	6%	na	na

Legend:

≥ State Average
≥ USA Average
≥ Both State and USA Average
≥ 76 Percentile

Table E-2: Socioeconomic Characteristics for Trigg County, Kentucky (2018 – 2022 ACS, Tract 9802)

Census Tract	Location	Population	Median Income	People of Color	Percentile in State	Percentile in USA	Low Income	Percentile in State	Percentile in USA	Unemployment Rate	Percentile in State	Percentile in USA
9802	Trigg County, KY	14,154	\$48,920	32%	na	na	18.2%	na	na	4.3%	na	na
9702.02	adjacent	3,642	\$26,151	14%	62	29	28%	36	51	6%	64	64
9703.02	adjacent	1,902	\$32,604	4%	30	10	23%	29	43	4%	49	48
Kentucky Average	na	na	na	16%	na	na	37%	na	na	6%	na	na
Tennessee Average	na	na	na	28%	na	na	35%	na	na	6%	na	na
USA Average	na	na	na	39%	na	na	31%	na	na	6%	na	na

Legend:

≥ State Average
≥ USA Average
≥ Both State and USA Average
≥ 76 Percentile

Table E-4: Socioeconomic Characteristics for Stewart County, Tennessee (2018 – 2022 ACS, Tract 9802)

Census Tract	Location	Population	Median Income	People of Color	Percentile in State	Percentile in USA	Low Income	Percentile in State	Percentile in USA	Unemployment Rate	Percentile in State	Percentile in USA
9802	Stewart County, TN	13,724	\$57,257	8%	na	na	11.5%	na	na	7%	na	na
1102.01	adjacent	3,642	\$26,151	2%	10	6	32%	49	59	1%	27	25
1102.02	adjacent	1,902	\$32,604	6%	24	14	22%	29	41	6%	64	63
Kentucky Average	na	na	na	16%	na	na	37%	na	na	6%	na	na
Tennessee Average	na	na	na	28%	na	na	35%	na	na	6%	na	na
USA Average	na	na	na	39%	na	na	31%	na	na	6%	na	na

Legend:

≥ State Average
≥ USA Average
≥ Both State and USA Average
≥ 76 Percentile

Appendix F
Summary of Impacts Per Resource and Alternative

Summary of Impacts Per Resource and Alternative

	Alt 1 and Alt 2	Alt 1	Alt 3 (Full)	Alt 3 (Base)	No – Action Alternative
Weapons System	IFPC (Missile Launcher, HP-DE)	M10 Booker	Full MDTF (IFPC, LRHW, MRC, HP-DE)	Base MDTF (Undetermined but fewer than the Full MDTF)	N/A
Site Name	2-44 ADA	Screaming Eagle District	DESTINY1 or MABRY1 or SABRE1	NCB1 (W) or NCB2 (E)	N/A
Size (acres)	Existing/Renovation	Temp Existing/Renovation	93	18	N/A
Personnel	735	400	400	60 -100	N/A
Air Quality	<ul style="list-style-type: none"> Construction of the associated facilities would be less than significant as the emissions associated with the equipment would be below emissions thresholds. 	<ul style="list-style-type: none"> Construction of the associated facilities would be less than significant as the emissions associated with the equipment would be below emissions thresholds. 	<ul style="list-style-type: none"> Construction of the associated facilities would have an increase in emissions as compared to Alternative 1 as the construction areas would increase. However, the impact would be less than significant as the emissions associated with the equipment would be below emissions thresholds. 	<ul style="list-style-type: none"> Construction of the associated facilities would have an increase in emissions as compared to Alternative 1 as the construction areas would increase. However, the impact would be less than significant as the emissions associated with the equipment would be below emissions thresholds. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Airspace	<ul style="list-style-type: none"> Fielding and stationing of equipment, including construction of required facilities, and personnel would have no significant impact. Training doctrine requirements are under development, not available at this time, and not included in this PEA. When available, they will be compared against installation-specific ongoing training to determine if additional analysis could be required. Given that current IFPC training requirements are projected to require vertical airspace control height to 45,000 feet, additional NEPA analysis would likely be required. 	<ul style="list-style-type: none"> Fielding and stationing of equipment, including construction of required facilities, and personnel would have no significant impact. Training doctrine requirements are under development, not available at this time, and not included in this PEA. When available, they will be compared against installation-specific ongoing training to determine if additional analysis could be required. Given that current IFPC training requirements are projected to require vertical airspace control height to 45,000 feet, additional NEPA analysis would likely be required. 	<ul style="list-style-type: none"> Fielding and stationing of equipment, including construction of required facilities, and personnel would have no significant impact. Training doctrine requirements are under development, not available at this time, and not included in this PEA. When available, they will be compared against installation-specific ongoing training to determine if additional analysis could be required. Given that current MDTF training requirements are projected to require vertical airspace control height to 60,000 feet, additional NEPA analysis would likely be required. 	<ul style="list-style-type: none"> Fielding and stationing of equipment, including construction of required facilities, and personnel would have no significant impact. Training doctrine requirements are under development, not available at this time, and not included in this PEA. When available, they will be compared against installation-specific ongoing training to determine if additional analysis could be required. Given that current MDTF training requirements are projected to require vertical airspace control height to 60,000 feet, additional NEPA analysis would likely be required. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Biological Resources	<ul style="list-style-type: none"> Federally and state listed species are present within the project area. Construction may have a long term impact on listed species. With BMPs the impact will be less than significant. Management practices, mowing restrictions, and tree removal restrictions will be followed to minimize impacts to biological resources. 	<ul style="list-style-type: none"> Construction would occur within an area currently developed and minimal vegetation. No impact to biological resources is anticipated. 	<ul style="list-style-type: none"> Federally and state listed species are present within the project area. Construction may have a long term impact on listed species. With BMPs the impact will be less than significant. Management practices, mowing restrictions, and tree removal restrictions will be followed to minimize impacts to biological resources. 	<ul style="list-style-type: none"> Federally and state listed species are present within the project area. Construction may have a long term impact on listed species. With BMPs the impact will be less than significant. Management practices, mowing restrictions, and tree removal restrictions will be followed to minimize impacts to biological resources. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Cultural Resources	<ul style="list-style-type: none"> There are no historic resources recorded within the project area, no impact to cultural resources is anticipated. Prior to ground disturbing activities, the Ft. Campbell Archaeological Database will be reviewed to ensure that resources are not present and / or a survey has been conducted 	<ul style="list-style-type: none"> There are no historic resources recorded within the project area, no impact to cultural resources is anticipated. Prior to ground disturbing activities, the Ft. Campbell Archaeological Database will be reviewed to ensure that resources are not present and / or a survey has been conducted 	<ul style="list-style-type: none"> There are no historic resources recorded within the project area, no impact to cultural resources is anticipated. Prior to ground disturbing activities, the Ft. Campbell Archaeological Database will be reviewed to ensure that resources are not present and / or a survey has been conducted 	<ul style="list-style-type: none"> There are no historic resources recorded within the project area, no impact to cultural resources is anticipated. Prior to ground disturbing activities, the Ft. Campbell Archaeological Database will be reviewed to ensure that resources are not present and / or a survey has been conducted 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.

	Alt 1 and Alt 2	Alt 1	Alt 3 (Full)	Alt 3 (Base)	No – Action Alternative
Electromagnetic Spectrum	<ul style="list-style-type: none"> Fielding and stationing of equipment, including construction of required facilities, and personnel would have no significant impact. Training doctrine requirements are under development, not available at this time, and not included in this PEA. When available, they will be compared against installation-specific ongoing training to determine if additional analysis could be required. Should training requirements potentially impact electromagnetic spectrum use, additional NEPA analysis would be required. 	<ul style="list-style-type: none"> Fielding and stationing of equipment, including construction of required facilities, and personnel would have no significant impact. Training doctrine requirements are under development, not available at this time, and not included in this PEA. When available, they will be compared against installation-specific ongoing training to determine if additional analysis could be required. Should training requirements potentially impact electromagnetic spectrum use, additional NEPA analysis would be required. 	<ul style="list-style-type: none"> Fielding and stationing of equipment, including construction of required facilities, and personnel would have no significant impact. Training doctrine requirements are under development, not available at this time, and not included in this PEA. When available, they will be compared against installation-specific ongoing training to determine if additional analysis could be required. Given that current MDTF training requirements would include High Power Directed Energy systems with the potential to impact other electromagnetic systems currently in use at Ft. Campbell, additional NEPA analysis would likely be required. 	<ul style="list-style-type: none"> Fielding and stationing of equipment, including construction of required facilities, and personnel would have no significant impact. Training doctrine requirements are under development, not available at this time, and not included in this PEA. When available, they will be compared against installation-specific ongoing training to determine if additional analysis could be required. Given that current MDTF training requirements would include High Power Directed Energy systems with the potential to impact other electromagnetic systems currently in use at Ft. Campbell, additional NEPA analysis would likely be required. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Geological and Soil Resources	<ul style="list-style-type: none"> Significant impacts to soils resulting from construction activities. Soils could be significantly altered because of soil excavation at planned construction sites. To reduce impacts to less than significant, the applicable permits would be obtained and BMPs would be implemented based on site-specific conditions to reduce impacts by applying the following management actions: sediment barriers (silt fence, rock check dams), temporary detention basins, grade stabilization with seed and mulch, and geotextile slope stabilization. Soil disturbance could also result in increased erosion potential from loss of groundcover and exposure of bare soils to precipitation and runoff. Potential temporary impacts to soils would be controlled and avoided using appropriate BMPs and soil stabilization/revegetation techniques following construction activities. 	<ul style="list-style-type: none"> Significant impacts to soils resulting from construction activities, however impact reduced compared to only constructing the IFPC. Soils could be significantly altered because of soil excavation at planned construction sites. To reduce impacts to less than significant, the applicable permits would be obtained and BMPs would be implemented based on site-specific conditions to reduce impacts by applying the following management actions: sediment barriers (silt fence, rock check dams), temporary detention basins, grade stabilization with seed and mulch, and geotextile slope stabilization. Soil disturbance could also result in increased erosion potential from loss of groundcover and exposure of bare soils to precipitation and runoff. Potential temporary impacts to soils would be controlled and avoided using appropriate BMPs and soil stabilization/revegetation techniques following construction activities. 	<ul style="list-style-type: none"> Significant impacts to soils resulting from construction activities. Soils could be significantly altered because of soil excavation at planned construction sites. To reduce impacts to less than significant the applicable permits would be obtained and BMPs would be implemented based on site-specific conditions to reduce impacts by applying the following management actions: sediment barriers (silt fence, rock check dams), temporary detention basins, grade stabilization with seed and mulch, and geotextile slope stabilization. Soil disturbance could also result in increased erosion potential from loss of groundcover and exposure of bare soils to precipitation and runoff. Potential temporary impacts to soils would be controlled and avoided using appropriate BMPs and soil stabilization/revegetation techniques following construction activities. 	<ul style="list-style-type: none"> Significant impacts to soils resulting from much increased construction activities as compared to Alternative 1 are anticipated. Soils could be significantly altered because of soil excavation at planned construction sites. To reduce impacts to less than significant, the applicable permits would be obtained and BMPs would be implemented based on site-specific conditions to reduce impacts by applying the following management actions: sediment barriers (silt fence, rock check dams), temporary detention basins, grade stabilization with seed and mulch, and geotextile slope stabilization. Soil disturbance could also result in increased erosion potential from loss of groundcover and exposure of bare soils to precipitation and runoff. Potential temporary impacts to soils would be controlled and avoided using appropriate BMPs and soil stabilization/revegetation techniques following construction activities. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Hazardous and Toxic Materials/Waste	<ul style="list-style-type: none"> Construction and renovation would generate additional solid and hazardous waste; however the quantity generated would be less than significant. With the increase in personnel, there will be an increase in solid waste generated; however with mitigation measures, the impact would be less than significant. With known ERP sites in the area, the potential for a minor to moderate impact to the site from construction related 	<ul style="list-style-type: none"> Construction and renovation would generate additional solid and hazardous waste; however the quantity generated would be less than significant. With the increase in personnel, there will be an increase in solid waste generated; however with mitigation measures, the impact would be less than significant. With known ERP sites in the area, the potential for a minor to moderate impact to the site from construction related 	<ul style="list-style-type: none"> Construction and renovation would generate additional solid and hazardous waste; however the quantity generated would be less than significant. With the increase in personnel, greater than Alternative 1, there will be an increase in solid waste generated; however with mitigation measures, the impact would be less than significant. With known ERP sites in the area, the potential for a minor to moderate impact to the site from construction related activities is possible; 	<ul style="list-style-type: none"> Construction and renovation would generate additional solid and hazardous waste; however the quantity generated would be less than significant. With the increase in personnel, greater than Alternative 1, there will be an increase in solid waste generated; however with mitigation measures, the impact would be less than significant. With known ERP sites in the area, the potential for a minor to moderate impact to the site from construction related activities is possible; 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.

	Alt 1 and Alt 2	Alt 1	Alt 3 (Full)	Alt 3 (Base)	No – Action Alternative
	<p>activities is possible; however the impact would be less than significant with the implementation of BMPs.</p> <ul style="list-style-type: none"> To reduce the quantity of wastes disposed of within the landfill, materials that can be recycled will be. Additionally, locations of ERP sites will be verified prior to ground disturbing activities. 	<p>activities is possible; however the impact would be less than significant with the implementation of BMPs.</p> <ul style="list-style-type: none"> To reduce the quantity of wastes disposed of within the landfill, materials that can be recycled will be. Additionally, locations of ERP sites will be verified prior to ground disturbing activities. 	<p>however the impact would be less than significant with the implementation of BMPs.</p> <ul style="list-style-type: none"> To reduce the quantity of wastes disposed of within the landfill, materials that can be recycled will be. Additionally, locations of ERP sites will be verified prior to ground disturbing activities. 	<p>however the impact would be less than significant with the implementation of BMPs.</p> <ul style="list-style-type: none"> To reduce the quantity of wastes disposed of within the landfill, materials that can be recycled will be. Additionally, locations of ERP sites will be verified prior to ground disturbing activities. 	
Human Health and Safety	<ul style="list-style-type: none"> Construction and renovation activities would be short term and less than significant. No long-term significant human health and safety effects would be anticipated. Installation of safety plans and SOPs would be followed to mitigate associated hazards from construction activities. Use of appropriate PPE, safety equipment, dust control methods, and work zone or hazard demarcation would reduce risk of injury or exposure of workers and other personnel. 	<ul style="list-style-type: none"> Construction and renovation activities would be short term, less than constructing the IFPC, and less than significant. No significant long-term construction or renovation human health and safety effects would be anticipated. Installation of safety plans and SOPs would be followed to mitigate associated hazards from construction activities. Use of appropriate PPE, safety equipment, dust control methods, and work zone or hazard demarcation would reduce risk of injury or exposure of workers and other personnel. 	<ul style="list-style-type: none"> Construction and renovation activities would be short term and moderately more than Alternatives 1 and 2; however, the impacts would be less than significant. No significant long-term construction human health and safety effects would be anticipated. Installation of safety plans and SOPs would be followed to mitigate associated hazards from construction activities. Use of appropriate PPE, safety equipment, dust control methods, and work zone or hazard demarcation would reduce risk of injury or exposure of workers and other personnel. 	<ul style="list-style-type: none"> Construction and renovation activities would be short term and moderately more than Alternatives 1 and 2; however, less than significant. No significant long-term construction human health and safety effects would be anticipated. Installation of safety plans and SOPs would be followed to mitigate associated hazards from construction activities. Use of appropriate PPE, safety equipment, dust control methods, and work zone or hazard demarcation would reduce risk of injury or exposure of workers and other personnel. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Land Use	<ul style="list-style-type: none"> Minor short term land use impacts expected during renovations/construction and siting as current land use designations mostly appropriate for planned uses. Impacts are less than significant. No long term land use impacts requiring mitigation were identified in association with the proposed action. 	<ul style="list-style-type: none"> Similar to Alternative I but somewhat less due to the fielding of only the IFPC. No significant short or long term impacts 	<ul style="list-style-type: none"> Moderate land use impacts may occur since the current land use designations may be necessary. Changes to land use could occur under Alternative 3 for all of the proposed sites if additional land has to be converted from training or buffer zone designations to planned uses. No long term significant impacts anticipated. Full construction activities would require multiple permits, zoning, and other land use actions necessary in the process. 	<ul style="list-style-type: none"> Moderate land use impacts may occur since the current land use designations may be necessary. Changes to land use could occur under Alt 3 for all of the proposed sites if additional land has to be converted from training or buffer zone designations to planned uses. Impacts are less than significant. Full construction activities would require multiple permits, zoning, and other land use actions necessary in the process. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Noise	<ul style="list-style-type: none"> Minor and short term impacts are anticipated during the construction phase. The impacts would be less than significant based upon the distance between the equipment / noise sources and the sensitive receptors (residential areas). All construction operations would occur during the day, Monday through Friday, with no construction operations on weekends nor in the evenings or nights. Use of the systems would require additional analysis. 	<ul style="list-style-type: none"> Minor and short term impacts are anticipated during the construction phase and would be greater than those of only constructing the IFPC facilities. However, the impacts would be less than significant based upon the distance between the equipment / noise sources and the sensitive receptors (residential areas). All construction operations would occur during the day, Monday through Friday, with no construction operations on weekends nor in the evenings or nights. Use of the systems would require additional analysis. 	<ul style="list-style-type: none"> Minor and short term impacts are anticipated during the construction phase and would be greater than under Alternative 1. However, the impacts would be less than significant based upon the distance between the equipment / noise sources and the sensitive receptors (residential areas). All construction operations would occur during the day, Monday through Friday, with no construction operations on weekends nor in the evenings or nights. Use of the systems would require additional analysis. 	<ul style="list-style-type: none"> Minor and short term impacts are anticipated during the construction phase and would be greater than under Alternative 1. However, the impacts would be less than significant based upon the distance between the equipment / noise sources and the sensitive receptors (residential areas). All construction operations would occur during the day, Monday through Friday, with no construction operations on weekends nor in the evenings or nights. Use of the systems would require additional analysis. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.

	Alt 1 and Alt 2	Alt 1	Alt 3 (Full)	Alt 3 (Base)	No – Action Alternative
Socioeconomics	<ul style="list-style-type: none"> Minor short term beneficial impact to local economy (employment, income, business expenditures) from renovation/construction of IFPC and M10 Booker facilities. Minor long-term beneficial impact to local economy (income, consumer spending) from influx of new personnel and families, primarily with the IFPC. With the increase in personnel, minor potential long-term impact to stress on housing and schools (on-post and off-post) from influx of new personnel and families, primarily with the IFPC. Prior to the implementation of the alternative, availability for housing and educational opportunities, on and off Ft. Campbell will be assessed to reduce the potential for the systems to be at capacity or over. 	<ul style="list-style-type: none"> Less than significant temporary beneficial impact to local economy (employment, income, business expenditures) from renovation/construction of IFPC facilities. Minor long-term beneficial impact to local economy (income, consumer spending) from influx of new personnel and families, with the IFPC. With the increase in personnel, minor potential long-term impact to stress on housing and schools (on-post and off-post) from influx of new personnel and families, with the IFPC. Prior to the implementation of the alternative, availability for housing and educational opportunities, on and off Ft. Campbell will be assessed to reduce the potential for the systems to be at capacity or over. 	<ul style="list-style-type: none"> Moderate temporary beneficial impact to local economy (employment, income, business expenditures) from construction of Full MDTF facilities. Moderate long-term beneficial impact to local economy (income, consumer spending) from influx of new personnel and families with the Full MDTF. With the increase in personnel, moderate potential long-term impact to stress on housing and schools (on-post and off-post) from influx of new personnel and families with the Full MDTF. If the SABRE 1 site were selected, negligible loss of agricultural lease revenue and associated impact to local agricultural economy. Prior to the implementation of the alternative, availability for housing and educational opportunities, on and off Ft. Campbell will be assessed to reduce the potential for the systems to be at capacity or over. 	<ul style="list-style-type: none"> Moderate temporary beneficial impact to local economy (employment, income, business expenditures) from construction of Full MDTF facilities. Moderate long-term beneficial impact to local economy (income, consumer spending) from influx of new personnel and families with the Full MDTF. With the increase in personnel, moderate potential long-term impact to stress on housing and schools (on-post and off-post) from influx of new personnel and families with the Full MDTF. Prior to the implementation of the alternative, availability for housing and educational opportunities, on and off Ft. Campbell will be assessed to reduce the potential for the systems to be at capacity or over. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Transportation and Traffic	<ul style="list-style-type: none"> Moderate potential long-term impact at the following locations: a Shau Valley Intersection, Screaming Eagle, Shau Valley Intersection, and Shau Valley / Airborne on-street parking, Wickham, and Normandy. Prior to implementation of the alternative, a level-of-service (LOS) traffic study will be conducted to identify specific mitigation required. 	<ul style="list-style-type: none"> Minor potential long-term impact associated with on-street parking 56th St., 51st St. & 49 th St. Existing traffic issues may require mitigation. Prior to implementation of the alternative, a LOS traffic study should be conducted to identify specific mitigation required. 	<ul style="list-style-type: none"> Minor potential long-term impacts associated with the entrances/exits off Night Stalker Road. Prior to implementation of this alternative, the site design may require modification to ensure adequate turn and entrances/exits off Night Stalker Road. 	<ul style="list-style-type: none"> Moderate potential long-term impacts associated with the site entry/exit with railroad, terrain, and former landfill. Long-term impacts may be anticipated as there is existing street parking along Airborne. Prior to implementation of this alternative, the site design may require modification. Additionally, a LOS traffic study should be conducted to identify and quantify congestion. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Utilities	<ul style="list-style-type: none"> Less than significant impact to capacity of utilities as all utilities are present and easily accessible. 	<ul style="list-style-type: none"> Less than significant impact to capacity of utilities as all utilities are present and easily accessible. 	<ul style="list-style-type: none"> During construction, there could be a moderate cost impact to bring utilities to this remote site, utilities not easily accessible. This impact is less than significant. During operation of these facilities, a minor impact to capacity of utilities due to increase in personnel is anticipated. This impact is less significant. Prior to construction, capacity of existing systems will be verified to ensure that increase in personnel will not create burden. 	<ul style="list-style-type: none"> During construction, there could be a moderate cost impact to bring utilities to this remote site, utilities not easily accessible. This impact is less than significant. During operation of these facilities, a minor impact to capacity of utilities due to increase in personnel is anticipated. This impact is less significant. Prior to construction, capacity of existing systems will be verified to ensure that increase in personnel will not create burden. 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.
Water Resources	<ul style="list-style-type: none"> No mapped water resources are present within the project area; therefore, no impacts are anticipated. Prior to construction, a wetland delineation will be completed to determine the presence/absence of wetlands. If wetlands are present, less than significant impacts are expected. If any unmapped features within the project area are impacted, a jurisdictional determination should be completed 	<ul style="list-style-type: none"> No mapped water resources are present within the project area; therefore, no impacts are anticipated. If any unmapped features within the project area are impacted, a jurisdictional determination should be completed utilizing the most recent definition of WOTUS prior to any clearing, filling, or modifications. If waters are designated as jurisdictional, the post would then obtain authorization 	<ul style="list-style-type: none"> No mapped water resources are present within the project area; therefore, no impacts are anticipated. Mapped water resources are located on the peripheries of the DESTINY, MABRY, and SABRE sites. Prior to design and construction, a wetland delineation and hydrologic determinations will be completed to determine the presence/absence of wetlands and other 	<ul style="list-style-type: none"> No mapped water resources are present within the project area; therefore, no impacts are anticipated. Prior to construction, a wetland delineation will be completed to determine the presence/absence of wetlands. If wetlands are present, less than significant impacts are expected. If any unmapped features within the project area are impacted, a jurisdictional determination should be completed utilizing 	<ul style="list-style-type: none"> No impact would be anticipated as no activities would occur.

	Alt 1 and Alt 2	Alt 1	Alt 3 (Full)	Alt 3 (Base)	No – Action Alternative
	utilizing the most recent definition of WOTUS prior to any clearing, filling, or modifications. If waters are designated as jurisdictional, the post would then obtain authorization or a permit to fill in or modify under the CWA. If wetland features are impacted, the appropriate permit or authorization under the CWA will be obtained prior to construction	or a permit to fill in or modify under the CWA. If wetland features are impacted, the appropriate permit or authorization under the CWA will be obtained prior to construction	<p>water resources. If wetlands are present, less than significant impacts are expected.</p> <ul style="list-style-type: none"> • If any unmapped features within the project area are impacted, a jurisdictional determination should be completed utilizing the most recent definition of WOTUS prior to any clearing, filling, or modifications. If waters are designated as jurisdictional, the post would then obtain authorization or a permit to fill in or modify under the CWA. If wetland features are impacted, the appropriate permit or authorization under the CWA will be obtained prior to construction 	the most recent definition of WOTUS prior to any clearing, filling, or modifications. If waters are designated as jurisdictional, the post would then obtain authorization or a permit to fill in or modify under the CWA. If wetland features are impacted, the appropriate permit or authorization under the CWA will be obtained prior to construction	

Appendix G
Resource Exhibits

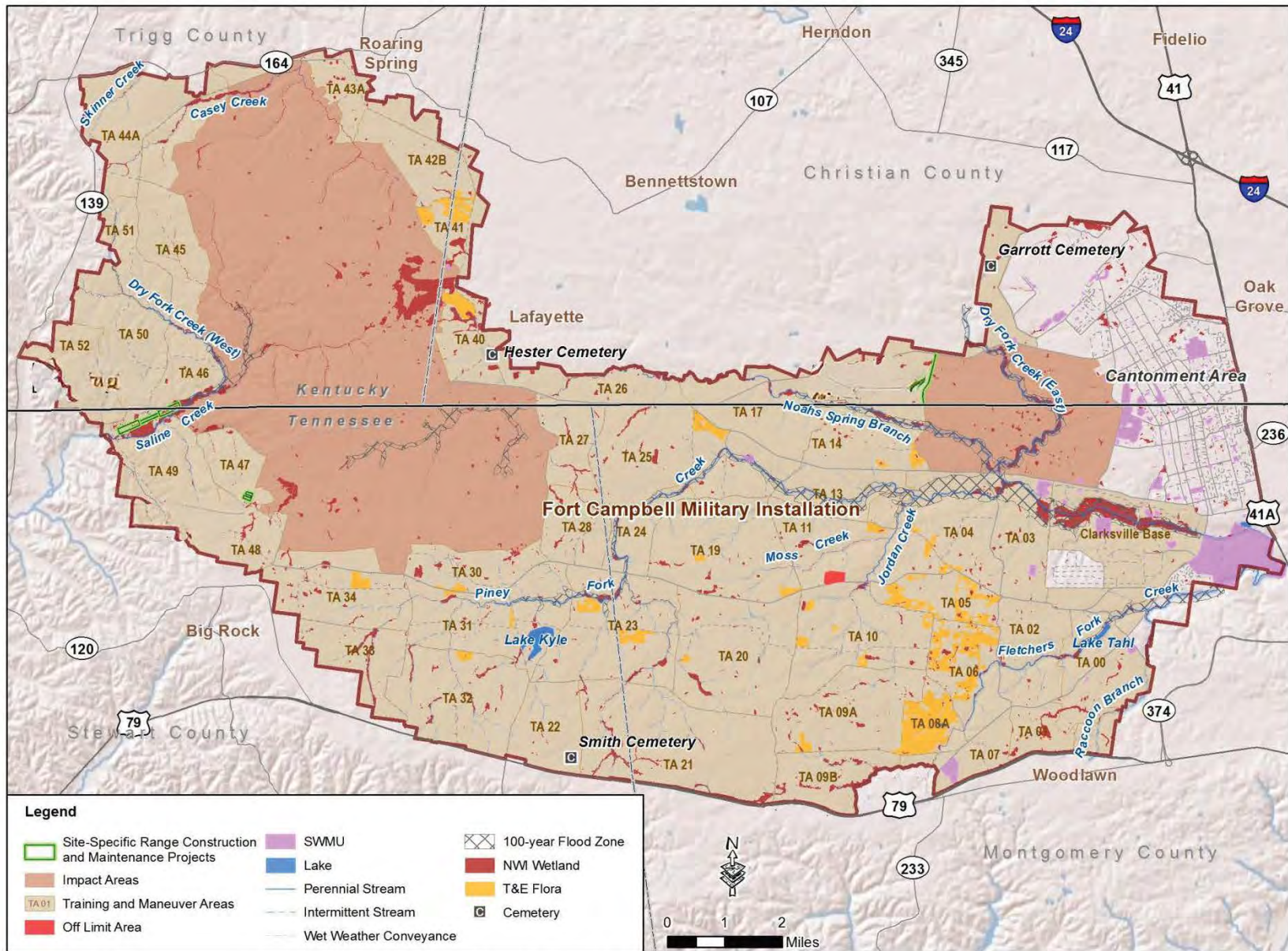


Figure 2-1. Site-Specific Range Construction and Maintenance Projects

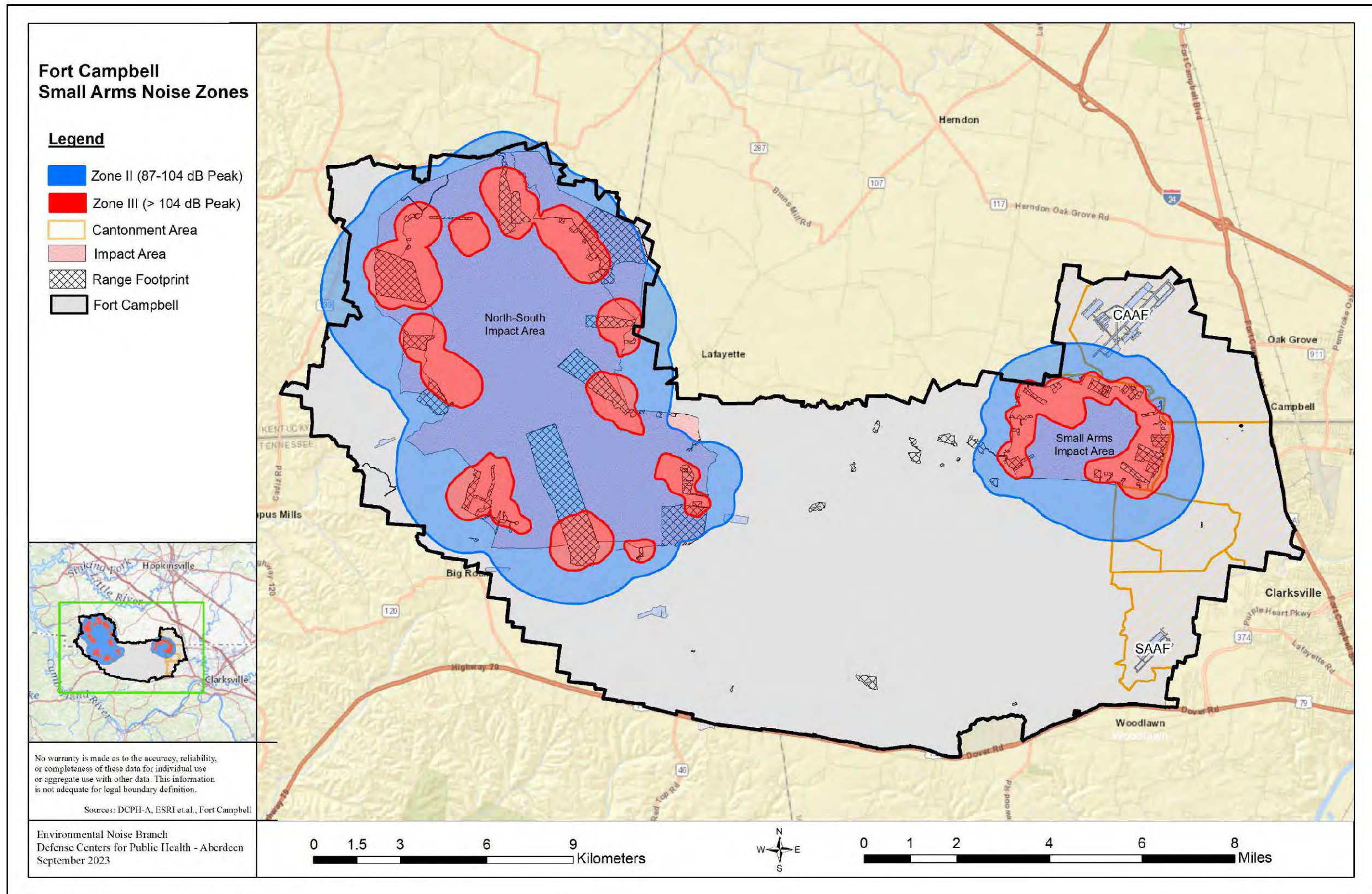


Figure 4-1. Small Arms Noise Zones



Legend

 Proposed Sites

0 3,000 6,000



Feet

**Weapons
Modernization
Fielding PEA
Existing
Utilities**

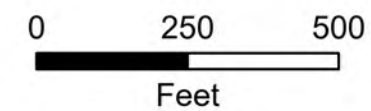
Jacobs ch2m.



IFPC - 1 2-44 ADA Existing Utilities

Legend

- Fire Hydrant
- Water Main
- Service Line
- Sewer Lateral
- Manhole
- Gravity Main
- Sewer Force Main
- Lift Station



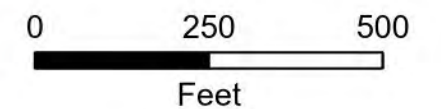
**TEMP M10
BOOKER
SUPPORT SITE
(ADMINISTRATIVE)
EXISTING UTILITIES**

**TEMP M10
BOOKER
SUPPORT SITES
ADMINISTRATION**

**TEMP M10
BOOKER
SUPPORT SITES
(TEMF)**

Legend

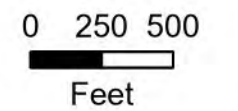
- Fire Hydrant
- Water Main
- Service Line
- Sewer Lateral
- Manhole
- Gravity Main
- Sewer Force Main



**NCB 1 & 2
18-ACRE
SITE
Existing Utilities**

Legend

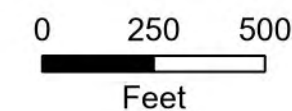
- Fire Hydrant
- Water Main
- Service Line
- Sewer Lateral
- Manhole
- Gravity Main
- Sewer Force Main
- bb Lift Station



M10 SUPPORT EXISTING UTILITIES

Legend

- Fire Hydrant
- Water Main
- Service Line
- Sewer Lateral
- Manhole
- Gravity Main
- Sewer Force Main
- Lift Station



**PROPOSED CONSOL.
FOOTPRINT
(pre-decisional)**

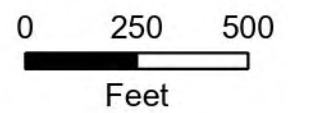
**MPF
BARRACKS**



**DESTINY1
93-ACRE SITE
EXISTING UTILITIES**

NO UTILITIES

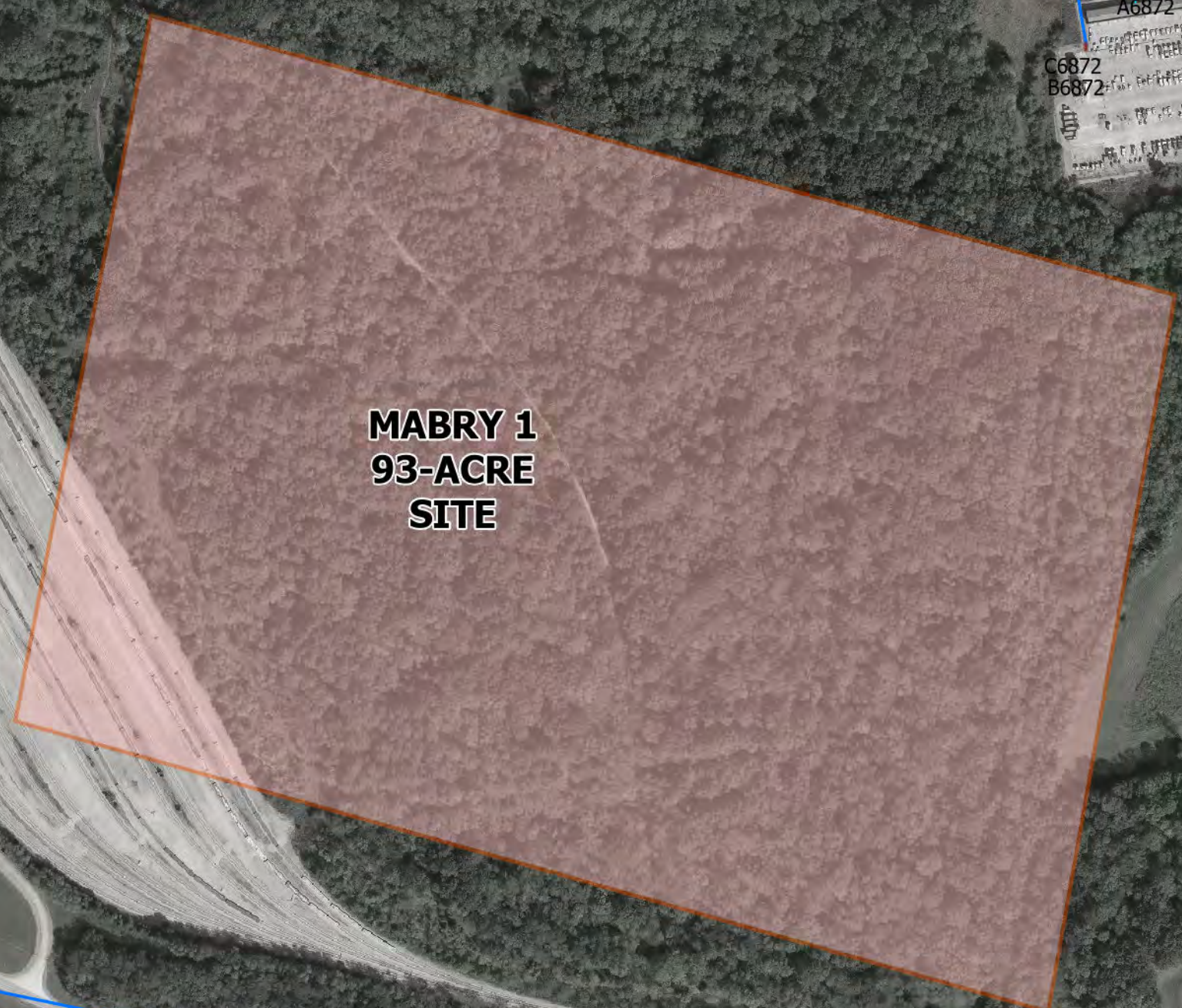
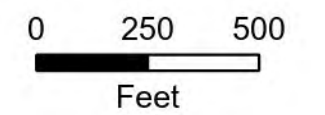
**DESTINY 1
93-ACRE
SITE**



**MABRY1
93-ACRE SITE
EXISTING UTILITIES**

Legend

- Fire Hydrant
- Water Main
- Service Line
- Sewer Lateral
- Manhole
- Gravity Main



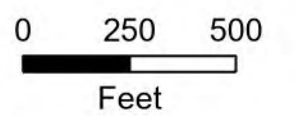
**MABRY 1
93-ACRE
SITE**

**SABRE
93- ACRE
SITE
Existing Utilities**

**SABRE
93-ACRE
SITE**

Legend

- Fire Hydrant
- Water Main
- Service Line
- Sewer Lateral
- Manhole
- Gravity Main



G0012
G0013
G0014
A6635
6634
A6636
6635
6636
6637
B6636
6640



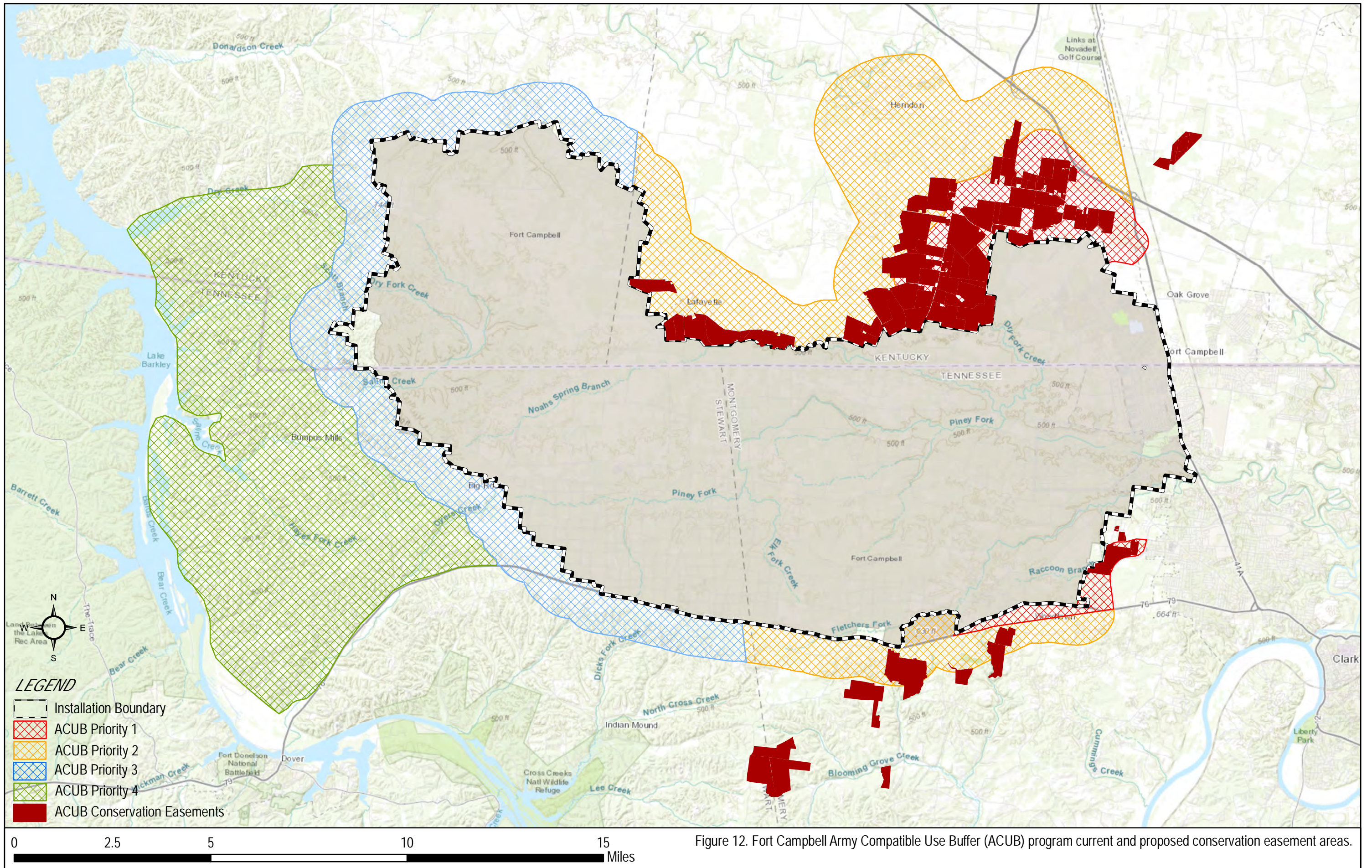


Figure 12. Fort Campbell Army Compatible Use Buffer (ACUB) program current and proposed conservation easement areas.

Appendix H
Documents Incorporated by Reference

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *Environmental Impact Analysis Process* (EIAP, 32 CFR 989); the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: Fort Campbell
State: Kentucky
County(s): Christian; Trigg
Regulatory Area(s): Clarksville-Hopkinsville, TN-KY

b. Action Title: PEA Fort Campbell Weapons Modernization Fielding Alternative 2

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2026

e. Action Description:

The proposed action is to analyze, from a programmatic perspective, the potential effects of fielding up to six additional weapon systems at Fort Campbell, and to identify potential sitespecific supplemental analysis needed to inform a future fielding decision at Fort Campbell.

Each proposed weapon system has previously been analyzed at the programmatic level to establish appropriate requirements for potential implementation at a broad range of Joint Force bases. Each proposed weapon system presents its own requirements for storage, logistics, training, operation, maintenance, staffing, and associated soldier's families to be integrated into the Fort Campbell base infrastructure and surrounding communities.

Under Alternative 1, the IFPC would be fielded and stationed at Fort Campbell in Fiscal Year (FY) 25, followed by the M10 Booker in FY27.

Under Alternative 2, only the IFPC and associated soldiers would be fielded and stationed at Fort Campbell in FY25, without the M10 Booker.

Under Alternative 3, up to four additional new weapon modernization systems would be fielded and stationed at Fort Campbell beginning in FY25 and continuing through the 2030 timeframe, including:

- Long-Range Hypersonic Weapon (LRHW) System
- Mid-Range Capability (MRC) System
- High-Power Microwave Direct Energy (HP-DE) System
- Multi-Domain Task Force (MDTF) Table 2-1 details the means of meeting the physical criteria for each system.

f. Point of Contact:

Name: Sophia Pietrzak
Title: Air Quality
Organization: OTIE
Email: spietrzak@oesgroup.com
Phone Number: (321) 427-2133

2. Analysis: Total reasonably foreseeable net change in direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" (highest annual emissions) and "steady

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

state" (no net gain/loss in emission stabilized and the action is fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

All emissions estimates were derived from various sources using the methods, algorithms, and emission factors from the most current *Air Emissions Guide for Air Force Stationary Sources*, *Air Emissions Guide for Air Force Mobile Sources*, and/or *Air Emissions Guide for Air Force Transitory Sources*. For greater details of this analysis, refer to the Detail ACAM Report.

applicable
 not applicable

Conformity Analysis Summary:

2026

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Clarksville-Hopkinsville, TN-KY			
VOC	1.476	100	No
NOx	5.555	100	No
CO	4.581		
SOx	0.791		
PM 10	2.236		
PM 2.5	0.917		
Pb	0.000		
NH3	0.004		

2027 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Clarksville-Hopkinsville, TN-KY			
VOC	0.029	100	No
NOx	0.526	100	No
CO	0.442		
SOx	0.003		
PM 10	0.040		
PM 2.5	0.040		
Pb	0.000		
NH3	0.000		

The Criteria Pollutants (or their precursors) with a General Conformity threshold listed in the table above are pollutants within one or more designated nonattainment or maintenance area/s for the associated National Ambient Air Quality Standard (NAAQS). These pollutants are driving this GCR Applicability Analysis. Pollutants exceeding the GCR thresholds must be further evaluated potentially through a GCR Determination.

The pollutants without a General Conformity threshold are pollutants only within areas designated attainment for the associated NAAQS. These pollutants have an insignificance indicator for VOC, NOx, CO, SOx, PM 10, PM 2.5, and NH3 of 250 ton/yr (Prevention of Significant Deterioration major source threshold) and 25 ton/yr for Pb (GCR de minimis value). Pollutants below their insignificance indicators are at rates so insignificant that they will not cause or contribute to an exceedance of one or more NAAQSs. These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Refer to the *Level II, Air Quality Quantitative Assessment Insignificance Indicators* for further details.

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

None of the annual net change in estimated emissions associated with this action are above the GCR threshold values established at 40 CFR 93.153 (b); therefore, the proposed Action has an insignificant impact on Air Quality and a General Conformity Determination is not applicable.

Sophia Pietrzak, Air Quality
Name, Title

Mar 12 2025
Date

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *Environmental Impact Analysis Process* (EIAP, 32 CFR 989); the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: Fort Campbell
State: Kentucky
County(s): Christian; Trigg
Regulatory Area(s): Clarksville-Hopkinsville, TN-KY

b. Action Title: PEA Fort Campbell Weapons Modernization Fielding

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2026

e. Action Description:

The proposed action is to analyze, from a programmatic perspective, the potential effects of fielding up to six additional weapon systems at Fort Campbell, and to identify potential sitespecific supplemental analysis needed to inform a future fielding decision at Fort Campbell.

Each proposed weapon system has previously been analyzed at the programmatic level to establish appropriate requirements for potential implementation at a broad range of Joint Force bases. Each proposed weapon system presents its own requirements for storage, logistics, training, operation, maintenance, staffing, and associated soldier's families to be integrated into the Fort Campbell base infrastructure and surrounding communities.

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- Long-Range Hypersonic Weapon (LRHW) System
- Mid-Range Capability (MRC) System
- High-Power Microwave Direct Energy (HP-DE) System
- Multi-Domain Task Force (MDTF)

f. Point of Contact:

Name: Sophia Pietrzak
Title: Air Quality Specialist
Organization: OTIE
Email: spietrzak@oesgroup.com
Phone Number: (321) 427-2133

2. Analysis: Total reasonably foreseeable net change in direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" (highest annual emissions) and "steady

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

state" (no net gain/loss in emission stabilized and the action is fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

All emissions estimates were derived from various sources using the methods, algorithms, and emission factors from the most current *Air Emissions Guide for Air Force Stationary Sources*, *Air Emissions Guide for Air Force Mobile Sources*, and/or *Air Emissions Guide for Air Force Transitory Sources*. For greater details of this analysis, refer to the Detail ACAM Report.

applicable
 not applicable

Conformity Analysis Summary:

2026

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Clarksville-Hopkinsville, TN-KY			
VOC	2.158	100	No
NOx	4.452	100	No
CO	4.349		
SOx	0.132		
PM 10	6.503		
PM 2.5	0.347		
Pb	0.000		
NH3	0.012		

2027 - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Clarksville-Hopkinsville, TN-KY			
VOC	0.125	100	No
NOx	2.274	100	No
CO	1.910		
SOx	0.014		
PM 10	0.173		
PM 2.5	0.173		
Pb	0.000		
NH3	0.000		

The Criteria Pollutants (or their precursors) with a General Conformity threshold listed in the table above are pollutants within one or more designated nonattainment or maintenance area/s for the associated National Ambient Air Quality Standard (NAAQS). These pollutants are driving this GCR Applicability Analysis. Pollutants exceeding the GCR thresholds must be further evaluated potentially through a GCR Determination.

The pollutants without a General Conformity threshold are pollutants only within areas designated attainment for the associated NAAQS. These pollutants have an insignificance indicator for VOC, NOx, CO, SOx, PM 10, PM 2.5, and NH3 of 250 ton/yr (Prevention of Significant Deterioration major source threshold) and 25 ton/yr for Pb (GCR de minimis value). Pollutants below their insignificance indicators are at rates so insignificant that they will not cause or contribute to an exceedance of one or more NAAQSs. These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Refer to the *Level II, Air Quality Quantitative Assessment Insignificance Indicators* for further details.

AIR CONFORMITY APPLICABILITY MODEL REPORT RECORD OF CONFORMITY ANALYSIS (ROCA)

None of the annual net change in estimated emissions associated with this action are above the GCR threshold values established at 40 CFR 93.153 (b); therefore, the proposed Action has an insignificant impact on Air Quality and a General Conformity Determination is not applicable.

Sophia Pietrzak, Air Quality Specialist
Name, Title

Mar 12 2025
Date

Animal species recorded on Fort Campbell that are federally listed, state-listed, and/or ranked as in need of management, special concern, imperiled, or declining by the states of Tennessee or Kentucky.

Scientific Name	Common Name	Status (Rank)			
		Fed	KY	TN	BCC
<i>Myotis austroriparius</i>	southeastern bat		E		
<i>Myotis grisescens</i>	gray bat	E	T	E	
<i>Myotis leibii</i>	eastern small-footed bat			D	
<i>Myotis septentrionalis</i>	Northern long-eared bat	T	E		
<i>Myotis sodalis</i>	Indiana bat	E	E	E	
<i>Nycticeius humeralis</i>	evening bat		S		
<i>Sorex cinereus</i>	masked shrew		S	D	
<i>Sorex longirostris</i>	southeastern shrew			D	
<i>Synaptomys cooperi</i>	southern bog lemming			D	
<i>Zapus hudsonius</i>	meadow jumping mouse			D	
<i>Accipiter striatus</i>	Sharp-shinned Hawk		S	D	
<i>Actitis macularia</i>	Spotted Sandpiper		E		
<i>Aimophila aestivalis</i>	Bachman's Sparrow		E	E	X
<i>Ammodramus henslowii</i>	Henslow's Sparrow		S	D	X
<i>Ammodramus leconteii</i>	Le Conte's Sparrow				X
<i>Anas clypeata</i>	Northern Shoveler		E		
<i>Anas discors</i>	Blue-winged Teal		T		
<i>Aquila chrysaetos</i>	Golden Eagle			T	
<i>Ardea alba</i>	Great Egret		T	D	
<i>Asio flammeus</i>	Short-eared Owl		E		X
<i>Bartramia longicauda</i>	Upland Sandpiper		H		
<i>Botaurus lentiginosus</i>	American Bittern		H		
<i>Bubulcus ibis</i>	Cattle Egret		S		
<i>Calcarius pictus</i>	Smith's Longspur				X
<i>Caprimulgus vociferus</i>	Whip-poor-will				X
<i>Certhia americana</i>	Brown Creeper		E		
<i>Chondestes grammacus</i>	Lark Sparrow		T	T	
<i>Circus cyaneus</i>	Northern Harrier		T	D	
<i>Cistothorus platensis</i>	Sedge Wren		S		X
<i>Contopus cooperi</i>	Olive-sided Flycatcher			D	
<i>Dendroica cerulea</i>	Cerulean Warbler			D	X
<i>Dendroica discolor</i>	Prairie Warbler				X
<i>Dendroica fusca</i>	Blackburnian Warbler		T		

Scientific Name	Common Name	Status (Rank)			
		Fed	KY	TN	BCC
<i>Dolichonyx oryzivorus</i>	Bobolink		S		
<i>Egretta caerulea</i>	Little Blue Heron		E	D	
<i>Egretta thula</i>	Snowy Egret		E	D	
<i>Empidonax minimus</i>	Least Flycatcher		E		
<i>Euphagus carolinus</i>	Rusty Blackbird				X
<i>Falco peregrinus</i>	Peregrine Falcon		E	E	
<i>Fulica americana</i>	American Coot		E		
<i>Geothlypis formosa</i>	Kentucky Warbler				X
<i>Haliaeetus leucocephalus</i>	Bald Eagle		T	D	X
<i>Helmitheros vermivorus</i>	Worm-eating Warbler				X
<i>Hylocichla mustelina</i>	Wood Thrush				X
<i>Ictinia mississippiensis</i>	Mississippi Kite		S	D	
<i>Junco hyemalis</i>	Dark-eyed Junco		S		
<i>Lanius ludovicianus</i>	Loggerhead Shrike			D	X
<i>Lophodytes cucullatus</i>	Hooded Merganser		T		
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker				X
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron		T		
<i>Pandion haliaetus</i>	Osprey		S		
<i>Passerculus sandwichensis</i>	Savannah Sparrow		S		
<i>Peromyscus gossypinus</i>	Cotton Mouse		T		
<i>Phalacrocorax auritus</i>	Double-crested Cormorant		T		
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak		S		
<i>Podilymbus podiceps</i>	Pied-billed Grebe		E		
<i>Poocetes gramineus</i>	Vesper Sparrow		E	D	
<i>Seiurus motacilla</i>	Louisiana Waterthrush				X
<i>Setophaga cerulea</i>	Cerulean Warbler				
<i>Setophaga discolor</i>	Prairie Warbler				X
<i>Sitta canadensis</i>	Red-breasted Nuthatch		E		
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker			D	
<i>Thyomanes bewickii</i>	Bewick's Wren		S	E	X
<i>Tringa solitaria</i>	Solitary Sandpiper				X
<i>Tryngites subruficollis</i>	Buff-breasted Sandpiper				X
<i>Tyrannus forficatus</i>	Scissor-tailed Flycatcher				
<i>Tyto alba</i>	Barn Owl		S	D	
<i>Vermivora chrysoptera</i>	Golden-winged Warbler			D	

Scientific Name	Common Name	Status (Rank)			
		Fed	KY	TN	BCC
<i>Vermivora pinus</i>	Blue-winged Warbler				X
<i>Vireo bellii</i>	Bell's Vireo		S		X
<i>Hyla gratiosa</i>	barking tree frog		S	D	
<i>Cryptobranchus alleganiensis</i>	eastern hellbender		E	D	
<i>Eumeces inexpectatus</i>	southeastern five-lined skink		S		
<i>Thamnophis s. sauritus</i>	eastern ribbon snake		S		
<i>Esox niger</i>	chain pickerel		S		
<i>Noturus exilis</i>	slender madtom		E		

Sources: KSNPC 2015; Tennessee Division of Natural Heritage 2016a, 2016b, Fort Campbell Migratory Bird Management Strategy (2017).

Status (Federal, State or Conservation Concern)

E – Endangered; T – Threatened S – Special Concern; H – Historic; D – “Deemed in Need of Management”; BCC – Birds of Conservation Concern

Custom Soil Resource Report for **Christian County, Kentucky**

Site 2 Destiny1 93 ac Site



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Map Scale: 1:9,880 if printed on A landscape (11" x 8.5") sheet.


0 100 200 400 600 Meters

0 450 900 1800 2700 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: UTM Zone 16N WGS84


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils







 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Christian County, Kentucky
 Survey Area Data: Version 22, Aug 30, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 7, 2016—May 1, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrA	Crider silt loam, 0 to 2 percent slopes	53.6	13.9%
CrB	Crider silt loam, 2 to 6 percent slopes	62.0	16.1%
CrC	Crider silt loam, 6 to 12 percent slopes	10.8	2.8%
HbC	Hammack-Baxter complex, 6 to 12 percent slopes	18.7	4.9%
HbC3	Hammack-Baxter complex, 6 to 12 percent slopes, severely eroded	18.0	4.7%
Ln	Lindside silt loam	11.1	2.9%
NhA	Nicholson silt loam, 0 to 2 percent slopes	8.8	2.3%
NhB	Nicholson silt loam, 2 to 6 percent slopes	86.8	22.5%
No	Nolin silt loam	19.7	5.1%
PmA	Pembroke silt loam, 0 to 2 percent slopes	0.0	0.0%
PmB	Pembroke silt loam, 2 to 6 percent slopes	95.1	24.6%
Ro	Robertsville silt loam	1.0	0.2%
Totals for Area of Interest		385.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called

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noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can

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be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Christian County, Kentucky

CrA—Crider silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v5b1
Elevation: 390 to 720 feet
Mean annual precipitation: 39 to 60 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 154 to 219 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Crider and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 38 inches: silt loam
2Bt2 - 38 to 100 inches: clay
2R - 100 to 110 inches: bedrock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 59 to 157 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Hydric soil rating: No

Minor Components

Bedford

Percent of map unit: 4 percent

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Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pembroke

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Nolin, occasionally flooded

Percent of map unit: 1 percent
Landform: Sinkholes
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

CrB—Crider silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2v5b2
Elevation: 350 to 1,340 feet
Mean annual precipitation: 39 to 60 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 154 to 219 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Crider and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

Ap - 0 to 8 inches: silt loam

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Bt1 - 8 to 38 inches: silt loam
2Bt2 - 38 to 100 inches: clay
2R - 100 to 110 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 59 to 157 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bedford

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pembroke

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

CrC—Crider silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2v58w

Elevation: 390 to 1,360 feet

Mean annual precipitation: 39 to 60 inches

Mean annual air temperature: 44 to 69 degrees F

Frost-free period: 154 to 219 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Crider and similar soils: 88 percent

Minor components: 12 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crider

Setting

Landform: Ridges

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

Ap - 0 to 8 inches: silt loam

Bt1 - 8 to 38 inches: silt loam

2Bt2 - 38 to 100 inches: clay

2R - 100 to 110 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent

Depth to restrictive feature: 59 to 157 inches to lithic bedrock

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Ecological site: F122XY004KY - Loess Veneered Uplands

Hydric soil rating: No

Minor Components

Baxter

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pembroke

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bedford

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Nolin, occasionally flooded

Percent of map unit: 2 percent
Landform: Sinkholes
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

HbC—Hammack-Baxter complex, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: lfbl
Elevation: 400 to 650 feet
Mean annual precipitation: 43 to 58 inches
Mean annual air temperature: 45 to 68 degrees F
Frost-free period: 164 to 194 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hammack and similar soils: 45 percent
Baxter and similar soils: 42 percent
Minor components: 13 percent

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Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hammack

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 28 inches: silty clay loam
H3 - 28 to 42 inches: very gravelly silty clay loam
H4 - 42 to 99 inches: gravelly clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Description of Baxter

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 5 inches: gravelly silt loam
H2 - 5 to 17 inches: gravelly silt loam
H3 - 17 to 75 inches: gravelly silty clay
H4 - 75 to 96 inches: clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

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Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands

Hydric soil rating: No

Minor Components

Nolin

Percent of map unit: 5 percent

Landform: Flood plains

Hydric soil rating: No

Vertrees

Percent of map unit: 5 percent

Hydric soil rating: No

Other soils

Percent of map unit: 3 percent

Hydric soil rating: No

HbC3—Hammack-Baxter complex, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: lfbm

Elevation: 430 to 610 feet

Mean annual precipitation: 43 to 58 inches

Mean annual air temperature: 45 to 68 degrees F

Frost-free period: 164 to 194 days

Farmland classification: Not prime farmland

Map Unit Composition

Hammack, severely eroded, and similar soils: 42 percent

Baxter, severely eroded, and similar soils: 40 percent

Minor components: 18 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hammack, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 7 inches: silty clay loam
H2 - 7 to 24 inches: silty clay loam
H3 - 24 to 38 inches: very gravelly silty clay loam
H4 - 38 to 95 inches: gravelly clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands
Hydric soil rating: No

Description of Baxter, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey residuum weathered from cherty limestone

Typical profile

H1 - 0 to 10 inches: gravelly silty clay loam
H2 - 10 to 68 inches: gravelly silty clay
H3 - 68 to 96 inches: clay

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium

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Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Ecological site: F122XY001KY - Deep Well Drained Cherty Uplands

Hydric soil rating: No

Minor Components

Nolin

Percent of map unit: 5 percent

Landform: Flood plains

Hydric soil rating: No

Baxter

Percent of map unit: 5 percent

Hydric soil rating: No

Vertrees

Percent of map unit: 5 percent

Hydric soil rating: No

Other soils

Percent of map unit: 3 percent

Hydric soil rating: No

Ln—Lindsay silt loam

Map Unit Setting

National map unit symbol: lfbq

Elevation: 390 to 680 feet

Mean annual precipitation: 43 to 58 inches

Mean annual air temperature: 45 to 68 degrees F

Frost-free period: 164 to 194 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Lindsay, occasionally flooded, and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lindside, Occasionally Flooded

Setting

Landform: Closed depressions, flood plains
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 2.00 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

Nolin

Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: No

Newark

Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: No

NhA—Nicholson silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: lfbt
Elevation: 460 to 670 feet

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Mean annual precipitation: 43 to 58 inches
Mean annual air temperature: 45 to 68 degrees F
Frost-free period: 164 to 194 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Nicholson and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nicholson

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 23 inches: silty clay loam
H3 - 23 to 42 inches: silty clay loam
H4 - 42 to 70 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 16 to 30 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: F122XY006KY - Moderately Well Drained Fragipan Uplands
Hydric soil rating: No

Minor Components

Lawrence

Percent of map unit: 5 percent
Landform: Stream terraces
Hydric soil rating: No

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

NhB—Nicholson silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: lfbv
Elevation: 410 to 790 feet
Mean annual precipitation: 43 to 58 inches
Mean annual air temperature: 45 to 68 degrees F
Frost-free period: 164 to 194 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Nicholson and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nicholson

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 23 inches: silty clay loam
H3 - 23 to 42 inches: silty clay loam
H4 - 42 to 70 inches: silty clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 16 to 30 inches to fragipan
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: F122XY006KY - Moderately Well Drained Fragipan Uplands
Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 5 percent
Hydric soil rating: No

Lawrence

Percent of map unit: 5 percent
Landform: Stream terraces
Hydric soil rating: No

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

No—Nolin silt loam

Map Unit Setting

National map unit symbol: lfbx
Elevation: 400 to 780 feet
Mean annual precipitation: 43 to 58 inches
Mean annual air temperature: 45 to 68 degrees F
Frost-free period: 164 to 194 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Nolin, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nolin, Occasionally Flooded

Setting

Landform: Closed depressions, flood plains
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Typical profile

H1 - 0 to 9 inches: silt loam
H2 - 9 to 63 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)
Depth to water table: About 36 to 63 inches
Frequency of flooding: Occasional

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Frequency of ponding: None

Available water supply, 0 to 60 inches: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C

Ecological site: F122XY016KY - Riverbank Loamy Alluvium

Hydric soil rating: No

Minor Components

Lindside

Percent of map unit: 5 percent

Landform: Flood plains

Hydric soil rating: No

Other soils

Percent of map unit: 5 percent

Hydric soil rating: No

PmA—Pembroke silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v5c2

Elevation: 480 to 720 feet

Mean annual precipitation: 41 to 59 inches

Mean annual air temperature: 45 to 69 degrees F

Frost-free period: 164 to 215 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Pembroke and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pembroke

Setting

Landform: Ridges

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

Ap - 0 to 9 inches: silt loam

Bt1 - 9 to 18 inches: silt loam

2Bt2 - 18 to 62 inches: silty clay loam

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2Bt3 - 62 to 79 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 1

Hydrologic Soil Group: B

Ecological site: F122XY004KY - Loess Veneered Uplands

Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 5 percent

Landform: Ridges

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Bedford

Percent of map unit: 4 percent

Landform: Ridges

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Nolin, occasionally flooded

Percent of map unit: 1 percent

Landform: Sinkholes

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: No

Baxter

Percent of map unit: 0 percent

Landform: Ridges

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

PmB—Pembroke silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2v5c1
Elevation: 290 to 1,290 feet
Mean annual precipitation: 39 to 60 inches
Mean annual air temperature: 45 to 69 degrees F
Frost-free period: 156 to 213 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pembroke and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pembroke

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over clayey residuum weathered from limestone

Typical profile

Ap - 0 to 9 inches: silt loam
Bt1 - 9 to 18 inches: silt loam
2Bt2 - 18 to 62 inches: silty clay loam
2Bt3 - 62 to 79 inches: silty clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F122XY004KY - Loess Veneered Uplands
Hydric soil rating: No

Minor Components

Crider

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bedford

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Nolin, occasionally flooded

Percent of map unit: 1 percent
Landform: Sinkholes
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Baxter

Percent of map unit: 0 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ro—Robertsville silt loam

Map Unit Setting

National map unit symbol: lfc5
Elevation: 410 to 700 feet
Mean annual precipitation: 43 to 58 inches
Mean annual air temperature: 45 to 68 degrees F
Frost-free period: 164 to 194 days
Farmland classification: Not prime farmland

Map Unit Composition

Robertsville, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Robertsville, Occasionally Flooded

Setting

Landform: Stream terraces, depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 16 inches: silt loam
H3 - 16 to 45 inches: silt loam
H4 - 45 to 66 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 12 to 20 inches to fragipan
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: F122XY013KY - Saturated Flats
Hydric soil rating: Yes

Minor Components

Melvin, occasionally flooded

Percent of map unit: 5 percent
Landform: Closed depressions, flood plains
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Lawrence

Percent of map unit: 5 percent
Landform: Stream terraces
Hydric soil rating: No

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the following National Soil Survey Handbook link: "[National Soil Survey Handbook](#)."

ABC soil

A soil having an A, a B, and a C horizon.

Ablation till

Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

AC soil

A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil

The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil

Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone

A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

Alluvial fan

A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium

Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Alpha,alpha-dipyridyl

A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

Animal unit month (AUM)

The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions

Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon

A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo

The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in unconsolidated material. It is usually dry but can be transformed into a temporary watercourse or short-lived torrent after heavy rain within the watershed.

Aspect

The direction toward which a slope faces. Also called slope aspect.

Association, soil

A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity)

The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low: 0 to 3

Low: 3 to 6

Moderate: 6 to 9

High: 9 to 12

Very high: More than 12

Backslope

The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp

A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

Badland

A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

Bajada

A broad, gently inclined alluvial piedmont slope extending from the base of a mountain range out into a basin and formed by the lateral coalescence of a series of alluvial fans. Typically, it has a broadly undulating transverse profile, parallel to the mountain front, resulting from the convexities of component fans. The term is generally restricted to constructional slopes of intermontane basins.

Basal area

The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation

The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology)

A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding plane

A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology)

from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedding system

A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock

The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography

A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace

A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum

Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout (map symbol)

A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed. The adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

Borrow pit (map symbol)

An open excavation from which soil and underlying material have been removed, usually for construction purposes.

Bottom land

An informal term loosely applied to various portions of a flood plain.

Boulders

Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks

A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

Breast height

An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management

Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte

An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

Cable yarding

A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil

A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche

A general term for a prominent zone of secondary carbonate accumulation in surficial materials in warm, subhumid to arid areas. Caliche is formed by both geologic and pedologic processes. Finely crystalline calcium carbonate forms a nearly continuous surface-coating and void-filling medium in geologic (parent) materials. Cementation ranges from weak in nonindurated forms to very strong in indurated forms. Other minerals (e.g., carbonates, silicate, and sulfate) may occur as accessory cements. Most petrocalcic horizons and some calcic horizons are caliche.

California bearing ratio (CBR)

The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy

The leafy crown of trees or shrubs. (See Crown.)

Canyon

A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

Capillary water

Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena

A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation

An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity

The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps

See Terracettes.

Cement rock

Shaly limestone used in the manufacture of cement.

Channery soil material

Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment

Control of unwanted vegetation through the use of chemicals.

Chiseling

Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Cirque

A steep-walled, semicircular or crescent-shaped, half-bowl-like recess or hollow, commonly situated at the head of a glaciated mountain valley or high on the side of a mountain. It was produced by the erosive activity of a mountain glacier. It commonly contains a small round lake (tarn).

Clay

As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions

See Redoximorphic features.

Clay film

A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clay spot (map symbol)

A spot where the surface texture is silty clay or clay in areas where the surface layer of the soils in the surrounding map unit is sandy loam, loam, silt loam, or coarser.

Claypan

A dense, compact subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. The layer restricts the downward movement of water through the soil. A claypan is commonly hard when dry and plastic and sticky when wet.

Climax plant community

The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil

Sand or loamy sand.

Cobble (or cobblestone)

A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material

Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility)

See Linear extensibility.

Colluvium

Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope

Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil

A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions

See Redoximorphic features.

Conglomerate

A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system

Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage

A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil

Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping

Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section

The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat)

A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

Corrosion (geomorphology)

A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations)

Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop

A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management

Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system

Growing crops according to a planned system of rotation and management practices.

Cross-slope farming

Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown

The upper part of a tree or shrub, including the living branches and their foliage.

Cryoturbate

A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying material.

Cuesta

An asymmetric ridge capped by resistant rock layers of slight or moderate dip (commonly less than 15 percent slopes); a type of homocline produced by differential erosion of interbedded resistant and weak rocks. A cuesta has a long, gentle slope on one side (dip slope) that roughly parallels the inclined beds; on the other side, it has a relatively short and steep or clifflike slope (scarp) that cuts through the tilted rocks.

Culmination of the mean annual increment (CMAI)

The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave

The walls of excavations tend to cave in or slough.

Decreasers

The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing

Postponing grazing or resting grazing land for a prescribed period.

Delta

A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer

A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depression, closed (map symbol)

A shallow, saucer-shaped area that is slightly lower on the landscape than the surrounding area and that does not have a natural outlet for surface drainage.

Depth, soil

Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Desert pavement

A natural, residual concentration or layer of wind-polished, closely packed gravel, boulders, and other rock fragments mantling a desert surface. It forms where wind action and sheetwash have removed all smaller particles or where rock fragments have migrated upward through sediments to the surface. It typically protects the finer grained underlying material from further erosion.

Diatomaceous earth

A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

Dip slope

A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace)

A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming

A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural)

Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface

Runoff, or surface flow of water, from an area.

Drainageway

A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Draw

A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

Drift

A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

Drumlin

A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

Duff

A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune

A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

Earthy fill

See Mine spoil.

Ecological site

An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation

The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation

A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit

Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Ephemeral stream

A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation

A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion

The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (accelerated)

Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion (geologic)

Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion pavement

A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

Erosion surface

A land surface shaped by the action of erosion, especially by running water.

Escarpment

A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Escarpment, bedrock (map symbol)

A relatively continuous and steep slope or cliff, produced by erosion or faulting, that breaks the general continuity of more gently sloping land surfaces. Exposed material is hard or soft bedrock.

Escarpment, nonbedrock (map symbol)

A relatively continuous and steep slope or cliff, generally produced by erosion but in some places produced by faulting, that breaks the continuity of more gently sloping land surfaces. Exposed earthy material is nonsoil or very shallow soil.

Esker

A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left

behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

Extrusive rock

Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.

Fallow

Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan remnant

A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Fertility, soil

The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat)

The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity

The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fill slope

A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil

Sandy clay, silty clay, or clay.

Firebreak

An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom

An obsolete, informal term loosely applied to the lowest flood-plain steps that are subject to regular flooding.

Flaggy soil material

Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone

A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain

The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms

A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain splay

A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

Flood-plain step

An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial

Of or pertaining to rivers or streams; produced by stream or river action.

Foothills

A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

Footslope

The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb

Any herbaceous plant not a grass or a sedge.

Forest cover

All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type

A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan

A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil

The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai

Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glaciofluvial deposits

Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

Glaciolacustrine deposits

Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

Gleyed soil

Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping

Growing crops in strips that grade toward a protected waterway.

Grassed waterway

A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel

Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravel pit (map symbol)

An open excavation from which soil and underlying material have been removed and used, without crushing, as a source of sand or gravel.

Gravelly soil material

Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gravelly spot (map symbol)

A spot where the surface layer has more than 35 percent, by volume, rock fragments that are mostly less than 3 inches in diameter in an area that has less than 15 percent rock fragments.

Green manure crop (agronomy)

A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water

Water filling all the unblocked pores of the material below the water table.

Gully (map symbol)

A small, steep-sided channel caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage whereas a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock

Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim

Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan

A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope (geomorphology)

A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat)

Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops

Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill

A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope

A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil

A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

Custom Soil Resource Report

O horizon: An organic layer of fresh and decaying plant residue.

L horizon: A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon: The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon: The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon: The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon: The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon: Soft, consolidated bedrock beneath the soil.

R layer: Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

M layer: A root-limiting subsoil layer consisting of nearly continuous, horizontally oriented, human-manufactured materials.

W layer: A layer of water within or beneath the soil.

Humus

The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups

Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock

Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation

The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil

A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers

Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration

The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity

The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate

The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate

The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

- Very low:* Less than 0.2
- Low:* 0.2 to 0.4
- Moderately low:* 0.4 to 0.75
- Moderate:* 0.75 to 1.25
- Moderately high:* 1.25 to 1.75
- High:* 1.75 to 2.5
- Very high:* More than 2.5

Interfluve

A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology)

A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream

A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders

On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions

See Redoximorphic features.

Irrigation

Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin: Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border: Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding: Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation: Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle): Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow: Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler: Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation: Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding: Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame

A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

Karst (topography)

A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

Knoll

A small, low, rounded hill rising above adjacent landforms.

Ksat

See Saturated hydraulic conductivity.

Lacustrine deposit

Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain

A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lake terrace

A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landfill (map symbol)

An area of accumulated waste products of human habitation, either above or below natural ground level.

Landslide

A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones

Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lava flow (map symbol)

A solidified, commonly lobate body of rock formed through lateral, surface outpouring of molten lava from a vent or fissure.

Leaching

The removal of soluble material from soil or other material by percolating water.

Levee (map symbol)

An embankment that confines or controls water, especially one built along the banks of a river to prevent overflow onto lowlands.

Linear extensibility

Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $1/3$ - or $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit

The moisture content at which the soil passes from a plastic to a liquid state.

Loam

Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess

Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength

The soil is not strong enough to support loads.

Low-residue crops

Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Marl

An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Marsh or swamp (map symbol)

A water-saturated, very poorly drained area that is intermittently or permanently covered by water. Sedges, cattails, and rushes are the dominant vegetation in marshes, and trees or shrubs are the dominant vegetation in swamps. Not used in map units where the named soils are poorly drained or very poorly drained.

Mass movement

A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses

See Redoximorphic features.

Meander belt

The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

Meander scar

A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

Meander scroll

One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment

Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil

Very fine sandy loam, loam, silt loam, or silt.

Mesa

A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

Metamorphic rock

Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

Mine or quarry (map symbol)

An open excavation from which soil and underlying material have been removed and in which bedrock is exposed. Also denotes surface openings to underground mines.

Mine spoil

An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil

Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage

Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area

A kind of map unit that has little or no natural soil and supports little or no vegetation.

Miscellaneous water (map symbol)

Small, constructed bodies of water that are used for industrial, sanitary, or mining applications and that contain water most of the year.

Moderately coarse textured soil

Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil

Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon

A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine

In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

Morphology, soil

The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil

Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mountain

A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can

occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Muck

Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mucky peat

See Hemic soil material.

Mudstone

A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

Munsell notation

A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon

A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil

A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules

See Redoximorphic features.

Nose slope (geomorphology)

A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant

Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter

Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

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Very low: Less than 0.5 percent

Low: 0.5 to 1.0 percent

Moderately low: 1.0 to 2.0 percent

Moderate: 2.0 to 4.0 percent

High: 4.0 to 8.0 percent

Very high: More than 8.0 percent

Outwash

Stratified and sorted sediments (chiefly sand and gravel) removed or “washed out” from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

Outwash plain

An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace

An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan

A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material

The unconsolidated organic and mineral material in which soil forms.

Peat

Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped

An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment

A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedon

The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation

The movement of water through the soil.

Perennial water (map symbol)

Small, natural or constructed lakes, ponds, or pits that contain water most of the year.

Permafrost

Ground, soil, or rock that remains at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

pH value

A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil

A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping

Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting

Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plastic limit

The moisture content at which a soil changes from semisolid to plastic.

Plasticity index

The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology)

A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Playa

The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff. Playa deposits are fine grained and may or may not have a high water table and saline conditions.

Plinthite

The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan

A compacted layer formed in the soil directly below the plowed layer.

Ponding

Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded

Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings

See Redoximorphic features.

Potential native plant community

See Climax plant community.

Potential rooting depth (effective rooting depth)

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning

Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil

The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil

A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use

Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and

promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland

Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil

A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid: Less than 3.5

Extremely acid: 3.5 to 4.4

Very strongly acid: 4.5 to 5.0

Strongly acid: 5.1 to 5.5

Moderately acid: 5.6 to 6.0

Slightly acid: 6.1 to 6.5

Neutral: 6.6 to 7.3

Slightly alkaline: 7.4 to 7.8

Moderately alkaline: 7.9 to 8.4

Strongly alkaline: 8.5 to 9.0

Very strongly alkaline: 9.1 and higher

Red beds

Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations

See Redoximorphic features.

Redoximorphic depletions

See Redoximorphic features.

Redoximorphic features

Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

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1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
 - A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
 - B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
 - C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
 - A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
 - B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix

See Redoximorphic features.

Regolith

All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief

The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material)

Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill

A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser

The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut

A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments

Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop (map symbol)

An exposure of bedrock at the surface of the earth. Not used where the named soils of the surrounding map unit are shallow over bedrock or where "Rock outcrop" is a named component of the map unit.

Root zone

The part of the soil that can be penetrated by plant roots.

Runoff

The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil

A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Saline spot (map symbol)

An area where the surface layer has an electrical conductivity of 8 mmhos/cm more than the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has an electrical conductivity of 2 mmhos/cm or less.

Sand

As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone

Sedimentary rock containing dominantly sand-sized particles.

Sandy spot (map symbol)

A spot where the surface layer is loamy fine sand or coarser in areas where the surface layer of the named soils in the surrounding map unit is very fine sandy loam or finer.

Sapric soil material (muck)

The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturated hydraulic conductivity (Ksat)

The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are:

Very high: 100 or more micrometers per second (14.17 or more inches per hour)

High: 10 to 100 micrometers per second (1.417 to 14.17 inches per hour)

Moderately high: 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour)

Moderately low: 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour)

Low: 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour)

Very low: Less than 0.01 micrometer per second (less than 0.001417 inch per hour).

To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

Saturation

Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification

The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock

A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum

A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil

A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Severely eroded spot (map symbol)

An area where, on the average, 75 percent or more of the original surface layer has been lost because of accelerated erosion. Not used in map units in which "severely eroded," "very severely eroded," or "gullied" is part of the map unit name.

Shale

Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion

The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Short, steep slope (map symbol)

A narrow area of soil having slopes that are at least two slope classes steeper than the slope class of the surrounding map unit.

Shoulder

The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell

The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Shrub-coppice dune

A small, streamlined dune that forms around brush and clump vegetation.

Side slope (geomorphology)

A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silica

A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio

The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt

As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone

An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils

Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole (map symbol)

A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

Site index

A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides (pedogenic)

Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slide or slip (map symbol)

A prominent landform scar or ridge caused by fairly recent mass movement or descent of earthy material resulting from failure of earth or rock under shear stress along one or several surfaces.

Slope

The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope alluvium

Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill

The slow filling of ponds, resulting from restricted water transmission in the soil.

Slow water movement

Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

Sodic (alkali) soil

A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodic spot (map symbol)

An area where the surface layer has a sodium adsorption ratio that is at least 10 more than that of the surface layer of the named soils in the surrounding map unit. The surface layer of the surrounding soils has a sodium adsorption ratio of 5 or less.

Sodicity

The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $\text{Ca}^{++} + \text{Mg}^{++}$. The degrees of sodicity and their respective ratios are:

Slight: Less than 13:1

Moderate: 13-30:1

Strong: More than 30:1

Sodium adsorption ratio (SAR)

A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock

Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil

A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates

Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand: 2.0 to 1.0

Coarse sand: 1.0 to 0.5

Medium sand: 0.5 to 0.25

Fine sand: 0.25 to 0.10

Very fine sand: 0.10 to 0.05

Silt: 0.05 to 0.002

Clay: Less than 0.002

Solum

The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Spoil area (map symbol)

A pile of earthy materials, either smoothed or uneven, resulting from human activity.

Stone line

In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones

Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony

Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stony spot (map symbol)

A spot where 0.01 to 0.1 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surrounding soil has no surface stones.

Strath terrace

A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace

One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping

Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil

The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are:

Platy: Flat and laminated

Prismatic: Vertically elongated and having flat tops

Columnar: Vertically elongated and having rounded tops

Angular blocky: Having faces that intersect at sharp angles (planes)

Subangular blocky: Having subrounded and planar faces (no sharp angles)

Granular: Small structural units with curved or very irregular faces

Structureless soil horizons are defined as follows:

Single grained: Entirely noncoherent (each grain by itself), as in loose sand

Massive: Occurring as a coherent mass

Stubble mulch

Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil

Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling

Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum

The part of the soil below the solum.

Subsurface layer

Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow

The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit

The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer

The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil

The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus

Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts

Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terminal moraine

An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

Terrace (conservation)

An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field

generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology)

A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Terracettes

Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

Texture, soil

The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer

Otherwise suitable soil material that is too thin for the specified use.

Till

Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

Till plain

An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

Tilth, soil

The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope

The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil

The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements

Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread

The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Tuff

A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

Upland

An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Valley fill

The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variiegation

Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve

A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very stony spot (map symbol)

A spot where 0.1 to 3.0 percent of the soil surface is covered by rock fragments that are more than 10 inches in diameter in areas where the surface of the surrounding soil is covered by less than 0.01 percent stones.

Water bars

Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering

All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded

Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wet spot (map symbol)

A somewhat poorly drained to very poorly drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit.

Wilting point (or permanent wilting point)

The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

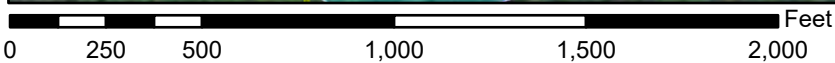
Windthrow

The uprooting and tipping over of trees by the wind.

National Flood Hazard Layer FIRMMette



87°31'7"W 36°41'2"N



1:6,000

87°30'30"W 36°40'33"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
MAP PANELS		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

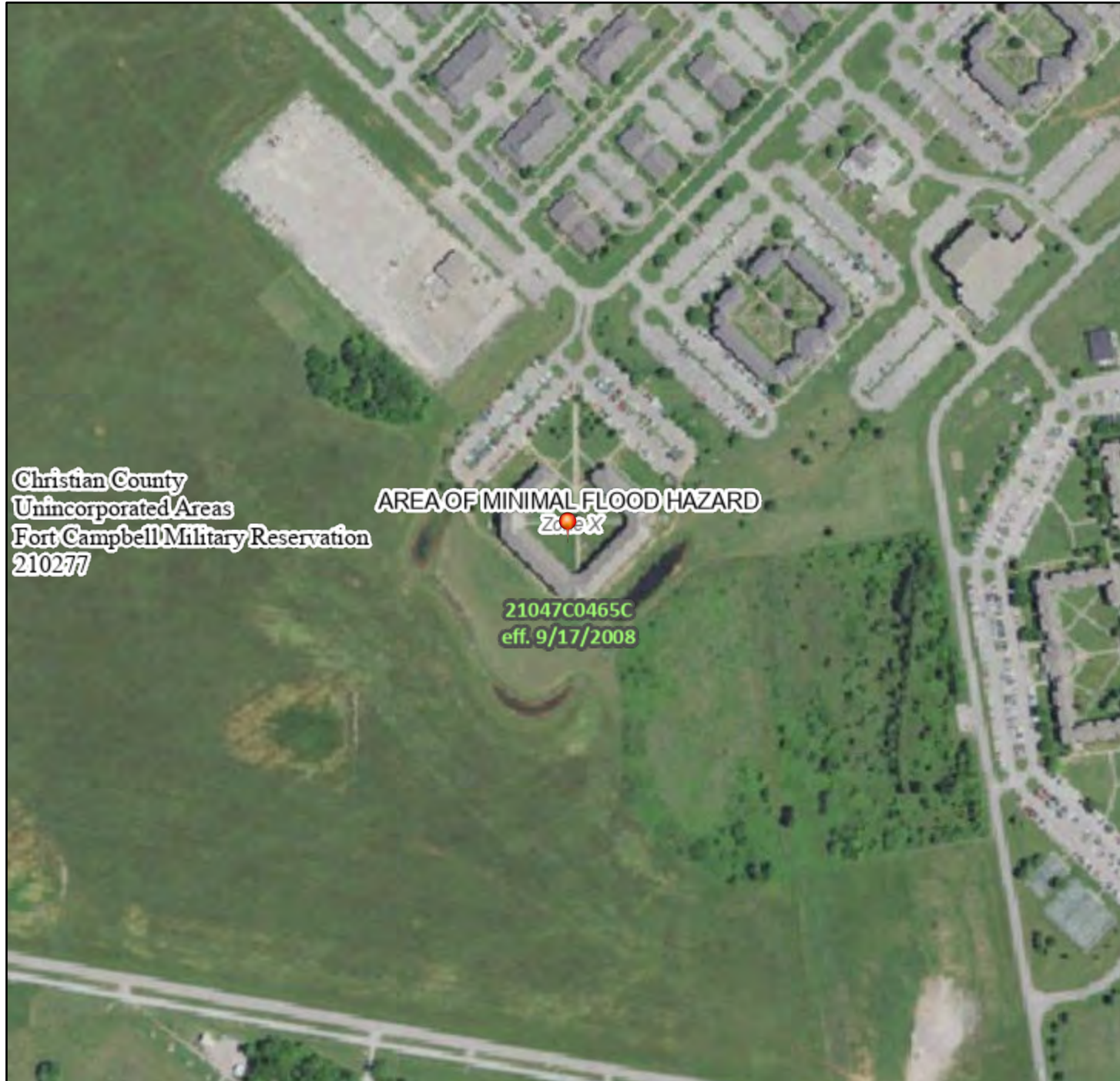
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/20/2025 at 7:31 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette



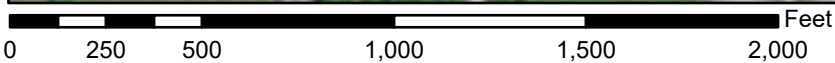
87°29'38"W 36°39'36"N



Christian County
Unincorporated Areas
Fort Campbell Military Reservation
210277

AREA OF MINIMAL FLOOD HAZARD
Zone X

21047C0465C
eff. 9/17/2008



1:6,000

87°29'W 36°39'7"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

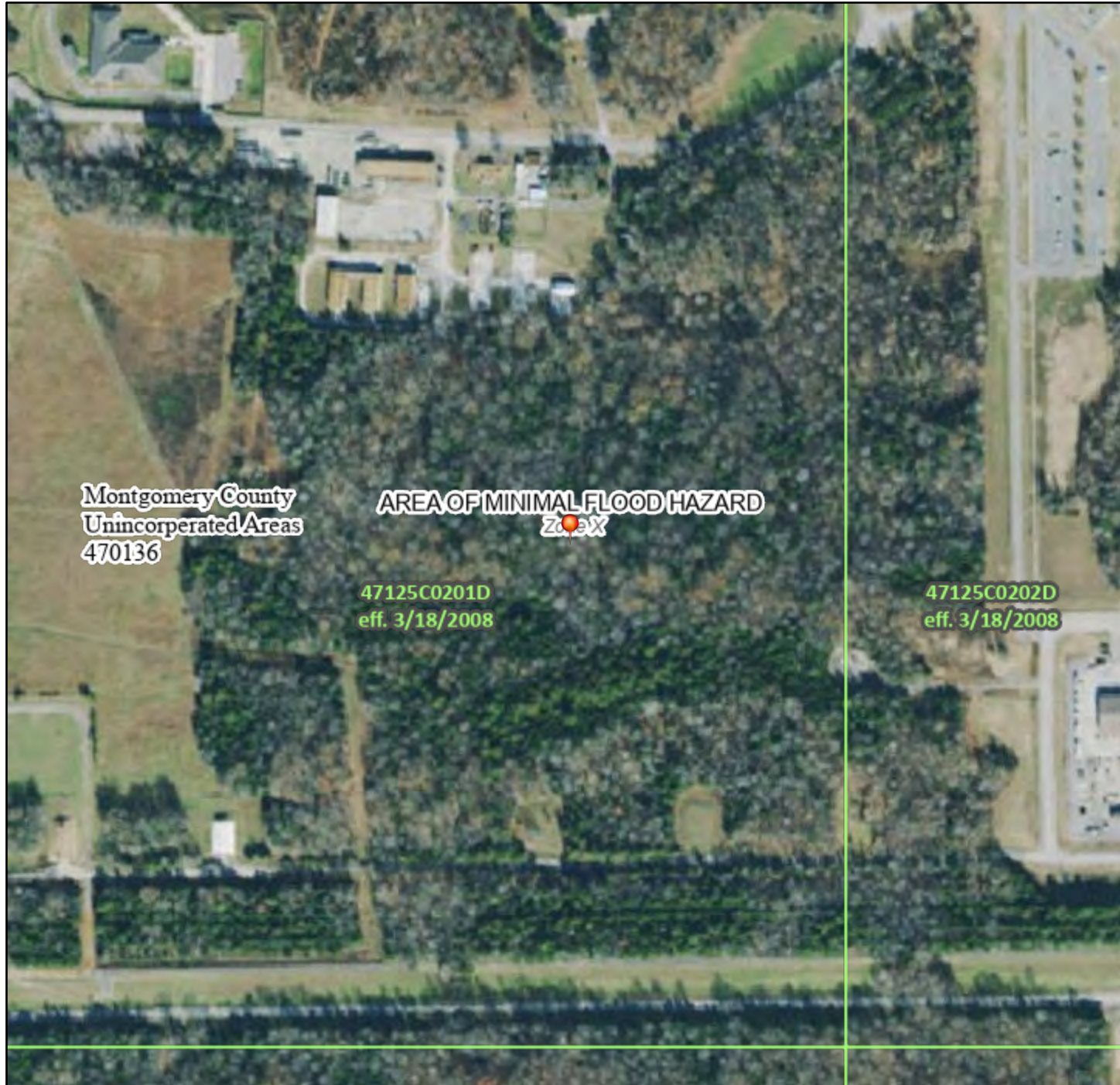
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/20/2025 at 7:29 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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National Flood Hazard Layer FIRMette



87°28'35"W 36°36'5"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
MAP PANELS		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/20/2025 at 7:28 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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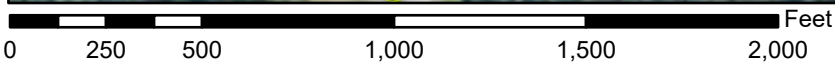
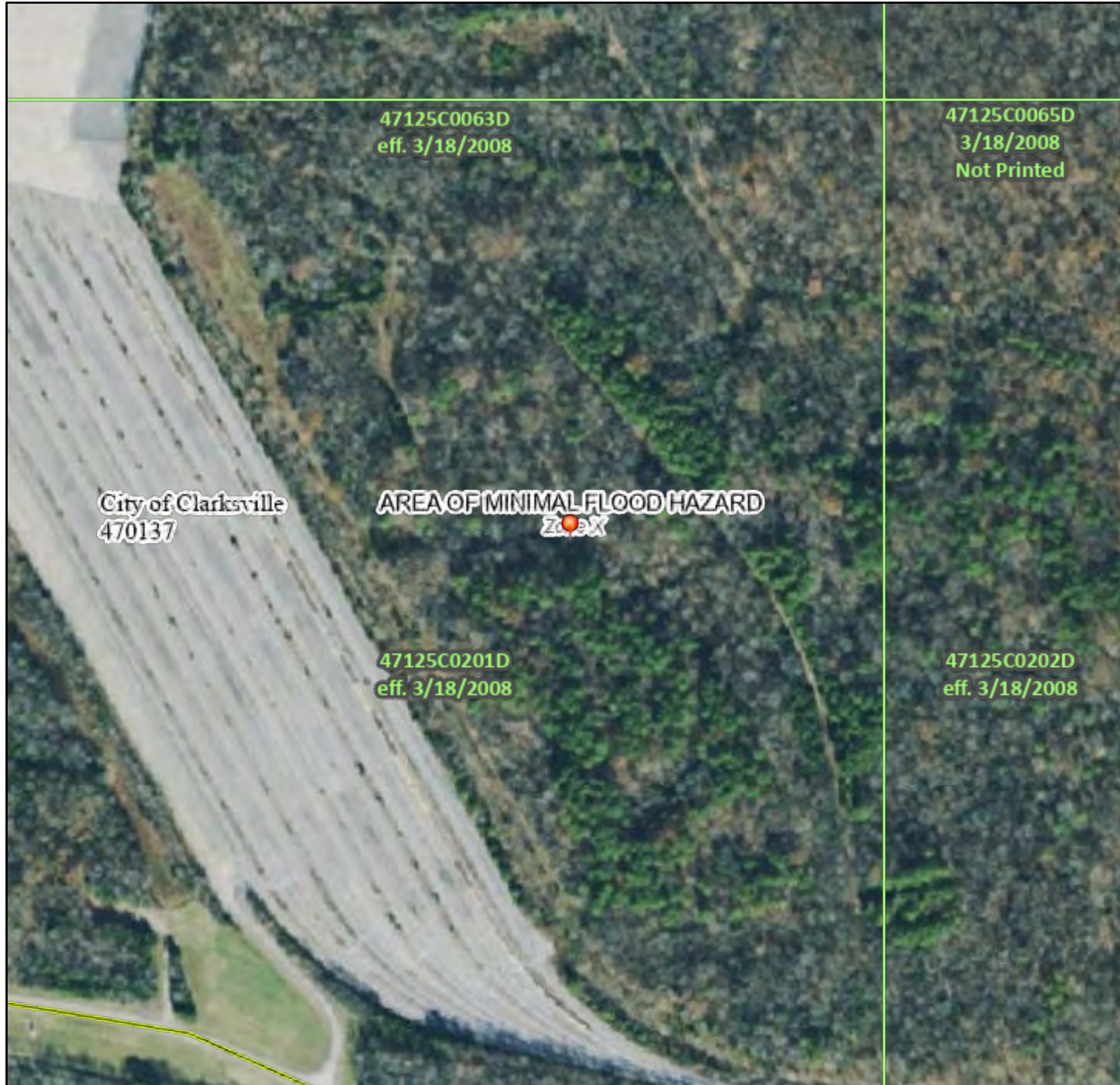


87°27'58"W 36°35'36"N

National Flood Hazard Layer FIRMMette



87°28'37"W 36°37'33"N



1:6,000

87°27'59"W 36°37'4"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- | | | |
|------------------------------------|--|--|
| SPECIAL FLOOD HAZARD AREAS | | Without Base Flood Elevation (BFE)
<i>Zone A, V, A99</i> |
| | | With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i> |
| | | Regulatory Floodway |
| OTHER AREAS OF FLOOD HAZARD | | 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i> |
| | | Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i> |
| | | Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i> |
| | | Area with Flood Risk due to Levee <i>Zone D</i> |
| OTHER AREAS | | NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i> |
| | | Effective LOMRs |
| GENERAL STRUCTURES | | Area of Undetermined Flood Hazard <i>Zone D</i> |
| | | Channel, Culvert, or Storm Sewer |
| | | Levee, Dike, or Floodwall |
| OTHER FEATURES | | 20.2 Cross Sections with 1% Annual Chance |
| | | 17.5 Water Surface Elevation |
| | | Coastal Transect |
| | | Base Flood Elevation Line (BFE) |
| | | Limit of Study |
| | | Jurisdiction Boundary |
| MAP PANELS | | Digital Data Available |
| | | No Digital Data Available |
| | | Unmapped |
| | | The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location. |



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

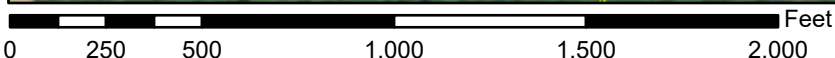
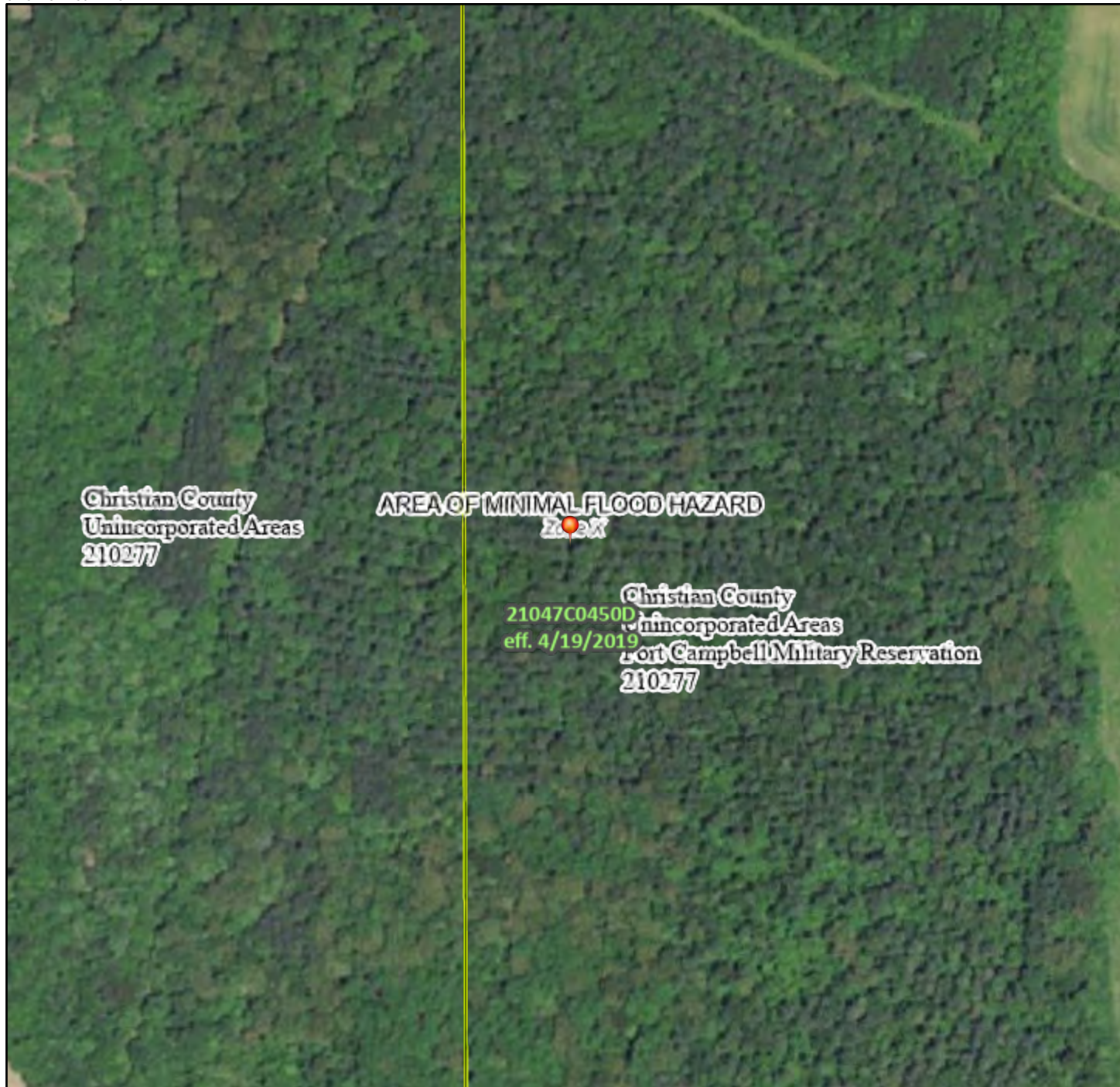
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/20/2025 at 7:27 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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National Flood Hazard Layer FIRMMette



87°31'15"W 36°41'13"N



1:6,000

87°30'37"W 36°40'44"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
MAP PANELS		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

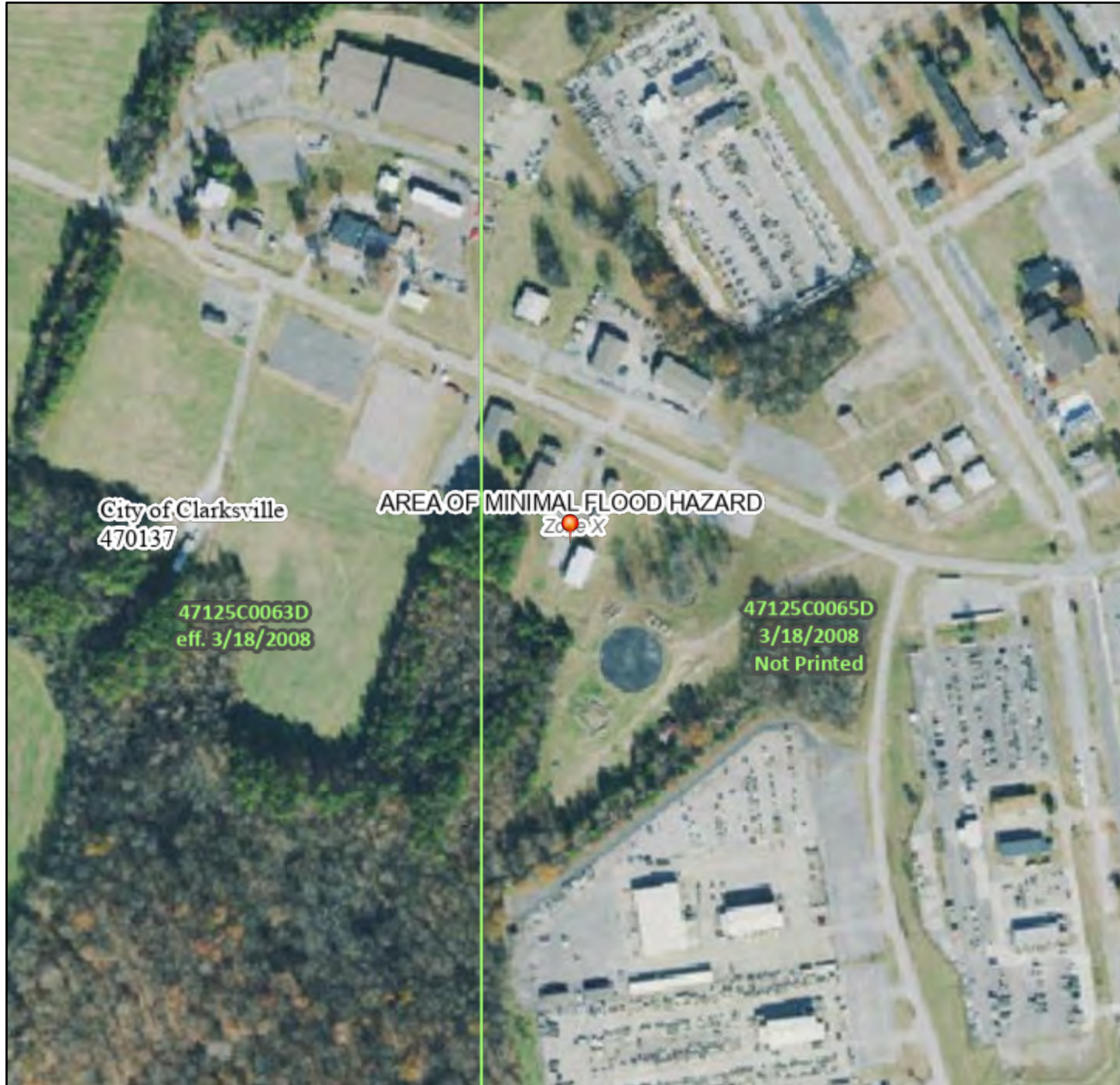
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/20/2025 at 7:25 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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National Flood Hazard Layer FIRMMette



87°28'23"W 36°38'21"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>

OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
		Area of Undetermined Flood Hazard <i>Zone D</i>

GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall

OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Profile Baseline
		Hydrographic Feature

MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

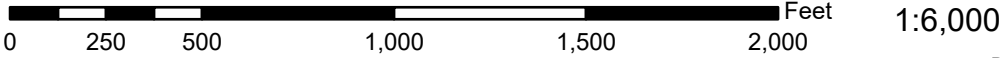


The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/20/2025 at 7:30 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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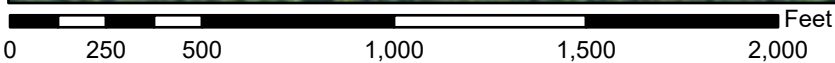
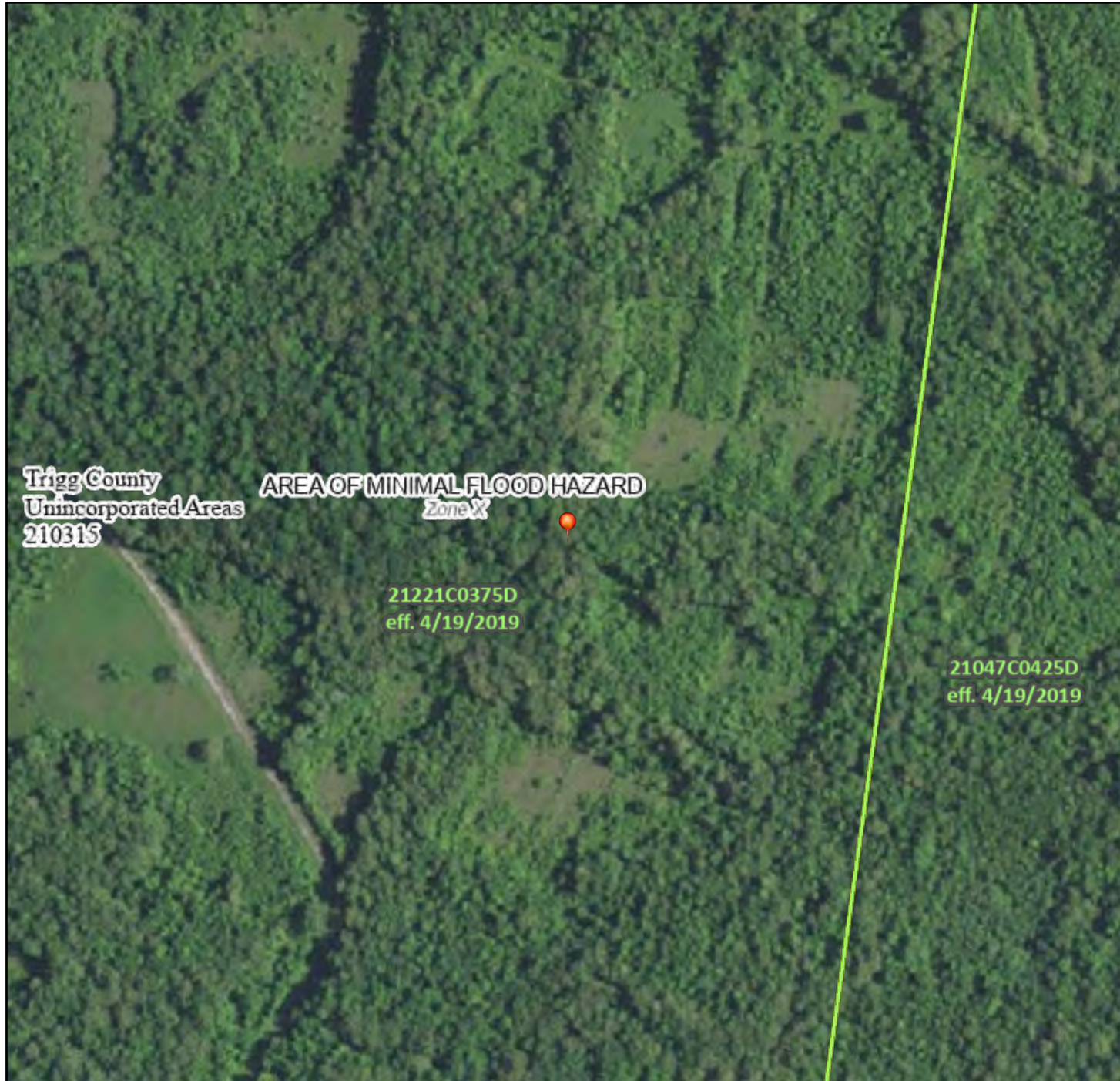


87°27'46"W 36°37'52"N

National Flood Hazard Layer FIRMMette



87°41'42"W 36°41'6"N



1:6,000

87°41'4"W 36°40'37"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

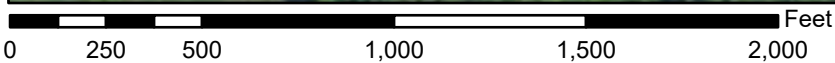
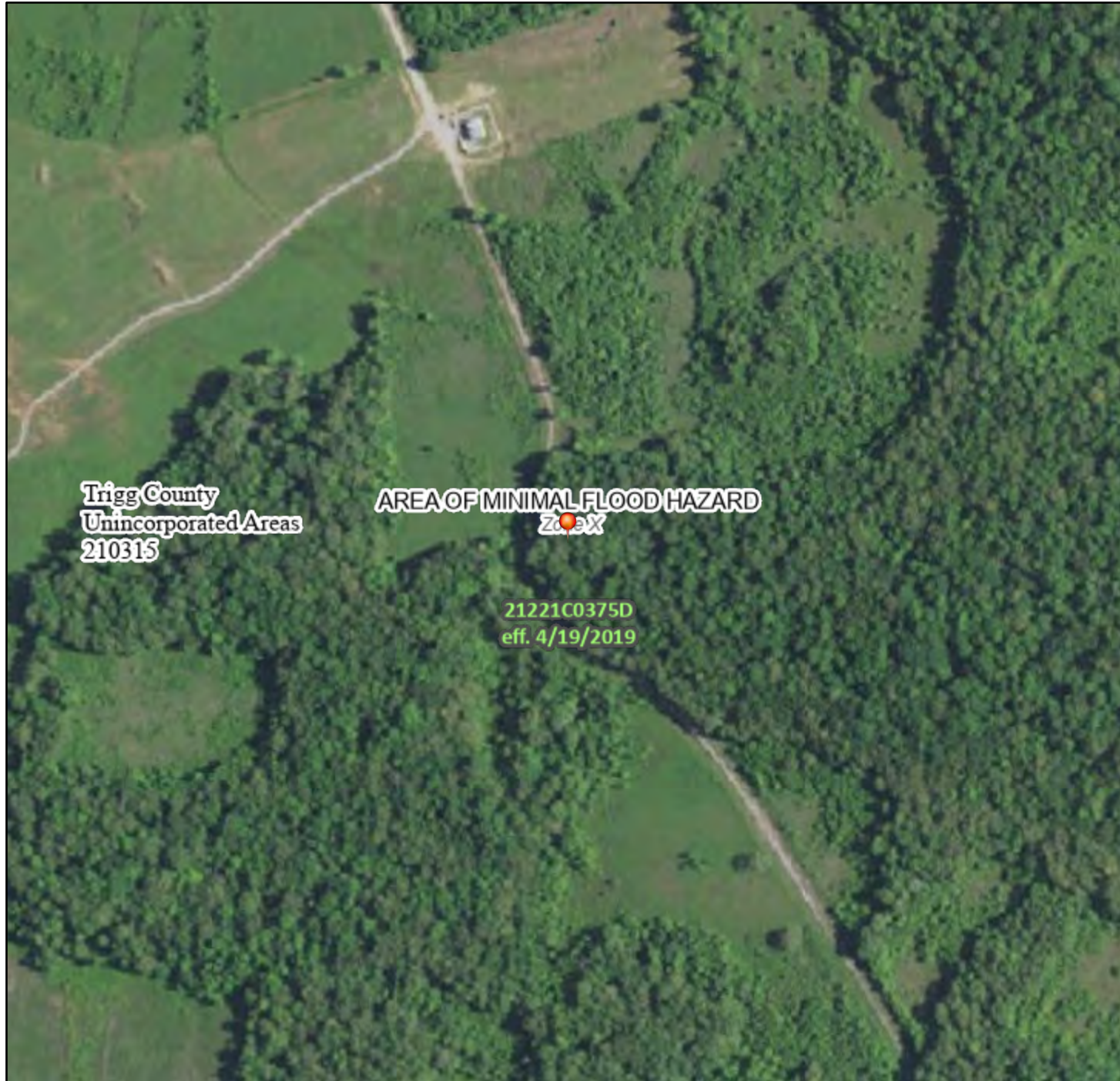
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/19/2025 at 7:29 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMMette



87°42'1"W 36°41'11"N



1:6,000

87°41'23"W 36°40'42"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



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The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/19/2025 at 7:33 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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March 19, 2025

Wetlands

- | | | | | | |
|---|--------------------------------|---|-----------------------------------|---|-------|
|  | Estuarine and Marine Deepwater |  | Freshwater Emergent Wetland |  | Lake |
|  | Estuarine and Marine Wetland |  | Freshwater Forested/Shrub Wetland |  | Other |
|  | Freshwater Pond |  | Riverine | | |

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.