Continental United States (CONUS) Interceptor Site

SECTION 3.4 – CRJMTC

Environmental Impact Statement Draft

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3.4.1 Air Quality – CRJMTC

An evaluation of the air quality environmental resource requires an evaluation of both the potentially affected environment, as well as the environmental consequences (including potential mitigation measures) of the potential CIS deployment at CRJMTC. The evaluation of the potentially affected environment provided in this section includes an assessment of existing climate and meteorology, air quality in the surrounding area, existing CRJMTC emissions sources, and air regulations potentially applicable to the potential CIS deployment should the decision be made to deploy and CRJMTC is selected. The evaluation of the environmental consequences and mitigation options provided in this section includes an assessment of impacts from construction and operation phases of the potential CIS deployment at CRJMTC.

3.4.1.1 Regulatory Framework – Air Quality - CRJMTC

The following section summarizes notable regulatory requirements, both at the federal and state levels, required to authorize construction and subsequent operation of the air emissions sources should the decision be made to deploy and CRJMTC is selected. The discussion here is intended to illustrate how the air permitting process, if undertaken at a later date, would assist in controlling the emissions to comply with all federal and state air quality regulations.

The federal air quality regulatory framework is laid out in the CAA, which originally became law in 1970 and was revised in 1977 and 1990. USEPA, which is charged with executing the CAA's requirements at the federal level, delegates much of the monitoring, enforcement, and permitting responsibilities stipulated by the CAA to individual states. Ohio's state air quality regulations, which adopt and incorporate various key federal regulations, are codified under the Ohio Administrative Code (OAC), in Chapters 3745-14 to 3745-26, 3745-31, 3745-71 to 3745-80, 3745-100 to 3745-105, 3745-108, 3745-109, and 3745-112 to 3745-114 and are enforced by the Ohio Environmental Protection Agency (OEPA). The notable state and federal air quality requirements identified as applicable to the potential CIS deployment at CRJMTC include:

- OAC Chapter 3745-31 – Permits to Install and Operate New Sources.
- Title V Operating Permits.
- Toxic Air Contaminants.
- NESHAPS.
- NSPS.

3.4.1.1.1 OAC Chapter 3745-31 – Permit to Install and Operate

A proposed new emissions source or a proposed modification to an existing emissions source is required to apply for and obtain an air construction permit prior to the commencement of construction. In Ohio, an air construction permit is known as a PTI for major stationary sources and a "Permit to Install and Operate" (PTIO) for minor stationary source installations; the applicability of each being based on the magnitude of projected new emissions. The construction of each emissions source included for the potential CIS deployment at CRJMTC would need to be authorized by a PTI/PTIO unless an exemption from the requirement to obtain a PTI/PTIO for a particular emissions source is applicable under the Ohio rules.

Major Source Permitting

NSR, which is outlined in the CAA, is the process that major stationary sources of air pollution or major modifications to major stationary sources must undergo in order to obtain an air construction permit to authorize their construction and initial operation. NSR is executed on a pollutant-by-pollutant basis and could take one of two paths for a given pollutant depending on whether a project is proposed to be located in an area not attaining the NAAQS (i.e., a non-attainment area) for one or more pollutants, or in an area that is in attainment of the NAAQS for a given pollutant. The following is a description of regulatory requirements for each path:

- Non-attainment New Source Review (NA NSR).
  - Federal rule codified at 40 CFR Part 51.165.
  - State rule outlined in OAC 3745-31-21 to 3745-31-27.
  - The requirements of NA NSR are designed to ensure that proposed major sources of air pollution do not impede a non-attainment area's progress towards improving air quality such that the NAAQS may eventually be attained.
- Prevention of Significant Deterioration New Source Review (PSD NSR) - for attainment areas.
  - Federal rule codified at 40 CFR Part 51.166.
  - State rule outlined in OAC 3745-31-10 to 3745-31-20.
  - The requirements of PSD NSR are designed to ensure that proposed major sources of air pollution do not cause significant deterioration of an area's air quality such that a violation of the NAAQS would occur.

As previously indicated, Portage County, Ohio, is currently designated as a marginal non-attainment area for the 2008 ozone and a maintenance area for the 2006 $PM_{2.5}$ NAAQS (USEPA, 2015c). As such, the potential CIS deployments' maximum potential annual emissions (i.e., PTE) of NO_X and VOCs (considered precursors to ground-level ozone formation) would be limited by the more stringent requirements of NA NSR (assuming they would be of a magnitude large enough to trigger the applicability threshold).

NA NSR Permitting. As previously indicated, the existing emission sources at CRJMTC include boilers and heaters that are used for heating purposes for existing on-base buildings. However, none of these air emissions sources currently require an air permit. Thus, should the decision be made to deploy and CRJMTC is selected, the potential CIS deployment would be considered a new stationary emissions source. As a new stationary source, NA NSR applicability for the project's emissions of NO_X and/or VOCs would be determined by comparing project's PTE (on an individual pollutant basis) to the marginal non-attainment area NA NSR major source threshold of 100 tpy.

Should the potential CIS deployment be applicable to NA NSR permitting requirements for its emissions of NO_X and/or VOCs, the following would be required:

- Application of the Lowest Achievable Emission Rate (LAER) technology regardless of cost;
- Compliance Certification - The applicant is required to certify that all existing major stationary sources owned and/or operated by the applicant are in compliance with all applicable emission limitations and standards under the CAA;
- An analysis demonstrating that the site, size, processes, and environmental controls proposed for the project outweigh possible alternatives on a basis of environmental and social costs;
- Acquisition of emissions (offsets) - Emissions offsets are credits for a permanent reduction or elimination of emissions of a non-attainment pollutant or its precursors/surrogates within the non-attainment area or an adjacent source region for the purpose of negating or reducing the impact of emissions produced due to the proposed installation. OAC 3745-31-26 stipulates that for marginal ozone non-attainment areas such as Portage County, offsets for NO_X and VOC emissions must be obtained at a ratio of 1.1:1.

For the remainder of criteria pollutants emitted by the facility (i.e., those pollutants for which the potential CIS deployment location is classified as in attainment of the NAAQS), the requirements of PSD NSR would be applicable to the potential CIS deployment at CRJMTC site should the project be applicable as a major stationary source (see the following paragraphs for discussion of PSD NSR permitting).

PSD Permitting. The existing air emission sources currently located at CRJMTC site are provided in Section 3.4.1.2.2 and are exempt from requiring an air permit. Thus, CRJMTC would be considered a new stationary emission source. PSD applicability for proposed new emission sources for criteria pollutants is determined by comparing a facility's maximum potential annual emissions (i.e., PTE) on a pollutant-by-pollutant basis against either a 100 tpy major source threshold for a facility that is one of the 28 sources listed in 40 CFR Part 68, or a 250 tpy major source threshold (for a source that is not one of the 28 sources listed in 40 CFR Part 68). Should the decision be made to deploy and CRJMTC is selected, the potential CIS deployment would not qualify as one of the 28 listed sources and, as such, the determination of whether it would constitute a PSD major source (thus triggering PSD NSR) is made by comparing it's PTE for each criteria pollutant (i.e., SO_2, CO, PM_{10}, $PM_{2.5}$) against the 250 tpy major source threshold. Should the CIS's PTE exceed the major source threshold for one or more pollutants, the project would be required to undergo PSD NSR for each of those pollutants. PSD NSR requires the following exercises and analyses:

- One year of preconstruction ambient air monitoring (potentially required if no existing monitor is found to be representative of the project location);
- Air Quality Impact Analyses using air dispersion models;
- Case-by-case BACT analysis;
- Additional Impact Analysis examining the project's impacts on visibility, soils, vegetation, and residential and industrial growth; and
- A demonstration that the project would not negatively impact the air quality and visibility at Federal Class I areas.

Emissions of GHG are also regulated under USEPA's PSD permitting rules and trigger PSD permitting under a separate major source threshold. Emission sources that exceed major source threshold(s) for one or more traditionally regulated pollutants (i.e., NO_x, VOC, PM_{10}, $PM_{2.5}$, CO, SO_2) and exceed separate GHG major source thresholds (New: 100,000 tpy/Modified: 75,000 tpy) are required to obtain a PSD and/or Title V permit for GHG emissions.

Minor Source Permitting

Should the project's PTE be less than the applicable major source threshold for each criteria pollutant, the project would be considered a minor source and would therefore not be required to undergo NA NSR or PSD NSR. In this case, the potential CIS deployment would require a minor source PTI if less than the NA NSR or PSD NSR thresholds but above 100 tpy, or a minor source PTIO if emissions remained below 100 tpy of each individual criteria pollutant.

3.4.1.1.2 Title V Operating Permit

Depending on the magnitude of emissions, the authorization of on-going operations would be handled via either a PTIO for minor sources or a major source Title V PTO. The need for a PTIO was discussed as part of the construction permitting process for minor sources.

Title V of the federal CAA, codified under 40 CFR Part 70, requires individual states to establish an air operating permit program. Ohio's Title V operating permit program is outlined in OAC Chapter 3745-77. The Title V PTO, which is required to authorize long term operation of a Title V major source, essentially combines all regulated emissions sources and their associated state and federal regulatory requirements at a facility into a single comprehensive permit. Title V major source applicability is determined by comparing a facility's total PTE against the following Title V major source thresholds[8]:

- 100 tpy of any criteria pollutant;
- 100 tpy GHG on a mass basis and 100,000 tpy GHG on a carbon dioxide equivalents CO_2e basis[9];
- 10 tpy of a single HAPs;
- 25 tpy of cumulative HAPs.

According to OAC Chapter 3745-31-02, long term operation of a project that is a non-Title V source (i.e. minor source) is authorized under the project's PTIO.

3.4.1.1.3 Toxic Air Contaminants

Ohio Revised Code (ORC) 3704.03(F) delegates authority to the OEPA to regulate the emissions of TACs via the requirement to obtain a permit to authorize the construction of a source of TACs (permits were discussed previously in Section 3.4.1.1.1). Ohio's list of TACs is maintained in OAC Chapter 3745-114-1. Facilities are required to conduct an analysis involving air dispersion modeling in order to demonstrate their emissions of TACs do not exceed the maximum acceptable ground level concentration (MAGLC), which is calculated in accordance with the methodology outlined in the OEPA document entitled, "Review of New Sources of Air Toxics Emissions, Option A." Should the results of this analysis indicate a project's emissions of a given TAC are 80 percent or more of the MAGLC, daily emissions limits equal to the modeled impacts may be imposed on the facility. Conversely, if the modeled impacts of a TAC are less than 80 percent of the MAGLC, a facility is required to submit an annual report verifying that the facility is operating within the parameters used in the modeling analysis.

3.4.1.1.4 National Emissions Standards for Hazardous Air Pollutants

Unlike permit authorizations which must be obtained prior to installing a new source of air emissions, there are other regulations that set standards which certain emissions units must meet regardless of major or minor source permit requirements. A certain set of such standards are addressed in Section 112 of the CAA regarding emissions of HAPs for major and certain area sources of HAP emissions. A major source of HAPs is a site that emits, or has the potential to emit, any single HAP at a rate of 10 tons or more per year, or any combination of HAPs at a rate

[8] Title V major source thresholds are more stringent than PSD major source thresholds for sources that are not included in the group of 28 listed sources (i.e., 100 tpy vs. 250 tpy). Additionally, Title V applicability considers emissions from every emissions source operating at a facility, whereas PSD applicability only considers sources included in a particular project (i.e., construction of new emissions source or modification of existing emissions source).

[9] Federal Title V permitting requirements cannot be applied to sources based solely on their GHG emissions. Rather, a source must exceed major source thresholds for at least one other regulated pollutant and GHG in order to be considered a major Title V source for GHGs.

of 25 tons or more per year. An area source of HAPs is a source that is not a major source of HAPs. For major sources, Section 112 requires the maximum degree of reduction in HAP emissions per standards that are commonly referred to as MACT standards. For area sources, GACT or management practices are used to reduce emissions of HAPs. These MACT/GACT standards are found in 40 CFR Part 63. Various NESHAPS, which could entail emissions limits, work and management practices, and/or reporting requirements, may be applicable to the proposed emissions sources included in the CIS design. One such notable emissions source would be the use of diesel generator engines for backup power generation.

3.4.1.1.5 New Source Performance Standards (NSPS)

Similar to the standards discussed previously, Section 111 of the CAA authorized the USEPA to develop technology-based standards which apply to specific categories of stationary sources for criteria pollutants. These standards are referred to as NSPS and are found in 40 CFR Part 60. NSPS establish minimum emissions control requirements, or "best demonstrated technology", for all facilities within a specified category. Various NSPS, which could entail emissions limits, work and management practices, and/or reporting requirements, may be applicable to the proposed emissions sources included in the potential CIS deployment's design. The diesel generator engines would be emission sources that may be subject to NSPS.

3.4.1.2 Affected Environment – Air Quality – CRJMTC

The following sections provide a description of the affected environment surrounding CRJMTC.

3.4.1.2.1 Climate and Meteorology

CRJMTC is located in northeast Ohio and experiences long cold winters and warm summers. Northeast Ohio generally has a humid continental climate interspersed with frequent intrusions of continental polar air throughout the year. Maritime polar air that originates over the Pacific Ocean also could make it to Ohio during most seasons. These air masses are carried over the Rocky Mountains by the predominant westerly upper level winds and are modified to continental polar air. This leads to mainly dry and mild to cool conditions, depending upon the season. Occasional arctic air is not uncommon during the cold season. The warm season features occasional continental tropical air. The continental tropical air originates in the southwestern U.S. and could bring periods of extreme heat to the region.

The continental tropical air often mixes with maritime tropical air from the Gulf of Mexico, thus creating periods of hot and humid conditions in the region. General weather conditions feature small temperature ranges during the winter with persistent cloudiness. The summer is generally warm, but prolonged periods of extreme heat are rare. Spring and fall are transitional periods. Temperatures are typically highly variable from season to season. A maximum high temperature of 104°F has been recorded in the region, with a coldest minimum regional temperature of -25°F (WRCC, 2014a). Average temperatures range from as low as 23.1°F in January, to as high as

69.8°F in July. The temperature exceeds 90°F on average 2.6 days per year during the summer period. During the cold season, air temperatures fall below 32°F an average of 143.2 days per year (NCDC, 2014g).

Precipitation amounts are spread evenly throughout the year (NWS, 2010; TAMU, 2014; NCDC, 2014a). The average precipitation for the area is 42.68 inches, 54 percent of which falls between May and October. There are approximately 155 days per year with at least 0.01 inch of precipitation recorded in the region. The area around CRJMTC averages 65.6 inches of snow per year, some of which is caused by lake effect snow off of Lake Erie (MRCC, 2012). The region averages 67.4 days per year with at least 1 inch of snow on the ground (WRCC, 2014a). The region also averages around 25 days per year with dense fog (1/4 mile or less) and 38 thunderstorm days per year (NCDC, 2014a).

Persistent winds are out of the southwest approximately 11 percent of the time. Winds are west-southwest just under 9 percent of the time. The average wind speed is 7.2 knots. The annual wind rose is provided on Figure 3.4.1-1 (NCDC, 2014d).

3.4.1.2.2 Regional Air Quality

This section provides a description of the existing air quality near CRJMTC.

Air Quality Standards

The CAA requires the USEPA to establish NAAQS. The USEPA developed these ambient air quality standards for six criteria pollutants: SO_2, CO, O_3, NO_x, Pb, and PM. PM includes two subspecies: particles with diameters less than or equal to 10 microns (PM_{10}) and particles with diameters less than or equal to 2.5 micrometers ($PM_{2.5}$). The NAAQS are based on total concentrations of criteria pollutants in the ambient air (i.e., outdoor air that is accessible to the public [40 CFR Part 50.1(e)]). The NAAQS are comprised of both primary and secondary standards. The primary standards protect the health of particularly vulnerable populations such as asthmatics, children, the sick, and the elderly. Secondary standards are welfare-based and protect against visibility decreases and damage to crops, animals, vegetation, and buildings (USEPA, 2014c).

In the State of Ohio, the OEPA is the responsible agency for monitoring air quality and assessing compliance with the NAAQS for each of the criteria pollutants. Table 3.4.1-1 lists the applicable NAAQS for each of the six criteria pollutants.

Table 3.4.1-1 National and Ohio Ambient Air Quality Standards - CRJMTC

Pollutant	Averaging Period	Primary Limit (Health Based) (µg/m^3)	Secondary Limit (Welfare Based) (µg/m^3)	NAAQS Basis
CO	1-Hour	40,000	---	High-2nd-High – Not to be exceeded (NTBE) more than once per year
CO	8-Hour	10,000	---	High-2nd-High - NTBE more than once per year
NO_X	1-Hour	188	---	98th percentile 3-Year average per receptor
NO_X	Annual	100	100	High-1st-High
PM_{10}	24-Hour	150	150	24-hour average NTBE more than once every 3 years
$PM_{2.5}$	24-Hour	35	35	98th percentile 3-year average
$PM_{2.5}$	Annual	12	15	High-1st-High Ave – Ann at mean averaged over 3-years Secondary is an annual mean
SO_2	1-Hour	196	---	99th percentile 3-year average
SO_2	3-Hour	--	1,300	NTBE more than once per year
SO_2	24-Hour	365	---	NTBE more than once per year
SO_2	Annual	80	---	NTBE
Ozone	1-hour	244	244	NTBE more than three times in 3 years
Ozone	8-hour	147	147	High-4st-High – 3-Year Average
Pb	Quarterly	0.15	0.15	Maximum 3-month rolling average
Source: USEPA, 2014c; OEPA, 2014c; ug/m3=micrograms per cubic meter.				

Existing Air Quality

The potential CIS deployment is entirely located within Portage County, Ohio, between Akron, and Warren. The air quality of the site is largely influenced by the nearby Cleveland, Akron, and Canton metropolitan areas, and, to a lesser degree, the Columbus, and Cincinnati metropolitan areas, which are both located southwest (upwind) of CRJMTC. Portage County is part of the Greater Metropolitan Cleveland Intrastate Air Quality Control Region.

Monitored ambient concentrations of criteria pollutants during the 2013 annual period for locations within Portage County or in counties near CRJMTC are listed in Table 3.4.1-2 (OEPA, 2014b). In some cases in which no data were available from a nearby representative county, data from the nearest monitor were used as a substitute. Data from the monitors are used to demonstrate attainment with the NAAQS and develop pollution control strategies.

Portage County is currently classified as a marginal nonattainment area for the 2008 8-hour ozone standard and a maintenance area for the 2006 24-hour $PM_{2.5}$ standard. A maintenance area is defined as a former nonattainment area that is now classified as in attainment; however, the maintenance area must implement certain required safeguards to help keep the area in attainment. Portage County is classified as attainment for all other criteria pollutants (USEPA, 2015c).

Existing Emission Sources

The existing emission sources at CRJMTC include three natural gas boilers, one propane boiler, and six large capacity field heaters that are used for heating purposes for existing on-base buildings. None of the existing emissions sources at CRJMTC are required to be permitted due to their low emissions or because of their categorization as "for heating purposes" and thus, are not required to submit emission reports to the OEPA. CRJMTC is also planning on installing a 300-kW diesel-fueled emergency backup generator that would be used to power a water booster station when there is a loss of the utility power to the facility. This generator is planned to be installed prior to the CIS.

Table 3.4.1-2 Monitored Ohio Background Concentrations - CRJMTC

Pollutant	Averaging Period	2013 Background ($\mu g/m^3$)	Standard Primary/ Secondary ($\mu g/m^3$)	Background Monitoring County
CO	1-Hour	1,514	40,760	Summit
CO	8-Hour	932	10,481	Summit
NO_X	1-Hour	96	191	Cuyahoga
NO_X	Annual	25	101	Cuyahoga
PM_{10}	24-Hour	32	150	Trumbull
$PM_{2.5}$	24-Hour	23.3	35	Portage
$PM_{2.5}$	Annual	10.4	12/15	Summit
SO_2	1-Hour	157	200	Summit
SO_2	3-Hour	--	--	--
SO_2	24-Hour	51	373	Summit
SO_2	Annual	8	80	Summit
Ozone	1-hour	148	239	Portage
Ozone	8-hour	116	150	Portage
Pb	Quarterly	0.01	0.15	Trumbull
Source: OEPA, 2014b; OEPA, 2014c.				

3.4.1.3 Environmental Consequences and Mitigation – Air Quality – CRJMTC

This section addresses the potential air quality impacts that would result from the construction and operation phases of the CIS, as well as the potential measures that could be undertaken to mitigate the air quality impacts.

It should be noted that operations impacts and mitigation analyses are provided for the baseline and expedited schedule. This is because the vehicle and equipment emission factors established by USEPA and industry vary by year. As such, emission estimates for operations that initiate in Year 6 (baseline) could differ from emission estimates for operations that initiate in Year 4 (expedited)

3.4.1.3.1 Construction - Baseline Schedule

Under implementation of the CIS, various types of site preparation and construction activities and their associated equipment would emit criteria air pollutants and GHGs. Therefore, if a decision is made to deploy and if CRJMTC is selected then construction of the CIS would cause some impact to the air quality; however, any such construction impacts would be temporary in nature. The following sections discuss the methods for assessing potential impacts, the types of potential impacts to the air quality surrounding CRJMTC, and possible mitigation measures for reducing such impacts for the baseline schedule.

3.4.1.3.1.1 Methods for Assessing Construction Impacts

<u>Factors Considered in Air Quality Impact Analysis</u>

The following key factors are typically considered in assessing the intensity and duration of construction-related air quality impacts:

- Construction activities (types, durations, etc.).
- Construction schedule.
- Construction equipment and vehicle emissions (types, number, duration of operation, etc.).

These factors were reviewed in evaluating the air quality impacts from construction of the CIS. Their contributions to the potential CIS deployment's air quality analysis modeling and any respective assumptions that were used in the analysis are further described in Section 3.4.1.3.1.2.

<u>Air Quality Impact Analysis Modeling</u>

The U.S. Air Force ACAM, Version 5.06 (USAF, 2016) was used in this analysis to estimate both the combustion and fugitive source emissions from potential construction activities. The ACAM model was utilized because it has the capability to develop an air emission estimate based on certain assumptions regarding the preliminary construction schedule, preliminary construction equipment list, and the total acreage disturbed.

3.4.1.3.1.2 Environmental Consequences

The type and extent of air quality impacts depend on various construction characteristics including activities, schedule, equipment, acreage of construction site disturbed, equipment emission characteristics, and other factors. These construction characteristics for the baseline schedule are described in greater detail in the following paragraphs.

Emission Sources

Emission Types. Generally, emissions of criteria pollutants (i.e., PM_{10}, $PM_{2.5}$, NO_x, SO_2, VOC, and CO) and GHGs (i.e., mostly CO_2) during construction activities would occur from one of two processes: (1) combustion of fuels in engines which propel or otherwise operate mobile or stationary construction equipment; or (2) fugitive dust activities which introduce particles into the air through the disturbance and movement of materials. In more project-specific terms, the air emissions from combustion of fuels in mobile engines (both on-road and non-road) during construction would be primarily driven by the following construction activities:

- Construction workers traveling from surrounding counties in the non-attainment/ maintenance area to and from the construction site.
- Trucks that travel through the non-attainment/maintenance area to and deliver construction materials to the construction site.
- Trucks that travel from the construction site through the non-attainment/maintenance area hauling soil and waste materials to a local disposal site.
- Operation of heavy equipment such as cranes, bulldozers, and scrapers.
- Use of support vehicles to transport materials around the construction site.
- Operation of other miscellaneous mobile fossil-fuel combustion sources such as generators necessary for construction activities.

Construction activities would also result in fugitive dust emissions (in the form of direct PM_{10} and $PM_{2.5}$ emissions) in the construction area and nearby surrounding area. In general, the levels of fugitive dust released depend on the type of construction activity, the level of activity conducted, the weather during the construction activity, and the composition of the soil disturbed. In more project-specific terms, the fugitive dust emissions during construction would be primarily caused by the following construction activities:

- Tree clearing.
- Ground clearing, grading, and excavation.
- Bulk handling of materials such as spoils, backfill, and aggregate.
- Disturbance from the movement of vehicle tires over paved and non-paved surfaces.

Air emissions from construction of the CIS could be further categorized as being either direct or indirect emissions. Both direct and indirect emissions are those emissions of criteria pollutants and precursors that are initiated by the federal approval of the CIS, originate in the non-attainment or maintenance area, and are reasonably foreseeable. Direct emissions are those that occur at the same time and place as the CIS. Air emissions resulting from operation of construction equipment, stationary emission sources (i.e., generators, air compressors, etc.), and other construction activities that occur at the construction site would be considered direct emissions.

Indirect emissions are those emissions that occur at a different time or place as the location of the CIS. Indirect air emission resulting from construction activities include worker vehicles, trucks that deliver dirt and construction materials to the construction site, and trucks that transport dirt and waste materials from the construction site to an off-base disposal site. These types of construction activities would have the potential to occur away from the CIS construction site and within the non-attainment/maintenance area.

Effects of Construction Schedule on Emissions Estimates. The construction of the CIS, which would include the initial deployment of up to 60 GBIs total and the associated buildings and components, would occur over approximately a 5-year period under the baseline construction schedule as discussed in Section 2.5.1. Design and permitting activities would occur throughout Year 1; however, tree and brush clearing would last 6 months starting in October of Year 1, referenced as Month 1 in this emission analysis. This would be followed by 12 months of site preparation activities, such as grading and cut and fill activities. The construction phase of the project (i.e., building foundations, erection of structures, and build-out) could last an additional 3 years after the site preparation phase. The emissions analysis assumed the following construction schedule:

- Tree Clearing: Months 1 through 6, beginning October of Year 1.
- Site Preparation: Months 7 through 18, beginning April of Year 2.
- Heavy/intrusive construction: Months 19 through 42, beginning April of Year 3.
- Build-out and completion: Months 43 through 54, beginning April of Year 5.

Construction Equipment. As the construction plan for the potential CIS deployment has not yet been developed, there is no detailed equipment list for the construction equipment. However, a preliminary equipment list was developed for the purpose of developing an air emission estimate for the construction of the CIS (see Appendix D.1). The preliminary equipment list was based on construction information from previous MDA projects similar to the potential CIS deployment. The preliminary construction list includes an inventory of the construction equipment (i.e., type and amount) and hours per day that the construction equipment would operate and be used to perform work. This preliminary equipment list and the assumptions listed previously were used as input into the ACAM model to estimate both the combustion and fugitive source emissions from tree clearing and brush, site preparation, and construction activities.

Construction Site Disturbance. Should the decision be made to deploy and CRJMTC is selected, the construction footprint for the potential CIS deployment would require approximately 941 acres and includes a lay-down area, GBI fields to accommodate up to 60 GBIs total, associated mission facilities, mission support structures, and the upgrade to certain roads. This analysis assumed the entire acreage for the CIS discussed previously would be graded. In reality, however, some of the acreage would not be graded or require construction activities, a factor which further supports this analysis as representing the upper bounds of the actual expected air emissions.

Emissions Estimates

Construction Equipment. The criteria air pollutant and GHG emissions from construction equipment during the construction of the CIS were estimated based on the inputs and assumptions pertaining to construction activities, preliminary construction schedule, preliminary equipment list, and acreage disturbed during construction. The emission factors utilized in ACAM for non-road construction equipment are specific to Portage County from USEPA's MOVES model (USEPA, 2014b). The fugitive and combustion source air emissions from construction equipment are provided in Table 3.4.1-3 for each year of construction.

Worker Vehicles. Vehicles transporting construction workers to and from the site on a daily basis would emit criteria pollutants and GHGs into the air shed surrounding the CIS. During each month of construction, the number of construction workers and site activation personnel would vary depending on the phases of the project, as well as the construction activities that would be conducted. The emissions estimate for worker vehicles traveling to CRJMTC site assumed 100 workers during tree and brush clearing, 400 workers during site preparation, 600 workers during 2 years of construction involving heavy/intrusive construction activities, and again 400 workers during the final year of construction that involves build-out. It was further assumed that the construction workers would travel 50 miles roundtrip 6 days per week with the vehicle types divided between 50 percent passenger cars and 50 percent light-duty trucks fueled by gasoline. Mobile emission factors used to estimate the emissions from worker vehicles were from the ACAM model, which utilizes emission factors for mobile on-road vehicles specific to Portage County from USEPA's MOVES model (USEPA, 2014b). The emission factors were used along with the other inputs to create an estimate of the worker vehicle emissions. The air emissions estimated from construction worker vehicles are provided in Table 3.4.1-3 for each year of construction.

Table 3.4.1-3 Estimated Annual Emissions from Construction Activities - Baseline Schedule - CRJMTC

Emission Activity [1][2][3]	Annual Period [4]					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
VOC (tons)						
Construction Equipment	0.23	3.75	4.83	4.93	1.69	0.16
Worker Vehicles	0.22	2.51	3.80	3.71	2.52	0.56
On-Road Haul/Delivery Trucks	0.10	0.35	0.32	0.29	0.27	0.07
Total Annual Emissions	0.6	6.6	8.9	8.9	4.5	0.8
CO (tons)						
Construction Equipment	1.12	19.42	24.15	24.21	10.48	1.49
Worker Vehicles	2.42	27.35	42.88	43.45	30.49	6.78
On-Road Haul/Delivery Trucks	0.35	1.27	1.17	1.07	0.99	0.25
Total Annual Emissions	3.9	48.0	68.2	68.7	42.0	8.5
PM_{10} (tons)						
Construction Equipment	0.09	4,405.27	1,469.7	1.76	0.53	0.03
Worker Vehicles	0.01	0.07	0.10	0.11	0.07	0.02
On-Road Haul/Delivery Trucks	0.05	0.16	0.14	0.12	0.10	0.03
Total Annual Emissions	0.1	4,405.5	1,469.9	2.0	0.7	0.1
$PM_{2.5}$ (tons)						
Construction Equipment	0.09	1.39	1.75	1.76	0.53	0.03
Worker Vehicles	0.01	0.06	0.09	0.09	0.07	0.01
On-Road Haul/Delivery Trucks	0.04	0.15	0.13	0.11	0.10	0.02
Total Annual Emissions	0.1	1.6	2.0	2.0	0.7	0.1
NO_x (tons)						
Construction Equipment	1.59	25.07	31.80	32.14	11.28	1.10
Worker Vehicles	0.27	2.57	3.74	3.52	2.30	0.51
On-Road Haul/Delivery Trucks	1.06	3.85	3.47	3.13	2.83	0.71
Total Annual Emissions	2.9	31.5	39.0	38.8	16.4	2.3
CO_2e [5] (metric tons)						
Construction Equipment	222	3,770	4,693	4,698	2,406	412
Worker Vehicles	163	2,062	3,396	3,602	2,625	583
On-Road Haul/Delivery Trucks	215	850	842	835	828	207
Total Annual Emissions	599	6,682	8,931	9,135	5,859	1,203
SO_2 (tons)						
Construction Equipment	0.003	0.045	0.055	0.055	0.028	0.005
Worker Vehicles	0.003	0.014	0.024	0.026	0.019	0.004
On-Road Haul/Delivery Trucks	0.002	0.008	0.008	0.008	0.008	0.002
Total Annual Emissions	0.01	0.07	0.09	0.09	0.06	0.01

Notes:
1. The annual air emissions of criteria pollutants for construction equipment include both fugitive and combustion source related emissions from non-road type construction equipment.
2. The annual emissions for worker vehicles are based on the maximum number of construction workers that would commute to and from CRJMTC for the construction phase of the CIS.
3. The annual emissions from on-road trucks represents the activities for heavy-duty trucks that 1) remove dirt, debris, and construction waste from CRJMTC to an off-base location and 2) deliver dirt and construction-related materials to CRJMTC.
4. The preliminary baseline schedule assumes that tree clearing would commence in October of Year 1 and last for 6 months. The start of site preparation activities commences during April of Year 2 and would last a full 12 months. The heavy intrusive construction activities would start during April of Year 3 and continue until March of Year 5. Build-out would start during April of Year 5 and continue until March of Year 6.
5. The air emissions of carbon dioxide equivalents are provided in metric tpy. The air emissions of criteria pollutants are provided in tpy.

Haul/Delivery Trucks. During tree and brush clearing, site preparation, and construction activities, there would be on-road trucks that remove dirt and other construction waste materials from the construction site and deliver them to off-base locations, as well as deliver dirt and construction materials needed for certain construction activities. For on-road haul/delivery trucks, the analysis assumed the following:

- The on-road haul/delivery trucks would make 90 trips per day.
- The on-road haul/delivery trucks would operate 6 days per week.
- The on-road haul/delivery trucks would travel a roundtrip distance of 20 miles for each trip.

The emission factors used to estimate the emissions from the on-road truck activities are from the U.S. Air Force ACAM. As discussed for the worker vehicle emissions, ACAM utilizes emission factors for heavy-duty trucks from USEPA's MOVES model. The emission factors for the on-road truck were used along with the other inputs to create an estimate of on-road truck emissions. The air emissions estimated from the on-road haul/delivery trucks is provided in Table 3.4.1-3 for each year of construction.

Air Quality Impacts

Should a decision be made to deploy and CRJMTC is selected, the CIS would be entirely located within the boundaries of Portage County, Ohio. The criteria pollutant and CO_2e emissions for Portage County are provided in Table 3.4.1-4. The annual emissions data for Portage County is from the NEI databases for the year 2011 (USEPA, 2013d). Table 3.4.1-4 also contains, for comparison purposes, the maximum annual emissions for each pollutant displayed in Table 3.4.1-3. Although there would be emissions that occur outside of Portage County due to worker commuting and delivery of equipment and materials, the magnitude of such emissions and associated impacts would be negligible compared to the Portage County emissions.

As illustrated in Table 3.4.1-4, the maximum annual emissions estimated for criteria pollutants and CO_2e from the construction of the CIS at CRJMTC would be a small percentage of the existing total emissions currently emitted within Portage County. The emissions of PM_{10} presented in Table 3.4.1-4 would be mostly associated with site grading activities that generate fugitive dust emissions during the site preparation phase of construction (Months 7-18). A best management plan for controlling fugitive dust emissions during construction would be developed and used to reduce the estimated PM_{10} air emissions. Overall, the air quality impacts from the construction of the CIS would be temporary, local to the construction area and nearby surrounding area, and would be small for each year of construction.

Table 3.4.1-4 Comparison Construction Emissions to Existing Portage County Annual Emissions – Baseline Schedule - CRJMTC

Location	Emissions (tons)						
	VOC	CO	PM_{10}	$PM_{2.5}$	NO_x	CO_2e	SO_2
Portage County (1)	9,257	30,577	4,839	1,316	6,601	1,506,783	171
CRJMTC Maximum Annual Emissions During Construction (2)	8.9	68.7	4,405.5	2.0	39.0	9,135	0.09
Percentage of CRJMTC Construction Emissions to Portage County Emissions	0.10	0.22	91.04	0.16	0.59	0.61	0.05

Notes:

1. Annual air emissions for Portage County are from USEPA's NEI database representing the 2011 annual period.
2. Maximum annual construction emissions for CRJMTC potential CIS deployment are the maximum emission values for each air pollutant from Table 3.4.1-3. CO_2e is given in metric tons.

Considerations for Greenhouse Gas

Table 3.4.1-3 provides the estimated annual emissions of CO_2e expected during construction of the potential CIS deployment at CRJMTC. The annual emissions of CO_2e included in this analysis would be generated by operation of non-road construction equipment, worker vehicles that commute to and from CRJMTC and on-road trucks that transport materials to and from CRJMTC for construction. The CEQ has published guidance that indicates when GHG emissions from a project warrant a quantitative analysis (CEQ, 2014). The CEQ has provided a reference point of 25,000 metric tons of CO_2e on annual bases, which indicates which projects are large enough to warrant a full quantitative GHG emission analysis. The estimated CO_2e annual emissions from construction are below 25,000 metric tons indicating the minor nature of the potential CIS deployment's GHG impacts and that a full quantitative emissions analysis of GHG is not required.

3.4.1.3.1.3 Mitigation

Because only minor impacts would occur, no mitigation would be required. BMPs would be implemented during construction to reduce any impacts to the air quality a. Examples of such measures could include, but not be limited to, the following:

- Re-vegetating disturbed areas.
- Properly maintaining construction vehicles and equipment.
- Mandating in contract for construction use of newer construction equipment or construction equipment retrofitted with exhaust control technologies.

- Using cleaner fuels in construction vehicles and equipment.
- Application of anti-idling procedures.

Although the construction activities would cause an increase in air pollutants, the impact would be both temporary and local to the construction area and surrounding area. The specific measures that could be used should be determined during the project's air permitting process.

3.4.1.3.2 Construction – Expedited Schedule

Another possibility for the potential CIS deployment could be to expedite the construction schedule and complete construction within 3 years. Under this expedited construction scenario certain assumptions discussed for the baseline schedule would change and result in different estimated annual air emissions.

The following sections discuss the methods for assessing potential impacts, the types of potential impacts to the air quality surrounding CRJMTC, and possible mitigation measures for reducing such impacts associated with the expedited schedule. The focus of the following discussion is relevant to the assumptions that change, would the expedited schedule be chosen for the potential CIS deployment.

3.4.1.3.2.1 Methods for Assessing Construction Impacts

The methods considered for assessing construction impacts for the expedited schedule are the same as those discussed for the baseline schedule.

3.4.1.3.2.2 Environmental Consequences

The assumptions and characteristics for the expedited schedule would be the same as that described in the baseline schedule except for those discussed in the following sections:

<u>Emission Sources</u>

Effects of Construction Schedule on Emissions Estimates. The expedited schedule assumes that construction of the CIS would be completed within approximately a 3 year period. The expedited schedule assumes that the final design and required air permits would be obtained during Year 1 (i.e., Months 1-3). The emissions analysis assumed the following expedited construction schedule:

- Tree clearing: Months 4 through 7, Begins January of Year 2.
- Site preparation: Months 8 through 14, Begins May of Year 2.
- Heavy/intrusive construction: Months 15 through 29, Begins December of Year 2.
- Buildout and completion: Months 30 through 36, begins March of Year 4.

The expedited schedule assumes that all construction activities would occur 7 days per week and with two 10-hour shifts per day.

Emissions Estimates

Construction Equipment. The construction equipment assumptions for the expedited schedule would be the same as that described in the baseline schedule, except for the number of hours per day each piece of equipment would operate on a daily basis and the number of days per week construction activities would occur. The expedited schedule assumes that construction activities would occur 7 days per week and with two 10-hour shifts per day. The preliminary equipment list that includes the number and hours per day for each type of construction equipment is contained in Appendix D.1. The fugitive and combustion source air emissions from construction equipment for the expedited schedule are provided in Table 3.4.1-5 for each year of construction.

Worker Vehicles. The expedited schedule assumes construction activities would occur 7 days per week and that two shifts per day would be necessary to complete the construction of the CIS within 3 years. The number of construction workers and site activation personnel for the expedited schedule is assumed to be twice the number of workers as discussed for the baseline schedule. The emissions estimate for worker vehicles traveling to CRJMTC each day of construction assumes 200 workers during tree and brush clearing, 800 workers during site preparation, 1,200 workers during heavy/intrusive construction activities, and 800 workers during buildout. The air emissions from worker vehicles are provided in Table 3.4.1-5 for each year of construction.

Haul/Delivery Trucks. The haul/delivery truck assumptions such as miles per trip and number of trips per day for the expedited schedule would remain the same as the baseline schedule. However, for the expedited schedule the haul/delivery truck would operate 7 days per week. The air emissions from haul/delivery trucks are provided in Table 3.4.1-5 for each year of construction.

Air Quality Impacts

The comparisons of the maximum annual emissions for each pollutant displayed in Table 3.4.1-5 to the Portage County emissions are provided in Table 3.4.1-6. As shown in Table 3.4.1-6, the maximum annual emissions estimated for criteria pollutants and CO_2e from construction of the potential CIS deployment at CRJMTC would be a small percentage of the existing total emissions currently emitted within Portage County. The unmitigated emissions of PM_{10} would be mostly associated with site grading activities during site preparation. A best management plan for controlling fugitive dust emissions during construction would be developed and used to reduce the estimated PM_{10} air emissions. Overall, the air quality impacts from the construction of the CIS would be temporary, local to the construction area and surrounding area, and would be minor for each year of construction.

Table 3.4.1-5 Estimated Annual Emissions from Construction Activities - Expedited Schedule - CRJMTC

Emission Activity (1)(2)(3)	Annual Period (4)		
	Year 2	Year 3	Year 4
	VOC (tons)		
Construction Equipment	7.71	13.80	2.54
Worker Vehicles	5.76	9.70	4.80
On-Road Haul/Delivery Trucks	0.41	0.38	0.26
Total Annual Emissions	13.9	23.9	7.6
	CO (tons)		
Construction Equipment	39.55	65.38	15.09
Worker Vehicles	62.69	109.45	56.17
On-Road Haul/Delivery Trucks	1.49	1.36	0.94
Total Annual Emissions	103.7	176.2	72.2
	PM_{10} (tons)		
Construction Equipment	3,917.40	1,962.38	0.82
Worker Vehicles	0.15	0.27	0.14
On-Road Haul/Delivery Trucks	0.19	0.16	0.11
Total Annual Emissions	3,917.7	1,962.8	1.1
	$PM_{2.5}$ (tons)		
Construction Equipment	2.84	5.10	0.82
Worker Vehicles	0.14	0.24	0.12
On-Road Haul/Delivery Trucks	0.17	0.15	0.10
Total Annual Emissions	3.2	5.5	1.0
	NO_x (tons)		
Construction Equipment	51.36	90.65	17.17
Worker Vehicles	5.89	9.55	4.55
On-Road Haul/Delivery Trucks	4.51	4.06	2.74
Total Annual Emissions	61.8	104.3	24.5
	CO_2e (5) (metric tons)		
Construction Equipment	8,102	10,996	4,032
Worker Vehicles	4,727	8,668	4,657
On-Road Haul/Delivery Trucks	995	985	731
Total Annual Emissions	13,823	20,649	9,419
	SO_2(tons)		
Construction Equipment	0.090	0.147	0.040
Worker Vehicles	0.032	0.060	0.033
On-Road Haul/Delivery Trucks	0.009	0.009	0.007
Total Annual Emissions	0.13	0.22	0.08

Notes:
1. The annual air emissions of criteria pollutants for construction equipment include both fugitive and combustion source related emissions from non-road type construction equipment.
2. The annual emissions for worker vehicles are based on the maximum number of construction workers that would commute to and from CRJMTC for the construction phase of the CIS.
3. The annual emissions from on-road trucks represents the activities for heavy-duty trucks that 1) remove dirt, debris, and construction waste from CRJMTC to an off-base location and 2) deliver dirt and construction-related materials to CRJMTC.
4. The preliminary expedited schedule assumes that tree clearing would commence in January of Year 2 and last for 4 months. The start of site preparation activities commences during May of Year 2 and would last 7 months. The heavy intrusive construction activities would start during December of Year 2 and continue until February of Year 4. Build-out would start during March of Year 4 and continue until September of Year 4.
5. The air emissions of carbon dioxide equivalents are provided in metric tpy. The air emissions of criteria pollutants are provided in tpy

Table 3.4.1-6 Comparison of Construction Emissions to Existing Portage County Annual Emissions - Expedited Schedule - CRJMTC

Location	Emissions (tons)						
	VOC	CO	PM_{10}	$PM_{2.5}$	NO_x	CO_2e	SO_2
Portage County [(1)]	9,257	30,577	4,839	1,316	6,601	1,506,783	171
CRJMTC Maximum Annual Emissions During Construction [(2)]	23.9	176.2	3,917.7	5.5	104.3	20,649	0.22
Percentage of CRJMTC Construction Emissions to Portage County Emissions	0.26	0.58	80.96	0.42	1.58	1.37	0.13

Notes:
1. Annual air emissions for Portage County are from USEPA's NEI database representing the 2011 annual period.
2. Maximum annual expedited construction emissions for CIS at CRJMTC are the maximum emission values for each air pollutant from Table 3.4.1-5. CO_2e is given in metric tons.

<u>Considerations for Greenhouse Gas</u>

Table 3.4.1-5 provides the estimated annual emissions of CO_2e associated with construction activities during the expedited construction schedule at CRJMTC. Although the expedited annual CO_2e emissions are higher in the expedited schedule than the emissions in the baseline schedule, they are still below the 25,000 metric tons recommended as a reference point by CEQ indicating that a full quantitative emissions analysis of GHG is not required.

3.4.1.3.2.3 Mitigation

Because only minor impacts would occur, no mitigation would be required. BMPS described for the baseline schedule would also be implemented during expedited construction schedule to reduce any impacts to the air quality.

3.4.1.3.3 Operation

If a decision is made to deploy and if CRJMTC is selected then stationary and mobile sources (both combustion and non-combustion) would emit both criteria and GHG air pollutants during each year of operation. The air pollutant emissions from operation of the CIS would be a long-term impact on an on-going annual basis; however, the impacts would be limited to the local and regional area. The following sections discuss the methods for assessing potential impacts, the types of potential impacts to the air quality surrounding CRJMTC, and possible mitigation measures for reducing such air quality impacts due for the baseline schedule to the operation.

3.4.1.3.3.1 Methods for Assessing Operation Impacts

Factors Considered in Air Quality Impact Analysis

The following key emission sources and factors were considered in assessing the intensity and duration of operation-related air quality impacts:

- Backup power plant operating characteristics.
- Comfort heating boiler.
- Commuter/work vehicles.
- Operation schedule.
- Fuel storage tanks.

The respective contributions of these factors to the project's air quality analysis modeling and any respective assumptions used in the analysis are further described in Section 3.4.1.3.2.2.

Air Quality Impact Analysis Modeling

The ACAM Version 5.06 (USAF, 2016) model was used in this analysis to estimate source emissions from operation. The ACAM model was utilized because it has the capability to develop an air emission estimate based on certain assumptions regarding the schedule, equipment and other variables.

3.4.1.3.3.2 Environmental Consequences

Air emissions from the operation of the CIS could be categorized as being either direct or indirect emissions. As previously indicated, both direct and indirect emissions are those emissions of criteria pollutants and precursors that are initiated by the federal approval of the CIS, originate in the non-attainment or maintenance area, and are reasonably foreseeable. Direct emissions are those that occur at the same time and place as the action project. Air emissions resulting from operation of the backup power plant, other stationary emission sources (i.e., generators, boilers, etc.), and fuel storage tanks would be considered direct emissions.

Indirect emissions are those emissions that occur at a different time or place as the location of the CIS. Indirect air emissions resulting from operation activities include operational staff vehicles that occur off-base. These types of operational activities have the potential to occur away from the potential CIS deployment site and within the non-attainment / maintenance area.

The following paragraphs describe the emission sources and assumptions for the baseline schedule that would produce direct and indirect emissions from operation of the CIS.

Power Plant and Heating Boiler

Commercial electrical power would be the primary source of power which would be supplied by off-base public power generation sources. The GBI fields and structures associated with the potential CIS deployment would, however, require backup power to ensure continuous operation abilities. The backup power would be supplied by four 3-MW RICE. The purpose of the backup RICE would be to provide power to the potential CIS deployment when utility power is lost or possibly when there is a potential for the power at the facility to be lost. The backup generators would be designed to handle backup power to operate up to 60 GBIs total.

The CIS would also include installation of a 7 MBtu diesel-fired boiler that would generate heat for the buildings and structures of the potential CIS deployment on an as-needed basis.

The air permitting effort for the four 3-MW backup RICE and comfort heating boiler would be conducted at a later time prior to construction to ensure compliance with all federal and state air permit regulations. The air permitting assessment would determine the categorization of the engines (i.e., emergency, non-emergency) as defined by the federal NESHAP[10] and NSPS[11] regulations that cover these types of engines. The categorization of the engines in combination with the air permitting assessment that would be conducted prior to construction of the CIS would determine the annual number of hours each engine would be allowed to operate. The permitting assessment would also determine any regulations that may be applicable to the diesel-fired comfort heating boiler. The following bullets provide the major assumptions currently used to estimate emissions for the four 3-MW engines and 7 MBtu comfort heating boiler planned for the CIS.

- The engines would be categorized as emergency engines (i.e., subject to, and therefore not exempt from, the applicable NSPS).
- The air emissions assessment used 500 hours per year of operation for the emergency engines based on USEPA guidance that indicates the number of hours per year an emergency engine could be expected to operate under worst case conditions , which includes hours for emergencies, emergency-related operations (i.e., maintenance and readiness testing), and non-emergency operations allowed by USEPA's regulations.
- The four 3-MW engines would be subject to the emission standards for Tier 2 engines manufactured after 2010 and greater than 900 kW, as prescribed in 40 CFR Part 89.112(a). Using these emissions factors to estimate the emissions from the four 3-MW engines is conservative because they are higher emission factors for NO_x, VOC, and $PM_{2.5}$ than using the emission standards for a Tier 4 engine, which are more stringent.
- The comfort heating boiler would be permitted to operate up to 8,760 hours per year.
- The air emissions estimate for the comfort heating boiler is based on emission factors for boilers with heat input of less than 100 MBtu/hr from USEPA's AP-42.

[10] 40 CFR Part 63, Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.
[11] 40 CFR Part 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

- The sulfur dioxide emission estimate was based on the assumption that the four 3-MW engines and comfort heating boiler would use ULSFO with a sulfur content of no more than 0.0015 percent.
- GHG emission factors for the engines and comfort heating boiler were based on emission factors contained in Tables C-1 and C-2 of 40 CFR Part 98, Subpart C.

Mobile Vehicles

During operation, various types of mobile vehicles would emit air pollutants. The potential mobile vehicle activities would primarily include staff arrivals and dismissals. The estimated emissions from the types of mobile vehicles and activities for the operation of the CIS were developed using emission factors derived from the ACAM model, which utilizes emission factors from USEPA's MOVES model (USEPA, 2014b). The emissions estimate for the mobile vehicles assumed the staff would travel 50 miles roundtrip with vehicle types divided between 50 percent passenger cars and 50 percent light-duty trucks fueled by gasoline. The vehicle emissions estimate was also based on the estimated maximum number of staff that would be expected to travel to and from CRJMTC per day, which is a total of 850 military, civilian and contractor support maintenance personnel. This provides a bounding estimate of potential air emissions emitted annually for the staff vehicles, because the analysis does not consider carpooling or the fact that not all staff would be required to travel to CRJMTC each day. The emission factors and inputs described previously were used to create an estimate of the potential staff vehicle emissions which are provided in Table 3.4.1-7 for each annual period of operation.

Fuel Storage Tanks

Each of the four 3-MW backup RICE would have dedicated ASTs ranging in capacity from approximately 300 to 1,500 gallons. Three larger fuel storage tanks (each 30,000 gallons) would also be built to store fuel for the backup RICE for longer term operations. The fuel storage tanks and associated fuel loading operations to fill the tanks would be fugitive sources of VOCs. Air emissions from storage tanks are created by breathing and working loss activities. Breathing losses are produced by pressure variations that occur as the temperature of the stored fuel changes based on ambient conditions. Working losses occur due to the filling of the storage tank or as liquid is withdrawn from the storage tank. The ACAM model was utilized to estimate potential fugitive VOC emissions from the AST and larger fuel storage tanks (USAF, 2015). Table 3.4.1-7 lists the estimated emissions of VOCs from the fuel storage tanks during operation of the action.

Table 3.4.1-7 Estimated Emissions from Operations - Baseline Schedule - CRJMTC

Emission Activity [1][2]	**Annual Period** [3]	
	Year 6	**Year 7**
	VOC(tons)	
Power Plant and Heating Boiler	31.79	42.39
Staff Vehicles	4.19	5.57
Fuel Storage Tanks	0.048	0.064
Total Annual Emissions	36.0	48.0
	CO (tons)	
Power Plant and Heating Boiler	18.20	24.27
Staff Vehicles	50.77	67.38
Fuel Storage Tanks	--	--
Total Annual Emissions	69.0	91.6
	PM_{10} (tons)	
Power Plant and Heating Boiler	1.27	1.69
Staff Vehicles	0.12	0.16
Fuel Storage Tanks	--	--
Total Annual Emissions	1.4	1.9
	$PM_{2.5}$ (tons)	
Power Plant and Heating Boiler	1.06	1.41
Staff Vehicles	0.11	0.15
Fuel Storage Tanks	--	--
Total Annual Emissions	1.3	1.6
	NO_x(tons)	
Power Plant and Heating Boiler	35.10	46.80
Staff Vehicles	3.83	5.08
Fuel Storage Tanks	--	--
Total Annual Emissions	38.9	51.9
	CO_2e [4] (metric tons)	
Power Plant and Heating Boiler	6,626	8,835
Staff Vehicles	4,370	5,800
Fuel Storage Tanks	--	--
Total Annual Emissions	10,997	14,636
	SO_2(tons)	
Power Plant and Heating Boiler	0.069	0.092
Staff Vehicles	0.032	0.043
Fuel Storage Tanks	--	--
Total Annual Emissions	0.10	0.13

Notes:

1. The annual emissions for vehicles are based on the maximum number of staff that would commute to and from CRJMTC for the operation of the CIS.
2. The preliminary baseline schedule assumes the start of operation would commence during April of Year 6.
3. The annual air emissions estimated for Year 7 are representative of a full year of operation of the CIS and does not include any concurrent future projects and as such represents emissions from all remaining years of operation.
4. The air emissions of carbon dioxide equivalents are provided in metric tpy. The air emissions of criteria pollutants are provided in tpy.

Schedule of Operation Activities

The air emission analysis for the baseline schedule assumed operation would begin during April of year 6, which is the month after construction of the potential CIS deployment would be completed. The operation of the CIS would be 24 hours per day for each day of the year.

Air Quality Impacts

Should the decision be made to deploy and CRJMTC be selected, the CIS would be entirely located within the boundaries of Portage County, Ohio. The criteria pollutant and CO_2e emissions for Portage County are provided in Table 3.4.1-8. The annual emissions data for Portage County were from the NEI databases for the year 2011 (USEPA, 2013d). Table 3.4.1-8 also contains, for comparison purposes, the maximum annual emissions for each pollutant from Table 3.4.1-7. The maximum annual emissions estimated for criteria pollutant and CO_2e from operation for the baseline schedule would be a small percentage of the existing total emissions currently emitted within Portage County. Overall, the air quality impacts from the operation of the potential CIS deployment would be minor for each year of operation.

Table 3.4.1-8 Comparison of Operation Emissions to Existing Portage County Annual Emissions - Baseline Schedule – CRJMTC

Location	Emissions (tons)						
	VOC	**CO**	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**CO_2e**	**SO_2**
Portage County (1)	9,257	30,577	4,839	1,316	6,601	1,506,783	171
CRJMTC Maximum Annual Emissions During Operation (2)	48.0	91.6	1.9	1.6	51.9	14.363	0.13
Percentage of CRJMTC Operation Emissions to Portage County Emissions	0.52	0.30	0.04	0.12	0.79	0.97	0.08

Notes:
1. Annual air emissions for Portage County are from USEPA's NEI database representing the 2011 annual period.
2. Maximum annual operation emissions for the potential CIS deployment at CRJMTC are the maximum emission values for each air pollutant from Table 3.4.1-7. CO_2e is given in metric tons.

Considerations for Greenhouse Gas

Table 3.4.1-7 provides the estimated annual emissions of CO_2e that would occur during operation of the CIS at the CRJMTC. The CEQ has published guidance that indicates when GHG emissions from a project warrant a quantitative analysis (CEQ, 2014). The CEQ has provided a reference point of 25,000 metric tons of CO_2e on annual basis, which indicates which projects are large enough to warrant a full quantitative GHG emission analysis. The estimated annual emissions from operation of the potential CIS deployment at CRJMTC for the baseline schedule would be below 25,000 metric tons indicating the minor nature of the CIS's GHG impact and that a full quantitative emissions analysis of GHG is not required.

Finally, the CIS would be required to obtain all required air permits at a later date that would allow operation of the emission sources associated with operation of the CIS. Ultimately the air operating permit that would be required for the CIS is stipulated by the CAA and the state's air regulations to prevent the degradation of the local and regional air quality. The air permits that could be required would ensure the CIS's air emissions would not cause the exceedance of the national and Ohio ambient air quality standards or conflict with any local or regional air quality management plans. Due to the nature of the air emissions for the CIS and the air quality regulations that would be applicable to the emissions sources, the impacts related to the operation phase of the CIS would be small.

3.4.1.3.3.3 Mitigation

Because only minor impacts would occur, no mitigation would be required. BMPs to reduce air quality impacts from emission sources during operation of the CIS would implemented. Examples of such measures could include maintaining equipment in working order, voluntarily accepting enforceable limits on the number of hours the power plant engines could operate per year, or installing air emission controls to the engines. However, the emission sources for the CIS deployment would be required to obtain the appropriate air operating permits and operate in accordance with all state and federal air quality regulations, which would ensure air quality impacts to the local and regional air quality from the CIS, would be small. The specific measures that would be used should be determined during the air permitting process.

3.4.1.3.4 Operation – Expedited Schedule

The following sections discuss the methods for assessing potential impacts, the types of potential impacts to the air quality surrounding CRJMTC, and mitigation measures for reducing such impacts due to operation of the CIS with the expedited schedule. The focus of the discussion below is relevant to the assumptions and characteristics that change, would the expedited schedule be chosen for the CIS.

3.4.1.3.4.1 Methods for Assessing Operation Impacts

The methods considered for assessing air quality impacts during operation for the expedited schedule are the same as those discussed for the baseline schedule.

3.4.1.3.4.2 Environmental Consequences

The assumptions and characteristics for the expedited schedule would be the same as that described in the baseline schedule except for certain assumptions regarding when operation would commence.

The following paragraphs describe the changes in the assumptions and characteristics associated with the expedited schedule.

Schedule of Operation Activities

The expedited schedule assumes that construction of the CIS would be completed within approximately a 3-year period. The expedited schedule assumes construction of the CIS could be completed during September of Year 4 and that operation could begin the month after construction ends, which would be October of Year 4. The first full year of operation is expected to be during Year 5. The total estimated air emissions for the expedited schedule are provided in Table 3.4.1-9.

Mobile Vehicles

The assumptions for mobile vehicles for the expedited schedule are the same as those used in the baseline schedule, except for the emission factors used to estimate air emissions from mobile vehicles. The emission factors for the operation staff vehicles traveling to and from the CRJMTC site from ACAM reduce slightly in future annual periods. It is assumed that the start year of operation for the expedited schedule would be earlier than the baseline schedule; as such the air emission estimate uses different emission factors for the mobile equipment. The total estimated air emissions from mobile vehicles for the expedited schedule are provided in Table 3.4.1-9.

Air Quality Impacts

Table 3.4.1-10 contains the comparison of the maximum annual emissions for each pollutant displayed in Table 3.4.1-9 with the Portage County existing air emissions. As illustrated in the table, although the estimated annual emissions are higher with the expedited schedule, they would be a small percentage of the existing total emissions currently emitted within Portage County. The air quality impacts during operation for the expedited schedule are the same as those discussed for the baseline schedule.

Considerations for Greenhouse Gas

Table 3.4.1-9 provides the estimated annual emissions of CO_2e associated for operational activities during the expedited construction schedule of the CIS at CRJMTC. Although the expedited annual CO_2e emissions are slightly higher in the expedited schedule than the emissions in the baseline schedule, they are still below the 25,000 metric tons indicating that a full quantitative emissions analysis of GHG is not required.

Table 3.4.1-9 Estimated Emissions from Operation - Expedited Schedule - CRJMTC

Emission Activity [(1)(2)(3)]	Annual Period [(3)]	
	Year 4	Year 5
	VOC (tons)	
Power Plant and Heating Boiler	10.60	42.39
Staff Vehicles	1.55	6.16
Fuel Storage Tanks	0.02	0.06
Total Annual Emissions	12.2	48.6
	CO (tons)	
Power Plant and Heating Boiler	6.07	24.27
Staff Vehicles	18.15	72.01
Fuel Storage Tanks	--	--
Total Annual Emissions	24.2	96.3
	PM_{10} (tons)	
Power Plant and Heating Boiler	0.42	1.69
Staff Vehicles	0.05	0.38
Fuel Storage Tanks	--	--
Total Annual Emissions	0.5	2.1
	$PM_{2.5}$ (tons)	
Power Plant and Heating Boiler	0.35	1.41
Staff Vehicles	0.04	0.33
Fuel Storage Tanks	--	--
Total Annual Emissions	0.4	1.7
	NO_x (tons)	
Power Plant and Heating Boiler	11.70	46.80
Staff Vehicles	1.47	12.35
Fuel Storage Tanks	--	--
Total Annual Emissions	13.2	59.2
	CO_2e [(4)] (metric tons)	
Power Plant and Heating Boiler	2,209	8,835
Staff Vehicles	1,505	12,642
Fuel Storage Tanks	--	--
Total Annual Emissions	3,714	21,478
	SO_2 (tons)	
Power Plant and Heating Boiler	0.023	0.092
Staff Vehicles	0.011	0.091
Fuel Storage Tanks	--	--
Total Annual Emissions	0.03	0.13

Notes:

1. The annual emissions for vehicles are based on the maximum number of staff that would commute to and from CRJMTC for the operation of the CIS.
2. The preliminary expedited schedule assumes the start of operation would commence during October of Year 4.
3. The annual air emissions estimated for Year 5 are representative of a full year of operation of the CIS and does not include any concurrent future projects and as such represents emissions from all remaining years of operation.
4. The air emissions of carbon dioxide equivalents are provided in metric tpy. The air emissions of criteria pollutants are provided in tpy.

Table 3.4.1-10 Comparison of Operation Emissions to Existing Portage County Annual Emissions- Expedited Schedule - CRJMTC

Location	Emissions (tons)						
	VOC	CO	PM_{10}	$PM_{2.5}$	NO_x	CO_2e	SO_2
Portage County (1)	9,257	30,577	4,839	1,316	6,601	1,506,783	171
CRJMTC Maximum Annual Emissions During Operation (2)	48.6	96.3	2.1	1.7	59.2	21,478	0.13
Percentage of CRJMTC Operation Emissions to Portage County Emissions	0.53	0.31	0.04	0.12	0.80	0.98	0.08

Notes:
1. Annual air emissions for Portage County are from USEPA's NEI database representing the 2011 annual period.
2. Maximum annual expedited operation emissions for CRJMTC potential CIS deployment are the maximum emission values for each air pollutant from Table 3.4.1-9. CO_2e is given in metric tons.

3.4.1.3.4.3 Mitigation

No major impacts requiring mitigation would occur. BMPs would be implemented to reduce air quality impacts from emission sources during operation of the potential deployment. The operation BMPs for air quality for the expedited schedule would be the same as those described for the baseline schedule.

3.4.1.3.5 General Conformity Related Discussion – Air Quality - CRJMTC

The CAA requires federal agencies to ensure their actions (i.e., license, permit, or approval) conform the applicable SIP. The purpose of the conformity regulation is to ensure federal actions: (1) do not interfere with the SIP; (2) do not cause or contribute to new violations of the NAAQS; and (3) do not impede the ability to attain or maintain the NAAQS. The SIP is a plan that provides for implementation, maintenance, and enforcement of the NAAQS, and includes emission budgets and control measure to attain (for non-attainment areas) and maintain (for maintenance areas) the NAAQS. 40 CFR Part 93, Subpart B requires that a federal action undergo a general conformity determination for non-attainment or maintenance areas[12] where the emissions of the affected criteria pollutant or its precursor(s) would be equal or exceed emission thresholds set forth in the regulation.

[12] For areas that were non-attainment but have attained the NAAQS, EPA requires as part of the re-designation process that states develop a 10-year plan (i.e. SIP) to ensure maintenance (or continued attainment) of the NAAQS. During this 10-year period these re-designated areas are known as maintenance areas.

The CIS would be constructed within Portage County, which, as discussed previously, is designated by USEPA as a marginal non-attainment area with the 2008 8-hour ozone standard and a maintenance area with respect to the 2006 $PM_{2.5}$ standard. As such, a general conformity determination would be required for this federal action if the CIS-related emissions of the non-attainment and maintenance area pollutants or their precursors (i.e. $PM_{2.5}$, NO_x, SO_2, or VOC) equal or exceed the conformity determination thresholds stated in 40 CFR Parts 93.153(b)(1) and 93.153(b)(2) on a pollutant-by-pollutant basis. This estimate of emissions is also known as the conformity applicability analysis and determines if 40 CFR Part 93, Subpart B is triggered and a general conformity determination is required for the potential CIS deployment.

3.4.1.3.5.1 Baseline Schedule

The annual air emissions for the baseline schedule from construction and operation of the potential CIS deployment were developed and discussed in previous sections. Table 3.4.1-11 shows the comparison of the estimated total direct and indirect air emissions associated for the baseline schedule from construction and operation of the CIS with the general conformity thresholds. The table demonstrates that the direct and indirect air emissions during each calendar year of construction and operation would be expected to be below the general conformity thresholds, which indicates the project would not be required to undergo a general conformity determination for the baseline schedule.

Also, because the estimated air emissions for the baseline schedule from construction and operation of the CIS would not exceed the general conformity thresholds, the project should not need to apply mitigation or offsets that are prescribed by the general conformity regulation.

3.4.1.3.5.2 Expedited Schedule

The annual air emissions for the expedited schedule from construction and operation of the CIS were developed and discussed in previous sections. Table 3.4.1-12 shows the comparison of the estimated total direct and indirect air emissions associated with the expedited schedule from construction and operation of the CIS with the general conformity thresholds. The table demonstrates that the direct and indirect air emissions of NO_x for Year 3 (construction) would be expected to exceed the general conformity thresholds, which indicates the project would be required to undergo a general conformity determination for these pollutants. Should the decision be made to deploy and CRJMTC be selected, MDA would comply with the requirements of the general conformity regulation to demonstrate compliance with the State of Ohio SIP, which could include applying mitigation or securing offsets such that the estimated air emissions of NO_X during construction are reduced below the general conformity thresholds.

Table 3.4.1-11 Estimated Annual Air Emissions from Construction and Operation in Comparison to General Conformity Thresholds - Baseline Schedule – CRJMTC Site

Emission Activity [1]	Annual Period [2]							Conformity Threshold [3] (tpy)
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	
VOC (tons)								
Construction	0.6	6.6	8.9	8.9	4.5	0.8	--	--
Operation	--	--	--	--	--	36.0	48.0	--
Total Annual Emissions	0.6	6.6	8.9	8.9	4.5	36.8	54.2	100
$PM_{2.5}$ (tons)								
Construction	0.1	1.6	2.0	2.0	0.7	0.1	--	--
Operation	--	--	--	--	--	1.2	1.6	--
Total Annual Emissions	0.1	1.6	2.0	2.0	0.7	1.3	1.6	100
NO_x (tons)								
Construction	2.9	31.5	39.0	38.8	16.4	2.3	--	--
Operation	--	--	--	--	--	38.9	51.9	--
Total Annual Emissions	2.9	31.5	39.0	38.8	16.4	41.2	51.9	100
SO_2(tons)								
Construction	0.01	0.07	0.09	0.09	0.06	0.01	--	--
Operation	--	--	--	--	--	0.10	0.13	--
Total Annual Emissions	0.01	0.07	0.09	0.09	0.06	0.11	0.13	100

Notes:

1. The annual air emissions of criteria pollutants for the baseline schedule from construction and operation of the CIS are from Tables 3.4.1-3 and 3.4.1-7, respectively.
2. The preliminary baseline construction schedule assumes the start of tree clearing commences during October of Year 1. Site preparation activities commences during April of Year 2 and would last a full 12 months, the heavy/intrusive construction activities start during April of Year 3 and continues until March of Year 5. Build-out construction activities start during April of Year 5 and ends during March of Year 6. Operation commences during April of Year 6. The estimated annual air emissions during Year 7 are representative of a full year of operations for the CIS.
3. The general conformity thresholds are from 40 CFR Part 93.153(b)(1) and 93.153(b)(2).

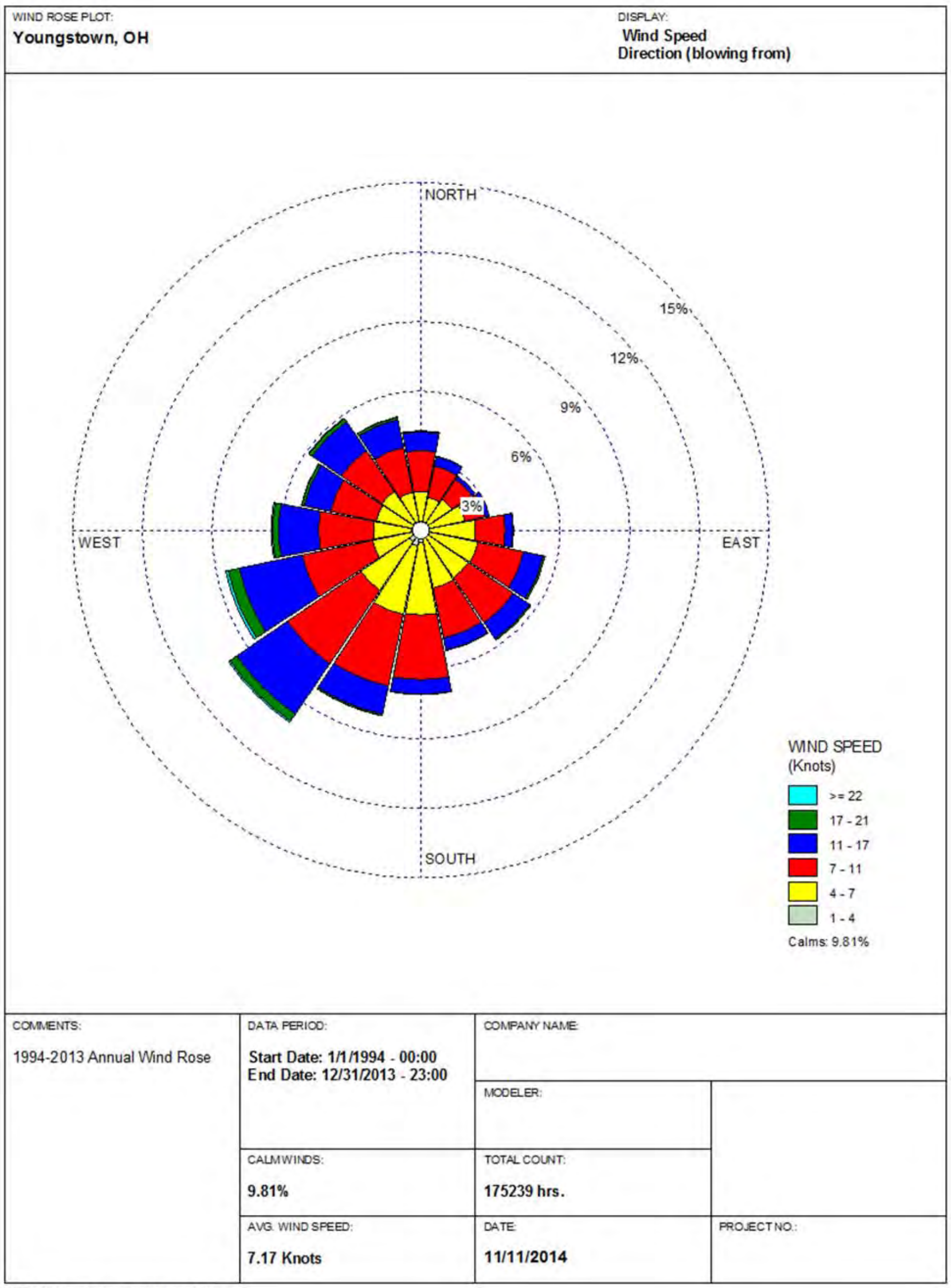
Table 3.4.1-12 Estimated Annual Emissions from Construction and Operation in Comparison to General Conformity Thresholds – Expedited Schedule – CRJMTC Site

Emission Activity [1]	Annual Period [2]				Conformity Threshold [3] (tpy)
	Year 2	Year 3	Year 4	Year 5	
			VOC (tons)		
Construction	13.9	23.9	7.6	--	--
Operation	--	--	12.2	48.6	--
Total Annual Emissions	13.9	23.9	19.8	48.6	100
			$PM_{2.5}$ (tons)		
Construction	3.2	5.5	1.0	--	--
Operation	--	--	0.4	1.6	--
Total Annual Emissions	3.2	5.5	1.4	1.6	100
			NO_x (tons)		
Construction	61.8	104.3	24.5	--	--
Operation	--	--	13.2	52.6	--
Total Annual Emissions	61.8	104.3	37.7	52.6	100
			SO_2 (tons)		
Construction	0.13	0.22	0.08	--	--
Operation	--	--	0.03	0.13	--
Total Annual Emissions	0.13	0.22	0.11	0.13	100

Notes:

1. The annual air emissions of criteria pollutants for the expedited schedule from construction and operation of the CIS are from Tables 3.4.1-5 and 3.4.1-9, respectively.
2. The preliminary expedited construction schedule assumes the start of tree clearing commences during January of Year 2. Site preparation activities commences during May of Year 2 and would last 7 months, the heavy/intrusive construction activities start during December of Year 2 and continues through February of Year 4. Build-out construction activities start during March of Year 4 and continue through September of Year 4. Operation commences during October of Year 4. The estimated annual emissions during Year 5 are representative of a full year of operations of the CIS.
3. The general conformity thresholds are from 40 CFR Part 93.153(b)(1) and 93.153(b)(2).

Figure 3.4.1-1 Annual Wind Rose, Youngstown, Ohio - CRJMTC



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3.4.2 Airspace – CRJMTC

Airspace is defined as that ordinate space which lies above a nation and considered part of that nation's jurisdiction. Airspace, in this context, is a finite resource designated by vertical and horizontal boundaries. It could also consist of a time component and could be considered transient, in regards to its use for aviation purposes, which is a very substantial factor in airspace management and air ATC.

3.4.2.1 Regulatory Framework – Airspace – CRJMTC

Under the Federal Aviation Act of 1958, as amended (42 USC 1301 et seq.), the FAA is charged with the safe and efficient use of our nation's airspace. In the U.S., airspace is categorized as regulatory and non-regulatory. Within these categories exist regulatory controlled (Classes A, B, C, D, and E) and non-regulatory uncontrolled (Class G) airspace. These designations are determined based on which ATC service is provided to IFR flights and certain VFR flights. Class F is not used in the U.S. Other airspace type designations include Special Use and Other Airspace.

3.4.2.2 Affected Environment – Airspace – CRJMTC

For the purpose of this document, the existing state of controlled and uncontrolled airspace and the requirements for airspace above critical system facilities within the CIS footprint would be evaluated for potential impacts related to the applicable principal airspace attribute type listed and described in the applicable sections. The ROI is defined as that which could be affected by either the ongoing No Action Alternative or which could potentially be affected by the CIS deployment. Applicable for this document, the ROI is defined as that airspace within 50 nautical miles of the CIS footprint, in addition to air traffic generated by commercial and military airports within 10 miles and flight patterns which bring aircraft within 5/8 miles of the CIS footprint are considered.

3.4.2.2.1 Controlled and Uncontrolled Airspace

Controlled and uncontrolled airspace is divided into six classes, dependent upon location, use, and degree of control. Class A airspace, which is not specifically charted, is generally, that airspace from 18,000 ft MSL up to 60,000 ft. Unless otherwise authorized, all aircraft must be operated under instrument flight rules. Class B airspace is generally that airspace from the surface to 10,000 ft MSL surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are cleared receive separation services within the airspace. Class C airspace is generally that airspace from the surface to 4,000 ft above the airport elevation. It surrounds those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of IFR operations or passenger enplanements. Class D airspace is generally that airspace from the surface to 2,500 ft above the airport elevation that surrounds those airports having an operational control tower. Class E airspace is controlled airspace that is not Class A, Class B, Class C, or Class D airspace.

Uncontrolled airspace, or Class G airspace, has no specific definition but generally refers to airspace not otherwise designated. No ATC service to aircraft operating under either instrument or visual flight rules is provided other than possible traffic advisories when the ATC workload permits and radio communications could be established (Illman, 1993).

The CRJMTC CIS footprint does not lie within any classified, restricted, or controlled airspace jurisdictions (unclassified airspace).

3.4.2.2.2 Special Use Airspace

Complementing the classes of controlled and uncontrolled airspace described previously are several types of special use airspace used by the military to meet its particular needs. Special use airspace consists of that airspace wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of these activities, or both. Except for Controlled Firing Areas, special use airspace areas are depicted on aeronautical charts, which also include hours of operation, altitudes, and the controlling agency. Typical kinds of special use airspace include:

- Restricted Areas: 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 restriction. Activities within these areas must be confined because of their nature, or limitations imposed upon aircraft operations that are not a part of these activities, or both. Restricted Areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Restricted Areas are published in the FR and constitute FAR Part 73 Aeronautical Information Manual (FAR/AIM, 1998).
- Military Operations Areas: Military Operations Areas consist of airspace of defined vertical and lateral limits established for the purpose of separating certain non-hazardous military training activities from IFR traffic and to identify (for visual flight rules) traffic where these activities are conducted. Whenever a military operations area is being used, non-participating IFR traffic may be cleared through a military operations area if IFR separation could be provided by ATC. Otherwise, ATC would reroute or restrict non-participating instrument flight rules traffic (FAR/AIM, 1998).

There are currently no special use airspace designations over the CIS footprint or the CRJMTC installation.

On occasion, the CRJMTC installation by Memorandum AGOH-FTOH-Z established a Small Arms Range Safety Area over small arms training areas for direct fire weapons up to 7.62 mm (CRJMTC, 2015a.) For these activities a NOTAM is sent to the local office of the FAA, with specific boundary locations, date and time, and activities to be conducted. The area designated for these activities are outside of the CRJMTC CIS footprint.

3.4.2.2.3 Other Airspace Areas

Other types of airspace include airport advisory area, military training routes, temporary flight restrictions areas, flight limitations/prohibitions areas, parachute jump aircraft operations areas, published visual flight rules routes, and terminal radar service areas (FAR/AIM, 1998).

There are currently no specific use airspace designations over the CRJMTC CIS footprint or CRJMTC installation.

Enroute Airways and Jet Routes

There are numerous air traffic corridors from Cleveland, Ohio, to Pittsburgh, Pennsylvania, which are in the vicinity of the CRJMTC installation and CIS footprint. The low and high altitude airway and jet routes in the vicinity of CRJMTC are shown for reference in Figures 3.4.2-1 and Figure 3.4.2-1, respectively.

Airports and Airfields

There are several airports and airfields located in the vicinity of the CRJMTC installation. As indicated previously no controlled airspace for these airports or airfields within the CRJMTC CIS footprint or CRJMTC installation. Provided for reference is a list of the primary airports and airfield within a 50-nautical mile radius of the CRJMTC (Airnav, 2015):

- Portage County Airport; 9 nautical miles, unclassified.
- Youngstown-Warren Regional Airport, 22 nautical miles, Class E airspace (closest controlled airspace).
- Akron-Cation Regional Airport, 25 nautical miles, Class C airspace.
- Cleveland-Hopkin International Airport, 41 nautical miles, Class B airspace.
- Several other small private and commercial airports and airfield are also within the ROI.

3.4.2.3 Environmental Consequences and Mitigation – Airspace – CRJMTC

The affected airspace environment characterized by principal airspace attributes, are evaluated as applicable, for periods during construction and facility operations. These principal attributes consists of controlled and uncontrolled airspace, special use airspace and other airspace areas. Additional attributes to be evaluated, as applicable, are enroute airways and jet routes, airports and airfields and air navigation facilities.

3.4.2.3.1 Construction – Baseline Schedule

3.4.2.3.1.1 Environmental Consequences

No CIS-related structures or equipment would occur at heights that would affect airspace during construction. Therefore, no impacts from, or during, construction would occur within the ROI for the CRJMTC CIS footprint related to principal airspace attributes.

3.4.2.3.1.2 Mitigation

Because no airspace construction impacts would occur, no airspace construction mitigation measures would be required.

3.4.2.3.2 Construction – Expedited Schedule

3.4.2.3.2.1 Environmental Consequences

As with the baseline construction schedule for airspace, no impacts from, or during, construction would occur within the ROI for the CRJMTC CIS footprint related to principal airspace attributes during the expedited construction schedule.

3.4.2.3.2.2 Mitigation

Because no airspace construction impacts would occur during the expedited construction schedule, no airspace construction mitigation measures would be required.

3.4.2.3.3 Operations

Anticipated operations impacts to the applicable principal airspace attributes are described in the following sections.

3.4.2.3.3.1 Environmental Consequences

<u>Controlled and Uncontrolled Airspace</u>

No controlled airspace is present over the CRJMTC CIS footprint or installation and no additional controlled impacts would occur. Therefore, no mitigation measures would be required for controlled airspace.

<u>Special Use Airspace</u>

There currently are no special use airspace areas designated at the CRJMTC installation; therefore, no mitigation regarding special use airspace would be required for special use airspace.

Other Airspace Areas

Navigation warnings and controls could be required for the CIS footprint to separate activities related to CIS operations from current CRJMTC activities and operations, and to prohibit the overhead flight of aircraft. The establishment of prohibited and restricted areas in coordination with the FAA and local ATC facilities is an effective means of mitigation. 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. Flight restrictions are a measure established to protect persons and property in the air or on the surface from an existing or imminent hazard associated with an incident on the surface when the presence of low-flying aircraft would magnify, alter, spread, or compound that hazard. The ATC Center having jurisdiction would enforce the flight restriction.

"Other airspaces" for the CRJMTC CIS where pre-established avoidance zones and associated NOTAMS may be provided would include the following (MDA, 2015a).

IDT. Based on electromagnetic modeling, avoidance zones would need to be established over the IDT due to the associated energy being transmitted vertically above the facility. No adverse health impacts from the potential deployment of the IDTs would occur as the energy produced by the maximum radiation of the IDT would be less than 200 volts per meter, a level safe for any civilian or military aircraft, fixed-wing or rotorcraft; however, EMR could adversely affect or cause interference with aircraft guidance and instrumentation systems. IDTs are typically tested daily and used during heightened periods of threat. The anticipated cone would be up to 10,000 ft AGL. Establishing an avoidance zone would allow pilots time to divert or keep clear of impending radar beaming and protect against interference. A permanently established avoidance zone, based on the volume of air traffic, would need to be negotiated with the FAA.

Minor impacts would occur from establishing this avoidance zone.

SATCOM Facilities. An avoidance zone would need to be established over the SATCOM antennas to facilitate the functional requirements of the R&CF. The anticipated cone would be up to 10,000 ft AGL. The airspace above these antennas would be allowed for over flights above 10,000 ft except for security and preapproved flights with ground controllers.

Minor impacts would occur from establishing this avoidance zone.

GBI Site. Although no designated airspace restriction would be established above the missile field and support facilities at the CIS footprint under normal conditions, temporary airspace sanitization procedures in the form of a Joint Letter of Procedure would need to be developed to establish authorities, responsibilities, and procedures for activation of a temporary flight restriction during homeland defense operations.

The Joint Letter of Procedure and Flight Safety Advisory would be developed in accordance with similar policies and procedures as these established at the Fort Greely, Alaska GMD site.

A permanent Flight Safety Advisory would need to be established to discourage the potential for circling, loitering, and routine encroachment of civilian flights over the CRJMTC CIS footprint.

Negligible impacts would occur over the GBI site, therefore no mitigation would be required.

Military Exercise/Training Areas and Training Routes. Helicopter and C-130 flight training routes currently exist over the CIS footprint. Deployment of the CIS would impact these aviation training routes. Existing flight restrictions would actively address military aircraft that currently use this airspace for training; however, training maneuvers would have to be relocated, modified, or coordinated accordingly. The greatest impact would be related to C-130 aircraft that fly low altitude parallel lines east to west at 400 ft AGL. These operations would be curtailed to the northern half of post if the middle of CRJMTC becomes restricted as a result of CIS deployment. To mitigate, these operations and training activities would need to be modified or coordinated with currently established airspace controls.

Enroute Airways and Jet Routes

Although there are numerous air traffic corridors from Cleveland, Ohio, to Pittsburgh, Pennsylvania, in the vicinity of the CRJMTC CIS footprint, due to the CIS footprint's relative proximity being outside of the corresponding navigation warning area jurisdiction limits, impacts would be negligible.

Airports and Airfields

None of the proximity airports or airfields identified have airspace navigation warning areas that exist at the CRJMTC footprint. Therefore, no mitigation would be required.

3.4.2.3.3.2 Mitigation

Overall because the impacts identified are negligible to minor, no mitigation would be required.

Figure 3.4.2-1 Low Altitude Airspace Routes – CRJMTC

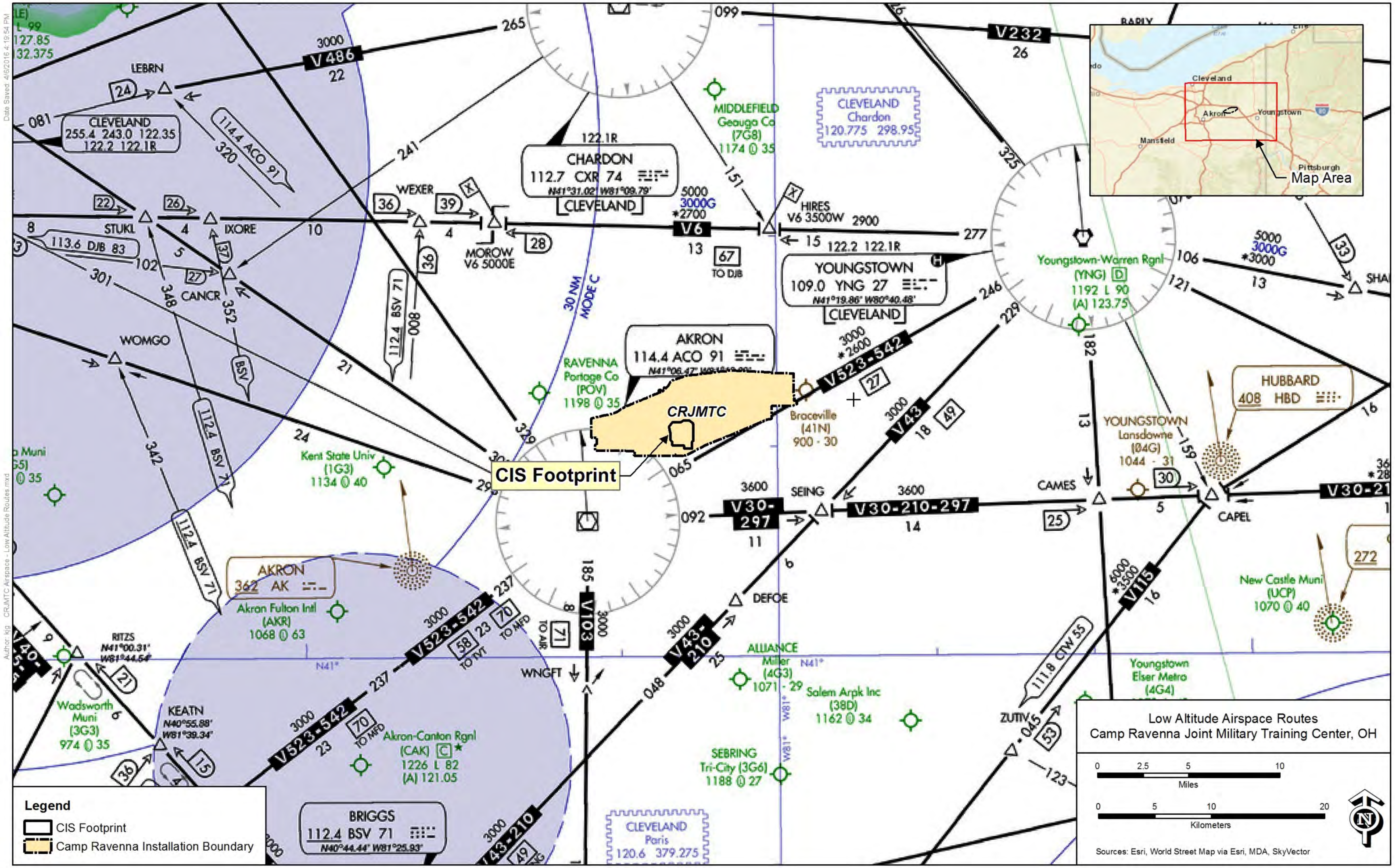
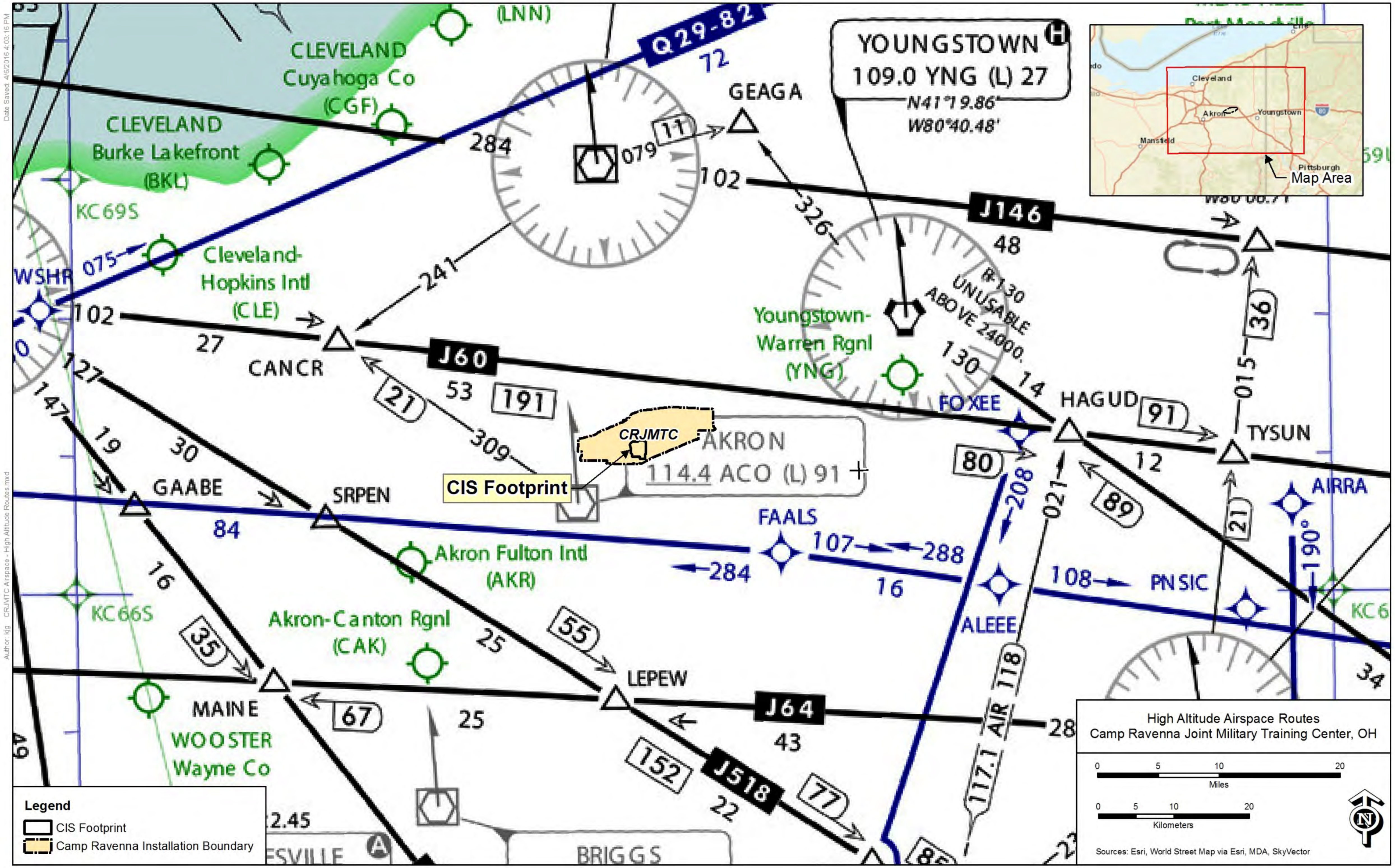


Figure 3.4.2-2 High Altitude Airspace Routes - CRJMTC



3.4.3 Biological Resources – CRJMTC

Biological resources include flora, fauna, and terrestrial and aquatic habitats. Existing and site-specific information on flora and fauna species and habitat types on and near the candidate CIS footprint at CRJMTC was reviewed for this EIS.

The general intent in the EIS is to assess the impacts of the deployment of the potential CIS on biological resources within the CIS footprint and surrounding areas.

This section includes an overview of regulatory framework, a description of the terrestrial and aquatic resources present within the CIS footprint and surrounding area, and identification of federal and state-listed special status species listed as rare, threatened, or endangered.

3.4.3.1 Regulatory Framework - Biological Resources – CRJMTC

The following are statutes with specific regulatory requirements pertaining to biological resources located at CRJMTC. This list is not exhaustive, but it characterizes those regulations with the greatest influence on the project.

Federal

- ESA of 1973, (16 USC 1531 et seq.) - The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. Under Section 7 of the ESA, federal agencies are required to coordinate their actions with the USFWS and the NOAA to prevent jeopardizing the continued existence of species. The ESA protects endangered and threatened species and their habitats by prohibiting the "take" of listed animals and the interstate or international trade in listed plants and animals, including their parts and products, except under federal permit.
- MBTA of 1918 (16 USC 703-712) - The MBTA prohibits the take of migratory bird species, including nests, parts of migratory birds or products derived from migratory birds, and it implements a series of international treaties protecting migratory birds that cross international boundaries on migration.
- FWCA of 1980 (16 USC 2901-2911) -The FWCA authorizes financial and technical assistance to the states for development, revision, and implementation of conservation plans and programs for nongame fish and wildlife.
- BGEPA of 1940 (16 USC 668-668c) - The BGEPA contains provisions for the protection of Bald Eagles and Golden Eagles, including prohibitions of take, habitat destruction including nests, or use of eagle parts and products without a permit.
- Sikes Act - The Sikes Improvement Act seeks to ensure that ecosystems on military lands are protected and enhanced while allowing military lands to meet the needs of military operations. The Act includes provisions for preparation and implementation of INRMPs in cooperation with the USFWS, NMFS, National Guard, and the applicable state fish and wildlife agency.

- AR 200-1, Environmental Protection and Enhancement (Chapter 4; 13 December, 2007) – This regulation covers U.S. Army environmental protection and enhancement for all Army organizations and agencies (except civil works under USACE jurisdiction) and provides the framework for the Army Environmental Management System.

Ohio

- ORC 1531 (animals) and ORC 1518 (plants). The Ohio rules on state listed endangered and threatened animals and plants have different levels of regulation. For animals it is unlawful to collect, take, transport, sell, offer for sale, or possess any state listed endangered or threatened animal without a permit. The Ohio Department of Natural Resources (ODNR), Division of Wildlife issues permits for animal take (OAC 1501:31-23). The ODNR, Division of Natural Areas and Preserves manages the endangered plant law (ORC 1518.01).

3.4.3.2 Affected Environment – Biological Resources – CRJMTC

The affected environment for biological resources includes a description of terrestrial resources (vegetation communities and wildlife), aquatic resources, and special status species.

3.4.3.2.1 Terrestrial Resources

Terrestrial resources include vegetation communities and wildlife such as birds, mammals, reptiles, amphibians, and insects.

3.4.3.2.1.1 Vegetation Communities

CRJMTC is located in the U.S. Ecoregion – Humid Temperate Domain – Hot Continental Division – Eastern Broadleaf Forest (Oceanic) Province – Erie/Ontario Drift and Lake Plain – Low Lime Drift Plain ecosystem land classification. The Low Lime Drift Plain ecoregion is characterized by a rolling landscape composed of low rounded hills with scattered end moraines and kettles (OHARNG, 2014). The majority of lands within CRJMTC are post-successional agricultural lands, with the exception of a few areas of large mature forest and areas that were considered too wet to farm. Approximately 90 percent of CRJMTC, with the exception of wet woods, had historically been cleared and used for agriculture or otherwise disturbed. Habitats present within the installation include large tracts of closed-canopy hardwood forest, scrub/shrub open areas, grasslands, wetlands, open-water ponds and lakes, and semi-improved administration areas.

Vegetation Alliances

Vegetated land at CRJMTC could be divided into three broad vegetation categories: tree-dominated, shrub-dominated, and herb-dominated. Remaining areas not dominated by vegetation include previously developed or disturbed areas with structures, roads, and other development.

Figure 3.4.3-1 illustrates the vegetation communities and alliances at CRJMTC using the Federal Geographic Data Committee (FGDC) vegetation classification standard, which is the approved standard for vegetation classification on federal lands (OHARNG, 2014).

Table 3.4.3-1 provides a list of the FGDC vegetation communities and alliances present on the CIS footprint at CRJMTC with associated acreage, habitat description, and dominant species. A plant alliance is a category of vegetation classification that describes a characteristic plant species composition, habitat conditions, climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes. Vegetative alliances are used to classify similar plant communities across a landscape. The CIS footprint encompasses approximately 1,070 acres, of which 941 acres would be cleared for construction. Eight forest communities and alliances within the CIS footprint comprise approximately 391 acres; five shrub communities and alliances on 314 acres; and four herbaceous communities and alliances on 236 acres.

Table 3.4.3-1 Vegetation Community Alliances within Continental United States Interceptor Site Footprint - CRJMTC

FGDC Code	Formation	Community (C) or Alliance (A)	Map Code	Acres	Description	Dominant Species
Forest Formations						
I.A.8.C.a.	Plantations (planted timber stands, Christmas trees)	Pinus strobus plantation (C)	PP	1.7	Characterized by nearly pure stands of eastern white pine, usually planted in rows	White pine
I.B.2.N.e.	Seasonally flooded cold-deciduous forest	Acer rubrum - Fraxinus pennsylvanica Seasonally Flooded Forest Alliance (A)	FL3	24.3	A mixture of upland, mesic species in combination with hydrophytic species. It is located in areas subject to seasonal flooding.	Red maple, American elm, green ash pin oak, swamp white oak, and quaking aspen
I.B.2.N.a.	Lowland or submontane cold-deciduous forest	Fagus grandifolia - Acer saccharum - (Liriodendron tulipifera) Forest Alliance	FU1	48.0	A diverse community common to mesic, gently sloping sites	American beech and sugar maple dominate the canopy.
		Fagus grandifolia – Quercus spp. – Acer spp. Forest (A)	FU2	189.6	A forest community that is an intermediate between upland and lowland and contains species common to both wet and dry environments.	Sugar maple, red maple, northern red oak, American beech, yellow-poplar, white oak, swamp white oak, pin oak, green ash, and American elm.
		Quercus alba - (Quercus rubra, Carya spp.) Forest (A)	FU3	22.1	Found on well-drained sites often in gently sloping areas.	White oak, northern red oak, shagbark hickory, and bitternut hickory.

FGDC Code	Formation	Community (C) or Alliance (A)	Map Code	Acres	Description	Dominant Species
		Acer rubrum successional forest (C)	FU4	149.9	Characterized by a high abundance of red maple often in nearly pure stands.	Red Maple. Green ash, white ash, black cherry, and sugar maple often are present, but never dominant.
		Mixed Cold-Deciduous successional forest (C)	FU5	134.8	Indicative of a late stage of recovery following substantial disturbance (e.g., clear-cutting).	White ash, wild black cherry, red maple, black locust, quaking aspen, and bigtooth aspen.
I.B.2.N.d.	Temporarily flooded cold-deciduous forest	Fraxinus pennsylvanica - Ulmus americana - Celtis (occidentalis, laevigata) Temporarily Flooded Forest (A)	FL1	36.0	Associated with areas near streams and rivers and other temporarily flooded areas.	Green ash, American elm, hackberry, and red maple. Black walnut, white ash, swamp white oak, cottonwood, and black willow also are present.
		Salix nigra Temporarily Flooded Forest (A)	FL2	4.2	Generally found immediately adjacent to streams.	Black willow in association with other less abundant species such as cottonwood, American elm, green ash.
I.B.2.N.e.	Seasonally flooded cold-deciduous forest	*Quercus palustris* - (*Quercus bicolor*) Seasonally Flooded Forest (A)	FL4	0.4	Characterized by species tolerant of seasonally saturated or inundated conditions. Standing water (e.g., vernal pools) is often present in the spring and early summer. By late summer and fall, these areas generally are dry.	Pin oak, swamp white oak, and red maple are the dominant tree species.
Shrub Formations						
III.B.2.N.a.	Temperate cold-deciduous shrubland	Dry mid-successional cold-deciduous shrubland (C)	SU1	189.6	Characterized by shrub species covering more than 50 percent of the area with relatively few large trees (greater than seven meters or ~ 20 feet in height). Found within previously disturbed areas.	Gray dogwood, northern arrowwood, blackberry, hawthorn, and multiflora rose.

FGDC Code	Formation	Community (C) or Alliance (A)	Map Code	Acres	Description	Dominant Species
		Dry late-successional cold-deciduous shrubland (C)	SU2	2.2	Young pioneer trees generally less than seven meters in height are dominant. Shrub and herbaceous species are still present although to a lesser extent.	Red maple, wild black cherry, white ash, and black locust.
III.B.2.N.c.	Intermittently flooded cold-deciduous shrubland	Intermittently flooded mid-successional cold-deciduous shrubland (C)	SL1	6.0	Very similar to the Dry mid-successional cold-deciduous shrubland community. However, this community is characterized by the presence of hydrophytic species.	Willows, silky dogwood, eastern cottonwood, and quaking aspen. Patches of sedges, rushes, and bulrushes also are present.
		Intermittently flooded late-successional cold-deciduous shrubland (C)	SL2	5.8	Young pioneer trees generally less than seven meters in height are dominant.	Red maple, eastern cottonwood, quaking aspen, and green ash.
Herbaceous Formations						
III.B.2.N.g.	Saturated cold-deciduous shrubland	*Cornus* spp. – *Salix* spp. Saturated Shrubland (A)	SL4	2.5	Found in many locations including edges of open water, beaver dams, swales, ditches, depressional areas in fields and forests, and along small creek tributaries.	Dogwood species (especially silky dogwood), pussy willow, black willow, swamp rose, meadow-sweet, common elder, and northern arrowwood.
V.A.5.C.b.	Landscaped urban/ suburban/rural (yards, nurseries)	Landscaped/ Maintained grounds around buildings	LM	47.1	Maintained vegetation surrounding buildings composed mainly of grasses, mowed periodically, ornamental trees and shrubs.	Grass, ornamental trees and shrubs.
V.A.5.N.k.	Seasonally flooded temperate or subpolar grassland	*Phalaris arundinacea* Seasonally Flooded Herbaceous (A)	HL2	9.1	Found most often in depressional areas and swales in previously cleared fields.	Reed canary grass.
V.A.5.N.k.	Seasonally flooded temperate or subpolar grassland	*Typha* spp. - (*Scirpus* spp. - *Juncus* spp.) Seasonally Flooded Herbaceous (A)	HL3	7.4	Saturated or inundated conditions prevail during much of the growing season, but water depths generally do not exceed 15 centimeters (~ six inches).	Cattails, bulrushes, rushes, giant bur-reed, big-leaved arrowhead, duckweed, blue vervain, manna-grass, and water plantain.

FGDC Code	Formation	Community (C) or Alliance (A)	Map Code	Acres	Description	Dominant Species
V.C.2.N.a.	Permanently flooded temperate or subpolar hydromorphic rooted vegetation	Nuphar lutea - Nymphaea odorata Permanently Flooded Herbaceous Alliance (HL5)	HL5	0.6	Permanently flooded areas such as shallow ponds or lakes with depths generally less than 0.5 meters.	Spatterdock and white water lily
V.B.2.N.a.	Tall temperate or subpolar perennial forb vegetation	Dry early successional herbaceous field (C)	HU1	147.2	Present in recently disturbed areas without sufficient recovery time for substantial invasion by shrub species.	Goldenrod, clasping-leaf dogbane, self-heal (heal-all), yarrow, strawberry, black-eyed Susan, sheep sorrel, and fescue
Source: OHARNG, 2014.						

Plants

Of the plant species identified at CRJMTC in the 2010 vascular plant survey, 26 percent are not native to Ohio (Gardner, 2011).

3.4.3.2.1.2 Wildlife

Birds. Most of the information on birds that follows is adapted from the CRJMTC INRMP (OHARNG, 2014). Surveys of avian communities at CRJMTC were conducted in 1993, 1999, and 2001 through 2015. Survey methods used included foot surveys, point counts and breeding bird survey routes. Point counts and breeding bird survey routes were completed in accordance with USFWS standards.

Avian species appear to be extremely robust both in terms of diversity of species and bird populations. Areas along Eagle and Sand Creeks are tremendous nurseries for many Neotropical migrant species, including summering cerulean warblers (*Dendroica cerulea*) (Semroc and Rosche, 2010). Fish, amphibian, and reptile populations appear to be very healthy. Invertebrate populations, specifically lepidopterans (butterflies and moths), appear to be reference quality in terms of both overall diversity and sheer abundance. Overall, both game and non-game species populations are healthy (Ogden, 2000).

The diversity and abundance of contiguous habitat at CRJMTC has enhanced the diversity and abundance of breeding bird species. CRJMTC is located in a glaciated physiographic region of the state, and statewide surveys have identified this region as having the highest average number of bird species per breeding bird survey sample block in comparison to the rest of Ohio. A total of 214 species of birds have been identified at CRJMTC and approximately 114 species were either confirmed or considered likely to nest on CRJMTC properties (OHARNG, 2014).

Species common in Ohio are abundant at CRJMTC, including red-winged blackbird (*Agelaius phoeniceus*), red-eyed vireo (*Vireo olivaceus*), yellow warbler (*Setophaga petechia*), American robin (*Turdus migratorius*), and song sparrow (*Melospiza melodia*). Other common species present include field sparrow (*Spizella pusilla*), common yellowthroat (*Geothlypis trichas*), gray catbird (*Dumetella carolinensis*), eastern towhee (*Pipilo erythrophthalmus*), American goldfinch (*Carduelis tritis*), and blue-winged warbler (*Vermivora pinus*). In addition, some species considered uncommon in northeastern Ohio have been frequently observed at CRJMTC (Ogden, 2000), apparently owing to large blocks of habitat in various successional stages. Alder flycatcher (*Empidonax alnorum*), a species that nests in wet shrub dominated habitats in northern Ohio and considered to be uncommon and local in Ohio, are common at CRJMTC. The numbers of chestnut-sided warbler (*Dendroica pensylvanica*) nesting at CRJMTC also are greater than expected. Approximately 220 veery (*Catharus fuscescens*) pairs, inhabitants of damp second growth woods with dense understories, were counted. Approximately 184 pairs of wood thrush (*Hylocichla mustelina*) have been observed at CRJMTC. Verry is a Neotropical migratory species declining rangewide, including in Ohio, due to habitat loss.

CRJMTC provides abundant woodland edge and open second growth wooded habitat, supporting Neotropical woodland inhabitants, such as the rose-breasted grosbeak (*Pheucticus ludovicianus*), red-eyed vireo, yellow-throated vireo (*Vireo flavifrons*), eastern wood-pewee (*Contopus virens*) and Acadian flycatcher (*Empidonax virescens*). In addition permanent residents such as the tufted titmouse (*Parus bicolor*), black-capped chickadee (*Poecile atricapillus*), American crow (*Corvus brachyrhynchos*), blue jay (*Cyanocitta cristata*), and various woodpeckers (*Melanerpes* spp.) could be found at CRJMTC. A few species were at the edge of their range, including the Kentucky warbler (*Oporornis formosus*), black-and-white warbler (*Mniotilta varia*), white-eyed vireo (*Vireo griseus*), and yellow-breasted chat (*Icteria virens*).

Some common birds associated with wetlands found at CRJMTC are red-winged blackbird (*Agelaius phoeniceus*), great blue heron (*Ardea herodias*), tree swallow (*Tachycineta bicolor*), mallard (*Anas platyrhynchos*), and wood duck (*Aix sponsa*). The wetlands at CRJMTC also are a major stopover point for various waterbird species during migration, including pied-billed grebe (*Podilymbus podiceps*), horned grebe (*Podiceps auritus*), gadwall (*Anas strepera*), American widgeon (*Anas americana*), and ring-necked duck (*Aythya collaris*).

Mammals. A total of 35 species of land mammals have been identified at CRJMTC through two studies conducted in 1993 (Schneider, 1993) and 1999 (Carroll, 1999) and incidental observations by CRJMTC environmental staff. The most abundant species include white-tailed deer, raccoon, woodchuck (*Marmota monax*), and eastern fox squirrel (*Sciurus niger*) (OHARNG, 2014).

The OHARNG commissioned and conducted separate surveys for bats in 1999, 2002, 2005, and 2010. Eleven species of bats are known to live in Ohio, and six of these species were identified at CRJMTC. Bat species captured with mist nets at CRJMTC include little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), tri-colored bat (*Perimyotis subflavus*) [previously named eastern pipistrelle (*Pipistrellus subflavus*)], northern long-eared bat (*Myotis* *septentrionalis*), eastern red bat (*Lasiurus borealis*), and hoary bat (*Lasiurus cinereus*). Mist net efforts and acoustic monitoring to date have provided no evidence of the federally endangered Indiana bat (*Myotis sodalis*) (see also the discussion in Section 3.4.3.2.3 Threatened and Endangered Species).

Tragus Environmental Consultants, Inc. (Tragus, 2010) rated most of the roosting habitat in proximity of mist net sites of moderate value for Indiana bat, although some high quality summer roosting habitat does exist on the installation. The habitat supports reproduction by all bat species captured. All mist net-captured bats were banded by Tragus and several were fixed with a radio transmitter to document maternity colony locations. Additionally, health status and evidence of recent birth were documented by Tragus. Reproduction by little brown and northern long eared bats suggests that many aspects of the habitat could be suitable for Indiana bat. However, in surveys completed to date Indiana bat has not been detected within CRJMTC and the species is considered absent. The USFWS has reviewed CRJMTC bat studies and agreed that sampling for individual projects is not an effective sampling method at CRJMTC. Therefore, OHARNG conducts an installation-wide Indiana bat survey every 5 years, rather than conducting surveys for individual projects. The surveys are coordinated with the USFWS to ensure CRJMTC is adequately sampled. The need for project-specific surveys is based on the site-wide survey results in five-year intervals as determined in consultation with the USFWS.

Table 3.4.3-2 presents a comparison of bat species results from the most recent 2010 study to historical data (Tragus, 2010).

Table 3.4.3-2 Bat Species Study Data for CRJMTC

Species Name	No. Individuals Observed (2004)	No. Individuals Observed (2010)	Percent Change
Big Brown Bat (*Eptesicus fuscus*)	122	119	-2.5
Little Brown Bat (*Myotis lucifugus*)	99	63	-36.4
Northern Long-Eared Bat (*Myotis septentrionalis*)	20	29	+45
Tri-Colored Bat (*Perimyotis subflavus*)	2	2	0
Eastern Red Bat (*Lasiurus borealis*)	26	22	-15.4
Hoary Bat (*Lasiurus cinereus*)	3	4	+33
Total Number of All Bat Species	**272**	**239**	**-12.1**
Source: Tragus, 2010.			

Amphibians. Amphibian species likely to be present in suitable habitats within the CIS footprint based on the results of prior studies (Pfingsten, 2000) include northern dusky salamander (*Desmognathus fuscus fuscus*), mountain dusky salamander (*Desmognathus ochrophaeus*), northern two-lined salamander (*Eurycea bislineata*), redback salamander (*Plethodon cinereus*;

including the (erythristic or red morph phase), eastern American toad (*Bufo americanus*), gray tree frog (*Hyla versicolor*), spring peeper (*Pseudacris crucifer*), bullfrog (*Lithobates catesbeianus*), western chorus frog (*Pseudacris triseriata*), green frog (*Rana clamitans melanota*), and pickerel frog (*Lithobates palustris*). The latter species has been found in only three locations at CRJMTC; the CIS footprint represents one of these or 33 percent of all sites where the species is found at CRJMTC.

Reptiles. Reptile species likely to be present in suitable habitats within the CIS footprint based on the results of prior studies (Pfingsten, 2000) include Northern redbelly snake (*Storeria occipitomaculata*), northern water snake (*Nerodia sipedon*), northern brown snake (*Storeria dekayi*), black rat snake (Elaphe obsoleta), eastern garter snake (*Thamnophis sirtalis sirtalis*), eastern milk snake (*Lampropeltis triangulum triangulum*), five-lined skink (*Eumeces fasciatus*), eastern box turtle (*Terrapene carolina carolina*), snapping turtle (*Chelydra serpentina*), and eastern painted turtle (*Chrysemys picta picta*).

Eastern box turtle has been observed once within the CIS footprint (Pfingsten, 2000), but the population could be small enough to escape detection and the species is considered likely present. Reptile species at CRJMTC found in only one or two locations including the CIS footprint are eastern milk snake, black rat snake, and eastern box turtle.

Insects. Insect surveys at CRJMTC have focused on Odonata, Lepidoptera, and Coleoptera. The order Odonata is divided into two suborders that include dragonflies (*Anisoptera*) and damselflies (*Zygoptera*). Odonata larvae inhabit still waters of lakes, wetlands, and slow moving streams and rivers. While adult Odonata are less water-dependent than their larvae, they are also most prevalent in wet to mesic habitats owing to the predominance of mosquitoes on which odonates prey.

The 1993, 1999, and 2010 Odonate surveys identified a total of 86 species at CRJMTC. Among the species found in 2010 is the brushtipped emerald (*Somatochlora walshii*), a state endangered dragonfly.

Lepidopteran surveys conducted in 1993, 1994, 1999, and 2005 have identified 64 species of butterflies and 793 species of moths at CRJMTC. Notable observations regarding the butterfly populations include: very high numbers of the little wood satyr (*Megisto cymela*), red-spotted purple (*Limenitis arthemis astyanax*), question mark (*Polygonia interrogationis*), comma (*Polygonia comma*), and common wood nymph (*Cercyonis pegala*); an unusual Ohio sighting of many spicebush swallowtail (*Papilio troilus troilus*) nectaring on thistles in 1999; and the consistent presence of tiger swallowtail (*Papilio glaucus glaucus*) throughout the installation. These details emphasize the variety and quality of habitat at CRJMTC.

Lepidoptera surveys have also identified a very diverse population of moths indicating a great variety of habitats and host flora. Two state-listed moth species, the coastal plain apamea (*Melanapamea* [*Apamea] mixta*) and the moth *Brachylomia algens*, have been documented at

CRJMTC. Several unique species were observed in the Wadsworth Glen hemlock ravine area on the northern boundary of CRJMTC. The greatest number of species collected feed on oak foliage. Other common host plants for these species include willows (*Salix* spp.), maples (*Acer* spp.), elms (*Ulmus* spp.), hickory (*Carya* spp.), and various species of herbaceous plants.

Several pest lepidopteran species were identified at the installation, although all of these species are apparently kept under control by parasites and predators. The moth and butterfly species known from this area are natives, except for a few species. One such non-native species is the gypsy moth (*Lymantria dispar*), which appears to have a stable population on the installation. The CRJMTC staff monitors and controls gypsy moth populations as needed. Additionally, *Entomophaga maimaiga*, the gypsy moth-killing fungus, is present and killing gypsy moth larvae, so gypsy moth control is not a major concern (OHARNG, 2014).

A survey of beetles (*Order Coleoptera*) at CRJMTC was conducted over three consecutive years, 1999 through 2001. This single survey effort identified 800 species of beetles, representing 78 families of beetles. The most abundant family was Carabidae, the ground and tiger beetles, representing 107 species. No threatened or endangered species of beetles were identified (OHARNG, 2014).

3.4.3.2.2 Aquatic Resources

This section focuses on the fauna that is associated with CRJMTC aquatic resources. Aquatic resources include the fauna dependent on the hydrologic regimes of wetland and open water resources.

3.4.3.2.2.1 Aquatic Habitat

CRJMTC contains a variety of aquatic habitats. A discussion of water resources and wetlands within the CRJMTC CIS footprint is provided Sections 3.5.14 and 3.5.15, respectively.

3.4.3.2.2.2 Aquatic Organisms

Fish. Fish surveys were conducted at CRJMTC beginning in 1993, with the most recent surveys completed in 2010 (Hoggarth and Rice, 2011). Surveys were conducted within streams, ponds, beaver swamps, and small beaver overflows. Forty-seven species of fish were observed within these waterbodies. A list of fish encountered at CRJMTC is found in Appendix D of the INRMP (OHARNG, 2014).

Fish sampling locations are shown on Figure 3.4.3-2, Biological and Water Quality Study Sampling Locations. The overall fish community is characteristic of small to medium sized streams. The fish communities found in ponds appear to be primarily the result of intentional and accidental introductions over the years and include species such as rainbow trout (*Oncorhynchus mykiss*), channel catfish (*Ictalurus punctatus*), and fathead minnow (*Pimephales promelas*). The small and large beaver impoundments, while not as diverse as the stream impoundments, have their own characteristic fish community, commonly including bluegill sunfish (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), pumpkinseed sunfish (*Lepomis gibbosus*), largemouth bass (*Micropterus salmoides*), grass pickerel (*Esox americanus vermicula*), central mudminnow (*Umbra limi*), and golden shiner (*Notemigonus crysoleucas*) (OHARNG, 2014).

Crayfish. Four species of crayfish, two aquatic and two semi-terrestrial, are known to exist at CRJMTC. Both aquatic species, Allegheny crayfish (*Orconectes obscurus*) and White River crayfish (*Procambarus acutus*), were collected from streams or beaver impoundments of streams. The Allegheny crayfish was abundant and widely distributed across the installation, while the White River crayfish was only rarely encountered and was never abundant. Allegheny crayfish are state-listed as species of concern. Survey data demonstrates that the aquatic crayfish species composition at CRJMTC has remained fairly constant over time. The semi-terrestrial species, rock crayfish (*Cambarus bartoni carinirostris*) and digger crayfish (*Fallicambarus fodiens*), are burrowing crayfish collected in conjunction with amphibian sampling across the installation (OHARNG, 2014).

Molluscs. Eight species of unionid mollusks have been identified at CRJMTC, and these unionid mollusk species (river clams) are common residents of headwaters within Ohio. One of the unionid mollusks, the creek heelsplitter (*Lasmigona compressa*), is listed as a state species of concern. This species was observed in Sand Creek in 1993, but was absent in a survey in 1999 and has not been found since. Ten species of sphaeriid mollusks (fingernail clams) have been identified at CRJMTC, representing all three Ohio genera. Twelve species of aquatic gastropods (snails) have been identified at CRJMTC. In general, the diversity of snails is directly related to the diversity and density of aquatic plant species. Forty-five species of terrestrial gastropods have been identified at CRJMTC, which represent the largest diversity of mollusks on the installation (OHARNG, 2014).

Aquatic Macroinvertbrates. Aquatic macroinvertebrate (invertebrates large enough to identify with unaided eye) surveys, which could include Odonata, Lepidoptera, and Coleoptera among others, were conducted in 1998 (USGS, 1998) and 2003 (USACE, 2005) at CRJMTC. The total number of taxa ranged from 25 to 76 within streams, 32 to 60 in ponds and 6 to 30 in sampled wetlands. No biological impairments were identified based on macroinvertebrate community findings. The widespread presence of many coldwater and pollution intolerant macroinvertebrate taxa reflects the good resource quality of the streams and aquatic habitats at CRJMTC.

3.4.3.2.3 Special Status Species

Special status species are endangered, threatened, or rare and sensitive species of conservation concern, whether listed at state or federal levels.

3.4.3.2.3.1 Federally-Listed Species

Federally-listed species with the potential for occurrence within CRJMTC are presented in Table 3.4.3-3.

Table 3.4.3-3 Federally-Listed Biological Resources with Potential for Occurrence within CRJMTC

Common Name	Scientific Name	Federal Status
Bald eagle	*Haliaeetus leucocephalus*	Species of concern
Indiana bat	*Myotis sodalis*	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Threatened
Eastern massasauga	*Sistrurus catenatus*	Candidate species
Mitchell's satyr	*Neonympha mitchellii mitchellii*	Endangered
Northern monkshood	*Aconitum noveboracense*	Endangered
Source: USFWS, 2016.		

According to the INRMP (OHARNG, 2014), currently there is one federally-listed threatened or endangered species present on CRJMTC, the northern long-eared bat. Federally protected and other federal status species are discussed in the following sections based on the USFWS "County Distribution of Federally-Listed Threatened, Endangered, Proposed, and Candidate Species" listing for Portage County in Ohio (USFWS, 2014).

Bald Eagle. The bald eagle (*Haliaeetus leucocephalus*) is a federal species of concern, and bald eagle nest is located in a forest management compartment southwest of the CIS footprint. The nest was used from 2010 to 2014 when it was temporarily inactive. CRJMTC staff observed an eagle refurbishing the nest in 2015. The bald eagle is protected under the BGEPA and the MBTA.

Indiana Bat. The Indiana bat (*Myotis sodalis*), a federally-listed endangered species, has not been documented on CRJMTC through mist netting surveys or acoustic monitoring efforts. Past studies have indicated that many aspects of the habitat at CRJMTC are suitable for Indiana bat (Tragus, 2010).

Survey efforts to date have provided no evidence that Indiana bats are present at CRJMTC. OHARNG conducts an installation-wide Indiana bat survey every five years in coordination with the USFWS.

Northern Long-eared Bat. The northern long-eared bat (*Myotis septentrionalis*), a species listed federally and by the state as threatened, has been confirmed present at CRJMTC (Tragus, 2010). Northern long-eared bats have been captured in bat surveys at Camp Ravenna. There were five captures in 1998, 1 capture in 2002, 20 captures in 2004, and 29 captures in 2010 (see also Table

3.4.3-2). Captures included adults and juveniles, pregnant and non-reproductive, indicating CRJMTC is providing summer roosting, maternity roosting, and foraging habitat for the species.

In continuing bat studies in 2015, a post-lactating female was captured at CRJMTC near the CIS footprint. The species has been detected widely throughout CRJMTC (tragus, 2010) and it is likely to be present in suitable habitats anywhere at CRJMTC.

Eastern Massasauga Rattlesnake. The eastern massasauga rattlesnake (*Sistrurus catenatus*), a federal candidate species, has not been documented at CRJMTC to date. In Ohio, they are found in or near wet areas, including wetlands, wet prairie, or nearby woodland or shrub edge habitat. This often includes dry goldenrod (*Solidago* spp.) meadows with a mosaic of early successional woody species, such as dogwood (*Cornus* spp.) or multiflora rose (*Rosa multiflora*). They prefer marsh and fen wetlands, and avoid open water. Emergent wetlands dominated by grasses and sedges with access to upland areas are preferred. Natural succession from herbaceous to woody vegetation is one cause of habitat loss for this species (OHARNG, 2014).

Monarch Butterfly. The monarch butterfly (*Danaus plexippus plexippus*) currently is under status review by the USFWS to determine if the species warrants listing as threatened under ESA. To date, the 90-day finding on the petition to list the monarch butterfly indicated that the petition presented substantial information indicating that the petition action may be warranted. As of December 31, 2014, the USFWS initiated a status review of the species (79 FR 78775). Although the monarch has not been documented to occur at CRJMTC, two plant species often used as larval food plants are present; common milkweed (*Asclepias syriaca*) and swamp milkweed (*Asclepias incarnata*) (AMEC, 2008b). In addition, plants suitable for adult nectaring are available (AMEC, 2008a) and up to 64 moth and butterfly species have been documented at CRJMTC (OHARNG, 2014). Therefore, the monarch was included in this document although the future listing status is yet to be determined. The monarch butterfly is not listed as threatened or endangered in Ohio.

Two milkweed species, which supply food for monarch butterfly larva (Monarch Joint Venture, 2016) occur within CRJMTC boundary common milkweed (*Asclepias syriaca*) and swamp milkweed (*Asclepias incarnata*) (AMEC, 2008b). The latitude of CRJMTC is approximately 41.16 decimal degrees, which according to Table 3.4.3-4, indicates that the peak in monarch abundance (fall migration) occurs from September 3 through September 20 of any given year. During the fall migration, monarchs cease to breed and head for their overwintering roost sites, which for the monarchs coming from the eastern U.S. are several high altitude mountain forests in Mexico (Monarch Watch, 2016).

Table 3.4.3-4 Monarch Peak Abundance – CRJMTC

Latitude	Peak in Monarch Abundance
45	August 29 – September 10
43	September 3 – September 15
41.16	*CRJMTC dates approximated between Latitudes 41 and 43*
41	September 8 – September 20
39	September 14 – September 26
Source: Monarch Watch, 2016.	

Adult monarchs (spring, summer, and fall alike) feed on nectaring plants, which include a wide variety of wildflower species supplying a diet of nectar taken up by the butterfly's specialized proboscis (feeding tube). The available data is inconclusive for determining if the CIS footprint occurs within a distinct migration route. Nonetheless, CRJMTC and the CIS footprint likely contain plants that could be used by adult monarchs during fall migration.

Mitchell's Satyr Butterfly. The Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*) , a federal endangered species, has not been documented at CRJMTC to date. The favored habitat for this species is sedge-dominated fens with low shrubs and tamaracks, with tussock sedge (*Carex stricta*) considered a primary larval host species. This butterfly has declined in most of its range and has disappeared from its former habitat in northeastern Ohio because of habitat alteration. Lepidopteran inventories at CRJMTC continue on a five-year cycle.

Northern Monkshood. Northern monkshood (*Aconitum noveboracense*), a federal endangered plant species, has not been documented at CRJMTC. The CIS does not contain shaded cliff faces in wooded ravines, or other suitable habitat for the northern monkshood (e.g., algific talus slopes); therefore, an undetected presence by this species is unlikely (OHARNG, 2014).

3.4.3.2.3.2 State-Listed Species

Several Ohio state-listed protected species have been documented at CRJMTC, as discussed in the following sections.

Plants. Three vascular plant surveys have been conducted at CRJMTC by The Nature Conservancy (survey dates not available); by the ODNR in 1993, 1998/1999, and 2010; and incidentally by the CRJMTC Natural Resources Manager between 2012 and 2013. Floral surveys to date have identified 144 bryophyte species (includes 124 species of moss and 20 species of liverworts) and 948 species of vascular plants. The four state-listed mosses and 16 state listed vascular plant species listed in Table 3.4.3-5 have been identified at CRJMTC. No sensitive vascular plant species have been identified as occurring within the CIS footprint or in the vicinity, with one exception. Lurking leskea, a non-vascular moss species listed as state threatened, is believed present in the CIS footprint. This species is under consideration for delisting because more populations exist than was previously documented. State-listed species at CRJMTC are located in areas outside the CIS footprint and would not be affected by the CIS project. A complete list of the plants observed at CRJMTC is provided in Appendix D of the INRMP (OHARNG, 2014).

Table 3.4.3-5 State-Listed Mosses and Vascular Plant Species at CRJMTC

Family	Scientific Name	Common Name	Group	State Status
Bartramiaceae	Philonotis fontana var. caespitosa	Tufted moisture-loving moss	Bryophyta, Musci	E
Plagiotheciaceae	Plagiothecium latebricola	Lurking leskea	Bryophyta, Musci	T
Bryaceae	Pohlia elongata var. elongata	Narrow-necked Pohl's moss	Bryophyta, Musci	E
Adoxaceae	Viburnum alnifolium	Hobblebush	Dicotyledons	T
Cupressaceae	Thuja occidentalis	Arbor vitae	Gymnosperms	P
Cyperaceae	Carex albolutescens	Greenwhite sedge	Monocotyledons	P
Cyperaceae	Carex formosa	Handsome sedge	Monocotyledons	E
Cyperaceae	Carex lupuliformis	False hop sedge	Monocotyledons	P
Cyperaceae	Carex pallescens	Pale sedge	Monocotyledons	P
Cyperaceae	Carex straminea	Straw sedge	Monocotyledons	P
Equisetaceae	Equisetum sylvaticum	Woodland-horsetail	Pteridophytes	P
Equisetaceae	Equisetum variegatum	Variegated horsetail	Pteridophytes	E
Iridaceae	Sisyrinchium montanum	Strict blue-eyed grass	Monocotyledons	T
Isoetaceae	Isoetes engelmannii	Appalachian quillwort	Lycopods	E
Onagraceae	Epilobium strictum	Simple willow-herb	Dicotyledons	T
Orchidaceae	Spiranthes lucida	Shining ladies'-tresses	Monocotyledons	P
Poaceae	Glyceria acutiflora	Sharp-glumed manna grass	Monocotyledons	P
Poaceae	Panicum philadelphicum	Philadelphia panicgrass	Monocotyledons	E
Rosaceae	Geum rivale	Water avens	Dicotyledons	P
Thelypteridaceae	Phegopteris connectilis	Long beech fern	Pteridophytes	P
State Status: E = endangered; T = threatened; P = potentially threatened.				

Wildlife. The state endangered northern harrier (*Circus cyaneus*) and the state threatened barn owl (*Tyto alba*) have been confirmed near the CIS footprint. The state endangered sandhill crane

(*Grus canadensis*) has been observed on overflights of CRJMTC, but landed birds have not been observed within the installation. Other state species of concern or interest documented near or on the CIS footprint include the eastern box turtle (*Terrapene carolina carolina*), least flycatcher (*Empidonax minimus*), northern bobwhite (*Colinus virginianus*), purple finch (*Haemorhous purpureus*), woodland jumping mouse (*Napaeozapus insignis*), and the yellow-bellied sapsucker (*Sphyrapicus varius*).

The bobcat (*Felis rufus*) is a state-listed species that has been indirectly observed through sign for several years. A bobcat was released at CRJMTC by the Ohio Division of Wildlife in 2003. The star-nosed mole (*Condylura cristata*), the woodland jumping mouse (*Napaeozapus insignis*), and the pygmy shrew (*Sorex hovi*) are state-listed species. Listed as a species of concern, the star-nosed mole is arguably the most unusual of the moles found in Ohio, favoring wetter habitats than other moles. The woodland jumping mouse, a state species of concern, was captured in a variety of habitats (pond and wetland edges, and brushy fields) and in numbers that indicate a fairly widespread population on the installation (OHARNG, 2014).

The black bear (*Ursus americanus*) is currently listed as state endangered in Ohio. Beginning in 2012, at least one black bear was observed roaming about the CRJMTC grounds. Multiple sightings of the bear were reported by CRJMTC staff throughout 2015.

Some state-listed bird species use wetlands at CRJMTC, including the little blue heron (*Egretta caerulea*), American bittern (*Botaurus lentiginosus*), least bittern (*Ixobrychus exilis*), northern waterthrush (*Seiurus noveboracensis*), sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), and common moorhen (*Gallinula chloropus*).

Table 3.4.3-6 lists the Ohio state-listed wildlife species documented at CRJMTC.

3.4.3.3 Environmental Consequences and Mitigation – Biological Resources – CRJMTC

3.4.3.3.1 Construction – Baseline Schedule

3.4.3.3.1.1 Environmental Consequences

The major CIS construction phases are discussed in Section 2.5.1. The CIS footprint is approximately 1,070 acres, of which 941 acres would be cleared and graded. Existing vegetation would be cleared, including grubbing tree roots, and the site would be graded during CIS construction to produce a level site. Impacts to water resources and wetlands due to construction of the CIS are detailed in Sections 3.5.14 and 3.5.15, respectively.

Table 3.4.3-6 State-Listed Wildlife Species at CRJMTC

Common Name	*Scientific Name*	State Status	Federal Status
Birds			
Sharp-shinned Hawk	*Accipiter striatus*	SC	
Henslow's Sparrow	*Ammodramus henslowii*	SC	
Northern Shoveler	*Anas clypeata*	SI	
Green-winged Teal	*Anas crecca*	SI	
American Black Duck	*Anas rubripes*	SI	
Gadwall	*Anas strepera*	SI	
Great Egret	*Ardea alba*	SC	
Redhead Duck	*Aythya americana*	SI	
American Bittern	*Botaurus lentiginosus*	E	
Pine Siskin	*Carduelis pinus*	SI	
Hermit Thrush	*Catharus guttatus*	SI	
Brown Creeper	*Certhia americana*	SI	
Northern Harrier	*Circus cyaneus*	E	
Marsh Wren	*Cistothorus palustris*	SC	
Sedge Wren	*Cistothorus platensis*	SC	
Northern Bobwhite	*Colinus virginianus*	SC	
Trumpeter Swan	*Cygnus buccinator*	T	
Black-throated Blue Warbler	*Dendroica caerulescens*	SI	
Cerulean Warbler	*Dendroica cerulea*	SC	
Blackburnian Warbler	*Dendroica fusca*	SI	
Magnolia Warbler	*Dendroica magnolia*	SI	
Bobolink	*Dolichonyx oryzivorus*	SC	
Least Flycatcher	*Empidonax minimus*	SI	
Wilson's Snipe	*Gallinago delicata*	SI	
Common Moorhen	*Gallinula chloropus*	SC	
Sandhill Crane	*Grus canadensis*	E	
Purple Finch	*Haemorhous purpureus*	SI	
Bald Eagle	*Haliaeetus leucocephalus*		SC
Least Bittern	*Ixobrychus exilis*	T	
Dark eyed Junco	*Junco hyemalis*	SI	
Mourning Warbler	*Oporornis philadelphia*	SI	
Ruddy Duck	*Oxyura jamaicensis*	SI	
Sora	*Porzana carolina*	SC	
Prothonotary Warbler	*Protonotaria citrea*	SC	
Virginia Rail	*Rallus limicola*	SC	
Golden-crowned Kinglet	*Regulus satrapa*	SI	
Northern Waterthrush	*Seiurus noveboracensis*	SI	
Red-breasted Nuthatch	*Sitta canadensis*	SI	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	SC	

Common Name	*Scientific Name*	State Status	Federal Status
Winter Wren	*Troglodytes troglodytes*	SI	
Barn Owl	*Tyto alba*	T	
Golden-winged Warbler	*Vermivora chrysoptera*	X	
Canada Warbler	*Wilsonia canadensis*	SI	
Fish			
Central Stoneroller	*Campostoma anomalum*	SC	
Mountain Brook Lamprey	*Ichthyomyzon greeleyi*	E	
Mammals			
Star-nosed Mole	*Condylura cristata*	SC	
Big Brown Bat	*Eptesicus fuscus*	SC	
Bobcat	*Felis rufus*	T	
Eastern Red Bat	*Lasiurus borealis*	SC	
Hoary Bat	*Lasiurus cinereus*	SC	
Little Brown Bat	*Myotis lucifugus*	SC	
Northern Long-Eared Bat	*Myotis septentrionalis*	SC	LT
Woodland Jumping mouse	*Napaeozapus insignis*	SC	
Tri-Colored Bat	*Perimyotis subflavus*	SC	
Deer mouse	*Peromyscus maniculatus*	SC	
Pygmy Shrew	*Sorex hoyi*	SC	
Southern Bog Lemming	*Synaptomys cooperi*	SC	
Mollusks			
Creek Heelsplitter	*Lasmigona compressa*	SC	
Reptiles			
Smooth Green Snake	*Opheodrys vernalis*	SC	
Eastern Box Turtle	*Terrapene c. carolina*	SC	
Eastern Garter Snake	*Thamnophis s. sirtalis*	SC	
Amphibians			
Four-toed Salamander	*Hemidactylium scutatum*	SC	
Insects			
Brachylomia algens moth	*Brachylomia algens*	SC	
Subflava Sedge Borer moth	*Capsula subflava*	SI	
Graceful Underwing moth	*Catocala gracilis*	E	
Monarch butterfly	*Danaus plexippus plexippus*		**
Northern Scurfy Quaker moth	*Homorthodes furfurata*	SC	
Coastal Plain Apamea moth	*Melanapamea (=Apamea) mixta*	SC	
Caddisfly	*Psilotreta indecisa*	T	
Brush-tipped Emerald dragonfly	*Somatochlora walshii*	E	

Ohio State Status: E = Endangered; T = Threatened; P = Potentially Threatened*; SC = Species of Concern*; SI = Special Interest*; X = Extirpated. (*Administrative status, not a legal designation).
Federal Status: LT = threatened; SC = Species of Concern; ** = Under ESA Status Review.
Source: Appendix D of OHARNG, 2014.

Terrestrial Resources

Vegetation Alliances. 941 acres would be cleared by construction activities. This acreage is comprised of 391 acres of forest community/alliances, 314 acres of shrub community/alliances, and 236 acres of herbaceous community alliances. These resources have been previously presented in Table 3.4.3-1.

Plants. An indirect minor impact to plant diversity at CRJMTC may result from increasing edge habitat resulting from clearing 931 acres for the CIS footprint. Edge habitat often provides adequate opportunities for the establishment of non-native species. According to the 2010 vascular plant survey, 26 percent of the 948 species of vascular plants recorded to occur within CRJMTC are not native to Ohio (Gardner, 2011). Though not an exhaustive list of invasive species, Canada thistle (*Cirsium arvense*), Johnsongrass (*Sorghum halepense*), and purple loosestrife (*Lythrum salicaria*) currently occur on CRJMTC and have the ability to increase in disturbed habitats and spread into conservative vegetation alliances.

Birds. The loss of all vegetation alliances within the CIS footprint would result in negligible indirect impacts to all avian species currently using the area. Most notable would be the loss of interior forest areas, which are often used by conservative migratory avian species. Grassland areas converted to maintained turf grasses may not be able to provide essential habitat for grassland birds, though the loss of such habitat would be considered a negligible impact to these widespread species.

Impacts to birds under the baseline construction schedule would likely be most prevalent during the site clearing phase of the project when trees, shrubs, and other vegetation are removed. However, to the extent practicable, the site clearing process would be scheduled to coincide with the non-nesting periods of local and migratory bird life cycles when bird populations (particularly brooding parents and nesting eggs and young) are more mobile and less vulnerable to construction-induced disturbances. Although this measure would not completely eliminate all impacts to birds, it would reduce them to a level of negligible impact, especially on a regional basis.

Current MBTA regulations authorize permits for the take of migratory birds for activities such as scientific research, education, and depredation control, though there is no permit systems for the incidental take of migratory birds associated with otherwise lawful activities. Section 315 of the NDAA 2003 exempts military readiness activities of the Armed Forces from the take prohibitions of the MBTA. MBTA regulations implementing Section 315 state that the Armed Forces may take migratory birds incidental to military readiness activities and requires that for their activities that may result in a significant adverse effect on a population of a migratory bird species, they must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects (50 CFR Part 21.15).

To address this issue, MBTA-protected species known to use habitats in or near the CIS footprint (Table 3.4.3-7) were reviewed to determine if any such populations would be significantly adversely affected by the development and operation of the CIS. A list of the 214 bird species known to inhabit CRJMTC is provided in the CRJMTC INRMP (OHARNG, 2014). These species are present in other locations at CRJMTC, so of the MBTA-protected species using habitats near the CIS footprint none would be subject to significant adverse effects at the population level from project construction and operational activities.

Mammals. The removal of all vegetation alliances within the CIS footprint would result in the displacement of many mammal species. Perimeter fencing would directly impede the movement of larger mammals. Mammal species affected by fencing would include, but not be limited to deer, coyote (*Canis latrans*), raccoon, red fox (*Vulpes vulpes volva*) and opossum (*Didelphus virginiana*). Small, grassland mammal species would be directly impacted by land clearing activities.

Bats would be indirectly adversely affected by loss of available foraging/roosting habitat by converting the CIS footprint to a managed turf grass area. However, if activities associated with military training and readiness activities at CRJMTC are conducted following specific conservations measures concurred upon with the USFWS, including but not limited to forest clearing between October 1 and March 31, then the activities are not likely to adversely affect the northern long-eared bat (AGD, 2015; USFWS, 2015a).

Amphibians. Construction activities within the CIS could make the pools used by salamanders unsuitable for reproduction, causing them to seek temporary refuge in suitable habitat outside the CIS footprint. Some amphibians exhibit strong homing instincts and may be expected to attempt to return to natal ponds. Returning individuals could be crushed by construction vehicles, but the overall effect on resident populations would not be major, as suitable habitat would remain outside the CIS footprint.

Reptiles. Reptiles likely to be present within the CIS footprint are mobile enough to locate to new areas outside the CIS, although slower animals such as turtles may need additional time to relocate. Amphibians and other semi-aquatic to aquatic wildlife are likely to be the most affected, as aquatic habitats within the CIS, including wetlands, ponds and some streams, would be filled, diverted, or otherwise modified. Some of these species would be able to re-locate outside the CIS using riparian areas as movement corridors.

Insects. Conversion of forested and grassland habitat to a maintained turf grass area would reduce the available larval host and adult nectaring plants for butterflies and moths. Suitable plants would remain available in locations outside the CIS footprint and overall impacts would be minor.

Table 3.4.3-7 Migratory Bird Species of Conservation Concern at CRJMTC

Common Name	Scientific Name	Seasonal Occurrence	Species Status
Henslow's Sparrow	*Ammodramus henslowii*	Breeding	SC
Upland Sandpiper	*Bartramia longicauda*	Breeding	E
American Bittern	*Botaurus lentiginosus*	Breeding	E
Black Tern	*Chlidonias niger*	Breeding	E
Northern Harrier	*Circus cyaneus*	Breeding	E
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Breeding	BCC
Trumpeter swan	Cygnus buccinator	Breeding	T
Sandhill Crane	*Grus canadensis*	Breeding	E
Cerulean Warbler	*Dendroica cerulea*	Breeding	SC
Willow Flycatcher	*Empidonax traillii*	Breeding	BCC
Peregrine Falcon	*Falco peregrinus*	Breeding	BCC
Wood Thrush	*Hylocichla mustelina*	Breeding	BCC
Least Bittern	*Ixobrychus exilis*	Breeding	T
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Breeding	BCC
Black-crowned Night-heron	*Nycticorax nycticorax*	Breeding	T
Pied-billed Grebe	*Podilymbus podiceps*	Breeding	BCC
Prothonotary Warbler	*Protonotaria citrea*	Breeding	SC
Common Tern	*Sterna hirundo*	Breeding	E
Barn owl	*Tyto alba*	Breeding	T
Golden-winged Warbler	*Vermivora chrysoptera*	Breeding	X
Blue-winged Warbler	*Vermivora pinus*	Breeding	BCC
Canada Warbler	*Wilsonia canadensis*	Breeding	SI
Rufa Red Knot	*Calidris canutus rufa*	Migration	LT
Semipalmated Sandpiper (Eastern)	*Calidris pusilla*	Migration	BCC
Buff-breasted Sandpiper	*Calidris subruficollis*	Migration	BCC
Marbled Godwit	*Limosa fedoa*	Migration	BCC
Hudsonian Godwit	*Limosa haemastica*	Migration	BCC
Whimbrel	*Numenius phaeopus*	Migration	BCC
Horned Grebe	*Podiceps auritus*	Migration	BCC
Lesser Yellowlegs	*Tringa flavipes*	Migration	BCC
Solitary Sandpiper	*Tringa solitaria*	Migration	BCC
Short-eared Owl	*Asio flammeus*	Wintering	SI
Bald Eagle	*Haliaeetus leucocephalus*	Year-round	BCC

Species status: LE = federal endangered; LT = federal threatened; E = state endangered; T = state threatened; SSC = species of concern; BCC = bird species of conservation concern; X = extirpated from the state
Sources: (OHARNG, 2014; USFWS, 2008)

Aquatic Resources

Fish. All fish populations within the CIS footprint would be lost due to land grading activities. Local loss of fish populations within the CIS footprint would be negligible to fish species conservation at the regional level.

Crayfish. All crayfish populations within the CIS footprint would be lost due to land grading activities. Local loss of crayfish populations within the CIS footprint would be negligible to crayfish species conservation at the regional level.

Molluscs. All mollusc populations within the CIS footprint would be lost due to land grading activities. Local loss of mollusc populations within the CIS footprint would be negligible to mollusc species conservation at the regional level.

Aquatic Macroinvertebrates. Impacts to aquatic macroinvertebrates would be negligible because they are not present within the CIS footprint.

Special Status Species (Federal and State)

Birds. Bald eagle, a protected migratory raptor species, has been nesting in a wetland located southwest of the CIS since 2010 or earlier. The CIS layout was modified to avoid this wetland and the eagle nest. The eagle nest was destroyed in 2014 storm, but an eagle was observed re-building the nest in 2015. The CIS footprint is approximately 0.25-mile from the bald eagle nest. Impacts to bald eagles would be negligible.

Mammals. Northern long-eared bat would be affected by tree clearing that removed roost trees or trees that provide foraging habitat. No known roost trees are present in the CIS footprint, so these would not be affected and loss of forage habitat is the primary effect. If tree clearing is necessary during the period from April to October when bats are on summer roosts and actively foraging, consultation with the USFWS would be initiated to determine if additional conservation measures would be necessary to protect the species.

Reptiles. Eastern box turtle, a state species of concern, prefers open broadleaf forests, field-forest edges, shrubby grasslands, marshy meadows, stream valleys, and other vegetation types (van Dijk, 2013). Habitat conversions within the CIS facilities would reduce the suitability of these sites for eastern box turtle and could result in mortality if nearby areas are already occupied by other turtles. Turtles moving to new locations may be subject to predation in unfamiliar areas. If present during construction, some turtles may be crushed by machinery. Conversion of forested areas to a manicured lawn would result in less food available, adding to other stressors.

Insects. The monarch butterfly, a species currently under review for a potential listing, may be directly impacted by development of the CIS footprint. Adverse direct impacts to the species may include the destruction of monarch caterpillars if present on larval food plants within areas scheduled for land grading activities. Land clearing activities may result in indirect adverse impacts to the species through destruction of larval plant species or adult nectaring plant species, which would reduce available habitat for the species. If land clearing were completed in the winter months, direct impacts would be limited, but loss of larval habitat could occur. Nectaring adults would be forced to forage outside the CIS footprint for wildflowers on which to feed.

Lighting

Nighttime construction activities and associated temporary construction lighting are not expected to be part of CIS construction for most of the baseline construction period. However, for safety reasons construction activities would require lighting during portions of the fall, winter, and early spring when the length of natural daylight is decreased. Seasonal construction lighting would be used for an estimated 1 to 2 hours in the early morning and 1 to 2 hours in the late afternoon and early evening each workday. Artificial lighting could affect wildlife by altering behaviors and possibly circadian rhythm (Frank, 2006; Beier, 2006).

Lighting effects on wildlife tend to vary considerably, with some individuals and species more sensitive than others. Most wildlife evolved under a reliable cycle of day and night and behavior, certain cycles, predator/prey relationships, and reproduction can be affected by light pollution. Lighting effects can be generalized as follows; artificial lighting tends to

- Attract some organisms (e.g., moths, mayflies), concentrating them as a food source to be preyed upon. Among those organisms not predated, they can be caught in a light trap that eventually exhausts or kills the trapped animals (Frank, 2006).
- Displace some animals, excluding them from habitat where they might otherwise successfully forage. For example, seed collection by small mammals is reduced in lit areas because of the higher risk of predation (Beier, 2006). The effect is a reduction in the extent of suitable habitat.
- Disrupt foraging behaviors and increase the risk of predation (Beier, 2006; Rydell, 2006).
- Affect the time available for finding forage, shelter, or mates (Wise and Buchanan, 2006).
- Disorient animals that use the stars for navigation, losing their way when exposed to artificial lights (Gauthreaux and Belser, 2006).
- Alter day/night (circadian) patterns, resulting in disturbed sleep patterns, reproductive cycles, and mistiming of certain behaviors, such as foraging (Frank, 2006; Beier, 2006).

For animals that are highly habitat specific, relocation or displacement may not be an option. Under conditions of artificial light these animals may be predated or fail to reproduce at levels that can affect population growth and stability (Wise and Buchanan, 2006). For species that can move to new areas, as lighting encroaches on dark areas, the areas dark enough to move to become fewer, ultimately reducing the available habitat.

Moths attracted to security lights would be selectively predated by some bat species, but not others. *Myotis* spp. (such as northern long-eared bat) typically avoid lights, so these species would not benefit from the concentrated prey and they could be adversely affected as a result because of reduced prey species availability. This includes federally-listed Indiana bat and northern long-eared bat. Owl hunting could be reduced in lit areas, potentially affecting reproductive success if additional dark foraging areas are not available to individuals.

The use of security lighting or temporary construction lighting would affect wildlife within or near the CIS footprint. Because construction activities requiring lighting would be temporary and would largely occur seasonally during the second through fourth years of construction, there would be minimal impact to wildlife from lighting during construction. Much of this impact would be in the form of formerly dark areas and by skyglow, which would be most visible on cloudy nights and would have the same effects as a full moon, reducing prey and predator species activity. It is not expected that constant security lighting would be used during construction because under the baseline construction schedule work would cease shortly after sundown.

<u>Noise</u>

Wildlife species rely on biologically meaningful sounds for communication, navigation, avoiding danger, and finding food. Noise is any sound generated that alters or interferes with these activities. Disruption from noise may be characterized as disturbance (causing a detectable adverse change in behavior) or harm (adversely affecting health, reproduction, survivorship, habitat use, distribution, or abundance). There are four primary ways animals are adversely affected by noise pollution:

- Hearing loss, resulting from (chronic) noise levels of 85 dB or greater;
- Masking, which is the inability to hear important environmental cues and signals;
- Physiological effects, such as increased heart rate and respiration and general stress reaction; and,
- Behavioral effects resulting in abandonment of territory or lost reproduction opportunities (NNS, 2003).

Site preparation, construction, and utility line installation may temporarily disturb wildlife in the immediate area of construction activities. However, these activities would be limited and intermittent (daily halt to activities and inactive overnight) in duration under the baseline construction schedule, and long-term wildlife disturbance or harm arising from direct auditory impacts are not anticipated. The effects of noise on wildlife vary from no effect to serious in different species and different situations. Behavioral responses to noise also vary from alarm to departure from favorable habitat, due partly to the fact that wildlife can be very sensitive to sounds in some situations (e.g., during breeding) and insensitive to the same sounds in other situations (Larkin et. al., 1996).

Most of the site preparation and construction noise and human activity would be caused by heavy traffic to and from the CIS footprint and the short-term, intermittent use of heavy machinery during construction. The increased human presence may cause birds and other mobile wildlife species to temporarily evacuate areas subject to the highest level of noise and activity. However, noise tends to attenuate with distance (Larkin et al., 1996) so long-term impacts to wildlife from construction noise affecting populations are not anticipated.

Summary of Environmental Consequences

Loss of suitable habitat for several federally-listed threatened and endangered species would occur from construction of a CIS at CRJMTC. Because, however, seasonal restrictions on tree clearing would be implemented to the maximum extent practicable, construction under the baseline schedule may affect, but is not likely to adversely affect federally-listed threatened and endangered species including the northern long-eared bat, which is the only federally-listed threatened and endangered species known to occur.

3.4.3.3.1.2 Mitigation

No mitigation measures (compensatory, offsetting activities, or otherwise) have been identified for biological resources that would be impacted by construction activities within the CRJMTC CIS footprint under the baseline construction schedule.

3.4.3.3.2 Construction - Expedited Schedule

Under the expedited schedule, the types and amounts of habitat clearing would remain the same, but the timing of the clearing and other construction activities would be compressed. As such, the types of biological impacts would largely be the same as those that would occur under the baseline schedule, but the intensity and timing of the impacts would differ.

3.4.3.3.2.1 Environmental Consequences

In general, the impacts for the baseline schedule and the expedited schedule would be similar with the exception that the season timing of vegetation clearing/grubbing may result in impacts to nesting songbirds and monarch butterflies.

The MBTA military readiness exemption review described in the construction baseline schedule would apply to the expedited construction schedule and adverse effects to birds of conservation concern at a population level would not be anticipated.

Lighting effects from an expedited construction schedule could be more extensive than the baseline construction schedule because of the longer period when lighting would be used. This would have the effect of further displacing some species, forcing them to seek new dark areas in which to forage and carry out other activities under the cover of darkness. Insects would be affected through an attraction to the lights, which could benefit bats as they exploit the concentrated prey. Some moth species react to light by failing to fly, seek mates, or other essential activities (Frank, 2006). Because of the extended period in which lighting would be used, some effects could have moderate impacts, altering population dynamics of some species, particularly insects.

Noise impacts during the expedited schedule, would be similar to the baseline similar, but intensified due to the around the clock and nighttime work activities. To minimize noise impacts to wildlife and birds, the more noise-intense construction activities would be limited during nighttime hours.

3.4.3.3.2.2 Mitigation

No mitigation measures (compensatory, offsetting activities, or otherwise) have been identified for biological resources that would be impacted by construction of the CIS under the expedited schedule.

Because under the expedited schedule, tree clearing would be anticipated to occur outside the seasonal timeframe restriction, consultation with the USFWS regarding the northern long-eared bat would be conducted to determine if any additional conservation measures would be required and to likely obtain a take permit. Based on the impacts to the northern long-eared bat within the CRJMTC CIS footprint, a determination has been made that these impacts may affect and would likely adversely affect a threatened or endangered species, which results in a major impact and would be considered as a “significant” impact.

To minimize the effects of lighting on wildlife, positioning the light source at lower heights and using longer wavelength lighting (ambers and reds rather than blues or white light) are the preferred measures. Light fixtures could be mounted as low as possible to illuminate just the area needed for safety and comfort with minimal overlap into the surrounding areas. Where necessary, lighting could be shielded to prevent overlap into the surrounding areas where light is not required. Shielding would also reduce skyglow. Wherever feasible, long wavelength light sources could also be used. Long wavelength light alters the exposure of wildlife to lighting effects at night while providing illumination. The use of reflective surfaces under lights could also be avoided as wildlife may be confused and attracted to what appears to be water.

3.4.3.3.3 Operation

3.4.3.3.3.1 Environmental Consequences

Following construction, the CIS would be relatively static except periodically for maintenance of various structures during the service life of the CIS. Flight testing of missiles is not a planned operational activity, although in-ground tests and other hardware-in-the-loop exercises could occur. Testing activities would not result in measurable impacts to biological resources, because most tests would occur inside structures and they would not result in environmental releases that could affect biological resources.

The primary impacts from CIS operation on vegetation management would be related to maintenance of the clear zone and landscaping within the CIS and its perimeter. Specific activities may include selective use of mowing, herbicides, or similar methods. These impacts would be minor. The application of herbicide and mechanical trimming of the perimeter could result in the establishment of a variety of non-native plant species. These non-native plant species would have the ability to increase in disturbed habitats and spread into adjacent vegetation communities. In the event of herbicide spills, the CIS maintenance and spill response team would follow established SPCC plans to contain and clean up a spill.

In addition to vegetation, minor impacts from facility and security lighting and some noise due to the impacts from backup power generation equipment would occur. Impacts from lighting would be minimized by the use of fully recessed lighting that directs lighting downward. Noise impacts would occur during temporary back-up situations (power outages or during test and maintenance activities).

3.4.3.3.3.2 Mitigation

No mitigation measures (compensatory, offsetting activities, or otherwise) have been identified for biological resources that would be impacted by operation of the CIS at CRJMTC.

Figure 3.4.3-1 Vegetative Communities and Alliances - CRJMTC

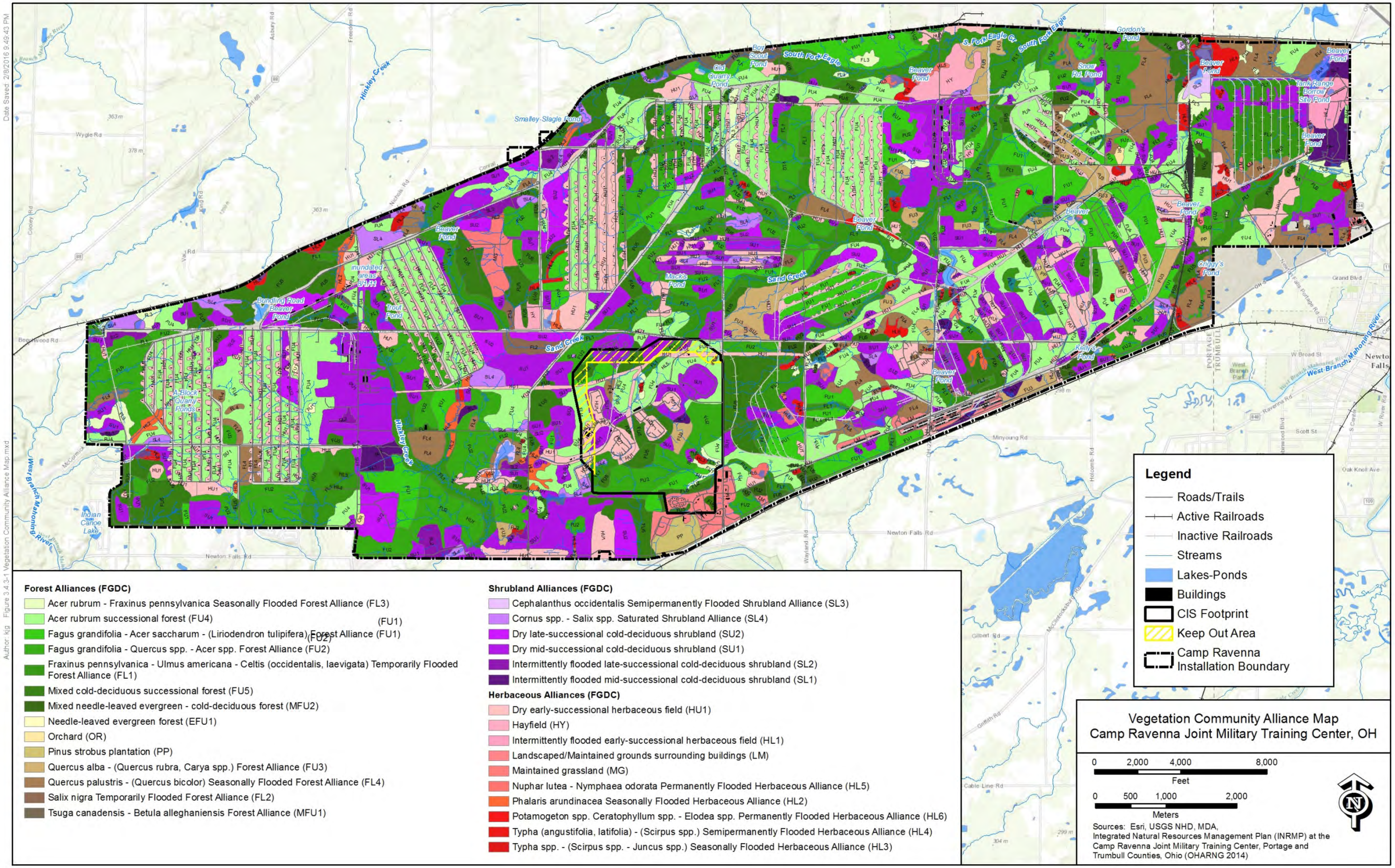
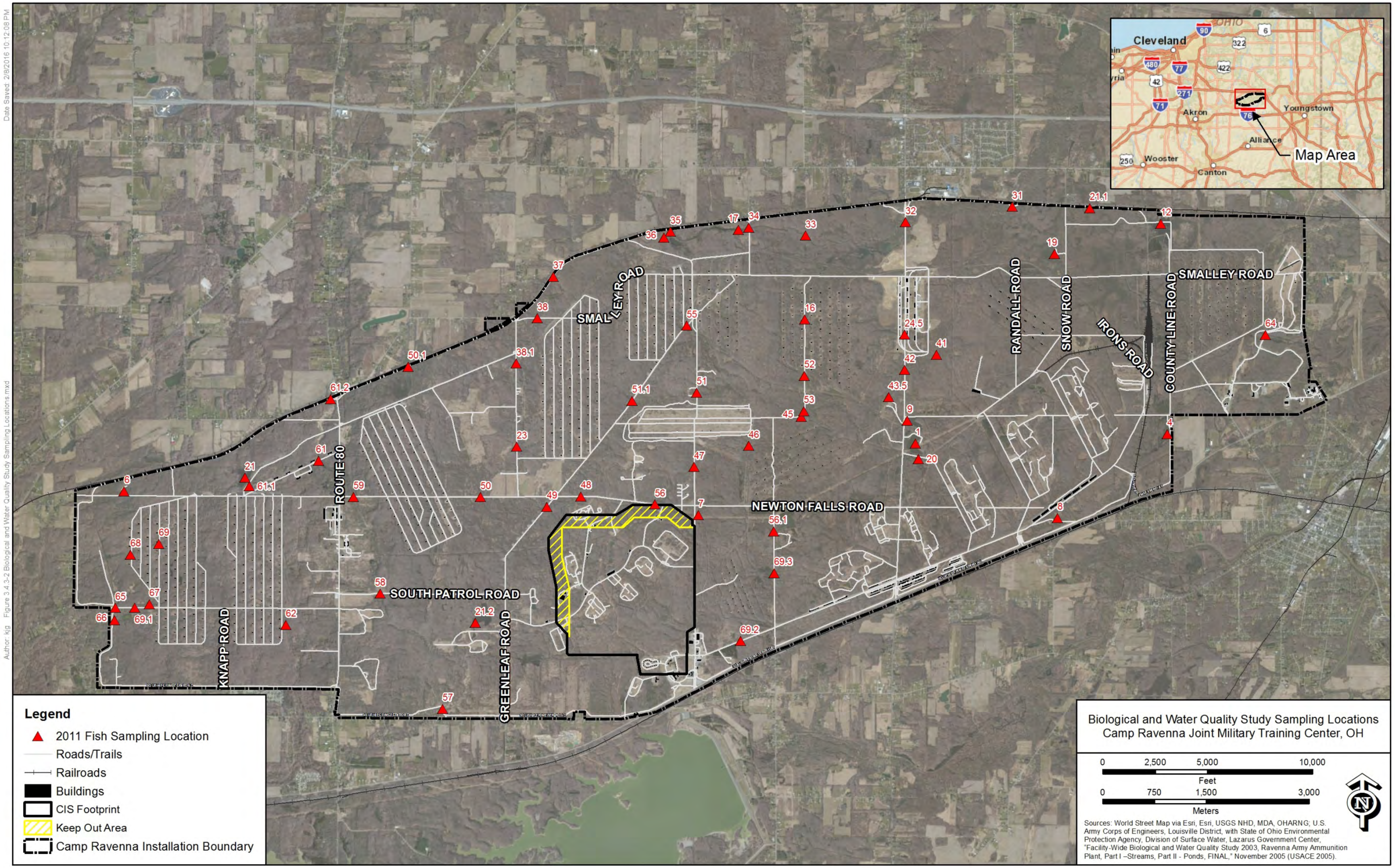


Figure 3.4.3-2 Biological and Water Quality Study Sampling Locations - CRJMTC



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3.4.4 Cultural Resources – CRJMTC

Cultural resources include prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. Cultural resources are typically discussed in terms of archaeological resources (prehistoric and historic), historic buildings and structures, and native populations/ traditional resources (e.g., Native American sacred or ceremonial sites). Prehistoric and historic archaeological resources are the physical remnants of human activity. They include archaeological sites, features, ruins, artifacts, and other evidence of prehistoric or historic human behavior. Historic buildings and structures (i.e., architectural features) consist of above ground, standing properties postdating the advent of written records (e.g., homesteads, ranchsteads, World War II buildings, Cold War structures). Traditional resources may be prehistoric sites and artifacts, historic areas of occupation and events, historic and contemporary sacred areas, materials used to produce implements and sacred objects, hunting and gathering areas, and other botanical, biological, and geological resources of importance to contemporary culture groups.

This section discusses the existing cultural resources at and in the vicinity of the CIS footprint, the potential project impacts, and potential mitigation measures associated with the project.

3.4.4.1 Regulatory Framework – Cultural Resources – CRJMTC

There are several laws, regulations, EO, and other requirements that must be taken into consideration with determining effects of a potential deployment or its alternatives on cultural resources, including, but not limited to the following:

- NEPA – NEPA requires that cultural resources are fully considered prior to undertaking any major federal action that significantly affects the environment.
- NHPA, as amended (16 USC 470 et seq.) – The NHPA is legislation intended to preserve historical and archaeological sites in the U.S. The act created the NRHP, the list of National Historic Landmarks, and the SHPOs.
- ARPA of 1979, as amended (16 USC 470aa-470mm) – The ARPA strengthened the permitting procedures required for conducting archeological fieldwork on federal lands, originally mandated by the Antiquities Act. It also establishes more rigorous fines and penalties for unauthorized excavation on federal land.
- Antiquities Act of 1906 (16 USC 431–433) - Provides for the protection of historic and prehistoric ruins and objects of antiquity on federal lands, and authorizes scientific investigation of antiquities on federal lands subject to permits and other regulatory requirements. This act also provides information on penalties for damage and destruction of antiquities.
- Archeological and Historic Data Preservation Act of 1974 (16 USC 469-469c) - This statute requires that federal agencies provide for the preservation of historical and

archeological data (including relics and specimens) which might otherwise be irreparably lost or destroyed as the result of any alteration of the terrain caused as a result of any federal construction project of federally-licensed activity or program.

- AIRFA of 1978 (42 USC 1996) – The AIRFA was enacted to protect and preserve the traditional religious rights and cultural practices of American Indians, Eskimos, Aleuts, and Native Hawaiians.
- NAGPRA (25 USC 3001 et seq.) - The NAGPRA requires federal agencies and institutions that receive federal funding to return Native American cultural items to lineal descendants and culturally affiliated Indian tribes and Native Hawaiian organizations. Cultural items include human remains, funerary objects, sacred objects, and objects of cultural patrimony.
- Curation of Federally Owned and Administered Archeological Collections (36 CFR Part 79) – These regulations provide minimum standards for the long-term management and care of archeological collections, including the associated records and reports.
- Presidential Memorandum for Heads of Executive Departments and Agencies on Government-to-Government Relations with Native American Tribal Governments (1994) – The purpose of this memorandum was to clarify the responsibility of the federal government during interactions with Native American Tribal governments.
- EO 13175, Consultation and Coordination with Indian Tribal Governments – This EO requires consultation and collaboration with Indian tribal governments; strengthening of the government-to-government relationship between the U.S. and Indian tribes; and reducing the imposition of unfunded mandates upon Indian tribes.
- EO 13007, Indian Sacred Sites – This EO requires executive agencies with administrative responsibility of federal land management to accommodate access to and ceremonial use of Indian sacred sites and avoid adversely affecting the physical integrity of sacred sites.
- EO 13084, Consultation and Coordination with Indian Tribal Governments – This EO reaffirms the unique legal relationship between the U.S. and Indian tribal governments; stressing that federal agencies maintain regular and meaningful collaboration with Indian tribal governments when formulating policies that would uniquely affect such governments being guided by the principle of respect for their self-government and sovereignty.
- EO 13287, Preserve America – This EO establishes a federal policy to provide leadership in preserving the nation's heritage by actively advancing the protection, enhancement, and contemporary use of historic properties owned by the federal government and by promoting intergovernmental cooperation and partnerships for the preservation and use of historic properties.
- DoD Instruction 4710.02, Interactions with Federally Recognized Tribes – This DoD instruction implements DoD policy, assigns responsibilities, and provides procedures for DoD interactions with federally-recognized tribes as required by federal regulations.

- DoD Instruction 4715.3, Environmental Conservation Program - Promotes DoD-wide conservation program cooperation to guarantee continued access to land, air, and water resources for realistic military training and testing while ensuring that the natural and cultural resources, air and water continue to be sustained for future generations. Includes the requirement that all installations have an INRMP and/or an ICRMP.
- DoD Instruction 4715.16, Cultural Resources Management – This Instruction establishes DoD policy and assigns responsibilities to comply with applicable federal statutory and regulatory requirements, EOs, and Presidential memorandums for the integrated management of cultural resources on DoD-managed lands.
- AR 200-1, Environmental Protection and Enhancement - This regulation addresses the environmental responsibilities of all Army organizations and agencies. It covers environmental protection and enhancement and provides the framework for the Army Environmental Management System.

These laws, regulations, EOs, and requirements outline the process of compliance, define responsibilities of the federal agency proposing an undertaking, and prescribe the relationships among other federal, state, and local agencies and stakeholders. An "undertaking" is a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency, those carried out with federal financial assistance, or those requiring a federal permit, license, or approval (36 CFR Part 800.16).

Sections 106 and 110 (16 USC 470 et seq.) of the NHPA require that for any federal undertaking, prior to the approval of the expenditure of any federal funds on that undertaking, the effect of the undertaking on any district, site, building, structure of object that is included in or eligible for inclusion in the NRHP must be taken into account. To be considered eligible for inclusion in the NRHP, a property must meet the NRHP listing criteria, which is specified in the DoI regulations (36 CFR Part 60.4 and NRHP). To determine NRHP eligibility, all potential prehistoric, historic, Native American and traditional historic properties in the footprint and vicinity of the undertaking (e.g., potential deployment or its alternatives) must be evaluated. "Historic properties" include any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP maintained by the Secretary of the Interior. This includes artifacts, records, and remains that are related to, and located within, such properties and properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization, and that meet the NRHP criteria (36 CFR Part 800.16). In addition to identification and evaluation of historic properties, the regulations also state the need to determine what potential impacts could occur to historic properties if the potential deployment or its alternatives were implemented.

Compliance under Section 106 of the NHPA requires consultation with SHPO, local governments, associated federal agencies, federally recognized Native American tribes, and the interested public, as appropriate.

3.4.4.2 Prehistoric and Historic Background – Cultural Resources - CRJMTC

Managing cultural resources at CRJMTC is guided, in accordance with AR 200-1, by an ICRMP, which is required to be updated every 5 years. The most recent ICRMP (draft) was prepared in March 2015 for all OHARNG installations, including CRJMTC. The ICRMP includes a brief description of the OHARNG parent installation, an overview of all known cultural resources across all OHARNG installations, and at each installation, the status of those resources and appropriate compliance and management activities for the next 5 years. It also establishes priorities for identification and standards for the evaluation of cultural resources on all OHARNG installations, and provides a schedule to accomplish program objectives. (AMEC E&I, 2015).

The following sections provide a brief summary of the prehistory of northeastern Ohio and the history of Portage County and CRJMTC based on a review of the ICRMP and previous cultural resource investigations conducted at CRJMTC.

3.4.4.2.1 Prehistoric Background

The prehistoric occupation of northeastern Ohio is generally divided into the following major periods (MSG, 2015):

- Paleo-Indian.
- Archaic.
- Woodland.
- Protohistoric.

In general, the Paleo-Indian Period includes the earliest documented human occupation in the region, beginning in the early post-glacial period around 12,000 years B.P. through 10,000 years B.P. Paleo-Indians were nomadic groups comprised of small kin-based bands that primarily practiced a foraging subsistence strategy. These Paleo-Indian bands repetitively moved within a circumscribed geographic range to intercept large herd animals during their migratory cycles (Gramly, 1988; Stothers et al., 1996). Over time, the focus of these groups likely shifted from large-scale hunting expeditions to a more regular procurement of game accompanied by a decrease in the overall size of territory encompassed by these groups. Paleo-Indian sites are most easily recognized in the archaeological record by the presence of lanceolate spear points (MSG, 2015).

The Archaic Period is defined by cultural adaptation to changing environmental conditions beginning around 10,000 B.P. and extending through approximately 2,500 B.P. in which localized seasonal settlement and subsistence patterns replaced the broad seasonal migration patterns of the Paleo-Indian Period (Cardno JFNew, 2014). The Archaic Period is generally broken into three time periods, Early, Middle, and Late, which generally reflects the transition from highly nomadic to more sedentary lifestyles. Lithic tools recovered from the Archaic Period suggest that vegetable foods were becoming a more important staple in the diet of these early Native Americans (Dragoo, D.W., 1976). A gradual warming of the climate took place in the Middle Archaic Period, (8,000-5,000 B.C.), and the regional development of Native American cultures began to take place. The primary focus of subsistence activities became the deer, turkey, other small mammals, fish, and shellfish. Small upland camps as well as villages in riverine environments are site types associated with the Middle Archaic Period. Artifacts of the Middle Archaic Period include side-notched and stemmed projectile points/knives as well as ground stone tools. The Late Archaic Period (8,000 – 5,000 B.P.) reflects the increasing complexity of Native American cultural groups resulting in decreased movement and individuals occupying an area for longer periods of time. The primary focus of subsistence activities during the Late Archaic Period focused on shellfish, fish, migratory birds, and other aquatic resources primarily obtained during spring and summer and nuts and floral resources obtained during the fall. Hunting occurred year-round, with the primary focus on the white-tailed deer (Cardno JFNew, 2014; AMEC E&I, 2015).

The Woodland Period, occurring approximately 2,500 B.P. through 900 B.P. is broadly associated with innovations such as pottery, bow and arrow, and plant domestication. Occupations during the Woodland Period were typically centered in more riverine environments and represent the transition from the nomadic Archaic subsistence strategy to a more localized, semi-sedentary subsistence strategy (MSG, 2015). The Woodland Period is generally broken into three periods, Early, Middle, and Late. During the Early Woodland Period, an increase in social complexity was observed by the construction of earthen mounds and the elaborate ceremonial treatment of the deceased associated with the Adena culture. During the Middle Woodland Period, the Hopewell culture (which superseded the Adena culture) was generally associated with trade items found in ceremonial contexts including copper and silver found near the Great Lakes, obsidian from the western states, and marine shells and pearls from the southeastern gulf coast. (AMEC E&I, 2015) The Late Woodland Period is not as well understood as the earlier Adena and Hopewell cultures of Ohio and is primarily defined on the basis of ceramic types.

The Protohistoric Period represents early historic background and occurred from circa 1550 through 1765 before large-scale European presence was established in northeastern Ohio. Disease decimated many Native American tribes, placing them in a constant state of flux.

At this time, subsistence patterns began to change as Native Americans grew to rely on European trade items; receiving European material indirectly from intermediate sources such as French sources in the St. Lawrence River region and/or English sources in the Chesapeake Bay region (Pendergast, 1985; Pendergast, 1990; Stothers et al., 1994), but did not actually have physical contact with Europeans.

3.4.4.2.2 Historic Background – State of Ohio, Portage County, Ohio Army National Guard, and CRJMTC

This section provides a brief summary of the historic background of the State of Ohio, Portage County, OHARNG, and the CRJMTC based on a review of the CRJMTC ICRMP and previous archaeological investigations conducted at CRJMTC.

State of Ohio

Until the late 18th century, several Native American groups, including the Iroquois, Wyandot, and Delaware, controlled present day Ohio, discouraging Euro American migration to the area (Cardno JFNew, 2014). Following the French and Indian War (1756-1763), the French relinquished control of all Ohio lands to the British.

Prior to the Revolutionary War, Connecticut held claim to the land from its western boundary to the Mississippi River. After the war, the colony ceded most of this land to the U.S. government through a series of treaties in the 1780s and 1790s, with the exception of a 120-mile strip located in northern Ohio called the Connecticut Western Reserve (MSG, 2015). This area was one of the first partitions of Ohio lands. The Connecticut Land Company purchased the Connecticut Western Reserve in 1795 for the sum of $1.2 million and began a survey of the region, dividing the area into townships of 5 mi^2. Ohio was incorporated as a state in 1803.

Portage County

Portage County was created by the Ohio State Legislature on June 7, 1807, from lands which were part of Trumbull County. The name originated from an old Native American "portage" route which ran between the Cuyahoga and Tuscarawas rivers (Howe, 1900). In 1808, Ravenna was established as the county seat.

The growth of Portage County was slow in comparison to other areas of the Western Reserve, mainly because of its relative isolation from other communities. This began to change by the middle of the 19th century with the movement of people from eastern states and countries like Germany, Ireland, and England (Wilhelm, 1982).

Milling (wheat) was one of the earliest industries to develop in Portage County. Over the course of the early 19th century, mills were constructed in almost every township in Portage County. Additional industries of the period included a tannery, pottery, brick factory, and glass factory (Waite et al., 1996); however, the 19th century economy of Portage County was primarily based on agriculture, and more specifically dairy farming. Dairy farmers initially focused on cheese and butter-making but as other areas of the U.S. shifted away from self-production of these goods, the demand for Ohio dairy products increased (Weinberger et al., 2002). The construction of the Pennsylvania and Ohio Canal in 1840 facilitated the market by allowing dairy products to be shipped to the East Coast. Railroads eventually surpassed canals as the primary avenue for shipping and transportation and by the end of the 19^{th} century, the focus of the dairy industry shifted from butter and cheese to milk (Cardno JFNew, 2014).

OHARNG

The OHARNG originated on July 25, 1788, when the Northwest Territory passed a law establishing a militia. The original mission of these citizen-soldiers from Marietta, Ohio included the protection of family and land in the territory. Numerous forts were built to protect the incoming settlers and to push many Native American tribes out of the area (Dupuy, 1971). These early forts included Ft. Steuben (built 1786); Ft. Washington (Ohio's most important fort, built 1789) in present day Cincinnati; and Fort Hamilton, Fort Jefferson, and Fort St. Clair, all built in 1791. Other forts, consisting of Fort Columbus, Fort Defiance, Fort Greenville, Fort Adams, Fort Recovery, and St. Mary's, were constructed later (AMEC E&I, 2015).

The Ohio militia conducted its first significant mission during the spring of 1812, when it was called upon to defend the American post at Detroit against the British and their Indian allies during the War of 1812. In 1848, the U.S. Government engaged in mass expansionism motivated by the theory of Manifest Destiny, thereby creating conflict with Mexico. Two years later, the Ohio militia was again called up to help fight in the latter portion of the Mexican American War. (AMEC E&I, 2015)

In 1864, the Ohio legislation officially renamed the Ohio militia the National Guard of Ohio, formalizing its place in the U.S. military. The following is a brief summary of the OHARNG contributions during major conflicts through history (AMEC E&I, 2015):

- Civil War (1861 – 1865) - 350,000 Ohioans served in such battles as Bull Run, Shiloh, Antietam, Gettysburg, Chattanooga, and Chickamauga.
- Spanish-American War (1898) - the OHARNG contributed forces in the form of infantry, cavalry, light artillery, and naval militia units.
- World War I (1917) - a total of 225,000 Ohioans fought in this war, the fourth largest contribution of soldiers from all of the U.S.
- Between WW I and WW II, the OHARNG primarily performed relief missions in times of natural disaster.
- World War II (1940) - 20,000 OHARNG troops were stationed in the Pacific Theatre.
- Korean War (1950) - 25,000 OHARNG soldiers received training and provided individual replacements in Korea as needed.
- Vietnam War (1959) – OHARNG 121^{st} Tactical Fighter Group called to duty.
- Gulf War (1991) – 956 OHARNG troops sent to Europe and the Middle East.
- September 11, 2001 - 178^{th} and 180^{th} Fighter Wings assisted in air cover and homeland security after the terrorist attack. Several Air and Army Guard units were mobilized in the days following the attack in support of the War on Terror.

- Beginning in 2003, Ohio units received the call for missions in Afghanistan and Iraq. Since that time, more than 10,000 Soldiers have deployed in support of the War on Terror.
- OHARNG continues to mobilize units in support of various current missions within the U.S. and over-seas including vital peacekeeping and humanitarian missions.

The OHARNG has fulfilled work in all five areas of the National Guard's operations categories, which include assisting with civil disturbances, mobilization against the spread of communism, active participation in war, rescue, and relief from natural disasters, and active duty manning missile sites (Waite et al., 1996).

CRJMTC

In 1940, the federal government acquired 223 farms encompassing approximately 21,422 acres of land to build the present day CRJMTC. On March 23, 1942, a World War II facility was opened which consisted of two facilities on the CRJMTC reservation: the Ravenna Ordnance Plant and the Portage Ordnance Depot. The facilities, which had the primary mission of the loading and storage of ammunition (AMEC, 2008c), employed over 14,000 people (L&A, 2012). One year after their completion, the two facilities were combined to form the Ravenna Ordnance Center. In 1945, it became the Ravenna Arsenal. The installation was government-owned and contract-operated by the Atlas Powder Company from 1940 until the end of the war, when it was turned over to the U.S. Ordnance Department (AMEC, 2008c). The facility was placed on standby status at the end of World War II in 1945, and produced agricultural ammonium nitrate fertilizer from 1946 to 1949 (AMEC, 2008c).

In 1950, the facility resumed full operational status to support the Korean War. The facility eventually returned to standby status in 1957 at which time it was responsible for the renovation and demilitarization of various kinds of ammunition (AMEC, 2008c). In 1961, the facility separated; the ammunition operation was renamed the Ravenna Ordnance Plant and the overall installation was named the Ravenna Army Ammunition Plant (RVAAP). Operations at the RVAAP were reactivated in 1968 during the Vietnam War, although at a reduced scale, with the primary mission consisting of the shipment of ammunition; the cleaning, refurbishing, and storage of equipment from other installations; and the demilitarization of ammunition (AMEC, 2008c).

By 1973, the RVAAP was back on standby status; the Vietnam War was the last time the RVAAP was used during war.

The OHARNG began using portions of the facility for training in the 1950s. In May 1999, the National Guard Bureau acquired the majority of the RVAAP property and licensed it to the OHARNG for management and use as a training area, known as the Ravenna Training and Logistics Site (RTLS) (AMEC, 2008c). The facility was renamed CRJMTC in 2002.

3.4.4.3 Affected Environment – Cultural Resources – CRJMTC

The affected environment for cultural resources is identified through determination of the APE. The APE is defined by 36 CFR Part 800.16 as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

The APE of the potential CIS (referred to herein as the CIS APE) at CRJMTC includes an approximately 2,270-acre area which was determined by MDA and CRJMTC cultural resources staff in coordination with the Ohio Historic Preservation Office (OHPO). The primary APE for the potential CIS is bounded to the north by Newton Falls road, to the west by Greenleaf Road, to the south by South Perimeter Road, and to the east by George Road. Secondary APEs for the potential relocation of training facilities and new utilities (as discussed in Section 2.9.2) are defined as the CIS footprint and the immediate area within which the relocated facilities would be visible. The potential CIS and relocated facilities APE is presented on Figure 3.4.4-1.

During construction, SIV/silos, and materials would be transported via interstate, state, and local roads as described in Section 3.4.12. No historic properties listed in the NRHP were identified to occur directly on (i.e. roadside) the transportation route. Further, no roads along the transportation route would require any ground disturbance, road widening, or bridge modifications for the potential CIS construction.

For the purposes of this EIS, cultural resources have been divided into the following categories:

- Prehistoric and historic archaeological resources.
- Architectural resources.
- Native populations/traditional resources.

The following sections discuss the affected environment for cultural resources within the CIS APE based on review of the ICRMP and previous cultural resource investigations conducted at CRJMTC.

3.4.4.3.1 Prehistoric and Historic Archaeological Resources

Prehistoric and historic archaeological resources include any material remains of past human life or activities which are of archeological interest such as pottery, basketry, bottles, weapons, tools, structures/foundations, rock paintings, rock carvings, graves, human skeletal material or any portion or piece of such items.

There are eight known archeological sites located at CRJMTC; three sites are 19th to 20th century homesteads (33PO0588, 33PO0562, 33PO0570), one site is an early 20th century farmstead (33PO0731), and four sites are early 20th century farmsteads likely associated with sugar maple production (33PO0725, 33PO0728, 33PO0729, 33PO0730) (CRJMTC, 2015e). None of these historic properties are within the APEs for the potential CIS at CRJMTC. The sites are approximately 1.5 to 2.5 miles away from the CIS APE and approximately 0.5 to 3.0 miles from the facility relocation APEs. Given the distance of these sites from the location of the proposed CIS, there is no potential for these historic properties to be affected by the construction of the CIS.

One of the relocation facilities (hand grenade/demo range) is approximately 0.5 miles from site 33PO0731; however, there is no potential to affect the historic property. Site 33PO0731 is located on the opposite side of the road from the proposed construction area and the historic site would not be disturbed in any way. The new facility would be constructed in a forested area and would not be visible to the archaeological site. The proposed footprint of the facility has been situated to keep the archaeological site out of the safety distance zone (CRJMTC, 2015d).

In compliance with Section 106 of the NHPA, the OHARNG has undertaken a number of historic property identification and evaluation efforts at Camp Ravenna. Within and near the CIS APE, nine archaeological surveys have been completed since 1997. During these 9 archaeological surveys, 34 archaeological sites were identified within the APE for this undertaking. None of these 34 sites meets the eligibility criteria for listing in the NRHP and no further work is recommended. These sites are typical of those found throughout CRJMTC. Sites have been severely disturbed and do not possess integrity of setting, design, materials, workmanship, and feeling necessary for listing in the NRHP. These sites cannot be associated with any important persons or events and do not possess the potential to yield additional information regarding regional or local history. Therefore, no archaeological historic properties would be affected by the proposed undertaking at CRJMTC. The OHARNG sent the results of these surveys long with eligibility determinations to the OHPO for concurrence. Copies of OHPO correspondence letters are provided in Appendix E.2. A list of the archaeological surveys completed within the CIS APE and the relocated facilities APE is provided in Table 3.4.4-1.

Figure 3.4.4-2 presents the general locations of the study areas within the CIS APE that were evaluated during each investigation listed in Table 3.4.4-1.

A brief summary of the results of each investigation conducted within the CIS APE including the potential relocated facilities is provided in the following paragraph in descending order by date.

Mannik & Smith Group, Inc. (2015). A Phase I Archaeological Survey was completed by The Mannik & Smith Group, Inc. (MSG) in February 2015 within the CIS footprint on 412 acres (Figure 3.4.4-1, Area 1) that had been studied during previous investigations. The investigation resulted in the identification of two previously unrecorded archaeological sites which are located within Load Line 9 and represents remnants of a historical farmstead. MSG recommended that the site is not eligible for listing in the NRHP based on the site's loss of integrity due to previous disturbance and lack of research potential; no further work was recommended.

Table 3.4.4-1 Cultural Resource Investigations Conducted at CRJMTC within the CIS APE and Relocated Facilities

Area No. (See Figure 3.4.4.-2)	**Title**	**Report Date**	**Prepared By**	**No. Sites in APE**	**OHPO Concurrence**
1	*Phase 1 Archaeological Survey, Camp Ravenna Joint Military Training Center*	February 2015	The Mannik & Smith Group, Inc.	1	1/28/2015
2 (includes relocated RTI Building and new utilities)	*Phase I Archaeological Reconnaissance Survey of 2,964 Acres in Selected Survey Areas at Camp Ravenna Joint Military Training Center*	January 2014	Cardno JFNew	7	4/9/2014
3	*Phase 1 Archaeological Survey of 1,287 Acres in Select Training Areas at Camp Ravenna Joint Military Training Center*	July 2012	Lawhon & Associates, Inc.	7	7/9/2012
4	*Phase I Archaeological Reconnaissance Survey for Proposed Range Development at the Ravenna Training and Logistics Site*	December 2008	AMEC Earth & Environmental, Inc.	2	3/4/2009
5	*Phase I Archaeological Reconnaissance Survey for a Proposed Engineer School and Ranges at the Ravenna Training and Logistics Site*	October 2006	AMEC Earth & Environmental, Inc.	0	12/14/2006
6 (includes relocated Parking Lot and Hand Grenade and Demolition Range and new utilities)	*Phase 1 Archaeological Reconnaissance Survey and Phase II Investigations in Selected Tracts at the Ravenna Training and Logistics Site*	October 2004, revised February 2005	MWH Americas, Inc.	6	4/14/2005
7 (plus new utilities)	Phase 1 Archaeological Reconnaissance Survey of Selected Tracts	November 1997	Montgomery Watson	9	3/29/2001
8 (relocated Shoot House, Access Road, and Overhead Electrical/Communication Utility Line)	*Phase I Archaeological Survey of the Proposed 294.54-Acre Engineer Training Area Development at the Ravenna Training and Logistics Site, Charlestown Township, Portage County, Ohio*	February 2008	Ohio Valley Archaeology, Inc.	2	4/4/2008
9 (relocated Nuclear, Biological and Chemical (NBC)/Gas Chamber Training Building/Expanded Double Parking Lot)	*Phase I Archaeological Survey of Three Timber Cutting Units Encompassing 485 Acres in the Eastern Portion of the Ravenna Training and Logistics Site, Windham Township, Portage County, Ohio*	February 2009	Lawhon & Associates, Inc.	0	4/10/2009

The findings of this investigation were sent to the OHPO on December 18, 2014, for review and concurrence with the conclusions. On January 28, 2015, the OHARNG Cultural Resources Manager issued a Memorandum for Record indicating that the OHPO had not provided a response within the required 30 days per 36 CFR Part 800. In accordance with 36 CFR Part 800.5(c)(1), the OHARNG has assumed OHPO concurrence of a determination of no historic properties affected. A copy of the letter sent to the OHPO and the Memorandum for Record is provided in Appendix E.2.

Cardno JFNew (2014). A Phase I Archaeological Reconnaissance Survey was completed by Cardno JFNew in January 2014 on 2,964 acres in selected areas of CRJMTC. Approximately 164 acres were studied within the CIS APE (Figure 3.4.4-1, Area 2), which included the area of the potential relocation of the RTI building and new utilities (approximately 1.8 acres). The survey area was noted to contain large areas of cultural disturbance due to past building construction, demolition, and other activities associated with historic and modern activities at the CRJMTC. Parking lots and military structures were identified throughout the survey area.

The investigation resulted in the identification of seven previously unrecorded archaeological sites within the CIS APE. Three of the sites were associated with historic military use in which foundations and refuse scatters (wheel lug, glass bottle fragments, and glass plate fragments) were observed.Two sites represented historic refuse scatters which largely consisted of bottles, metal fragments, and ceramics. One site represented remnants of a historic farmstead. Only one prehistoric site was observed. This site was determined to have a low probability of containing prehistoric artifacts based on the predictive model and an unlikelihood of yielding information important to the prehistory of Portage County. There were no sites identified in the area of the potential relocated RTI building or new utility locations.

Cardno JFNew recommended that none of the identified sites were eligible for listing in the NRHP based on several factors such as loss of integrity in the historic sites due to previous disturbance and sparse artifact assemblages observed in the prehistoric sites. No further work was recommended.

The findings of this investigation were sent to the OHPO for review and concurrence with the conclusions. In a letter dated April 9, 2014, the OHPO provided concurrence that the identified sites were not eligible for listing in the NRHP. A copy of this concurrence letter is provided in Appendix E.2.

Lawhon & Associates, Inc. (2012). A Phase I Archaeological Survey was completed by Lawhon & Associates, Inc. (L&A) in July 2012 on 1,287 acres in selected areas of CRJMTC. Approximately 542 acres were studied within the CIS APE (Figure 3.4.4-1, Area 3). The investigation resulted in the identification of seven previously unrecorded archaeological sites within the CIS APE. Five sites represented foundation remnants and various artifacts from historic residences/homesteads. Two sites represented historic refuse scatters which largely consisted of glass fragments from bottles and jars. Several sites were noted as previously disturbed. L&A recommended that none of the identified sites was eligible for listing in the NRHP because they had little potential to make significant contributions to the understanding of the historic occupation of the area. No further work was recommended.

The findings of this investigation were sent to the OHPO for review and concurrence with the conclusions. In a letter dated July 9, 2012, the OHPO provided concurrence that the identified sites were not eligible for listing in the NRHP. A copy of this concurrence letter is provided in Appendix E.2.

L&A (2009). A Phase I Archaeological Survey was completed by L&A in February 2009 on 485 acres of select areas of CRJMTC proposed for timber cutting. Approximately 5 acres were studied within the CIS APE (Figure 3.4.4-1, Area 9), which included the APEs of the potential relocation of the nuclear, biological, and chemical (NBC)/Gas Chamber Training Building and the Expanded Double Parking Lot. Based on the final report, the investigation resulted in the identification of three previously unrecorded archaeological sites (ultimately recommended not eligible for listing in the NRHP); however, none of the site were identified in the APE of the potential relocated NBC/Gas Chamber Training Building or the Expanded Double Parking Lot. No further work was recommended.

The findings of this investigation were sent to the OHPO for review and concurrence with the conclusions. In a letter dated April 10, 2009, the OHPO provided concurrence that the identified sites were not eligible for listing in the NRHP and that no historic properties would be affected by the proposed undertaking. A copy of this concurrence letter is provided in Appendix E.2.

AMEC Earth & Environmental, Inc. (2008). A Phase I Archaeological Reconnaissance Survey was completed by AMEC Earth & Environmental, Inc. (AMEC) in December 2008 on 561 acres for potential range development areas at CRJMTC. Approximately 195 acres were studied within the CIS APE (Figure 3.4.4-1, Area 4). The investigation resulted in the identification of two previously unrecorded archaeological sites within the CIS APE. Both sites represented foundation remnants and various artifacts from historic residences/homesteads. AMEC recommended that the site was not eligible for listing in the NRHP because the site had little potential to make significant contributions to the understanding of the historic occupation of the area. No further work was recommended.

The findings of this investigation were sent to the OHPO for review and concurrence with the conclusions. In a letter dated March 9, 2009, the OHPO provided concurrence that the identified site was not eligible for listing in the NRHP. A copy of this concurrence letter is provided in Appendix G.

Ohio Valley Archaeology, Inc. (2008). A Phase I Archaeological Survey was completed by Ohio Valley Archaeology, Inc. (OVA) in February 2008 on 295 acres of select areas of CRJMTC for proposed training area development. Approximately 11.43 acres were studied within the CIS APE (Figure 3.4.4-1, Area 8), which included the APEs of the potential relocation of the Shoot House, Access Road, and Overhead Electrical/Communication Utility Line. Based on the final report, the investigation resulted in the identification of seven previously unrecorded archaeological sites, two of which occurred within the CIS APE along the potential Overhead Electrical/Communications Utility Line route. Both sites represented remains of farm complexes. OVA recommended that neither of the identified sites was eligible for listing in the NRHP due to lack of site integrity. No further work was recommended.

The findings of this investigation were sent to the OHPO for review and concurrence with the conclusions. In a letter dated April 4, 2008, the OHPO provided concurrence that the identified sites were not eligible for listing in the NRHP. A copy of this concurrence letter is provided in Appendix E.2.

AMEC (2006). A Phase I Archaeological Reconnaissance Survey was completed by AMEC in October 2006 on 328 acres for a proposed engineer school and ranges at CRJMTC. Approximately 28 acres were studied within the CIS APE in an area proposed for an Engineer Assault Course (Figure 3.4.4-1, Area 5). Based on the investigation, no archaeological sites were documented within the CIS APE and no further work was recommended.

The findings of this investigation were sent to the OHPO for review and concurrence. In a letter dated December 14, 2006, the OHPO concurred with the OHARNG determinations. A copy of the concurrence letter is provided in Appendix E.2.

MWH (2004) and MWH (2005). A Phase I Archaeological Reconnaissance Survey and Phase II Investigation were completed by MWH Americas, Inc., (MWH) in October 2004 and (revised February 2005) on 2,012 acres of select areas at CRJMTC. Approximately 163 acres were studied within the CIS APE (Figure 3.4.4-1, Area 6), which included the APEs of the potential relocation of the New Parking Lot and Hand Grenade and Demolition Ranges and new utilities (approximately 21.76 acres). The investigation (originally conducted in 2004 and revised in 2005) resulted in the identification of six previously unrecorded archaeological sites within the CIS APE. These sites represented foundation remnants and various artifacts from historic residences/homesteads. The survey area was noted to contain heavy vehicle ruts which suggested that wide-scale disturbance had occurred in the past. MWH recommended that the sites were not eligible for listing in the NRHP because the area had been subjected to a high degree of disturbance that severely compromised its ability to effectively illustrate a property type or an important historic theme. Given this, the sites had limited potential to yield additional new information relevant to regional or local history. There were no sites identified in the area of the potential relocated Parking Lot or Hand Grenade and Demolition Range or new utility locations. No further work was recommended.

The findings of this investigation were sent to the OHPO for review and concurrence with the conclusions. In a letter dated April 14, 2005, the OHPO provided concurrence that the identified sites were not eligible for listing in the NRHP. A copy of this concurrence letter is provided in Appendix E.2.

Montgomery Watson (1997). A Phase I Archaeological Reconnaissance Survey was completed by Montgomery Watson in November 1997 on 2,995 acres of select areas at the CRJMTC. Approximately 786 acres were studied within the CIS APE (Figure 3.4.4-1, Area 7). Based on the final report, a total of 9 previously unrecorded sites were identified within the CIS APE. Eight of the sites were prehistoric sites; and one site was both historic and prehistoric. Of these sites, four were identified as potentially meeting criteria for listing in the NRHP; therefore, a Phase II Archeological Survey was recommended to determine eligibility for listing in the NRHP.

The findings of this investigation were sent to the OHPO on February 6, 2001, for review and concurrence with the conclusions. The OHPO returned the letter on February 29, 2001, and provided concurrence with the conclusions of the 1997 investigation. A copy of this concurrence letter is provided in Appendix E.2. In 2005, Phase II investigations were conducted at specific sites to determine eligibility for listing in the NRHP; all were determined not eligible for listing (MHW, 2005).

3.4.4.3.2 Architectural Resources

Architectural resources include aboveground historic structures and buildings.

There is one known pre-World War II architectural resource eligible for the NRHP located at CRJMTC. The Stone Arch Bridge (POR-288-8) is a late 19^{th} century historic bridge that spans the South Fork Eagle Creek along the northern boundary of CRJMTC (Wadsworth Road) in Windham township. The Stone Arch Bridge is not located within the CIS APE, including the APEs of the potential facility relocations. It is over 3 miles away from the CIS APE.

Extensive research into the historical record of the RVAAP (renamed CRJMTC in 2002), dating from approximately 1939 to1989, was documented in the World War II Ordnance Department's Government-Owned Contractor-Operated Industrial Facilities: Ravenna Ordnance Plant Historic Investigation (Geo-Marine, Inc., 1995). This document describes the history, land procurement, construction, development, and operation of the RVAAP. In part, the purpose of this document was to fulfill mitigation efforts of the 1993 Programmatic Agreement (PA) among the Army Material Command (AMC), the ACHP, and multiple SHPOs concerning a program to cease maintenance, excess, and dispose of certain properties. These mitigation efforts are summarized in the following paragraphs based on a review of an EA conducted at the RTLS in 2004 (AMEC, 2004).

In 1983, a Historic Properties Report was completed for the RVAAP which included a full-scale architectural assessment of 1,371 structures, of which 1,275 dated to the WWII era. A Level IV Historic American Building Survey (HABS)/Historic American Engineering Record (HAER) documentation was prepared for 36 structures. Some of the structures that post-dated WWII were also evaluated as they were considered to be notable because of their association with advancements in weaponry, electronics, or any other technological or scientific endeavor. The HABS/HAER documentation indicated that the majority of the buildings evaluated had a utilitarian style of architecture, and that most were historically important due to their collective representation of the site during WWII as opposed to their individuality. In 1988, a PA among the DoD, the ACHP, and the National Conference of Historic Preservation Officers established procedures to be followed regarding the treatment of temporary WWII buildings. The agreement stated that studies would be completed by the DoD to establish a historic context around the construction of these buildings and identify that installation's WWII development. The terms of this PA have been met at the RVAAP; therefore, although the temporary wooden WWII buildings are considered eligible for listing to the NRHP, no further studies or protection of these buildings is required by the OHARNG.

In 1993, the AMC PA to Cease Maintenance, Excess, and Dispose of Select Buildings (CEMED) established procedures for maintenance and disposal of buildings located within the confines of the RVAAP in Ohio, and other installations in Wisconsin, Illinois, Indiana, Kansas, Virginia and Minnesota. The 1,275 buildings and structures at the RVAAP, which date to the WW II era, fall under this PA. As such, the Section 106 compliance responsibilities to manage the installation's WW II-era architectural resources have been met, and all impacts to those architectural resources have been mitigated through implementation of the CEMED PA. The documentation associated with this PA indicated that there were no RVAAP Cold War era buildings, structures, or other objects that were considered of exceptional significance applied to resources less than 50 years of age as of 1993. The PA established that no new architectural surveys were required at the RVAAP because the existing documentation was sufficient.

There are no other architectural sites that are listed in the NRHP, potentially eligible for listing, or eligible for listing present within the CIS APE including the areas of the potential facility relocations.

3.4.4.3.3 Native Populations/Traditional Resources

Traditional resources include burial grounds, sacred or religious sites, and/or artifacts (tools, arrowheads, pottery, etc.) that are related to native populations that have had an affiliation with a site.

Fourteen Native American groups were identified as having possible ancestral ties to the CRJMTC area. These groups include the Cayuga, Chippewa, Delaware, Kickapoo, Mohawk, Oneida, Onondaga, Ottawa, Potawatomi, Sac and Fox, Seneca, Shawnee, Tuscarora, and Wyandotte. These groups were identified based on the OHARNG ICRMP, consultation, personal correspondence, and research by the OHARNG Cultural Resources Manager. From the 14 identified groups, 46 federally recognized Native American tribes were consulted with by the OHARNG regarding the potential CIS deployment at CRJMTC.

The consultation was conducted as required under DoD Instruction 4710.02, which implements the Annotated DoD American Indian and Alaska Native Policy, AR 200-1; NEPA; the NHPA; and the NAGPRA. Tribes were invited to participate in the EIS and NHPA Section 106 processes as Sovereign Nations per EO 13175.

Consultation letters were sent on November 7, 2014. A list of the federally recognized tribes invited to consult is provided in Section 4.0. All correspondence was conducted by certified letters. A Memorandum for Record, which summarizes the consultation efforts by the OHARNG, is included in Appendix E.2.

3.4.4.4 Environmental Consequences and Mitigation – Cultural Resources – CRJMTC

The following sections provide an evaluation of the environmental consequences that would occur and the mitigation that would be required as a result of construction and operation of the potential CIS at CRJMTC.

3.4.4.4.1 Construction – Baseline Schedule

3.4.4.4.1.1 Environmental Consequences

Nearly all of the potential for impacts to cultural resources would occur during construction of the potential CIS, specifically during ground disturbing activities (e.g., clearing and grading). Any cultural resources that occur within the limits of the disturbance would likely be permanently altered or destroyed during construction of the potential CIS if a deployment decision is made and CRJMTC is selected as the preferred alternative.

Based on the cultural resource investigations conducted at CRJMTC (as summarized in Section 3.4.4.2) and the concurrence letters from the OHPO (Appendix E.2), there are no known historic, archaeological, or architectural resources that are listed on, or eligible for listing in the NRHP within the CIS APE including areas of potential relocated facilities; therefore, no known historic properties (by definition) would be affected by the construction of the potential CIS.

In accordance with Section 106 of the NHPA, a letter was submitted to the OHPO by CRJMTC cultural resources staff on October 8, 2015, summarizing the potential CIS deployment. The letter indicated that no historic properties would be affected by the proposed undertaking in accordance with 36 CFR Part 800.4(d)(l). A copy of this letter is provided in Appendix E.2. As of the date of this EIS, an official letter response has not been received from the OHPO; however, Ms. Lisa Adkins (OHPO) attended an agency update meeting on 16 October 2015 and indicated that the OHPO did not foresee any potential issues with historic properties in regards to the proposed undertaking.

As discussed in Section 3.4.16 (Visual/Aesthetics), there would be no visual impacts to historic properties within CRJMTC or the vicinity. The existing Hand Grenade and Demolition Range would be relocated to a location that is approximately 0.5 miles from known historic archeological site 33PO0731; however, if relocated, the facility would be constructed in a forested area and would not be visible to the archaeological site (CRJMTC, 2015e). The Stone Arch Bridge (POR-288-8) is the only architectural resource at CRJMTC eligible for listing in the NRHP; however, it is over 3 miles away from the potential CIS APE. The CIS would not be visible from the Stone Arch Bridge; therefore, the aesthetics of the bridge would not be affected by construction of the potential CIS if a deployment decision is made and CRJMTC is selected as the preferred alternative.

Based on consultation with the tribes affiliated with CRJMTC and the responses received from consultation letters (BVSPC, 2015b), no traditional cultural properties of concern occur within the CIS footprint. In the event of an inadvertent discovery of artifacts, human remains, or funerary items during construction, all ground disturbing activities would stop and the SOP OHARNG Procedures for Inadvertent Discovery of Cultural Materials at CRJMTC would be followed (OHARNG, 2013b).

3.4.4.4.1.2 Mitigation

Because no historic properties were identified within the CIS APE, no mitigation would be required for affects to cultural resources due to construction of the potential CIS; therefore, no mitigation would be required.

3.4.4.4.2 Construction – Expedited Schedule

3.4.4.4.2.1 Environmental Consequences

The environmental consequences of implementing the Expedited Schedule during construction would be the same for affects to cultural resources as those described for the baseline schedule (Section 3.4.4.4.1.1).

3.4.4.4.2.2 Mitigation

Mitigation requirements for affects to cultural resources would be the same for implementing the Expedited Schedule during construction as those described for the baseline schedule (Section 3.4.4.4.1.2).

3.4.4.4.3 Operation

3.4.4.4.3.1 Environmental Consequences

During construction, any cultural resources (including archaeological, architectural, and traditional cultural properties) present within the CIS APE would be destroyed, protected, or excavated and removed for preservation; therefore, the potential for impacts to occur during operation is negligible. Based on the information summarized in Section 3.4.4.2, there are no historic properties identified within the CIS APE including areas of relocated facilities that require further study, protection, or preservation.

If a deployment decision is made and CRJMTC is selected as the preferred alternative, the completed CIS would not be visible from any known historic properties at CRJMTC; therefore, no visual impacts would occur during operation.

3.4.4.4.3.2 Mitigation

Because no historic properties were identified within the CIS APE and no visual impacts would occur, no mitigation would be required for affects to cultural resources due to operation of the CIS; therefore, no mitigation would be required.

Figure 3.4.4-1 Area of Potential Effects - CRJMTC

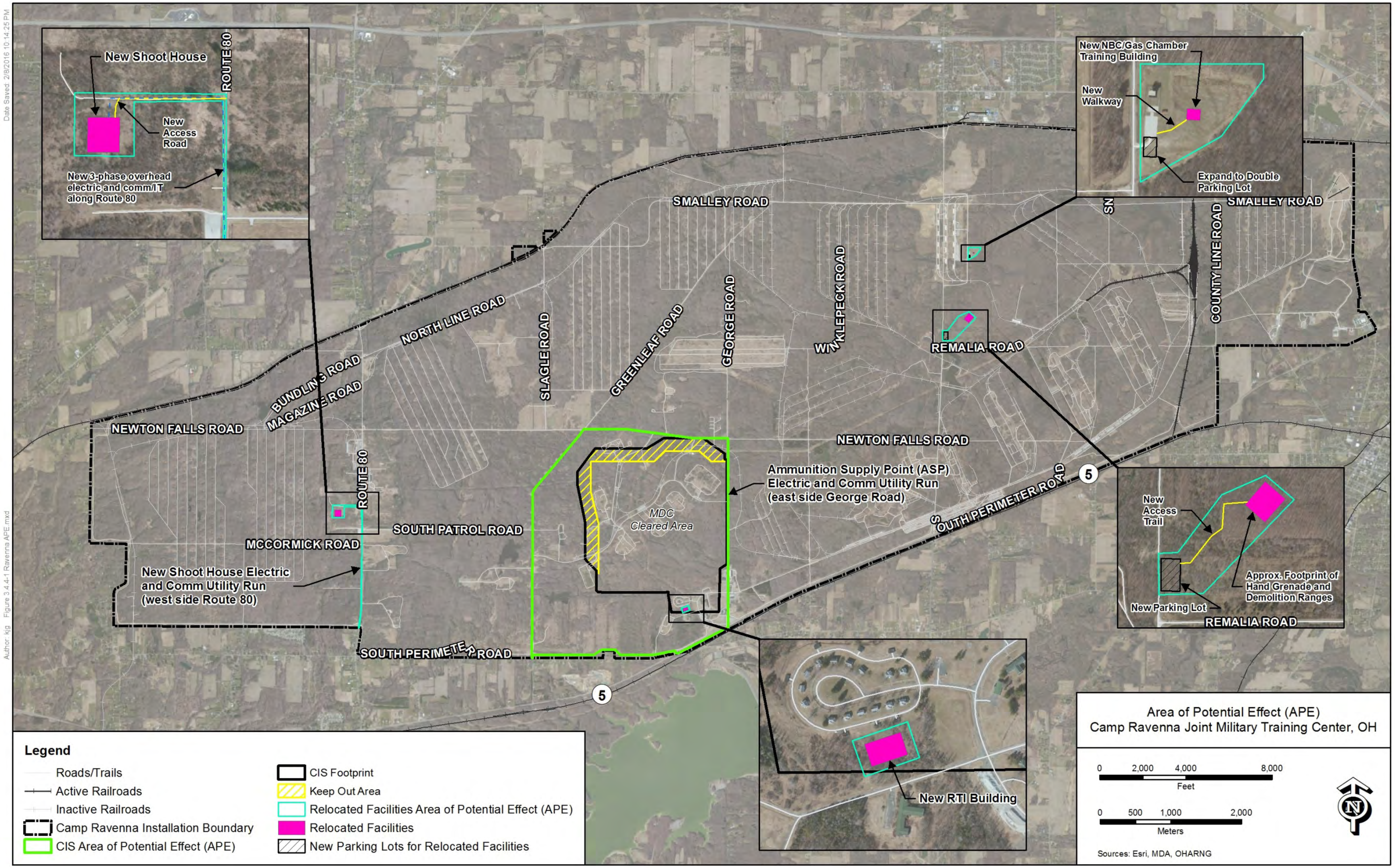
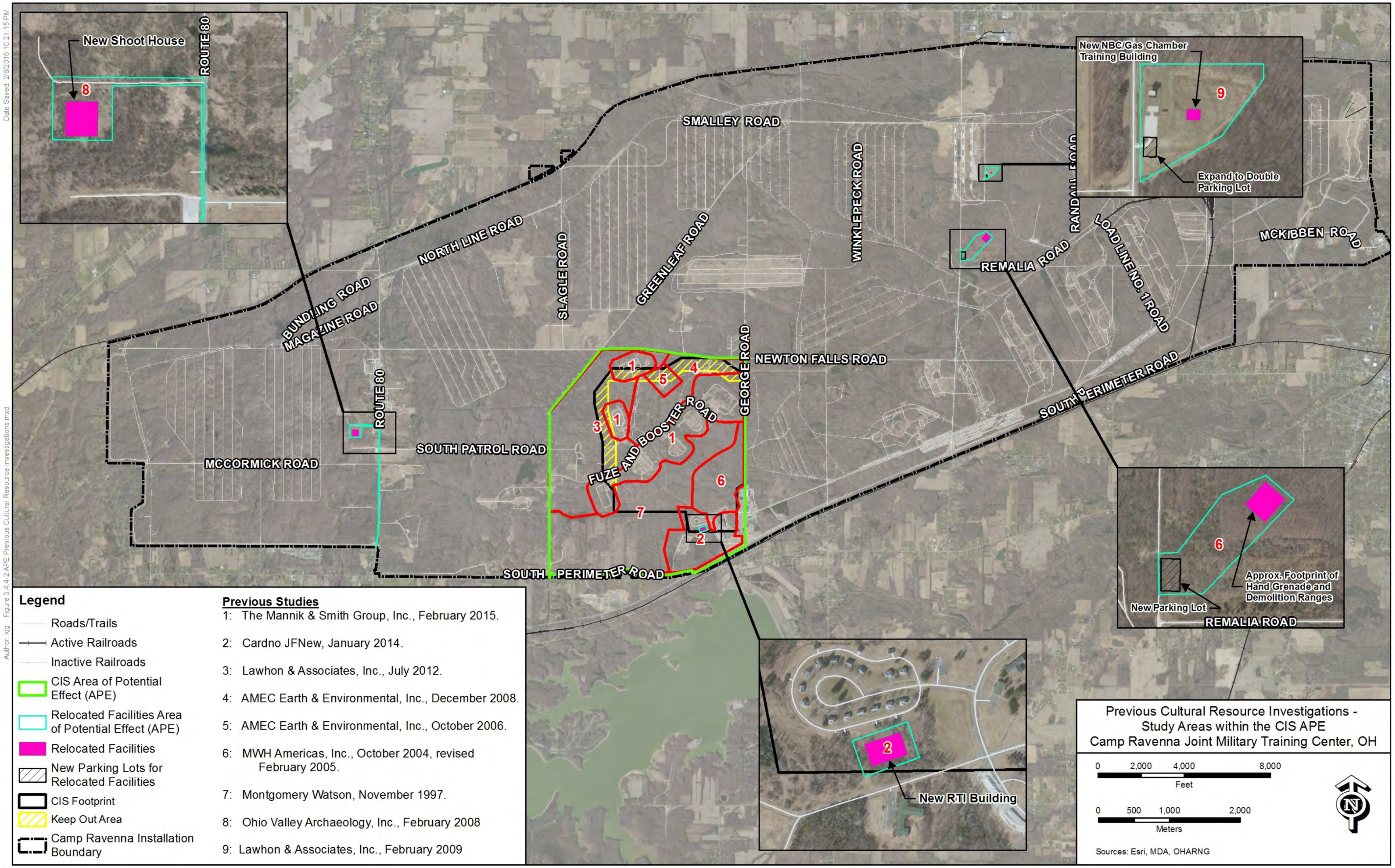


Figure 3.4.4-2 Previous Cultural Resource Investigations – Study Areas within the Continental United States Interceptor Site CRJMTC Area of Potential Effects



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3.4.5 Environmental Justice – CRJMTC

Environmental justice reviews involve identification of offsite environmental impacts, their geographic locations, minority and low-income populations that may be affected, community health, the significance of such effects, and whether they are disproportionately high and adverse compared to the population within the geographic area. Available mitigation measures and those that would be implemented are also part of the review and analysis.

The first step in analyzing this issue is to identify minority and low-income populations that might be affected by implementation of the potential CIS deployment or its considered alternatives. Demographic information on ethnicity, race, and economic status is provided in this section as the baseline against which potential environmental justice effects could be identified and analyzed.

3.4.5.1 Regulatory Framework – Environmental Justice – CRJMTC

On February 11, 1994, President Clinton issued EO 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations. The purpose of the EO is to avoid the disproportionate placement of adverse environmental, economic, social, or health effects from federal potential deployments and policies on minority and low-income populations.

On February 27, 2012, federal agencies, led by the CEQ and the USEPA, released environmental justice strategies, implementation plans, and progress reports outlining the steps that agencies would take to protect certain communities facing health and environmental risks. Through the NEPA environmental impact analysis process, federal agencies incorporate compliance with EO 12898 to ensure that their potential deployments would not have disproportionate impacts on minority and low-income populations.

This approach is consistent with the USEPA objectives concerning environmental justice, which include "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (USEPA, 2012).

3.4.5.2 Affected Environment – Environmental Justice – CRJMTC

3.4.5.2.1 Environmental Justice Methods

Portage and Trumbull Counties comprised the study area for the potential CIS deployment at CRJMTC. Census blocks are the smallest unit of geographic area for which the Census Bureau collects and tabulates 10-year census data. Census block boundaries are defined by streets, roads, railroads, streams and other bodies of water, other visible physical and cultural features, and the legal boundaries shown on Census Bureau maps.

Census data for these areas serve as a valuable source for small-area geographic studies. Census block groups are the next larger geographic unit above census blocks. They are comprised of census blocks and are the units that make up a Census tract. Block groups can include varying numbers and sizes of blocks depending on their boundaries, which themselves can vary based on topographic or other geographic features. Based on 1990s Census guidelines, an ideal size for a block group is 400 housing units, but can range between a 250 and 550 housing units (DOC, 1994). This analysis used Census block group level data because they were sufficient to support a meaningful environmental justice analysis.

The Census's American FactFinder reports numbers of both minorities and people with incomes below poverty level (individuals and families). Minority populations included in the census are identified as Black; American Indian, Eskimo or Aleut; Asian or Pacific Islander; Hispanic; or other/multiple races. For purposes of this environmental justice analysis, low income is considered the same as income below the poverty level.

Persons and organizations known or thought to have a potential interest in the CIS project, including minority, low-income, disadvantaged, and Native American groups, were identified, informed, and given the opportunity to participate in scoping meetings and public information sessions. Refer to the summary of the Scoping Report in Section 1.7 for further information on consideration of potential environmental justice concerns.

Environmental justice for potential deployment of a CIS at CRJMTC was evaluated based on screening level information available from public resources such as the Census block data and the USEPA's EJSCREEN (upgrade of former EJView) environmental justice online database and associated tools.

The potential CRJMTC CIS was evaluated based on screening level information available from public resources such as the Census and the USEPA's EJView environmental justice online database and associated tools.

3.4.5.2.2 Minority Populations

Generally, to qualify as a minority area, the population would need to be either 50 percent or more minority, or the minority population in an area would need to be 20 percent or more larger than the minority population in an area of comparison, such as another nearby community, county, or the state.

Private residences in the vicinity of CRJMTC are primarily rural in nature, and evidence of substantial minority populations was not found in Census or other data. The percentage of minorities in Portage County was 8.1; in all of Ohio, it was 17.1 percent. Trumbull County had 10.9 percent minority population (Census, 2014b). Percentages of minorities in the CRJMTC CIS area are substantially lower than those in the state.

According to Census data at the block group level, the nearest minority (50 percent or more minority) block groups were 13 miles east of the CIS in the western part of the City of Warren. Minority block groups are also present in central Akron, about 20 miles west of the closest point on the CIS. Other than those areas surrounding the nearest cities, almost the entire area overlapping and around CRJMTC, with the exception of a few block groups around the City of Ravenna, has a very low percentage of minority residents (between 0 and 10 percent) (USEPA, 2013b).

While racial and ethnic minorities are reported in Census data as only 8 percent of Portage County's population, minorities generally represent a higher proportion of the population in certain areas, such as the City of Kent (17 percent). The City of Ravenna has only 10 percent of its population shown in minority groups (Portage, 2015d).

3.4.5.2.3 Low Income Populations

For an area to be termed low income, the population would need to have either 50 percent or more residents living with incomes below poverty level, or the population in an area would need to have 20 or more percent greater rate of people living below the poverty level than the population in a comparable area (e.g., another nearby community, county, or the state.)

The 2015 federal poverty level for an individual is $11,770. For each additional person in a household, there is a determined poverty level that is incrementally increased from the individual level. For a family of four people, the poverty level in 2015 is $24,250 (FR, 2015).

Private residences in the vicinity of CRJMTC are primarily rural in nature, and evidence of substantial low income populations was not found in Census or other data. More than 50 percent of people in the Portage County have incomes of more than $50,000 per year (ODS, 2012a).

The percentage of all people in Portage County with incomes below poverty level was 16.1, while the percentage of all people in the State of Ohio was 15.8. For families, the percentages are 10.5 in Portage County and 11.6 in the state. In Trumbull County, the percentage below the poverty level of all people with incomes below poverty level was 17.4, and 13.4 for all families (Census, 2014b). The overall percentages of people with incomes below poverty level in the area around CRJMTC are roughly equivalent to the percentage in the state, but appear to be trending slightly higher, especially in Trumbull County to the east of CRJMTC. Trumbull County includes one of the larger cities in the site vicinity, the City of Warren.

According to data at the Census block group level, the nearest low income (50 percent or more of the people having incomes below the poverty level) block group was about 15 miles east of the CIS in the southern part of the City of Warren. Low income block groups are also present in central Akron, about 20 miles west of the closest point of the CIS. Other than those areas close to the nearest cities, most of the area overlapping and around CRJMTC has less than 10 percent of residents with low incomes. However, the area overlapping the CRJMTC installation includes four block groups with 8, 17, 9, and 29 percent low income residents, (Portage County), and one block group with 9 percent (Trumbull County). The higher percentage of people with income below poverty level in the block group contains the northeast portion of CRJMTC is likely influenced by the presence of the town of Windham in the same block group. Similarly, Charlestown is present in the same block group as the southwest portion of CRJMTC. Because these block groups include relative population centers, they therefore also have higher percentages of people with income below poverty level compared to other adjacent block groups that are very sparsely populated. The CIS footprint at CRJMTC is split between two block groups. The western portion of the CIS footprint is in a block group with 8 percent of the population with income levels below poverty level. The eastern portion of the footprint is in a bock group with 17 percent of the population with income levels below poverty level. If the two Census block group low income percentages were averaged for the entire CIS footprint, 12.5 percent of the population would be considered low income.

Portage County demographic data suggest that 16 percent of the county's population lives in poverty; however, there are some specific geographic areas for which the reported poverty rates are notably higher, including the City of Kent at 34 percent and the City of Ravenna at 23 percent (Portage, 2015d).

3.4.5.2.4 Summary of Environmental Justice Factors

Table 3.4.5-1 shows both the percentages of minorities and people living with incomes below poverty level for each individual Census block group that overlaps the CRJMTC installation. The tracts in Table 3.4.5-1 are shown on Figure 3.4.5-1 and are listed in clockwise order beginning with the tract covering the area of the CIS footprint.

Table 3.4.5-1 Summary of Environmental Justice Factors in CRJMTC Area

Census Block Group	Percent Minority	Percent Below Poverty	County	Portion of CRJMTC Within Block Group
391336007041	1	8	Portage	Eastern approximately 2/3 of CIS and southeast quarter of CRJMTC
391336007031	7	17	Portage	Western approximately 1/3 of CIS and southwest quarter of CRJMTC
391336006022	0	9	Portage	No CIS facilities; northwest small corner of CRJMTC
391336006032	3	9	Portage	No CIS facilities: majority of north and northeast portion of CRJMTC
Source: USEPA, 2013b.				

Often, individuals or groups of people who rely on natural resources for food and/or income, or live at a subsistence level, may be associated with very low income areas. Information about these groups and individuals is not typically captured in Census or other population data. Based on socioeconomic data and information reviewed and input from CRJMTC personnel, no populations or local groups are known to principally rely on fish or wildlife for subsistence on CRJMTC or in the surrounding vicinity (Morgan, 2016b).

3.4.5.2.5 Community Health

Community health was evaluated primarily using county and state health department information and was supplemented with information from USEPA's EJView database (USEPA, 2013b; NCHCP, 2013). The Ohio Department of Health (ODH) compiles county health profile information, which is summarized in Table 3.4.5-2 for Portage and Trumbull Counties.

In addition, data provided by the USEPA in their EJView online tool was used to compile information on several general indicators of community health status in the area around CRJMTC in Portage and Trumbull Counties. These data include the most recent available statistics for cancer risk, respiratory risk, and neurological risk in accordance with the NATA, which is USEPA's ongoing comprehensive evaluation of air toxics that is used to prioritize pollutants, emission sources, and locations of interest and to better understand potential health risks. The most current NATA results date back to 2004 and 2005 (USEPA, 2013b; USEPA, 2013c).

Table 3.4.5-2 Community Health Indicators for Portage and Trumbull Counties – CRJMTC

Portage County	Trumbull County
No health insurance: 17.4 percent of adults 18 years and older and 5.1 percent of children 17 years and younger	No health insurance: 12.1 percent of adults 18 years and older and 7.5 percent of children 17 years and younger
70.1 percent of resident deaths from diseases of the heart, cancer, stroke, lower respiratory disease, diabetes mellitus, and unintentional injuries	71.8 percent of resident deaths from diseases of the heart, cancer, stroke, lower respiratory disease, diabetes mellitus, and unintentional injuries
Chronic disease risk factors: --23.4 percent smoke cigarettes (adults) --36.2 percent overweight --24.5 percent obese	Chronic disease risk factors: --21.9 percent smoke cigarettes (adults) --37.4 percent overweight --25 percent obese
1,217 resident deaths per year (average 2004 through 2006); leading causes include: --Heart disease – 324 deaths per year --Cancer – 307 deaths per year --Stroke (not provided)	2,443 resident deaths per year (average 2004 through 2006); leading causes include: --Heart disease – 720 deaths per year --Cancer – 555 deaths per year --Stroke (not provided)
Source: ODH, 2008.	

The NATA-determined health risks for the region around CRJMTC included in Table 3.4.5-3 show that Portage and Trumbull Counties have lower potential health risks overall than the more heavily developed counties in the region, but the risks for the CRJMTC counties are higher than the state percentile for cancer and respiratory concerns.

Table 3.4.5-3 Estimated Health Risks for CRJMTC Region

Area	Cancer Risk (Persons per Million)	Neurological Hazard Risk	Respiratory Hazard Risk
Portage County	34.33 (68.3 Percentile)	0.04 (82.1 Percentile)	1.02 (71.1 Percentile)
Trumbull County	37.33 (77.4 Percentile)	0.05 (86.3 Percentile)	1.03 (71.5 Percentile)
Cuyahoga County	57.93 (97.5 Percentile)	0.1 (96.8 Percentile)	2.18 (92.5 Percentile)
Summit County	41.69 (86.6 Percentile)	0.06 (91.7 Percentile)	1.37 (81.5 Percentile)
Mahoning County	37.05 (76.4 Percentile)	0.06 (91.6 Percentile)	1.19 (76.6 Percentile)
Ohio	41.41 (46.2 Percentile)	0.08 (92.3 Percentile)	1.43 (44.2 Percentile)

Note: Values are derived from 2005 NATA Cancer Risk Estimates and Non-Cancer Hazard Index Scores. Percentiles are ranking of counties and states from 0 (lowest) to 100 (highest).
Source: USEPA, 2013b.

USEPA information about the CRJMTC area shows the following numbers of sites (those with pollutant emissions, discharges, or generation sources) reporting information to the USEPA under various programs. The sites are located within the approximate 1-mile area beyond the CRJMTC installation boundary. The information indicates that most pollutant source sites are congregated near small towns or other more developed areas, such as the towns of Windham, Charlestown, and Newton Falls. Pollutant source sites within an approximate 1-mile radius of CRJMTC include the following (USEPA, 2013b):

- 27 sites in addition to the RVAAP at CRJMTC reporting hazardous waste generation.
- 4 sites with reported air emissions.
- 8 sites reporting water discharges in addition to CRJMTC.
- 2 sites reporting release of toxics in addition to CRJMTC.

3.4.5.2.6 Presence of Contamination at CRJMTC

There are multiple AOCs under the CRJMTC IRP that are under investigation and being remediated (as needed) because of potential chemical contamination from former activities at the CRJMTC. The IRP was initiated at the former RVAAP in 1989. As of 2014, 29 areas were under active investigation under the IRP, several of which are in the area of the CIS footprint (Vista, 2014). Refer to Sections 3.4.7 Hazardous Materials and Hazardous Waste Management, and 3.4.9 Land Use for detailed information about the AOCs at the CRJMTC site.

Based on the stream sampling that has been performed at CRJMTC as part of the IRP, water quality has been determined to be good to excellent, with very few exceedances of Ohio aquatic life water quality criteria. Sediment did not generally show contamination. Surface waters continue to be monitored so that a final determination could be made about whether surface waters on the installation have been impacted by restoration activities (Vista, 2014).

3.4.5.3 Environmental Consequences and Mitigation – Environmental Justice – CRJMTC

For there to be a major concern that low-income or minority populations would be subject to a disproportionate share of negative impacts from a facility, the following statements generally need to be true: 1) high percentages of minority and low income populations would need to be in close proximity to the site; 2) negative cultural, economic, or health impacts on such populations would be expected; and 3) minority and low-income areas would bear a disproportionate share of negative impacts from the facility.

3.4.5.3.1 Construction - Baseline Schedule

3.4.5.3.1.1 Environmental Consequences

3.4.5.3.1.1.1 Impacts on Minority Populations

Given the expectation that most negative impacts to all populations in the area would be temporary and related to noise and traffic near the site, and the implementation of the mitigation measures, minority areas would not be directly affected by CIS construction because the nearest minority area is 13 miles from the CIS. Of the estimated 60 to 90 construction workers (approximately 15 percent of the estimated 400 to 600 total construction workers) who would typically be expected to relocate to the CRJMTC area from the wider surrounding region (to reduce commuting time, gas expenses, or for other personal reasons), a few of these workers and their families could establish residences in one of the closest minority areas. However, there is a good supply of available housing in areas closer to the CRJMTC installation, as discussed in Section 3.4.11 Socioeconomics. Given that the estimated number of relocating construction workers would be a very minimal change in population for the CRJMTC surrounding area, the impacts on health and culture in CRJMTC and Portage County should be negligible. Likewise, Trumbull County, which overlaps only a small eastern portion of the CRJMTC installation and none of the CIS facilities, would also experience negligible impacts. Accordingly, there would not be any disproportionate impacts to the small minority populations in these two counties.

Neither Portage nor Trumbull County would be considered a minority area, nor would any of the Census tracts that overlap the CRJMTC installation or the CIS footprint. If a deployment decision is made and CRJMTC is selected; most impacts from construction of the CIS would be limited to the CIS, the CRJMTC installation, and the immediate surrounding area, with Portage County being the focus because the CIS location is located entirely within its boundaries.

As described throughout this EIS document, any air, water, noise, or other emissions from potential construction of the CIS that could have an impact on community health would be minimized through the use of BMPs and potential mitigation measures. These impact minimization and mitigation measures would ensure that emissions from CIS construction would not be major contributors to the existing level of emissions in the CRJMTC vicinity or to the potential impact from those emissions on community health.

In summary, any negative project-related impacts on minority populations would be negligible (small to a degree that they would not be able to be measurably attributed to the CIS project), and would not be disproportionate relative to project impacts on other portions of the local population.

3.4.5.3.1.1.2 Impacts on Low Income Populations

As previously discussed, there are no low-income areas in the CRJMTC vicinity, and the nearest area that qualifies as low income is a Census block group about 15 miles east near the City of Warren.

As discussed in Section 3.4.8 Health and Safety, the potential health impacts on local populations from potential construction of the CIS would be limited to minor noise impacts and possibly impacts related to the increased emissions and traffic delays associated with worker vehicles and transportation of materials and supplies to the site. These impacts would be temporary and largely limited to the CIS and areas near the CRJMTC installation main entrance. Because most project-related impacts would be localized, the low income areas (including the nearest, which is near the City of Warren), would not be disproportionately impacted.

No known subsistence level hunting, fishing, or trapping occurs at CRJMTC. Therefore, no impacts to subsistence populations would occur.

The socioeconomic impact analysis for CIS construction concluded that the impacts from CIS construction would be major and largely positive and beneficial to the CRJMTC surrounding region. Primary among these positive impacts are employment and income benefits and increased tax revenues to local jurisdictions. Although the most extensive economic benefit would likely occur in Portage County because of increased property and sales tax revenues, it is expected that the wider surrounding area would also benefit economically as a result of the potential CIS deployment at CRJMTC.

Part of this benefit for the project area is that a group of individuals from the low income population would be likely to fill some of the jobs at service establishments that may be opened because of additional demand created in association with CIS construction (TWPFP, 2013). These low income individuals would also generally benefit from and influx of tax revenue and improved emergency services in the area where they live. Similar far-reaching benefits would apply to all residents of the area; however, low income residents may particularly benefit from the increased availability of service job openings that may not be pursued by higher income individuals living in the same area. Generally, low income populations could be assumed to benefit from these impacts (i.e., via filling service jobs, having access to additional emergency services, etc.) to a comparable degree as other regional populations.

In summary, the overall project-related impacts on low income populations are projected to be positive. However, such impacts likely would be negligible because most of the jobs that low income workers would benefit from (particularly in the services industry) would be relatively low-paying and not change the economic status of most low income people.

3.4.5.3.1.1.3 Impacts on Community Health

General Community Health

Historically, there has been concern from some residents living near the CRJMTC site relating to cancer, which prompted the OEPA to test 25 residential water wells. The private wells were tested for explosives contamination (judged to be the most likely contamination based on past use of the CRJMTC site as the RVAAP) in November 1997 and again in March 1998. No explosives contamination was detected in any of the private wells (Vista, 2014). Investigation and remediation of soil and groundwater contamination has been ongoing at CRJMTC since 1989; these activities are further described in Section 3.4.7.2.3 Hazardous Materials and Hazardous Waste Management.

According to (Vista, 2014), other community health-related historic or current concerns expressed by local residents include the following:

- Perceptions of a cancer cluster hydraulically downgradient of the site. These concerns were addressed by the OEPA, which indicated that no link between cancer and CRJMTC site contamination could be established.
- Dust from OHARNG activities.
- Impact on health and safety of OHARNG personnel.
- The extent and nature of contamination at the site, the feasibility of complete cleanup of the site, and risks associated with possible contamination.
- The future use of the property.

Potential construction activities at the CIS could disturb existing areas of contamination because the soil surface, surface waters, and groundwater in contaminated areas would be disturbed during filling and grading of the site as well as excavation of the deep vaults needed for placement of the interceptors in the interceptor field areas. This disturbance would not mobilize any additional or unknown contamination in the CIS area, as contamination in this area has been thoroughly assessed and continues to be monitored and remediated. As previously indicated, existing contamination and corresponding considerations related to ongoing investigations and remediation of the AOCs would be addressed by MDA and the OEPA prior to construction of the potential CIS facilities. Remediation of soil and sediment contamination is required to be completed to levels protective of human health and the environment as determined by the

USEPA. The schedule for remediation actions at CRJMTC indicates that soil and sediment remediation would likely be completed before or during construction of the CIS. Monitoring for groundwater contamination is ongoing; if encountered during construction, this contamination would be contained and remediated onsite as needed. Impacts on community health related to potential mobilization of existing contamination on the CIS are, therefore, would not be a major impact.

The overall health of the community surrounding CRJMTC would not be impacted by potential construction of the CIS. The majority of potential impacts on community health from CIS construction would be temporary. Measures to protect air quality, water quality, pollution prevention, BMPs, distance from residential and other sensitive receptors, and other measures discussed throughout this EIS ensure that CIS construction impacts to community health would be minimized and remain negligible.

Children's Health

There are two important areas of difference between children and adults regarding potential health impacts. First, there are differences in exposure to pollutants and in the nature and magnitude of health effects resulting from the exposure that relate to greater vulnerability of children to certain effects (body systems still in development) and the differences in children's behavior (crawling, ingestion) that may place them at greater risk. Second, there may be a different economic value placed on reducing health risks to children compared to reducing such risks to adults. Additionally, short-term exposure of children to environmental contaminants such as lead or mercury could lead to life-long health consequences (USEPA, 2014a).

Impacts to children's health (compared to adults) would not occur from potential construction of the CIS at CRJMTC. Because of the large size of the CIS footprint, many of the impacts such as air emissions from construction equipment, noise, VOCs from paints, chemicals, and fuel tanks, debris from demolition of existing buildings, and similar activities are likely to remain largely within the CIS and CRJMTC installation boundary.

Children generally are not present at CRJMTC, as it is an active military training installation. The nearest school to the site is Windham High School, just north of the installation boundary and about 4 miles northeast of the of the CIS footprint. CIS construction activities are, therefore, unlikely to disproportionately impact children living in residences outside the CRJMTC site or attending schools in the surrounding area.

3.4.5.3.1.1.4 Summary

If a deployment decision is made and CRJMTC is selected, the potential for negative environmental impacts during construction would largely be minimized through the application of routine construction procedures, BMPs, and the location of the CIS at an existing military installation that includes a relatively large forested buffer area. Routine procedures include those in the areas of site security, fire protection, medical preparedness, spill containment measures, dust suppression, noise minimization, traffic control, and other measures that would minimize negative impacts to the surrounding area. Overall, specific populations, including minority, low income, or children, would not be disproportionately impacted by construction of the CIS.

3.4.5.3.1.2 Mitigation

Negligible environmental justice impacts would occur during construction of the potential CIS, thus mitigation measures would be required. Construction BMPs and other measures discussed throughout this EIS to minimize impacts to air quality, water quality, traffic, ambient noise environment, health and safety, socioeconomics, and land use would also serve to minimize the potential for adverse impacts to community health in the area around CRJMTC.

3.4.5.3.2 Construction - Expedited Schedule

3.4.5.3.2.1 Environmental Consequences

Environmental justice impacts would be similar to the baseline case because, although impacts from the overall project would occur faster and with greater intensity, the impacts would occur to the same area as that evaluated in the baseline scenario and would not disproportionately impact low income and minority areas. With the more urgent need to hire construction workers so that construction could begin and progress more quickly, there may be an increased perception on the part of people seeking employment in the area surrounding the CIS project that they are being denied job opportunities if an effort is not made to hire local labor for construction of the project. However, the number of direct jobs that a project provides to the local community is not a regulated factor, depends on the skills of the job-seekers, and is outside the environmental justice focus on low income and minority population impacts.

3.4.5.3.2.2 Mitigation

Mitigation for construction under the expedited schedule would be the same as those discussed for the baseline schedule.

3.4.5.3.3 Operation

3.4.5.3.3.1 Environmental Consequences

Based on the information included in Section 3.4.5.2, the nearest areas to CRJMTC that qualify as minority and low income areas are specific Census block groups in the vicinity of the City of Warren and are approximately 13 and 15 miles east of the CIS footprint at CRJMTC. In light of these characteristics of the area in the region around CRJMTC and the expectation that any impacts during operation of the CIS would be largely contained within the CIS footprint and CRJMTC installation boundaries, it is reasonable to conclude that there would not be specific populations near the site that would raise environmental justice concerns.

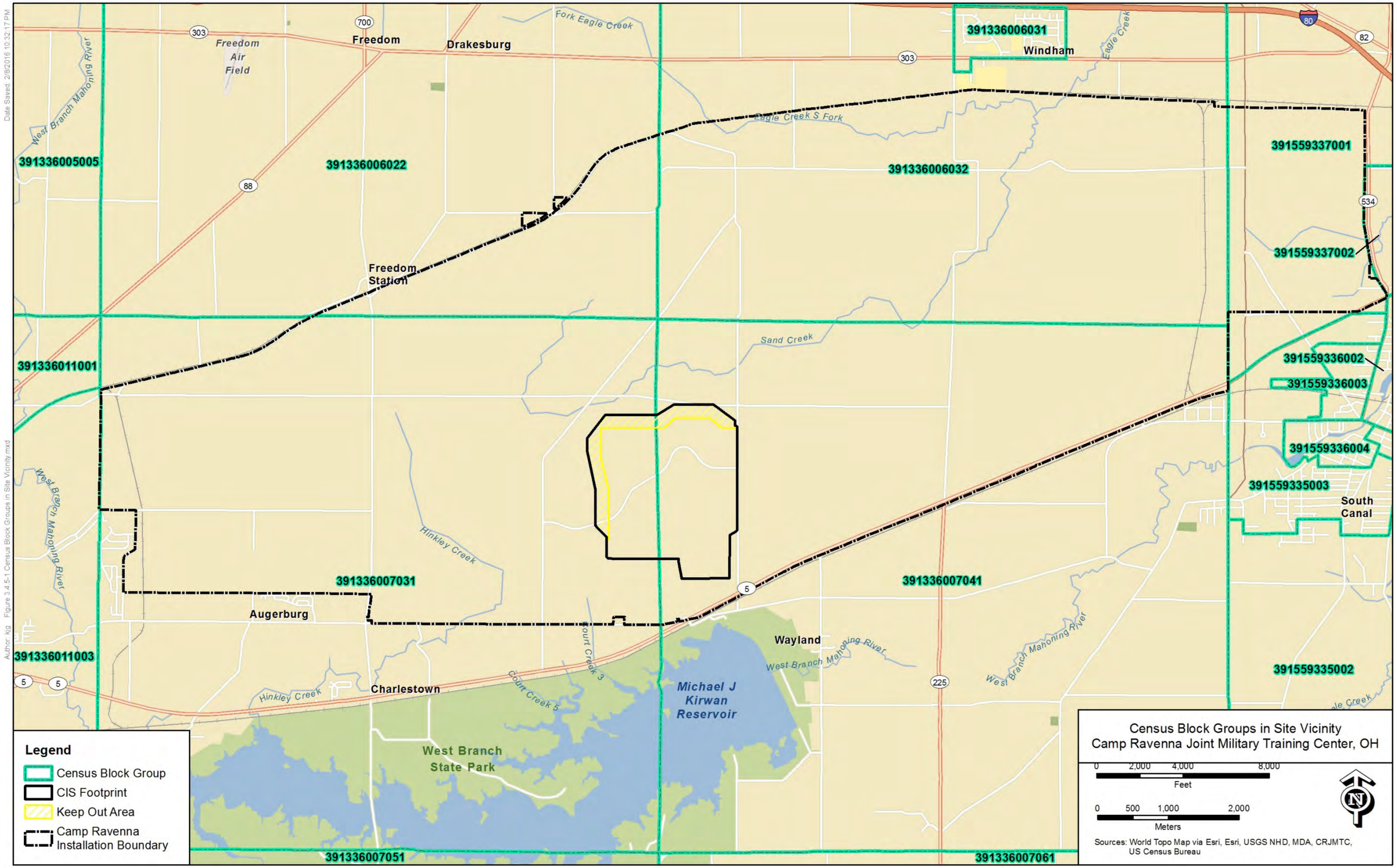
The absence of major minority or low income populations, and the general absence of children from an active military training site further reduces the potential for impacts from CIS operational activities.

The three conditions required for environmental justice impacts are not present in the CRJMTC CIS area. Namely, 1) low income or minority populations are not in close proximity to the site; 2) during operation, only minor negative impacts would occur, other than potentially larger traffic impacts near the CRJMTC installation main entrance; and 3) low income and minority populations would not encounter a disproportionate share of any negative impacts from the operation of the CIS because low income, minority, or subsistence populations are not located near the site. Consequently, negligible and no disproportionate operation-related environmental justice impacts would occur.

3.4.5.3.3.2 Mitigation

No environmental justice impacts from CIS operation would occur. No mitigation measures would be required. Operational BMPs and other measures discussed throughout this EIS to minimize impacts to air quality, water quality, traffic, ambient noise environment, health and safety, socioeconomics, and land use would also serve to minimize the potential for adverse impacts to community health in the area around CRJMTC. No additional mitigation measures would be required.

Figure 3.4.5-1 Census Block Groups in the CRJMTC Vicinity



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3.4.6 Geology and Soils – CRJMTC

Geology and soils are those earth resources that may be described in terms of landforms, geology, and soil conditions. The makeup of geology and soils, including freshwater and marine sediments, could influence erosion, depletion of mineral or energy resources, seismic risk or landslide, structural design, and soil and groundwater contamination resulting from proposed construction and operational activities (DoD, 2007).

3.4.6.1 Regulatory Framework – Geology and Soils - CRJMTC

The following Army regulation applies to geology and soils at CRJMTC:

- AR 200-1, Environmental Protection and Enhancement - Covers environmental protection and enhancement and provides the framework for the U.S. Army Environmental Management System.

3.4.6.2 Affected Environment – Geology and Soils – CRJMTC

CRJMTC is located in east-central Portage and southwestern Trumbull Counties, in northeastern Ohio. Trumbull County is bordered to the east by Pennsylvania. The installation is located approximately 35 miles southeast of Cleveland, 3 miles east-northeast of the City of Ravenna, 15 miles west-southwest of the City of Warren, and 1 mile northwest of the City of Newton Falls. Camp Ravenna is approximately 11 miles long and 3.5 miles wide encompassing a total of 21,683 acres (OHARNG, 2014).

3.4.6.2.1 Physiography and Topography

Camp Ravenna is located in the Appalachian Plateau Physiographic Region of northeastern Ohio. Although the land within this region was uplifted as part of the Appalachian Mountain building process, the glaciers were able to override the gentle hills of the plateau. Huge ice blocks broke free from the glaciers and kettle lakes formed as the blocks melted. Eventually, these lakes filled with sediment leaving boggy wetlands with unique assemblages of plants. Ridges and flat uplands, which are covered within thin drift and dissected by steep valleys, occur generally above 1200 feet above MSL. Valley segments, ranging in elevation from 600 feet above MSL to 1500 feet above MSL, alternate between broad drift-filled and narrow rock-walled reaches. Camp Ravenna is located in the Mahoning River Basin. Three major streams (South Fork Eagle Creek, Sand Creek, and Hinkley Creek) drain approximately 65 percent of the installation. The northern and central portions of the property are drained by Sand Creek, with a total drainage area of 13.5 mi^2 (8,640 acres). Sand Creek subsequently drains to South Fork Eagle Creek, which has a drainage area of 30.7 mi^2 (19,648 acres) and runs into Eagle Creek and finally the Mahoning River. The western portions of Camp Ravenna drain to Hinkley Creek, a 7.2 mi^2 (4,608-acre) drainage basin, and subsequently to the West Branch of the Mahoning River. The eastern-most portion of the installation drains to the West Branch of the Mahoning

River near its confluence with the main trunk of the Mahoning River. The southern areas drain directly into Michael J. Kirwin Reservoir. A number of smaller, unnamed creeks drain other areas of the installation (OHARNG, 2014).

Overall, the CRJMTC installation area could be considered flat land, although there are occasional steep slopes. Many of the steep slopes are due to modifications of the landscape from cut and fill operations during the construction of the ammunition plant in the 1940s. The topographic relief across CRJMTC is approximately 290 feet, with the elevation high point located in the northwest portion of the installation, at approximately 1,220 feet above MSL. The lowest point elevation of CRJMTC is located in the southeast corner of the installation, at approximately 930 feet above MSL.

3.4.6.2.2 Geology and Hydrogeology

CRJMTC is situated within the glaciated Allegheny Plateau section of the Appalachian Plateaus Province. The general terrain is gently rolling, which is characteristic of post-glacial moraine formations. Surface geology at Camp Ravenna generally consists of glacial till deposits from the Wisconsinan glacial advance, with occasional outcrops of bedrock of the Pottsville formation. The surface of the eastern two-thirds of the Camp Ravenna property is occupied by the clay-rich and relatively impermeable Hiram Till and associated outwash plain, while the western one-third is covered by the Lavery Till, a silty, sandy material with a few cobbles and sporadic boulders. Pre-glacial valleys were deepened by scouring and subsequently buried during two minor glacial advances and retreats. The first advance occurred over the entire installation, depositing the Lavery Till at a thickness of 20 to 40 feet. The second advance covered only the eastern two-thirds of Camp Ravenna depositing the Hiram Till. The Hiram Till consists of 12 percent sand, 41 percent silt, and 47 percent illite and chlorite clay minerals, and ranges in depth from 5 to 15 feet bgs. The Hiram Till overlies thin beds of sandy outwash material in the far northeastern corner of the installation. The till thickness throughout the property ranges from less than 3 feet to approximately 45 feet. The uppermost bedrock underlying Camp Ravenna consists of several units of the Pottsville sandstone formation of Pennsylvanian age. The weathered bedrock was typically encountered around 25 ft bgs during site investigations. The Pottsville formation is underlain by Mississippian-age shale of the Cuyahoga formation. The Pottsville formation varies in composition from coarse, permeable sandstones to impermeable shales (OHARNG, 2014).

There are no known mineral resources within the CIS footprint.

Groundwater at CRJTMC typically occurs within an unconsolidated aquifer and sandstone aquifers (Upper Sharon and Sharon Sandstone/Conglomerate aquifers) (BVSPC, 2015a). The groundwater table within the CRJMTC CIS footprint first occurs within the unconsolidated and upper sandstone aquifers at depths ranging from 10 to 50 feet bgs. A more detailed description of the groundwater aquifers present at CRJMTC is presented in Section 3.4.14 Water Resources.

3.4.6.2.3 Soils

Soils are unconsolidated materials overlying bedrock or other parent material. Soils play a critical role in both the natural and human environment. Soil structure, elasticity, strength, shrink-swell potential, and erodibility determine the ground's ability to support man-made conservation practices, structures, and facilities. Soils are typically described in terms of complex type, slope, physical characteristics and relative compatibility or constraining properties with regard to types of land use and/or construction activities.

Soil types at CRJMTC exist as a glacial veneer, and for the most part were formed in glacial till ground moraines on upland areas. Small pockets of end moraine material also exist throughout the installation. The soils covering the majority of the installation have a thin layer of topsoil, are heavy textured, seasonally wet, strongly acidic, and limited in productivity by poor drainage. Soils within CRJMTC have been heavily influenced in many areas by human-related activities, including agriculture, cut-and fill operations, fire, and general construction-related activities.

A soil association is a landscape that has a distinctive pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern. Soil association information is suitable for general planning only, and is used to compare areas and certain kinds of land use. Eight soil associations exist at Camp Ravenna and include: Chili, Fitchville-Haskins-Sebring, Loudonville-Mitiwanga-Dekalb, Mahoning-Ellsworth, Ravenna-Canfield, Remsen-Geeburg-Trumbull, Sebring-Holly-Canaedea, and Wadsworth-Rittman. The eastern two-thirds of the property and underlying much of the CIS footprint is Hiram Till, a 5 to 15 feet thick clay-rich, relatively impermeable till deposited as a ground moraine. Hiram Till generally falls in the Mahoning-Ellsworth soil association (AMATS, 1993). In addition to the glacially-formed soils, recent alluvium is present in the Lower Sand Creek area and in the confluence area, which is considered the Sebring-Holly-Caneadea association. Additional outwash sand and gravel is present in the elevated area in the northeastern corner of the installation (NRCS, 1978; NRCS, 1992). Chemical analyses conducted for the previous agricultural activities on the installation indicate the following chemical makeup of typical unimproved grounds:

- pH Range: 6.1 to 6.3.
- Phosphorus: 44 to 58 pounds per acre (lbs/acre).
- Potassium: 128 to 152 lbs/acre.
- Calcium: 1850 to 2530 lbs/acre.
- Magnesium: 228 to 327 lbs/acre.
- Cation Exchange Capacity: 8 to 12.

Soils that have profiles that are alike make up a soil series. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement (NRCS, 1992). A total of 37 soils series, comprising of 71 soil map units, are delineated within the 21,683-acre CRJMTC property. This installation has very little difficulty with erosion control. Generally, slope on the installation is 5 percent or less and most areas have a slope of 2 percent or less. Erosion problems are man-made due to alterations of original surface grade, or related to maintenance of bare earth under the perimeter fence. Problem areas are few and localized. Currently, there are no problem areas caused by mission activities beyond the scope of routine maintenance. The majority of CRJMTC soils are thin, heavy-textured, seasonally wet, and limited in productivity by poor drainage. However, some areas have small pockets of productive soils, characterized by favorable drainage, water capacity, texture, and pH. These areas include the Canfield, Chili, Dekalb, Geeburg, Oshtemo, Lakin, Loudonville, Rittman, and Tioga soils.

For additional information pertaining to CRJMTC hydric soils, prime farmland, soil hydrology, woodland management, and soil limitations consult the USGS Web Soil Survey or the Soils Planning Level Survey for Ravenna Training and Logistics Site (AMEC, 2006a).

3.4.6.2.4 Geologic Hazards

Seismic activity in Ohio is relatively low and the probabilistic hazard mapping identifies the Akron Suffield Fault system located approximately 20 miles southwest and the Akron Magnetic Boundary located between 30 and 90 miles south, west and north as contribution to the seismic hazard, and, therefore, results in the low seismic risk at CRJMTC.

This area is not identified as a known karst area by the ODNR, Division of Geologic Survey. Land subsidence and collapsible soils are not anticipated. Karst features are naturally occurring solution cavities within the bedrock. A review of the relative densities of the sand layers, fines content, shear wave velocity profiles, and relatively low seismic accelerations show that liquefaction would not be a concern. There are no substantial slopes on the project area and landslides would not be a hazard (BVSPC, 2015a).

Mapping of the potential flooding areas by FEMA show the potential facilities areas within flood zones.

3.4.6.3 Environmental Consequences and Mitigation - Geology and Soils - CRJMTC

This section addresses the potential geologic hazards and environmental impacts that may affect the design and construction for the structures and foundations at the potential CRJMTC Site should a deployment decision be made and CRJMTC be selected. The project activities evaluated include construction and operation impacts.

3.4.6.3.1 Construction – Baseline Schedule

3.4.6.3.1.1 Environmental Consequences

Construction of a new CIS and support facilities would require disturbing approximately 941 acres for grubbing and grading. Traditional drilling and excavation would be anticipated, but may not be applicable where bedrock would be encountered. The existing available soil material should be suitable for site grading. Soils were identified as sandy silts, silty sands, and low plasticity clays. The soils are not expansive, but would be sensitive to substantial moisture changes during placement. In the areas where bedrock would be encountered during cut activities, the use of excavated shale should not be used for fill placement, but could be used for general fill areas provided it is not on a slope. Rock excavation would be a major portion of the excavation. Basal heave should not be a concern and shoring methods could be limited to the soil profile above the bedrock. A more in-depth constructability evaluation for the potential CRJMTC site is provided in the CONUS Site Analysis Report (BVSPC, 2015a).

To establish proper topography at the site, construction and potential CIS deployment activities would require ground surface grading, including both excavation (cut) and placing of compacted fills. Quantities of the amount of cut and fill have been estimated to maintain a 2 percent grade for specific areas within the CIS footprint by using existing topographic elevations a conservative estimate of earthwork at CRJMTC may include 15 to 20 MCY of cut material and approximately 15 to 20 MCY of fill material (MDA, 2016a). Reuse of the soil onsite would be implemented to the extent possible in lieu of material importing and exporting. Due to the estimated quantities of cut and fill, the project construction would not require the export of excavated materials or the import of fills from offsite source. There would be potential for the use of onsite sand and gravel resources as part of the construction process. Several former and potential active gravel pits exist on or are in close proximity to CRJMTC if extra cut or additional fill is required. The exact quality, extent, and economic potential of the aggregate resources are unknown. Minimizing the construction footprint through phased earthwork would be sufficient for staging during construction. There are no known mineral resources within the site; therefore, development of land for the potential CIS at this site would not affect mineral resources. All clearing, staging and disposal of excavated soils would be provided in accordance with local, state and federal regulations.

Though soils are poorly drained and slopes are not substantial, BMPs would be used to stabilize soil erosion in sloped and previously forested or vegetated areas during construction. BMPs could be implemented to minimize negative short-term effects of the construction activities including clearing and grubbing, excavations, and grading for connecting infrastructure, roadways and parking.

Dewatering techniques could be required in areas where groundwater intercepts construction activities. Due to the nature of the contamination potential at the CRJMTC site, water generated could require treatment. Extraction wells to reduce infiltration in deep excavations would be discouraged and shoring systems that prevent seepage would be used.

There is potential for hazardous material and hazardous waste spills affect to the soils and geology during construction. Hazardous materials and hazardous waste include substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to the public health, welfare, or the environment if an unlikely release were to occur. Minimization of hazardous materials spills would also be minimized through implementation of site-specific hazardous material management plans and procedures.

3.4.6.3.1.2 Mitigation

The impacts associated with construction activities for geology and soils would be reduced from moderate to major impacts to moderate impacts with the implementation of BMPs. Therefore, implementation of mitigation measures would not be required.

BMPs would be used to reduce the potential for soil erosion during construction. Practices recommended could include, reduction of slopes, partially grading streets, and pads, minimizing clearing areas, frequent watering of graded areas and the use of soil stabilizers; and revegetation of slopes post construction.

Any fill material would be tested to ensure proper engineering characteristics and could be properly compacted to ensure stability of the surface and to reduce the potential for erosion. Additional investigations could concentrate on identifying the fracture and bedding planes within the bedrock. Packer tests could be used to identify the potential for groundwater inflow in excavations. Shallow excavations could be completed with traditional equipment unless bedrock is encountered which may require pneumatic rock breakers for excavation. Deep excavations could be shored with the use of conventional braced sheeting, secant columns, or jet grout columns. Dewatering techniques including sumps and pumps would be adequate for shallow excavations; groundwater may be mitigated with the use of extraction wells although because of the potential for contamination low permeable shoring during deep excavations would be preferred.

In addition to BMPs, contaminated soils and groundwater generated during construction could require analytical laboratory testing during excavation and dewatering. Treatment and disposal of the media, if required, would be in accordance with state, local, and federal requirements before discharge or disposal.

3.4.6.3.2 Construction – Expedited Schedule

3.4.6.3.2.1 Environmental Consequences

The environmental consequences associated with the construction under the expedited schedule would be similar to those described for the baseline schedule in Section 3.4.6.3.1.1. Due to the expedited schedule and the amount of earthwork required, a larger land disturbance footprint would occur. The shortened duration on construction would increase the intensity and context of the construction footprint and phased cutting and grubbing, including excavating and placement of site soils may not be applicable. Although moderate to major impacts would be reduced moderate with BMPs, local and state regulations for earthwork, such as limiting the number of distributed acres at one time, may not be able to be met. BMPs would also need to be aggressively implemented to properly minimize negative short-term effects of the construction activities.

The expedited schedule could have moderate impacts on construction where groundwater intercepts construction activities and dewatering techniques would be implemented. The intensity of groundwater extraction could affect site aquifers and wetlands. Site hydrology may require monitoring during construction. Refer to Section 3.4.14 Water Resources for site hydrology information.

3.4.6.3.2.2 Mitigation

Although moderate impacts would occur to geology and soil resources due to expedited construction activities, no mitigation measures would be required.

3.4.6.3.3 Operation

Following construction, the potential operation CIS impacts would be relatively minor, except for periodic maintenance of various structures during the service life of the potential CIS.

3.4.6.3.3.1 Environmental Consequences

Similar to construction activities, during normal operations of the potential CIS soil erosion and slope stabilization could impact the geology and soils of the site and would be addressed using an erosion control plan. Likewise, impacts to soil and groundwater from potential hazardous materials used during daily activities would be addressed by storm water prevention procedures. Refer to Section 3.4.14 Water Resources for site hydrology impacts and mitigative measures.

3.4.6.3.3.2 Mitigation

Operations impacts would be minor and further mitigation would not be warranted.

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3.4.7 Hazardous Materials and Hazardous Waste – CRJMTC

3.4.7.1 Regulatory Framework – Hazardous Materials and Hazardous Waste – CRJMTC

Hazardous materials are defined as any items or agents (biological, chemical, and physical) which have the potential to cause harm to humans, animals, or the environment, either by themselves or through interaction with other factors. A hazardous material could be a solid, liquid, gas, or combination with toxic, flammable, reactive, or corrosive characteristics. These materials are regulated at CRJMTC by laws and regulations administered by USEPA, OSHA, DOT, and DoD.

Hazardous materials must be disclosed to personnel in accordance with the OSHA 29 CFR Part 1910.1200 HazCom standards. The materials are to be labeled and stored in accordance with the HazCom standards and RCRA 40 CFR Parts 264/265 requirements.

In addition to the federal requirements, responsible personnel who sign shipping papers or manifests for hazardous materials must attend specialized transportation training in accordance with DoD Regulation 4500.9-R, Part II, Chapter 204. Handlers who do not sign shipping papers only receive general awareness, function specific, safety, and security training as indicated in the DoD Regulation. All drivers of hazardous material receive driver's training per 49 CFR Part 177.816 (Army, 2014b).

Hazardous wastes are characterized in accordance with 40 CFR Part 261. Once waste materials are identified as being hazardous the waste should then be managed in accordance with 40 CFR Parts 262 – 264. These standards outline the requirements for storage, transport, disposal, and associated manifesting for differing types of waste (USEPA, 2015d) Army installations also address environmental issues in their own regulatory document in AR 200-1.

Waste minimization policies are used to recycle materials when feasible to reduce the volume, quantity, or toxicity of the waste. Material minimization methods are presented in 40 CFR Part 266. Non-chemical military munitions are specifically addressed in 40 CFR Part 266.205.

3.4.7.2 Affected Environment – Hazardous Materials and Hazardous Waste Management – CRJMTC

The mishandling of hazardous materials onsite has the potential to impact several differing environmental matrices. Spills of hazardous compounds have the potential to contaminate building components as well as soils. Soils saturated with contaminants could release hazardous substances into surface waters and associated sediments. Contaminated surface waters and percolation through soils then result in the hazardous substances arriving in the groundwater aquifers and migrating even further. The contamination of soils and waters result in the exposure of human and ecological receptors.

CRJMTC manages hazardous materials and hazardous waste through the implementation of several installation management plans including the OHARNG Hazardous Materials and Waste Management Plan AGOH PAM 200-1 (HMWMP) (OHARNG, 2005), and the Camp Ravenna ICP (OHARNG, 2015b).

3.4.7.2.1 Hazardous Materials

This section discusses the hazardous materials that currently exist at CRJMTC and where they are located. These materials are handled, stored, and managed in accordance with DoD, Army 200-1, federal, and state regulations (OHARNG, 2015b). Hazardous materials are currently stored and managed at two locations within the CIS footprint. Building 813 contains small amounts (less than 55 gallons) of hazardous materials (paints, solvents, and oils) which are stored on secondary containment or within a flammables cabinet. Two 2500-gallon propane ASTs are located adjacent to Building 813. Small amount of hazardous materials are also stored within a flammables cabinet at the shoot house. A 250-gallon propane AST is also located adjacent to the shoot house.

The HMWMP and CRJMTC ICP address hazardous materials management in order to protect human health and the environment. The HMWMP addresses handling, storage, and general management of hazardous materials; whereas the CRJMTC ICP addresses potential spills or releases of oil or hazardous substances.

Hazardous materials are used regularly at CRJMTC and are properly stored and managed at maintenance and training areas throughout the installation. These areas encompass vehicle maintenance and storage areas. Engine oil, gear oil, grease, hydraulic fluid, brake fluid, gasoline, diesel fuel, antifreeze, solvents, asbestos brake linings, and paints are used at the motor pool and maintenance facilities.

Herbicides and pesticides are used throughout the installation and are managed in accordance with the OHARNG Integrated Pest Management Plan, the CRJMTC ICP and the HMWMP. ACMs, LBP, PCBs, PCB paint, and fluorescent light bulbs are present in older buildings throughout the installation. These are properly managed in accordance with local, state, and federal basis on an as needed basis during renovation and/or demolition activities.

Asbestos surveys were conducted at the installation in the early 1990s. All friable asbestos was removed from the buildings and former steam lines in the late 1990s. ACM is still present in buildings at the installation and is managed in accordance with the OHARNG Asbestos Management Plan dated January 2013 (OHARNG, 2013a) and local, state, and federal regulations during any renovation or demolition activities. Currently, prior to any building renovation or demolition, the OHARNG conducts an environmental hazard survey which includes the identification of asbestos in order to identify any ACM that must be managed and/or removed during work activities.

Due to the age of existing structures, all painted surfaces have been assumed to contain lead. PCBs have also been identified in the paint within the buildings on the installation. A formal LBP and PCB paint survey has not been conducted at buildings on the installation. Lead and PCB surveys and associated removal are performed on an as needed basis during renovation or demolition activities in accordance with applicable local, state, and federal regulations.

Electrical transformers containing PCBs have been either taken out of service or replaced with non-PCB equipment. The storage areas used during removal and replacement activities and former operations of the RVAAP are being addressed under the RVAAP restoration program. Lighting fixture ballasts may still be in use which could contain PCBs. Therefore, the OHARNG conducts an environmental hazard survey to identify any PCB-containing equipment prior to any renovation or demolition activities.

Live fire ranges used for training purposes are located throughout the installation. Ammunition and explosives used for training are currently brought onsite on an as needed basis. Over 600 inactive earth-covered magazines related to former operation of the RVAAP are located on the installation. These earth-covered magazines are no longer used to store finished munitions.

3.4.7.2.2 Hazardous Waste Management

CRJMTC manages hazardous waste through the implementation of the OHARNG HMWMP and the CRJMTC ICP. These documents were prepared in accordance with RCRA, OEPA, and AR 200-1. These plans focus on the management of all hazardous waste generated, stored, and managed throughout the installation. CRJMTC is identified in accordance with RCRA regulations as a conditionally exempt small–quantity generator of hazardous wastes. CRJMTC has periodic small quantity and large quantity generation episodes generally due to waste generated from building demolition projects. In addition, the CRJMTC ICP also addresses hazardous waste management procedures related to restoration program activities. Waste generated under the restoration program is managed under a separate USEPA identification number. The restoration program is designated as a small quantity generator of hazardous waste but seldom generates hazardous waste (OHARNG, 2015b).

Hazardous wastes generated are properly containerized, labeled, and tracked and are stored at three main hazardous waste generator accumulation areas on the installation. When ready for disposal, a licensed contractor properly transports and disposes of the wastes (OHARNG, 2015b).

Used oil and off-spec fuel generated from vehicle maintenance activities are properly stored and recycled. Used batteries are also recycled. Fluorescent light bulbs are properly managed and disposed (OHARNG, 2015b).

Spills of hazardous materials occasionally occur during training activities. Spills and spill waste is managed in accordance with the CRJMTC ICP and OHARNG HMWMP. Spill waste is typically nonhazardous and is properly managed and stored at CRJMTC pending disposal or recycling.

No hazardous wastes are currently being stored within the boundaries of the CIS footprint. There are several areas within the CIS footprint which are identified as AOCs due to contamination from former operations. Any waste associated with future removal actions at any of these AOCs would be managed appropriately under the RVAAP restoration program.

3.4.7.2.3 Installation Restoration Program

The U.S. Army established the IRP in 1975 in concurrence with the CERCLA which was amended by the SARA. These regulations were implemented to identify, monitor, and remediate hazardous waste sites at federal facilities (RVAAP, 2015a).

CRJMTC has a total of 67 identified AOCs and 17 Munitions Response Sites (MRSs). These areas were identified by the investigation of historical records and activities which found the potential for contamination within these areas. Historical activities involving the production of explosive and munitions in the load lines are responsible for the majority of contamination at the installation (RVAAP, 2015a).

Areas have been found to be contaminated with explosives, MEC, heavy metals, VOCs, SVOCs, petroleum products, PCBs, pesticides, and other compounds associated with the assembly and testing of conventional munitions. Potential contamination associated with AOCs/MRSs is considered when determining land use and development potential and the suitability of a given area to support military training activities (OHARNG, 2014).

The groundwater within the installation boundaries has been found to be contaminated and is being managed through the Facility-Wide Groundwater Management Program. Currently there are 284 monitoring wells monitoring the shallow and deep regional aquifers. The shallow aquifer has been found to be contaminated with several contaminants of concern (COCs) above applicable screening criteria while the COCs detected in the deep aquifer are below applicable screening criteria (OHARNG, 2014).

There are nineteen AOCs/MRSs at CRJMTC that fall within the footprint of the potential CIS. There are two additional facility-wide AOCs, groundwater (RVAAP-66) and sewers (RVAAP-67), which are also in part within the CIS footprint. The AOCs/MRSs are identified in the RVAAP Installation Action Plan (RVAAP, 2015a). Each AOC/MRS which could be potentially impacted by the CIS is briefly discussed in the following paragraphs (CRJMTC, 2015c). The locations of the AOCs/MRSs within the CIS footprint are shown on Figure 3.4.7-1. A summary of their status is shown in Table 3.4.7-1. Three AOCs, RVAAP-14 (Load Line 6 Evaporation Unit), RVAAP-15 (Load Lind 6 Treatment Plant), and RVAAP-30 (Load Line 7 Treatment Plant) have been closed out with no further action necessary and will not be discussed in the following text and table.

Table 3.4.7-1 Areas of Concern in Continental United States Interceptor Site Footprint - CRJMTC

AOCs	Acreage	Media	COC	Investigation Status	Remedial/End Status
RVAAP-32-R-01 40mm Firing Range	1.3	S	MEC	RI (2015)	9/19, use restrictions
RVAAP-33 Load Line 6	43	S,SD, SW	SVOC, PP	RI (2016)	8/2017; no LUC
RVAAP-33-R-01 Firestone Test Facility	0.4 acres	S, SD, SW	MEC, MC	Complete (9/2015)	Complete; no LUC
RVAAP-39 Load Line 5	39	S, SD, SW	SVOC	RI (2016)	9/17; no LUC
RVAAP-40 Load Line 7	37	S	SVOC	RI (2016)	4/18; no LUC
RVAAP-41 Load Line 8	44	S, SD, SW	SVOC, PP	RI (2016)	10/17; no LUC
RVAAP-42 Load Line 9	69	S, SD, SW	PP,SVOC	RI (2016)	6/18; no LUC
RVAAP-43 Load Line 10	36	S, SD, SW	SVOC	Proposed plan (6/2016)	5/17; no LUC
RVAAP-44 Load Line 11	47	S, SD, SW	SVOC, PP	RI (2016)	11/17; no LUC
RVAAP-62-R-01 Water Works #4 Dump	0.77	S	MEC	Complete (12/2015)	Complete; no LUC
RVAAP-66 Facility-wide Groundwater	Shallow under load lines	GW	MEC, PP, VOC, SVOC	Semi-Annual monitor RI/FS (2017)	Use restrictions, active remediate
RVAAP-67 Facility-wide Sewers	Load line areas	Sewer System	PP	RI (10/2017)	Remove sewer sediment (10/2019); no LUC
CC-RVAAP-68 West Electrical Substation	Substation	S	PCB, VOC, SVOC	Proposed Plan (6/2016)	7/2017; no LUC
RVAAP-72 Facility Wide USTS	11 in footprint	S	MEC, PP, VOC, SVOC	SI (7/2015)	Complete; No LUC
CC-RVAAP-73 North of Load Line 6 coal storage	Two in footprint	S	PP,SVOC	Complete (12/2011)	Complete; no LUC
CC-RVAAP-83 Former Building 1031 &1039	Former laboratory & hospital	S	PP	Complete (12/2011)	Complete; No LUC

Note: Three previous AOCs (RVAAP-14, RVAAP-15, and RVAAP-30) are not shown in the summary above, because they have been closed out with no further action being required.
Media: S-Soil, GW-Groundwater, SW-Surface Water, SD-Sediment
COC – Contaminates of Concern: VOC – volatile organics, PP- priority pollutant metals, PCB-polychlorinated biphenyls, MEC-munitions and explosives of concern, SVOC-semi-volatile organic compound
Investigation Status: FS-feasibility study (year to complete): RI-remedial investigation, (year to complete), SI-Site Inspection (year to complete).
Remedial Status: Remediation complete (year); End Status: LUC – Land Use Control

40MM Firing Range MRS (RVAAP-032-R-01). The 40mm Firing Range MRS is an 8.55-acre former test range that operated between 1969 and 1971. A small portion of this MRS at the firing potion end of the range is within the CIS footprint. The former test range was used to perform acceptance tests that included muzzle velocity measurements and impact function tests. Munitions reportedly fired at the former test range included the M407A1 series 40mm practice grenade and the M406 series high explosive 40mm grenade. The remedial investigation completed in 2015 recommended further action to assess some statistical uncertainty of MEC at the site. A removal action at the MRS would be required with on-call UXO construction support required for any future disturbance activities at the site. Remedial actions at the MRS are anticipated to be completed by September 2019 (CRJMTC, 2015d).

Load Line 6 (RVAAP-33). A portion of the CIS footprint would be located within former Load Line 6 (RVAAP-33). Load Line 6 was formerly used as a fuze assembly line and for weapons experimentation to develop shaped charges for armor penetration. Building foundations were demolished and removed in 2006 down to a minimum of 4 feet bgs. The former test pond still remains. The remedial investigation did not identify any contaminants of concern that would require a removal action. Additional remedial work which includes the finalization of investigation and decision documents is planned for 2016 and is anticipated to be completed in 2017 with a final status that meets unrestricted use with no need for a removal action and requires no land use controls (CRJMTC, 2015d). The associated Evaporation Unit (RVAAP-14) and Treatment Plant (RVAAP-15) were previously closed under RCRA regulations (SAIC, 2012).

Firestone Test Facility (RVAAP 33-R-01). The Firestone Test Facility (RVAAP-033-R-01) is located within Load Line 6 and was used for testing tube launched missiles and developing shaped charges from the 1950s to the late 1970s. The buildings and test chambers have been demolished and only the test pond remains. No Further Action status was achieved in 2015. The site meets unrestricted use and no land use controls are required (CRJMTC, 2015d).

Load Line 5 (RVAAP-39). Load Line 5 (RVAAP-39) was used as a finished product assembly line to produce fuzes for artillery projectiles from 1941 to 1945. Building foundations were demolished and removed in 2006. The remedial investigation did not identify any contaminants of concern that require a removal action. Additional remedial work which includes the finalization of investigation and decision documents is planned for 2016 and is anticipated to be completed in 2017 with a final status that meets unrestricted use with no need for a remedial action and requires no land use controls (CRJMTC, 2015d).

Load Line 7 (RVAAP-40). Load Line 7 (RVAAP-40) was used to produce booster charges for artillery projectiles from 1941 to 1945. It was also used to produce 40mm projectiles from 1969 to 1970. The Load Line 7 Treatment Plant (RVAAP-30) is collocated on the AOC and was used as a pink water treatment plant which was properly closed in 2000. Buildings and foundations were demolished in 2007. The remedial investigation indicates that approximately 150 CY of soil requires removal due to elevated levels of polycyclic aromatic hydrocarbons (PAHs) in the surface soil. Additional remedial work which includes the finalization of investigation and decision document and the completion of a removal action would be completed in 2018 with a final status that meets unrestricted use and requires no land use controls (CRJMTC, 2015d).

Load Line 8 (RVAAP-41). Load Line 8 (RVAAP-41) was used to produce booster charges for artillery projectiles from 1941 to 1945. Building foundations were demolished and removed in 2006. The remedial investigation did not identify any contaminants of concern that require a removal action. Additional remedial work which includes the finalization of investigation and decision documents is planned for 2016 and is anticipated to be completed in 2017 with a final status that meets unrestricted use and requires no land use controls (CRJMTC, 2015d).

Load Line 9 (RVAAP-42). Load Line 9 (RVAAP-42) was used to produce fuze components for artillery projectiles from 1941 to 1945. The buildings and foundations were demolished in 2003. Basements for several buildings were demolished in place to 3 feet below grade. The remedial investigation indicates that approximately 1200 CY of soil requires removal due to elevated levels of PAHs and mercury in the surface soil. Additional remedial work, which includes the finalization of investigation and decision documents and the completion of a removal action, would be completed in 2018 with a final status that meets unrestricted use and requires no land use controls (CRJMTC, 2015d).

Load Line 10 (RVAAP-43). Load Line 10 (RVAAP-43) operated as an initiator blending and loading line from 1941 to 1945. The line was reactivated in the 1950s and 1960s to produce primers for artillery. The buildings and foundations were demolished in 2007. The remedial investigation did not identify any contaminants of concern that require a removal action. Additional remedial work which includes the finalization of investigation and decision documents is planned for 2016 and is anticipated to be completed in 2017 with a final status that meets unrestricted use and requires no land use controls (CRJMTC, 2015d).

Load Line 11 (RVAAP-44). Load Line 11 (RVAAP-44) was used for the production of artillery primers and fuzes in the early 1940s and late 1960s. The buildings and foundations were demolished in 2007. Footers were removed down to a minimum depth of 4 feet bgs. The remedial investigation did not identify any contaminants of concern that require a removal action. Additional remedial work which includes the finalization of investigation and decision documents is planned for 2016 and is anticipated to be completed in 2017 with a final status that meets unrestricted use and requires no land use controls (CRJMTC, 2015d).

Water Works #4 Dump (RVAAP-062-R-01). The Water Works #4 Dump was presumably used for the intentional dumping of nonexplosive metal parts of large-caliber ordnance rounds from 1941 to 1949. The remedial investigation did not identify any contaminants of concern or munitions items that require a removal action. This site achieved No Further Action status in December 2015 and meets unrestricted use with no land use controls (CRJMTC, 2015d).

Facility-Wide Groundwater (RVAAP-66). Groundwater issues are managed at CRJMTC through a facility-wide AOC (RVAAP 66). Monitoring of the facility-wide groundwater is conducted semi-annually throughout the installation at selected areas and AOCs. The groundwater monitoring program consists of a total of 284 monitoring wells for CRJMTC, installed in both shallow and regional deeper aquifers (EQMI, 2015). A total of 40 or more monitoring of wells at several AOCs are within the CIS footprint. Concentrations of VOCs were found within the CIS footprint in the Load Line 10 (RVAAP-43) AOC just above screening levels. These concentration levels are relatively low and would not pose any exposure concerns (TEC-Weston, 2016). Additional information on groundwater contamination within the CIS footprint is discussed in Section 3.4.14 Water Resources. Remedial investigation and feasibility study efforts are between efforts are anticipated to continue through 2018. Natural attenuation, use restrictions, and some active groundwater remediation are anticipated long-term for some areas (CRJMTC, 2015d).

Facility-Wide Sewer System (RVAAP 67). Facility-Wide Sewers (RVAAP-67) Sewer (storm and sanitary) systems were used throughout the installation to support ammunition production. The sanitary sewers are distributed across four drainage networks. Three of the sanitary sewer drainage networks are associated with former sewage treatment plants and had a combined daily capacity of the 750,000 gallons and the fourth network used a small septic and Imhoff tank system. The storm sewers collected runoff from drainage areas along roads, railbeds, and buildings and diverted it to ditches and drainage conveyances through outfalls. For the areas within the CIS footprint, storm and sanitary sewers were used in areas of former Load Lines 5 through 11 and within the former cantonment area (located in the southeast corner of the CIS footprint). Remedial Investigation indicates that a removal action is required in several locations due to elevated levels of metals in sewer sediment. These removal action areas are not located within the CIS footprint. Additional remedial work, which includes the finalization of investigation and decision documents and the completion of a removal action, would be completed in 2019 with a final status that meets unrestricted use and requires no land use controls (CRJMTC, 2015d).

Electrical Substations (RVAAP-68). The West Substation lies towards the center of the CIS footprint. The remedial investigation did not identify any contaminants of concern that require a removal action. Additional remedial work which includes the finalization of the decision documents is planned for 2016 and is anticipated to be completed in 2017 with a final status that meets unrestricted use and requires no land use controls (CRJMTC, 2015d)

Facility-wide USTs (RVAAP-72). This AOC encompasses the investigation of USTs across the installation. Multiple USTs associated with former ammunition operations were located within the CIS footprint. The Site Investigation Report did not identify any contaminants of concern that required additional investigation or a removal action. This site achieved No Further Action status in July 2015 and meets unrestricted use (no land use controls) (CRJMTC, 2015d).

North of Load Line 6 coal storage (CC-RVAAP-73). North and west of Load Line 6 (RVAAP-33) there are three former storage areas located within the CIS footprint (RVAAP-73). The sites were investigated and A No Further Action Status was achieved for all three sites in December 2011. The sites meet unrestricted use and no land controls are required (CRJMTC, 2015d).

RVAAP-83 Building 1031 (former hospital) &1039 (former laboratory). The footprint of the former Building 1031 lies within the CIS footprint. Both of these buildings have been demolished. The Historical Records Report for Building 1031 did not identify any COCs that required additional investigation or a removal action. This site achieved No Further Action status in December 2011, and meets unrestricted use with no need for land use controls (CRJMTC, 2015d). Former Building 1039 is outside of the CIS footprint.

3.4.7.3 Environmental Consequences and Mitigation – Hazardous Materials and Hazardous Waste – CRJMTC

CRJMTC currently operates with hazardous materials and wastes under state and federal regulatory guidelines. Using existing installation hazardous waste spill prevention programs and management procedures, along with the additional contractor's HazCom and HazWst management program, would minimize the potential for any environmental impacts during construction efforts.

3.4.7.3.1 Construction – Baseline Schedule

3.4.7.3.1.1 Environmental Consequences

A HazCom program for the site would need to be established during the initial planning stages of construction. At least one member of the construction team should be designated with the responsibility for the enforcement of the HazWst Management Program at the site. A controlled hazardous material storage area with spill containment areas including pallets for drums, containment cabinets, spill containment equipment, etc., should be established during construction activities and secured by the contractor's HazWst Manager. The additional quantities of hazardous materials, and associated wastes, involved with CIS operations would be reduced by incorporating existing facility management plans coordinating tracking, purchasing, and storage procedures.

The operation and maintenance of motorized vehicles during the construction of the potential CIS would involve the same types of materials and wastes that are currently in use at the installation motor pools. All fuels, oils, solvents, coolants, and wastes associated with motorized equipment would need to be stored and managed in accordance with the Construction HazCom program. Waste disposal would need to be coordinated with the CRMJTC's HMWMP and ICP.

Some areas within the footprint were previously used and contaminated due to former operations related to munitions manufacturing and related industrial activities. Required soil removal actions within the AOCs/MRSs would be completed prior to construction. As indicated in the previous descriptions and Table 3.4.7-1, soil cleanup is anticipated to be completed by 2018. There is a low probability that munitions and explosives of concern could be encountered. Groundwater beneath the site is known to be contaminated. Groundwater generated during dewatering would need to be characterized to determine if it could be surface discharged or would need to be treated and/or disposed of at a sewage treatment plant or other appropriate disposal facility. This could result in moderate impacts. Prior to any demolition within the CIS footprint, an Environmental Hazard Survey would be conducted to identify any ACM, LBP, PCBs, mercury, and any other hazardous materials which would be encountered.

Paints, coatings, and solvents used during construction should be addressed in the contractor's HazWst management plan and stored and staged in the contractor's HazWst storage area.

Hazardous wastes generated would be stored temporarily within the potential CIS secure area prior to transfer to the CRJMTC main hazardous waste storage facility for disposal or recycling. This hazardous waste stream would reflect maintenance activities at the motor pool and building services. Waste materials would consist of paints, solvents, oil, lubricants, antifreeze, and batteries

3.4.7.3.1.2 Mitigation

If a decision to deploy is made and CRJMTC is selected, impacts throughout the construction process would be alleviated by strict adherence to established contractor and installation hazardous materials management programs and policies and associated BMPs. Therefore, no mitigation for typical construction HM/HW impacts would be required.

To protect construction workers, a general awareness brief of AOCs/MRSs would be provided in the unlikely event that unforeseen circumstances or conditions related to former operations or contamination are encountered. Groundwater encountered during construction activities would be characterized to determine if it could be released onsite or needs to be treated and/or disposed of offsite. On-call UXO construction support would be used when working within 40mm RVAAP-032-R-01 firing range MRS due to the low probability of encountering MEC. Although not contamination issues, old footers/foundations related to former buildings and former sanitary and storm sewers may be encountered and would be removed during construction.

3.4.7.3.2 Construction - Expedited Schedule

The impacts and mitigation measures from hazardous materials use and wastes during an expedited schedule would be the same as for the baseline schedule. By creating a project specific HazCom program using existing CRJMTC management plan and BMPs, the risk of creating ecological and human exposures would be controlled.

3.4.7.3.3 Operation

3.4.7.3.3.1 Environmental Consequences

As described is Section 2.7.1, several potential CIS-specific facilities would involve the use and storage of hazardous materials. Some hazardous waste would also be generated and temporarily stored prior to disposal. For these activities, a CIS-specific hazardous materials and hazardous waste management plan would need to be developed and implemented. By implementation of the hazardous materials and hazardous waste management plan, the potential for accidental release of hazardous materials would be very limited for the operation of the potential CIS and the potential for impacts would be negligible.

The potential for accidental release of hazardous materials is very limited for the operation of the potential CIS. The additional quantities of hazardous materials, and associated wastes, involved with CIS operations would be reduced by incorporating existing facility management plans coordinating tracking, purchasing, and storage procedures.

General Operations

During normal operations of the CIS, materials containing hazardous substances and materials may be brought onsite, such as cleaning supplies, paints, solvents, acids, bases, ethylene glycol, and alcohol oil, and lubricants (SMDC, 2002). These products would be managed in accordance with CIS-specific hazardous material/hazardous waste management plans (prepared specifically to address these products) and or coordinated with pre-existing (but updated) installation plans such as the HMWMP and ICP.

Fuel Management

As described in Section 2.4.1, the CIS installation would require several fuel storage tanks for the emergency power plant (approximate three 30,000-gallon ASTs) and associated fuel unloading facilities. These facilities would be designed and constructed in accordance with federal, state, and local SPCC requirements and managed in accordance with CIS facility plans (prepared specifically to address potential CIS operations) and or coordinated with existing (but updated) CRJMTC's ICP. Fuel storage tanks would include provisions such as double-walled tanks, secondary containment, and cathodic protection as SPCC measures.

CIS-Specific Activities

The following information is a summary of CIS-specific activities that involves hazardous materials and hazardous waste management. This information was obtained from the Ground-based Missile Defense Validation of Operations Concept Environmental Assessment (EA) (SMDC, 2002).

KV fuel (hydrazine) and oxidizer (nitrogen tetroxide) are new hazardous materials that would be brought to the facility. These materials are listed on the USEPA's Toxic Substances Control Act Inventory and would be transported in accordance with DOT requirements, arrive at the CIS facility in preloaded tanks (<5 gallons each), and would be stored in separate structures until loaded into the GBI for placement in launch silos. USEPA's EPCRA would be followed by the adequate reporting to the local authorities of the hydrazine which is included in the USEPA's Extremely Hazardous Substance List. A sensor system would be installed which would monitor the status of the propellants. Specially trained emergency response personnel would accompany the transport of these materials onsite to all destinations in the event of a spill.

The current KV system includes beryllium components in the sunshade and telescope. Beryllium is listed on the USEPA's Toxic Substances Control Act Inventory. These components are deeply embedded in the kill vehicle and would never be removed at the missile site. The kill vehicle would be shipped intact to the manufacturer should maintenance on these parts be required.

Small explosive components are used to blow the silo hatch covers during deployment and for GBI booster stage separation. These components would be stored in a separate building prior to installation in the silos and during GBI assembly. The explosive exposure potential would only exist during initial installation and assembly and later during silo maintenance procedures.

Any hazardous waste generated should be managed in accordance with appropriate federal, state, and local regulation.

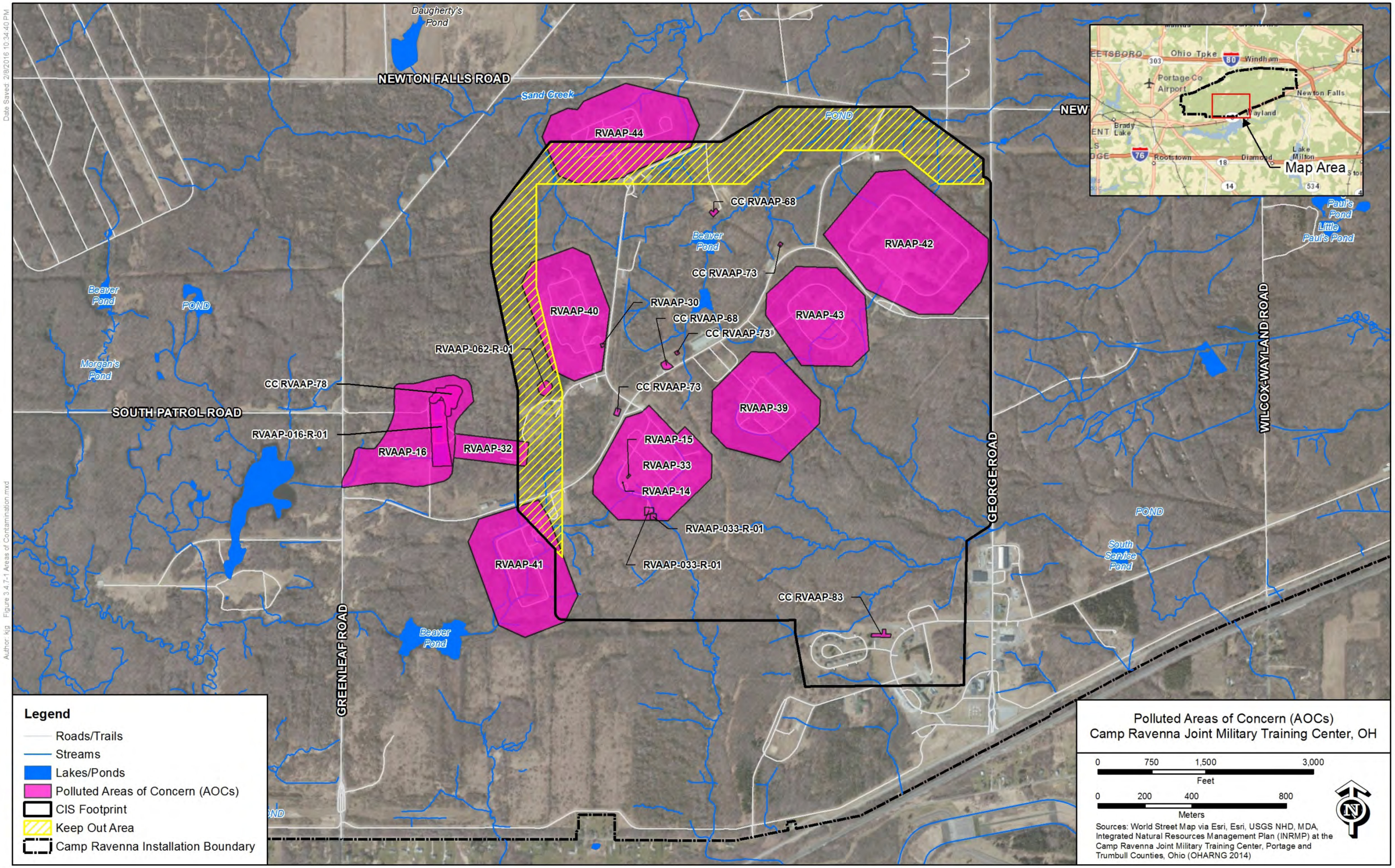
Appropriate hazardous materials and waste management plans would be developed for the facility.

3.4.7.3.3.2 Mitigation

Mitigation concerns during normal operations for hazardous materials are minimized by adhering to the policies and procedures outlined in the CIS-specific plans and coordinated with installation plans such as the CRJMTC's HMWMP, and ICP.

Environmental and personnel exposure risks involving the KV fueling operations would only be present during initial delivery, assembly, and loading operations. These risks are mitigated through the use of preloaded tanks, supervision by emergency response personnel, and adherence to CIS-specific plans and procedures.

Figure 3.4.7-1 Areas of Concern (AOCs) – CRJMTC



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3.4.8 Health & Safety – CRJMTC

3.4.8.1 Regulatory Framework – Health & Safety – CRJMTC

The statutes and regulatory requirements pertaining to health and safety are as follows:

- AR 385-10, Army Safety Program (3 September 2009) - Implements requirements of the Occupational Safety and Health Act of 1970 and establishes policy on Army safety management procedures.
- Occupational Safety and Health Act of 1970 (29 USC 651) - Legislation designed to ensure that workplaces are free from recognized hazards to safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions.
- EO 12196, Occupational Safety and Health Programs for Federal Employees (26 February 1980) – Provides guidance for the implementation of Section 19 of the Occupational Safety and Health Act of 1970 which includes provisions to ensure safe and healthful working conditions for federal sector employees.
- AR 40-5, Preventative Medicine (25 May 2007) - Establishes practical measures for the preservation and promotion of health and the prevention of disease and injury.
- DoDI 6050.5, DoD Hazardous Communication (HAZCOM) Program (15 August 2006) - Implements the Hazardous Materials Process Controls and Information Management requirements relevant to product hazard data.
- DoDI 6055.5, DoD Occupational Health (11 November 2008) - Implements policies and prescribes procedures for maintaining deployment health activities and reduce occupational and environmental health.
- DoDI 6055.12, DoD Hearing Conservation Program (5 March 2004) - Protects DoD personnel from hearing loss resulting from operational (to include combat) and occupational noise exposure.

3.4.8.2 Affected Environment – Health & Safety – CRJMTC

The evaluation of health and safety considers actions or operations which could affect or provide safety risks and the well-being of construction workers, facility workers, the general public, and the environment. Potential safety risks are typically assessed for activities that primarily occur during construction and operation. These risks are characterized prior to the initiation of actions, documented, and relayed to affected parties, then continually updated throughout the activity as additional safety risks are identified.

For CRJMTC and the potential CIS, the primary health and safety issues consist of those related to on-base safety (current training hazards and emergency response systems), the EMR environment, and explosion hazards. Additional health and safety issues and hazards related to specific resources including those related to hazardous materials and hazardous waste management (including those related specifically to CRJMTC's IRP and transportation-related hazards) are described within the sections for those specific and respective resources.

3.4.8.2.1 On-Base Safety

CRJMTC is used by the OHARNG for training exercises throughout the year for the training of troops, weapons firing, tactical maneuvers, and responses to disaster conditions. For these activities, safety procedures and hazard prevention are addressed through polices and plans based on Army standards. Part of the safety procedures at CRJMTC includes established SDZs around all ranges. As described in Section 2.9.2, several facilities including a shoot house, RTI training building, hand grenade range, demolition range, and gas chamber training building currently reside within the CIS footprint. Of these activities the only activity that includes a SDZ is the hand grenade and demolition range. As discussed in Section 2.9.2 (see Figure 2.9-6), if the CIS is deployed to CRJMTC, then these facilities would be relocated and SDZs established for the new location.

On-base safety also considers the presence of emergency response systems, including those specifically related to fire protection. Currently, CRJMTC relies on offsite (off-base) sources for emergency response systems including fire protection (Army, 2014a).

3.4.8.2.2 Electromagnetic Radiation Environment

EMR is the radiant energy released by certain electromagnetic processes. EMR is usually classified as one of two types: ionizing radiation (typically produced by x-rays, cosmic rays, and gamma rays) and non-ionizing radiation (typically produced by a wide variety of equipment such as cellular phones, radios, television, and radar). For the potential CIS, issues related to EMR are important due to the potential for interferences with communications equipment, human exposure, and exposure to fuel or explosive devices.

Currently there are no EMR issues at CRJMTC related to current activities. However, to determine the potential for communications equipment, a background assessment of the EME at CRJMTC was conducted as part of the potential CIS siting process by the Joint Spectrum Center (MDA, 2014a). To accurately define the EME at CRJMTC, site RF measurements were obtained in the 100 MHz to 45 GHz frequency band from existing frequency related radiation sources (such as RF-related equipment within the vicinity of the CRJMTC footprint). The measurements obtained from the EME assessment were compared to the frequencies of potential CIS systems to determine compatibilities and if adequate space or distances would be available at CRJMTC to mitigate these potential interferences without special procedures.

Based on the EME assessment conducted, the database searches and onsite measurements indicated that the potential CIS systems would be compatible with the current usage of the electromagnetic spectrum within the vicinity of CRJMTC CIS footprint and that there is adequate distance for the potential CIS to be operated without the interference with EMR source (e.g., radio gear, etc.) that may be in the vicinity of CRJMTC without the use of special procedures (MDA, 2014a).

3.4.8.2.3 Explosive Hazards

There are several active training facilities currently present within the CIS footprint at CRJMTC (see Section 2.9.2). Of these facilities, both the hand grenade range and demolition range provides some safety and explosive hazard risks, however procedures and SDZs have been established to mitigate and eliminate any associated explosive hazards.

In addition due to CRJMTC's use as an ammunition plant and depot there could be some risk, although perceived low risk from previous survey including a specific survey of the CRJMTC CIS footprint (USACE, 2014b), associated with the presence of MEC and UXO. Recommendations from previous survey of the CRJMTC CIS footprint indicated that although encountering MEC and UXO would be low risk during construction activities, standard ordnance awareness training was recommended for construction personnel prior to construction (USACE, 2014b). There should also be on-call UXO support during construction.

3.4.8.2.4 Terrorist Threats

Terrorism is a growing concern throughout the U.S. To counter the threat, facilities such as those to be provided for the CIS are designed and constructed in accordance with the UFC and DoD anti-terrorist building standards, which are designed to address a range of terrorist attack scenarios, including explosives, fire and chemical, biological, and radiological weapons. In evaluating installation security for the CIS, MDA considered the potential impacts of threats to the site and community and incorporated commensurate levels of physical security and anti-terrorism mitigation measures in accordance with DoD standards. Measures are in place to secure the CIS facilities with a strong and integrated system. First, CRJMTC is a closed military installation with its own internal security force and cooperative agreements with local law enforcement agencies. Only personnel with valid credentials are permitted access. Second, restricted areas within the CIS would be completely fenced with access control. The restricted area fencing would be equipped with intrusion detection sensors that are linked to installation security and local law enforcement. Finally, the restricted areas within the CIS also have a dedicated security force that patrols the site and controls access on a 24-hour/7-day basis.

3.4.8.3 Environmental Consequences and Mitigation – Health & Safety - CRJMTC

3.4.8.3.1 Construction – Baseline Schedule

3.4.8.3.1.1 Environmental Consequences

General Construction Hazards. Some typical risks that would be associated with the construction of the potential CIS could include trips and falls, equipment hazards, dermal contact and inhalation of toxic materials, electrocution, overhead, and lifting hazards, confined space entry, and trenching activities. Each potential CIS construction activity would be evaluated and documented in a formal JHA in accordance with OSHA guidelines. Contractors would prepare and implement JHA and Safety Plan documentation to ensure safe working conditions during construction activities in accordance with applicable guidelines.

Explosive Hazards. Because the site was a former ammunition arsenal and a military installation, there is a low risk hazard during construction for encountering MEC and UXO. A survey was conducted at this site which indicated that the risk of exposure is extremely low, but recommended standard ordnance awareness training (USACE, 2014b).

CIS Transportation Hazards. There would be potential transportation hazard associated with construction. GBI boosters and unfueled KV, payloads, and support equipment would be transported separately by air and then transported over-the-road by common carrier truck to the potential CIS. All shipping would be conducted in accordance with applicable U.S. Air Force, U.S. Army, FAA, and DOT regulations. Transportation of hazardous materials would be in accordance with DOT regulations for interstate shipment of hazardous materials found in 49 CFR Parts 100-199.

Once onsite the GBI components would be placed in the MAB for assembly, integration, and check-out or ISF for storage prior to assembly or emplacement. The KV bi-propellant tanks would be stored in the KV Fuel and Oxidizer Storage facilities until mounted onto the KV subassembly. From storage, the GBI and KV components are brought separately to the MAB to be assembled.

Based on over 15 years of operations and transport of GBIs to and from sites similar to that anticipated for the potential CIS (e.g., Vandenberg Air Force Base, CA, and Fort Greely, AK), there have been no reported transportation incidents or accidents. As a standard of practice and to alleviate transportation related health and safety issues, prior to any shipments of GBI components, a transportation safety plan would be written in accordance with the appropriate DoD and DOT regulations, and transportation crews would receive the appropriate training in accordance with the plan. In addition, the emergency response personnel and equipment would accompany the GBI components during transport to handle and contain hazardous materials in the unlikely event of a release during transport.

Other Hazards. As previously indicated, several training facilities (including some with specific health and safety related issues such as SDZs) currently reside in the CIS footprint. However, these facilities would be relocated more as a land use issue rather than a safety issue, if the potential CIS were to be installed at CRJMTC, thus reducing current safety related impacts. Therefore, the assessment of the impacts associated with the relocation of this facility will be discussed in Section 3.4.9 Land Use. There may be some residual safety hazard from MEC and

UXO after relocating the training facilities (hand grenade and demolition range). A UXO survey and removal would be conducted prior to construction.

3.4.8.3.1.2 Mitigation

Safety issues for construction would be addressed by the implementation of common safety practices. Therefore, no additional mitigation measures would be required.

3.4.8.3.2 Construction – Expedited Schedule

3.4.8.3.2.1 Environmental Consequences

In comparison with the baseline schedule, increased health and safety risks may be incurred during for the expedited construction schedule. Although the exact form of schedule expedition on specific work activities has not yet been specifically defined, the shortened schedule could result an increase numbers of workers onsite, longer work hours, overlapping shifts, and night work. To address these increased health and safety risks, in additional to the common safety practices defined for the baseline schedule, some added but commonly used safety practices (e.g., lighting for night work) could be provided to reduced and eliminate the increased safety risks.

3.4.8.3.2.2 Mitigation

Safety issues for construction would be addressed by the implementation of common safety practices. Therefore, no additional mitigation measures would be required.

3.4.8.3.3 Operation

3.4.8.3.3.1 Environmental Consequences

On-Base Safety. If the CIS is deployed to CRJTMC, additional emergency response infrastructure, including those related to fire protection would be required and augmented to the extent necessary, thus reducing potential emergency response related health and safety impacts. The requirements of the enhanced EMS services would be defined during the design of the facilities.

Electromagnetic Radiation (EMR) Environment. EMR issue related to the potential CIS includes communications interference, personnel hazards, and potential explosive hazards.

As described previously, the EME for the CIS would include the potential for in-band frequency interference associated when two pieces of communications-electronics equipment (offsite radio equipment versus CIS facility equipment) that are operating within the same frequency band. However, based on the EME assessment in conjunction with the CIS (MDA, 2014a), the CIS systems would be compatible with the current EME within the CRJMTC CIS footprint and there would be adequate distance for the CIS to be operated without the interference without the use of special procedures. Therefore, no impacts related to communications interference from EMR would occur.

EMR could also impact personnel health due to radiation effects and act as a potential explosive/ignition source for fuel and ordnance. However, safety risks and impacts from the operation of facilities similar to those within the CIS have been incurred and the potential appears to be low due to the implementation of established safety provisions, including use of facility separation and explosive safety distances. Therefore, impacts related to from EMR to human health or as explosive/ignition sources would not occur.

Explosive Hazards. In addition to potential fuel sources alleviated through standard practices and establishment of explosion/safety distances at the potential CIS including those related directly to the GBIs, provide some ordnance related hazards. However, ESQDs would be established to reduce hazards based on the net explosive weight of each GBI and its function, thus alleviating explosive hazards and associated impacts.

KV Assembly. The GBI components would be placed in the MAB for assembly, integration, and check-out or ISF for storage prior to assembly or emplacement. The KV bi-propellant tanks would be stored in the KV fuel and oxidizer storage facilities until mounted onto the KV subassembly. From storage, the GBI and KV components are brought separately to the MAB to be assembled

Inherent health and safety hazards and risks to GBI maintenance personnel and equipment damage would be mitigated by the multi-layer design of the tanks, protective packaging during transport, and proven operating procedures that have been in place for more than 10 years.

The KV would contain liquid hypergolic propellants. Hypergolic propellants are fuels and oxidizers that ignite on contact with each other and need no ignition source. A release of either propellant could result in the release of hazardous materials inside the canister.

An indoor release of liquid propellants could result in localized concentrations that exceed both the IDLH or PEL for workers. Nitrogen tetroxide is the greater hazard due to its lower IDLH limit and lower boiling point. Risk from inadvertent release would be mitigated by design of the tanks, atmospheric monitoring, and monitoring, and procedure as summarized below. The most likely area for this to occur would be within the MAB, ISF, and the GBI missile field. Exposure to propellant released below the PEL level for the nitrogen tetroxide as a result of a release would not cause irreversible damage. Exposure at these levels would be mildly irritating to the eyes and nose and could include coughing.

Facility and equipment designs would incorporate the following measures to minimize the potential for and impact of accidents.

- The liquid bi-propellant tanks would have multiple safeguards, such as an internal bladder system, requiring several system failures before a release would occur, thereby making the potential for a release very remote.
- A sensor system would be used to monitor the condition/status of the KV propellant system during bi-propellant tank installation and checkout operations. In addition, the following operating procedures and training would be instituted to minimize the potential for and impact of accidents.
- Specific health and safety plans would be developed including evacuation plans, and notification of local and offsite emergency response as required.
- An emergency response team would be on call during tank installation and emergency equipment would be near the facility.
- The local fire departments would be notified through the existing cooperative agreements with the installation.
- In the event of a liquid bi-propellant release, the emergency response team would ensure the area would be evacuated, ignition sources would be removed, and vapors would be ventilated. All liquid would be contained for treatment and neutralization and disposed of in accordance with all applicable regulations. Releases would be absorbed with appropriate materials and transferred to containers for disposal.

GBI Integration. Integration and assembly of the GBI components could include installing electronics, wiring, and ordnance in each of the stages; mating the stages together; and mating the KV to the flight vehicle.

The Class 1.3 propellant used in the GBI is principally considered a blast hazard for overpressure from gases generated by inadvertent ignition. There is also a secondary fire hazard from residual propellant spread from any blast.

Accidental ignition of solid propellant could be caused by static discharge, lightning, or a nearby fire or explosion. Additionally, impact of the rocket motor casing against any object or penetration of the rocket motor's casing may produce enough internal or external frictional energy release to cause ignition. However, detonation resulting solely from an impact is considered impossible because Class 1.3 propellants are not shock sensitive as defined by the DOT. Data show that even when subjected to explosive shock from explosives (C4) Class 1.3 propellants with HTPB binders, AP oxidizer, and AL fuel do not exhibit burn rates in excess of 3000 m/sec that is the accepted lower limit for detonation (Merrill et al., 1994).

To address GBI integration hazard concerns, the site would be designed such that facilities would be spaced out in accordance with safety quantity distances based on the net explosive weight of each GBI. It should be noted that there is no warhead on the GBI. The net explosive weight is based on the weight of the propellant. The appropriate separation of the GBIs in the silos would prevent any potential for a mishap impacting more than one GBI at any time. In addition, inhabited buildings, traffic routes, etc., would be located at a distance from the GBI's to minimize any potential health and safety hazards.

In addition, the following operating procedures and training would be instituted to minimize the potential for and impact of accidents, such as accidental launch.

- Measures would be taken to prevent static buildup during transportation and GBI handling would be in accordance with standard safety procedures developed by DoD for the handling of solid and liquid propellants.
- A health and safety plan would be prepared that would include procedures to handle emergencies involving the GBI. This plan would describe how to handle each type of emergency, the appropriate base and off-base contacts, and an evacuation plan, if necessary.

Cooperative agreements with local fire departments would need to be updated to inform them of the additional hazards and safety considerations.

Terrorist Threats. The counter terrorist measures described in Section 3.4.8.2.4 are expected to prevent unauthorized personnel from entering the CIS facilities, damage to defense assets or injury to personnel, adverse effects to the general health and safety of site personnel or the general public, and adverse effects to the environmental attributes of the site. Environmental consequences due to damage to GBIs and fuel tanks caused by terrorist threats would have the similar results as those caused by accidents and would be addressed in similar manners as previously discussed in the hazardous materials and hazardous waste operations section, Section 3.4.7.3.3.1.

3.4.8.3.3.2 Mitigation

Based on assessments provided during the facility design, enhancement of emergency response related services could be provided to mitigate potential impacts from the lack of emergency responses, including those related to fire protection.

Safety issues for operations would be addressed by the implementation of the site-safety and associated facility design practices. Therefore, no additional mitigation measures would be required.

3.4.9 Land Use – CRJMTC

Land use can be defined as the human use of land resources for various purposes including economic production, natural resources protection, or institutional uses. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are allowable or protect specially designated or environmentally sensitive uses. Potential issues typically stem from encroachment of one land use or activity on another, or an incompatibility between adjacent land uses that leads to encroachment.

This section presents information on the current land use conditions at the CIS footprint and in the vicinity, project-related construction and operation impacts, and mitigation measures.

3.4.9.1 Regulatory Framework – Land Use – CRJMTC

Land use at CRJMTC is influenced and governed by a variety of management plans, both regional and internal. These plans are either general plans for the installation in its entirety or are specific to ARNG activities and resources. Regional and internal land use management plans which influence and govern CRJMTC land use and planning are described in the following section.

3.4.9.1.1 Federal Programs

- AR 210-20, Real Property Master Planning for Army Installations (16 May 2005) – Defines the real property master planning concept and requirements and establishes policies and responsibilities for implementing the real property master planning process for U.S. Army communities.
- AR 405-20, Federal Legislative Jurisdiction (21 February 1974) - Provides for implementation of the additional authority granted to the military departments by Congress relative to relinquishment of legislative jurisdiction of Defense Directive 5160.63.
- AR 405-80, Management of Title and Granting Use of Real Estate (10 October 1997) - States the policy on management of title, unauthorized use, and granting use of U.S. Army controlled real property.
- AR 405-90, Disposal of Real Estate (10 May 1985). Includes policy for disposing of U.S. Army controlled real estate.
- FLPMA of 1976 (Public Law 94-579; 43 USC 35) – Calls for establishment of procedures for managing federal lands.
- EO 12372, Intergovernmental Review of Federal Programs - Encourages consultations between federal, state and local governments in use of federal financial assistance and planning for federal development.

3.4.9.1.2 Regional Land Management Plans

Several local regulatory and property development authorities have prepared long-range plans and programs for areas adjacent to and surrounding the CRJMTC. These plans address transportation improvement and management planning, land use and housing analysis planning, and rural development planning (Ogden, 2000). These authorities include:

<u>Portage County Regional Planning Commission</u>

The Portage County Regional Planning Commission maintains databases and compiles information on building construction, general property development, property development projections, population estimates, and population projections. This information is then used to produce land use plans, economic development plans, housing improvement strategies, development simulation models, and growth scenarios for Portage County. The Portage County Regional Planning Commission also maintains a GIS database for Portage County (Ogden, 2000).

Akron Metropolitan Area Transportation Study (AMATS). The AMATS is both a regulatory organization and an overall master-planning study, which commissions and conducts smaller studies with regard to "... the comprehensive, continuous and cooperative transportation planning process for Summit and Portage Counties, as well as Chippewa Township in Wayne County. The primary objective of AMATS is to guide the staged development of a balanced transportation system in concert with the existing and future development of the area and to efficiently serve the transportation needs of more than 666,000 persons." Land use inventories for the political units within AMATS jurisdiction are conducted every 5 years, and are used to prepare and revise both long-range and short-range transportation plans, as well as long- and short-range land use forecasts (Ogden, 2000). These plans/forecasts include:

AMATS Fiscal Year (FY) 1998-2001 Transportation Improvement Program. This plan summarizes the transportation improvements that would be conducted within the AMATS jurisdiction in FY 1998-2001, and specifically indicates that three transportation improvement projects would be conducted near the RTLS. These projects include: 1) preservation of the rail line along the northern boundary of the RTLS; 2) resurfacing and bridge repair for State Route 5 west of the CRJMTC; and 3) resurfacing of State Road 82 north of the property. No other projects included in the FY 1998-2001 Transportation Improvement Program were located in the vicinity of the RTLS (Ogden, 2000).

AMATS Year 2010 Transportation Plan. This plan presents a 20-year planning horizon for areas within the AMATS jurisdiction. The Year 2010 Transportation Plan identifies existing transportation problems, anticipates future problems, and ensures that planned improvements are consistent with the goals and objectives of residents and businesses in the area. The plan provides a clear understanding of both the positive and negative impacts of proposed transportation improvements in order to support the orderly development of the region. In addition, the plan acts as a guide to local officials in implementing transportation improvements involving federal funds. No specific long-range transportation improvements or needs are addressed for the area immediately surrounding the CRJMTC (Ogden, 2000).

Trumbull County Planning Commission

The Trumbull County Planning Commission is similar to the Portage County Regional Planning Commission in that it maintains databases and compiles current and future information on general property development and population. The Trumbull County Planning Commission also produces development plans, strategies, and scenarios, including the following:

Trumbull County Land Use and Housing Analysis Plan. This plan, produced in 1977, is an update of the 1962 Trumbull County Comprehensive Plan. It defines the existing conditions and future status of land use and housing in Trumbull County. The CRJMTC property was not specifically addressed in the plan. Surrounding communities, such as Newton Falls and Braceville, were projected to continue with growth and development at average rates (Ogden, 2000).

Trumbull County Major Thoroughfare Plan. This plan, which was revised and re-issued in 1964, presents an inventory of existing highways in Trumbull County, identifies deficiencies in highway systems, and recommends improvements for various Trumbull County highways. No major improvements are recommended for highways within the vicinity of the CRJMTC (Ogden, 2000).

Trumbull County Rural Development Plan. This plan identifies and ranks potential economic development sites in rural areas of the county via a screening analysis method. The plan presents a framework for the establishment of new economic development activities in the rural-urban fringes of the county. The plan was prepared in response to structural changes in the local economy that eliminated or curtailed development of basic industries and resulted in high unemployment rates. In this plan, the CRJMTC is identified as "Public Land", owned by the DoD, and considered to have limited potential for economic development. Economic resources specific to CRJMTC are identified as limited public hunting and oil/gas well development. Two small areas located directly east of the CRJMTC, near the SR 5/SR 534 intersection and SR 5/I-80 intersection, were ranked highly as potential sites for industrial development. Lands within or in the vicinity of the City of Newton Falls were identified as having potential for commercial and industrial development (Ogden, 2000).

3.4.9.1.3 Site Land Management Plans

Land use at CRJMTC is governed by a variety of management plans. These plans are either general plans for the installation in its entirety or are specific to OHARNG activities. The following are land management plans specific to OHARNG activities or administered by the OHARNG at CRJMTC (OHARNG, 2004):

Range and Training Land Development Program, Range Development Plan. The Range and Training Land Development Program (RTLP), Range Development Plan (RDP) was developed for the OHARNG and provides a review of available assets, identifies users, and establishes training requirements based on Army training doctrine and resource guidance information (OHARNG, 2009). The RTLP-RDP establishes current requirements and utilization levels for available training facilities, and identifies additional training facilities' needs.

Training Site Master Plan. The purpose of the Training Site Master Plan is to identify the missions, requirements, vision, opportunities, constraints, and conditions of the OHARNG and, based on these data, generate a Comprehensive Plan that describes the specific facilities required to best develop the CRJMTC over the next several years to meet the defined requirements and vision (OHARNG, 2009).

Environmental Noise Management Plan. Based on information in the Statewide Operational Noise Management Plan, it does not appear that the CIS facilities would conflict with the Environmental Noise Management Plan (OHARNG, 2008a).

Integrated Cultural Resources Management Plan. The ICRMP, prepared in consultation with the OHPO and the ACHP, provides detailed guidelines and procedures to enable the CRJMTC managers to meet the legal responsibilities for the identification, evaluation, and management of historic properties.

Watershed Inventory and Management Plan. Construction of CIS facilities would not conflict with the Watershed Inventory and Management Plan. The Watershed Inventory and Management Plan establishes land management procedures including the use of an all-inclusive ecosystem level approach to manage natural resources while supporting and enabling the military mission; establishing a sampling program to detect migrating contaminants associated with training activities; and procedures to reduce soil erosion from storm water runoff.

Integrated Natural Resources Management Plan. The INRMP describes the baseline conditions of the natural resources and provides guidance to allow for the completion of the military mission while providing for the conservation of renewable resources, preservation of unique and rare resources, and long-term sustainability of ecosystems. The major management programs addressed in the INRMP include land management and grounds maintenance, forest management, and fish and wildlife management. The INRMP is coordinated with federal, state, and local natural resources managements and agencies with natural resources expertise (OHARNG, 2015b).

Integrated Contingency Plan. The ICP consolidates multiple emergency response plans (i.e., SPCC Plan) into one functional emergency response plan (OHARNG, 2015b).

Installation Hazardous Waste Management Plan. The Installation Hazardous Waste Management Plan identifies state, federal, and Army regulations required to ensure that all hazardous waste generated, accumulated, stored, or treated at CRJMTC is managed to protect human health and the environment through established procedures. This plan is a component of the ICP.

3.4.9.2 Affected Environment – Land Use - CRJMTC

3.4.9.2.1 Regional Land Use

The CRJMTC lies in both Portage and Trumbull Counties in Ohio. Compliance with municipal zoning is not mandatory for federal property. However, the CRJMTC does influence local land use for those areas surrounding the property. Aesthetics, dust, and noise issues are the primary factors concerning residents in these adjacent areas (Ogden, 2000).

Land use immediately adjacent to CJRMTC includes rural farms, single family homes, trailer parks, Ohio State Highway 5, outdoor recreation areas, and small industrial operations. The majority of the area is zoned as agricultural and rural residential with some industrial and commercial zones (OHARNG, 2014). The Ravenna Township Zoning Map shows the area immediately northwest of the northwest CRJMTC boundary is zoned commercial residential and the area immediately west of the west CRJMTC boundary is zoned residential low (PCRPC, 2009).

Communities surrounding CRJMTC include the City of Ravenna to the west; the Village of Freedom, the Village of Drakesburg, and the Village of Windham to the north; the Village of Garrettsville to the northeast; and the Village of Wayland, the Village of Paris, and the City of Newton Falls to the south (OHARNG, 2014). The nearest community is the Village of Windham, which is about 3.5 miles north/northeast from the CIS footprint boundary.

3.4.9.2.2 Site Land Use

The CRJMTC is located in east-central Portage and southwestern Trumbull Counties in northeast Ohio. The CRJMTC is comprised of 21,683 acres of federally-owned property under command of the OHARNG (refer to Figure 3.4.9-1). The OHARNG initially referred to the installation as the RTLS. Onsite land use management plans address the security of essential OHARNG mission activities from encroachment and the protection of both human and natural environment.

The CRJMTC is used for mounted and dismounted training exercises primarily by the OHARNG, but all branches of the Armed Services, non-military law enforcement, and emergency management agencies use or have used the training site facilities. Training includes both mounted and dismounted tactical training. Mounted training includes a 12.5-mile tracked vehicle driving course, artillery maneuver, tracked vehicle and artillery simulator training, a 21-mile wheeled vehicle convoy course, night vision driving, and use of the Gunnery Table IV multi-purpose training range for the M-1 tanks. Dismounted training includes small unit infantry tactics, reconnaissance, terrain and map analysis, escape and evasion tactics, infiltration tactics, land navigation, patrolling, and tactical concealment/bivouacking. Bivouacking involves temporary field quarters for one person or several platoons or companies. Temporary infrastructure for bivouacs includes vehicle parking, tents, portable latrines, portable water, and gray water holding tanks (OHARNG, 2009). Training also includes aerial drop and aerial spray training by fixed wing aircraft and sling load, nap of the earth flying, hovering, rescue basket and hot refueling by rotary wing; small arms and weapons firing and qualification; hand grenade and engineer demolition training; and water purification training.

Land management areas at CRJMTC are categorized as improved, semi-improved, and unimproved grounds. Improved grounds are those intensively maintained. Semi-improved grounds are areas that receive some maintenance, but are not as intensively maintained as improved grounds. Unimproved grounds are those that receive little or no regular maintenance. Approximately 411 acres of CRJMTC are improved grounds; approximately 2,500 acres are classified as semi-improved grounds; and 18,772 acres are unimproved lands (OHARNG, 2014). The CIS footprint encompasses 1,070 acres. Within the CIS footprint, there are approximately 6 acres of improved grounds, approximately 55 acres of semi-improved grounds, and approximately 1,036 acres of unimproved grounds (refer to Figure 3.4.9-2).

Land Use Classifications

Specific land uses within the CRJMTC installation include range, multi-purpose training, cantonment area, field fueling area, maintenance, gas chamber, storage, RTI, drop zone, Tank-automotive and Armaments Command North Dig Site, and restricted access. The restricted access areas consist of AOCs and wetland mitigation sites. The AOCs are not available for military training because they are still under investigation for environmental remediation. These areas would become available after remediation is complete. Wetland mitigation sites are precluded from development and use for military training (Morgan, 2015).

The total area of the CIS footprint would be 1,070 acres. Specific land uses within the CIS footprint include range, multi-purpose training, RTI, and cantonment areas. Existing training structures within the CIS footprint include the RTI training schoolhouse; live-fire hand grenade and demolition ranges; a NBC/gas chamber training building; and shoot house. Existing structures within the cantonment area include former family housing residential structures (refer to Figure 3.4.9-3) (OHARNG, 2009; OHARNG, 2013e; OHARNG, 2013f; Morgan, 2016a).

The area of the CIS footprint is designated as an Ohio Tree Farm 3497 (refer to Figure 3.4.9-4). The forest is valuable for military training, wildlife habitat, soil stabilization, water quality protection, and overall biological diversity.

3.4.9.2.3 Constraints

Land Use

Certain on-installation lands are currently unavailable for development and limited in allowable land use and are categorized as being a development constraint. These lands include the AOCs and MRSs still undergoing investigation and remediation, and wetland and stream mitigation sites. The CIS footprint encompasses several AOC and MRS sites, which are discussed in Section 3.4.7. There are no wetland or stream mitigation sites within the CIS footprint.

Wetland Mitigation Sites

There is no development or military training allowed within the boundaries of the wetland mitigation sites (refer to Figure 3.4.14-2). The mitigation sites must remain wetlands in perpetuity (DoD, 2015). There are no wetland mitigation sites within the CIS footprint.

Water Resources

All areas designated within a 100-year floodplain, and streams and ponds and the 100-foot buffer around each resource are precluded from development unless it is a mission and/or national requirement. Beaver impoundments are found within stream corridors and wetland areas and are included as a development constraint (OHARNG, 2009).

The CIS footprint would be located outside of the 100-year floodplain. There is a beaver pond within the CIS footprint as well as wetlands and streams. Refer to Section 3.4.14 for information regarding water resources at CRJMTC. Refer to Section 3.4.15 for a discussion of wetlands.

Biological Resources

Special interest areas with high quality ecosystems and federally-listed and state-listed species' locations are not precluded from development if essential to the military mission (OHARNG, 2009). There are potentially one federally-listed species and two species identified as special concern by the State of Ohio located within the CIS footprint. Refer to Section 3.4.3 for a description of biological resources.

Cultural Resources

Properties eligible for listing on the NHRP are considered a development constraint, but are not precluded from development if essential to the military mission and/or national requirement (OHARNG, 2009). There are no known historic, archaeological, or architectural properties that are listed on, or eligible for listing on, the NRHP within the CIS footprint site. Refer to Section 3.4.4 for a discussion of cultural resources.

Areas of Concern and Munition Response Sites

There are 67 AOCs and 17 MRSs throughout CRJMTC. These AOC and MRS sites were identified by the investigation of historical and present activities which resulted in contamination at some sites. Historical activities from the former load, assemble, and pack activities related to the RVAAP are the source of the contamination at the installation (RVAAP, 2015b). Currently, there are 36 AOCs and 14 MRS sites actively involved in the CERCLA remediation process. Additionally, groundwater is also being investigated on a facility-wide basis. For sites that cannot be cleaned up to unrestricted/residential use, land use controls, which may be physical controls such as fencing, signage is implemented to control access. Full-time military training is not permitted within the AOC/MRS sites where remediation and environmental investigation is ongoing. A list that identifies the AOCs/MRSs within the CIS footprint and a brief status regarding restoration investigation and remedial efforts is provided in Section 3.4.7.

Hydric Soils

All hydric soils are categorized as a constraint due to the potential for those areas to contain wetlands. However, hydric soils could be developed if in the national interest or to support the installation mission. No other soil characteristics are designated as a constraint (OHARNG, 2009).

There are wetlands present within the CIS footprint. Refer to Section 3.4.15 for a discussion of hydric soils and wetlands.

Prime and Unique Farmland

Prime farmland relates to soils that have the optimal combination of physical and chemical characteristics for producing food, feed, forage, fiber and/or oilseed crops. The NRCS has identified nearly all of the soils within CRJMTC to be prime farmland; however, the soils would only meet these criteria if drainage tile systems were installed (OHARNG, 2009). There are no known drainage tile systems within the CIS footprint.

Building Site Development

Building site development categories identify the type of soil limitations that may affect shallow excavations due to low soil permeability. The categories include ‘slight’, ‘moderate’, and ‘severe’. ‘Slight’ indicates building site development limitations are minimal; ‘moderate’ indicates conditions are not favorable and special planning, design, or maintenance may be required to overcome or minimize the limitation; and ‘severe’ indicates that conditions are unfavorable and that special design, possibly substantial increases in construction costs, and increased maintenance are likely required. Limitations are based on the ease of digging, filling, or compacting; the optimal time of the year that work could be conducted; and resistance of excavation walls or banks to sloughing or caving. Nevertheless, these limitations do not constrain construction activities. Approximately 92 percent of CRJMTC has a ‘severe’ rating for shallow excavations (OHARNG, 2009). The CIS footprint consists of mostly ‘severe’ and some ‘moderate’ limitations in terms of shallow excavations. The soil properties within the CIS footprint would be evaluated in terms of design and construction.

3.4.9.2.4 Recreational Land Use

Regional Recreation

The primary offsite recreation area is the Michael J. Kirwan Reservoir, which is located immediately south of the southern CRJMTC boundary. This is a public reservoir that was developed by the USACE for flood control, water supply, recreation, and fish and wildlife management. The reservoir is surrounded by West Branch State Park, which is managed by the Ohio Division of State Parks. Recreational activities at West Branch State Park include boating, camping, picnicking, swimming, fishing, hunting, and hiking on 12 miles of trails (OHARNG, 2014). Facilities provided at the West Branch State Park include camp sites; showers; fish cleaning stations; fishing docks and piers; picnic areas; swimming; and bike, equestrian, and hiking trails (USACE, 2015b). The location of the Michael J. Kirwan Reservoir is illustrated on Figure 3.4.9-2 and Figure 3.4.9-4.

The City of Ravenna Parks and Recreation Department maintains approximately 92 acres of woodlands and recreational area for local residents. A hike and bike trail runs through the City of Ravenna and is part of a larger network of trails (OHARNG, 2014).

Site Recreation

Open public access is not permitted on CRJMTC. Controlled public access is granted only when compatible with the military mission for harvesting timber products, deer hunting, fishing, and trapping; for CRJMTC-hosted events and educational tours for small groups; for biologists and natural resource professionals conducting research or biological inventories; and for personnel from environmental and conservation agencies and organizations (OHARNG, 2014). Controlled access means a controlled process whereby permits are issued, there is a sign-in and sign-out procedure, assigned hunt locations, security check of vehicles, and CRJMTC personnel are in the field to oversee and manage these recreation activities.

Controlled public deer hunting and trapping, and employee fishing are permitted. There are approximately 230 acres within the CIS footprint where deer hunting is allowed for the military personnel. There are approximately 569 acres within the CIS footprint where deer hunting is allowed for the public. Within the CIS footprint, hunting is prohibited in the AOC and MRS areas undergoing remediation. Public and military deer hunting areas are identified by number. Table 3.4.9-1 lists the designated deer hunting and deer hunt parking areas located within the CIS footprint (refer to Figure 3.4.9-5) (OHARNG, 2014).

Table 3.4.9-1 Designated Deer Hunting and Parking Areas in Continental United States Interceptor Site Footprint - CRJMTC

Deer Hunting Area Number	Deer Hunt Parking Number	Military Personnel or Public Hunting Area
24A	24	Public
24B	24	Military Personnel
31A	31	Military Personnel
31B and 31C	31	Public
32C	32	Public
32A and 32B	32	Public
45	45	Public

Deer hunting is prohibited within AOCs and MRSs, including the following, which would be within the CIS footprint (refer to Figure 3.4.7-1 in Hazardous Materials):

- RVAAP-33 Load Line 6;
- RVAAP-033-R-01 Firestone Test Facilities;
- RVAAP-39 Load Line 5;
- RVAAP-40 Load Line 7;
- RVAAP-41 Load Line 8;
- RVAAP-42 Load Line 9;
- RVAAP 43 Load Line 10; and
- RVAAP-44 Load Line 11.
- CCRVAAP-68 West Electrical Substation.
- RVAAP 032-R-01 40MM Firing Range MRS.
- CCRVAAP-83-Former Building 1031 and 1039.

Figure 3.4.9-6 shows fishing areas on CRJMTC. There are no designated fishing ponds within the CIS footprint.

3.4.9.3 Environmental Consequences and Mitigations– Land Use – CRJMTC

3.4.9.3.1 Construction – Baseline Schedule

3.4.9.3.1.1 Environmental Consequences

Compatibility with Existing Regional Land Use/ Management Plans and Policies

Regional compatibility for construction of the CIS was determined with regional land use/management plans and policies available for review as listed in Section 3.4.9.1.1.2. However, the federal government is not subject to state or local land use or zoning regulations. Even so, the federal government does consider land use and zoning policies and cooperates with state and local agencies to avoid conflicts when feasible (ARNG, 2011). In any case, it appears that CIS facilities' construction would not conflict with regional land use plans

Land Use Conversion. Construction of the CIS facilities would not alter offsite land use designations. Permitting and design would occur in year 1; site preparation would occur in year 2; heavy construction would occur in years 3 and 4; and the final build-out would occur in year 5.

Recreation. The nearest offsite recreation area is the Michael J. Kirwan Reservoir and West Branch State Park. Potential impacts to these recreation resources could include fugitive dust and emissions from earthwork activities; although such emissions would be localized. Fugitive dust control BMPs like water spray would be implemented, as required, to suppress dust. Visitors to the reservoir and park, especially in the northern portion, would likely hear some distant construction equipment engines and possibly backup signals from machinery being used on the site. Overall, however, potential impacts would be minor due to the temporary nature of construction.

Compatibility with Existing Site Land Use/ Management Plans and Policies

Based upon general information provided in this section, construction of CIS would not conflict with existing land use/management plans unless otherwise noted. In addition, CRJMTC has acknowledged that portions of its training range would be impacted, as well as some of its facilities (CRJMTC, 2015c). These impacts are also discussed in this section.

Range and Training Land Development Program, Range Development Plan. Based on information presented in the RDP, it does not appear that the CIS would conflict with the RTLP-RDP.

Training Site Master Plan. It is possible that construction of CIS facilities could conflict with the Training Site Master Plan in terms of development constraints that have been identified within the CIS footprint. Potential impacts associated with development constraints are discussed later in this section (see Facilities/Activities Relocation).

Environmental Noise Management Plan. Based on information in the Environmental Noise Management Plan, it does not appear that the CIS facilities would conflict with the Environmental Noise Management Plan.

Integrated Cultural Resources Management Plan. Construction of CIS facilities would not conflict with the ICRMP. In terms of land use, the ICRMP establishes procedures to comply with regulations, which includes Section 106 of the National Historic Preservation Act, and requires assessment of the effects of federal actions on cultural resources. There are no prehistoric or historic archaeological sites or architectural features within the CIS footprint that are listed on, eligible for listing on, or potentially eligible for listing in the NRHP. There are SOPs within the

ICRMP that have been established in the event that cultural and/or archeological resources are found during instances of development and land disturbance; therefore, conflicts with the ICRMP would not occur.

Watershed Inventory and Management Plan. Construction of CIS would not conflict with the Watershed Inventory and Management Plan. The Watershed Inventory and Management Plan establishes land management procedures including the use of an all-inclusive ecosystem level approach to manage natural resources while supporting and enabling the military mission; establishing a sampling program to detect migrating contaminants associated with training activities; and procedures to reduce soil erosion from storm water runoff. Therefore, conflicts with the Watershed Inventory and Management Plan would not occur.

Integrated Natural Resources Management Plan. Construction of CIS facilities would have a minor conflict with the INRMP in that the INRMP calls for no net loss of military training areas and the conservation of natural resources and habitat. The CIS facilities would result in a net loss of military training and natural resource areas. However, such losses would be minor compared to the land available for training and habitat within the CRJMTC installation boundary.

Integrated Contingency Plan and Installation Hazardous Waste Management Plan. Based on general information provided in Section 3.4.9.2.2, there would be no conflict with the potential CIS deployment at CRJMTC

Land Use Conversions. Potential impacts from the construction of the CIS facilities to current land use designations would be permanent, yet minor. This is because land use designations would be assigned to the CIS to reflect the functional land use, but would be compatible with the military use of CRJMTC. In addition to construction within the CIS footprint, setback distances from construction activities could temporarily impact military training/use in the area; however, the enforcement of such setbacks would be temporary and thus would be minor.

Of the 1,070 acres within the CIS footprint, the OHARNG currently has training and military use of approximately 662 acres. However, construction of the CIS would mean that the OHARNG would no longer have access to 662 acres for training and military use. This reduction in lands available to the OHARNG for training and military use would be minor because it would amount to approximately five percent of the 21,683 acres that comprise CRJMTC. Thus, construction of the CIS would have a minor impact on land available for OHARNG training and military use.

As it pertains to the reduction of available training area for the OHARNG due to construction of the CIS facilities, the forest that comprises the CIS footprint is designated as Ohio Tree Farm 3497. The timber would be cleared from approximately 941 acres for construction of the CIS. The loss of 941 acres of the 5,616 total acres of Ohio Tree Farm 3497 would be a reduction of approximately 17 percent of Ohio Tree Farm 3497. The remaining forested areas within the CRJMTC installation boundary which comprises approximately 12,539 acres would continue to be available for military training. Therefore, considering the small proportion of the CRMJTC that would be occupied by the CIS and thus unavailable for military use, the permanent impact to military training from a reduction in forested area would be minor.

Facilities/Activities Relocation. Potential impacts to current land use from the relocation of facilities/activities within the CIS footprint to other areas of the CRJMTC would be minor because the CRJMTC land use is for military training use. Thus, the relocation of facilities to other areas within CRJMTC would conform to military training land use designations. New construction would be required to relocate existing facilities/activities that are currently within the CIS footprint. Construction of new facilities includes a hand grenade range (two firing points), demolition ranges, NBC/gas chamber, and RTI Laboratory (CRJMTC, 2015d). The new construction would occur within CRJMTC, but outside of the CIS footprint (refer to Figure 3.4.9-7). The relocation of facilities would conform to the military training land use designation of the installation.

To support the relocation of facilities from within the CIS footprint to other areas within CRJMTC, approximately 1.5 miles of new overhead electric and communication lines would be constructed to replace lines currently within the CIS footprint that feed the OHARNG ammunition supply point. Additionally, approximately 1.3 miles of new overhead electric and communications line from an outside source would be constructed to the new shoot house location (refer to Figure 3.4.9-7). The new onsite utility corridor would necessitate revising the facility's Master Plan to reflect the utility corridor designations. However, this permanent impact would be minor because the area affected by a change in land use designation from military training to utilities would be small and apply only to the width and length of the utility corridor.

Demolition. Demolition would be required for the construction of the potential CIS. Table 3.4.9-2 lists the buildings that would be demolished (refer to Figure 3.4.9-8). The demolition of buildings currently within the CIS footprint would not alter land use designations because the demolition itself is a transitional activity that does not directly change land use; it is the construction of the CIS that would necessitate a change in land use designations.

Table 3.4.9-2 Facilities and Building to be Relocated or Abandoned in Continental United States Interceptor Site Footprint - CRJMTC

Building No.	Construction Date	Building Description	Current Use	Historic Use
1B-14	1942	Inert Storage	Abandoned	Inert Storage
1B-15	1942	Shipping Building	Abandoned	Shipping Building
2B-14	1942	Inert Storage	Abandoned	Inert Storage
2B-15	1942	Shipping Building	Abandoned	Shipping Building
2F-21	1942	Inert Storage	Abandoned	Inert Storage
2F-22	1942	Shipping Building	Abandoned	Shipping Building
AP-15	1942	Inert Storage	Abandoned	Inert Storage
AP-16	1942	Shipping Building	Abandoned	Shipping Building

Building No.	Construction Date	Building Description	Current Use	Historic Use
DT-30	1942	Inert Storage	Abandoned	Inert Storage
DT-31	1942	Shipping Building	Abandoned	Shipping Building
PE-23	1942	Inert Storage	Abandoned	Inert Storage
PE-24	1942	Shipping Building	Abandoned	Shipping Building
WW003	1942	Water Works 3	Abandoned	Water Treatment Plant
WW03A	1942	Water Works 3	Abandoned	Water Treatment Plant
WW03C	1942	Reservoir	Abandoned	5,000,000 gal raw water storage
WW-32	1943	Elevated Water Tower	Abandoned	Elevated Water Tower
WTP01	1972	Water Works 4	Abandoned	Surface Water Treatment Plant
WTP02	1972	Water Works 4	Abandoned	Surface Water Treatment Plant
SD-23	1942	Ejector Station No. 5	Abandoned	Sewer Ejector Station
813	1941	RTI School House	RTI Office and Classrooms	Idle Equipment Process Building
2828	1941	Gas Chamber	Training - NBC Chamber	West Electrical Substation
Shoot House	~2012	No SDZ Shoot House	Active	NA
1061-A	1941	Family Housing	Abandoned	Base Housing
1061-C	1941	Family Housing	Abandoned	Base Housing
1061-E	1941	Family Housing	Abandoned	Base Housing
1061-F	1941	Family Housing	Abandoned	Base Housing
1061-H	1941	Family Housing	Abandoned	Base Housing
1061-K	1941	Family Housing	Abandoned	Base Housing
1061-N	1941	Family Housing	Abandoned	Base Housing
1061-Q	1941	Family Housing	Abandoned	Base Housing
1062-B	1941	Family Housing	Abandoned	Base Housing
1062-D	1941	Family Housing	Abandoned	Base Housing
1062-G	1941	Family Housing	Abandoned	Base Housing
1062-J	1941	Family Housing	Abandoned	Base Housing
1062-L	1941	Family Housing	Abandoned	Base Housing
1062-M	1941	Family Housing	Abandoned	Base Housing
1062-P	1941	Family Housing	Abandoned	Base Housing
1057G-1	1941	Family Housing Garage	Abandoned	Garage
1057G-2	1941	Family Housing Garage	Abandoned	Garage
1057G-3	1941	Family Housing Garage	Abandoned	Garage
1057G-4	1941	Family Housing Garage	Abandoned	Garage
1057G-5	1941	Family Housing Garage	Abandoned	Garage
1057G-6	1941	Family Housing Garage	Abandoned	Garage
1057G-7	1941	Family Housing Garage	Abandoned	Garage

Water and Sewer Linear Facilities. Utilities within the CIS footprint, including the water main and sanitary sewer pipeline, would connect to the existing distribution systems on CRJMTC. The construction of new utilities would have a permanent impact on land use designations because the location of the utilities would no longer have a land use category of military training. This change in land use would necessitate revising the facility's Master Plan to reflect the utility corridor designations. However, this permanent impact would be minor because the area affected by a change in land use designation from military training to utilities would be small and apply only to the width and length of the utility corridor.

Recreation. There would be a permanent impact to the land available for public and military personnel deer hunting and trapping from construction of the CIS because hunting would not be allowed within the CIS footprint. The total acreage of currently available deer hunting and trapping areas that would be permanently impacted from construction of the CIS is approximately 1,070 acres. However, this permanent impact would be minor because there would be approximately 17,431 acres of land that would still be available for deer hunting and trapping within CRJMTC.

The potential impact to fishing as a recreation activity would also be minor because there are no designated fishing areas within the CIS footprint. Therefore, the fishing areas currently available would remain unchanged.

Environmental Constraints

Floodplain, Ponds, Streams, and Wetlands. There would be no impact to a 100-year floodplain because the CIS footprint is located outside of the 100-year floodplain. Impacts to land use due to environmental constraints associated with the presence of ponds, streams, and wetlands, would be minor because mitigation measures would be implemented prior to land development. Refer to Sections 3.4.14 Water Resources and 3.4.15 Wetlands for a discussion of mitigation measures.

Cultural Resources. There are no known historic, archaeological, or architectural properties that are listed on, or eligible for listing on, the NRHP within the CIS footprint. Therefore, impacts to land use due to this environmental constraint would be minor.

AOCs. There would be negligible impact to land use from this environmental constraint in terms of surface conditions because remediation of the AOCs would have to be completed prior to land development. However, it is possible that groundwater contamination could persist when CIS construction activities commence and be present if any dewatering is required. Even so, the potential impact to the groundwater development restriction would be minor because groundwater generated during dewatering activities would be contained, treated, and disposed of per the appropriate wastewater management standards, permits and conditions.

Hydric Soils. Hydric soils develop under continued wet conditions, which in turn promote wetland plant development. Hydric soils are present in wetland complexes including those wetlands located within the CIS footprint. Impacts to land use function due to the presence of the hydric soils, and ultimately wetlands, as an environmental constraint would be minor. This is because the permanent impacts to wetlands would be mitigated. Refer to Section 3.4.15 for a discussion of mitigation measures.

Prime and Unique Farmland. The soils that define prime farmland are present throughout nearly all of CRJMTC. However, these soils do not meet the criteria unless there are drainage tile systems installed in the land. There are no known drainage tile systems within the CIS footprint; thus, impacts to prime and unique farmland would be minor.

Building Site Development. The building site development environmental constraint is associated with deep and shallow excavations. Deep and shallow excavations could be required for construction of project facilities; however, impacts to land use due to this environmental constraint would be minor because the engineering design would incorporate methods for digging, filling, dewatering, or compacting soils associated with deep and shallow excavations.

3.4.9.3.1.2 Mitigation

No mitigation would be required because conflicts and impacts from the construction of the potential CIS with regional or site land use plans and policies would be minor or would not affect current land use designations.

Land Use Designations. No mitigation would be required for permanent impacts to adjacent land use designations. This is because the amount of land that would require redesignation due to the construction of the project facilities and the establishment of the various safety arcs would represent a small proportion of the installation.

Regional Recreation. No mitigation would be required for potential impacts to offsite recreation resources (such as the Michael J. Kirwan Reservoir and West Branch State Park) because CIS construction activities would be localized and would occur inside the CRJMTC installation and thus, not affect regional recreation activities or facilities.

Recreation. No mitigation would be required for permanent impacts to recreation activities currently allowed within the CIS footprint because no major impacts to recreation resources would occur.

3.4.9.3.2 Construction – Expedited Schedule

The impacts and mitigations related to land use at the CRJMTC site associated with the expedited construction schedule would be the same as for the baseline schedule.

3.4.9.3.3 Operation

3.4.9.3.3.1 Environmental Consequences

Regional Land Use

Compatibility with Existing Land Use/ Management Plans and Policies. Based on the review of information in Section 3.4.9.1.2, land use designations for the potential CIS operations would not conflict with or result in impacts to regional land use plans.

Land Use. Potential impacts to regional land use would be negligible because there would be no change in regional land use designations or actual land use function due to operations or maintenance activities.

Recreation. The nearest offsite recreation areas are the Michael J. Kirwan Reservoir and West Branch State Park. Potential impacts to these recreation resources from operations and maintenance activities would be minor because activities would be localized and would proceed inside the CRJMTC installation at a location over 2,600 feet away from the nearest point of the state park. The distance and other features in the area, including screening of the view by forested areas, would make these activities unlikely to be noticed by recreationists enjoying the reservoir or park.

Site Land Use

Compatibility with Existing Land Use/ Management Plans and Policies. Based on the review of information in Section 3.4.9.1.3, land use designations for the potential CIS operations would not conflict with or result in impacts to site land use plans.

Land Use. Safety arcs would be designated for the CIS facilities. The public traffic route (PTR) safety arc would not extend beyond the CIS footprint. The Inhabited Building Distance (IBD) safety arc and toxic/thermal safety arc would extend beyond the CIS footprint, but would not extend beyond the CRJMTC boundary. A PTR cannot be developed within these safety arcs and there are specific separation distances for the IBD. As such, land use within these safety arcs would be restricted. However, these restrictions would not have an impact to the land use function because there would be no existing PTR or inhabited buildings (beyond the CIS footprint) that would be impacted from the reach of the safety arcs. Further, military training activities would be allowed within the IBD and toxic/thermal safety arc. Therefore, there would be a negligible impact to OHARNG training activities.

Recreation. Operations would not interfere with recreation activities allowed in other parts of CRJMTC (hunting, fishing, and timber removal). The decrease in recreation area due to the presence of the project facilities would result in a minor, permanent decrease in the acreage of land within CRJMTC that is available for recreation.

3.4.9.3.3.2 Mitigation

Overall, the level of impact to onsite or offsite land use in terms of operation and maintenance of the CIS would be minor; therefore, no mitigation measures would be required.

Figure 3.4.9-1 Regional Map – CRJMTC

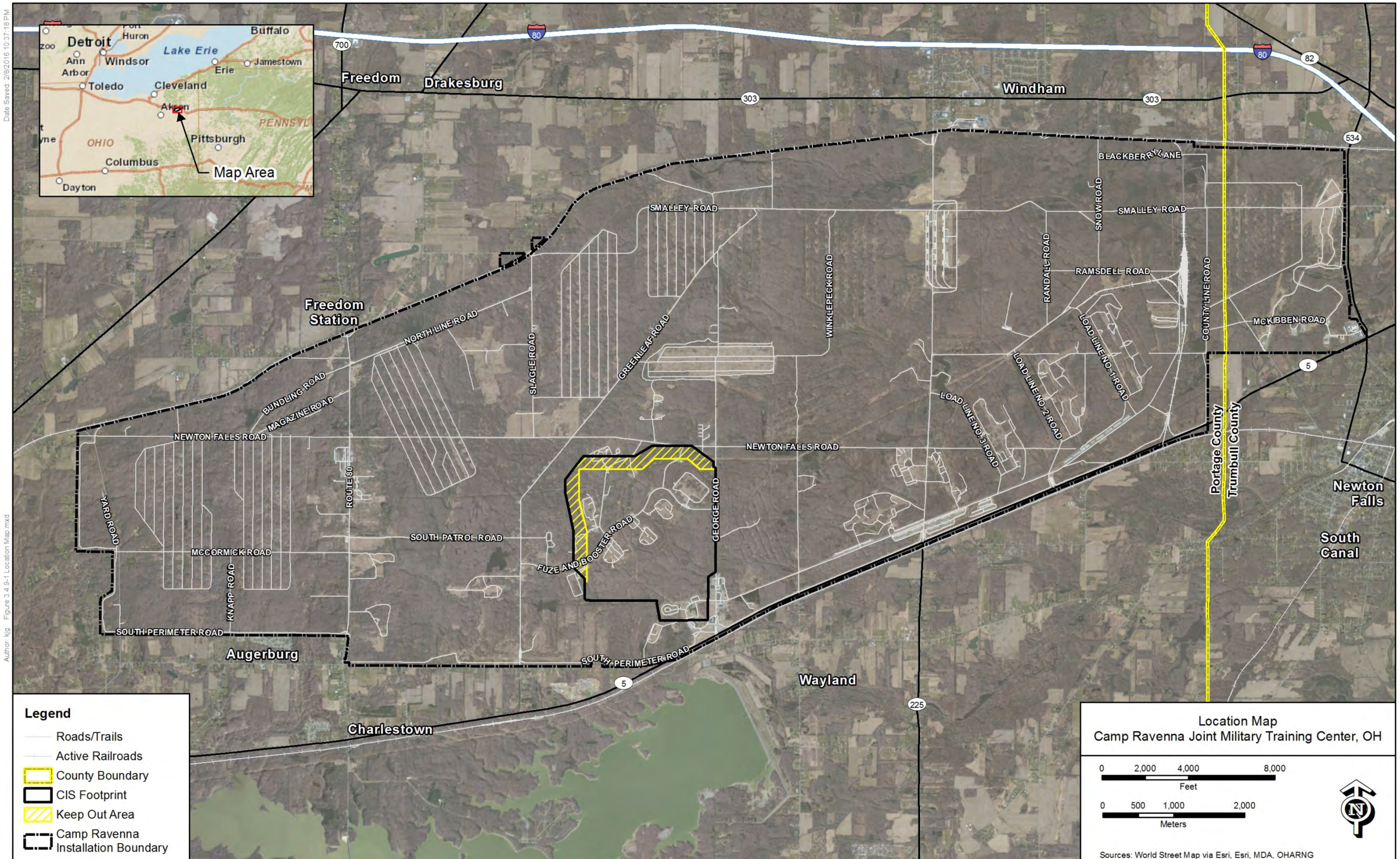


Figure 3.4.9-2 Improved, Semi-Improved, and Unimproved Grounds – CRJMTC

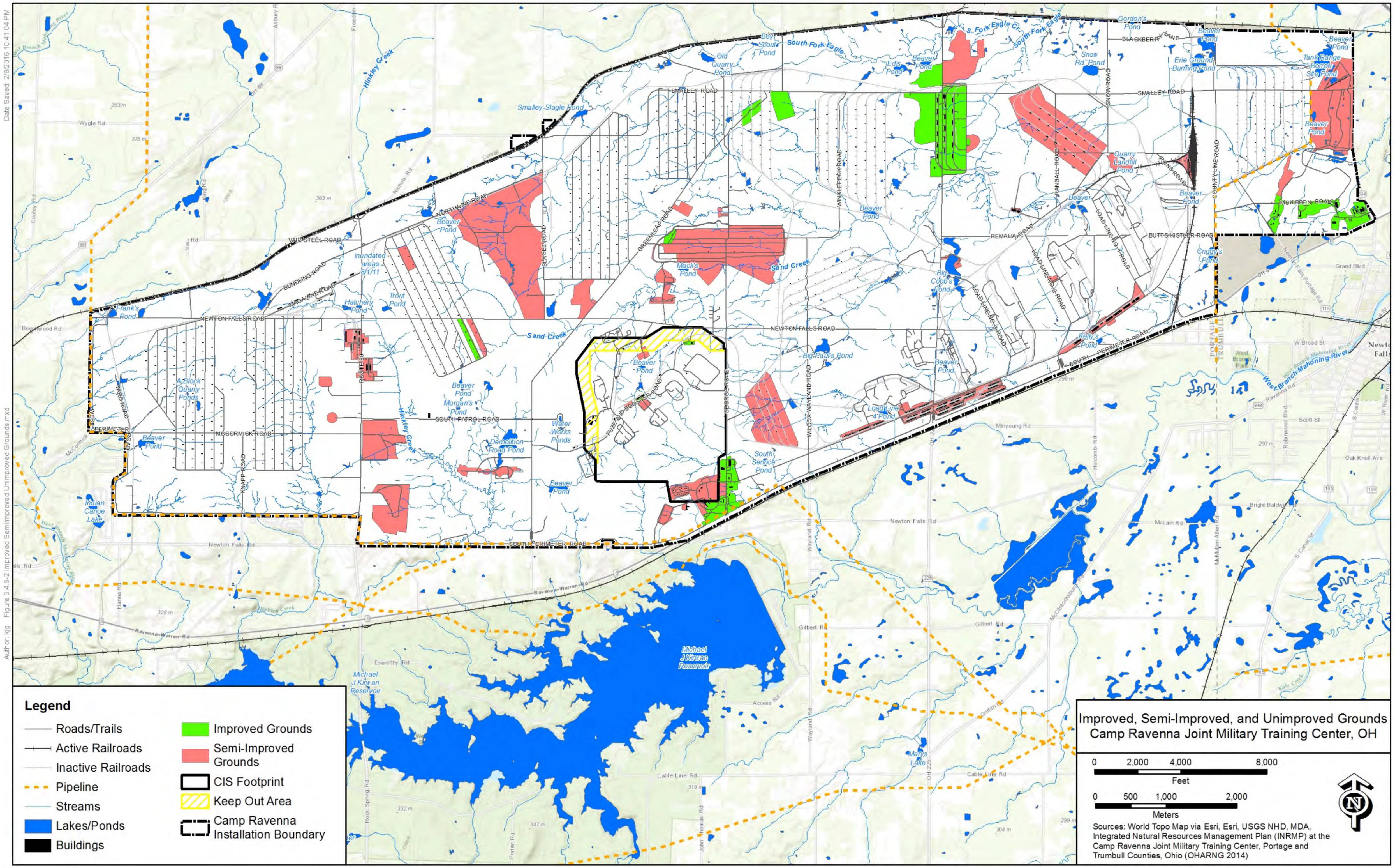


Figure 3.4.9-3 Land Use – CRJMTC

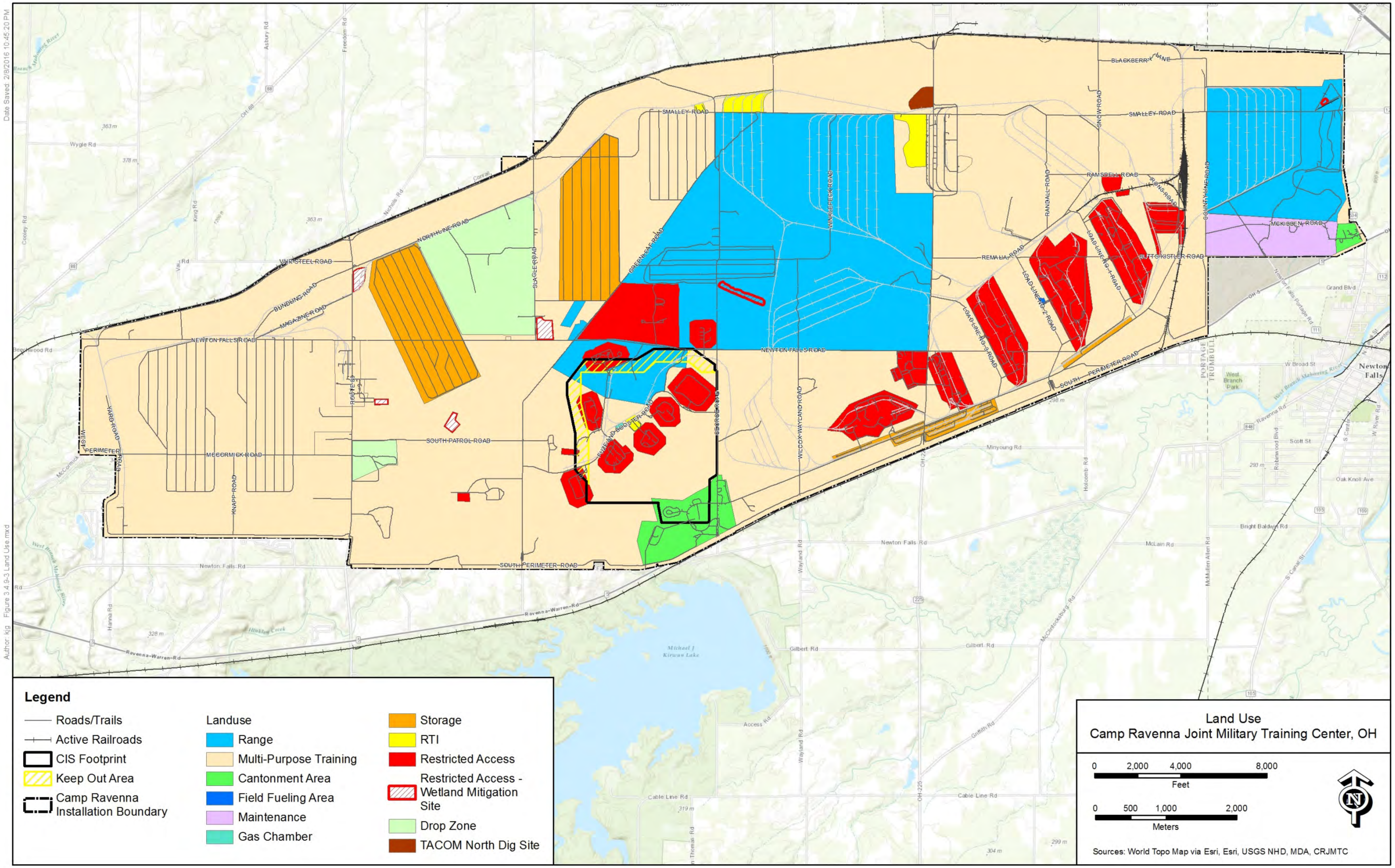


Figure 3.4.9-4 Forest Management Areas – CRJMTC

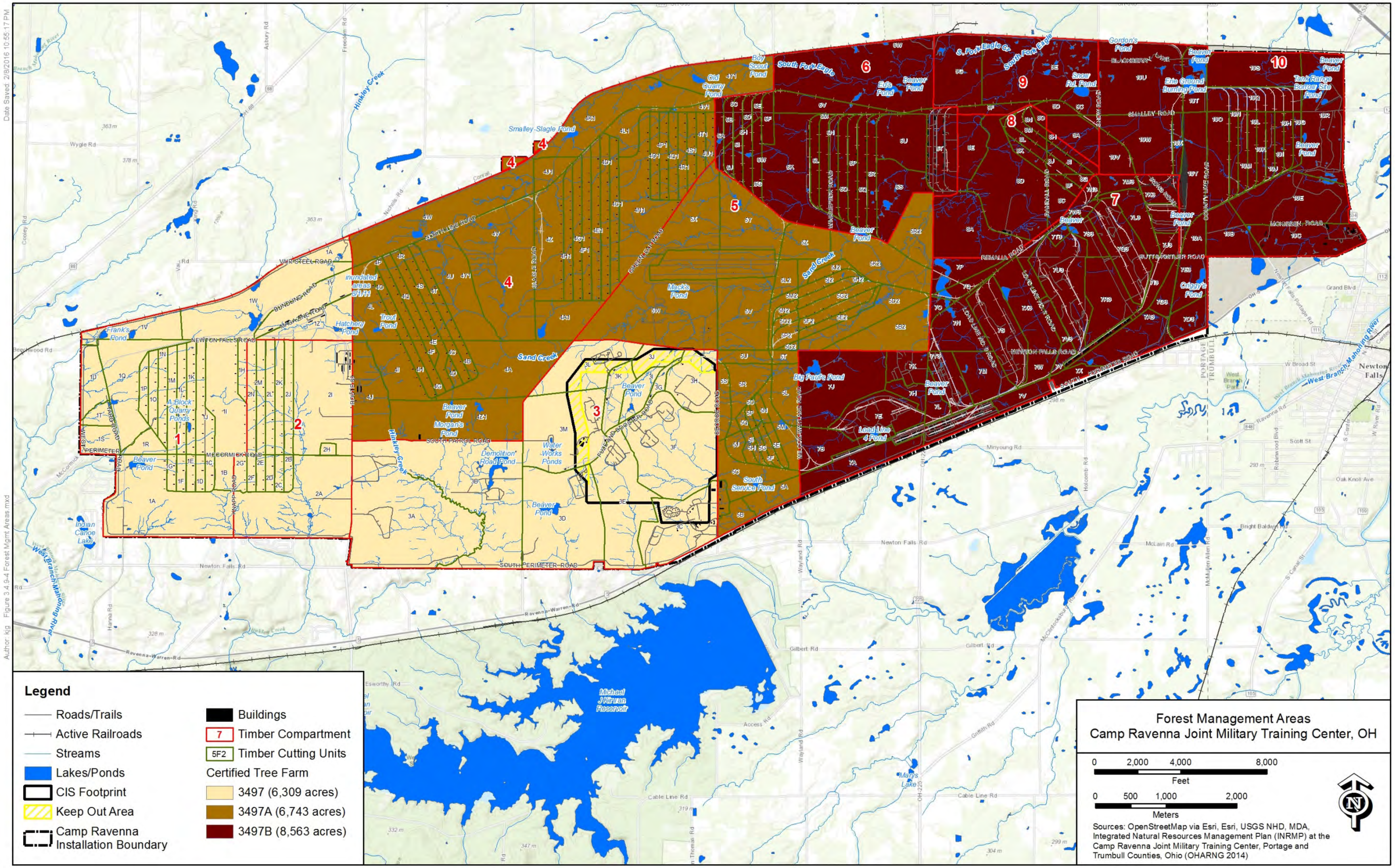


Figure 3.4.9-5 Hunting Areas – CRJMTC

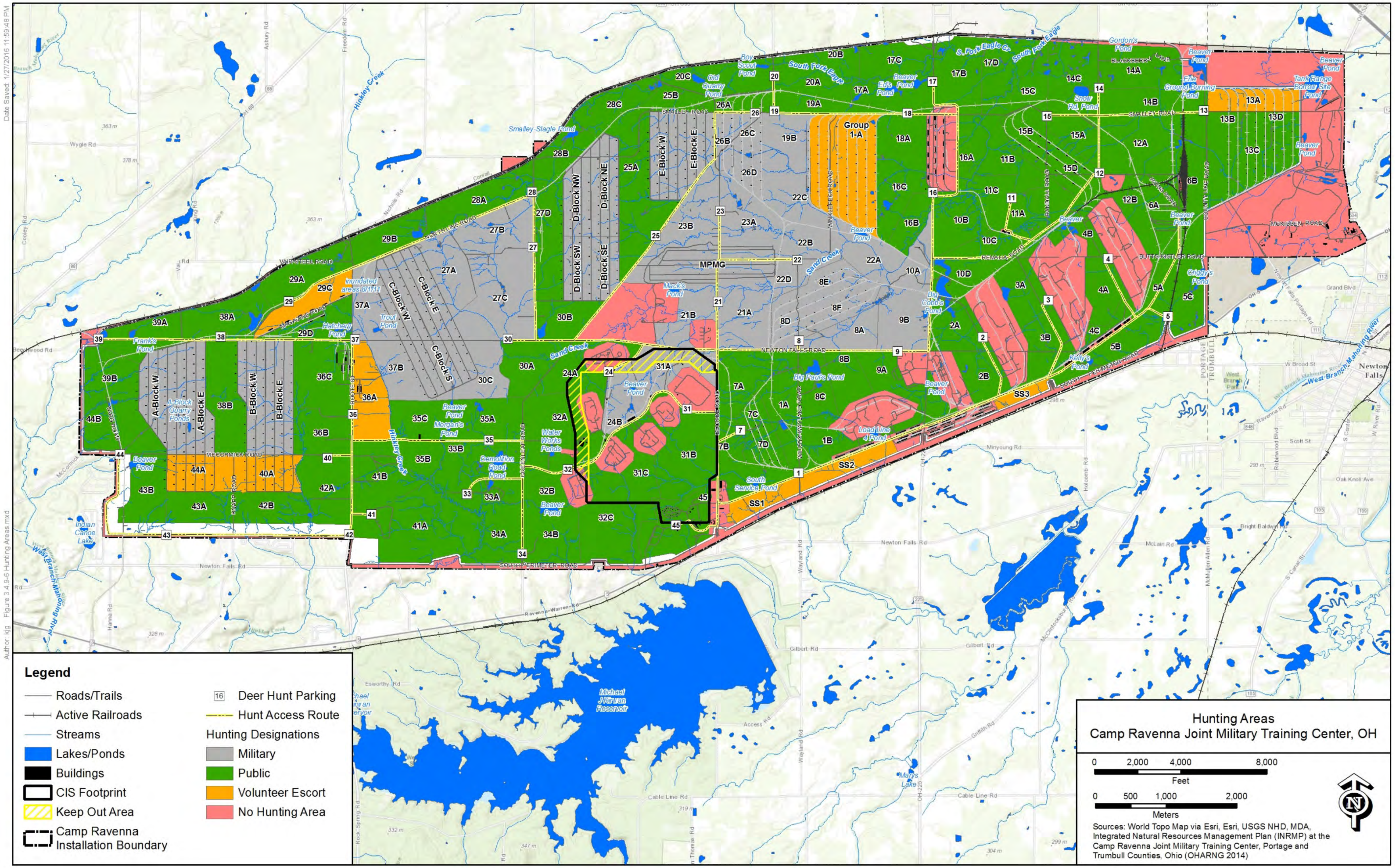


Figure 3.4.9-6 Fishing Areas – CRJMTC

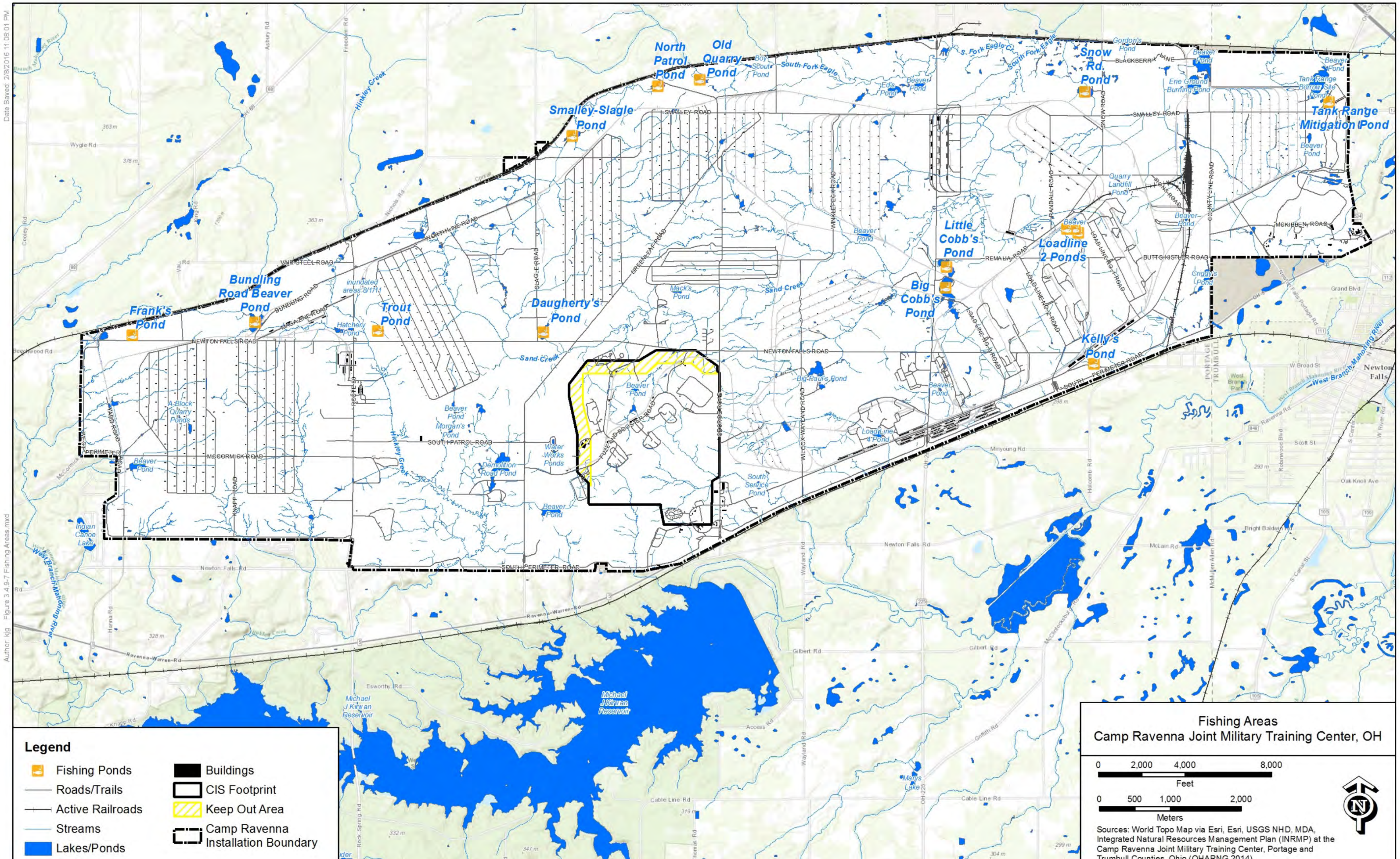


Figure 3.4.9-7 Relocated Facilities – CRJMTC

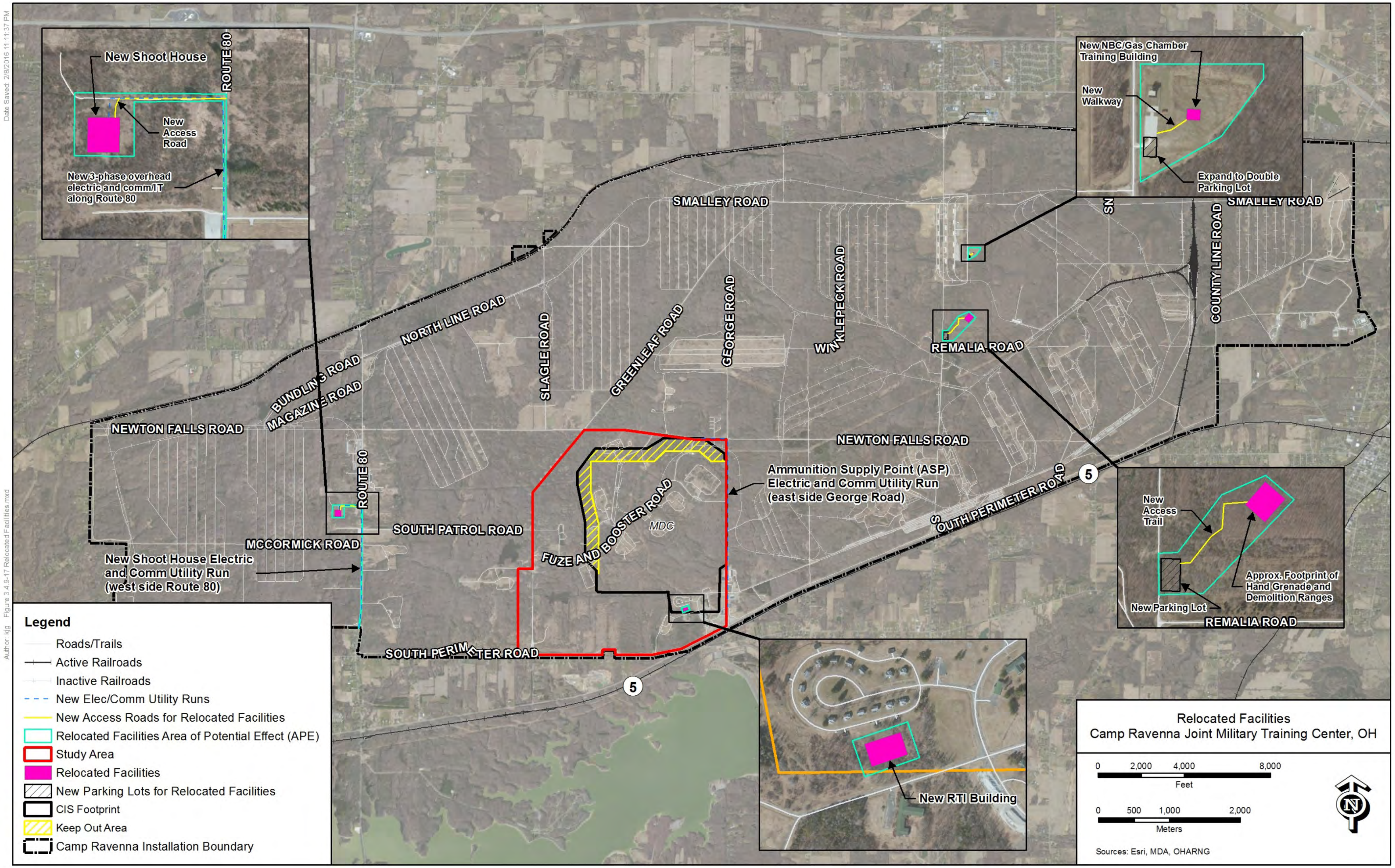
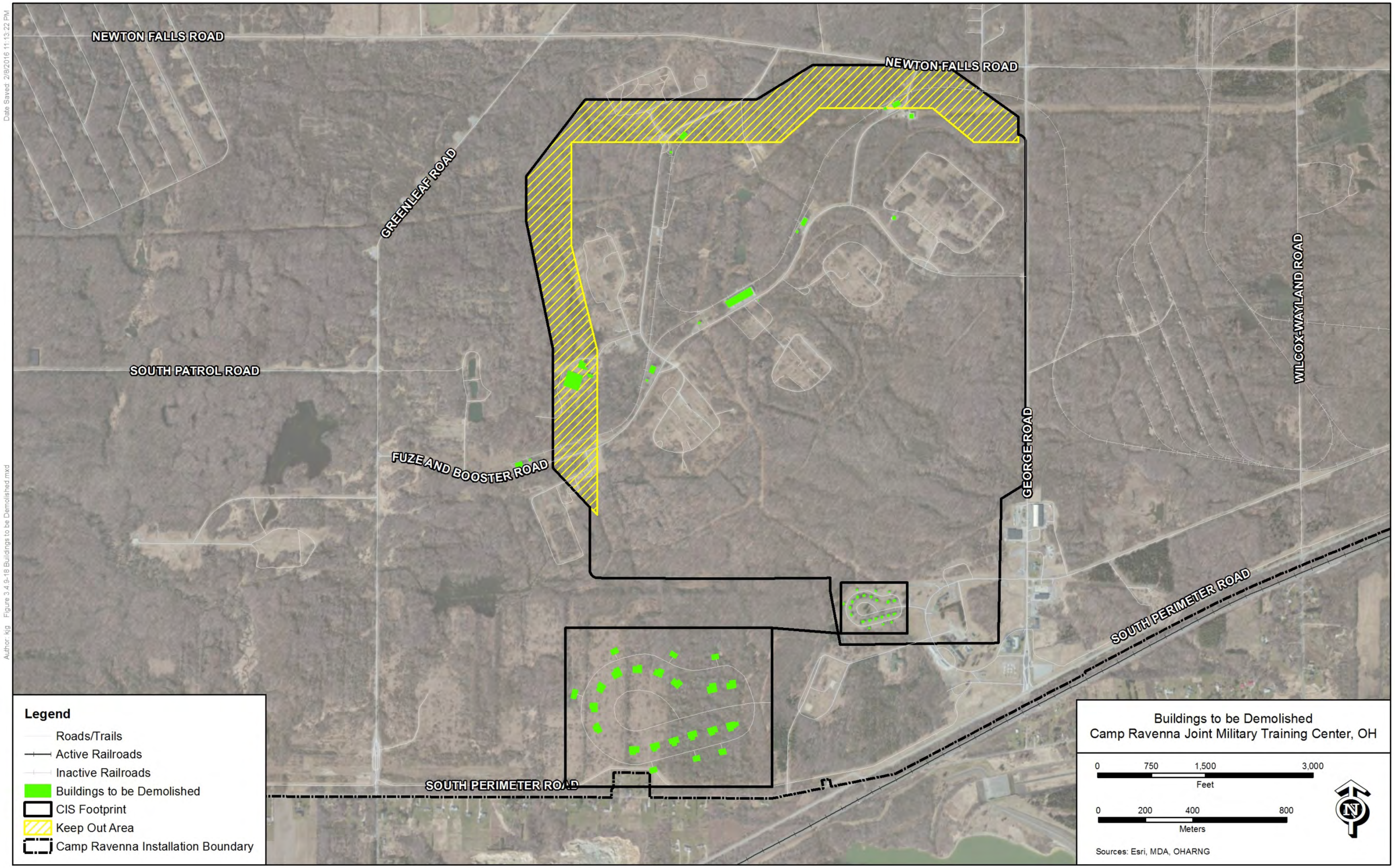


Figure 3.4.9-8 Buildings to be Demolished – CRJMTC



3.4.10 Noise – CRJMTC

3.4.10.1 Noise Regulations and Guidelines - CRJMTC

3.4.10.1.1 Local Noise Regulations

The CRJMTC installation is located in Portage County, OH, outside of the City of Ravenna, OH. The potential CIS deployment would be located in Charlestown and Paris Townships. There are no extant state or county laws, ordinances, or regulations that establish quantitative environment noise limits. Charlestown and Paris Township Zoning Resolutions prohibit noise that causes a nuisance (Charlestown Township Zoning Commission, 2010; Trustees of the Township of Paris, 2008). Otherwise, the Charlestown and Paris Township Zoning Resolutions do not include quantifiable sound level limits.

3.4.10.1.2 Federal Noise Guidelines

USEPA guidelines for environmental noise can be used for areas lacking quantifiable sound level limits. The USEPA has established a guideline limiting the L_{dn} (day-night average sound level) at noise-sensitive receptors, such as residences and schools, to 55 dBA (USEPA, 1974). The L_{dn} is based on the 1-hour L_{eq} measured over a 24-hour period with a +10 dBA penalty applied to the sound levels measured during the nighttime hours (22:00 to 07:00). The 1-hour sound levels for a 24-hour period are then logarithmically averaged to determine the L_{dn}.

The ARNG has established a policy that uses L_{dn} to assess the potential environmental noise impacts on people on- and off-post. The ARNG NEPA Handbook states that "noise-sensitive land uses, such as housing, schools, and medical facilities, are compatible with the noise environment in Zone I." The Zone I noise environment is defined as areas where the L_{dn} is < 65 dBA (ARNG, 2011). Because the ARNG policy recommends a higher sound level for Zone I compatibility, the USEPA L_{dn} recommendation of ≤ 55 dBA at noise-sensitive receptors is a more stringent guideline. Consistency with the ARNG policy could be inferred from consistency with the USEPA guideline.

3.4.10.2 Noise Introduction - CRJMTC

3.4.10.2.1 Acoustical Terminology

Environmental sound levels are quantified by a variety of parameters and metrics. In order to aid the reader, this section introduces general concepts and terminology related to acoustics and environmental noise.

3.4.10.2.2 Sound Energy Characteristics

Sound energy is physically characterized by amplitude and frequency. Sound amplitude is measured in dB as the logarithmic ratio of a sound pressure to a reference sound pressure

(20 micropascals). The reference sound pressure corresponds to the typical threshold of human hearing.

Noise is often considered unwanted sound. However, human response to noise is complex and is influenced by a variety of acoustic and non-acoustic factors. Acoustic factors generally include the sound's amplitude, duration, spectral content, and fluctuations. Non-acoustic factors typically include the listener's ability to become used to the noise, the listener's attitude towards the noise and the noise source, the listener's view of the necessity of the noise, and the predictability of the noise. As such, response to noise is highly individualized. Nonetheless, average listener reactions to changes in sound level are shown in Table 3.4.10-1.

Table 3.4.10-1 Human Reaction to Increases in Sound Pressure Level - CRJMTC

Increase in Sound Pressure Level (dB)	Human Reaction
Under 5	Unnoticed to tolerable
5 to 10	Intrusive
10 to 15	Very noticeable
15 to 20	Objectionable
Over 25	Very objectionable to intolerable
Source: Down and Stocks, 1977	

Frequency is measured in Hz, which is the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Typically, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the low and high frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, dBA. For reference, the A-weighted sound pressure levels associated with some common noise sources are shown in Table 3.4.10-2.

3.4.10.2.3 Environmental Noise Metrics

Noise in the environment is constantly fluctuating, such as when a car drives by, a dog barks, or a plane passes overhead. Several noise metrics have been developed to quantify fluctuating noise levels. These metrics include the equivalent-continuous sound level and the exceedance sound levels.

The equivalent-continuous sound level, L_{eq}, is the level of a hypothetical steady sound that has the equivalent sound energy as the actual fluctuating sound over a given time duration. For example, L_{eq} (1-hour) is the equivalent-continuous sound level measured over a 1-hour period and provides an indication of the average sound energy over the 1-hour period.

Table 3.4.10-2 Typical Sound Pressure Levels Associated with Common Noise Sources – CRJMTC

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	**Indoor**
140	Deafening	Jet aircraft at 75 ft	
130	Threshold of pain	Jet aircraft takeoff at 300 ft	
120	Threshold of feeling	Elevated train	Rock band concert
110	Extremely Loud	Jet flyover at 1000 ft	Inside propeller plane
100	Very Loud	Motorcycle at 25 ft, auto horn at 10 ft, crowd noise at football game	
90	Very Loud	Propeller plane flyover at 1000 ft, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately Loud	Diesel truck (40 mph) at 50 ft	Inside auto at high speed, garbage disposal, dishwasher
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner, electric typewriter
60	Moderate	Air-conditioner condenser at 15 ft, near highway traffic	General office
50	Quiet		Private office
40	Quiet	Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without t.v. and stereo)
20	Very Quiet	Rustling leaves	Quiet theater, whisper
10	Just audible		Human breathing
0	Threshold of hearing		
Sources: Egan, 1988; Ramsey and Sleeper, 1994.			

The exceedance sound level, L_x, is the sound level exceeded “x” percent of the sampling period and is referred to as a statistical sound level. The most common L_x values are L_{90}, L_{50}, and L_{10}. L_{90} is the sound level exceeded 90 percent of the sampling period. L_{90} is referred to as the residual sound level because it measures the background sound level without the influence of loud, transient noise sources (ANSI, 2013a). L_{50} is the sound level exceeded 50 percent of the sampling period or the median sound level. L_{10} is the sound level exceeded 10 percent of the sampling period. L_{10} is often referred to as the intrusive sound level because it measures the occasional louder noises.

3.4.10.3 Affected Environment – Noise - CRJMTC

3.4.10.3.1 Environmental Noise Survey

3.4.10.3.1.1 Survey Methodology

A CRJMTC ENS was completed in November, 2014 in order to characterize the existing acoustical conditions. The ENS was conducted in accordance with industry standard methods (ANSI, 2005; ANSI, 2011; ANSI, 2013a; ANSI, 2013b; ANSI, 2013c; ANSI, 2014a; ANSI, 2014b; ANSI, 2014c; ASTM, 2008; ISO, 2003; and ISO, 2007) and included the measurement of the L_{eq} and L_{90} sound levels. Weather conditions during the ENS were conducive to the measurement of sound levels; partly cloudy to clear conditions with low winds and no precipitation. Meteorological data from the nearby Portage County Airport (POV) weather station as well as in situ measurements of meteorological conditions are shown on Figure 3.4.10-1.

Locations of the nearest off-post noise-sensitive receptors (i.e., residences) that could be impacted by CIS construction and operation noise were identified during the ENS. NMLs were selected based on the locations of the noise-sensitive receptors. The NMLs selected during the ENS, numbered 1 through 3, are shown on Figure 3.4.10-2. Military training exercises were not being conducted at CRJMTC during the ENS period. The CRJMTC installation does not have permanent housing for personnel (e.g., barracks) and, therefore, on-post NMLs were deemed unnecessary.

Sound levels were monitored at each NML for at least 24 hours. Sound level monitors were secured and inspected periodically to ensure continuous operation, but were otherwise unmanned. Short-term sound levels were also measured at each NML for 5-minute periods during both the daytime and nighttime hours. Extant noise sources were observed and documented. A summary of sound level measurement and monitoring equipment is provided in Table 3.4.10-3. As shown, equipment was laboratory-calibrated within the 12 months of the ENS. Additionally, sound level meters were field-calibrated before and after each monitoring period and measurement series, and the change in calibration level did not exceed 0.1 dB. (A change exceeding 1.0 dB would have required measurements to be repeated.)

Table 3.4.10-3 Sound Level Measurement and Monitoring Equipment – CRJMTC

Model	Serial Number	Laboratory Calibration Date
Rion Model NL-22	01110135	15 July 2014
Rion Model NL-22	01110133	15 July 2014
Rion Model NA-27	01191119	17 July 2014
Rion Model NL-52	01232541	16 July 2014
Norsonic 1251 Acoustic Calibrator	25762	15 July 2014
Rion NC-73 Acoustic Calibrator	10527795	15 July 2014

3.4.10.3.1.2 Survey Results

NML1

NML1 was situated near the intersection of Wayland Road and Newton Falls Road in Paris Township. NML1 was chosen to be representative of the Paris Township residences that are closest to the potential CIS deployment footprint at CRJMTC. The main sources of noise observed at NML1 during the ENS were road traffic on State Highway 5 - approximately 1900 feet north of NML1 - and frequent rail traffic on the nearby CSX Transportation railroad - approximately 1600 feet north of NML1, parallel to State Highway 5. Other observed sources of noise were intermittent and included insects, birds, frogs, cars passing by on Newton Falls Road, aircraft, wind-blown trees, and barking dogs.

The sound levels measured at NML1 during the ENS are shown on Figure 3.4.10-3. The L_{dn} corresponding to the measured 1-hour L_{eq} data over a 24-hour period was 57 dBA. The median, measured 10-minute L_{90} was 42 dBA during the daytime and 30 dBA during the nighttime. The measured sound levels were typical for a residential area situated close to a highway and a busy railroad—the L_{eq} (and, thus, the L_{dn}) in such an area tends to be dominated by the passage of trains, whereas the residual L_{90} is dominated by relatively quieter, but more constant highway traffic. The L_{dn} measured at NML1 during the ENS already exceeds the ≤ 55 dBA USEPA guideline for noise-sensitive receptors, but is consistent with the < 65 dBA ARNG policy for Zone I compatibility. However, the primary sources of noise (road and rail traffic) are not related to any CRJMTC activity.

NML2

NML2 was situated at the gated entrance to the CRJMTC property at the intersection of Greenleaf Road and Newton Falls Road in Charlestown Township. NML2 was chosen because it is representative of Charlestown Township residences along Newton Falls Road that would be closest to the CIS development. Noise sources observed at NML2 during the ENS included train and highway traffic, as well as occasional birds, insects, frogs, barking dogs, passing cars, and aircraft flyovers. A faintly audible tone in the 125 Hz 1/3-octave-band was observed at NML2 during the daytime period. The tone appeared to be originating from southwest of the installation, upwind from NML2. The source of the tone could not be found, but the sound was similar to the electrical hum that is typical of electrical equipment such as transformers. The sound was not observed during the nighttime measurements. Further, because the observed direction of the source was from the southwest, it is reasonable to conclude that the sound did not originate from within the CRJMTC installation. The unknown sound is labeled in the 1/3-octave-band sound level spectrum shown on Figure 3.4.10-4, which is from a short-term (10-minute) daytime sound level measurement at NML2.

The sound levels measured at NML2 during the ENS are shown on Figure 3.4.10-5. The L_{dn} corresponding to the measured 1-hour L_{eq} data over a 24-hour period was 54 dBA. The median, measured 10-minute L_{90} was 40 dBA during the daytime and 32 dBA during the nighttime. The measured sound levels were typical for a quiet residential area. The L_{dn} measured at NML2 during the ENS is consistent with the ≤ 55 dBA USEPA guideline for noise-sensitive receptors and with the < 65 dBA ARNG policy for Zone I compatibility. The primary sources of noise are not related to any CRJMTC activity.

NML3

NML3 was situated at the southwest corner of the CRJMTC installation at the fence line along Garrett Road. Noise sources observed at NML3 during the ENS included rail and highway traffic, residential heating, ventilation, and air conditioning equipment, as well as occasional frogs, birds, insects, passing cars, aircraft flyovers, and wind-blown trees and vegetation. NML3 was selected to establish the existing acoustical environment at the closest residences to the west of the CRJMTC Site footprint shown on Figure 3.4.10-2.

The sound levels measured at NML3 during the ENS are shown on Figure 3.4.10-6. The L_{dn} corresponding to the measured 1-hour Leq data over a 24-hour period was 53 dBA. The median, measured 10-minute L_{90} was 42 dBA during the daytime and 37 dBA during the nighttime. The measured sound levels were typical for a quiet residential area. The L_{dn} measured at NML3 during the ENS is consistent with the ≤ 55 dBA USEPA guideline for noise-sensitive receptors and with the < 65 dBA ARNG policy for Zone I compatibility. The primary sources of noise are not related to any CRJMTC activity.

Table 3.4.10-4 summarizes the existing conditions at CRJMTC NMLs, as measured during the ENS, as well as the guidelines and regulations that would be used to assess potential environmental impacts.

Table 3.4.10-4 Summary of Ambient Sound Level Environmental Noise Survey Results and Continental United States Interceptor Site Sound Level Design Criteria – CRJMTC

Location	Measured Sound Level	Applicable Regulation / Guideline	Notes
NML1	L_{dn}: 57 dBA	USEPA: L_{dn} ≤ 55 dBA	(1)
NML1	Median L_{90}: 42 dBA (Daytime)	Assess potential increase to L_{90}	(1)
NML1	Median L_{90}: 30 dBA (Nighttime)	Assess potential increase to L_{90}	(1)
NML2	L_{dn}: 54 dBA	USEPA: L_{dn} ≤ 55 dBA	(2)
NML2	Median L_{90}: 40 dBA (Daytime)	Assess potential increase to L_{90}	(1)
NML2	Median L_{90}: 32 dBA (Nighttime)	Assess potential increase to L_{90}	(1)
NML3	L_{dn}: 53 dBA	USEPA: L_{dn} ≤ 55 dBA	(2)
NML3	Median L_{90}: 42 dBA (Daytime)	Assess potential increase to L_{90}	(1)
NML3	Median L_{90}: 37 dBA (Nighttime)	Assess potential increase to L_{90}	(1)

Notes:
1. Addition of CIS noise contribution should minimize cumulative impact at residences near NML.
2. The addition of CIS noise contribution should result in a cumulative L_{dn} that is consistent with the USEPA guideline.

3.4.10.4 Environmental Consequences and Mitigation

3.4.10.4.1 Noise Impact Assessment Guidelines

Potential cumulative environmental noise impacts at all locations, regardless of jurisdiction, are evaluated by determining the potential changes to the ambient, or residual, sound level. The residual sound level is quantified by the L_{90} exceedance level (ASTM, 2002). Potential changes in L_{90} sound level resulting from CIS construction and operation are compared to the guideline criteria shown in Table 3.4.10-1 to determine the potential reaction of neighbors.

3.4.10.4.2 Construction - Baseline Schedule

Environmental noise impacts associated with the baseline construction schedule discussed in Section 2.5.1 were evaluated.

3.4.10.4.2.1 Calculation Basis

Major CIS construction phases would consist of mobilization, site preparation, and individual facility construction. The individual facility construction for the potential CIS deployment would include foundation construction, building erection, and site clean-up/start-up.

Noise emissions would vary with each phase of construction depending on the specific construction activity, the location of the activity on the CIS, and the associated construction equipment required for each phase or activity. Accurately predicting the actual sound levels at off-post receptors resulting from construction activities is difficult due to the mobility and time-varying usage of construction equipment. Nonetheless, the variable nature of construction noise could be represented by an “average” sound level, which is determined in accordance with methodologies outlined by the USEPA and other construction noise resources (USEPA, 1971; BBN, 1977). The “average” construction sound levels account for the type and quantity of equipment, the expected usage of each piece of equipment over a typical 8 to 12-hour shift, and the typical sound levels of the equipment used during each phase of construction. A list of construction equipment that would be anticipated to be used for potential CIS construction is provided in Table 3.4.10-5. The typical sound level at a reference distance of 50 feet from each piece of equipment is also provided. Estimated quantities of each piece of equipment and the estimated usage percentages were provided for the mobilization, site preparation, and facility construction phases. Note that Table 3.4.10-5 provides all the equipment that could be used over the entire CIS construction period; actual type and quantity of equipment components in individual CIS construction areas would depend on the specific construction activity.

Table 3.4.10-5 Combined List of Continental United States Interceptor Site Construction Equipment for All Phases - CRJMTC

Construction Equipment	Typical sound level at 50 ft	Construction Equipment	Typical sound level at 50 ft
Air Compressor	76 dBA	Grader	77 dBA
Asphalt Paver	89 dBA	Grinder	79 dBA
Auger, Large (18') Excavator Mounted	85 dBA	Impact Wrench	85 dBA
Bobcat	84 dBA	Light Set (with Generator)	71 dBA
Bush Hammer	75 dBA	Man Lift	71 dBA
Chain Saw	85 dBA	Mobile Crane	80 dBA
Chop Saw	66 dBA	Pile Driver - Impact	101 dBA
Sheepsfoot Compactor	79 dBA	Rock Hammer	75 dBA
Concrete Pumper Truck	74 dBA	Rock Crusher	88 dBA
Concrete Saw	88 dBA	Roller	79 dBA
Concrete Truck	85 dBA	Scraper/Pan	88 dBA
Concrete Vibrator	68 dBA	Sump Pump	76 dBA
Crawler Excavator	86 dBA	Threading Machine	85 dBA
Diesel Generator	71 dBA	Torque Wrench	88 dBA
Dozer	77 dBA	Truck with Trailer	81 dBA
Drill	83 dBA	Troweling Machine	81 dBA
Dump Truck	81 dBA	Truck	81 dBA
Forklift	76 dBA	Vibratory Tamper	78 dBA
Front End Loader	77 dBA	Welder	81 dBA

3.4.10.4.2.2 Environmental Consequences

The potential worst-case "average" sound levels in nearby residential areas are determined using the aforementioned methods (USEPA, 1971; BBN, 1977). Distances from construction areas to the nearest noise-sensitive receptors (i.e., residences) shown on Figure 3.4.10-7 were determined. The nearest noise-sensitive receptors are generally consistent with the NMLs from the ENS, but are the actual locations of, e.g., residential buildings determined based on examining available aerial imagery. Table 3.4.10-6 provides the distance from each receptor on Figure 3.4.10-7, "R1" through "R4," to the closest CIS footprint boundary. The range of worst-case "average" construction sound levels was determined based on these distances. Note that this is a very conservative estimate because it assumes that all construction equipment is collocated at a single point on the closest CIS footprint boundary, and it assumes attenuation only from the geometrical spreading of sound, i.e., sound attenuation over distance. Other attenuation factors such as ground and atmospheric absorption, and shielding from local terrain are not considered.

The results in Table 3.4.10-6 are used to evaluate potential worst-case construction noise impacts by comparing the worst-case "average" sound level at a receptor to the median measured ambient daytime L_{90} sound level. The worst-case "average" construction sound level is then combined with the median daytime ambient sound level and the potential worst-case increase to the ambient sound level is determined. Finally, a potential reaction to the change in sound level is provided based on the guideline criteria in Table 3.4.10-1. Based on the results in Table 3.4.10-6, there could be times when construction noise is potentially intrusive or even objectionable at the closest residences represented by R1 and R2 on Figure 3.4.10-7. However, it should be noted that the estimated sound levels in Table 3.4.10-6 are conservative and that any impacts, while potentially tolerable to objectionable, would be temporary.

Table 3.4.10-6 Continental United States Interceptor Site Construction Noise Calculation Results - Baseline Schedule – CJRMTC

	Nearest Noise-sensitive Receptor (1)			
	R1	**R2**	**R3**	**R4**
Estimated distance to nearest construction area	1400 ft	3800 ft	3.9 miles	1.9 miles
Worst-case "average" construction sound levels (2)	44 to 60 dBA	39 to 50 dBA	26 to 36 dBA	32 to 43 dBA
Median measured daytime ambient (L_{90}) sound level (3)	42 dBA	40 dBA	42 dBA	40 dBA
Worst-case sound levels during construction	46 to 60 dBA	43 to 50 dBA	42 to 43 dBA	41 to 45 dBA
Potential worst-case sound level increase	4 to 18 dBA	3 to 10 dBA	0 to 1 dBA	1 to 5 dBA
Potential reaction from nearest noise-sensitive neighbors (4)	Tolerable to Objectionable	Tolerable to Intrusive	Unnoticed	Unnoticed to Tolerable

Notes:
1. See Figure 3.4.10-7.
2. Based on USEPA 1971 and BBN 1977.
3. Based on Table 3.4.10-4.
4. Based on Table 3.4.10-1.

3.4.10.4.2.3 Mitigation

Implementation of BMPs would adequately address construction noise so that mitigation measures would not be required. Construction noise BMPs would consist of the following:

- Where possible, select vibratory pile-driving in lieu of impact pile-driving because the former is typically roughly 10 dBA quieter than the latter.

- Outfit diesel engines with engine exhaust mufflers, as recommended by the manufacturers.
- Ensure noise control equipment, such as engine mufflers, are maintained and inspected regularly to ensure it is functioning properly.

Implement provisions, in accordance with guidelines, that would limit noisier construction periods, whenever practical, especially during the nighttime hours

3.4.10.4.3 Construction – Expedited Schedule

3.4.10.4.3.1 Environmental Consequences

Environmental noise impacts associated with the expedited deployment schedule discussed in Section 2.5.1 were also evaluated. Although the worst-case “average” construction sound levels associated with the expedited schedule would be identical to the baseline schedule potential 24/7 construction activities could result in additional nighttime acoustical impacts. Calculated nighttime acoustical impacts at the nearby noise sensitive receptors are detailed in Table 3.2.10-7.

3.4.10.4.3.2 Mitigation

In addition to efforts described for the baseline construction schedule, noisier construction activities could be limited to the daytime hours as much as possible.

Table 3.4.10-7 Continental United States Interceptor Site Construction Noise Calculation Results - Expedited Schedule – CJRMTC

	Nearest Noise-sensitive Receptor (1)			
	R1	**R2**	**R3**	**R4**
Estimated distance to nearest construction area	1400 ft	3800 ft	3.9 mi	1.9 mi
Worst-case “average” construction sound levels (2)	44 to 60 dBA	39 to 50 dBA	26 to 36 dBA	32 to 43 dBA
Median measured nighttime ambient (L_{90}) sound level (3)	30 dBA	32 dBA	37 dBA	32 dBA
Worst-case sound levels during construction	46 to 60 dBA	43 to 50 dBA	42 to 43 dBA	41 to 45 dBA
Potential worst-case sound level increase	16 to 30 dBA	11 to 18 dBA	6 to 7 dBA	10 to 13 dBA
Potential reaction from nearest noise-sensitive neighbors (4)	Objectionable to very objectionable/ intolerable	Very noticeable to objectionable	Intrusive	Very noticeable

Notes: 1. See Figure 3.4.10-7.
2. Based on USEPA 1971 and BBN 1977.
3. Based on Table 3.4.10-4.
4. Based on Table 3.4.10-1.

3.4.10.4.4 Operations

The results in herein conservatively assume continuous (24-hour) operation of the CIS backup power plant and a power plant location that is centrally located in the CIS footprint shown on Figure 3.4.10-7 (Note: Power plant operation would normally be intermittent and limited to testing periods and during power outages.).

3.4.10.4.4.1 Calculation Basis

The primary permanent CIS noise sources from potential CIS deployment at CRJMTC would be associated with the power plant, which would consist of as many as four 3-MW diesel engine-generators inside the backup power plant building although four generators could operate for short durations (5 to 10 minutes). This analysis uses the worst case short duration situation. The most substantial noise sources for the power plant would include the engine-generator exhausts, the air intakes, and the engine-generator operation. The engine-generator exhausts would be ducted to the outside of the building via an exhaust stack, and would be furnished with standard acoustical silencers ("mufflers") to reduce their environmental noise contribution.

The engine-generators are typically cooled via forced air from large AHUs having air intakes on the outside of the building. There is typically one AHU for each engine-generator. The AHU air intakes are typically outfitted with hoods and standard louvers and/or bird screens.

Typical equipment sound levels for power plant noise sources are as follows:

- Engine-generator exhaust stack exits: Sound power level of 100 to 105 dBA, including effects of silencers.
- AHU air intakes: Sound power level of 90 to 95 dBA.
- Engine-generator room noise leaking out through AHU air intakes: Interior sound pressure level of approximately 120 to 125 dBA (combined sound level from multiple operating engine-generators and AHUs).

In addition to the power plant, the MEBs could also radiate some noise from indoor or outdoor equipment, such as compressors, pumps, blowers, ventilation units, and/or transformers. Noise from indoor sources would be reduced considerably by the building walls and roof. Outdoor sources, such as small transformers and air conditioning units, would not be major environmental noise contributors due to their small size.

3.4.10.4.4.2 Environmental Consequences

The potential environmental sound levels at the nearest noise-sensitive receptors resulting from the operation of the potential CIS sources were estimated using standardized calculation methodology (ISO, 1993; ISO, 1996). The standard methodology accounts for source sound power, directivity, and height, and for acoustical shielding from local terrain and CIS buildings and structures. Ground inside CIS footprint is assumed to be acoustically reflective (e.g., packed dirt or pavement). Ground outside the CIS footprint is assumed to be acoustically non-reflective (e.g., loose dirt, grass, or foliage). Only potential CIS sources of sound are included in the calculations; other sources of sound such as background sound (e.g., traffic) are not included. Meteorological conditions are conservatively assumed to be downwind from source to receptor with a moderate temperature inversion, which bends sound propagating through the atmosphere back toward the ground.

The estimated CIS sound levels are summarized in Table 3.4.10-8 and Table 3.4.10-9 for the four nearest noise-sensitive receptors (residences), labeled "R1" through "R4" on Figure 3.4.10-7. Table 3.4.10-8 provides the calculated future L_{dn} for R1 through R4 considering continuous, 24-hour power plant operation. The L_{dn} at R1, R2, R3, and R4 is not expected to change, even during continuous power plant operation.

Table 3.4.10-8 Summary of Predicted Continental United States Interceptor Site Sound Levels and Predicted Future L_{dn} Sound Levels - Operation – CJRMTC

Location	Predicted CIS Sound Level	Existing L_{dn}	Predicted Future L_{dn} Including CIS	Potential Increase	Consistent with USEPA Guidelines?
R1	37 dBA	57 dBA (1)	57 dBA	0 dBA	Yes (2)
R2	34 dBA	54 dBA (3)	54 dBA	0 dBA	Yes
R3	< 20 dBA	53 dBA (4)	53 dBA	0 dBA	Yes
R4	21 dBA	54 dBA (3)	54 dBA	0 dBA	Yes

Notes:
1. Based on L_{dn} measured at NML1; see Table 3.4.10-2.
2. Existing L_{dn} exceeds USEPA guideline; CIS contribution would not increase existing L_{dn}.
3. Based on L_{dn} measured at NML2; see Table 3.4.10-2.
4. Based on L_{dn} measured at NML3; see Table 3.4.10-2.

The potential increases in ambient sound level (L_{90}) and the expected reactions to the increases are summarized in Table 3.4.10-9. During continuous 24-hour power plant operation, R1 would experience an increase to the ambient sound level that could be perceived as "intrusive" during nighttime hours. However, continuous nighttime operation of the power plant would be infrequent.

Table 3.4.10-9 Summary of Predicted Continental United States Interceptor Site Sound Levels and Potential Reactions at Residential Receptors - Operation – CJRMTC

Location	Predicted CIS Sound Level	Period	Existing Ambient Sound Level (L_{90})	CIS + Existing Ambient Sound Level	Potential Increase	Potential Reaction (1)
R1	37 dBA	Daytime	42 dBA (2)	43 dBA	1 dBA	Unnoticed
R1	37 dBA	Nighttime	30 dBA (2)	37 dBA	7 dBA	Intrusive
R2	34 dBA	Daytime	40 dBA (3)	41 dBA	1 dBA	Unnoticed
R2	34 dBA	Nighttime	32 dBA (3)	36 dBA	4 dBA	Tolerable
R3	< 20 dBA	Daytime	42 dBA (4)	42 dBA	0 dBA	Unnoticed
R3	< 20 dBA	Nighttime	37 dBA (4)	37 dBA	0 dBA	Unnoticed
R4	21 dBA	Daytime	40 dBA (3)	40 dBA	0 dBA	Unnoticed
R4	21 dBA	Nighttime	32 dBA (3)	32 dBA	0 dBA	Unnoticed

Notes:
1. Based on Table 3.4.10-1.
2. Based on median L90 measured at NML1; see Table 3.4.10-2.
3. Based on median L90 measured at NML2; see Table 3.4.10-2.
4. Based on median L90 measured at NML3; see Table 3.4.10-2.

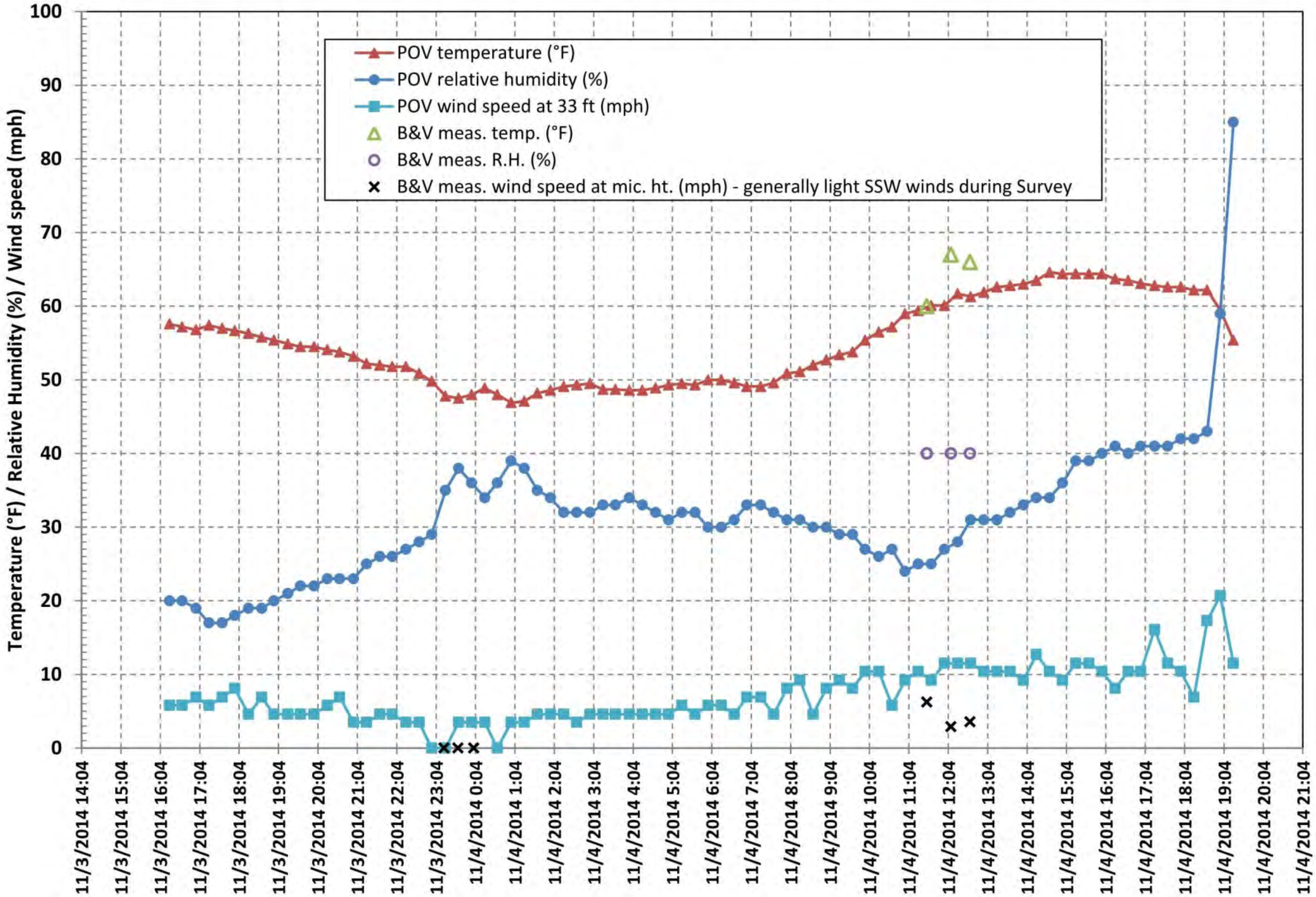
3.4.10.4.4.3 Mitigation

The overall environmental noise impact from the CIS operation would be negligible for the surrounding residential area. BMPs commonly used to reduce noise impacts during operations would include the following:

- Standard noise control equipment for continuous 24-hour operation of the CIS backup power plant equipment.
- Silencers for engine exhausts.
- Acoustical louvers and/or silencers, as needed, for AHU air intakes.
- Standard noise control equipment for outdoor equipment packages, as needed.

Because negligible noise impacts would occur from operations and implementation of BMPs could further address impacts from noise, no mitigation measures would be required.

Figure 3.4.10-1 Meteorological Data for Environmental Noise Survey Period - CRJMTC



Source: Hourly data from POV airport meteorological station accessed 4 December 2014 via http://www.wunderground.com.

Figure 3.4.10-2 Noise Monitoring Locations - CRJMTC

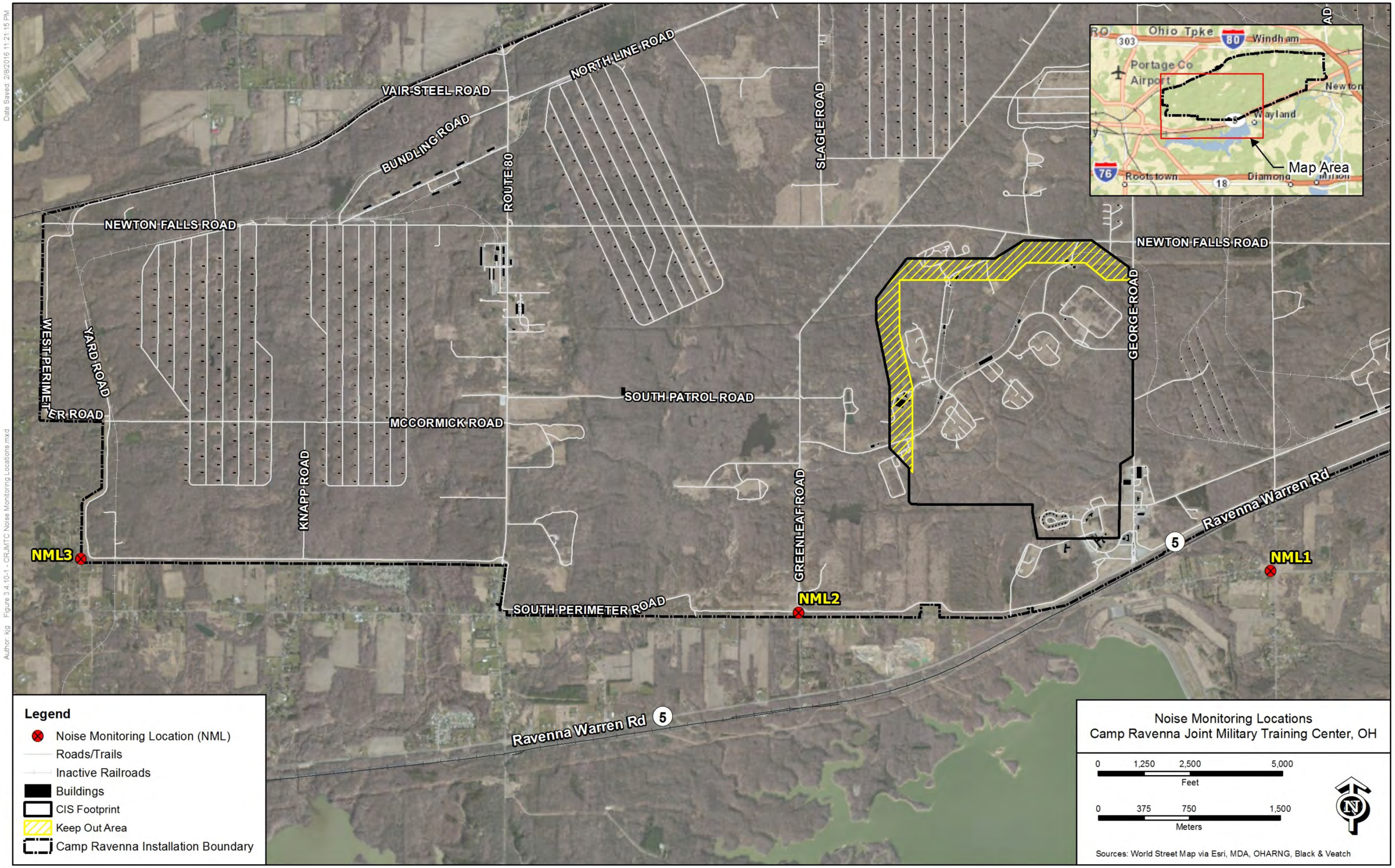


Figure 3.4.10-3 Measured Ambient Sound Levels at Noise Measurement Location 1 - CRJMTC

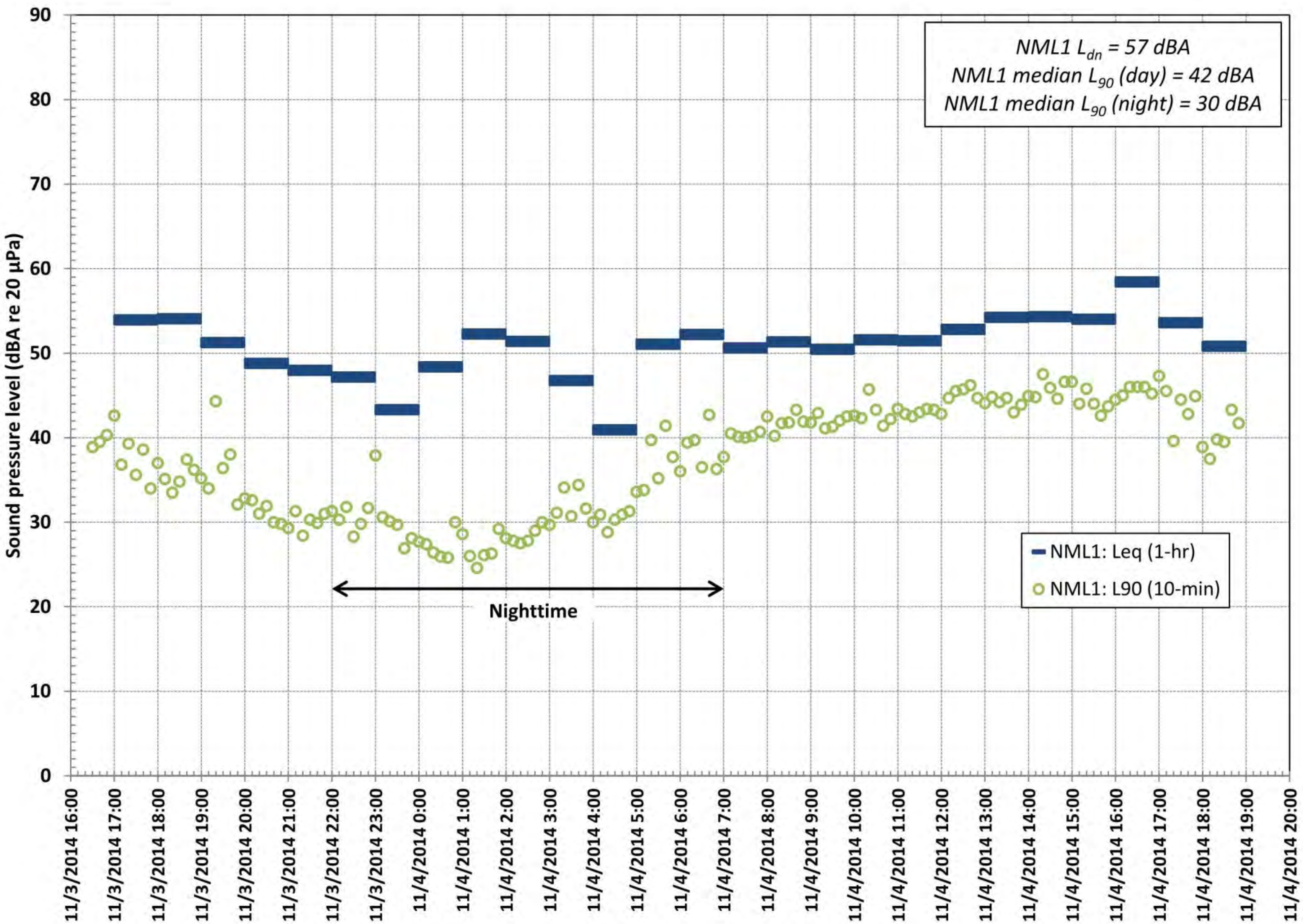


Figure 3.4.10-4 Measured Sound Levels at Noise Measurement Location 2 - CRJMTC Showing Unidentified (Non-CRJMTC) Tonal Source

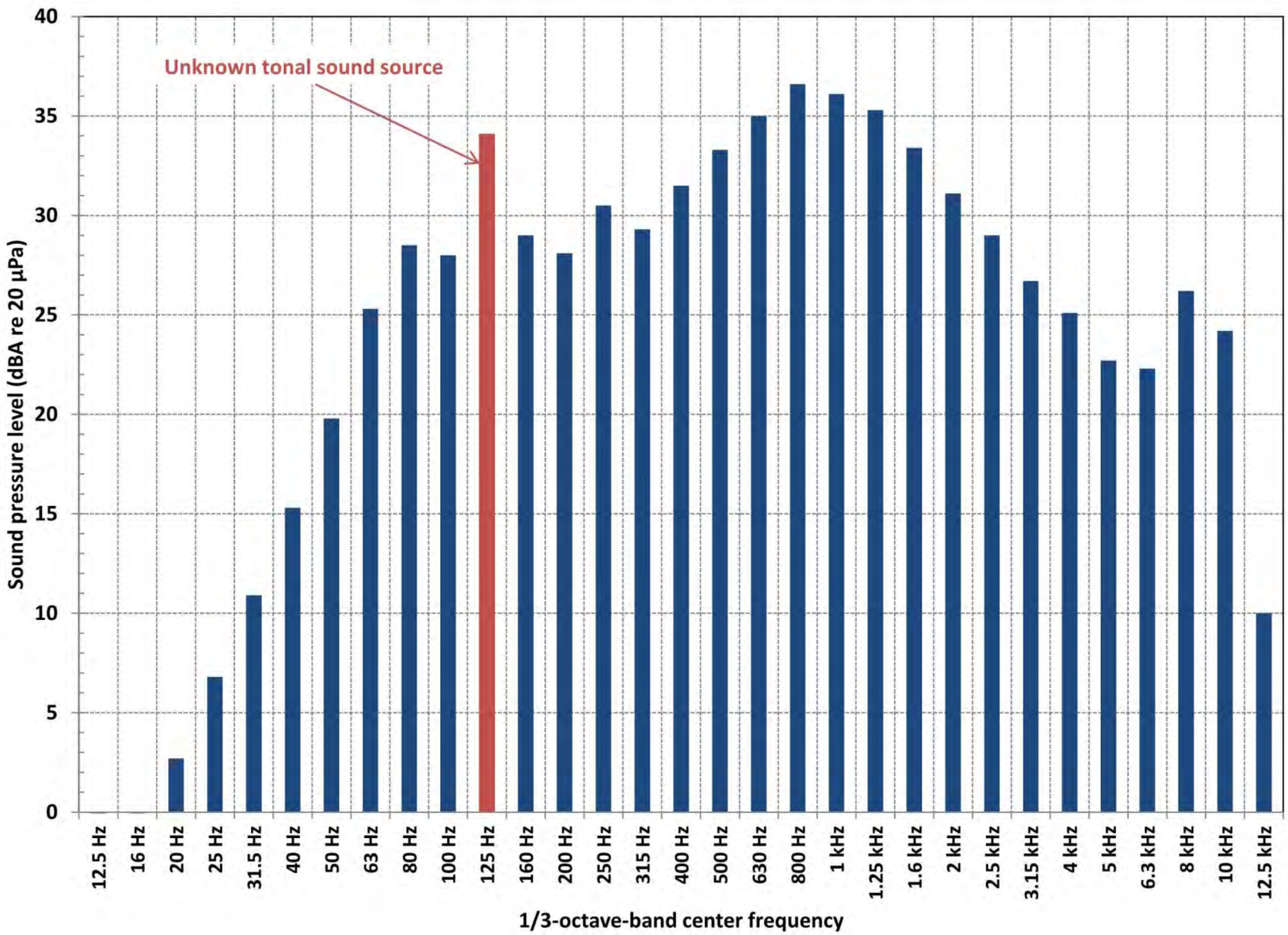


Figure 3.4.10-5 Measured Sound Levels at Noise Measurement Location 2 - CRJMTC

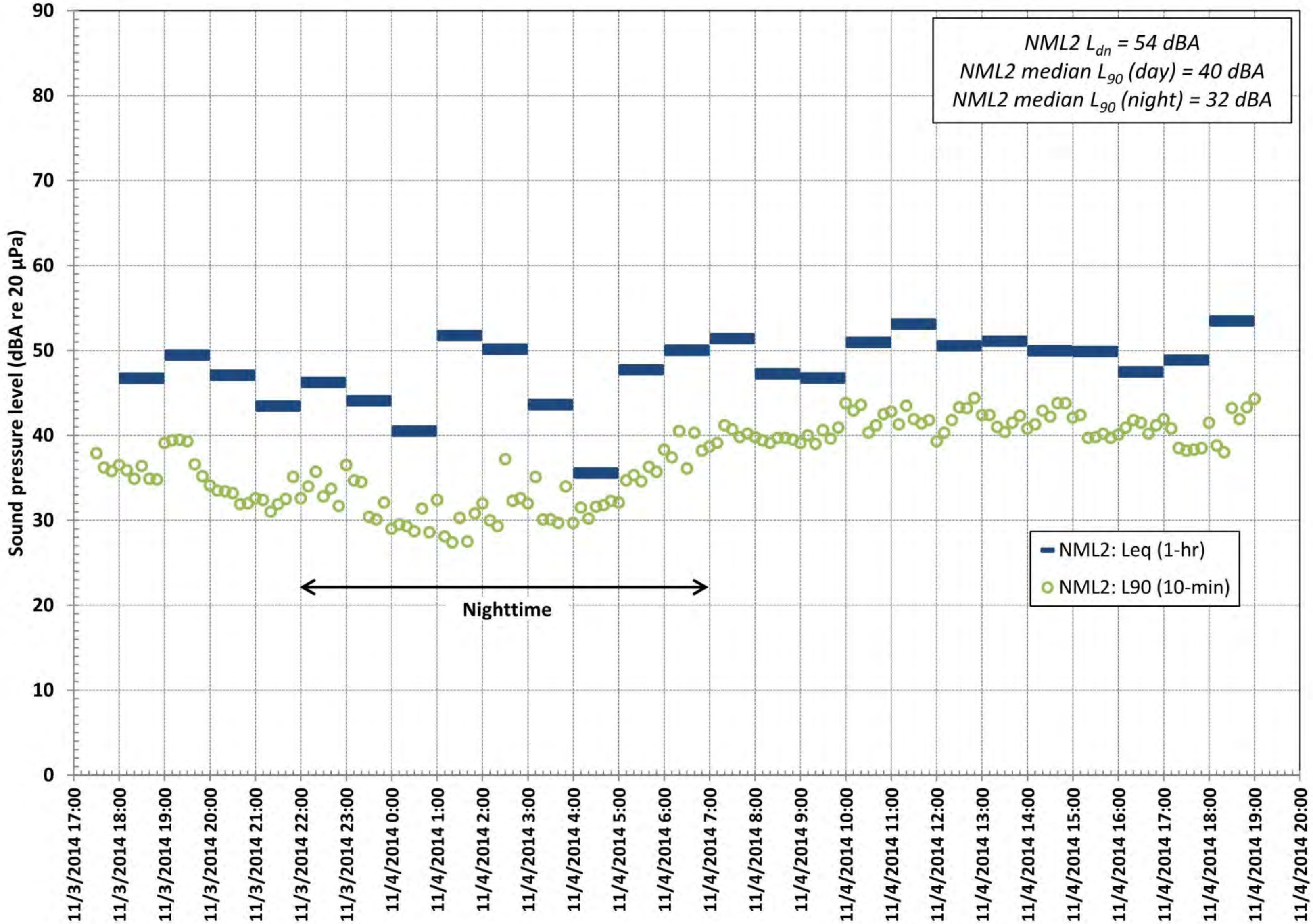


Figure 3.4.10-6 Measured Sound Levels at Noise Measurement Location 3 - CRJMTC

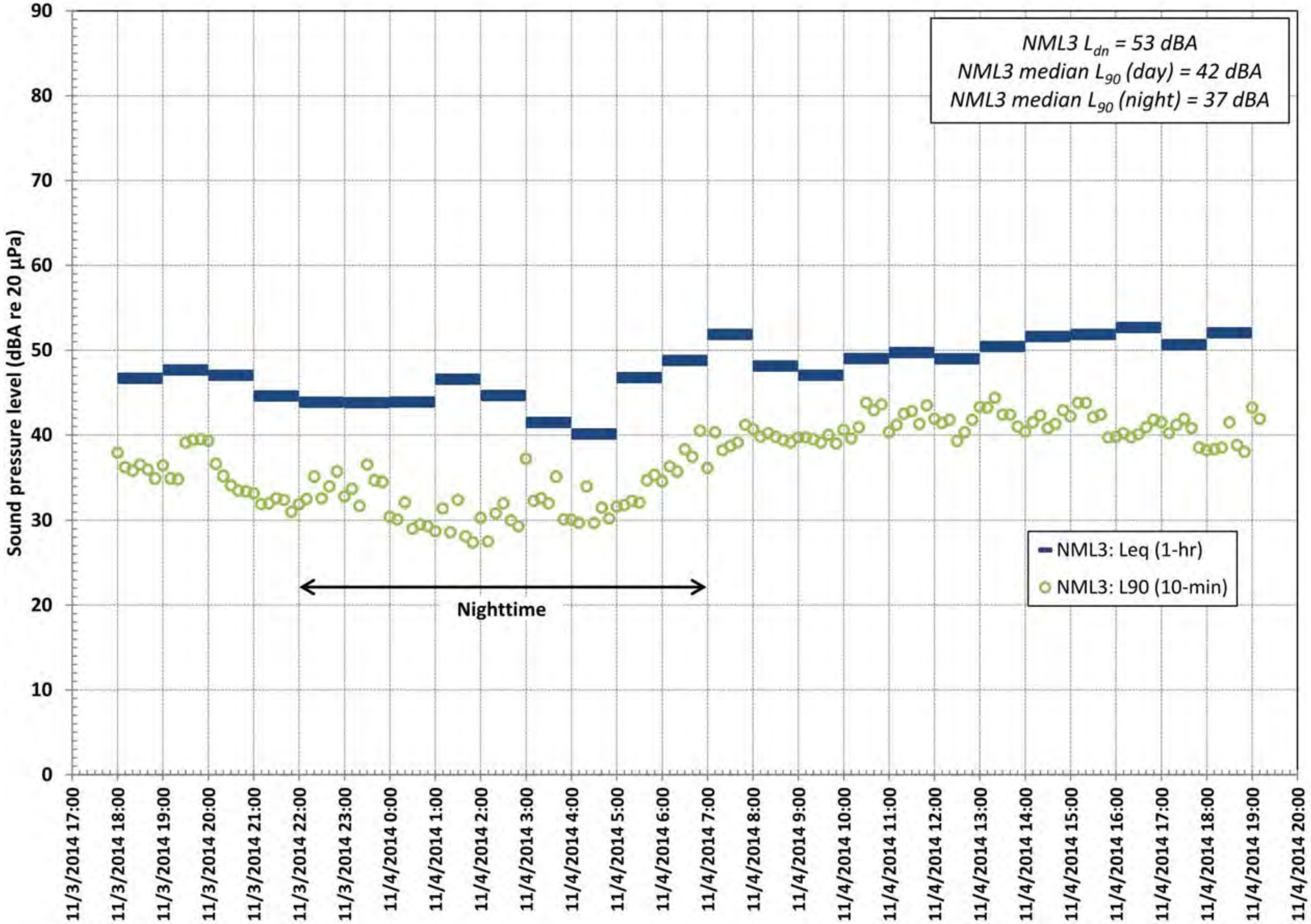
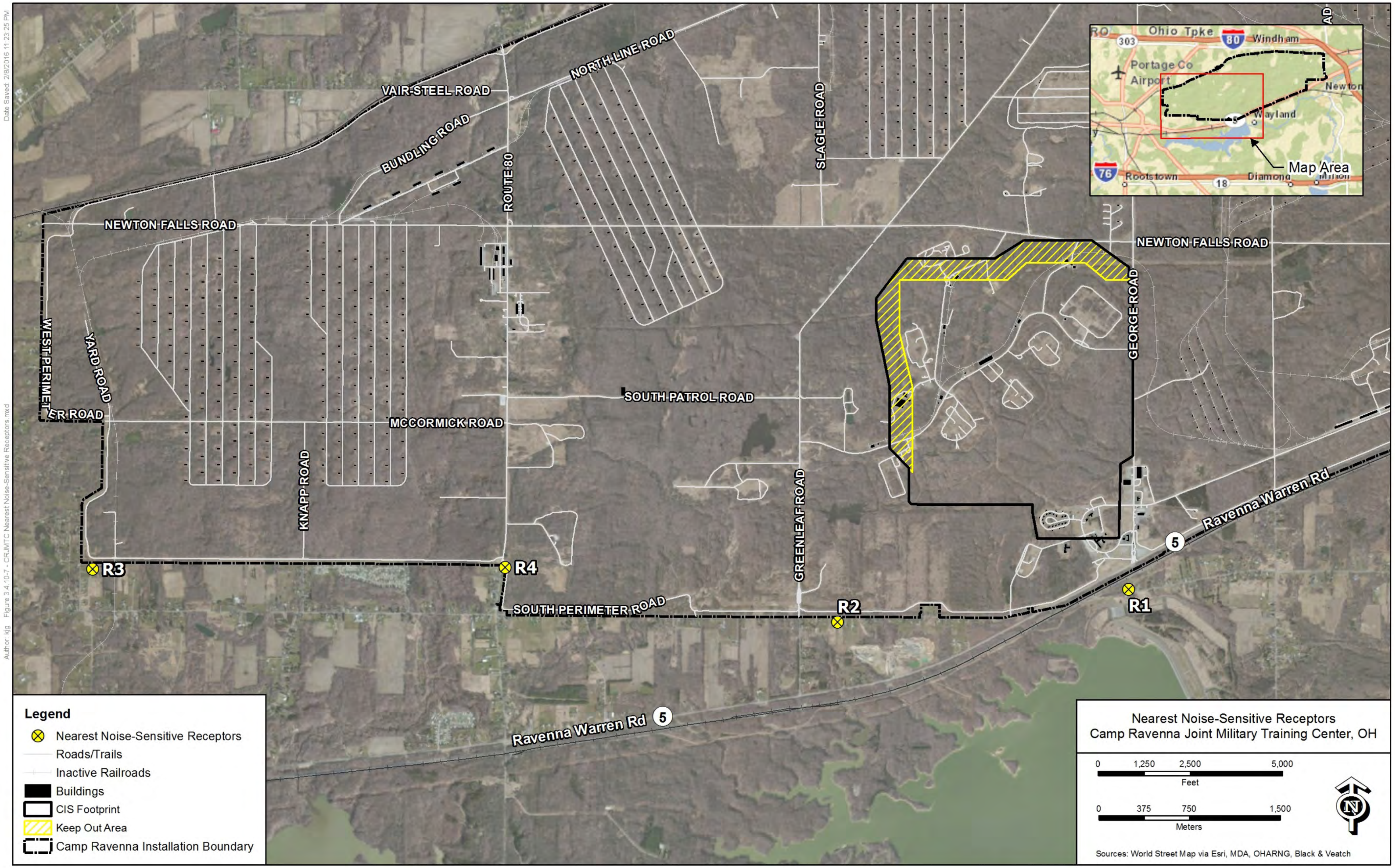


Figure 3.4.10-7 Noise-Sensitive Receptors - CRJMTC



3.4.11 Socioeconomics – CRJMTC

Socioeconomics describes a community by examining its social and economic characteristics. Several demographic variables are analyzed in order to characterize the community, including population size, the means and amount of employment, and income creation. In addition, socioeconomics analyzes the fiscal condition of local government and the allocation of the assets of the community, such as its schools, housing, public services, and healthcare facilities.

CRJMTC is located in northeastern Ohio within Portage and Trumbull Counties. It is approximately 3 miles east-northeast of the City of Ravenna and 1 mile north-northwest of the City of Newton Falls. The installation is approximately 11 miles long, 3.5 miles wide, and encompasses approximately 21,683 acres. The installation is bounded by State Route 5, West Branch State Park and the Michael J. Kirwan Reservoir, and the CSX System Railroad to the south; Garret, McCormick, and Berry Roads to the west; the Norfolk Southern Railroad to the north; and State Route 534 to the east. Additionally, CRJMTC is surrounded by the communities of Windham, Garrettsville, Charlestown, and Wayland (ODS, 2012a).

3.4.11.1 Regulatory Framework – Socioeconomics – CRJMTC

There are no U.S. Army for federal regulations that apply specifically to the assessment of socioeconomic impacts for an EIS.

3.4.11.2 Affected Environment – Socioeconomics – CRJMTC

The following counties comprise the socioeconomics study area for the CRJMTC site: Portage, Trumbull, Mahoning, Summit, Cuyahoga, Geauga, and Stark. These counties are within commuting range of CRJMTC (the commuting range is discussed in more detail in Section 3.4.11.3.1.1) and are densely populated so it is assumed that they would provide a substantial portion of the labor pool, at least for the construction phase. Also, the area supports a wide variety of industrial, commercial, and institutional businesses and services that could serve some of the project's need for contractor services, equipment and materials, business supplies, etc., and the workers' needs for housing, medical services, schools, shopping, entertainment, etc. Thus, the potential project-related impacts to the defined study area are the general focus of the socioeconomic evaluation.

Due to the number of workers that would be required to be present in Portage and Trumbull Counties on a daily basis for the construction and operation of the potential CIS, it has been assumed that the majority of the socioeconomic impacts would occur in these two counties of the study area. As such, Portage and Trumbull Counties have been emphasized in the socioeconomic analysis. Some effects of the construction and operation of the potential CIS would be felt in the larger region surrounding the potential CIS deployment site at CRJMTC and are discussed as needed.

The area immediately surrounding CRJMTC is mostly undeveloped forest land and agricultural cropland. There are established urban areas located within 10 to 15 miles of the CRJMTC site footprint (ODS, 2012a).

3.4.11.2.1 Population

Portage County was founded in 1807. The earliest Census data available estimated the population in the county to be 10,095 in 1826. The population estimate for the county was 163,862 in 2013. This population increase represents 460 percent growth for Portage County's population over 113 years. The State of Ohio's population increased at 178 percent over the same period of time (ODS, 2012a).

Based on the compiled data in Table 3.4.11-1, Portage County has been consistently growing since at least 1820. There are established industrial job markets in construction and business operations, which could bring in additional people if the potential CIS deployment would occur at CRJMTC. However, the 2020 projected population of the county is expected to decrease, as are the 2030 and 2040 populations. This may be attributed to more of the population moving to larger areas, such as nearby Akron or Cleveland, where employment and education options are more available (ODS, 2012a).

Table 3.4.11-1 Population of Portage County - CRJMTC

Year	Population
1820	10,095
1840	22,965
1860	24,208
1880	27,500
1900	29,246
1920	36,269
1940	46,660
1960	91,798
1980	135,856
2000	152,061
2013 (est.)	163,862
All numbers taken directly from Ohio Development Services (ODS) data. Source: ODS, 2012a; ODS, 2013.	

As shown in Table 3.4.11-2, the Trumbull County population grew from 1820 until 1980 then declined through the 2013 estimated population. The 2020 projected population is 200,840, trending below the current population and indicating that the population of the area would slowly decline in the future (ODS, 2013). Similar to Portage County, this population decrease may be attributed to people moving to larger cities which are located nearby in search of employment or education options that are not available in Trumbull County.

Table 3.4.11-2 Population of Trumbull County - CRJMTC

Year	Population
1820	15,546
1840	38,107
1860	30,656
1880	44,880
1900	46,591
1920	83,920
1940	132,315
1960	208,526
1980	241,863
2000	225,116
2013 (est.)	206,480
All numbers taken directly from ODS data. Sources: ODS, 2012b; ODS 2013.	

The nearest population centers to the CRJMTC installation include the cities of Cleveland (population 390,113, approximately 38 miles away), Akron (population 198,100, approximately 23.5 miles away), Kent (population 32,345, approximately 14 miles away), and Ravenna (population 11,556, approximately 8 miles away) to the west and Warren (population 40,768, approximately 14.7 miles away) and Youngstown (population 65,184, approximately 24.25 miles away) to the east (Census, 2014a).

3.4.11.2.2 Demographics

Portage County racial demographic information is presented in Table 3.4.11-3. The county is dominated by the white demographic at 92.2 percent of the population. The largest minority population in Portage County is African American at 3.9 percent of the total population in 2012.

Trumbull County racial demographic information is shown in Table 3.4.11-4. The county is predominantly white (89.1 percent). The largest minority population in Trumbull County is African-American at 8.3 percent of the total 2012 population.

Table 3.4.11-3 Portage County Population by Race (2012) - CRJMTC

Population by Race	Number	Percent
Total Population	161,178	100.0
White	148,536	92.2
African-American	6,297	3.9
Native American	173	0.1
Asian	2,464	1.5
Pacific Islander	0	0.0
Other	492	0.3
Two or More Races	3,216	2.0
Hispanic (may be of any race)	2,126	1.3
All numbers taken directly from ODS data. Source: ODS, 2012a.		

Table 3.4.11-4 Trumbull County Population by Race (2012) - CRJMTC

Population By Race	Number	Percent
Total Population	208,792	100.0
White	186,070	89.1
African-American	17,317	8.3
Native American	242	0.1
Asian	1,028	0.5
Pacific Islander	6	0.0
Other	335	0.2
Two or More Races	3,794	1.8
Hispanic (may be of any race)	2,984	1.4
All numbers taken directly from ODS data. Source: ODS, 2012b.		

Tables 3.4.11-5 and 3.4.11-6 show the age distribution, with the majority of the population in the age group that is active in the work force (18 to 64 years old) in Portage and Trumbull Counties, respectively. Trumbull County has a median age of 43.1, slightly higher than Portage County's median age of 37.4.

Table 3.4.11-5 Portage County Population by Age - CRJMTC

Population	Number	Percent
Total Population	161,178	
Under 5 years	8,039	5.0
5 to 17 years	25,378	15.7
18 to 24 years	25,447	15.8
25 to 44 years	37,259	23.1
45 to 64 years	44,217	27.4
65 years and more	20,838	12.9
All numbers taken directly from ODS data. Source: ODS, 2012a.		

Table 3.4.11-6 Trumbull County Population by Age - CRJMTC

Population	Number	Percent
Total Population	208,792	
Under 5 years	11,332	5.4
5 to 17 years	34,196	16.4
18 to 24 years	16,668	8.0
25 to 44 years	47,292	22.7
45 to 64 years	62,053	29.7
65 years and more	37,251	17.8
All numbers taken directly from ODS data. Source: ODS, 2012b.		

As indicated in Table 3.4.11-7, the most common family structure in Portage County is a married couple where both partners are in the labor force. Trumbull County (Table 3.4.11-8) is similar to Portage, with its most common family structure also being a married couple with both partners in the labor force.

The most common level of academic achievement for the residents of Portage County is a high school diploma (see Table 3.4.11-9). The lowest percentage of educational achievement for Portage County residents is earning an associate degree. A small percentage of Portage County residents achieve a degree from higher education. The most common level of academic achievement for the residents of Trumbull County is a high school diploma (see Table 3.4.11-10). The lowest percentage of educational achievement for Trumbull County residents is earning a master's degree or higher. A small percentage of Trumbull County residents achieve a degree from higher education.

Table 3.4.11-7 Portage County Family Type by Employment Status - CRJMTC

Families	Number	Percent
Total Families	40,409	
Married couple, husband and wife in labor force	17,529	43.4
Married couple, husband in labor force, wife not	5,450	13.5
Married couple, wife in labor force, husband not	2,442	6.0
Married couple, husband and wife not in labor force	5,419	13.4
Male householder, in labor force	1,929	4.8
Male householder, not in labor force	459	1.1
Female householder, in labor force	5,315	13.2
Female householder, not in labor force	1,866	4.6
All numbers taken directly from ODS data. Source: ODS, 2012a.		

Table 3.4.11-8 Trumbull County Family Type by Employment Status - CRJMTC

Families	Number	Percent
Total Families	55,634	
Married couple, husband and wife in labor force	18,112	32.6
Married couple, husband in labor force, wife not	7,699	13.8
Married couple, wife in labor force, husband not	3,729	6.7
Married couple, husband and wife not in labor force	10,204	18.3
Male householder, in labor force	2,847	5.1
Male householder, not in labor force	1,450	2.6
Female householder, in labor force	7,522	13.5
Female householder, not in labor force	4,057	7.3
All numbers taken directly from ODS data. Source: ODS, 2012b.		

Table 3.4.11-9 Portage County Educational Attainment - CRJMTC

Educational Attainment	Number	Percent
Persons 25 years and over	102,314	
No high school diploma	9,873	9.6
High school graduate only	39,761	38.9
Some college, no degree	21,243	20.8
Associate degree	6,252	6.1
Bachelor's degree	16,084	15.7
Master's degree or higher	9,101	8.9
All numbers taken directly from ODS data. Source: ODS, 2012a.		

Table 3.4.11-10 Trumbull County Educational Attainment - CRJMTC

Educational Attainment	Number	Percent
Persons 25 years and over	146,596	
No high school diploma	18,013	12.3
High school graduate only	65,447	44.6
Some college, no degree	27,768	18.9
Associate degree	10,397	7.1
Bachelor's degree	17,384	11.9
Master's degree or higher	7,587	5.2
All numbers taken directly from ODS data. Source: ODS, 2012b.		

3.4.11.2.3 Employment

Portage County has an estimated 39,793 people in the civilian work force. The highest employment percentage for an industry in Portage County is in the category of trade, transportation, and utilities at 26 percent of employed people. The second highest employment sector is manufacturing at 25.6 percent (ODS, 2012a). Trumbull County has an estimated 60,776 people in the civilian work force. The highest employment percentage for an industry in Trumbull County is also in the category of trade, transportation, and utilities with 23 percent of employed people. The second highest employment sector is manufacturing at 22 percent. (ODS, 2012b). Private wage and salary workers make up the largest group of workers in Portage County, at 82.7 percent of the work force. Government workers make up the second largest group at 11.9 percent (ODS, 2012a). Tables 3.4.11-11 and 3.4.11-12 summarize the industries present, employment, and wages for Portage and Trumbull Counties, respectively. The economies of both Portage and Trumbull Counties rely in large part on the services industry (ODS, 2012b).

Portage and Trumbull Counties currently have strong construction and business operations employment statistics. Construction and manufacturing employment is an indicator of economic health, so the substantial percentage of income being derived from construction and manufacturing in both Portage and Trumbull Counties indicates that there are skilled workers present in the area that could contribute to the CIS project.

Based on employment statistics, the service industry employs the highest number of people in Portage County, at 27,539 employees, and in Trumbull County, at 44,255 employees. The services sector also represents the largest portion of the wage base in Portage and Trumbull Counties.

Table 3.4.11-11 Portage County Establishments, Employment, and Wages by Sector: 2012 - CRJMTC

Industrial Sector	Number Of Establishments	Average Employment	Total Wages	Average Weekly Wage
Private Sector	3,032	39,793	$1,467,829,146	$709
Goods-Producing	668	12,253	$622,208,323	$977
Natural Resources and Mining	52	328	$13,111,510	$770
Construction	343	1,755	$82,171,514	$900
Manufacturing	273	10,171	$526,925,299	$996
Service-Providing	2,364	27,539	$845,620,823	$590
Trade, Transportation, and Utilities	736	10,352	$368,574,039	$685
Information	39	286	$13,559,021	$912
Financial Services	256	1,284	$51,043,910	$764
Professional and Business Services	454	3,783	$166,722,700	$848
Education and Health Services	243	4,590	$134,073,022	$562
Leisure and Hospitality	349	5,755	$76,968,718	$257
Other Services	275	1,446	$34,049,520	$453
Federal Government	N/A	293	$16,476,379	$1,082
State Government	Data Not Available			
Local Government	Data Not Available			
All numbers taken directly from ODS data. Source: ODS, 2012a.				

Table 3.4.11-12 Trumbull County Establishments, Employment, and Wages by Sector: 2012 - CRJMTC

Industrial Sector	Number Of Establishments	Average Employment	Total Wages	Average Weekly Wage
Private Sector	4,126	60,776	$2,296,521,576	$727
Goods-Producing	648	16,522	$988,692,263	$1,151
Natural Resources and Mining	28	162	$5,039,302	$599
Construction	372	2,806	$123,587,070	$847
Manufacturing	248	13,553	$860,065,891	$1,220
Service-Providing	3,471	44,255	$1,307,829,313	$568
Trade, Transportation, and Utilities	1,020	14,114	$437,028,044	$595
Information	38	551	$20,505,784	$715
Financial Services	398	2,408	$87,519,765	$699
Professional and Business Services	606	6,426	$223,478,952	$669
Education and Health Services	560	11,440	$405,750,886	$682
Leisure and Hospitality	463	7,110	$87,039,805	$235
Other Services	386	2,191	$46,113,598	$405
Federal Government	N/A	501	$27,839,181	$1,069
State Government	N/A	714	$37,412,282	$1,008
Local Government	N/A	8,231	$321,921,931	$752
All numbers taken directly from ODS data. Source: ODS, 2012b.				

Based on the number of construction workers and the unemployment rates in the surrounding counties, an adequate workforce would be available and could be drawn from the commuting distance (i.e., the study area) counties, especially for a project of the duration, size, and scope of the CIS. The likely commuting distance for construction workers is discussed in Section 3.4.11.3.1.1.

The unemployment rate for Portage County was estimated at 7.3 percent, or 9,624 people, for civilian workers. Unemployment rates and number of construction workers for Portage and surrounding counties are listed in Table 3.4.11-13.

Table 3.4.11-13 Unemployment Rates and Number of Construction Worker for Surrounding Counties - CRJMTC

County	Unemployment Rate	Construction Workers
Portage	7.2%	1,755
Trumbull	8.3%	2,806
Mahoning	8.3%	4,252
Summit	7.2%	9,142
Cuyahoga	7.7%	19,519
Geauga	3.9%	4,025
Stark	6.6%	9,143
Source: ODS, 2012a.		

The Ohio unemployment rate was 7.4 percent in 2013, which makes Cuyahoga, Mahoning, and Trumbull Counties' rates higher than the Ohio average (ODS, 2012a).

3.4.11.2.4 Income

In 2012, the median household income in Portage County was $51,969, which is 7.72 percent above the average for the State of Ohio at $48,246. Approximately 52.2 percent of households had an income greater than $49,999. In 2012, 15.1 percent of the residents of Portage County were living below the poverty level. Figure 3.4.11-1 shows the range of median household income in Portage County and Trumbull County (ODS, 2012a; ODS, 2012b). From 2006 to 2012, the per capita personal income average in the Northeast Ohio region, which includes Portage and Trumbull Counties, was $576 above Ohio's average income. Incomes in Portage and Trumbull Counties have been rising since 2009 after the collapse of the housing market drove wages down.

The income data presented on Figure 3.4.11-1 is in the format provided by the Census Bureau. The raw data was not available for review and alteration, which would have enabled direct comparisons between Portage and Trumbull Counties' income divisions.

3.4.11.2.5 Housing, Education, and Health

3.4.11.2.5.1 Housing

Portage County has 67,422 housing units, according to the 2008-2012 American Community Survey 5-Year Estimates from the Census. Of these, 9.5 percent were vacant. Table 3.4.11-14 presents the Portage County and Trumbull County housing characteristics using data from the years 2008 through 2012. The housing units in Portage County are focused in the cities of Kent and Ravenna. Additionally, vacant housing units make up only 9.5 percent of Portage County's housing units, so this may be a limiting factor for the size of the construction workforce (ODS, 2012a), which is estimated to range between 400 and 600 workers. Neighboring Trumbull

County, to the east of Portage County, has a larger population than Portage County with the majority of the population and housing being focused in the southwest area of the county in and around the City of Warren. According to the 2012 census, only 9.8 percent of the housing units in Trumbull County are vacant (ODS, 2012b). Whether this amount of vacant housing is sufficient for housing the project's labor force would depend on the condition of the vacant housing, the proximity of the housing to the project site, and the cost of the housing.

Table 3.4.11-14 Portage and Trumbull County Housing Characteristics (2008-2012) - CRJMTC

General Housing Data	2008-2012 Census Est.	Percent of Est. Total
Portage County		
Total Housing Units	67,422	100.0
Occupied	61,016	90.5
Vacant	6,406	9.5
Owner-Occupied Units	42,055	68.9
Trumbull County		
Total Housing Units	96,153	100.0
Occupied	86,760	90.2
Vacant	9,393	9.8
Owner-Occupied Units	63,160	72.8
Source: ODS, 2012a; ODS, 2012b. All numbers taken directly from ODS data.		

3.4.11.2.5.2 Education

Portage County contains 11 school districts, including the Ravenna City School District. The Ravenna City School District provides a variety of services and programs to families located within its boundaries. These services include special education, libraries, early childhood education, 21st Century Learning Centers, and a technology center (Portage, 2015b). Additionally, four higher education campuses are located in Portage County, including Kent State University in Kent. According to the 2010 Census, the Portage County public education system has 27,294 students enrolled in the grades of nursery school through high school and 21,348 students enrolled in higher education (Census, 2014b). Of the residents of Portage County, 38.9 percent have earned a high school diploma, while only 15.7 percent achieved a Bachelor's degree (ODS, 2012a). During the years of 2009-2013, 91.0 percent of people over 25 years old had achieved their high school diploma (Census, 2014a). There are 20 public school districts in Trumbull County which serve 35,000 students. The large cities near the CRJMTC, Warren and Newton Falls, both have public schools that serve each town's respective children (Trumbull, 2015a).

The existing education system in Portage County graduates approximately 91 percent of students that are enrolled, which is above the national average of 81 percent (NCES, 2015). Additionally, Portage County has a 15:1 student to teacher ratio, while Trumbull County has a 16:1 student to teacher ratio, which are at or under the national average for student to teacher ratio of 16:1 in 2013 (ODS, 2012a; ODS, 2012b; NCES, 2013). Based on graduation rates and student to teacher ratios, the Portage County public education system appears to adequately serve the current population.

3.4.11.2.5.3 Health

The majority of hospital services in Portage County are provided by several hospitals located in Ravenna, Kent, and Akron. The University Hospitals Portage medical Center in Ravenna is the closest facility to CRJMTC, located approximately 7 miles west-southwest.

Trumbull County has three major hospital facilities within 25 miles of CRJMTC location. These facilities are located in Warren, Youngstown, and Austintown, Ohio.

Using metrics that track the mortality, morbidity, health behaviors, clinical care, social and economic factors, and the physical environment, the University of Wisconsin compiles the County Health Rankings & Roadmaps document to rank the overall health of counties. The most recent ranking available was from 2015. The Health Outcomes metric represents how healthy a county is while the Health Factors metric represents what influences the health of the county. Portage County ranked 33rd in Health Factors and 17th in Health Outcomes out of the 88 counties in Ohio (UW, 2015a). These results suggest the Portage County health services system is currently meeting the health requirements of its citizens better than most of the counties in Ohio.

While Portage County is meeting the health requirements of its citizens, Trumbull County has not fared as well. Trumbull County is ranked 73rd in Health Factors and 77th in Health Outcomes. Trumbull County has a higher occurrence of preventable health issues (such as diabetes, heart disease, and excessive drinking) than Portage County and Ohio as a whole. This trend likely contributed to Trumbull County having lower scores in the University of Wisconsin metric.

Additionally, major population centers contained within the commuting region (including Cleveland, Akron, Canton, and Kent) would also likely support healthcare needs for project employees. The healthcare facilities in these cities are well developed and ranked at or above the average in Ohio for access to healthcare (UW, 2015a).

3.4.11.2.6 Services

This section focuses on the services available in the project county of Portage. First responders and emergency management for incidents occurring at the site for the potential CIS deployment would come from Portage County first, with other counties responding as needed (Army, 2014a).

3.4.11.2.6.1 Police/Sheriff Departments

Portage County has its own sheriff's department that serves the county in addition to local municipal police forces. CRJMTC does not currently have a military police force in place (Portage, 2015c). CRJMTC brings in military police during annual training events. The CRJMTC property is under concurrent legislative jurisdiction. This enables state and local law enforcement to make arrests, as opposed to exclusive federal jurisdiction where only federal law enforcement could make arrests. The Ohio State Police have primary enforcement authority for the OHARNG. The CRJMTC relies on the Ohio State Highway Patrol and County Sheriff Departments for law enforcement.

No issues concerning a lack of law enforcement services were identified in the Portage County area.

3.4.11.2.6.2 Fire/Emergency Services

CRJMTC has an agreement with the Village of Windham to provide fire and paramedic response on post. The Village of Windham and CRJMTC have a mutual aid agreement that applies to all fire and emergency services for both entities (Army, 2014a).

No issues concerning a lack of fire or emergency response services were identified in the Portage County area.

3.4.11.2.6.3 Emergency Management

The Portage County EMA was established by the Portage County Commissioners in 1989 under ORC 5915.071. The EMA is tasked with planning, training, and assisting with the coordination of disasters in Portage County. The EMA must be prepared to respond to natural disasters (tornado, flood, blizzard) and technological disasters (HazMat or nuclear) (Portage, 2014).

No issues concerning a lack of emergency management services were identified in the Portage County area.

3.4.11.2.7 Subsistence Living

Two churches in the area surrounding Camp Ravenna were contacted to gather information about any known local subsistence populations. The Ravenna Assembly of God and the Parkside Bible Church were contacted. No responses were received from the contacted churches. In addition, according to CRJMTC personnel, there are no known subsistence populations present in the CRJMTC area (Morgan, 2016b).

3.4.11.2.8 Tax Revenues

In general, local government is funded through a number of tax sources, and this revenue is allocated to various account funds. The largest of these funds is usually the general fund that typically generates revenues through property taxes. These taxes generally apply to all non-government and non-church property.

Portage County has one of the highest property tax collection rates in the U.S. and is ranked 429th of the 3,143 counties in order of median property taxes. The county collects 1.3 percent of the property's assessed fair market value as property tax. The average yearly property tax paid by Portage County residents amounts to about 3.17 percent of their yearly income (Portage, 2015f). Trumbull County has above average median property tax and is ranked 716th of the 3,143 counties in order of median property taxes. The county collects 1.48 percent of the property's assessed fair market value as property tax. The average yearly property taxes paid by Trumbull County residents amounts to about 2.81 percent of their yearly income (Trumbull, 2015b).

3.4.11.3 Environmental Consequences and Mitigation – Socioeconomics - CRJMTC

Generally, the social and economic impacts of construction are a function of the extent of site preparation and development work, the amount of equipment and materials purchased for construction, the size of the construction workforce, wages paid, and the number of relocating workers relative to the available community facilities and services. If negative impacts arise, the primary categories of concern usually include short-term traffic impacts and housing/services impacts (i.e., impacts that could arise if a large workforce is relocated to a region that has limited availability of housing or inadequate community facilities and services). The key information to make this determination is the size of the relocating construction workforce relative to the availability of housing and community facilities and services.

3.4.11.3.1 Construction – Baseline Schedule

As discussed in Section 2.5.1, between 400 and 600 employees and workers would be needed during CIS construction. These construction staff would be expected to be a mixture of commuting and permanent residents of the study area (CRJMTC region including Portage, Trumbull, Mahoning, Summit, Cuyahoga, Geauga, and Stark Counties), with relatively few workers having to relocate to the study area from outside locales. The majority of the economic impacts from potential construction of the CIS would be anticipated to occur in the immediate surrounding area, Portage and Trumbull Counties. As such, Portage and Trumbull Counties have been emphasized in the following analysis. Some effects of the construction of the CIS would be felt in the larger surrounding region and are discussed as needed.

3.4.11.3.1.1 Environmental Consequences

<u>Tax Revenue Impacts</u>

Tax revenue impacts could increase the amount of taxes collected in the study area as construction-related goods and services are purchased during project development. Workers purchasing goods and services for their personal use could also contribute to tax increases in the study area. In order to calculate the additional tax revenue that the potential CIS deployment at CRJMTC could bring to Portage and Trumbull Counties, the number of expected workers and the amount each worker could be expected to spend was multiplied by the sales tax rate for Portage and Trumbull Counties. Table 3.4.11-15 summarizes the estimates of tax revenue from the CIS during construction.

Table 3.4.11-15 Estimated Sales Tax Revenue - Construction - CRJMTC

Input	Construction
Number of Workers (middle of given range of workers)	500
Assumed Expenditures Subject to Sales Tax [1] (per person/year Ohio)	$25,708
Sales Tax Rate (Portage County)	7.0%
Estimated Sales Tax Revenue [2] (total for CIS workers/year Portage County)	$449,890
Sales Tax Rate Trumbull County	6.75%
Estimated Sales Tax Revenue [2] (total for CIS workers/year Trumbull County)	$433,823
Total estimated Tax Revenues	$883,713

Notes:

1. Based on 2014 data – no escalation.
2. Assumes 50 percent of expenditures would occur in county.

Sources: BLS, 2014; Sales Tax, 2014a

As shown in Table 3.4.11-15, the estimated taxable expenditures include expenditures like food, transportation, and entertainment that workers employed by the facility would likely be spending a portion of in Portage and Trumbull Counties regardless of where they have their permanent residence. Table 3.4.11-15 summarizes what the estimated tax revenue would be in Portage County and Trumbull County respectively, if CIS workers spent 50 percent of their expenditure dollars in each of those counties. The estimated total sales tax revenue generated from the potential CIS deployment at CRJMTC during construction could be up to approximately $899,780.

Any additional property tax collection for Portage and Trumbull Counties above what is being currently collected would depend on the number of workers that choose to move to the area and purchase newly constructed homes for use during the construction of the CIS. It is possible that the increase demand for housing in the area may cause home values in Portage and Trumbull Counties to increase, which would lead to increased tax revenue for Portage and Trumbull Counties. Conversely, many of the construction workers to be hired for CIS construction are likely to already live within commuting distance of the facility, so they would not contribute to property tax increases for Portage or Trumbull Counties.

Regional Economic Impact Estimates

The total economic impact of the potential CIS deployment would be greater than the direct employment, income, and tax revenue impacts arising from the project workforce. The additional economic impact would arise from what are commonly called "multiplier effects" that are associated with the successive rounds of spending in the economy from a new investment. The total economic impact is measured in this study using the RIMS II model. Regional input-output multiplier models such as RIMS II project how new expenditures will create changes in various economic categories within a defined geographic region. The specific economic categories include total gross output (sales), value added (gross domestic product), earnings, and employment.

In general, RIMS II multipliers are used by both the private and public sector to project future impacts arising from a project's direct expenditures. Project construction expenditures would go primarily to workers (labor) and subcontractors. Yet these direct expenditures on construction are only a portion of the total economic impacts generated by the project construction. There are also indirect impacts (that arise from company-to-company purchases in support of the direct construction expenditures) and induced impacts that deal with the spending of wages by laborers. Regional input-out multipliers capture both direct and secondary (indirect) impacts, therefore, giving a fuller and more complete picture of the total economic impacts generated by the initial direct construction expenditures. In the end, the overall economic impact within the region would be greater than the project's direct construction expenditures due to the secondary impacts. A more detailed explanation of how RIMS II was used in this analysis is provided in the following paragraphs.

The direct construction expenditures for the CIS deployment would have a major and direct impact on the CRJMTC region and would also impact the rest of Ohio. In addition to the primary or direct investment and expenditure impacts, there would also be secondary impacts in the form of indirect and induced benefits.

To capture the total economic impact of the project construction expenditures, it would be necessary to track expenditures as they work their way through the state and U.S. economy over a period of a few years after expenditures are first made. For example, firms that are hired to build the potential CIS would purchase materials and services from a diverse set of companies offering lumber, transportation, fuel, catering, etc. (any items purchased by the firm from another firm required to conduct their business). The suppliers of these goods and services would, in turn, use revenue to pay employees and to purchase inputs that allow the suppliers to meet their contract obligations. This process arising from the business to business purchases would continue through many rounds of spending in the economy and would create a total economic impact that is a multiple of the original purchase of material and service inputs by the firms hired to construct the CIS. This type of effect is called the "indirect effect." The indirect effect is measured in the RIMS II data based on recent survey information that measures the economic relationship among industries in terms of inputs purchased from other firms to produce output in a given industry.

Similarly, a substantial portion of the direct expenditures on the potential CIS deployment would be paid to workers who perform the construction work. Through what is called the “induced effect,” these workers would use their disposable earned income to purchase goods and services such as clothing, rent, automobile payments, food, vacations, savings, etc. Establishments that receive the worker’s income in exchange for goods and services would, in turn, use the revenue received to pay their own workers, to purchase supplies needed to provide additional goods and services, etc. This process would continue through multiple rounds of spending in the economy and create a total economic impact that is a multiple of the original wages received from the CIS workers. Generally, through each round of spending, the impact would lessen because not all of the income is spent in the study area due to the purchase of imports, worker savings, taxes, etc. Thus, there would be an economic “ripple effect” with project expenditures that lessens with time, as the successive rounds of spending work through the economy. While the models used to estimate the total impact of an investment do not estimate the timing of impacts, it is generally understood that most of the impacts from a new construction project would ripple through the economy within 2 to 3 years after the completion of a project.

While envisioning the successive rounds of spending in an economy is intuitive, in reality tracing the actual spending patterns of even a single construction project would be enormously difficult and expensive. Fortunately, there are mathematical methods and models available that estimate the economic impact of an investment on the economy; these models are commonly referred to as input-output models. These models are built upon detailed databases, including survey data that tracks the historical economic interrelationship and expenditure patterns among industries and households. Two widely used input-output models are the RIMS II developed by the BEA, and the IMPLAN model. RIMS II, which dates to the 1970s, was used in this analysis; its specific application to the potential CIS project is described in the following paragraphs. The impact multipliers generated by RIMS II allow users to apply the multipliers to project expenditures and estimate the regional impact of the project on output (sales), value added (gross domestic product), earnings, and employment.

RIMS II incorporates data contained in national input-output accounts that capture the relationship between each major industry and other industries or final users that use or purchase the goods and services produced by each industry. Thus, as any industry increases production, the mathematical relationships in RIMS II that reflect the historical input-output accounts would determine the added output required from other industries, as well as the increase in earnings, employment, and value added.

When performing an analysis for a sub-national region, RIMS II adjusts the national input accounts for local conditions, based on available data such as the size of each industry within the region, and generates multipliers for the selected area. The study area could be as small as a single U.S. county. Multipliers will be different for all study areas because all study areas have unique economic conditions.

A few other aspects of RIMS II are appropriate to highlight. First, RIMS II assumes that a constant mix of inputs is used to produce outputs; this assumption is because the national input-output accounts reflect the structure of the economy at a point in time, when the data was collected. The current input-output relationships are from 2010. The model also assumes that all businesses in a single industry use a similar production process, and it is assumed that there are no supply constraints that would increase prices for a particular input as demand for the input increases. Finally, RIMS II does not account for multi-regional feedback impacts, and the multipliers do not predict the period of time over which impacts would occur.

The end product from RIMS II is a series of economic multipliers. For this study, final demand multipliers were used. When a dollar change in final demand is applied to these multipliers, the estimated total economic impact from the expenditure in the selected region is produced. Final demand multipliers are produced by RIMS II for employment, earnings, value added (Gross Domestic Product), and output.

Government expenditures could be traced using RIMS II through a multi-step process that includes developing a breakdown of government expenditures by expected industry, an estimate of the local industries that would provide goods and services for the government project, and the application of final demand multipliers to the impacted industries.

Table F.2 in Appendix F lists the major expenditures for the CIS project and assigns these to a RIMS II industry. All categories but one are assigned to the RIMS II category of construction in the table. The first two columns listing estimated expenditure values for material and labor costs are presented in 2015 dollars and total approximately $201 million for materials and more than $48 million for labor costs. These estimates are based on a similarly sized government project operated at Fort Greely, AK. As the DoD has not decided to pursue an additional CIS, discussion of costs specific to a potential CIS are premature at this time. Before the RIMS II multipliers could be applied, however, several adjustments are required. First, when using a final demand multiplier, RIMS II requires that an adjustment be made for household purchases by workers who already live and work in the region, assumed to be 65 percent in this study. This adjustment avoids inflated impact estimates as the spending of workers living in the region is already part of the multipliers. Following this adjustment, Table F.2 shows the combined material plus labor that would be applied to the final demand multipliers. Also, because the RIMS II multipliers are derived from a model using 2010 data, it is necessary to state the 2015 costs in 2010 dollars and to then apply the multipliers.

Table F.2 shows the multipliers estimated by RIMS II for the CRJMTC region. Applying these multipliers to the adjusted expenditure line items and then summing the total (converted back to 2015 dollars) yields the following estimated results for the total construction period:

- The total change in output that occurs in all industries from the potential CIS project would be $388 million in the selected region.
- The total incremental earnings in the region arising from the project would be nearly $105 million.
- The project would create 2,351 indirect jobs that would be temporary and end when construction ends.
- Finally, the total value added arising in the region from the potential CIS project would be more than $224 million.

Employment and Industry

Construction employment at the CIS would vary substantially as project construction progresses. As discussed in Section 2.5.1, between 400 and 600 workers would be onsite over the course of the baseline construction period. Although a workforce distribution plan has not yet been developed, it is expected that the number of workers would be smaller during the first portions of site clearing and utility work, then increase substantially when heavy construction starts. The workforce would then decrease somewhat during the final build out period.

Based on estimates from similar projects, approximately 50 to 85 percent of the construction workforce would come from the commuting area around the site (CRJMTC region), while 15 to 50 percent (plus family members) are assumed to relocate from outside the region. Construction workers brought into the area from outside the CRJMTC region for the potential CIS project (assumed to be primarily those with selected skills or experience not generally available in the region) would likely be living and commuting between 5 and 11 miles (or possibly farther) from the job site if they are renting housing in either Kent or Ravenna, the two closest and most accessible cities. Construction workers may choose to reside in Trumbull County as an alternative to residing in Portage County, depending on the availability of rental units and their cost, or the desire to live closer to amenities found in a larger city. Due to the availability of vacant housing in Portage County, the new workforce would not likely experience difficulties while attempting to secure nearby living accommodations.

Workers from outside the CRJMTC region may decide to commute from their current living location rather than to compete for rental properties close to the job site. According to a 2010 study of commuter habits in an area similar to the CRJMTC area, willingness to commute is determined both by the economic benefit to the commuter and by commuting costs (Westin and Sandow, 2010). The latter consists of the commuter's perceived value of commuting time plus the actual expense for traveling. The value of commuting time differs between individuals depending on their specific circumstances, personal preferences, and characteristics, including gender. Additionally, commuting must be possible in terms of accessibility to transportation routes and availability of transportation sources. Generally, construction workers are more willing to commute than other professions due to the nature of their work and because if they are not willing to commute, they could lose out on relatively local employment opportunities. In any case, the inclination to commute declines rapidly when commuting times exceed 45 minutes, regardless of gender, transportation mode, and socio-economic factors (Westin and Sandow, 2010).

The availability of amenities is another factor which appears to influence the settlement patterns of workers and thus, the willingness to commute (Westin and Sandow, 2010). In general, larger communities (usually with 10,000 residents or more) attract most of the immigrating construction workers. Based upon observed settlement patterns in Westin and Sandow (2010), it appears that key quality of life factors (amenities) influencing construction workers' choice of residence are schools, shopping facilities, local services (medical and dental are of special importance), and housing availability.

Because the cities of Akron, Canton, Kent, Warren, Youngstown, and Cleveland are likely within the 45-minute commuting maximum (depending on traffic and road conditions), it is likely that project construction could draw commuting construction workers from these areas. It is unlikely that said workers would relocate closer to the job site due, in part, to the level of amenities available in their existing home towns. Thus, workers from these areas would be expected to spend most of their wages in their hometowns which would lead to local increases in business, sales tax, and income tax revenues.

Of the many industries that operate in Portage County, the largest employer is the service industry (e.g., restaurants), which would see a substantial increase in demand as construction workers are brought into the area for the potential CIS project (ODS, 2012a). Trumbull County would likely also see an increase in demand for service industry work as the construction force for the CIS came into the area. The demand for services work may decrease somewhat after construction would be completed and construction workers leave the area. However, the services demands of incoming permanent operation workers would offset some of the losses represented by the departure of the construction workers, and would continue through the operation of the potential CIS as the operations workforce would be permanently living and working in the area communities.

As the services industry is generally an industry that grows with demand growth, the impacts on the services industry from the construction of the CIS would be moderate, as the increased number of workers living and/or working in the area of the facility would need various services. Consequently, more services businesses and employees would be needed to meet the demand from the CIS construction workforce.

Traffic

There is the potential for minor, short-term, negative impacts on traffic patterns associated with the volume of workers accessing the site during the peak months of construction. A detailed discussion of the transportation impacts from CIS construction is presented in Section 3.4.12 Transportation.

Public Services

According to a Community Health Assessment, compiled in late 2014 by The Portage County Community Health Assessment Partnership, there are nine areas of public health need in Portage County that should be addressed. The areas of health needs are: 1) mental health and addiction; 2) access to care; 3) chronic disease; 4) prevention and wellness; 5) maternal and child health; 6) communicable disease; 7) oral health; 8) senior health; 9) cancer (Portage, 2015d). Based on these areas of need, the influx of construction workers for the CIS could negatively affect the county's ability to meet health care needs for the existing population. Additional workers and their families would increase the burden on the area's healthcare facilities. However, such an increase would not be major during construction because few workers would be expected to relocate to the area from outside of the region.

Some relocating workers may bring their children to live in the community and those children would need to attend the community schools. The area schools would likely see an increase in enrollment during the construction of the CIS. Based on the high graduation rates and below-average student to teacher ratio in the Portage County schools, the schools are not likely overcrowded. Because few construction workers would be expected to relocate to the area from outside of the region, the associated influx of new students to Portage County schools would not be expected to affect the availability or quality of education.

The level of emergency preparedness in the site area meets the needs of the current population. The EMA would likely need to investigate its currently emergency response plans to assess whether they adequately address procedures for the additional construction CIS workforces. The planning and preparation that would be needed from the EMA would not likely be a major impact on Portage County.

3.4.11.3.1.2 Mitigation

The socioeconomic impacts resulting from construction of the potential CIS would be major due to the generally depressed economies in the surrounding counties and largely positive, particularly in the areas of increased revenue for local counties and numbers of jobs supported. Therefore, mitigation measures would not be required.

3.4.11.3.2 Construction – Expedited Schedule

Section 1683 of the 2016 NDAA includes the requirements to develop a plan to expedite CIS deployment by at least 2 years. Execution of this plan, following a deployment decision, would result in achieving a CIS initial operational capability within 3 years following a deployment decision and site selection. The expedited schedule is approximately 60 percent of the baseline construction schedule. It has been assumed that the construction workforce would need to be doubled to meet the expedited schedule as discussed in Section 2.5.1.2. Therefore, the impacts of 800 to 1200 construction workers would be felt in the CRJMTC area during expedited construction, increased from 400 to 600 construction workers during the baseline construction schedule.

Unless discussed in this section, impacts and mitigations for the expedited construction schedule would be the same as the impacts and mitigations discussed for the baseline construction schedule.

3.4.11.3.2.1 Environmental Consequences

Tax Revenue Impacts

Expedited schedule workers purchasing goods and services for their personal use would contribute to increased sales tax revenue in the study area above the amounts presented for the baseline schedule. Based on the fact that the workforce for the expedited schedule would need to be doubled over the workforce for the baseline schedule, the expected sales tax revenue from the expedited schedule would also roughly double over what was estimated.

Regional Economic Impact Estimates

The RIMS II baseline construction schedule analysis assumed a 5-year construction schedule. In the event the timeline is reduced to 3 years, this change would not noticeably affect the results derived from RIMS II. This negligible impact is due, as previously discussed, to the fact RIMS II is a static model and does not take time into account—it is a snapshot of the economy at a given moment. Therefore, whether the construction period were to last 5 or 3 years the estimated impacts would be the in the same order of magnitude. Of course, there would likely be some cost differences between the construction periods. The 3-year construction period would offer a savings due to a shorter onsite presence but there would be substantial over-time paid to workers which would off-set these savings. Overall, it is estimated that the savings and additional expenses for the baseline and expedited construction schedules would largely cancel each other out creating similar impacts for each schedule duration.

Traffic

The traffic patterns in the CRJMTC area would be affected by the around the clock construction schedule that would be required by the expedited schedule. There would likely be increased road noise during the night from construction truck and worker traffic that would affect the populations living near the CRJMTC construction area and transportation routes. A more detailed discussion of the traffic impacts could be found in Section 3.4.12 Transportation.

Public Services

Under the expedited construction schedule for the CIS, there would be an increased impact on public services over the baseline construction schedule caused by the increased construction worker presence in the CRJMTC area.

More construction workers would be sending their children to CRJMTC area schools. However, the expedited construction schedule workforce would be similar in size to the operational workforce discussed in Section 3.4.11.3.3. The increase of 650 to 850 new students attending area schools during operation was estimated to be approximately one more student per teacher and would not cause a major impact to the CRJMTC area schools. Because the total number of workers required for the expedited construction schedule would be less than the operational workforce, the expedited schedule workforce would also not have a major impact on CRJMTC area schools.

3.4.11.3.2.2 Mitigation

The socioeconomic impacts resulting from construction of the CIS would be major due to the generally depressed economies in the surrounding counties and largely positive, particularly in the areas of increased revenue for local counties and numbers of jobs supported. Therefore, mitigation measures would not be required.

3.4.11.3.3 Operation

As discussed in Section 2.7, between 650 and 850 employees and workers would be needed during potential CIS operation. This would include full time operating staff, plus contract operation and maintenance personnel. This operation staff would be expected to be a mixture of military, civilian, and other support staff that would be located both on and off the CRJMTC installation.

3.4.11.3.3.1 Environmental Consequences

<u>Tax Revenue Impacts</u>

Impacts of the potential CIS's operation on the region and nearby communities could potentially include impacts on nearby populations, buildings, roads, and cultural or recreational facilities. There is the potential that the demand for a number of local public services in the primary impact area would be impacted by facility operation. On the positive side, an increase in the population base would increase taxes and user fees for the continued funding of facilities and services. Sales tax collection from the operational workers would also have a positive impact on the county. Table 3.4.11-16 estimated impact that the CIS's operation would have on tax revenue in Portage County. The potential for negative impacts would also be present and could arise if the relocation of workers occurred rapidly and outpaced the ability of the area to provide for the sudden increase in demand for services. However, it is unlikely that this would occur.

Table 3.4.11-16 Estimated Sales Tax Revenue – Operation – CRJMTC

Input	Operation
Number of Workers (middle of given range of workers)	750
Assumed Expenditures Subject to Sales Tax [1] (per person/year Ohio)	$25,708
Sales Tax Rate (Portage County)	7.0%
Estimated Sales Tax Revenue [2] (total for CIS workers/year Portage County)	$674,835
Sales Tax Rate (Trumbull County)	6.75%
Estimated Sales Tax Revenue[2] (total for CIS workers/year Trumbull County)	$650,734
Estimated Total Tax Revenue	$1,325,569
Notes: 1. Based on 2014 data – no escalation. 2. Assumes 50 percent of expenditures would occur in county. Sources: BLS, 2014; Sales Tax, 2014.	

Regional Economic Impact Estimates

CIS operation would be expected to influence the regional economy by increasing the demand for goods and services and generating additional employment, income, output, and value added in the region. For this impact analysis, it was assumed that 750 workers would be employed annual at the CIS, which is the mid-point of the 650 to 850 worker range provided. It is also assumed that 85 percent of these workers would come from outside of the region due to the specialized training and high rate of military personnel required. During the operation period, a substantial amount of materials would be purchased and earnings would be generated by workers at the CIS.

To estimate the multiplier impacts during operations, the process involved allocating expenditures for materials to specific industries and adding in the estimated earnings of potential CIS staff. The average earnings was based on 2014 wages for military personnel, escalated to 2015 at 2.5 percent. The resulting total wages assumed to be earned by CIS staff during operations are approximately $21.5 million per year in 2015 dollars. These earnings plus the estimated material purchases were set in 2010 dollars and the RIMS II multiplier were applied. The estimated regional impact from these expenditures is shown in Table F.2. The annual expenditures for materials and earnings during the operating period are projected to produce the following impacts:

- The total change in output that occurs in all industries from the annual operation of the potential CIS project is projected to be more than $45 million in the selected region.

- The total incremental earnings (over and above the $21.5 million earned by the CIS staff) in the region arising from the project operation each year are estimated to be more than $14 million.
- The potential CIS deployment is projected to create 340 indirect yearly jobs during the operation (over and above the estimated 750 direct workers onsite).
- Finally, the total value added arising in the region from the CIS is estimated to be more than $27 million for each year of operation.

Employment and Industry

Between 650 and 850 employees and workers would be needed during CIS operation. In addition to the full-time workforce, maintenance and contract personnel would work at the site during scheduled maintenance and forced outages. This operation staff would be expected to be a mixture of military, civilian, and other support staff that would be located both on and off the CRJMTC installation.

Based on similar projects, the majority of the workforce (approximately 85 percent) required for the operation of the potential CIS would need to be brought into the area due to the high military and technology training requirements Local area contractors and other civilian services may be used for certain operations and maintenance activities as facility management deems appropriate.

The increase in population caused by 85 percent of the 650 to 850 new workers and their families that settle in Portage and Trumbull Counties and the region would increase the demand for certain services, such as restaurants. Consequently, the services industry would see a substantial increase in employment (ODS, 2012a). This increase in demand for service workers would continue throughout the operation of the CIS and would contribute to a small decrease in unemployment over the operating life of the CIS.

Traffic

Operational workers would likely be required to live within a certain distance of the facility in order to meet management requirements for response times in case of an emergency. In most instances, 30 miles or 30 minutes away from the facility is the management requirement for operational workers (Gilmore, 1982). Akron, Kent, Youngstown, and Warren are all within 30 miles of the CIS footprint, but Cleveland is more than 30 miles away.

Project operation could result in minor, adverse impacts on local traffic patterns due to the volume of workers accessing the site from the region each day. The potential CIS operational workforce would likely consist of specialized expertise that would have to be brought in from outside the region. These workers would probably settle in, and commute to work from, various locations in the region. The resulting commuter traffic would increase traffic congestion on roadways in the region as well as around the site. Refer to Section 3.4.12 for further traffic impact analysis.

Public Services

As indicated previously, the assessment compiled by the Portage County and Trumbull County Community Health Assessment Partnership identified areas of public health need in Portage and Trumbull Counties. Based on these areas of need, the influx of operational workers for the CIS could negatively affect the two counties' ability to meet health care needs for the existing population. However, if workers commuting from the surrounding region use healthcare facilities located near their homes for routine care, it is unlikely that Portage or Trumbull Counties' healthcare facilities would be burdened beyond their capacity.

Schools in the area may also need to accommodate increased enrollment due to the new workforce present in the area. While exact numbers for the possibility of new students are not available, it could be assumed that a portion of the new workforce would have children that would be incorporated into the Portage County education system. Currently, Portage County has an approximately 15:1 student to teacher ratio, while Trumbull County has an approximately 16:1 student to teacher ratio (ODS, 2012a; ODS, 2012b). For a conservative estimate, if it is assumed that each worker has only one child, approximately 650 to 850 new students would be entering the area.

Nationwide, the year 1955 had the highest student to teacher ratio, 26.9:1, since the metric was first taken (DES, 2015). With modern ratios trending around 15:1 across the U.S., the projected student:teacher ratio of 16:1 in Portage and Trumbull Counties with the potential CIS operation as shown in Table 3.4.11-17 would not seem to be unreasonably above the national average. With an increase of no more than approximately one child per teacher, the impact on the existing education system would be negligible.

Table 3.4.11-17 Total Portage and Trumbull County Student-to-Teacher Ratios during Operation – CRJMTC

			Projected Estimates			
	Existing Values (2012)		Low Estimate of Potential CIS Operation Workers		High Estimate of Potential CIS Operation Workers	
County	Total Students	Student: Teacher Ratio	Total Students [1]	Student: Teacher Ratio	Total Students [2]	Student: Teacher Ratio
Portage	22,473	15:1	23,123	15:1	23,323	16:1
Trumbull	30,317	16:1	30,967	16:1	31,167	16:1

Notes: 1. Assumes 650 new students.
2. Assumes 850 new students.
Source: ODS, 2012a; ODS, 2012b.

The level of emergency preparedness the site area meets the needs of the current population. The EMA would likely need to investigate its current emergency response plans to assess whether they adequately address procedures for the additional operational CIS workforces.

Other safety impacts could potentially include impacts on the demand for safety and emergency services at the CIS and by workers and families relocating to the area. This could include demands on police, fire, ambulance, and hospital services. For each of these services, the impact created in the area by relocating population is a function of the percentage increase in population. Based on the projected populations for Portage and Trumbull Counties, the 680 to 850 person population increase attributed to the relocation of the facility workforce would be small enough to not have an impact on the 2020 projected populations for Portage and Trumbull Counties (ODS, 2012a; ODS, 2012b; ODS, 2013). This represents an extremely small population increase and thus, a negligible increase in the potential for safety-related impacts.

Another factor in reducing the potential for safety impacts is the fact that the demand for public safety services should be small because the CIS design, emergency response programs, and operational practices would be established per appropriate safety standards. In fact, the CIS would be largely self-sufficient in terms of safety mitigation, which would include measures such as the following:

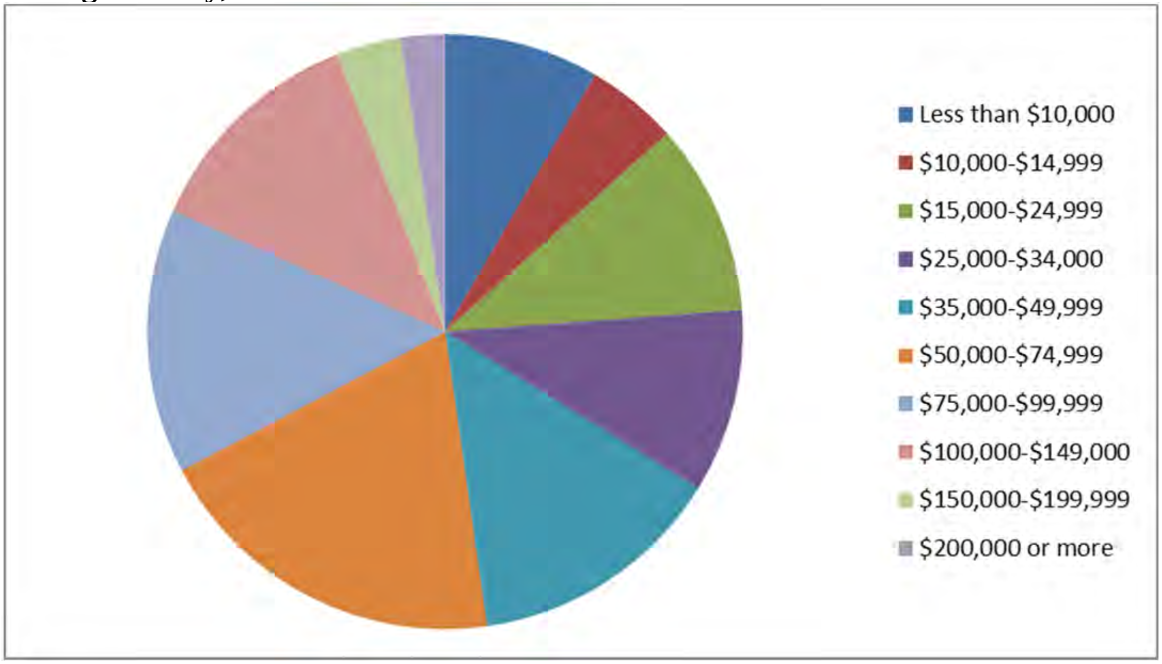
- Onsite personnel would be trained in facility response procedures as a condition of their employment;
- Security personnel posted onsite with a system in place to control personnel access.
- Security lighting, fire suppression equipment, and first aid stations throughout the facility site.
- Standard procedures for spill prevention and containment, injury response, and requests for assistance from local police, fire, and ambulance services.

3.4.11.3.3.2 Mitigation

The socioeconomic impacts that would result from operation of the potential CIS would be major due to the generally depressed economies in the surrounding counties and largely positive, particularly in the areas of increased revenue for local counties and numbers of jobs supported. Therefore, mitigation measures would not be required.

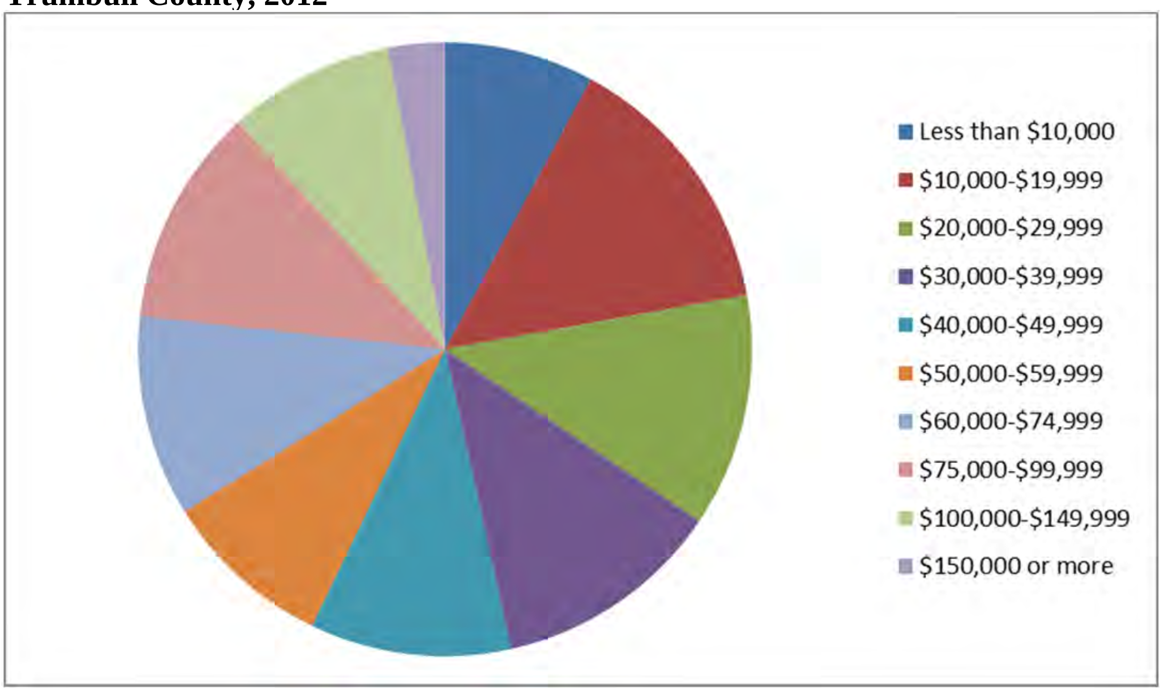
Figure 3.4.11-1 Median Household Incomes - CRJMTC

Portage County, 2012



Source: ODS, 2012a

Trumbull County, 2012



Source: Census, 2012d

3.4.12 Transportation – CRJMTC

Transportation focuses on the availability, condition, and use of infrastructure for moving people and goods and materials (including heavy haul equipment) within and through a given geographic area. This section presents information on the current transportation conditions at the CIS footprint and in the vicinity, project-related construction and operation impacts, and mitigation measures.

3.4.12.1 Regulatory Framework - Transportation – CRJMTC

Transportation infrastructure planning, design, and use are governed by various federal, state and local laws, regulations and ordinances. Key policies which influence how the federal government addresses environmental consequences include the following:

- EO 13274, Environmental Stewardship and Transportation Infrastructure Project Reviews (18 September 2002). EO 13274 promotes environmental stewardship in the Nation's transportation system and expedites environmental reviews of high-priority transportation infrastructure projects.
- EO13693 Planning for federal Sustainability in the Next Decade (19 March 2015). This EO establishes and integrated strategy towards sustainability in the federal government and to make reduction of greenhouse gas emissions a priority for federal agencies.

Requirements and permits for the transportation of people, equipment and materials are discussed in Section 3.4.12.3.1 and include a heavy haul permit from the Ohio Department of Transportation (ODOT), access permit from ODOT that requires a TIS for the potential CIS Gate traffic accessing SR 5, and a permit from the City of Cleveland for the heavy haul of equipment over city streets.

3.4.12.2 Affected Environment - Transportation – CRJMTC

There is a very good network of Interstate, U.S., and Ohio SRs, in the northeast portion of the State of Ohio. Those routes greatly enhance the ability to move both people and goods throughout the region. In the area around CRJMTC, there is I-80 to the north, I-76 to the south SR 11 to the east, and to the west there is I-77 up from Canton and I-480 and I-271 from Cleveland.

CRJMTC has an existing network of roads throughout the installation with many of them paved. The main roads in the area of the CIS footprint have been maintained, while the roads used less frequently have not been maintained and are in poor condition. If a deployment decision is made and CRJMTC is selected, an evaluation of existing roads along the potential CIS construction traffic route would be needed to determine if the roads have adequate structural capacity and if they meet the width and geometric requirements to facilitate vehicular transport of materials and equipment.

3.4.12.2.1 Ground Transportation

The capacity of the SRs used to access the CIS was evaluated for the EIS. This is a regional view of the potential impacts the site-generated traffic could have on the area roadways and is based on the available existing traffic counts from the ODOT. The area roadways are depicted on Figure 3.4.12-1.

The SRs selected for evaluation are all two-lane highways:

- SR 5 – in the vicinity of the Main Gate to CRJMTC.
- SR 225 – between I-76 and SR 5.
- SR 44/5 – between I-76 and SR 14.
- SR 14 – just northwest of Ravenna.
- SR 44 – just north of Ravenna.

The U.S. and Interstate highways are multi-lane routes and they are assumed to be able to accommodate the site-generated traffic. Thus the lower capacity State Routes with one lane in each direction, were chosen for analysis in this EIS. These State Routes feed into SR-5, which has direct access to the potential CIS gate at CRJMTC, and they are linked to the major highways in the Portage County area.

Traffic volumes are typically reported in Annual Average Daily Traffic (AADT) numbers, which represent the total volume of vehicles per day as averaged by the entire year. For the analysis of two-lane highways, the Design Hourly Volume (DHV) and directional distribution of traffic are a couple of main inputs for the HCS (UF, 2010). The HCS is based on the methodology of the Highway Capacity Manual (TRB, 2010). The peak hours of traffic on the roads are typically the morning and evening periods where motorists are traveling to and from work, respectively. The LOS is a quantitative measurement that represents the quality of service motorists experience as they travel the roadways. The Highway Capacity Model has six LOS, ranging from LOS A to LOS F, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst.

The following is a brief description of each level of LOS:

- LOS A - free flow, traffic flows at or above the posted speed limit.
- LOS B - reasonably free flow.
- LOS C - stable flow, at or near free flow.
- LOS D - approaching unstable flow, with speeds slightly decreased as traffic volumes increase.
- LOS E - unstable flow, operating at the capacity of the road.
- LOS F - forced or breakdown flow where vehicles move when the vehicle in front of it moves with frequent slowing required.

The ODOT website was used to access available traffic volumes (ODOT, 2013) for the selected SRs in the ROI. There is no traffic volume information for the CIS Gate nor the internal CRJMTC roads. The existing traffic volumes and LOS of the selected highways in this capacity analysis are noted in Table 3.4.12-1.

Table 3.4.12-1 Existing Traffic Volumes and Levels of Service - CRJMTC

Roadway	Annual Average Daily Traffic(1)	Traffic Peak Hour Volume(2)	Level of Service(3)
SR 5 (west of CRJMTC CIS Gate)	6,270	627	C
SR 225 (between I-76 and SR5)	1,520	152	B
SR 44/5 (between I-76 and SR 14)	13,100	1,310	D
SR 14 (just northwest of Ravenna)	15,280	1,528	C
SR 44 (just north of Ravenna)	7,090	709	D

1. From ODOT, 2013, with units of vehicles per day.
2. Assumed DHV is 10% AADT with units of vph.
3. HCS (UF, 2010) with assumed directional distribution of 50/50.

ODOT prefers a LOS C for these two-lane SRs. All of the highways meet this preference except for SR 44/5 and SR 44 which have an existing LOS D. This analysis was based on the morning peak hour time period, but it is also representative of the evening peak hour. The existing traffic data is based on AADT, with the assumption of the DHV being 10 percent of the AADT (TRB, 2000) and a directional distribution of 50/50. Furthermore, the percentage of no passing zones along the highways was very similar in either direction of travel in the segments studied for this EIS. Thus, the traffic volumes would be the same in either the morning or afternoon peak hours, just in opposite directions of travel, and because the other factors are consistent for travel in either direction there is really just one design hour that needs to be analyzed. See Appendix G.2 for the detailed HCS analysis results.

The existing onsite roads that provide access to various elements of the potential CIS were studied to determine their adequacy for carrying the site-generated traffic. Due to the availability of several existing road corridors within and serving the potential CIS area, there would be a very limited need to construct new roads in currently undisturbed areas. Figure 3.4.12-2 shows the existing roads on CRJMTC that would be used during the construction and operation of the potential CIS, along with some new segments of road required for access to select facilities.

The CIS gate for access to the CIS area would be George Road off of SR 5. This gate would be used by construction workers and operations personnel as they enter and exit CRJMTC. The delivery of the SIVs and silos would be through a gate on Greenleaf Road, just north of Newton Falls Road. Greenleaf Road extends south from CRJMTC and ties into SR 5, where it terminates. The SIVs and silos would need to access the CIS area at this gate, due to geometric constraints at the CIS gate.

3.4.12.2.2 Air Transportation

Air is the mode of transportation designated for initial transport of GBIs. The two airports available for delivery would be Akron-Canton Regional Airport and Youngstown Air Reserve Station. Akron-Canton Regional Airport is located approximately 15 miles from the CRJMTC CIS footprint and Youngstown Air Reserve Station is approximately 23 miles from the CRJMTC CIS footprint. Both airports could accommodate C-5 and C-17 aircraft and provide convenient access for subsequent ground transport to CRJMTC. The airfields have the capacity to accommodate the delivery of up to 60 GBIs total.

3.4.12.2.3 Railroad Transportation

Another possible mode of transport for equipment and materials during construction would be via rail. The majority of the railroad lines within CRJMTC have been deactivated. There is a rail yard on the east side of the installation that has a spur which extends 3,800 feet westward from a loading ramp to the CSX track south of SR 5. If any other tracks in the classification yard are to be used they would need to be inspected and repaired, most likely with ties being replaced. However, for this EIS it is assumed that the majority of the equipment and materials would be via over-the-road vehicles and thus an emphasis has been placed on that mode of transportation.

3.4.12.3 Environmental Consequences and Mitigation – Transportation - CRJMTC

If a deployment decision is made and CRJMTC is selected, an access permit for access at the CIS gate off of SR 5 would be required from ODOT. The access permit would warrant a TIS, due to the number of site generated traffic during both the construction and operation of the potential CIS. A special hauling permit for the transportation of the SIV and silos would be required from ODOT. The City of Cleveland also would require a permit for the movement of this type of cargo through their streets as it would be delivered from the Port of Cleveland to CRJMTC.

3.4.12.3.1 Construction – Baseline Schedule

3.4.12.3.1.1 Impact Calculation Basis

<u>Construction Traffic</u>

If a deployment decision is made and CRJMTC is selected, construction activities at CRJMTC would take a total of 5 years with tree clearing and site preparation (earthwork) occurring in the first two years, heavy construction (foundations, concrete, buildings, etc.) the next 2 years, and the final buildout occurring in the fifth year as discussed in Section 2.5.1. The construction workforce would average approximately 400 personnel, with a maximum of 600 during the peak construction activities. The site-generated DHV of one-way traffic for construction workers is estimated to be 540 vph due to the assumption of potential varying shifts and some carpooling.

These vehicles would be spread out over the various SRs, U.S. Routes, and Interstate highways in the area around CRJMTC. It is assumed that there would be a total of 90 trucks associated with the construction activities that would be entering and exiting the site during this time of peak construction. A 10-hour work shift was also assumed and thus an average of 9 trucks would be entering and exiting the site each and every hour of this workday. Furthermore, it was assumed that there would be some traffic exiting the site during the peak hour and it was equated to 10 percent of the construction workforce which equals 54 vehicles. Using the morning peak hour as the period for analysis, this results in a total site-generated traffic of 549 vehicles (540 cars and nine trucks) entering the CIS and 63 vehicles (54 cars and nine trucks) exiting the CIS during this peak period. It is also assumed this construction traffic would travel the surrounding road network during the existing peak hour of each respective roadway. There is an estimated balance between cut and fill volumes for site preparation and thus there is no need to analyze traffic impacts for trucks during this earthwork phase because they would remain onsite and not have to haul fill material to the site nor haul excess material off the site.

The construction and operation workforce would use the CIS gate to access the CIS which would be serviced exclusively by SR 5. The mobility of the construction workforce from Portage County and surrounding counties (Summit, Cuyahoga, Stark, Mahoning, Trumbull, and Geauga) was obtained from the 2010 Census (Census, 2010a). This information was used to distribute the construction workforce over the regional road network, taking into account the county the laborer resides in. The construction workers and the construction truck traffic were added to existing peak hour traffic data along the selected routes of this analysis. One of two future projects at CRJMTC, the Automated Record Fire to be constructed in 2016, would generate a slight increase in traffic assessing CRJMTC for Friday through Sunday training, three weekends per month. The other future project is the Multipurpose Machine Gun Range scheduled for construction in 2019–2021 and they do not anticipate a noticeable increase in traffic once this range opens. The projected population (ODS, 2013) of Portage County and that of the surrounding counties is expected to slightly decrease in the next 5 to 15 years. Therefore, the slight increase in CRJMTC traffic attributed to the Automated Record Fire is offset by a slight decrease in traffic due to the declining population in the area. Thus, the baseline condition of traffic in the future during the time of peak construction activities was assumed to be equal to the existing traffic condition. The LOS results with the construction traffic added to the baseline are shown in Table 3.4.12-2.

All of the SRs studied have the capacity to accommodate the increased traffic associated with the peak construction activities at CRJMTC. The LOS remained the same as the existing condition on three routes - SR 225, SR 44/5, and SR 44. However, the LOS was lowered from an existing condition LOS C to a peak construction condition of LOS D on two routes, SR 5 and SR 14.

Table 3.4.12-2 Continental United States Interceptor Site Peak Construction Levels of Service - CRJMTC

Roadway	Traffic Design Hour Volume(1)	Level of Service(2)
SR 5 (west of CRJMTC Main Gate)	1142	D
SR 225 (between I-76 and SR-5)	238	B
SR 44/5 (between I-76 and SR 14)	1,352	D
SR 14 (just northwest of Ravenna)	1,702	D
SR 44 (just north of Ravenna)	748	D
1. Units in vph. 2. HCS (UF, 2010).		

The existing onsite roads which would be designated for the potential CIS construction traffic route would be paved with a stabilized surface. Upgrades would be planned for the onsite existing roads that do not meet the necessary physical requirements. Potential modifications include curve widening at intersections and around curves to compensate for wheel off-tracking, surface stabilization (gravel roads) for augmented rut resistance and thickness increase for added structural capacity. New roads would be constructed within the CIS footprint to provide access to individual mission and support facility construction areas. These new roads would need to have sufficient width, structural capacity and meet longitudinal grade requirements.

Heavy Haul Equipment Transport

A viable route for heavy haul equipment was identified and coordinated with ODOT for the transportation of the SIV and silos during construction. A detailed evaluation of the proposed route is presented in the CIS Transportation Study (MDA, 2015a). The SIV and silos are heavy loads and also have height issues that need to be accounted for during transport over the road. If a deployment decision is made and CRJMTC is selected as the potential CIS location, at that time the exact route would be determined with ODOT while the heavy haul permit is obtained. The SIV and silos are anticipated to be manufactured on the West Coast and they would be shipped to the Port of Cleveland. Figure 3.4.12-3 shows one viable route for transporting the SIV/silos from the Port of Cleveland to CRJMTC. There were three transport vendors within 20 miles of CRJMTC with equipment capable of providing the required transport. The transport route begins on a few select city streets for a short distance then it goes along the following routes: U.S. Highway 422, I-271, I-480, SR 82, SR 91, SR 43, SR 14, and ultimately SR 5 to the Greenleaf Road Gate of CRJMTC.

Preliminary discussions were held with the ODOT during the CIS Transportation Study (MDA, 2015a) and this viable route does not require any modifications/upgrades to the existing roadway network. The route of the cargo going north on SR 91 and then south on SR 43 was directed by ODOT, due to construction on SR 82 between SR 91 and SR 43. Again, the final route would be determined with ODOT at the time the heavy haul permit is obtained. The Port of Cleveland has sufficient infrastructure to receive and unload vessels, provides a secure temporary holding area, and has easy access to a road network that is capable of handling the transport of the SIV and silo components.

MDA's preferred transport of GBIs and other equipment is by plane to an airfield, in close proximity of CRJMTC that is C-17 aircraft compatible and has adequate off loading facilities. The GBIs would be transported via truck over public roads and to the CRJMTC. The physical characteristics of the SIV and silo prohibit it from being transported by rail to the CIS at CRJMTC.

Onsite transportation of materials and equipment for CIS construction would be along a designated route originating at the last nodes of off-base ground transport (CIS gate and Greenleaf Road Gate) and traveling the perimeter of the CIS area via existing road corridors of George Road, Newton Falls Road, and Greenleaf Road, see Figure 3.4.12-2. To accommodate missile transport, SIV/silo transport, and delivery of materials and equipment, onsite roads would need to meet the requirements specified in Section 2.4.1.4. The dimensions and load characteristics of the SIV, silo, GBI and the transporters are noted in Section 2.6.1 and the CIS Transportation Study (MDA, 2015a).

3.4.12.3.1.2 Environmental Consequences

The regional roadway system has the capacity to accommodate the potential increased traffic due to peak construction activities at CRJMTC. If a deployment decision is made and CRJMTC is selected, there would be a slight reduction of LOS estimated for two of the State Routes, SR 5 just west of the CIS Gate at CRJMTC and SR 14 just northwest of the City of Ravenna. There would be no bridge, highway, or intersection modifications required for the transport of the SIVs and Silos from the Port of Cleveland to the CIS at CRJMTC. The majority of onsite roads (within the CIS footprint) would be newly constructed two-lane roads and they would have adequate capacity to accommodate the anticipated construction traffic.

3.4.12.3.1.3 Mitigation

ODOT prefers a LOS C for these two-lane State Routes. However, SR 44/5 and SR 44 have an existing LOS D and the two sections of highway that would be lowered from a LOS C to LOS D are very close to the threshold of the lower limit of LOS C. Typically a LOS D is acceptable during peak periods and ODOT would need to approve this slight reduction of LOS for the two roads noted. If CRJMTC is selected as the location of the CIS then an access permit from ODOT would be required which warrants a TIS red along SR 5 and current traffic counts, including turning movement counts, would be collected and analyzed at that time. This would involve close coordination with ODOT to ensure the LOS meets their requirements. At the intersection of SR 5 and the CIS gate, the volume of EB site-generated turning left into the gate would warrant a left turn lane for both the construction and operations conditions. There is already a right turn lane for WB motorists on SR 5 turning right into the gate, which satisfies the warrant for a right turn lane due to site-generated traffic volumes. The warrant for a traffic signal at the SR 5 and CIS gate entrance would be determined when a TIS is performed for an access permit from ODOT.

The LOS analysis conservatively assumed that all of the construction workers would travel to and from the CIS during the peak hour of traffic on the regional road network. To address this construction traffic concern, work schedules could be staggered such that the majority of the workers are traveling on the regional roads prior to and/or after the morning and evening peak hours for their respective roadways.

3.4.12.3.2 Construction – Expedited Schedule

The 3-year expedited construction schedule assumes two 10-hour per day work shifts with the peak period of construction still employing 600 workers as discussed in Section 2.5.1. There is also a 2 hour transition period between shifts so there are not 600 workers going to and coming from the potential CIS area at the same time. Therefore, the analysis performed for the baseline construction schedule would be the same for the expedited construction schedule because the peak volume of site-generated traffic would be the same and that traffic is still conservatively assumed to occur during the peak hour period of the respective area roadways. Thus the affected environment for transportation for CRJMTC would be the same as that described for the baseline construction schedule.

3.4.12.3.2.1 Environmental Consequences

The construction environmental consequences for transportation for CRJMTC would be the same as those described for the 5 year baseline construction schedule.

3.4.12.3.2.2 Mitigation

The construction mitigations for transportation for CRJMTC would be the same as those described for the 5 year baseline construction schedule.

3.4.12.3.3 Operation

As discussed in Section 2.7, a range of 650 to 850 employees and workers over a total of three work shifts would be needed during this CIS operation. The personnel employed would be a mixture of military, civilian and contractor workforce. It is assumed that there would be approximately 350 employees during the typical daytime shift spread out over the various SRs and U.S. Routes in the area of the potential CIS. Therefore, it is assumed that the CIS-generated traffic would be 350 one-way vehicles entering the CIS during the morning peak hour traffic. In addition, the personnel are assumed to arrive and depart within a 1-hour period (assumed no flex schedule) and it would coincide with the peak hour traffic volumes on the regional road network. It is assumed that there would be an additional 10 percent of traffic that would be attributed to trucks associated with the operation of the site entering and exiting the site. A 9-hour work shift was also assumed and thus an average of four trucks would be entering and exiting the site each and every hour of the workday. The other two work shifts are assumed to have approximately 250 workers per shift. Furthermore, using the morning peak hour for this analysis it was conservatively assumed one half of the third shift would travel the area roadways during the peak hour of the regional road network, which equates to approximately 125 vehicles. These assumptions result in a total CIS-generated traffic of 354 vehicles (350 cars and four trucks) entering the CIS and 129 vehicles (125 cars and four trucks) exiting the CIS during this peak period.

The distribution of site-generated traffic over the regional road network during the operation of the CIS would be similar to the construction worker distribution, with the majority of the workers coming from the more populated Cities located west of CRJMTC proper. The projected operations site-generated traffic was added to existing traffic data along the selected routes of this analysis. As noted previously, the projected population (ODS, 2013) of Portage County and that of the surrounding counties is expected to slightly decrease in the next 5 to 15 years. Therefore, the baseline condition of traffic in the future during the time of operations at the CIS is conservatively taken as the existing traffic condition. The LOS results with the operations traffic added to the baseline are shown in Table 3.4.12-3.

Table 3.4.12-3 Continental United States Interceptor Site Operations Levels of Service - CRJMTC

Roadway	Traffic Peak Hour Volume(1)	Level of Service(2)
SR 5 (west of CRJMTC CIS Gate)	1,032	D
SR 225 (between I-76 and SR5)	221	B
SR 44/5 (between I-76 and SR 14)	1,342	D
SR 14 (just northwest of Ravenna)	1,664	D
SR 44 (just north of Ravenna)	739	D
1. Units of vph. 2. HCS (UF, 2010).		

The LOS results of the operations site-generated traffic are similar to the results of the construction site-generated traffic on the surrounding road network. All of the SRs studied have the capacity to accommodate the increased traffic associated with the operations of the potential CIS at CRJMTC. The LOS would remain the same as the existing condition on three routes - SR 225, SR 44/5, and SR 44. However, the LOS would be lowered from an existing condition LOS C to an operations condition of LOS D on two routes, SR 5 and SR 14.

If a deployment decision is made and CRJMTC is selected, then during the design phase a network of onsite new roads and parking areas would be designed and subsequently constructed to serve the CIS operations. Onsite parking capacity, traffic circulation patterns, security, and turning radius would be evaluated during the design phase.

Table 3.4.12-4 provides a comparison of the LOS during the three periods analyzed in this EIS.

Table 3.4.12-4 Levels of Service Comparison - CRJMTC

Roadway	Existing Level of Service	Peak Construction Level of Service	Operations Level of Service
SR 5 (west of CRJMTC CIS Gate)	C	D	D
SR 225 (between I-76 and SR 5)	B	B	B
SR 44/5 (between I-76 and SR 14)	D	D	D
SR 14 (just northwest of Ravenna)	C	D	D
SR 44 (just north of Ravenna)	D	D	D

As noted previously, both the peak construction and operations periods lower the LOS one level for SR 5 west of CIS gate and SR 14 just northwest of Ravenna. This slight reduction in LOS for these two roadways is a minor impact and the roads have adequate capacity to accommodate the potential CIS generated traffic.

3.4.12.3.3.1 Environmental Consequences

The regional roadway system has the capacity to accommodate the increased traffic due to operation of the potential CIS at CRJMTC. If a deployment decision is made and CRJMTC is selected, there would be a slight reduction of LOS estimated for two of the SRs, SR 5 and SR 14 as noted above. Improvements to the internal roads would have been made during the construction phase, so there are no environmental consequences related to the internal road network during the operation of the CIS. The internal roads would have adequate capacity to accommodate the site-generated traffic.

3.4.12.3.3.2 Mitigation

ODOT prefers a LOS C for these two-lane State Routes. However, SR 44/5 and SR 44 have an existing LOS D and the two sections of highway that would be lowered from a LOS C to LOS D are very close to the threshold of the lower limit of LOS C. Typically a LOS D is acceptable during peak periods and ODOT would need to approve this slight reduction of LOS for the two roads noted. Again, if a deployment decision is made and CRJMTC is selected as the location of the CIS then an access permit from ODOT would be required which would warrant a TIS along SR 5 and current traffic counts, including turning movement counts, would be collected and analyzed at that time. This would involve close coordination with ODOT to ensure the LOS meets their requirements. At the intersection of SR 5 and the CIS gate, the volume of EB site-generated turning left into the gate warrants a left turn lane for both the construction and operations conditions. There is already a right turn lane for WB motorists on SR 5 turning right into the gate, which satisfies the warrant for a right turn lane due to site-generated traffic volumes. The warrant for a traffic signal at the SR 5 and CIS gate entrance would be determined when a TIS is performed for an access permit from ODOT.

The LOS analysis conservatively assumed that all of the operations personnel would travel to and from the potential CIS during the peak hour of traffic on the regional road network. To address this, operations traffic work schedules could be staggered such that the majority of the workers are traveling on the regional roads prior to and/or after the peak hours for their respective roadways.

Figure 3.4.12-1 Regional Road Network - CRJMTC

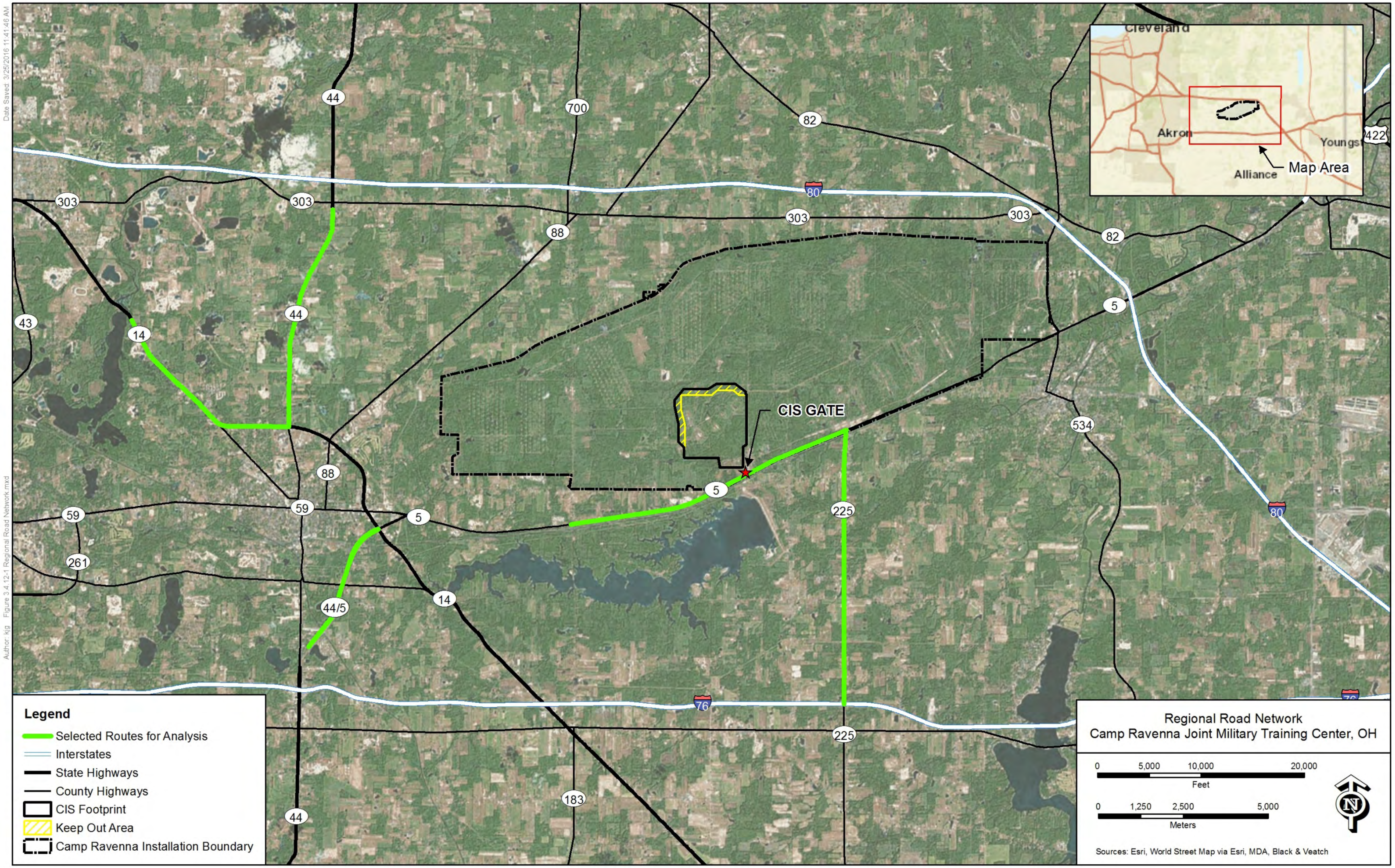


Figure 3.4.12-2 CRJMTC Road Network

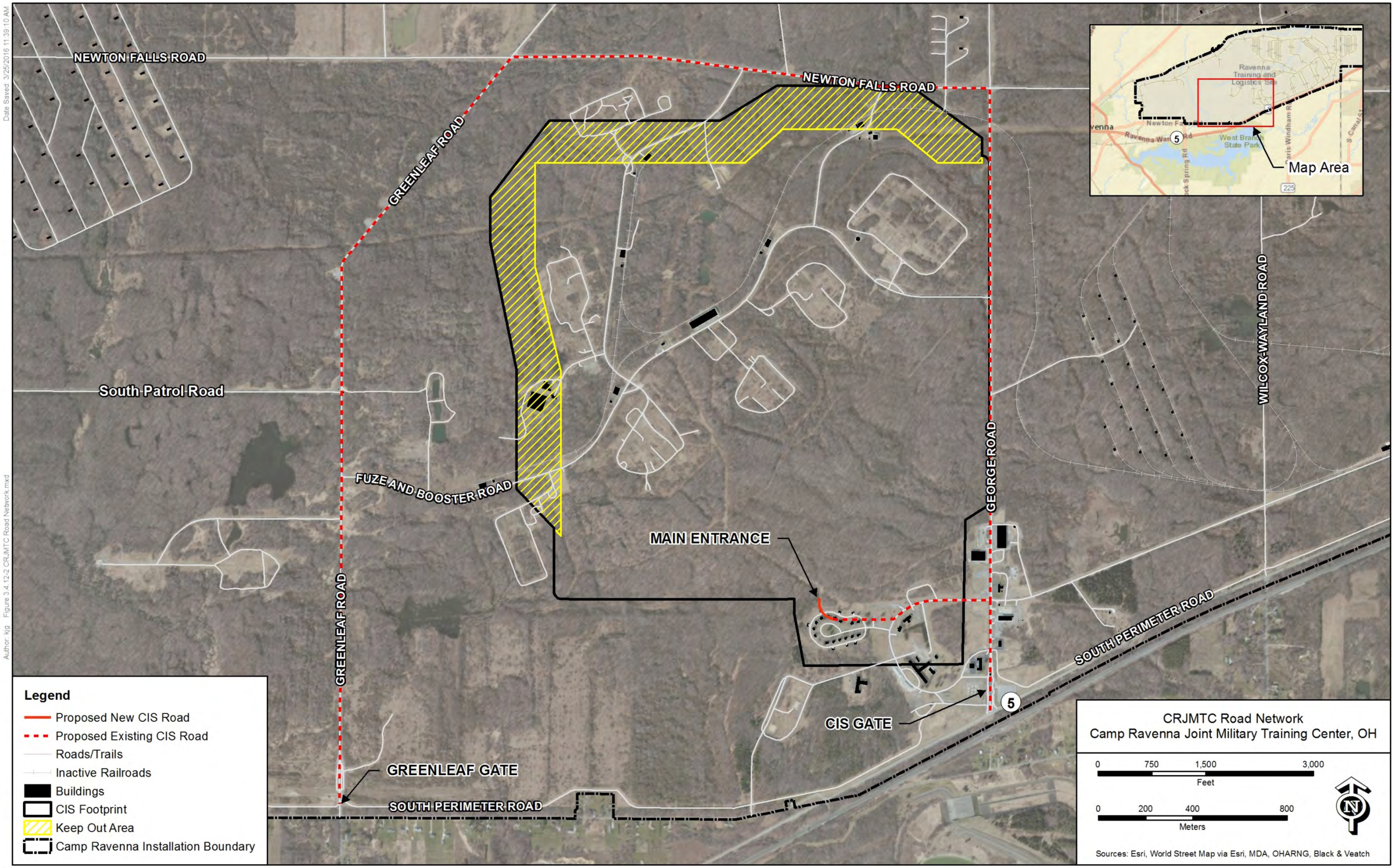
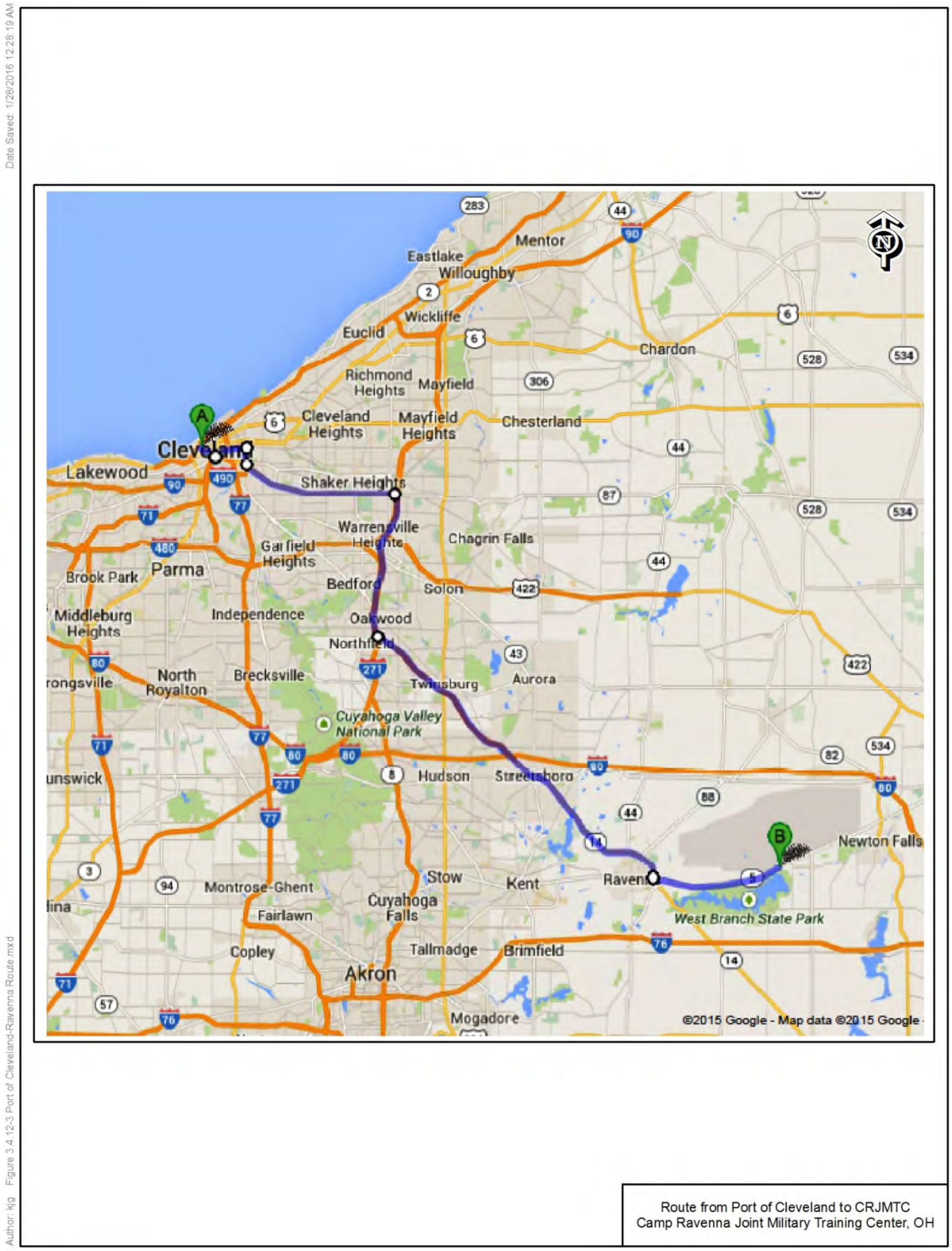


Figure 3.4.12-3 Route from Port Cleveland to CRJMTC



3.4.13 Utilities – CRJMTC

The utility systems addressed in this analysis include the facilities and infrastructure used for:

- **Water** services including pumping, treatment, storage, and distribution. Includes potable water, fire protection water, and water needed for facilities operation.
- **Wastewater** management including collection and treatment.
- **Solid waste** collection and disposal.
- **Electrical and natural gas or other fuel sources** used for energy generation and distribution.
- **Communication** services, specifically those related to telephone and internet services.

For this analysis, both onsite and offsite service provisions were considered. The primary considerations for the utility services include abilities related to processing, distribution, storage capacities, and consumption demands, needed to determine the adequacy of services for future services related to the potential CIS deployment.

3.4.13.1 Regulatory Framework – Utilities – CRJMTC

Utilities are governed by various federal, state, and local laws, regulations, and ordinances. Key guidance regarding how the federal government is to address the environmental compatibility of infrastructure is contained in the following:

- EO 13211 Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use (issued on May 18, 2001). EO 13211 requires that agencies address the effects of certain regulatory actions on energy supply, distribution, or use.
- EO 13693 Planning for Federal Sustainability in the Next Decade (issued on March 19, 2015). EO 13693 establishes an integrated strategy towards sustainability in the federal government and encourages federal agencies to reduce greenhouse gas emissions.

3.4.13.2 Affected Environment – Utilities – CRJMTC

Information and data gathered for this assessment was based primarily of correspondence with the installation (CRJMTC, 2015b), site plans (OHARNG, 2014), and through information obtained as part of the utility study (BVSPC, 2016a*)*.

The potential CIS at CRJMTC is located within an area of the installation that currently has limited utility services.

3.4.13.2.1 Water Supply

Potable water services for the primary cantonment area of the installation (east part of the site) are provided by the City of Newton Falls (OHARNG, 2014). If commercial connection was provided from the primary installation cantonment area to the CIS footprint it would require approximately 6.7 miles of service lines. In addition to commercial water, four water supply wells are present in the former cantonment area (located adjacent to the CIS footprint). These wells are only used as a non-public water source, for limited supplies of less than 25 persons each.

A water and wastewater MILCON funded project is currently underway that would provide water and sanitary sewer service for up to 5,000 personnel (CRJMTC, 2015b; OHARNG, 2014). These systems are currently under construction with a planned operational date of mid-2016. The water system would be provided by the Village of Windham (located to the north of the CRJTMC installation). The Village of Windham's water plant has a capacity of approximately 1 MGD, but currently only uses about 0.3 MGD (BVSPC, 2016a). The service access point for this newly installed water and wastewater system would be located within 0.5 miles of the southeast corner of the CRJMTC Site footprint.

Currently there are no water supply wells within the CIS footprint. As discussed in Section 3.4.6 Geology and Soils, and Section 3.4.14 Water Resources, there appears to be adequate groundwater present that could be used as sources of potable and non-potable water from water bearing units and aquifers underlying the CIS footprint. Based on previous geologic and hydrogeologic studies discussed in these sections, the groundwater aquifers underlying the CIS footprint could produce from 5 to 200 gpm or greater. However, as discussed later in the utilities consequences and mitigation section, capacity could be contingent on the location. If near one of the IRP sites where contamination from shallow groundwater (less than 70 ft bgs) has been noted, then provisions including casing off the upper water bearing units and or providing treatment could be required.

3.4.13.2.2 Wastewater Management

Current wastewater and sewer services for the primary installation cantonment area of the installation are provided by the City of Newton Falls (OHARNG, 2014). With the exception of a few small septic systems, no wastewater services are currently present in the CIS footprint. If commercial connection was provided from the primary installation cantonment area to the CRJMTC CIS footprint, it would require approximately 6.7 miles of service lines.

The wastewater MILCON funded project currently underway would provide sanitary sewer service for up to 5,000 personnel (CRJMTC, 2015b; OHARNG, 2014). This system is currently under construction with a planned operational date of mid-2016. This wastewater system would be provided by the Village of Windham (located to the north of the CRJTMC installation). The Village of Windham's wastewater plant was designed for a capacity of approximately 0.46 MGD, but currently average daily flows are only about 0.23 MGD (BVSPC, 2016a). The service access point for this newly installed wastewater system would be located within 0.5 miles of the southeast corner of the CIS footprint.

While the utility study does indicate that there is capacity at the sewage treatment plant at Windham, there is a possibility that the construction and manning of a CIS at CRJMTC would initiate upgrades to the Windham treatment plant. If upgrades are initiated, they would occur on already developed land at the existing water treatment plant. The overall impacts of this type of upgrade would be minor.

3.4.13.2.3 Solid Waste

Solid waste collection and disposal services are currently provided by Waste Management, Inc. (CRJMTC, 2015b).

3.4.13.2.4 Energy

Energy includes both electrical power and natural gas or other heat fuel alternatives.

Commercial power is provided to CRJMTC by Ohio Edison. Electricity comes onto the CRJMTC at several locations (OHARNG, 2014). The closest access point for electricity is near the main gate, approximately with 0.5 miles within the southeast corner of the CIS footprint (BVSPC, 2016a). A substation may need to be provided outside of the CRJMTC boundary near the CIS footprint to transform needed power source. If needed, the substation would require approximately 1 to 2 acres.

Natural gas is available at the primary cantonment area of the installation which is approximately 6.7 miles from the CIS footprint (OHARNG, 2014). Currently there is no natural gas service provided to the area of the CRJMTC Site footprint. Propane fuel for heating systems is currently provided for this area by local vendors. However, there is a natural gas service line to the south, within approximately 0.5 miles of the main gate and southeast corner of the CRJMTC site footprint. This line is owned and operated by Dominion East Ohio and could provide natural gas service to the potential CIS (BVSPC, 2016a).

3.4.13.2.5 Communications

Telephone service is currently available at the primary cantonment area (located in the eastern portion of the CRJMTC) and at the main CRJMTC gate (within approximately 0.5 miles of the CIS footprint) with services being provided by CenturyLink (CRJMTC, 2015b; OHARNG, 2014).

Internet (fiber cable) services are available and provided by CenturyLink at the primary cantonment area approximately 6.7 miles from the CIS footprint (CRJMTC, 2015b). No internet service is currently provided to the western portion of the site (area of the CRJMTC Site footprint). An available fiber cable connection point is also available near the main gate within approximately 0.5 miles of the CIS footprint, but has not yet been connected to provide internet services to this area (BVSPC, 2016a).

3.4.13.3 Environmental Consequences and Mitigation – Utilities - CRJMTC

Based on preliminary estimates defined for the utility study, utility services required for the potential CIS operations would consist of the following (BVSPC, 2016a):

- **Water demand**: 275 gpm (assumed peak demand includes potable and fire water demand). An emergency backup water supply source would be provided for potential CIS operation.
- **Wastewater/sewer capacity**: 100 gpm.
- **Solid waste**: 1.5 CY/day.
- **Electric demand**: 10 MW. A total of four 3-MW generators would be provided as part of the CIS emergency backup power.
- **Heating load:** 7 MBtu/hr. Load to be provided by natural gas or other fuel sources (fuel oil, etc.).
- **Communication usage**: To be determined based on personnel and system during CIS design.

Although not specifically defined, it has been assumed that the construction demand would be less than operations demand. However, to provide for a conservative estimate to the relative construction demands it has been assumed that they would be equal to operations demands.

For the utilities needed for the potential CIS, unless otherwise defined, it has been assumed that utility services would generally be provided by the existing commercial sources that were identified in Section 3.4.13.2. For the commercial utility services, it has been assumed that routing and the connection of new services to the CIS footprint would be provided within existing road or utility ROWs in order to minimize impacts to the environment.

All utility infrastructure exterior to the installation boundary would require acquisition ROW. Also, as needed, any permits required for utilities services would need to be obtained if a decision has been made whether to deploy the CIS and a preferred site is selected.

3.4.13.3.1 Construction – Baseline Schedule

For the analysis of the impacts from construction of utilities, it has been assumed that utilities services would be provided as follows:

- **Water services**: Commercial or onsite source to be provided though coordination with or by the construction contractor.
- **Wastewater/sewage services:** Commercial source or services to be provided by construction contractor.
- **Solid waste management**: Commercial services provided through/by the construction contractor.

- **Electric demand:** Commercial source coordinated with/through the construction contractor with some limited needs being directly provided by construction contractor provided generators.
- **Heating load**: Assumed to be provided through/by construction contractor through a commercially provided existing service (natural gas) or by offsite fuel source provider (fuel oil).
- **Communications:** Assumed to be provided through/by the construction contractor through a commercial source or provider.

3.4.13.3.1.1 Environmental Consequences

The following are environmental consequences attributed to utilities for construction related activities:

Water Supply. Water for construction activities would be provided from a commercial source.

It is assumed that for construction of the potential CIS that the water source currently being installed as part of the MILCON project would be available for connection and use. Based on the capacity being provided for up to 5,000 personnel, no impacts would occur. It has also been assumed that the connections and piping would be provided along existing road ROW or within areas to be developed within the CIS footprint; therefore, environmental impacts would be negligible.

Wastewater. Wastewater and sanitary sewage management during construction activities could be provided through commercial sources (connected to MILCON project source, if available) or provided via commercial services provided by the construction contractor. If connection to the commercial sources from the MILCON project is provided, based on the assumed demand versus the capacity no adverse impacts would occur. Also, if wastewater management would be provided by an existing commercial provider, it has been assumed that the connections and piping would be provided along existing road or utility ROW or within the CIS footprint and, therefore, environmental impacts would be negligible.

Otherwise, if wastewater and sanitary sewage management would be provided by the construction contractor’s commercially provided service, it has been assumed that this service would be licensed to provide these services in accordance with OEPA requirements. Therefore, environmental impacts associated with these services would be negligible.

Solid Waste. Collection and disposal of solid waste generated during construction activities would be coordinated by the construction contractor in accordance with OEPA requirements. Therefore, no impacts from solid waste disposal during the potential CIS construction activities would occur. The local landfill capacity could meet the demands anticipated during construction.

Electrical Power. Commercial power for the potential CIS construction activities could be provided by Ohio Edison. If a substation would need to be provided, it has been assumed that it would be provided by Ohio Edison at a location offsite. Routing of services from either of these sources would be provided within existing road or utility ROWs. In addition, the construction contractor could address localized construction needs by the use of generators. The use of generators has been accounted for in emissions estimates in Section 3.4.1 Air Quality. Overall, based on the estimated electrical demand versus available power, routing of service lines in existing road or utility ROWs, and accountability of potential low emission impacts during construction activities from construction contractor generators, negligible impacts from electrical services to be provided for construction activities for the CIS at CRJMTC would occur.

Although not related directly to electrical power needed for construction, one additional area that would be addressed during/prior to construction activities would be the relocation of facilities currently within the CIS footprint and associated utilities. As described in Section 2.9.2 (see Figure 2.2-6) and in further detail in Section 3.4.9 Land Use, several facilities located within the CIS footprint would need to be relocated. Electrical services would need to be provided and routing in a new area for the relocated shoot house (1.3 miles of new overhead and communications lines) and approximately 1.5 miles of new overhead electric and communication lines would be relocated to along the east side of the CIS footprint (from the west side to support both an ammunition supply point and shoot house). However, the impacts resulting from these actions would be relatively negligible because the routing of new service lines would be along existing roadway or utility ROWs.

Natural Gas or Other Heating Fuel Sources. Construction activities, especially at its peak, would primarily be provided during late spring, summer, and early fall; therefore, minimizing the need for temporary heating systems and the need for natural gas. It has been assumed that natural gas service would be provided to the CIS footprint to accommodate for the construction heating load. Fuel oil (kerosene or diesel) fired-boilers could be used as an alternative to natural gas. Natural gas is available near the site and would require providing service lines to the site if used for construction services. Fuel oil is also available through several vendors within the vicinity of CRJMTC. Provisions for accounting for heat generated emissions have been provided for in Section 3.4.1 Air Quality. Overall, based on the estimated temporary heating system demands from construction activities, ready availability of natural gas or fuel oil and associated accountability of related emissions, negligible impacts would occur.

Communication (telephone and Internet). Communication systems during the potential CIS construction would be the coordinated and the responsibility of the construction contractor. If communication systems are provided, they may be provided from existing sources (telephone and internet services) by connecting to existing services and routing them along existing ROWs or they could be provided by the construction contractor by other methods (e.g., cell phone service or wireless internet services). Overall, regardless of the communications method used, negligible impacts would occur for communication utilities during potential CIS construction activities.

3.4.13.3.1.2 Mitigation

Water. Due to the negligible impacts that might be incurred with commercial water use for potential CIS construction activities, no mitigation would be required for that water source.

Wastewater. Because there would be only negligible impacts for either commercial and onsite provided wastewater management for CIS construction activities, no mitigation would be required.

Solid Waste. Because there would be no impacts associated with solid waste disposal from CIS construction activities, no mitigation efforts would be required.

Electrical. Because there would be only negligible impacts associated with providing electrical services during CIS construction activities, no mitigation efforts would be required.

Natural Gas or Other Heating Fuel Sources. No mitigations would be required for the negligible impacts associated with the use of natural gas or alternatives such as fuel oil for heating sources during construction.

Communication (telephone and Internet). No mitigations would be required for the negligible impacts associated with providing communication services during CIS construction activities.

3.4.13.3.2 Construction – Expedited Schedule

The environmental consequences and mitigations for utilities for construction under the expedited schedule would be the same as for the baseline schedule.

3.4.13.3.3 Operation

For utilities needed for operation of the potential CIS the following has been assumed:

- **Water services:** Water services would be provided for routine operations by commercial sources or for routine, and at a minimum emergency/backup conditions by onsite sources.
- **Wastewater/sewage services:** Wastewater services would be provided by commercial or onsite sources for the estimated demand required for the operation of the potential CIS.
- **Solid Waste:** Solid waste collection and disposal services would be provided by existing commercial offsite sources.
- **Electric demand:** Electrical demand would be provided for a commercial source(s), with an onsite power generation source provided for backup and emergency services.
- **Heating load**: Heating loads and demands would be provided by existing commercial services or by an offsite fuel source provider.

- **Communications:** Communication services would be provided by commercial sources or providers.

3.4.13.3.3.1 Environmental Consequences

The following are environmental consequences attributed to utilities for operations-related activities:

Water Supply. Water for the potential CIS operations activities would be provided from either commercial sources for routine operation or by onsite wells for backup/emergency purposes.

If commercial sources are used, there would be no adverse impacts. For the commercial water sources, it has also been assumed that the connections and piping would be provided along existing road or utility ROW or within the CIS footprint and, therefore, environmental impacts would be negligible.

As described in section 2.4, an onsite water supply to fulfill the routine demand (275 gpm), it would be provided as an emergency/backup service. Based on hydrogeologic information provided for aquifers in the area of the footprint (5 to 200 gpm or greater), onsite groundwater from wells should be adequate to meet the demand during the CIS operations. However, due to the presence of potential groundwater contamination from the AOC sites present within the CIS footprint (more details provided in Section 3.4.14 Water Resources and Section 3.4.7 Hazardous Materials/Hazard Waste), care would need to be taken to avoid those areas, or if not avoided, a combination of casing and treatment could be required, especially if used as both potable and non-potable water sources. Therefore, only minor impacts would be anticipated. However, similar to construction, due to the adequate availability of commercial water source and potential for encountering groundwater contamination using onsite water for routine operations would be avoided.

Overall, whether used for routine operations or only for backup/emergency potential use during operations, environmental impacts associated with use of onsite groundwater for operations of the CIS facilities via onsite wells would only have moderate impacts due to the need for potential treatment contaminated water above standard practices due the presence of AOC sites.

Wastewater. Wastewater and sanitary sewage management during potential CIS operations are assumed to be provided through commercial sources (connected to existing sources) or as described in Section 2.4, provided by an onsite wastewater facility constructed as part of the CIS. For either of these wastewater management services, the capacity is assumed to be 100 gpm.

If commercial sources are used, based on the assumed demand versus the capacity no adverse impacts would be incurred. Also if commercial wastewater management is provided, it has been assumed that the connections and piping would be provided along existing road or utility ROWs or within the CIS footprint.

If provided by an onsite CIS-specific facility, as described in Section 2.4, the facility would be designed and built based on the unique size requirement for the specific CIS location. If provided, the onsite wastewater management facility would be designed and operated in accordance with UFC and applicable state (including OEPA) and local requirements. Specific provisions would include those related to any treated and permitted wastewater discharge and/or residual waste disposal requirements.

Overall whether wastewater services would be provided by commercial sources or by an onsite CIS facility, environmental impacts related to these services would be negligible.

Solid Waste. Solid waste generated during operational activities would be address by an offsite commercial source. Therefore, there would be only negligible impacts from solid waste disposal during the CIS operations.

Electrical Power. Electrical power for routine operations electrical power would be provided by a commercial source(s), whereas an onsite power generation source would be provided for backup and emergency services. A demand of 10 MW has been assumed for electrical power services.

Commercial power for the CIS could be provided by Ohio Edison. If a substation would need to be provided, it has been assumed that it would be provided by Ohio Edison at a location offsite. Routing of services from either of these sources would be provided within existing road or utility ROWs.

In addition to commercial power sources for routine operations, a backup and emergency power generator system would also be provided for the CIS. As described in Section 2.4, the backup power plant would consist of an estimated four 3-MW diesel generators, switchgear, operations room, and maintenance area. The power plant would be operated with diesel supplied from dedicated day tanks supplied from larger fuel tanks. The impacts related to emissions generated from the operation of this power plant as well as fuel storage and use has been discussed in the Section 3.4.1 Air Quality. Additional impacts related to fuel storage and use has also been discussed in the Section 3.4.7 Hazardous Materials/Hazardous Waste. In addition to the power plant, as defined in Section 2.4, a substation would be provided for the CIS. This substation would provide electrical service interface with the commercial and the CIS power plant. The specific size of this substation would be determined during the design process. Infrastructure for electrical service lines throughout the CIS would be provided by buried duct banks.

Overall whether electrical services are provided by commercial sources or by an onsite CIS facility, environmental impacts associated directly with these services would be negligible. As indicated, additional evaluation of impacts related to emissions and handling of fuel for the backup emergency electrical power generation plant has also been provided in the Sections 3.4.1 Air Quality and 3.4.7 Hazardous Materials/Hazardous Waste.

Natural Gas or Other Heating Fuel Sources. Heating of the potential CIS facilities during operations would be by natural gas, some alternative fuel source (kerosene or diesel), or by electricity. For the potential CIS operations an estimated 7 MBtu/hr heating load capacity would be required. Due to the nearby supply of natural gas, it would be the assumed fuel source for heating. Fuel oil (kerosene or diesel) fired-boilers could also be used as an alternative to natural gas to provide any required heating loads. Fuel oil is available through several vendors within the vicinity of CRJMTC. Provisions for accounting for natural gas fired-heating systems emissions have been provided for in Section 3.4.1 Air Quality for CIS operations.

Overall, because the source of natural gas or fuel oil appears readily available to meet the heating requirements for the potential CIS facilities, environmental impacts associated directly with these services would be negligible. As indicated, additional evaluation of impacts related to emissions have been provided in the CRJMTC Air Quality section.

Communication (telephone and Internet). Communication (telephone and internet) systems for the CIS operations would be provided from existing fiber cable sources and routed in or along existing road or utility ROWs and therefore environmental impacts would be negligible.

3.4.13.3.3.2 Mitigation

Water. Because impacts associated with use of a commercial water source for potential CIS operations would be negligible, no mitigation would be required.

Due to the potential presence of contamination from IRP sites, mitigation for groundwater use could be required and could include testing and treatment.

3.4.13.3.3.3 Mitigation

If CRJMTC is selected for deployment of the CIS, additional evaluation of well location, drilling of test wells, and pump testing to determine well capacity and degree of potential water quality would be provided. Any wells installed at CRJMTC for potable and non-potable water use would need to be drilled and installed in accordance to OEPA well requirements, and groundwater would also need to be treated in accordance with OEPA requirements. Overall impacts to groundwater as a water source for backup/emergency activities via onsite wells would be negligible.

Regardless, of whether onsite water was provided for routine operations, as described in Section 2.4, an on onsite source (groundwater provided by wells) would be provided and used for an emergency/backup water source. As defined in Section 2.4, a water supply facility would be provided and designed to supply and distribute water to the CIS facilities for all necessary capabilities in an autonomous mode for a period should conditions warrant. This facility system would consist of wells, water treatment equipment, pumps, and storage tank to distribute potable water. In addition to the water supply system for potable water, as also defined in Section 2.4, a fire protection water supply and storage system would also be provided for the CIS. Both the potable water supply and fire protection systems would be designed and operated in accordance with UFC and applicable state (including OEPA) and local requirements. As described previously area in the vicinity of former AOC sites and known groundwater contamination would need to be avoided or provisions treat the contaminated groundwater would need to be provided.

Wastewater. Because impacts associated with use of either commercial or onsite wastewater management for CIS operations would be negligible, no mitigation would be required.

Solid Waste. Because impacts associated with solid waste disposal for CIS operations would be negligible, no mitigation would be required.

Electrical. Because impacts associated with providing electrical power for CIS operations would be negligible, no mitigation would be required.

Natural Gas or Other Heating Fuel Sources. Because impacts associated with providing heating of facilities by natural gas or fuel oil during CIS operations would be negligible, no mitigation would be required.

Communication (telephone and Internet). Because impacts associated with providing communication services during CIS operations would be negligible, no mitigation would be required.

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3.4.14 Water Resources – CRJMTC

Water resources include the quality, quantity, physical characteristics, and use of groundwater and surface waters. This section describes the existing water resource conditions at the project site and construction and operations-related impacts and mitigation.

3.4.14.1 Regulatory Framework –Water Resources – CRJMTC

There are a variety of laws, regulations, and requirements that must be taken into consideration when determining the effects of a potential deployment and alternatives on water resources including, but not limited to:

- CWA Section 401, Water Quality Certification, 1986 provides states with the authority to ensure that federal agencies will not issue permits or licenses that violate the water quality standards.
- CWA Section 404, Permits for Dredged or Fill Material, 1977 establishes a program to regulate the discharge of dredged or fill material into the WOUS, including wetlands.
- CWA Section 402, National Pollutants Discharge Elimination System, 1972 regulates the discharge of storm water and wastewater to surface waters of the U.S.
- CWA Section 303(d), 1972 requires that all states, territories and authorized tribes designate and prioritize cleanup of waters that are too degraded to meet water quality standards (impaired waters).
- Endangered Species Act, 1973 protects and provides for recovery programs for imperiled species and the ecosystems upon which they depend. Under Section 7 of the ESA, federal agencies are required to coordinate their actions with the USFWS and the NOAA to prevent jeopardizing the continued existence of species.
- NEPA, 1969 requires that water resources be fully considered prior to undertaking any major federal action that significantly affects the environment.
- 40 CFR Part 112, Oil Pollution Prevention establishes procedures, methods, equipment, and other requirements to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable WOUS.
- 40 CFR Part 651, Environmental Analysis of Army Actions regulates environmental protection and enhancement and provides the framework for the U.S. Army Environmental Management System.
- AR 200-1 Environmental Protection and Enhancement implements policy for the integrated management of natural resources (including biological and earth resources) on property and lands managed and/or controlled by the DoD.
- DoD Instruction 4715.03, Natural Resources Conservation Program implements the NEPA and establishes the U.S. Army's policies and responsibilities for considering environmental issues in planning and decision-making.

- Ohio Administrative Code, Chapter 3745-1 sets forth minimum water quality requirements for all surface waters of the state to enhance, improve, and maintain water quality water quality as provided under the laws of the State of Ohio.
- Ohio Revised Code, Title 61, Chapter 6111 sets forth regulation of isolated wetlands.
- U.S. Department of the Army, Technical Manual 5-633, Fish and Wildlife Management provides civil engineering requirements for all new and renovated government-owned facilities for the DoD.
- UFC 3-210-01 Civil Engineering provides civil engineering requirements for all new and renovated government-owned facilities for the DoD.
- UFC 3-210-10 Low Impact Development provides technical criterial, technical requirements, and references for storm water planning and management at DoD projects.
- U.S. Energy Independence and Security Act, Section 438 of the EISA implements requirements for the reduction of storm water runoff associated with new construction of current and future DoD projects.

These laws, regulations, and requirements identify the compliance process; define responsibilities of the federal agency proposing an action; and coordination with appropriate public agencies and institutions. A ‘federal action’ is a project or program funded in whole or in part by a federal agency, an action being implemented on behalf of a federal agency, or one that requires a federal permit, license, or approval.

3.4.14.2 Affected Environment – Water Resources – CRJMTC

3.4.14.2.1 Surface Water Features

Watersheds. A watershed represents a dividing ridge separating one drainage area from others or the area that drains into a river or lake. The northern and central portions of the CRJMTC installation are drained by Sand Creek, with a total drainage basin of 13.5 mi^2. Sand Creek flows into the South Fork of Eagle Creek, which has a drainage basin of 30.7 mi^2. The South Fork of Eagle Creek flows into Eagle Creek and finally the Mahoning River. The western portions of CRJMTC drain to Hinkley Creek, which has a drainage basin of 7.2 mi^2. Hinkley Creek flows into the West Branch of the Mahoning River. The eastern-most portion of the installation drains to the West Branch of the Mahoning River near its confluence with the main trunk of the Mahoning River. The southern areas of the installation drain directly into Michael J. Kirwan Reservoir (OHARNG, 2008d) (refer to Figure 3.4.14-1). The annual mean discharge of the South Fork of Eagle Creek is 23.2 cubic feet per second (cfs); the annual mean discharge of Sand Creek is 13.6 cfs; and the annual mean discharge of Hinkley Creek is 7.42 cfs (AMEC, 2008a).

The CIS facilities would be located in the South Fork-Eagle Creek Sub-Watershed, Town of Newton Falls-West Branch of the Mahoning River Sub-Watershed, and the Kirwan Reservoir-West Branch of the Mahoning River Sub-Watershed (refer to Figure 3.4.14-1). The South Fork-Eagle Creek Sub-Watershed has a drainage area of approximately 26 mi^2.

The Town of Newton Falls-West Branch of the Mahoning River Sub-Watershed has a drainage basin of approximately 27 mi^2. The Kirwan Reservoir-West Branch of the Mahoning River has a drainage basin of approximately 37 mi^2 (USGS, 2014). These three sub-watersheds are part of the Mahoning River Watershed, which drains approximately 540 mi^2. The Mahoning River Watershed is within the Ohio River Basin. The Mahoning River Watershed extends into Portage, Mahoning, Trumbull, Columbiana, Stark, and Geauga counties. The HUC associated with the Upper Mahoning River Watershed is 05030103 (OEPA, 2014d). A HUC is a sequence of numbers or letters that identify a hydrological feature like a river, watershed, river reach, or lake.

Surface water drainage from the northwest, northeast, and west central portions of the CIS footprint flows northeasterly into Sand Creek. Surface water drainage from the southwest portion of the CIS footprint flows southward into the West Branch of the Mahoning River or the Michael J. Kirwan Reservoir. Surface water drainage from the southeast and east central portions of the CIS footprint flows southeasterly into the West Branch of the Mahoning River (refer to Figure 3.4.14-2).

Prominent Local Surface Water Features. The OEPA beneficial use designations for water bodies are identified in OAC Chapter 3745-1-07 Water Use Designations and Statewide Standards. Beneficial use designations describe existing or potential uses of waterbodies and include public water supply, protection and propagation of aquatic life, recreation in and on the water (primary and secondary contact recreation), agriculture and industrial (OEPA, 2014a). Designated beneficial uses are assigned to a water body or segment and correspond with surface water quality standards for each parameter. There are specific numeric criteria for each designated use. In accordance with OAC Chapter 3745-1, the most stringent numeric criteria associated with any one of the use designations assigned to a water body or segment would apply.

The South Fork of Eagle Creek, Sand Creek, and Hinkley Creek are the prominent surface water features within the CRJMTC installation and drain approximately 65 percent of the installation (OHARNG, 2008d). The South Fork of Eagle Creek, Sand Creek, and Hinkley Creek have the same designated beneficial uses per OAC 3745-1. These designated uses include warm water habitat (WWH) aquatic life, agriculture water supply, industrial water supply, and primary contact recreation (OEPA, 2014a).

The South Fork of Eagle Creek and its tributaries, including Sand Creek, are designated by the OEPA as a Superior High Quality Water, which is defined as surface water that possesses exceptional ecological values. The South Fork of Eagle Creek is listed as a Superior High Quality Water because of the presence of the state-listed endangered mountain brook lamprey (*Ichthyomyzon greeleyi*) collected in 1987, 1999, and 2003 (OHARNG, 2008a; OAC, Chapter 3745-1).

There are approximately 281 acres of ponds within the CRJMTC (refer to Figure 3.4.14-2). The ponds were created and used for multiple purposes including the discharge of industrial waste water, recreation, and sediment control (USGS, 2002). Many of the ponds are shallow and in advanced eutrophic states, but 14 are deep enough to support a warm water fishery. Most of the ponds were created by beaver dams or small man-made dams and embankments. A few of the ponds were originally used as settling ponds during load line production and are currently undergoing investigation and cleanup. Some of the more accessible ponds are used for fishing and hunting. Other ponds are either dry or have no function in terms of controlling water. Some ponds have been stocked with game fish; all contain fish except for the most shallow (AMEC, 2008a). There is one beaver dam within the CIS footprint.

There are specific ponds that serve as wetland mitigation sites (refer to Figure 3.4.14-2). These ponds include Morgan's Pond located northwest of the CIS footprint; Dautherty's Pond also located northwest of the CIS footprint; and Tank Range Borrow Site Mitigation Pond located in the extreme northeast portion of CRJMTC, beyond the CIS footprint (OHARNG, 2014). There are no wetland mitigation sites within the CIS footprint so none would be affected.

Site-Specific Surface Water Features. There are surface waters within the CIS footprint (refer to Figure 3.4.14-3). These surface waters are headwater tributaries to downstream, larger surface water bodies like Sand Creek, the West Branch of the Mahoning River, and the Michael J. Kirwan Reservoir. The tributaries located in the north and west central portions of the CIS footprint flow into unnamed tributaries of Sand Creek, and eventually Sand Creek. The tributaries in the southwest portion of the CIS footprint flow west and south into the Michael J. Kirwan Reservoir. The tributaries located in the southeast and east central portion of the CIS footprint flow into the West Branch of the Mahoning River. The condition of these surface waters has not been assessed in terms of whether the beneficial uses are being met. Table 3.4.14-1 lists the tributaries that are within the CIS footprint. The information presented in Table 3.4.14-1 corresponds to the information presented on Figure 3.4.14-3 (refer to Figure 3.4.14-3).

Table 3.4.14-1 Tributaries within CIS Footprint - CRJMTC

Tributary Identification	General Flow Direction	Tributary Flow Description
A, C, D, E	North	Unnamed tributary of Sand Creek
B	Northeast	Unnamed tributary of Sand Creek
G	West	Unnamed tributary of Hinkley Creek
F	Northwest	Unnamed tributary of Sand Creek
6a, 6b, 13t	Southeast	South Service Pond; unnamed tributary of the West Branch of the Mahoning River
13q, 13p, 13n	Southeast	Unnamed tributary of the West Branch of the Mahoning River
13m, 13i, 13h, 13k, 13g, 13r	South	Michael J. Kirwan Reservoir

Wetlands are present within the CIS footprint. These wetlands are a water resource in terms of providing aquatic habitat, terrestrial habitat, protecting and improving water quality, and recharging groundwater supplies. Details regarding wetlands are in Section 3.4.15.

Surface Water Quality – CRJMTC

As previously discussed, the OEPA beneficial use designations for water bodies are identified in OAC Chapter 3745-1-07 Water Use Designations and Statewide Standards. Water quality standards are identified in OAC 3745-1-34 Water Quality Standards for the Ohio River Basin. In accordance with OAC Chapter 3745-1, the most stringent standards associated with any one of the beneficial use designations assigned to a water body would apply. Surface waters that do not meet beneficial use designations, narrative water quality standards, water quality numeric criteria, and antidegradation provisions are designated as impaired (OEPA, 2015). The term 'impair' is used throughout the surface water quality discussion. The term means a change in the chemical, physical, or the biological integrity of the surface water sufficient enough for the surface water to be unable to meet its beneficial use.

The following sections present a discussion of surface water quality data including regional and site-specific conditions.

3.4.14.2.1.1 Regional Surface Water Quality

OEPA 2006 Survey - West Branch of the Mahoning River Watershed Assessment Unit. The OEPA conducted a survey of rivers, streams, and creeks in the Upper Mahoning River Watershed (HUC 05030103) in 2006. The survey included four Watershed Assessment Units (WAUs): 1) Mahoning River (headwaters to downstream from Beech Creek) (HUC 05030103010); 2) Mahoning River (downstream from Beech Creek to downstream from the Berlin Dam) (HUC 05030103020); 3) Mahoning River (downstream from the Berlin Dam to downstream from and including the West Branch of the Mahoning River) (HUC, 05030103030); and 4) Mahoning River (downstream from West Branch of the Mahoning River including Eagle Creek to upstream from Duck Creek) (HUC, 05030103040) (OEPA, 2008).

The following paragraphs present the results from the OEPA's 2006y survey that occurred in HUC 05030103030 – Mahoning River (downstream from the Berlin Dam to downstream from and including the West Branch of the Mahoning River) because this HUC includes the area of the CIS footprint. Samples collected from within the CRJMTC installation are discussed in Section 3.4.14.2.2.2. The sampling included fish and/or macroinvertebrates to assess the biological quality of the stream; chemical analysis of surface water samples to supplement the biological sampling and assess attainment with aquatic life use; and surface water to assess attainment with recreational use water quality standards (OEPA, 2008). The sample locations were not available from online resources.

Recreational Use. Widespread non-attainment of the recreational use water quality standard (a count of *E. coli* bacteria in a sample) was recorded within this WAU except for Hinkley Creek. Fourteen of twenty (70 percent) tributary sampling locations within this WAU were found to be in non-attainment for the recreational use water quality standard. Three of six (50 percent) of the sampling locations located on the West Branch of the Mahoning River also showed non-attainment for recreational use water quality standards. The recreational use water quality standards were met at locations downstream of the Michael J. Kirwan dam (OEPA, 2008).

Aquatic Life Use. One surface water sample and one fish and/or macroinvertebrate sample were collected from Hinkley Creek at a location downstream from the CRJMTC installation boundary. The surface water analytical results show all parameters met the aquatic life use water quality standards. The fish and/or macroinvertebrate sampling results showed the stream to be in good biological condition (OEPA, 2008).

Six samples of surface water and fish and/or macroinvertebrate were collected from the West Branch of the Mahoning River including locations both upstream and downstream from the Michael J. Kirwan Reservoir. Four sample locations were collected upstream from the Michael J. Kirwan Reservoir and all showed full attainment for aquatic life use. Two samples collected downstream of the Michael J. Kirwan Reservoir showed only partial aquatic life use attainment due to the poor condition of the macroinvertebrate community (OEPA, 2008).

Finally, biological sampling results from a tributary to the West Branch of the Mahoning River show non-attainment for aquatic life use due to the poor condition of the fish and macroinvertebrate community. Excessive stream bed siltation was observed during the sampling event (OEPA, 2008). The stream bed siltation would likely be the cause of the non-attainment because it could have a negative effect on aquatic species in terms of the availability of habitat and food.

Surface Water Quality Results. Two grab surface water samples were collected from two different tributaries to the West Branch of the Mahoning River and analyzed for heavy metals. The results showed that no heavy metals exceeded aquatic life use water quality standards or ecological risk assessment values promulgated by the OEPA (OEPA, 2008). Thus, this tributary appears to be in attainment for aquatic life use.

OEPA 2012 Integrated Water Quality Monitoring and Assessment Report. The 2012 Integrated Water Quality Monitoring and Assessment Report summarize the water quality conditions in Ohio. The report identifies specific water bodies and corresponding beneficial uses, and whether the surface water body is in attainment with applicable water quality standards.

Available data were compared to applicable water quality standards and corresponding designated beneficial uses. Waters not meeting the water quality standards for one or more of the designated beneficial uses (human health, recreation, aquatic life, and public drinking water supply) were referred to as impaired (OEPA, 2012).

The South Fork of Eagle Creek was identified as impaired for human health designated use based upon historical data; a TMDL is projected to be established in 2025. TMDL are criteria that are established to assess how much pollutant a water body could receive and still meet water quality standards. The South Fork of Eagle Creek did not meet the recreation use water quality standards based upon examination of E. Coli, and TMDL is complete. The South Fork of Eagle Creek was in attainment for aquatic life use water quality standards. As previously mentioned, the South Fork of Eagle Creek is listed as a Superior High Quality Water because of the presence of the state-listed endangered mountain brook lamprey. This water is not used for a public drinking water supply. The segments of Hinkley Creek and Sand Creek that are located within the CRJMTC installation boundary are in full attainment for aquatic life use; however, one sample collected from Hinkley Creek indicates only partial attainment for warm water fisheries (OEPA, 2012). This information suggests the water quality within the CRJMTC installation would be considered good.

The Michael J. Kirwan Reservoir – West Branch of the Mahoning River met the human health use, but did not meet the public drinking water supply and aquatic life water quality standards. A TMDL for the public drinking water beneficial use is expected to be established in 2025. This surface water body does not meet the water quality standards for recreation based upon examination of E. Coli, and there is no TMDL projected to be established (OEPA, 2012). Considering this information, it suggests the reservoir water quality would be considered perhaps moderate.

Regional Surface Water Quality Summary. The OEPA data from 2006 indicated a condition of non-attainment with recreational use throughout Mahoning River Watershed Areas based upon examination off E. coli upstream of the Michael J. Kirwin Reservoir show full attainment with aquatic life use. Sampling from a tributary to the West Branch of the Mahoning River shows the surface water meets the aquatic life use water quality standards for metals. Downstream of the Michael J. Kirwin Reservoir, locations along the West Branch of the Mahoning River show non-attainment with aquatic life use. Hinkley Creek, based upon a single sample location, is in full attainment for aquatic life use (OEPA, 2008).

USEPA data for Cycle Year 2008 show the West Branch of the Mahoning River, Sand Creek, the South Fork of Eagle Creek, and Hinkley Creek were impaired due to the following:

- Stream alteration: Stream alteration could impact aquatic habitat and flows and thus create conditions that suppress the growth of aquatic vegetation and possibly sources of food. Stream alteration resulting in low stream flow could also contribute to low dissolved oxygen levels.
- Sediment suspension/deposition/turbidity: Sediment suspension results in higher turbidity and, combined with sediment deposition, could have a negative effect on aquatic species via the suppression of vegetation growth and the production of food and habitat. Further, high turbidity could impact the ability for aquatic species to breathe through their gills.

- PCBs in fish tissue: PCBs in fish tissue suggest non-attainment with human health beneficial use
- Pathogens, organic enrichment biological indicators, and nutrients: Impairment due to nutrients and organic enrichment could have an impact on the recreational use of surface water because via the development of harmful algae blooms. Pathogens are disease-causing organisms that could also impact recreational use because some could be harmful to humans.
- Dissolved oxygen: Low dissolved oxygen levels could impair respiration of aquatic organisms and thus overall growth and survival.

There were no samples collected from within the CRJMTC installation.

The OEPA report *Integrated Water Quality Monitoring and Assessment Report* dated 2012 shows that the South Fork of Eagle Creek is impaired for human health use, and is not in attainment for recreational or aquatic life use based upon water quality standards. The Michael J. Kirwan Reservoir meets human health beneficial use based upon fish tissue analysis, and public drinking water supply beneficial use based upon water quality standards. However, it does not meet aquatic life or recreation beneficial uses (OEPA, 2012). These results indicate the water quality changed from the time the OEPA 2006 survey was conducted in that the Michael J. Kirwan Reservoir did not meet the public drinking water supply water quality standards, but did meet the aquatic life beneficial at that time.

Based upon the available information, regional surface water quality would be considered good to moderate.

3.4.14.2.1.2 Local Surface Water Quality

This section discusses surface water quality within the CRJMTC installation boundary.

Surface Water Planning Level Survey. Chemical analyses were conducted on surface water samples collected from locations in Sand Creek, unnamed tributaries to Sand Creek, the South Fork of Eagle Creek, unnamed tributaries to the South of Fork of Eagle Creek, and Hinkley Creek. The samples were analyzed for target analyte metals, pesticides, PCBs, explosive compounds, SVOCs, and nutrients. Surface water quality was generally found to be good to excellent within CRJMTC streams with very few exceedances of Ohio water quality standards for aquatic life (OHARNG, 2008d). Of the 11 ponds sampled during the 2003 survey, Boy Scout Pond and Administration Pond were the only water bodies which did not have exceedances of the Ohio water quality standards for WWH. The most numerous water quality standards exceedances occurred for lead (nine ponds), pH (seven ponds), and copper (three ponds). Concentrations of PCBs, pesticides, and total cyanide were reported as non-detectable in all 11 ponds. SVOCs, excluding various phthalates, were also reported as non-detectable in all 11 ponds. Fourteen explosive compounds were tested for in all 11 ponds evaluated and all results were non-detectable except for Upper and Lower Cobb's Ponds, Administration Pond, and Kelly's Pond. The ponds did not have detectable levels of ammonia-N except for the Administration Pond and Erie Burning Ground Pond. All of the reported ammonia-N concentrations were below the applicable water quality standard for the protection of aquatic life (OHARNG, 2008d).

USACE and OEPA Water Quality Study. Segments of Sand Creek, the South Fork of Eagle Creek, and Hinkley Creek within CRJMTC were assessed for surface water quality, sediment quality, and fish and macroinvertebrate community health in June and September 2003 (USACE, 2005). The exact sample locations were not available.

A total of 7.5 miles of Sand Creek was assessed for its surface water quality in terms of supporting WWH aquatic life. The results show full attainment of aquatic life use criteria. Explosives, SVOCs, pesticides, and PCBs were reported as non-detectable in surface water samples. Nutrients, metals, and dissolved solids were at low levels in Sand Creek surface water, and were indicative of the undeveloped condition of the watershed (USACE, 2005).

A total of 4.1 miles of the South Fork of Eagle Creek were also assessed for WWH aquatic life use. None of the chemicals measured in the surface water exceeded the WWH water quality standards. Chemical analyses of surface water samples collected from three locations in the South Fork of Eagle Creek showed no exceedances of the WWH aquatic life use criteria.

Concentrations of organic parameters (target analyte list explosives, SVOCs, pesticides, and PCBs) were reported as non-detectable. Metals concentrations were low and many of the results were reported as less than laboratory detection limits. Parameters with measurable concentrations were below the corresponding Ohio water quality standards. Nutrients and metals were very low and parameters with measurable concentrations were less than the corresponding Ohio water quality standards (USACE, 2005).

A total of 4.3 miles of Hinkley Creek were assessed in 2003 for aquatic life in terms of WWH. Surface water samples collected in June and September 2003 from four locations in Hinkley Creek were analyzed for target analyte list metals, pesticides, PCBs, explosive compounds, SVOCs, and several nutrient parameters. Analytical results showed that none of the chemicals exceeded the WWH aquatic life use standards aside from two field measurements of pH. Concentrations of all but three of the organic parameters tested (explosives, SVOCs, pesticides, and PCBs) were reported as non-detectable. The remaining three organic parameters were measured at concentrations below the water quality numeric criteria. Nutrients and metals concentrations were low, with many of the results less than the laboratory detection limits (USACE, 2005).

OEPA 2006 Sampling and Analysis. The OEPA's geographic information system provides water quality data from surface water sampling that occurred in 2006. Three surface water samples (Sample 200377, Sample 200372, and Sample N02K08) were collected from locations within the CRJMTC in 2006 (refer to Figure 3.4.14-4). Sample 200377 location is described as being at Hinkley Creek east of Ravenna at Perimeter Road; Sample 200372 location is described as being in a tributary to the West Branch of the Mahoning River on the south side of the road along the existing pond; and Sample N020K08 is described as being located on the South Fork of Eagle Creek at Windham Road. The use designations for the water body segments where each of the three samples were collected include WWH, agricultural water supply, industrial water supply, and primary contact recreation. Thus, the most stringent standards associated with the aforementioned uses would apply to the metals analytical results from 2006. These sample locations are outside of the CIS footprint.

At each of the three sample locations, surface water was analyzed for metals and hardness. The following metals were included in the analytical suite:

- Aluminum
- Cadmium
- Calcium
- Chromium
- Copper
- Iron
- Arsenic
- Lead
- Magnesium
- Manganese
- Nickel
- Potassium
- Barium
- Selenium
- Sodium
- Strontium
- Zinc

3.4.14.2.2 Surface Water Quality within CIS Footprint

Black & Veatch 2014 Environmental Sampling. In 2014, a site analysis investigation was completed in the area that comprises the CRJMTC CIS footprint and areas immediately beyond its boundary. A total of three surface water samples were collected at CRJMTC during the site investigation of the CIS. Sample SWD1 was collected from the unnamed tributary to Hinkley Creek; Sample SWD2 was collected from the unnamed tributary located in the southern part of the CRJMTC CIS footprint and flows into the Michal J. Kirwan Reservoir; and Sample SWD3 was collected from the confluence of two unnamed tributaries that flow into the West Branch of the Mahoning River (refer to Figure 3.4.14-5) (BVSPC, 2015a).

Sample SWD1, Sample SWD2, and Sample SWD3 analytical results showed low levels of VOCs, one pesticide, and metals. With the exception of arsenic in Sample SWD1 (0.0061 milligram/liter [(mg/L]) which was above the screening criteria of 0.0032 mg/L, all compounds identified were below screening criteria. The screening criteria are facility-wide cleanup goals developed in the Facility-wide Human Health Cleanup Goals Report (USACE, 2010). The screening criteria used to compare the surface water analytical results were from Table 4-2 Facility-Wide Cleanup Goal Used as Screening Criteria to Determine Exceedances located in the *Facility-Wide Sampling and Analysis Plan for Environmental Investigations, Camp Ravenna Army Ammunition Plant, Ravenna, Ohio,* prepared for the USACE Louisville District by Science Applications International Corporation dated February 24, 2011 (BVSPC, 2015a).

AOCs/Munitions Response Site. Contamination which requires remediation has been identified at four AOCs/MRSs within the CIS footprint. Refer to Section 3.4.7 Hazardous Materials/Hazardous Waste for details regarding the AOCs/MRSs.

3.4.14.2.3 Local Surface Water Quality Summary

Sampling in 2003 shows surface water quality in streams located within the CRJMTC installation to be good to excellent. Chemical contamination of the water and sediment was not observed at any of the stream sampling locations. Information from this same sampling event shows that of the 11 ponds sampled for water quality only the Boy Scout Pond and Administration Pond did not have exceedances of the WWH water quality standards. Numerous ponds had water quality exceedances of lead, pH, and copper (OHARNG, 2008b). This information suggests the surface water in the nine of the 11 ponds is fair.

Based upon the 2003 study results from the USACE and OEPA study, Sand Creek, the South Fork of Eagle Creek, and Hinkley Creek located within CRJMTC meet the WWH aquatic life beneficial use standards.

A review of the OEPA 2006 reported that analytical results for samples 200377, 200372, and N02K08 compared to the most stringent water quality standards for metals according to the designated beneficial use - indicate no exceedances (OEPA, 2008). The most stringent water quality standards would be associated with aquatic life use compared to the other beneficial uses which apply to the surface water bodies. Thus, the water quality supports the aquatic life designated use in terms of metals.

The analytical results from the 2014 site investigation at CRJMTC suggest the surface water quality for select tributaries located within the CRJMTC CIS footprint is good.

Based upon available information, the water quality within the CRJMTC installation would be considered good.

3.4.14.2.4 National Pollutant Discharge Elimination System (NPDES) Permit

Camp Ravenna – Engineer Dig Sites was issued an NPDES Individual Permit (permit number OH0145564) for the discharge of storm water from six permitted outfalls into an unnamed tributary of Sand Creek. The Engineer Dig Sites are located northwest and southwest from the intersection of Smalley Road and Windham Road, which is north of the CIS footprint. The NPDES permit number was issued December 12, 2013, and expires on December 31, 2018. Monitoring requirements associated with each of the six permitted outfalls include the flow rate, oil and grease, rainfall, total suspended solids, and pH (USEPA, 2015c).

A permit modification was issued on December 10, 2014 with an effective date of February 1, 2015. The new OEPA number is 3IN00383*BD (the permit still expires on December 31, 2018). The modification added another four outfalls bringing the total outfalls to ten. Monitoring requirements for these four outfalls include pH, total suspended solids, and oil and grease (Morgan, 2016c).

Recently, another permit modification was granted to increase the total number of outfalls to 19. This permit modification was issued on January 7, 2016 with an effective date of March 1, 2016. The permit covers the south dig site, north dig site, and the Tactical Vehicle Maneuver Area. Substantially similar outfalls have been combined resulting in the requirement to sample only eight outfalls. Sampling is done quarterly to monitor pH, total suspended solids, and oil and grease.

3.4.14.2.5 Floodplains

The CIS footprint is located in Zone X. Zone X includes those areas deemed to be outside of the 0.2 percent annual chance floodplain (500-year floodplain) (FEMA, 2009) (refer to Figure 3.4.14-6).

3.4.14.2.6 Groundwater

3.4.14.2.6.1 Groundwater Features

The regional hydrogeology consists of sandstone units of the Pottsville formation. Within this formation, the Sharon Conglomerate is the most productive unit and is the major bedrock aquifer in northeastern Ohio. These aquifers exist under artesian conditions and are confined by glacial drift or shale. The principal aquifer that underlies the CRJMTC site is the Sharon Conglomerate. The depth to groundwater within this formation varies from approximately 44 to 177 feet (OHARNG, 2014).

The groundwater flow beneath the CRJMTC is generally from west to east. The average groundwater well depth at CRJMTC is approximately 155 feet bgs and the average depth to groundwater is about 50 feet bgs. However, groundwater has been encountered at much shallower depths in the upper unconsolidated aquifer across CRJMTC.

Groundwater recharge occurs via surface water infiltration through sand and gravel within valleys. Two large buried valleys occur southwest and northwest of CRJMTC and could yield up to 1,600 gpm from wells penetrating those particular glacial tills. The majority of CRJMTC property, however, is comprised of clay-rich glacial tills with low permeability and underlying bedrock formations with extremely variable - but low - permeability. Typical yields from wells screened in the Sharon Conglomerate range from 5 to 200 gpm (OHARNG, 2014).

A groundwater pollution potential map was developed by the ODNR to assist planners, managers, and local officials in evaluating the potential for contamination from pollution. The map incorporates the hydrogeologic setting and a relative rating system for pollution potential. Based on this mapping system, CRJMTC has a pollution potential index ranging from 84 to 138 (maximum index rating is 200). The areas that comprise the CRJMTC site have a potential pollution index ranging from 109 to 138. The higher the index rating, the greater the vulnerability of the groundwater is to contamination. The pollution potential index range of 109 to 138 suggests a moderate pollution potential (ODNR, 1990).

3.4.14.2.6.2 Groundwater Use

Groundwater development and use is limited at CRJMTC due to the environmental restoration program and clean-up of munitions manufacturing and treatment facilities. Groundwater development and use is currently evaluated on a case-by-case basis to ensure there are no conflicts with the environmental restoration program (OHARNG, 2008d).

Many of the onsite production wells related to the former munitions production activities have been permanently abandoned. There are 10 remaining production wells that require proper closure. A contract is in place to close these wells in 2016. In 1993, two groundwater production wells were developed in the Cantonment Area at Post 1 – Main Gate. One well is west of the former Building 1039 location and provides potable water to Buildings 1037, 1038, and the Post 1 Guard Shack. This is a private well that serves less than 25 people and does not require an onsite licensed operator. The second well is west of Building 1034 and east of George Road and provides potable water to Building 1034. An additional two wells were installed by the OHARNG for potable use in 2011. These wells are located immediately north of Building 1067 along the western side of George Road and east of Building 1068 in the Cantonment Area. All wells are private systems and do not require a licensed operator (Morgan, 2016a).

3.4.14.2.6.3 Groundwater Quality

There are several AOCs that are part of the IRP within the CRJMTC CIS footprint. Refer to Section 3.4.7 for details regarding the AOCs. As part of the ongoing IRP, semi-annual groundwater monitoring and reporting activities are conducted throughout the CRJMTC installation. During the IRP groundwater monitoring, wells are sampled and analyzed for VOCs, SVOCs, target analyte metals as well as other metals and inorganics, pesticides and herbicides, PCBs, and explosive derivatives. The analytical results are then compared to primary Maximum Contaminant Levels (MCLs) and USEPA Risk Screening Limits (RSLs) (BVSPC, 2015a). Primary MCLs are a set of numeric standards established by the USEPA for drinking water quality.

Based on the review of a recent 2013 Annual Groundwater Monitoring Report, several groundwater wells are located in the area of the CIS footprint. Specific wells with recent data that were identified for discussion include the following: Load Line 6 wells, Load Line 10, and Load Line 11 wells (BVSPC, 2015a).

For Load Line 6 wells, the primary contaminants of concern that were identified during the recent and ongoing monitoring included arsenic, manganese, and iron. Arsenic was identified above the MCL (10 parts per billion (ppb)) and RSL (0.52 ppb) in July 2012 from Load Line 6 monitoring well 002. Load Line 6 monitoring well 005 showed consistently elevated concentrations of arsenic (greater than the MCL and RSL) from samples collected in January , April, July, and October 2009; October 2010; October 2011, January 2012; July 2012; and August 2013. By comparison, background monitoring well data available from October 2006 to July 2014 show elevated concentrations of arsenic in background monitoring well 13 and background monitoring well 17. These concentrations were recorded from sampling events that occurred from October 2006 through October 2007, and October 2009. Arsenic was detected in concentrations greater than the MCL and RSL except for one sample from July 2007 (background monitoring well 13) where the arsenic concentration was less than the MCL, but greater than the RSL. The concentrations of manganese and iron from October 2006 through October 2007 were elevated to concentrations greater than the MCL (EQMI, 2015). It should be noted that: (1) manganese and iron are not PP metals; and (2) there are only secondary MCLs for these two metals. Secondary MCLs are not mandatory; they are guidelines used to manage drinking water in terms of taste, color, and odor. According to the 2013 groundwater report, manganese was recorded in concentrations consistently greater than the MCL. Iron was only reported in two samples: the first sample contained an iron concentration less than the MCL while the second sample contained an iron concentration greater than the MCL (EQMI, 2015).

For Load Line 10 wells, carbon tetrachloride and chloroform were recently noted above RSLs in well LL10mw-03, but lower than the MCLs. Based on information discussed in the 2013 facility-wide groundwater monitoring report, the recent results are consistent with levels observed during monitoring events dating back to 2006 (BVSPC, 2015a).

For Load Line 11 wells, the primary contaminants of concern that were identified during recent and ongoing monitoring include arsenic, manganese, and iron. As previously noted in the Load Line 6 well discussion, manganese and iron are not PP metals. Arsenic has been observed in Load Line 11 wells at concentrations above its RSL and MCL. Arsenic was also identified above the MCL or RSL during recent reporting. Based on information from the 2013 facility-wide groundwater monitoring report, arsenic has been consistently identified at similar or higher levels during monitoring events dating back to 2006 (BVSPC, 2015a).

3.4.14.3 Environmental Consequences and Mitigation – Water Resources - CRJMTC

3.4.14.3.1 Construction – Baseline Schedule

3.4.14.3.1.1 Environmental Consequences

<u>Surface Water</u>

Soil Erosion and Sedimentation. Disturbance of land areas during land clearing and grubbing; temporary laydown areas, construction of CIS facilities; and linear facilities construction could potentially impact surface water quality, aquatic flora and fauna, and terrestrial flora and fauna due to soil erosion and sedimentation.

Potential construction-related impacts to surface water quality include sediment deposition and re-suspension from storm water runoff from land cleared of vegetation. Potential impacts to surface water from sediment deposition include a reduction of water flow capacity and the surface water's ability to discharge an increased sediment load, which could degrade aquatic habitat including sources of food. The suspended sediments and corresponding increases in turbidity tend to refract light, which could, in turn, affect the ability of aquatic flora to photosynthesize and otherwise thrive, particularly if combined with the effects of other environmental stressors, such as pollution from discharges like a release of petroleum product or chemicals used during construction. Suspended sediments that settle out of the water column could cover aquatic plants and organisms themselves, affecting plant photosynthesis and animals' ability to feed, reproduce, grow, and survive (particularly immobile organisms). Similarly, sediments that settle on the substrate could impact the diversity, quantity, and quality of bottom habitat that is available for use by aquatic organisms for cover, feeding, and reproduction. Increases in turbidity due to suspended sediments could interfere with respiration of aquatic fauna, including fish and aquatic invertebrates.

Potential impacts to terrestrial flora and fauna from soil erosion and sedimentation include a reduction in vegetative cover and food sources.

With regards to the project, potential impacts to surface water quality, aquatic fauna and flora, and terrestrial flora and fauna due to soil erosion and sedimentation would be localized, temporary, and minor because: (1) the implementation of sediment and erosion control BMPs under the OEPA General Permit for the discharge of storm water during construction would reduce potential impacts to surface water bodies accepting storm water flow; (2) the implementation of a construction SPCC Plan would reduce potential impacts from pollution of petroleum products and chemicals; and (3) disturbed areas would be stabilized by the time that construction is complete.

Wetlands. The placement of fill material in wetlands would have a permanent impact on their function in that the wetlands would no longer provide aquatic or terrestrial habitat. Its function to improve water quality and recharge groundwater would also be permanently impacted. Details regarding the potential impacts to wetlands are discussed in Section 3.4.15.

Onsite Tributaries. Construction activities would include clearing and grading to create a relatively flat topography. This would have a major impact on the site hydrology within the CIS footprint (refer to Table 3.4.14-1 for the list of onsite tributaries).

There are approximately 5.2 total miles of onsite unnamed tributaries within the CIS footprint. Of this approximately 5.2 total miles of streams, approximately 1.4 miles are perennial streams (continuous flow throughout year), approximately 1.8 miles are intermittent streams (flows during wet season), and approximately 2 miles are ephemeral streams (flowing briefly after rainfall).

Grading and placement of fill into the onsite tributaries would artificially divert stream flows, thus potentially reducing the stream flow and impacting aquatic and terrestrial flora and fauna (via burial or habitat alterations). The elimination of the onsite tributaries would result in the potential impacts to downstream hydrology in terms of reduced flow within the stream segments that continue offsite. A reduction in downstream flows could potentially impact aquatic and terrestrial flora and fauna, and wetlands. If required, hydrologic modeling would be completed during the design and permitting phase of the CIS project.

Fugitive Dust Generation. Increases in turbidity levels in local streams could result not only from soil erosion and sediment re-suspension, but also from the settling of dust generated from land clearing, grading, soil excavation, and the movement of equipment or vehicles across areas that are devoid of vegetation. As previously mentioned, turbidity refracts light and an increase in turbidity could affect the ability of freshwater vegetation to photosynthesize and otherwise thrive. Further, increases in turbidity could impact aquatic faunal respiration, and degrade the availability and value of habitat represented by the bottom substrate. In terms of the project, however, dust-related turbidity impacts would be localized and minor due to: (1) the implementation of dust suppression procedures which would ameliorate any dust-related impacts; and (2) the temporary nature of the construction activities.

Pollutants Associated with Construction. Project construction could result in the inadvertent release of minor amounts of pollutants via oil leaks from equipment and vehicles; chemical releases from cleaning agents, paints, solvents, etc.; construction waste; and other sources. However, the implementation of standard pollution control measures through the construction SPCC (specifically, the use of chemical and petroleum spill prevention; and control and cleanup facilities, equipment and procedures) would reduce the potential for substantial chemical or petroleum releases. Consequently, any adverse, pollutant-related impacts to surface water quality or aquatic or terrestrial resources would be temporary and minor.

Surface Water Use. No surface water withdrawals would occur during construction activities associated with the CIS. Therefore, there would be no impacts from surface water use.

Groundwater

Groundwater Withdrawals. Groundwater withdrawal in terms of dewatering is expected to be required for construction of deep foundations. Dewatering activities could result in a temporary, localized lowering of the groundwater table but would not affect the registered groundwater wells located immediately south or west of the CRJMTC installation due to the distance (approximately 1 mile) from the CIS footprint.

Additionally, construction of deep foundations could require the use of soil cement columns or other binding soil modification methods to provide cementation at the subgrade level prior to excavation. The purpose of the cementation is to prevent water infiltration into the excavation. Potential impacts to groundwater from cementation include a modification in groundwater flow or a change in the level of the groundwater table. However, these potential impacts would be minor because of the relatively small areas where cementation would be used.

Groundwater Contamination. There is existing groundwater contamination throughout the CRJMTC. Groundwater withdrawals are expected to be required during construction of deep excavations (beyond 20 feet bgs). Existing groundwater contamination could potentially migrate due to dewatering activities if not managed correctly. Therefore, the groundwater encountered during construction would be tested prior to discharge. If required, based on the results of the analyses, the groundwater would be treated prior to discharge or transported offsite for treatment. Thus, the potential for migration of groundwater contamination would be minor.

3.4.14.3.1.2 Mitigation

Storm Water Pollution Prevention. The discharge of storm water during construction would have a small, temporary impact on surface water. Prior to any construction activities, application would be made for a General Permit Authorization for Storm Water Discharges Associated with Construction Activity under the Ohio NPDES program. Potential impacts to surface waters from erosion and sedimentation would be minimized through implementation of the SWPPP required by the OEPA. Therefore, potential impacts to surface water quality from erosion and sedimentation would be minor and short-term due to implementation of these measures and the temporary nature of construction activities. The SWPPP would be completed and implemented prior to start of construction. All onsite construction workers would be trained in implementing storm water pollution prevention.

Fuel, Oil, or Chemical Pollution. The release of fuel, oil, or chemicals could potentially impact surface water and groundwater. To address potential releases of fuel, oil, or chemicals, a SPCC Plan) would be developed and implemented prior to initiation of construction. One component of SPCC is to provide spill containment. Rain water in the containment would be characterized prior to discharge. If a sheen is visible, then the rain water would be containerized and transported offsite. Onsite construction workers would be trained in SPCC. Considering these factors, direct potential impacts would be minor and short-term.

Fugitive Dust Suppression. The control of fugitive dust emissions would be identified in the construction SWPPP. Fugitive dust emissions controls implemented during construction activities could include water sprays, placing aggregate, wind fencing, and physical or vegetative stabilization practices, as appropriate. Consequently, no major fugitive dust impacts to water resources would occur.

Contaminated Groundwater. Groundwater encountered during construction of deep excavations and foundations would be contained and analyzed, then disposed of or treated if required based on the analytical results.

Onsite Tributaries. Major permanent impacts would result from the clearing, grading, and filling of the onsite tributaries. Due to the major impacts that would occur to surface water streams from the potential deployment of the CIS at the CRJMTC site, the impacts would be considered to be "significant" impacts. Mitigation methods would be analyzed during detailed design could consist of rerouting streams. The mitigation efforts related to the degraded streams would be restored somewhere within the greater Mahoning River Watershed.

3.4.14.3.2 Construction – Expedited Schedule

Erosion and sedimentation would occur under either construction schedule. However, under an expedited construction schedule, there could be larger areas of disturbance that create the potential for increased erosion and sedimentation from storm water runoff. Stabilization of disturbed areas with erosion control BMPs could be extended, and larger soil deposits in streams or wetlands and alterations of flow volumes and rates could potentially occur.

Under the expedited schedule, groundwater dewatering during deep foundation construction would need to occur at a faster rate than under the baseline schedule. Potential impacts to groundwater from an expedited construction schedule include a temporary altering of the existing groundwater flow and lowering of the existing groundwater table. However, these potential impacts would be minor given the temporary nature of the expedited construction schedule and the temporary nature of dewatering activities

3.4.14.3.3 Operation

3.4.14.3.3.1 Environmental Consequences

Impervious Areas. There would be an estimated 58 acres of impervious surface created due to new, permanent structures and concrete surfaces. However, the CIS footprint is approximately 940 acres. The impervious area would be about 6 percent of the total CIS footprint. While there would be a permanent decrease in the amount of area available for infiltration of surface water into groundwater, such decrease is extremely small and the corresponding effect on infiltration would be minor.

Groundwater Flow. There would be a long-term impact to groundwater flow from installation of the silos. Installation of the silos would include cementation to prevent water infiltration, which would disrupt groundwater flow. However, this long-term impact would be minor because groundwater flow disruption would only occur within the immediate vicinity of each silo.

Pollutants Associated with Operations. Project operations could result in the inadvertent release of minor amounts of pollutants to surface water or groundwater from silo coolant, diesel fuel from the power backup generators, oil leaks from equipment and vehicles; chemical releases from cleaning agents, paints, solvents, and other sources. However, the implementation of an SPCC Plan for operations, standard pollution control measures such as the use of chemical and petroleum spill prevention, control and cleanup facilities, equipment, and procedures would reduce the potential for substantial chemical or petroleum releases. Consequently, any adverse impacts to surface water or groundwater resources resulting from pollutant releases would be temporary, minor, and minor.

Storm Water Pollution Prevention. Project operations could result in potential impacts to surface water resources due to soil erosion and sedimentation. However, upon completion of construction activities, any areas devoid of vegetation would be stabilized to prevent sediment transport offsite. Further, operations and maintenance of permanent storm water controls installed during initial construction would minimize the potential for soil erosion and sedimentation. Therefore, impacts to surface water from soil erosion and sedimentation would be temporary and minor.

Surface and Groundwater Supplies. No surface water withdrawals would be required for CIS operations. Potable and service water would be provided from commercial sources. Groundwater would be provided as an emergency/backup water source by onsite wells. Groundwater provided by wells would be analyzed and treated, as necessary, and used for the emergency/backup water source. Additional information regarding utilities is presented in Section 3.4.13.

3.4.14.3.3.2 Mitigation

Storm Water Pollution Prevention. A SWPPP to address the potential discharge of sediment and other potential pollutants into storm water during operations would be completed prior to the start of operations. Onsite personnel would be trained in storm water pollution prevention and response. The SWPPP for operations would include the following information:

- The potential for discharging sediment and the identification of other potential pollutants from operations including fuel, oils, and chemicals.
- Location and type of all permanent storm water control BMPs.
- Procedures for the operations and maintenance of permanent storm water controls.
- Site maps with final grades; post-construction storm water flows and volume; impervious areas and soil types; and the identification of all surface waters and existing wetlands potentially impacted from storm water pollution.
- Methods to be implemented for final site stabilization of all exposed soil areas.

Fuel, Oil, or Chemical Pollution. To address potential releases of fuel, oil, or chemicals during operations, an SPCC Plan would be developed and implemented prior to start of operations. Onsite personnel would be trained in SPCC. The SPCC Plan for operations would include:

- A description of potential spill sources.
- Project and site information including drainage pathways, nearby surface waters and their distances.
- The identification of pre-existing contamination.

- Spill prevention and response procedures and training.
- Permanent BMPs to prevent discharges to groundwater or surface water during mixing or transfer of fuel, chemicals, or oil.

Figure 3.4.14-1 Watersheds (Hydrologic Unit Code 12) - CRJMTC

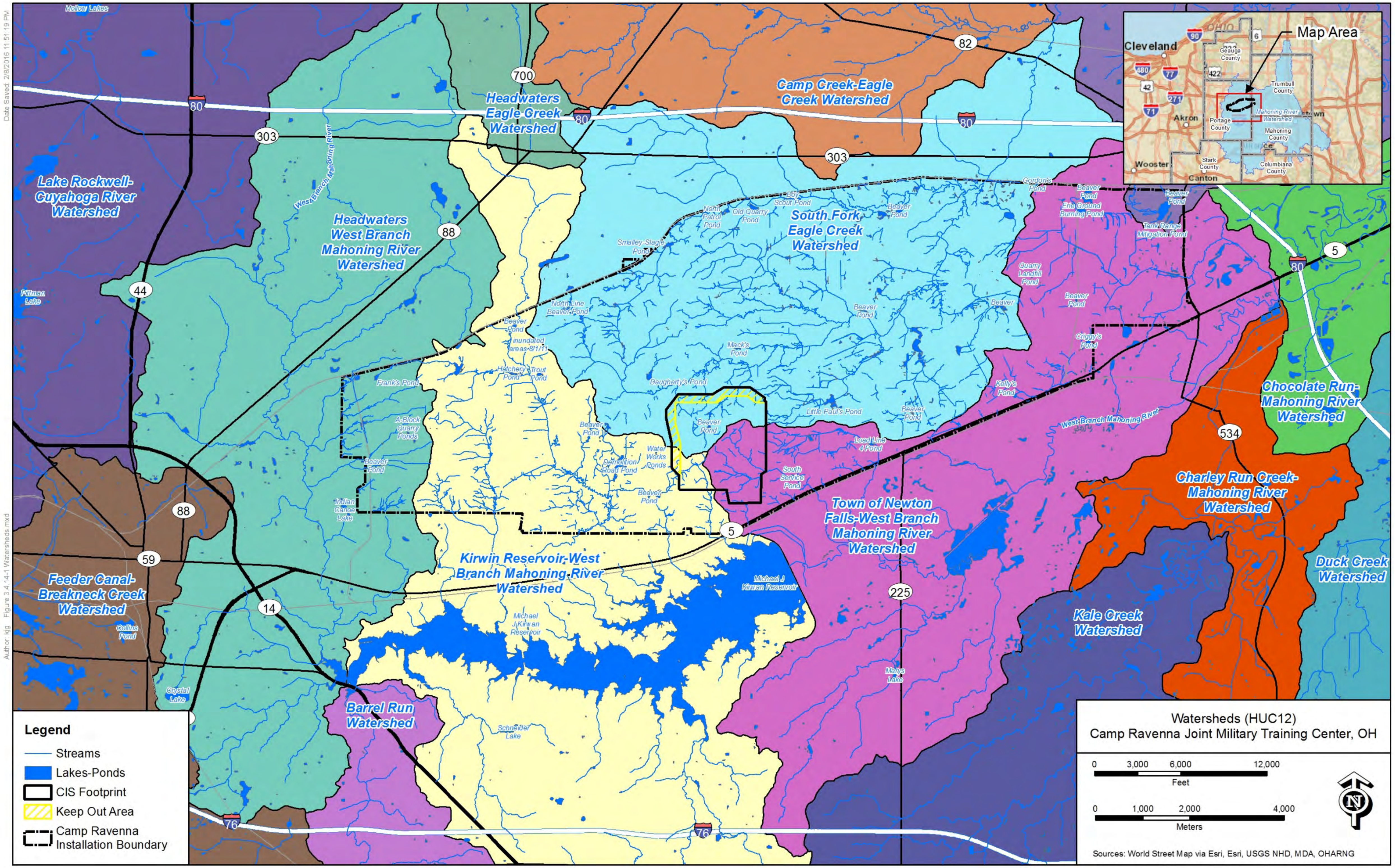


Figure 3.4.14-2 Surface Waters - CRJMTC

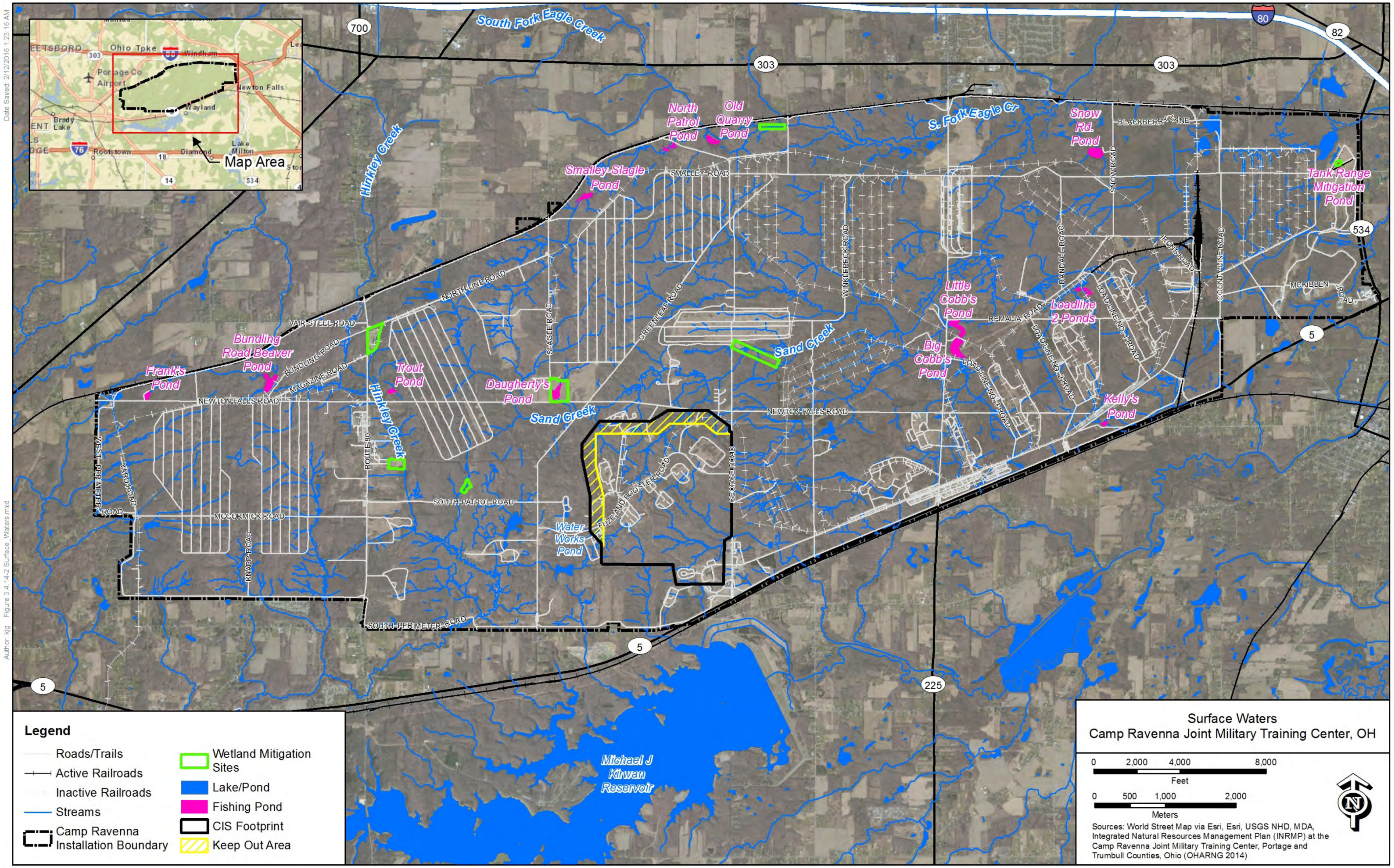


Figure 3.4.14-3 Tributaries within the Continental United States Interceptor Site Footprint - CRJMTC

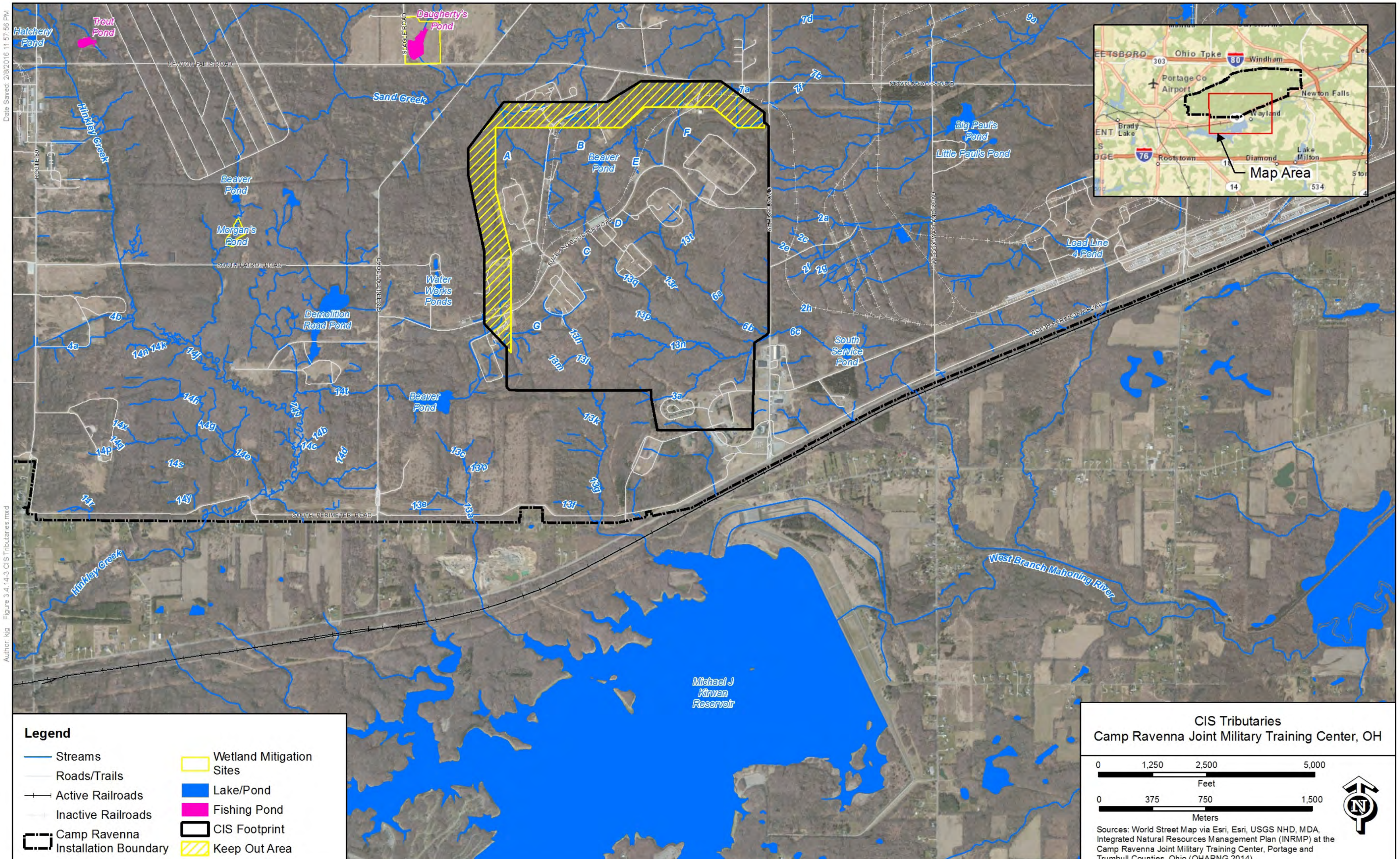


Figure 3.4.14-4 Ohio Environmental Protection Agency Surface Water Sample Locations - CRJMTC

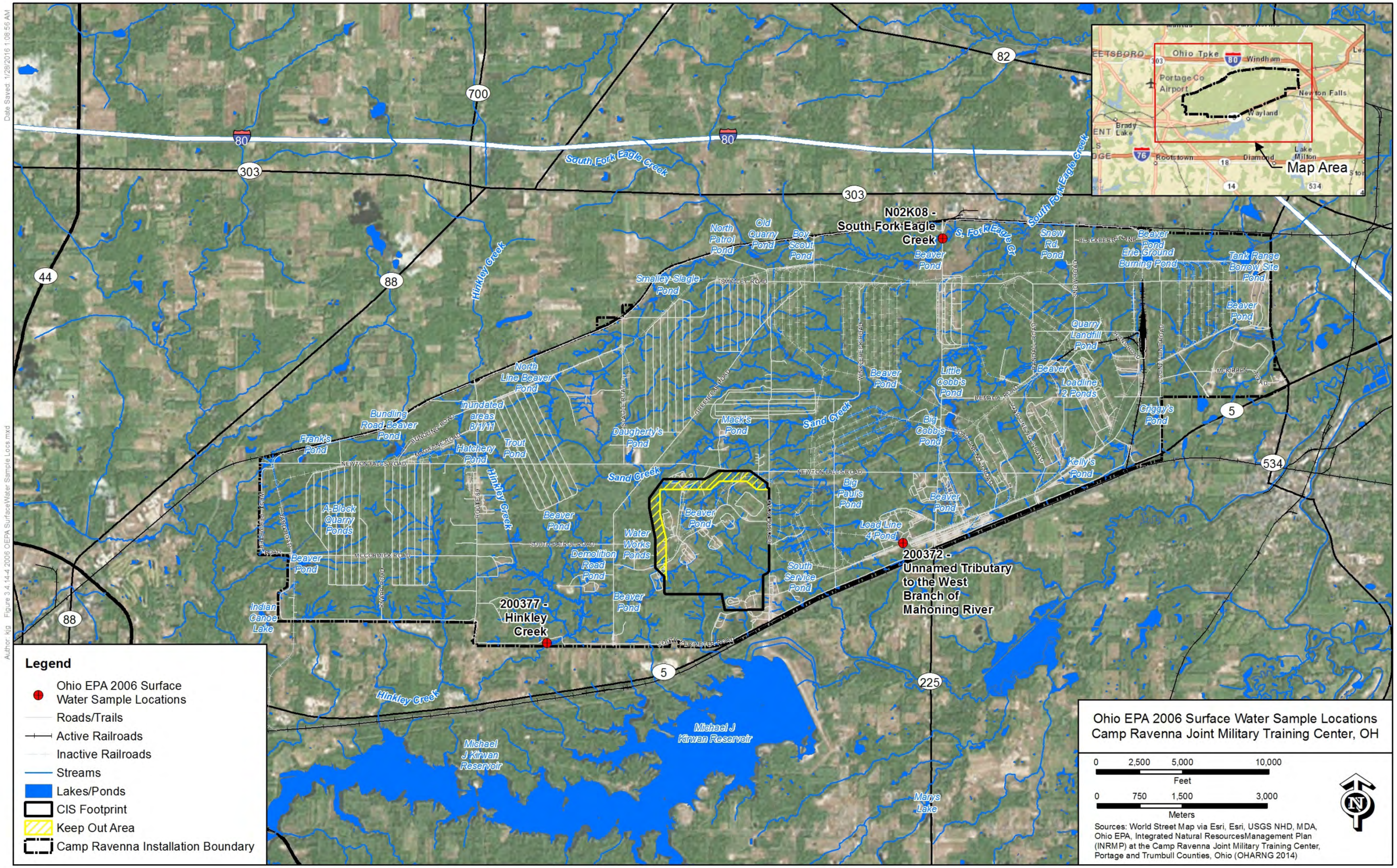


Figure 3.4.14-5 Investigation Locations within the Continental United States Interceptor Site Footprint - CRJMTC

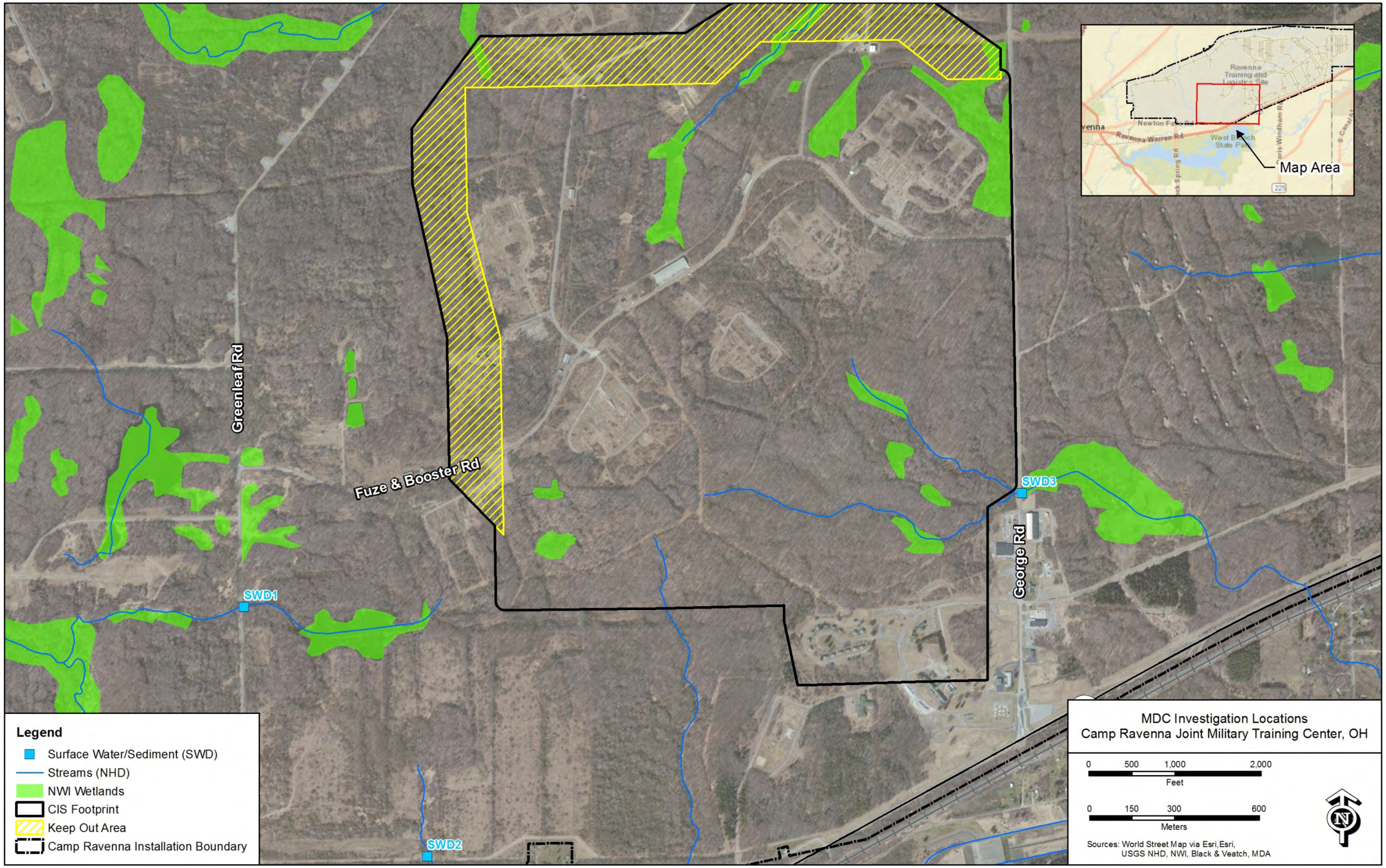
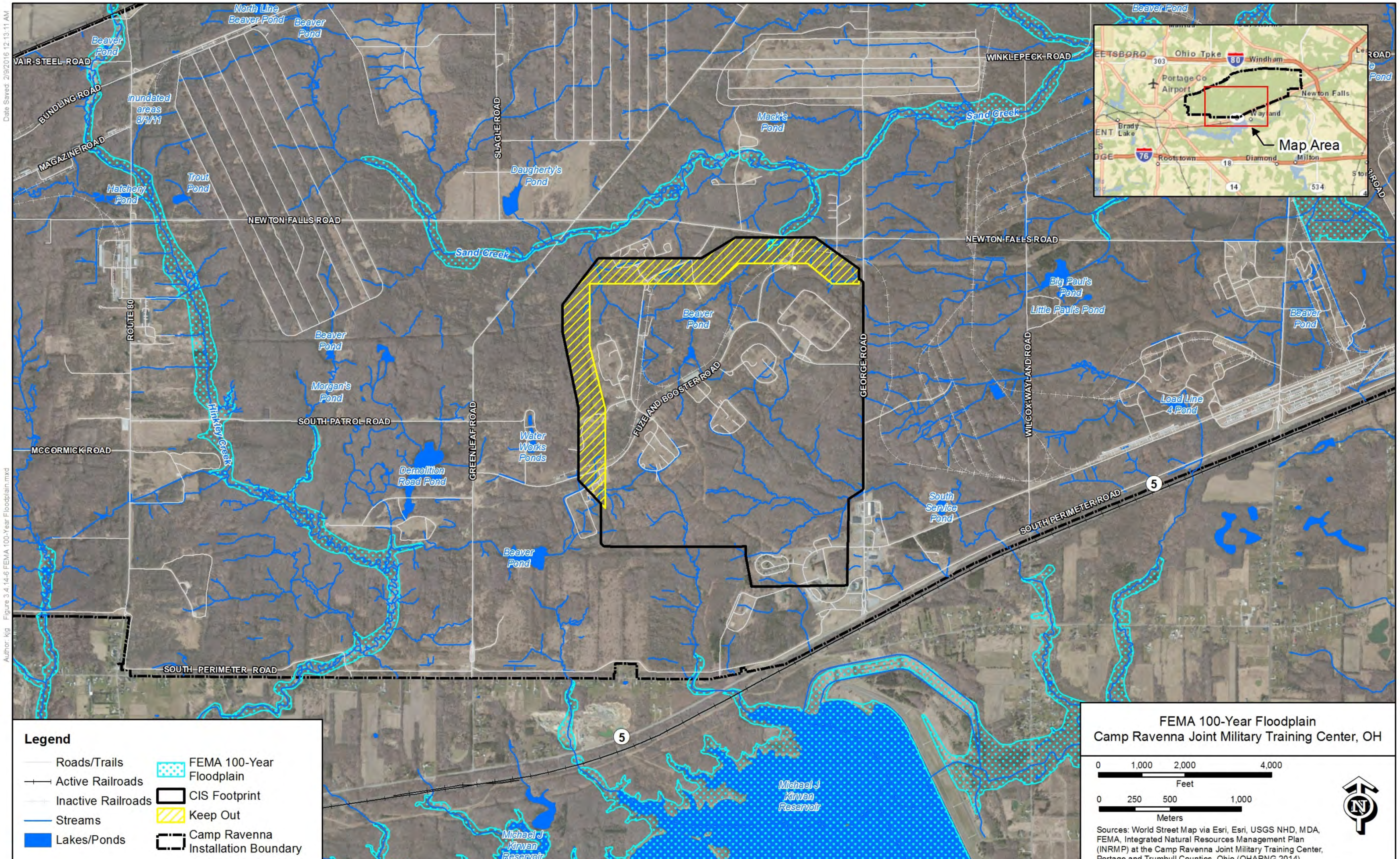


Figure 3.4.14-6 Federal Emergency Management Agency 100-Year Floodplain - CRJMTC



3.4.15 Wetlands – CRJMTC

This section describes the general wetland resources within CRJMTC, including detailed information regarding wetland resources within the CIS footprint on CRJMTC. It also presents the regulatory framework for how wetlands are regulated in the State of Ohio, the methodology for the wetland delineation within the CIS, and environmental consequences of constructing the CIS at CRJMTC and potential required mitigation.

3.4.15.1 Regulatory Framework – Wetlands - CRJMTC

The information provided in this section provides a basic federal and State of Ohio wetland regulatory background that is applicable to most situations. This summary is intended for basic informational purposes only and it should not be viewed as all-inclusive. In addition, federal, state, or local requirements may change frequently, which could alter some of the information provided.

Federal

Wetlands are defined under 33 CFR Part 328.3 (b) as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (USACE, 1987). Identification and delineation of wetland areas is based on the technical criteria outlined in the Corps of Engineers Wetlands Delineation Manual (Technical Report Y-97-1 USACE, 1987) and the appropriate Regional Supplement. Wetland identification includes consideration of the following three wetland parameters:

- Hydrophytic vegetation: The Corps of Engineers Wetlands Delineation Manual defines a hydrophytic vegetation community as one possessing greater than 50 percent of the dominant species from all strata being classified as obligate wetland (OBL – almost always observed in wetlands), facultative wetland (FACW – usually observed in wetlands), or facultative (FAC – observed in both wetlands and uplands) which are determined based on 2014 National Wetland Plant List version 3.2 (USACE, 2014a; Lichvar et al., 2014).
- Wetland hydrology: The Corps of Engineers Wetlands Delineation Manual defines wetland hydrology as "all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an over-riding influence on characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively. Such characteristics are usually present in areas that are inundated or have soils that are saturated to the surface for sufficient

duration to develop hydric soils and support vegetation typically adapted for life in periodically anaerobic conditions."

- Hydric soils: The USDA defines a hydric soil as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. The concept of hydric soils includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation.

Areas that exhibit positive indicators of these three parameters are determined to be a wetland and may be under the jurisdiction of either the USACE or State of Ohio.

The USACE regulatory program is one of the oldest in the federal government, having originated in the 19th century with the RHA of 1890 (Title 33-Navigation and Navigable Waters, Chapter 9-Protection of Navigable Waters and of Harbor and River Improvements). Generally, Section 401 (33 USC 401, et seq.), which established protection of waters used for commerce. The basic mission of the regulatory program today is "…to protect the nation's aquatic resources, while allowing reasonable development through fair, flexible and balanced permit decisions."

The geographic jurisdiction of the RHA includes all navigable WOUS, which are defined at 33 CFR Part 329 as, "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce." This jurisdiction extends seaward to include all ocean waters within a zone 3 nautical miles from the coastline (the "territorial seas"). Activities requiring RHA Section 10 permits include structures in navigable waters (e.g., piers, wharfs, breakwaters, bulkheads, jetties, weirs, and transmission lines) and work such as dredging or disposal of dredged material, or excavation, filling, or other modifications to navigable WOUS.

In 1972, amendments to the Federal Water Pollution Control Act added what is now known as Section 404 authority (33 USC 1344) to the program. The USACE is authorized to issue permits, after notice and opportunity for public hearings, for the discharge of dredged or fill material into WOUS, including wetlands at specified locations. Selection of such sites must be in accordance with guidelines developed by the USEPA in conjunction with the Secretary of the Army; which are known as the 404(b)(1) guidelines. The discharge of all other pollutants into WOUS is regulated under Section 402 of the Act (more commonly known as the NPDES). The Federal Water Pollution Control Act was further amended in 1977 and given the common name of CWA, and was again amended in 1987 to modify criminal and civil penalty provisions and to add an administrative penalty provision.

The CWA uses the term "navigable waters" which is defined at 33 CFR Part 329 as meaning "waters of the United States, including the territorial seas." Thus, Section 404 jurisdiction is defined as encompassing Section 10 waters, their tributaries, and adjacent wetlands. Isolated waters are jurisdictional where the use, degradation, or destruction of such waters could affect interstate or foreign commerce. Pursuant to Section 404 of the CWA, the USACE regulatory program has jurisdiction over the placement of fill or dredged material in all jurisdictional WOUS, including wetlands.

The geographic extent of USACE jurisdiction has recently been modified by several U.S. Supreme Court Cases, most notably the Solid Waste Agency of Northern Cook County and Rapanos/Carabell which found that the term WOUS may be limited to traditional navigable waters (i.e., waters navigable in fact or “Section 10 waters”), relatively permanent waters and wetlands adjacent to these waters (“Section 404 waters”). Because of the court decisions, isolated wetlands and non-permanent non-navigable waters usually are not jurisdictional, with the exceptional case where interstate commerce is supported by the waterbody (e.g., shellfish production or cypress bark harvested for interstate sale).” Most recently the USEPA and USACE finalized and published a Clean Water Rule: Definition of Waters of the United States on June 29, 2015, which became effective on August 28, 2015. However, as of October 2015, the Clean Water Rule was stayed by a federal court nationwide pending the outcome of several cases against the rule. As a result, any WOUS discussed in this section are based on the USACE regulations and guidance that were in effect in September 2014.

Under the CWA Section 404, placement of dredged or fill materials in WOUS is prohibited without a permit issued by the USACE. The determination that a wetland is subject to regulatory jurisdiction is made independently of procedures described in the delineation manual and the regional supplement.

EO 11990 – Protection of Wetlands (42 FR 26961, 3 CFR, 1977, p. 121) was executed on May 24, 1977, in order to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. The EO furthers Section 101(b)(3) of the NEPA (42 USC 4331(b)(3)) to improve and coordinate Federal plans, functions, programs and resources so the Country may attain the broadest range of beneficial uses of the environment without degradation and risk to health or safety. Each agency is charged with avoiding, undertaking, or providing assistance for new construction located in wetlands unless the head of the agency finds that there is no practicable alternative and that the potential deployment includes all practicable measures to minimize harm to wetlands which may result from such use. For the CIS, it should be noted that all potential sites analyzed in this EIS contain wetlands. All practicable measures were taken to arrange the CIS footprints to minimize and avoid impacts to wetlands while still maintaining operational effectiveness. However, impacts to wetlands, regardless of the site, are unavoidable. If a deployment decision were made, consultations would be held with the USACE and applicable state regulatory agencies to determine appropriate mitigations for wetland impacts. FONPA would then be prepared. The FONPA would explain why there is no practicable alternative to impacting wetlands at the identified site. It is important to note that no proposed action or decision to deploy has been made to construct the additional CIS.

State of Ohio

In Ohio, wetlands are defined under OAC 3745-1-02 as "…those areas that are inundated or saturated by surface or groundwater at a frequency and duration that are sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. 'Wetlands' includes swamps, marshes, bogs, and similar areas that are delineated in accordance with the *1987 Corps of Engineers Wetland Delineation Manual* and any other procedures and requirements adopted by the USACE for delineating wetlands." (USACE, 1987).

The OEPA regulates wetlands so that they are maintained and protected such that degradation of surface waters through direct, indirect or cumulative impacts do not result in the net loss of wetland acreage or functions (OAC 3745-1-54(B) – Wetland anti-degradation). OEPA requires that wetlands be assigned a category based on a wetland's relative function and values, sensitivity to disturbance, rarity, and potential to be adequately compensated for through compensatory mitigation (OAC 3745-1-54(B)(a)). Functions of importance to a wetland under OAC 3745-1-54(B)(b) include the following:

- Groundwater exchange, including the discharge and recharge of groundwater.
- Nutrient removal and/or transformation.
- Sediment and/or contaminant retention.
- Water storage.
- Sediment stabilization.
- Shoreline stabilization.
- Maintenance of biodiversity.
- Recreation.
- Education and research.
- Habitat for threatened or endangered species.

Ohio classifies wetlands into one of three categories under OAC 3745-1-54(C) based on these functions. This classification process is required for delineations using the Ohio Rapid Assessment Method version 5.0 (ORAM v. 50) in order to identify the applicable mitigation required to satisfy OEPA's mandate of no net loss of wetlands or wetland function. Each of the three categories is as follows:

1. Category 1 – Wetlands assigned to Category 1 generally support minimal wildlife habitat, possess very little hydrological and recreational function and do not provide critical habitat for federal or state listed threatened or endangered species. Typically these wetlands are isolated from other surface waters, possess very low species diversity (flora and fauna), have a predominance of non-native invasive species, and limited potential to achieve beneficial wetland functions. Examples of these types of wetland include acidic ponds created or excavated on mined lands without any surface connection, wetlands

with little or no vegetative cover, isolated wetlands, and wetland possessing greater than 80 percent aerial coverage of non-native and/or invasive species such as *Lythrum salicaria, Phalaris arundinacea,* and *Phragmites australis* [OAC 3745-1-54(C)(1)(a through c)].

2. Category 2 – Wetlands assigned to Category 2 generally support moderate wildlife habitat and possess hydrological or recreation functions. These wetlands are also dominated by native plant species, but without the presence of, or habitat for, rare, threatened, or endangered species. Category 2 wetlands may also be wetlands which are currently degraded, but have a reasonable potential for reestablishing lost wetland functions [(OAC 3745-1-54(C)(2)(a through c)].
3. Category 3 – Wetlands assigned to Category 3 support superior habitat and possess excellent hydrological or recreational functions. These wetlands are typified by high levels of diversity (flora and fauna), a high proportion of native species and any other functions exhibited are high. Examples of these wetlands include wetlands possessing habitat for threatened or endangered species, high quality forested wetlands (including old growth and mature forest), forested riparian wetlands, vernal pools and wetlands that are considered scarce regionally and/or statewide such as bogs and/or fens [(OAC 3745-1-54(C)(3)(a through c)].

OEPA requires projects that may impact wetlands to provide an analysis of avoidance and minimization to protect wetlands and their functions to the maximum extent. Compensatory mitigation is required for impacts that are permanent and are determined unavoidable after analyzing each alternative.

3.4.15.2 Affected Environment – Wetlands – CRJMTC

CRJMTC has a diverse landscape of habitats that include a variety of wetland types which have been identified and documented through several vegetation community surveys. Of the 18 vegetation communities identified and characterized according to the Anderson's classification system (Anderson, 1982), 12 are considered wetland communities (ODNR – DNAP, 1993) and include the following:

- Submergent Marsh.
- Floating-leaved Marsh.
- Mixed Emergent Marsh.
- Cattail Marsh.
- Sedge-grass meadow.
- Mixed Shrub Swamp.
- Button Bush Swamp.
- Oak-Maple Swamp Forest.
- Mixed Swamp Forest.

- Mixed Floodplain Forest.
- Wet Fields.
- Red Maple Woods.

Further identification and characterization was conducted at CRJMTC in 1999 according to the FGDC Standards for plant community identification (SAIC, 2000). The following plant communities exhibiting wetland characteristics were identified:

- *Acer rubrum* successional forest.
- *Fraxinus pennsylvanica – Ulmus americana – Celtis occidentalis* Temporarily Flooded Forest Alliance.
- *Salix nigra* Temporarily Flooded Forest Alliance.
- *Acer rubrum – Fraxinus pennsylvanica* Seasonally Flooded Forest Alliance.
- *Quercus palustris – Quercus bicolor* Seasonally Flooded Forest Alliance.
- Intermittently flooded mid-successional cold-deciduous shrub-land.
- Intermittently flooded late-successional cold-deciduous shrub-land.
- *Cephalanthus occidentalis* Semi-permanently Flooded Shrub-land Alliance.
- *Cornus* spp. – *Salix* spp. Saturated Shrub-land Alliance.
- *Phalaris arundinacea* Seasonally Flooded Herbaceous Alliance.
- *Typha* spp. – (*Scirpus* spp. – *Juncus* spp.) Seasonally Flooded Herbaceous Alliance.
- *Typha* (*angustifolia, latifolia*) – (*Scirpus* spp.) Semi-permanently Flooded Herbaceous Alliance.
- Intermittently flooded early successional herbaceous field.
- *Nuphar lutea – Nymphaea odorata* Permanently Flooded Herbaceous Alliance.
- *Potamogeton* spp. – *Ceratophyllum* spp. – *Elodea* spp. Permanently Flooded Herbaceous Alliance.

A more detailed description of the Anderson and FGDC Standards for vegetative community types is presented in Section 3.4.3.2.1.1 Vegetation Communities.

A Planning Level Survey was completed at CRJMTC in 1999 by the U.S. Army Research and Development Center installation-wide which summarizes the general locations where wetlands may occur. This type of survey is useful in macro-level planning (OHARNG, 2014). Although detailed jurisdictional and isolated wetland delineations are required when ground disturbing activities are proposed, these delineations typically are only conducted on a specific project need due to cost and length of validity (5 years). As a result, wetland delineations were completed within the CIS footprint on CRJMTC as described in the following section.

3.4.15.2.1 Wetland Identification Methodology

A jurisdictional waters delineation was completed by Professional Service Industries, Inc., (PSI) to determine the location and extent of USACE and/or OEPA jurisdictional wetlands and waters within a 2,080-acre portion of CRJMTC which encompassed the CIS footprint. The wetland delineation was conducted in accordance with the *Corps of Engineers Wetland Delineation Manual* (1987) and the *Regional Supplement to the Corps of Engineers Delineation Manual: Northcentral and Northeast Region* (Version 2.0) and classified using the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979), also known as the Cowardin Classification. Per OEPA requirements, an ORAM version 5.0 quantitative rating was conducted for each delineated wetland. Additional detail regarding specific wetland identification methodology is provided in the wetland delineation report prepared by PSI (PSI, 2015).

3.4.15.2.2 Wetlands Delineated

The jurisdictional waters delineation conducted by PSI in the 2,080-acre study area on CRJMTC identified 134 wetlands totaling 55.82 acres under the jurisdiction of the USACE – Pittsburgh District and/or OEPA (PSI, 2015). Table 3.4.15-1 summarizes the Cowardin Classification, Cowardin Classification Definition, and approximate acreage of that wetland type located within the 2,080-acre study area. Figure 3.4.15-1 shows the location and extent of the NWI.

As indicated in Jurisdictional Waters Delineation Report, the ORAM V. 5.0 categorization rating was completed for each of the 134 wetlands identified. Table 3.4.15-2 summarizes the wetland size, Cowardin Classification, ORAM Category, and assumed jurisdictional status for each wetland. Figure 3.4.15-2 shows the location and extent of all WOUS, including wetlands delineated within the CIS footprint.

Detailed data sheets and ORAM 5.0 worksheets are provided for each wetland identified and delineated in the Jurisdictional Waters Delineation Report (PSI, 2015). A brief description of each Category 3 wetland within the study area, which includes dominant plant species, is provided in the following sections because any impacts to these wetlands could be major due to their high function and/or value. A brief summary of dominant plant species collectively observed in Category 1 and 2 wetlands according to Cowardin Classification is also provided. The location and extent of all wetlands delineated within the study area according to Cowardin Classification is shown on Figure 3.4.15-3 and ORAM Categories are shown on Figure 3.4.15-4.

Table 3.4.15-1 Cowardin Classification Definition and Approximate Acreage in 2,080-acre Study Area on CRJMTC

Cowardin Class	Cowardin Class Definition	Acreage
P	**Palustrine System Wetlands** - [tidal and non-tidal marshy wetlands or shallow water, not Riverine (associated with a stream or river), Lacustrine (lakes and ponds over 20 acres), Estuarine (tidal and non-tidal wetlands associated with estuaries) or Marine (wetlands associated with near-shore marine environments that are not part of another system)]	55.82
PEM1A	**Palustrine** (P); **Emergent wetland** (EM), vegetation is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; **Persistent vegetation** (1), remnants of vegetation persists into winter months and is generally identifiable; **Temporarily Flooded** (A), surface water present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season.	1.31
PEM1A/ PFO1A	**Palustrine** (P); **Emergent wetland** (EM), vegetation is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; **Persistent vegetation** (1), remnants of vegetation persists into winter months and is generally identifiable; **Forested wetland** (FO), vegetation is dominated by forest tree species but also possess an understory of young trees and/or shrubs, and a sparse herbaceous layer; **Broad-leaved Deciduous** (1), broad-leaved deciduous tree species which are represented throughout the U.S.; **Temporarily Flooded** (A), surface water present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season.	2.45
PEM1A/ PSS1A	**Palustrine** (P); **Emergent wetland** (EM), vegetation is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; **Persistent vegetation** (1), remnants of vegetation persists into winter months and is generally identifiable; **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Temporarily Flooded** (A), surface water present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season.	1.44
PEM1B	**Palustrine** (P); **Emergent wetland** (EM), vegetation is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; **Persistent vegetation** (1), remnants of vegetation persists into winter months and is generally identifiable; **Saturated** (B), the substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.	10.84

Cowardin Class	Cowardin Class Definition	Acreage
PEM1B/ PSS1B	**Palustrine** (P); **Emergent wetland** (EM), vegetation is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; **Persistent vegetation** (1), remnants of vegetation persists into winter months and is generally identifiable; **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Saturated** (B), the substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.	0.11
PEM1C	**Palustrine** (P); **Emergent wetland** (EM), vegetation is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; **Persistent vegetation** (1), remnants of vegetation persists into winter months and is generally identifiable; **Seasonally Flooded** (C), surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.	0.46
PEM1C/ PSS1C	**Palustrine** (P); **Emergent wetland** (EM), vegetation is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; **Persistent vegetation** (1), remnants of vegetation persists into winter months and is generally identifiable; **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Seasonally Flooded** (C), surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.	0.09
PEM1F/ PFO1F	**Palustrine** (P); **Emergent wetland** (EM), vegetation is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; **Persistent vegetation** (1), remnants of vegetation persists into winter months and is generally identifiable; **Forested wetland** (FO), vegetation is dominated by forest tree species but also possess an understory of young trees and/or shrubs, and a sparse herbaceous layer; **Broad-leaved Deciduous** (1), broad-leaved deciduous tree species which are represented throughout the U.S.; **Semi-permanently Flooded** (F), surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.	0.17
PFO1A	**Palustrine** (P); **Forested wetland** (FO), vegetation is dominated by forest tree species but also possess an understory of young trees and/or shrubs, and a sparse herbaceous layer; **Broad-leaved Deciduous** (1), broad-leaved deciduous tree species which are represented throughout the U.S.; **Temporarily Flooded** (A), surface water present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season.	1.42

Cowardin Class	Cowardin Class Definition	Acreage
PFO1B	**Palustrine** (P); **Forested wetland** (FO), vegetation is dominated by forest tree species but also possess an understory of young trees and/or shrubs, and a sparse herbaceous layer; **Broad-leaved Deciduous** (1), broad-leaved deciduous tree species which are represented throughout the U.S.; **Saturated** (B), the substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.	1.59
PFO1B/ PSS1B	**Palustrine** (P); **Forested wetland** (FO), vegetation is dominated by forest tree species but also possess an understory of young trees and/or shrubs, and a sparse herbaceous layer; **Broad-leaved Deciduous** (1), broad-leaved deciduous tree species which are represented throughout the U.S.; **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Saturated** (B), the substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.	0.49
PFO1C	**Palustrine** (P); **Forested wetland** (FO), vegetation is dominated by forest tree species but also possess an understory of young trees and/or shrubs, and a sparse herbaceous layer; **Broad-leaved Deciduous** (1), broad-leaved deciduous tree species which are represented throughout the U.S.; **Seasonally Flooded** (C), surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.	1.20
PFO1C/ PSS1C	**Palustrine** (P); **Forested wetland** (FO), vegetation is dominated by forest tree species but also possess an understory of young trees and/or shrubs, and a sparse herbaceous layer; **Broad-leaved Deciduous** (1), broad-leaved deciduous tree species which are represented throughout the U.S.; **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Seasonally Flooded** (C), surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.	0.07
PFO1F	**Palustrine** (P); **Forested wetland** (FO), vegetation is dominated by forest tree species but also possess an understory of young trees and/or shrubs, and a sparse herbaceous layer; **Broad-leaved Deciduous** (1), broad-leaved deciduous tree species which are represented throughout the U.S.; **Semi-permanently Flooded** (F), surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.	0.06

Cowardin Class	Cowardin Class Definition	Acreage
PFO1F/ PSS1F	**Palustrine** (P); **Forested wetland** (FO), vegetation is dominated by forest tree species but also possess an understory of young trees and/or shrubs, and a sparse herbaceous layer; **Broad-leaved Deciduous** (1), broad-leaved deciduous tree species which are represented throughout the U.S.; **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Semi-permanently Flooded** (F), surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.	1.27
PSS1A	**Palustrine** (P); **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Temporarily Flooded** (A), surface water present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season.	0.36
PSS1B	**Palustrine** (P); **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Saturated** (B), the substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present.	1.83
PSS1C	**Palustrine** (P); **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Seasonally Flooded** (C), surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.	0.60
PSS1C/ PEM1C	**Palustrine** (P); **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Emergent wetland** (EM), vegetation is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; **Persistent vegetation** (1), remnants of vegetation persists into winter months and is generally identifiable; **Seasonally Flooded** (C), surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.	0.98

Cowardin Class	Cowardin Class Definition	Acreage
PSS1F	**Palustrine** (P); **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Semi-permanently Flooded** (F), surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.	0.35
PUB1F	**Palustrine** (P); **Unconsolidated Bottom** (UB), wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 3 inches diameter), and a vegetative cover less than 30%; **Cobble-Gravel** (1), unconsolidated particles are smaller than stone and predominantly cobble and gravel with finer sediments may be intermixed; **Semi-permanently Flooded** (F), surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.	0.50
PUB3H	**Palustrine** (P); **Unconsolidated Bottom** (UB), wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 3 inches diameter), and a vegetative cover less than 30%; **Mud** (3), unconsolidated particles smaller than stones, predominantly silt and clay, although coarser sediments or organic material may be intermixed; **Permanently Flooded** (H), water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes.	0.31
PUB4H/ PSS1A	**Palustrine** (P); **Unconsolidated Bottom** (UB), wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 3 inches diameter), and a vegetative cover less than 30%; **Organic** (4), unconsolidated material smaller than stones is predominantly organic where the number of species is limited and faunal productivity is very low. **Permanently Flooded** (H), water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes. **Scrub-Shrub** (SS), woody vegetation that is characterized as true shrubs, young trees and/or trees and shrubs that are small or stunted due to environmental conditions and are generally less than 20 feet in height; **Broad-Leaved Deciduous** (1), woody vegetation is predominantly deciduous and broad-leaved tree or shrub species; **Temporarily Flooded** (A), surface water present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season.	9.66
PUB4Hb	**Palustrine** (P); **Unconsolidated Bottom** (UB), wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 3 inches diameter), and a vegetative cover less than 30%; **Organic** (4), unconsolidated material smaller than stones is predominantly organic where the number of species is limited and faunal productivity is very low. **Permanently Flooded** (H), water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes. **Beaver** (b), wetland or deepwater habitat is a result of beaver dams/impoundments.	18.27
*Cowardin et al., 1979		

Table 3.4.15-2 Summary of Ohio Rapid Assment Method Categories within the 2,080-Acre Study Area on CRJMTC

Wetland ID	Approximate Acreage	Assumed Jurisdiction	ORAM Category	Cowardin Class	Within Cleared CIS Footprint
Wetland 001	0.0301	Jurisdictional	1	PEM1B	Yes
Wetland 002	0.0876	Jurisdictional	Modified 2	PEM1C/PSS1C	Yes
Wetland 003	0.0083	Jurisdictional	1	PEM1B	Yes
Wetland 004	0.0110	Jurisdictional	1	PEM1B	Yes
Wetland 005	0.1565	Isolated	1	PEM5B	Yes
Wetland 006	0.0094	Jurisdictional	Modified 2	PEM1B	Yes
Wetland 007	0.0250	Jurisdictional	Modified 2	PEM1B	Yes
Wetland 008	0.0217	Isolated	Modified 2	PEM1B	Yes
Wetland 009	0.0522	Isolated	1	PEM5B	Yes
Wetland 010	0.0274	Isolated	1	PEM1B	Yes
Wetland 011	0.6860	Jurisdictional	1	PEM1B	No
Wetland 012	18.2728	Jurisdictional	3	PUB4Hb	No
Wetland 013	0.0653	Jurisdictional	1	PEM1B	No
Wetland 014	0.0831	Jurisdictional	Modified 2	PEM1B	No
Wetland 015	0.0575	Jurisdictional	Modified 2	PEM1B	No
Wetland 016	1.1915	Jurisdictional	Modified 2	PEM1A/PFO1A	No
Wetland 017	0.4510	Jurisdictional	Modified 2	PEM1A/PFO1A	No
Wetland 018	0.1146	Isolated	Modified 2	PEM1B	No
Wetland 019	4.2483	Jurisdictional	1	PEM1B	No
Wetland 020	1.1967	Isolated	Modified 2	PFO1C	Yes
Wetland 021	0.2117	Jurisdictional	Modified 2	PEM1A	Yes
Wetland 022	0.1050	Isolated	Modified 2	PEM1A	No
Wetland 023	0.0123	Isolated	1	PEM1B	No
Wetland 024	0.0467	Jurisdictional	Modified 2	PEM1C	No
Wetland 025	0.0182	Jurisdictional	Modified 2	PFO1A	No
Wetland 026	0.6736	Jurisdictional	2	PFO1A	No
Wetland 027	0.0514	Jurisdictional	2	PEM1A	No
Wetland 028	0.0374	Jurisdictional	2	PFO1A	No
Wetland 029	0.0694	Jurisdictional	2	PFO1C/PSS1C	Yes
Wetland 030	0.0213	Isolated	2	PEM1B	No
Wetland 031	0.0032	Isolated	Modified 2	PFO1A	Yes
Wetland 032	0.0136	Isolated	Modified 2	PFO1A	Yes

Wetland ID	Approximate Acreage	Assumed Jurisdiction	ORAM Category	Cowardin Class	Within Cleared CIS Footprint
Wetland 033	0.1723	Jurisdictional	2	PEM1F/PFO1F	Yes
Wetland 034	1.2681	Jurisdictional	3	PFO1F/PSS1F	Yes
Wetland 035	0.0760	Isolated	2	PSS1C	Yes
Wetland 036	0.0578	Isolated	2	PFO1F	Yes
Wetland 037	0.3645	Jurisdictional	3	PEM1C	Yes
Wetland 038	0.0546	Jurisdictional	1	PEM1B	No
Wetland 039	0.8036	Jurisdictional	3	PEM1A/PFO1A	Yes
Wetland 040	0.6040	Jurisdictional	1	PEM1B	No
Wetland 041	0.1071	Jurisdictional	2	PSS1C	No
Wetland 042	0.2566	Jurisdictional	1	PEM1B	No
Wetland 043	0.9758	Jurisdictional	2	PSS1C/PEM1C	No
Wetland 044	0.0108	Isolated	Modified 2	PFO1B	No
Wetland 045	0.0614	Isolated	Modified 2	PEM1B	No
Wetland 046	0.0484	Jurisdictional	2	PEM1B	Yes
Wetland 047	0.0177	Jurisdictional	2	PEM1A	No
Wetland 048	0.1114	Isolated	Modified 2	PEM1B/PSS1B	No
Wetland 049	0.0329	Jurisdictional	2	PEM1C	No
Wetland 050	0.3145	Jurisdictional	3	PUB3H	No
Wetland 051	0.2024	Jurisdictional	2	PEM1A/PSS1A	No
Wetland 052	0.1717	Jurisdictional	2	PSS1B	No
Wetland 053	0.0332	Jurisdictional	Modified 2	PEM1B	No
Wetland 054	0.1099	Jurisdictional	2	PSS1B	No
Wetland 055	0.1238	Isolated	Modified 2	PSS1C	Yes
Wetland 056	0.4867	Jurisdictional	2	PFO1B/PSS1B	Yes
Wetland 057	0.1183	Jurisdictional	Modified 2	PFO1B	Yes
Wetland 058	0.5222	Jurisdictional	Modified 2	PEM1B	Yes
Wetland 059	0.2509	Isolated	2	PEM1B	Yes
Wetland 060	0.2534	Jurisdictional	2	PFO1A	Yes
Wetland 061	0.0197	Isolated	Modified 2	PSS1B	No
Wetland 062	9.6629	Jurisdictional	3	PUB4H/PSS1A	Yes
Wetland 063	0.0888	Jurisdictional	2	PSS1A	Yes
Wetland 064	0.0636	Jurisdictional	2	PFO1B	Yes
Wetland 065	0.0256	Jurisdictional	2	PFO1B	Yes
Wetland 066	0.0204	Jurisdictional	2	PFO1A	Yes
Wetland 067	0.0584	Jurisdictional	2	PEM1B	Yes

Wetland ID	Approximate Acreage	Assumed Jurisdiction	ORAM Category	Cowardin Class	Within Cleared CIS Footprint
Wetland 068	0.0147	Jurisdictional	2	PFO1B	Yes
Wetland 069	1.2367	Jurisdictional	2	PEM1A/PSS1A	Yes
Wetland 070	0.0208	Jurisdictional	Modified 2	PSS1B	No
Wetland 071	0.0229	Jurisdictional	2	PEM1B	Yes
Wetland 072	0.0195	Isolated	2	PEM1A	No
Wetland 073	0.0645	Jurisdictional	2	PEM1A	No
Wetland 074	0.0539	Jurisdictional	2	PSS1B	No
Wetland 075	0.0362	Jurisdictional	2	PSSIC	No
Wetland 076	0.0855	Jurisdictional	2	PSSIB	Yes
Wetland 077	0.0093	Jurisdictional	2	PFO1B	Yes
Wetland 078	0.1519	Isolated	Modified 2	PFO1A	Yes
Wetland 079	0.2217	Jurisdictional	2	PUB1F	Yes
Wetland 080	0.0731	Jurisdictional	2	PSS1C	Yes
Wetland 081	0.0920	Jurisdictional	2	PFO1A	No
Wetland 082	0.6341	Jurisdictional	2	PSS1B	No
Wetland 083	0.1956	Jurisdictional	2	PFO1B	No
Wetland 084	0.2688	Jurisdictional	Modified 2	PSS1A	No
Wetland 085	1.0237	Jurisdictional	2	PFA1B	Yes
Wetland 086	0.2475	Isolated	2	PUB1F	Yes
Wetland 087	0.0103	Jurisdictional	Modified 2	PEM1B	Yes
Wetland 088	0.1857	Jurisdictional	Modified 2	PEM1B	Yes
Wetland 089	0.0122	Jurisdictional	2	PFO1B	Yes
Wetland 090	0.3500	Jurisdictional	2	PSS1F	Yes
Wetland 091	0.1218	Jurisdictional	2	PSS1B	Yes
Wetland 092	0.0297	Jurisdictional	Modified 2	PFO1B	Yes
Wetland 093	0.3591	Jurisdictional	2	PSS1B	Yes
Wetland 094	0.0341	Jurisdictional	2	PSS1B	Yes
Wetland 095	0.0202	Jurisdictional	1	PEM1B	Yes
Wetland 096	0.0338	Isolated	1	PEM1B	Yes
Wetland 097	0.0654	Isolated	2	PFO1A	Yes
Wetland 098	0.0529	Isolated	2	PFO1A	Yes
Wetland 099	0.0470	Jurisdictional	2	PSS1B	Yes
Wetland 100	0.0253	Jurisdictional	Modified 2	PEM1B	Yes
Wetland 101	0.0414	Isolated	2	PEM1B	Yes
Wetland 102	0.0254	Jurisdictional	2	PEM1B	Yes

Wetland ID	Approximate Acreage	Assumed Jurisdiction	ORAM Category	Cowardin Class	Within Cleared CIS Footprint
Wetland 103	0.0120	Jurisdictional	Modified 2	PFO1B	Yes
Wetland 104	0.0991	Jurisdictional	Modified 2	PEM1B	No
Wetland 105	0.4374	Jurisdictional	Modified 2	PEM1B	No
Wetland 106	0.1787	Isolated	2	PSS1C	No
Wetland 107	0.0147	Jurisdictional	2	PEM1B	No
Wetland 108	0.0078	Jurisdictional	2	PEM1B	No
Wetland 109	0.0338	Isolated	2	PSS1B	No
Wetland 110	0.0082	Jurisdictional	2	PFO1B	No
Wetland 111	0.0663	Jurisdictional	2	PEM1B	No
Wetland 112	0.0415	Jurisdictional	Modified 2	PEM1B	No
Wetland 113	0.0234	Jurisdictional	1	PSS1B	No
Wetland 114	0.0127	Jurisdictional	1	PEM1B	No
Wetland 115	0.0157	Jurisdictional	1	PEM1B	No
Wetland 116	0.0086	Jurisdictional	1	PEM1B	No
Wetland 117	0.4867	Jurisdictional	Modified 2	PEM1B	No
Wetland 118	0.0320	Isolated	3	PUB1F	No
Wetland 119	0.3804	Jurisdictional	2	PEM5B	No
Wetland 120	0.9128	Jurisdictional	3	PEM1B	No
Wetland 121	0.0528	Jurisdictional	Modified 2	PEM1B	No
Wetland 122	0.0167	Isolated	Modified 2	PEM1C	Yes
Wetland 123	0.0334	Jurisdictional	Modified 2	PEM1A	Yes
Wetland 124	0.0405	Jurisdictional	3	PFO1A	Yes
Wetland 125	0.8075	Jurisdictional	2	PEM1A	No
Wetland 126	0.0680	Isolated	2	PFO1B	No
Wetland 127	0.1000	Isolated	Modified 2	PEM1B	No
Wetland 128	0.0241	Isolated	Modified 2	PEM1B	No
Wetland 129	0.0193	Isolated	Modified 2	PEM1B	No
Wetland 130	0.0788	Jurisdictional	Modified 2	PEM1B	No
Wetland 131	0.0398	Jurisdictional	1	PEM1B	No
Wetland 132	0.1082	Jurisdictional	Modified 2	PSS1B	Yes
Wetland 133	0.1382	Jurisdictional	Modified 2	PEM1B	Yes
Wetland 134	0.0208	Isolated	1	PEM1B	Yes
*PSI, 2015					

3.4.15.2.2.1 Category 3 Wetlands

The Category 3 wetlands documented to occur at CRJMTC within the CIS footprint are described in the following paragraphs.

Wetland 12 (PUB4Hb). This wetland is a palustrine wetland associated with the headwater of a stream located in the southwestern portion of the study area. The wetland is approximately 18.2 acres in size and dominated along the edges by pin oak (*Quercus palustris*), glossy buckthorn (*Frangula alnus*), reed canary grass (*Phalaris arundinacea*) and arrow-leaved tear thumb (*Polygonum sagittatum*). There are a multitude of aquatic plant species in the permanently inundated portions of the wetland, such as bladderworts (*Utricularia* spp.), bulrushes (*Scirpus*/*Schoenoplectus* spp.), duckweed (*Lemna* spp.) and spatterdock (*Nuphar* sp.), among many others. The wetland has substantially wide buffers, greater than 150 feet of undisturbed vegetated uplands which is considered a very low surrounding land use comprised of second growth or older forest, prairie, savannah or wildlife areas. The overall habitat provided by this wetland is of excellent quality with no alteration of the vegetation or substrate. A breeding bald eagle pair has also been documented nesting within this wetland for several years (PSI, 2015). Additional information on the bald eagle is provided in Section 3.4.3.2.3.1.

Wetland 34 (PFO1F/PSS1F). This wetland is a diverse, but relatively small wetland associated with an intermittent/seasonal surface water in central portion of the study area. The wetland is approximately 1.8 acres in size comprised by a high interspersion mosaic of aquatic beds, emergent, shrub, forest, and open water habitats. Dominant vegetation includes American elm (*Ulmus americana*), pin oak, rice-cut grass (*Leersia oryzoides*), sensitive fern (*Onoclea sensibilis*) and roadside agrimony (*Agrimonia striata*). The wetland has medium buffers, approximately 100 feet wide low (old field greater than 10 years successional, shrubland and young second growth forest)and very low (2nd growth or older forest, prairie, savannah, wildlife areas) intensity land use. Overall the quality of habitat provided by this wetland is excellent with no observed substrate disturbance. The wetland was historically disturbed, but apparently has recovered (PSI, 2015).

Wetland 37 (PEM1C). This wetland is an emergent wetland depression among 2nd growth forest in the central portion of the study area. The wetland is small in size, approximately 0.36 acre and dominated by reed canary grass, sweet wood reed (*Cinna arundinacea*), soft rush (*Juncus effusus*), sensitive fern, and deer tongue (*Dichanthelium clandestinum*). The wetland has medium buffers, approximately 100 feet in width of low (old field greater than 10 years successional, shrubland and young second growth forest) and very low (2nd growth or older forest, prairie, savannah, wildlife areas) intensity land use. Due to the presence of the state-listed threatened *Plagiothecium latebricola* species, this wetland was categorized as an ORAM Category 3. Additional information for this state-threatened plant species is provided in Section 3.4.3.

Wetland 39 (PEM1A/PFO1A). This wetland is a moderately high interspersion mosaic of emergent, scrub-shrub and forest habitat that is associated with a surface water in the central portion of the study area. The wetland is relatively small in size, approximately 0.80 acre, and dominated by tree and shrub species such as green ash (*Fraxinus pennsylvanica*), American elm, northern spicebush (*Lindera benzoin*) and herbaceous species such as fringed bromegrass (*Bromus ciliates*), deer tongue grass, white turtlehead (*Chelone glabra*), spinulose woodfern (*Dryopteris carthusiana*), and sensitive fern. The wetland possesses large buffers over 150 feet wide with very low intensity (2nd growth or older forest, prairie, savannah, wildlife areas) land use. Historically there has been selective timber harvesting as part of forest management to perpetuate the forested ecosystem; however, it has since recovered and the habitat is considered excellent quality with very little coverage of invasive species (PSI, 2015).

Wetland 50 (PUB3H). This wetland is a moderate interspersion mosaic of aquatic bed, emergent and open water associated with Sand Creek in the northwestern portion of the study area. The wetland is relatively small in size, approximately 0.31 acre, and dominated by rice-cut grass, reed canary grass, broad-leaf cattail (*Typha latifolia*) and New England aster (*Symphyotrichum novae-angliae*). The wetland possesses large buffers over 150 feet wide with very low intensity (2nd growth or older forest, prairie, savannah, wildlife areas) land use. Historically there has been disturbance to the substrate and habitat; however, it has since recovered and the habitat is considered excellent with sparse coverage of invasive species (PSI, 2015).

Wetland 62 (PUB4H/PSS1A). This wetland is a moderately high interspersion mosaic of aquatic bed, emergent, shrub, forest, and open water habitat associated with a beaver pond and unnamed perennial stream in the northwestern portion of the study area. The wetland is moderately sized, approximately 9.67 acres and dominated by pin oak, American elm, flowering dogwood (*Cornus florida*), rice-cut-grass, arrow-leaf tearthumb, sensitive fern, and broad-leaved cattail. The wetland possesses large buffers over 150 feet wide with very low (2nd growth or older forest, prairie, savannah, wildlife areas) and low (old field greater than 10 years successional, shrub-land and young second growth forest) intensity land use. Historically there has been habitat and substrate disturbance; however, the wetland has recovered from the disturbances and is now considered excellent quality habitat. Invasive species are nearly absent from this wetland (PSI, 2015).

Wetland 79 (PUB4F). This wetland is a small pond (approximately 0.36 acre) with moderately high interspersion of emergent wetland and open water habitat surrounded by deciduous forest in the northern portion of the study area. The wetland was dominated by broad-leaf cattail and green bulrush (*Scirpus atrovirens*). Upland buffers average approximately 100 feet to the nearest disturbance/development with very low (2nd growth or older forest) and low (old field greater than 10 years successional shrub-land and young second growth forest) intensity land use. Historically there is no evidence of past habitat alteration and there is no current or recent historic development (PSI, 2015).

Wetland 120 (PEM1B). This wetland is a small (approximately 0.91 acre) generally emergent wetland on the western portion of the study area with moderate interspersion of emergent, shrub, and forest habitats which creates an ecotone between the wetland and upland area with a high degree of vegetation structure. Dominant vegetation included pin oak, red-osier dogwood (*Cornus sericea*), reed canary grass, and flat-top goldenrod (*Euthamia graminifolia*). Upland buffers generally range between 100 and 150-feet to the nearest disturbed/developed area with very low (2nd growth or older forest, herbaceous field) and low (old field, shrub-land and young second growth forest) intensity land use. Green Leaf Road occurs east of this wetland approximately 50 feet. Historically this wetland appears to have been harvested for timber but it has excellent habitat development and it is considered to have recovered from this land disturbance.

Wetland 124 (PFO1A). This small (approximate 0.04-acre) forested wetland occurs in the south-central portion of the study area associated with a drainage that has been historically straightened. This wetland possesses moderately high interspersion of other wetland types; shrub and emergent. Dominant vegetation observed were pin oak, American elm), sugar maple (*Acer saccharum*), deertongue and white turtle head. Upland buffers are wide, generally over 150 feet to the nearest development/disturbed area with very low (2nd growth or older forest) and low (old field and shrub-land) intensity land use. Historically this wetland and surrounding area appears to have been timber harvested; however, the wetland has recovered and habitat development is excellent.

3.4.15.2.2.2 Non-Category 3 Wetlands

Palustrine Emergent. Emergent wetlands are the most abundant wetland type within the study area. They are generally associated with ponds, beaver dams and other impoundments and drainage areas near disturbed portions of the study area. The most common dominant plant species observed in these wetland habitats were:

- Fringed bromegrass (*Bromus ciliates*).
- Sedges (*Carex* spp.).
- White turtlehead (*Chelone glabra*).
- Deertongue *(Dichanthelium clandestinum*).
- Rough barnyardgrass (*Echinochloa muricata*).
- Flat-top goldentop (*Euthamia graminifolia*).
- Fowl mannagrass (*Glyceria striata*).
- Jewel weed (*Impatiens capensis*).
- Common rush (*Juncus effusus*).
- Rice cutgrass (*Leersia oryzoides*).
- Purple loosestrife (*Lythrum salicaria*).
- Sensitive fern (*Onoclea sensibilis*).

- Reed canary grass (*Phalaris arundinacea*).
- Arrowleaf tearthumb (*Polygonum sagittatum*).
- Woolgrass (*Scirpus cyperinus*).
- New England aster (*Symphyotrichum novae-angliae*).
- Broadleaf cattail (*Typha latifolia*).

Palustrine Forested. Forested wetlands occur in the northern and southern portion of the study area generally away from Fuze and Booster Road and the associated developed/disturbed areas. These wetlands are associated with drainage areas, headwaters of streams and seepage areas. The most common dominant plant species observed in these habitats were:

- Red maple (*Acer rubrum*).
- Silver maple (*Acer saccharinum*).
- Sugar maple *(Acer saccharum*).
- American hornbeam (*Carpinus caroliniana*).
- Quaking/trembling aspen (*Populus tremuloides*).
- Swamp white oak (*Quercus bicolor*).
- Pin oak (Quercus palustris).
- American elm (*Ulmus americana*).

Palustrine Scrub-Shrub. Scrub-shrub wetlands are generally associated with the outer edge of ponds, beaver dams and other impoundments and drainage areas near disturbed portions of the study area in the ecotone gradient between the emergent wetland and forested wetland/upland habitats. The most common dominant plant species observed in these wetland habitats were:

- Silky dogwood (*Cornus amomum*).
- Gray dogwood (*Cornus racemosa*).
- Redosier dogwood (*Cornus sericea*).
- Northern spicebush (*Lindera benzoin*).
- Amur honeysuckle (*Lonicera maackii*).
- Quaking/trembling aspen (*Populus tremuloides*).
- Multiflora rose (*Rosa multiflora*).
- Northern arrowwood (*Viburnum recognitum*).
- Poison ivy (*Toxicodendron radicans*).

Palustrine Unconsolidated Bottom. These wetland habitats are open water or mostly open water ponds, emergent and scrub-shrub wetland mosaics associated with beaver dams and other impoundments/depressions. Rooted vascular plant species observed in these areas were included in the discussion of emergent wetland habitat; however, additional non-rooted and rooted floating plant species included species of duckweed (*Lemnoideae* family), spatterdock (*Nuphar* spp.) and bladderworts (*Utricularia* spp.).

3.4.15.2.3 CRJMTC Facility Relocation Areas

The construction of the CIS at CRJMTC would result in several CRJMTC facilities being relocated to other locations on the installation as discussed in Section 2.0. As shown on Figure 3.4.15-5, none of the sites where these facilities would be relocated contain any wetlands; however, it should be noted that a jurisdictional wetland delineation has not been conducted in these areas since 2004. Should a decision be made to deploy the CIS and CRJMTC be selected as the preferred alternative, a current delineation would be necessary confirm that wetland conditions have not changed.

3.4.15.3 Environmental Consequences and Mitigation – Wetlands - CRJMTC

Construction activities associated with potential CIS deployment are detailed in Section 2.5.1. The following sections analyze the direct and indirect impacts that could occur to wetlands as a result of the construction and operation of the CIS.

3.4.15.3.1 Construction – Baseline Schedule

Construction of the CIS according to the baseline schedule as described in Section 2.0 of this EIS would result in unavoidable permanent and temporary impacts to wetlands. The specific types of impacts, quantity, and potential mitigation are described in detail in the following sections.

3.4.15.3.1.1 Environmental Consequences

The construction of the CIS would require extensive grading, cutting and filling of land in preparation of construction which would include wetland areas. The construction of this site and grading would result in permanent and temporary; direct and indirect impacts to wetland areas. This section quantifies the type of impact to wetlands within the CIS footprint according to their Cowardin Classification and ORAM Category.

Permanent Direct Wetland Impacts

Permanent and direct impacts would occur as a result of the grading and filling of wetlands within the cleared CIS footprint as shown on Figure 3.4.15-6 and Figure 3.4.15-7. Impacts within this footprint, according to Cowardin Classification and ORAM Category, are quantified in Tables 3.4.15-3 and 3.4.15-4, respectively.

Table 3.4.15-3 Summary of Direct, Permanent Impact to Wetlands within Continental United States Interceptor Site Footprint by Cowardin Classification - CRJMTC

Coward Classification	Acres	Coward Class	Acres
PEM	2.44	PSS	0.91
PEM/PFO	0.86	PSS/PEM	0.35
PEM/PSS	1.32	PUB	0.47
PFO	2.34	PUB/PSS	9.66
PFO/PSS	1.82	Total	20.17

Table 3.4.15-4 Summary of Direct, Permanent Impact to Wetlands within Continental United States Interceptor Site Footprint by Ohio Rapid Assessment Method Category - CRJMTC

ORAM Category	Acres
1	0.36
Modified 2	2.08
2	5.37
3	12.36
Total	20.17

Permanent Indirect Impacts to Wetlands

Permanent indirect impacts would occur to those wetlands outside, but immediately adjacent to, or bisected by the cleared CIS footprint. While not directly impacted due to fill, these wetlands could be indirectly impacted by erosion/sedimentation during construction; changes in hydrology due to additional runoff from the CIS; and permanent changes in vegetation communities caused by changes in nutrient loading, lighting, hydrology, and water flow velocities. These impacts would potentially be major and may require mitigation. Permanent indirect impacts that would occur to wetlands that are adjacent to, or bisected by the cleared CIS based on Cowardin Classification and ORAM Category are summarized in Tables 3.4.15-5 and 3.4.15-6 and shown on Figures 3.4.15-6 and 3.4.15-7, respectively.

Table 3.4.15-5 Summary of Permanent Indirect Impact to Wetlands According to Cowardin Classification - CRJMTC

Cowardin Classification	Acres
PEM	0.001
PEM/PFO	0.12
PFO	0.82
Total	0.94

Table 3.4.15-6 Summary of Permanent Indirect Impact to Wetlands According to Ohio Rapid Assessment Method Category - CRJMTC

ORAM Category	Acres
1	0
Modified 2	0.82
2	0.12
3	0
Total	0.94

<u>Temporary Indirect Impacts to Wetlands</u>

Wetlands occurring immediately downslope/downstream, including those wetlands outside of the CRJMTC, would also likely experience erosion/sedimentation and altered water quantity during construction. As a result, these wetlands might fill in from uncontrolled sedimentation and/or become wetter due to the additional surface water runoff from the CIS. The beaver pond/Bald Eagle nest, ORAM Category 3, wetland is located downstream of the CIS footprint and would be one such wetland complex receiving runoff from the CIS. These indirect impacts could have the potential to alter the wetland plant communities in the short term; however, they would recover after construction and surface flows return to normal. The beaver pond/Bald Eagle nest, ORAM Category 3 wetland is also a large wetland complex and would help buffer other wetlands further downstream by aiding in the filtering process of sedimentation leaving the construction site. It is assumed that these impacts would be reduced through use of BMPs such as soil erosion sediment control devices and a storm water management plan. As a result, these potential impacts would be minor, short-term, and are not anticipated to require compensatory mitigation.

Wetlands occurring upslope/upstream of the CIS footprint have the potential to experience an oversupply of hydrology caused by the CIS footprint restricting water flow downstream of those wetland systems. As a result, forested wetlands could become too wet which would cause tree die-offs and permanent conversion to either a scrub-shrub, emergent or a mosaic of the two. In addition, scrub-shrub wetlands could become too wet and be permanently converted to an emergent wetlands. Although it is uncertain if these impacts would occur, it is foreseeable that such impacts could result without a proper storm water management plan to maintain surface water flow. It is assumed for the purpose of this EIS that a storm water management plan would be designed and implemented to ensure that surface water flows are as close to preconstruction conditions as possible. Given this, potential indirect impacts to wetlands upslope/upstream of the CIS footprint would be minor, short-term, and not require compensatory mitigation.

The location of wetlands receiving runoff from or within close proximity to the CIS, that would potentially experience impacts are shown on Figure 3.4.15-8.

There are no wetlands in the CRJMTC facility relocation areas. Additionally, the potential transportation route would not involve the widening, reconstruction, or expansion of any roadway or bridge. As a result, there would not be any impact to wetlands in these locations.

3.4.15.3.1.2 Mitigation

As discussed in Section 3.4.15.1, wetlands in Ohio are under the jurisdiction of both the USACE – Pittsburgh District and the OEPA. Impacts to wetlands would require permit approval from both agencies. Because more than 1 acre of fill would occur, wetland impacts would be considered major and an Individual Permit approval with compensatory mitigation would be required. Due to the major impacts that would occur to wetlands from the potential deployment of the CIS at the CRJMTC site, the impacts would be considered to be "significant" impacts. This section summarizes the compensatory mitigation options that have been identified; however, the amount and type of mitigation would not be determined until the permit application process has been initiated with the USACE and OEPA.

Historically, the USACE Pittsburgh District preferred onsite mitigation for value and functions lost due to fill of WOUS, including wetlands, but offsite mitigation was possible, provided the mitigation site was located in the same HUC-8 watershed as the function and value lost. If available, mitigation was possible through mitigation banking sites.

In 2012, the Stream + Wetlands Foundation, formerly the OWF and Davey Resource Group proposed an ILFP to address the need for wetland compensatory mitigation in Ohio watersheds not served by approved Ohio Interagency Review Team wetland mitigation banks. Currently there are four ILFP service areas approved in the State of Ohio; one of these service areas includes CRJMTC (OWF, 2012).

Onsite mitigation at CRJMTC is not ideal because the wetland mitigation area is taken out of potential mission use in perpetuity, the overall costs associated with designing, developing and maintaining the site is high, and there is a substantial risk of potential mitigation failure. As a result, the preferred mitigation to compensate for lost function and value of WOUS, including wetlands is to use the ILFP that services the CRJMTC region. As previously indicated, the type and amount of mitigation would not be determined until the permit application process is initiated and negotiated under Section 404 and 401 of the CWA, Section 10 of the RHA, and the Ohio Isolated Wetlands Permit Program (ORC 6111) are initiated and negotiated.

3.4.15.3.2 Construction – Expedited Schedule

Other than the potential for a larger amount of soil disturbance causing sedimentation, water quality and quantity changes downstream in a shorter time frame, no other impacts would occur to wetlands as a result of the expedited construction schedule. As a result, only minor increases in impacts to wetlands over those discusses for the baseline construction schedule would occur.

Therefore, mitigations under the expedited construction schedule would be the same as those discussed under the baseline construction schedule.

3.4.15.3.3 Operation

Activities during the normal operation of the CIS are described in Section 2.7. The following sections detail the wetland impacts and potential mitigation during operations.

3.4.15.3.3.1 Environmental Consequences

During normal operation of the site, there would not be any increase in the CIS footprint or additional buildings that would impact wetlands remaining after the construction of the site, supporting facilities and cantonment area. The only potential impact to adjacent and nearby wetlands may occur due to erosion and sedimentation from developed areas and storm water management facility failures. However, this impact would be temporary and short-term because slopes would need to be stabilized and storm water facilities would need to be repaired. As a result, any potential impact to wetland areas as a result of erosion and sedimentation or storm water facility failure would be minor, and compensatory mitigation would not be required.

3.4.15.3.3.2 Mitigation

The potential erosion/sedimentation impact to adjacent wetlands during normal operation of the CIS would be minimized through regular maintenance of storm water management facilities, including outfalls and repairing erosional issues on the site. Because the impacts would be minor, compensatory mitigation would not be required.

Figure 3.4.15-1 National Wetlands Inventory - Wetlands - CRJMTC

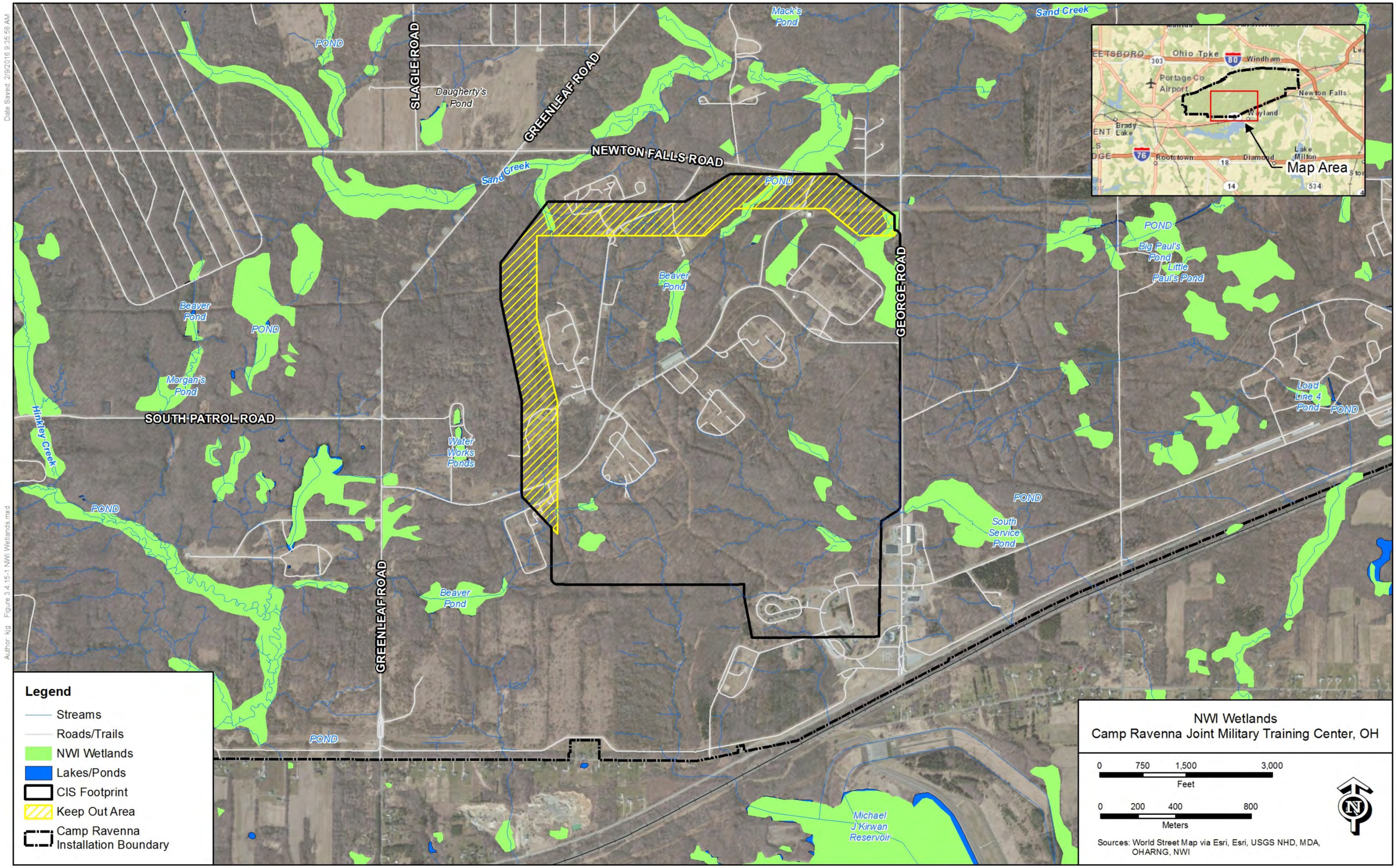


Figure 3.4.15-2 Continental United States Interceptor Site Delineated Wetlands - CRJMTC

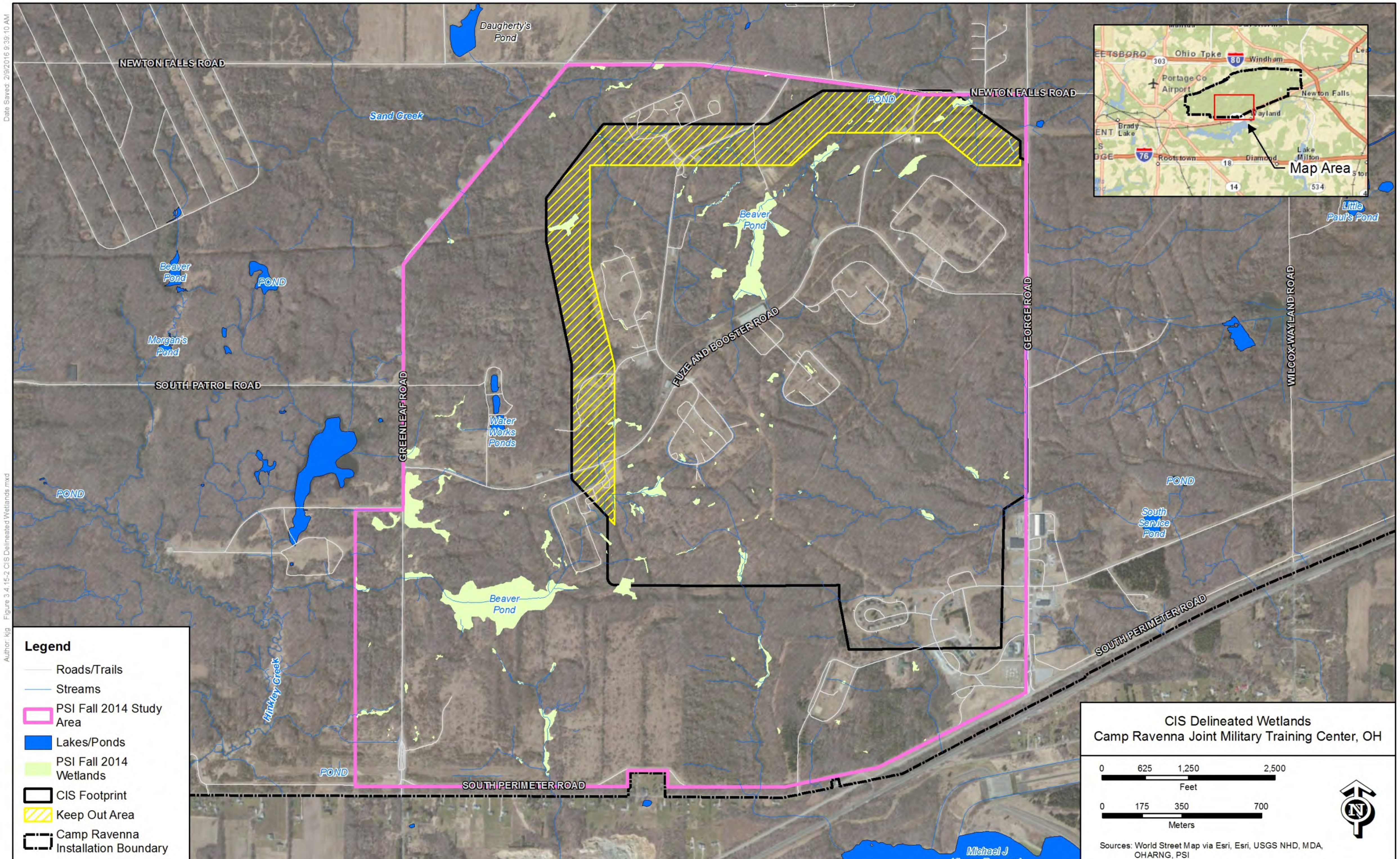


Figure 3.4.15-3 Continental United States Interceptor Site Delineated Wetland by Cowardin Classification - CRJMTC

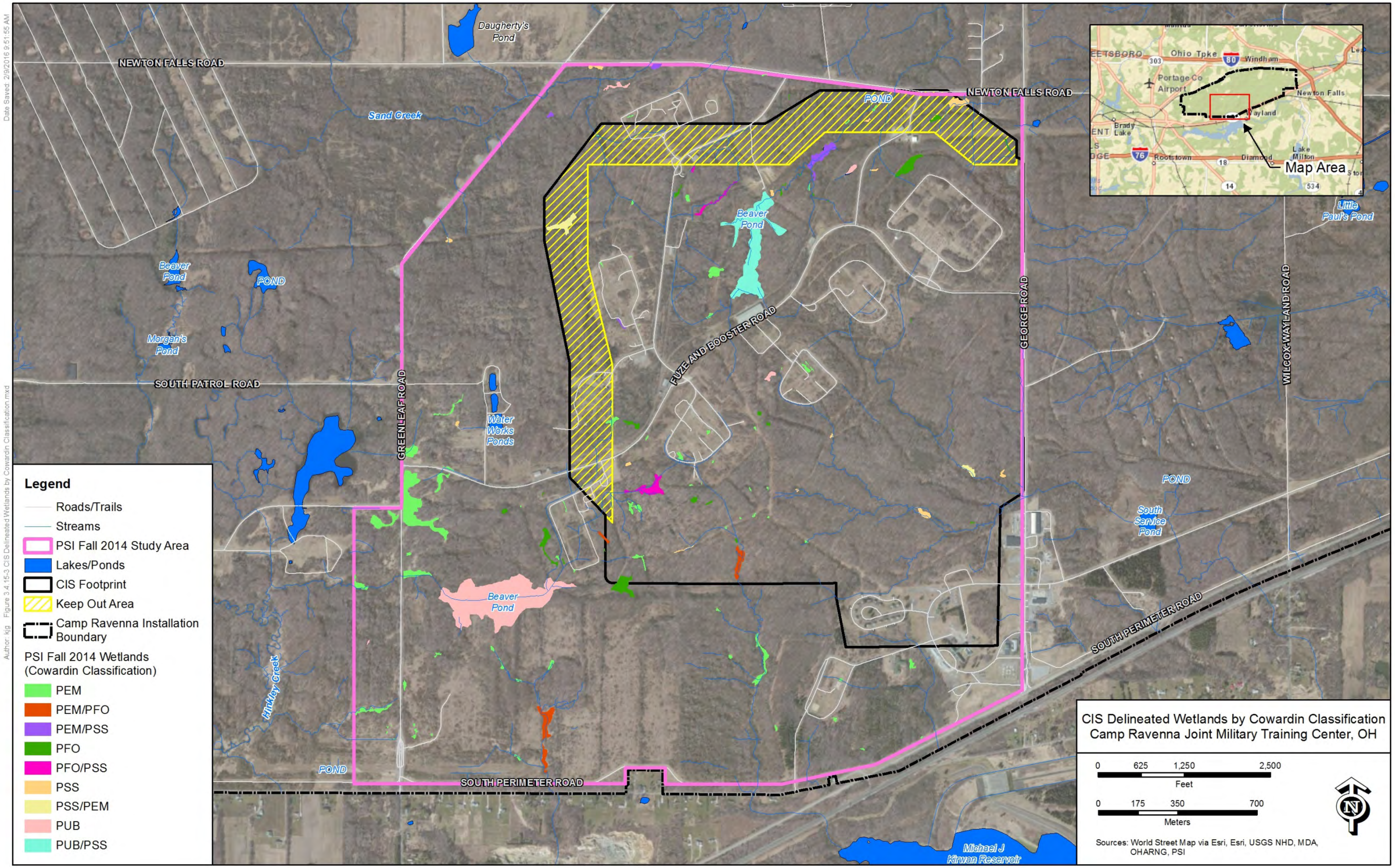


Figure 3.4.15-4 Continental United States Interceptor Site Delineated Wetlands by Ohio Rapid Assessment Method Category - CRJMTC

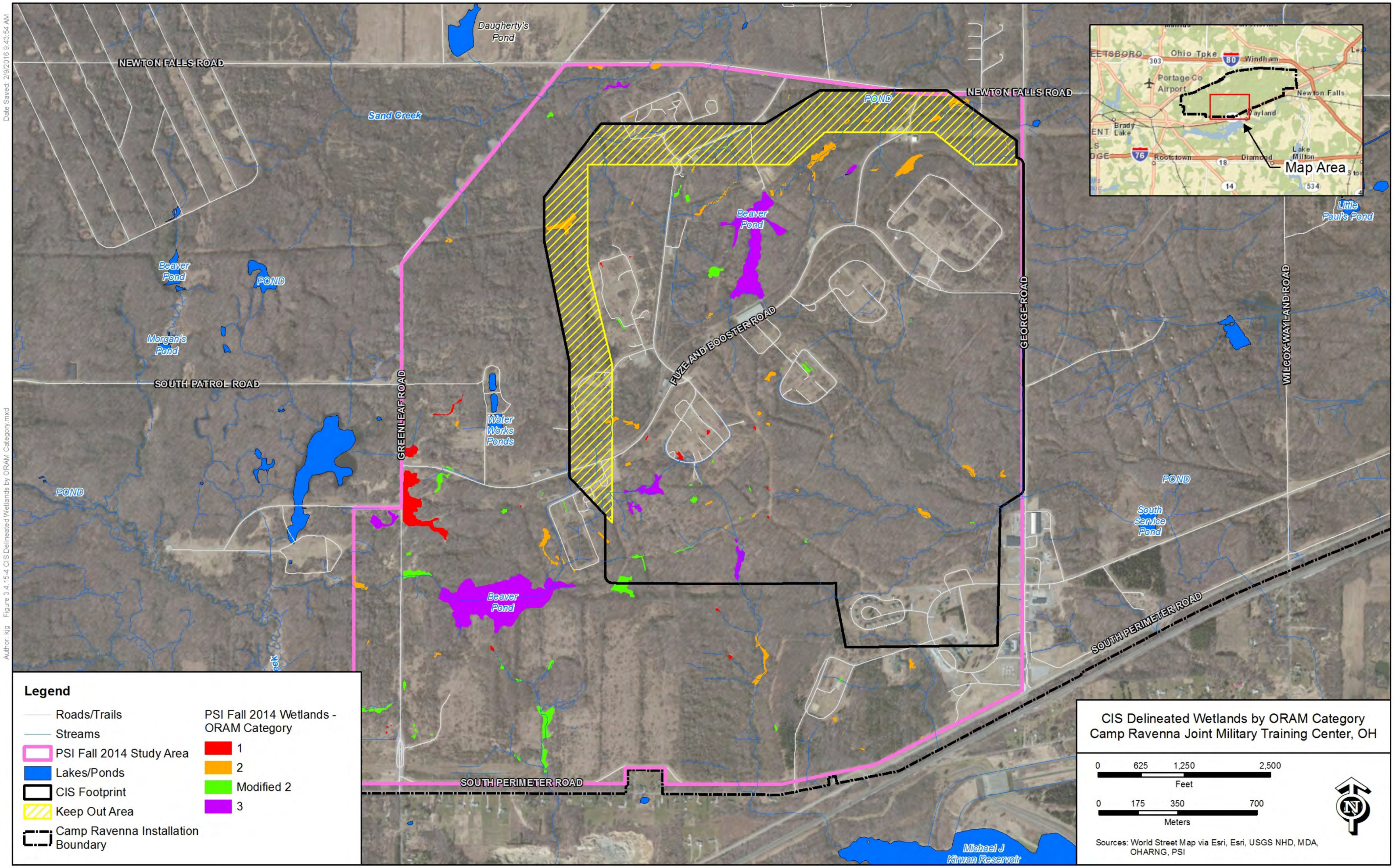


Figure 3.4.15-5 Wetlands for Relocated Facilities - CRJMTC

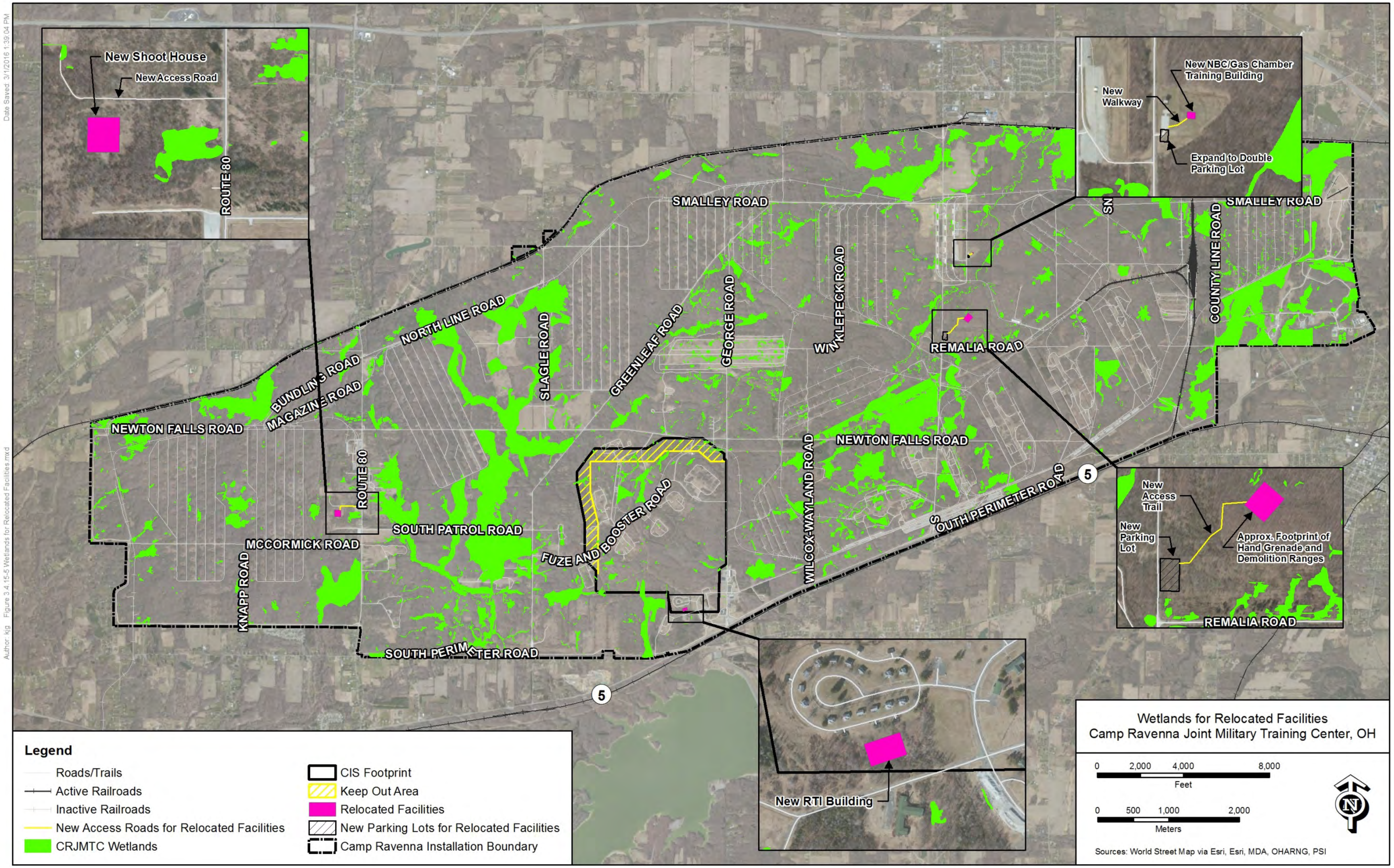


Figure 3.4.15-6 Wetlands in Cleared Continental United States Interceptor Site Footprint by Cowardin Classification – CRJMTC

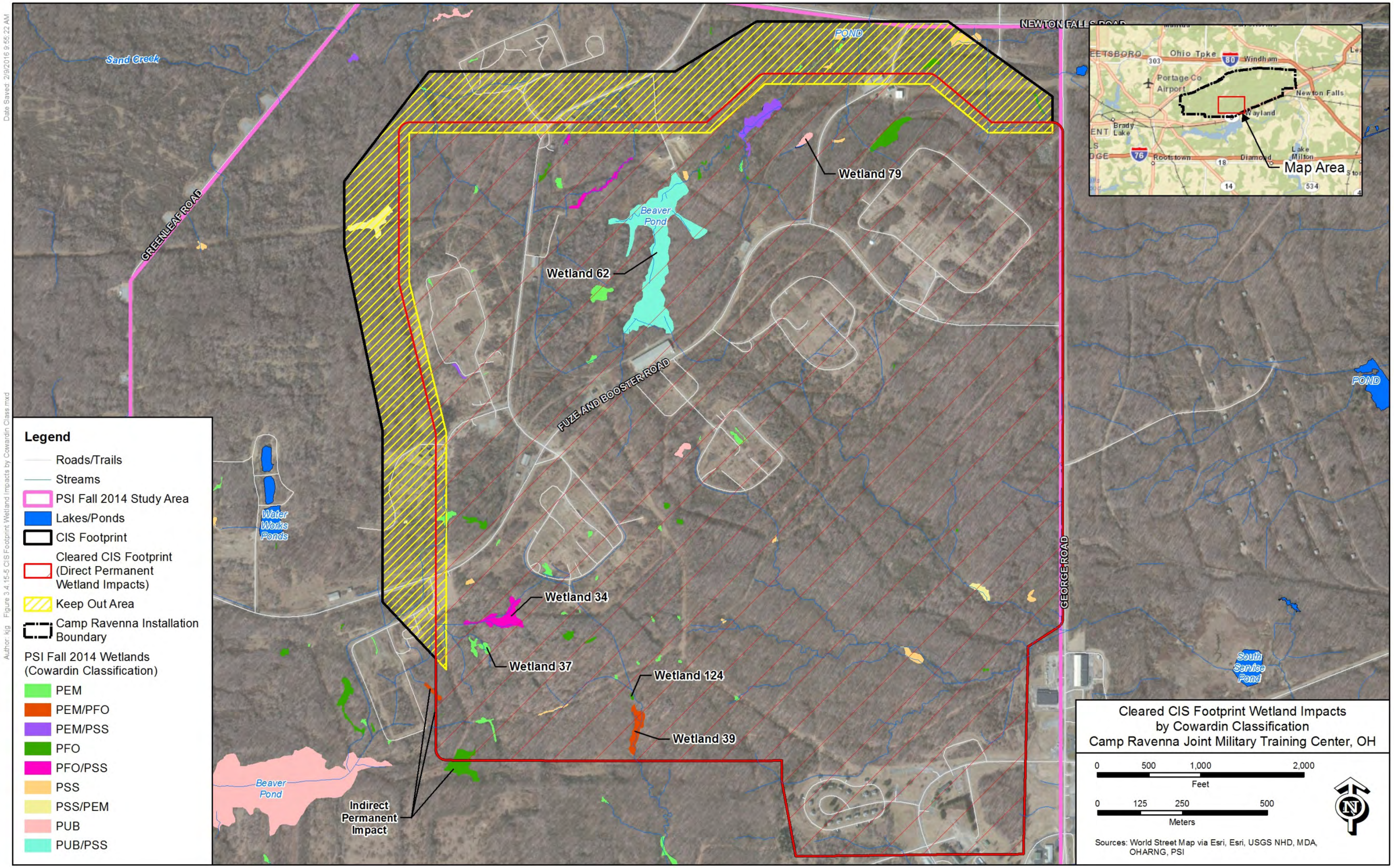


Figure 3.4.15-7 Wetlands in Cleared Continental United States Interceptor Site Footprint by Ohio Rapid Assessment Method Category – CRJMTC

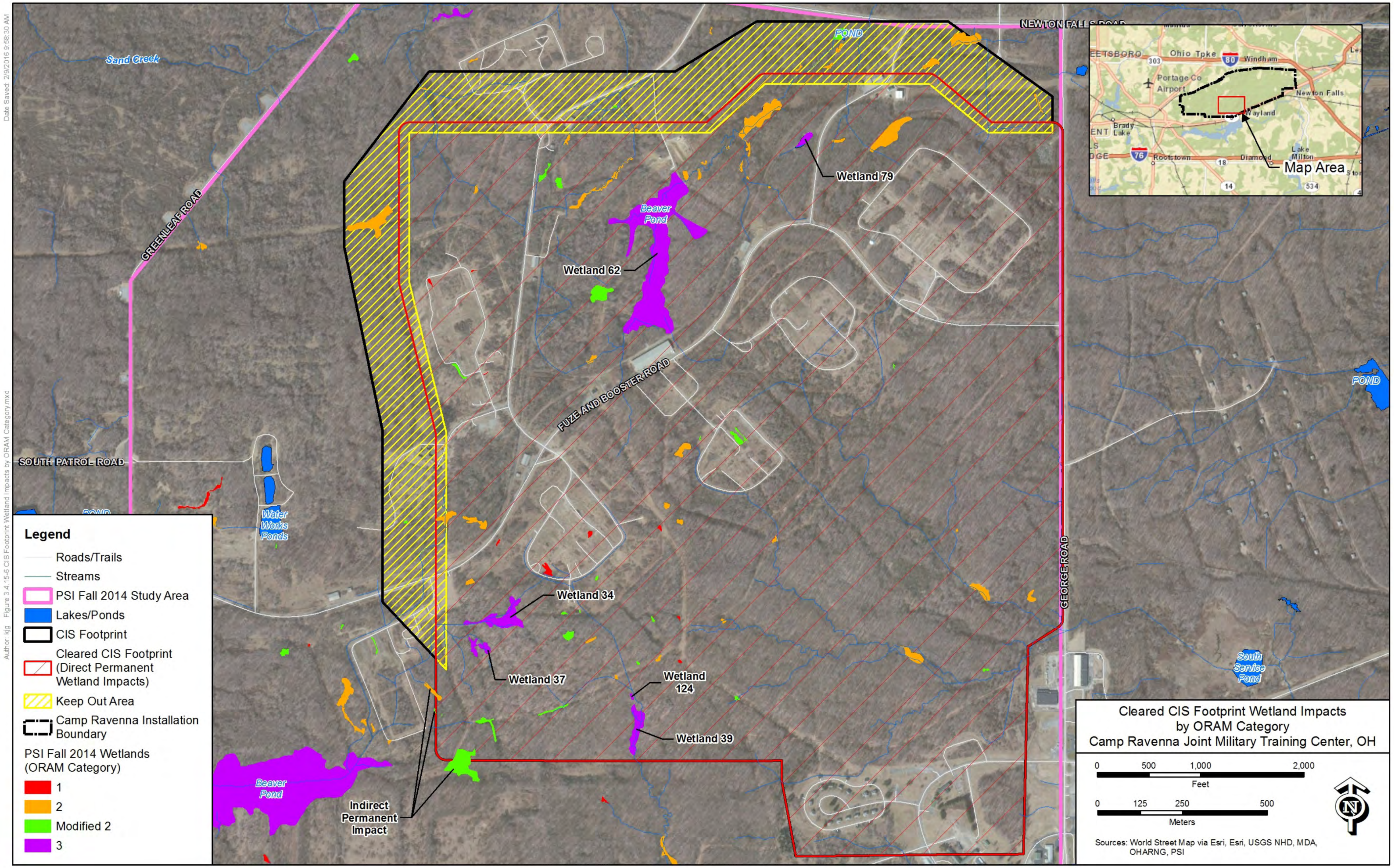
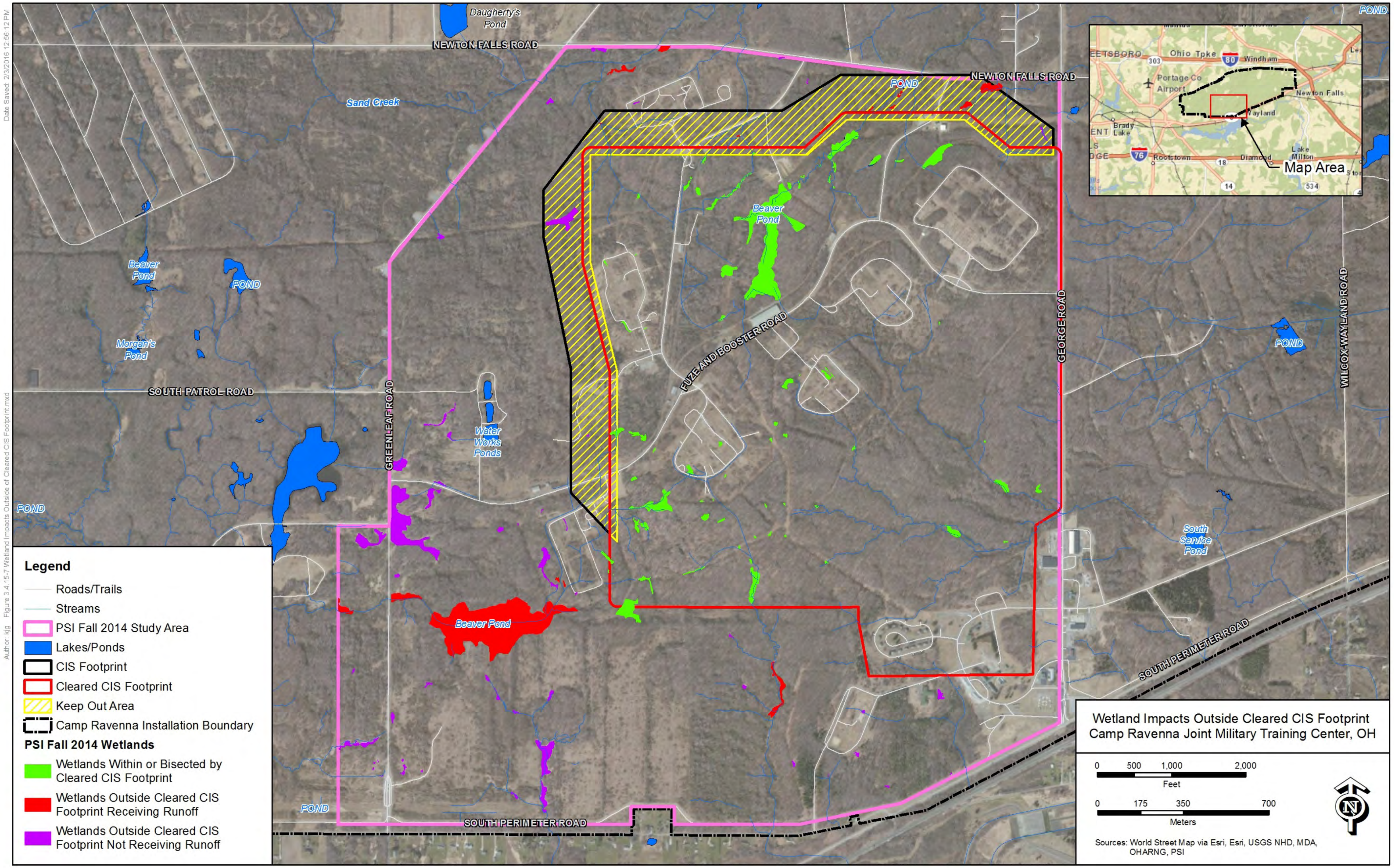


Figure 3.4.15-8 Wetlands Impacts Outside Cleared Continental United States Interceptor Site Footprint - CRJMTC



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3.4.16 Visual/Aesthetics – CRJMTC

Visual resources are the natural and man-made features that constitute the aesthetic character of an area. Topography, surface water, vegetation, and man-made features define the visual environment and form the overall impression that an observer receives of an area. The importance of visual resources and any changes in the visual character of an area is subjective and influenced by social considerations, including the public value placed on the area, public awareness of the area, and community concern about the visual resources in the area.

3.4.16.1 Regulatory Environment – Visual/Aesthetics – CRJMTC

Viewsheds are regulated by federal, state, and local land use and zoning codes. For example, local jurisdictions may independently designate scenic highways or other features that are of local importance. Federal laws governing this resource include the following:

- Wild and Scenic Rivers Act of 1968 (16 USC 1271) - Preserves certain rivers with outstanding natural, cultural and recreational values in a free-flowing condition for the enjoyment of present and future generations. Preserves certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations.
- National Trails System Act of 1968 (Public Law 90-543, 16 USC 1241) - Institutes a national system of recreation, scenic and historic trails and prescribes methods by which components may be added to the system. Institutes a national system of recreation, scenic and historic trails and prescribes methods by which components may be added to the system.
- NHPA of 1966, as amended (36 CFR Part 800) – Preserves historic and archaeological sites in the U.S. Preserves historic and archaeological sites in the U.S.

3.4.16.2 Affected Environment – Visual/Aesthetics – CRJMTC

3.4.16.2.1 Visual Impact Assessment Methodology

The Visual Impact Assessment characterized the visual quality of the CRJMTC area and defined CIS-related effects on visual quality from the perspective of local residents and/or visitors. Specifically, the Visual Impact Assessment determined the following information about the CIS project:

- Visibility from critical locations or vantage points by members of the general public.
- Effect on visual quality within the project viewshed. The total geographic area visible from a specified point is called the viewshed.
- Effect on scenic resources of state or national significance.

The CIS facility and infrastructure that would potentially be installed at CRJMTC, including the security lighting associated with the project, may impact the rural landscape in the surrounding area.

The Visual Impact Assessment was conducted using GIS to determine the project viewshed (the areas from which the CIS footprint would be visible) and areas where there would be public sensitivity to views of the CRJMTC site. A site visit was also made to CRJMTC and the surrounding area to confirm the areas identified by GIS as having potentially sensitive views. Areas from which there would likely be public views, in the professional judgment of the visual impact assessment specialist, were documented through photographs. AutoDesk Revit and Adobe Photoshop software were used for day and night photograph-based simulations to estimate the visual impacts of the CIS.

Viewshed Analysis

The project viewshed was determined using GIS-based elevation, land contour, and land cover data, and assuming the tallest structure that is part of the CIS would be 50 feet AGL. The majority of the CIS facility structures would be less than 50 feet tall; the communications tower(s) would be the tallest and would have a height of approximately 50 feet.

A 5-mile viewshed is typically considered adequate for viewshed analysis for most major actions. This 5-mile distance criterion originated from the U.S. Forest Service “distance zones” described in their 1973 landscape management journal (USDA, 1973). The USDA reasoned that an area that is 5 miles from an observer is still largely considered background, or a distance at which most activities are not a point of interest to a casual observer.

GIS viewshed data and Google Earth image investigations indicated that there would be relatively few publicly accessible views of the site from the surrounding area when vegetative screening is taken into account. It was verified during a field visit to CRJMTC that the forested areas near CRJMTC generally contain various sizes (height and spread) and ages of trees and substantial understory plants, which are effective in blocking views from most public areas.

Key Observation Points (KOPs)

As part of the desktop viewshed determination and evaluation, KOPs were identified within the viewshed. KOPs are intended to provide the reader with a representative view of the object of interest (in this case, the project site) from selected vantage points that are publicly accessible and/or have potential visual sensitivity.

KOPs for the visual assessment were selected based on the results of the viewshed analysis, desktop review of topography and sensitive features near the site, accessibility, and the professional judgment of the visual impact specialist (refer to Figure 3.4.16-1 for a map of preliminary KOP locations). The KOP locations were verified during the field visit and were subsequently narrowed down to two areas to account for accessibility and location-specific conditions that were not as apparent during the desktop review. These field-verified areas are West Branch State Park and the main entrance to CRJMTC; however, there is an existing view into CRJMTC that drivers on SR 5 are likely already accustomed to seeing. The KOPs evaluated are listed in Table 3.4.16-1 and shown on Figure 3.4.16-1.

Table 3.4.16-1 Key Observation Points at CRJMTC and Field Observations

KOP or Location Visited (refer to Figure 3.4.16-1)	Field Observations
1-NRHP Listing – Portage County, Ohio	Topography and forest between this site and in the CIS prevents views.
2-Houses along Newton Falls Road	Would no longer be a public viewpoint with current site layout; view from all public areas shielded by forest.
3-State Highway 5 near CRJMTC entrance	Very limited public view available from main entrance area; topography is likely to block almost all of the view.
4-Greenleaf Road – onsite and offsite to the south (residences)	Would no longer be a public viewpoint with current site layout. Views into this gate area and north along Greenleaf Road are available; however, views of CIS activities would be blocked by forest and distance;
5-Internal road northeast of interceptor area (PA St 1)	Not a public view area (inside CRJMTC).
6-Old Newton Falls Road	Not a public view area (inside CRJMTC).
7-Quarters, housing E, W of PA St 1	Not a public view area (inside CRJMTC).
8-CRJMTC road parallel to Newton Falls Road (internal perimeter)	Not a public view area (inside CRJMTC).
9-NRHP eligible stone arch bridge	Not a public view area (inside CRJMTC).

Facility View Simulations

Visual impact assessment fieldwork was conducted November 3 and 4, 2014, after the majority of trees in the CRJMTC region had dropped their leaves. For the purposes of full disclosure, it should be noted that the CIS footprint was modified after the field visit was conducted. However, the modifications were minor in terms of their effects on the outcomes of and data obtained from the field visit. Therefore, the field visit findings remain applicable to and valid for the following visual impact analysis.

The procedure for visual impact assessment fieldwork involved verifying the suitability of the KOPs identified during the desktop evaluation by visiting all accessible KOPs and taking photographs at the KOPs determined in the field to be public and/or visually sensitive. The photographs were taken from the perspective of a viewer located at the KOP and looking toward the site. The locations of the KOPs were field verified by first marking a representative point inside the CIS footprint with a visual reference point that could be seen from the surrounding area. This was done by using a large weather balloon that was anchored inside the CIS footprint and flown at a 50-foot height (representative of the tallest permanent structure expected to be part of the CIS). The balloon was located near the southeast corner of former RVAAP Load Line 8, which is representative of the location of a communication tower on the CIS footprint that would have an approximate 50 foot height. After installation of the balloon on the site, each of the identified KOPs was visited to verify whether the balloon could be seen, and thereby also verify the desktop viewshed determination shown on Figure 3.4.16-1. Photographs were taken at representative KOPs during daylight hours using a handheld digital camera.

Visual simulations of the CIS from the viewpoints judged to be most sensitive were created from field photos during daytime and nighttime, leaf-off conditions to estimate worst-case visual impacts. The visual simulations were conducted by superimposing CIS-type structures similar to those existing and operational at other MDA facilities onto photographs taken from CRJMTC viewpoints. Digital renderings of the estimated appearance of night lighting conditions were developed from one viewpoint – from the perspective of an observer on the ground at the CRJMTC main entrance. For simulated night views, it was assumed that all light fixtures on the site would use LEDs that are fully recessed and International Dark Sky Association approved such that light pollution and trespass, glare, and skyglow would be minimized to the extent feasible.

Light-related terms used in this visual impact assessment are defined as follows:

- Light pollution – an adverse effect of artificial light, including skyglow, light trespass, light clutter, and glare.
- Light trespass – poorly shielded or poorly aimed fixtures casting light into unwanted areas, such as buildings, neighboring property, and homes. Light trespass is a main contributor to skyglow.
- Glare – the effect of lighting within the visual field that is substantially greater than the light level to which the eyes are adapted, causing annoyance, discomfort, or loss in visual performance and visibility.
- Skyglow - the result of light fixtures that emit a portion of their light directly upward into the sky where light scatters, creating an orange, yellow, or pinkish glow above a city, town, or other intensely lit area.

In general, impacts would be less perceptible during the growing season and after forest regrowth occurs around the areas disturbed for CIS work.

3.4.16.2.2 Visual Character of the CIS Footprint and CRJMTC

The visual environment of the CIS footprint at CRJMTC includes characteristics of a rural, unmaintained area with some evidence of former development and limited presence of military infrastructure (roads, range security fencing, abandoned buildings). Much of the area is forested or in transition from cleared areas toward successional forest. Much of the CIS footprint coincides with the area formerly occupied by the historic RVAAP, which was used to manufacture, store, and dispose of ammunition from the early 1940s until 1992.

Most of the existing infrastructure and facilities that were part of RVAAP were only minimally maintained from 1993 until approximately 2005. This long timeframe with little or no maintenance and degradation of the few remaining former RVAAP buildings from weather has resulted in noticeable deterioration of the appearance of the CIS footprint area. The CIS footprint area has a derelict appearance, with the few remaining 1940s vintage broken-windowed buildings situated along a main concrete road and surrounded by overgrown former RVAAP ammunition load lines.

Since approximately 2005, OHARNG has undertaken substantial maintenance activities to repair, maintain, and upgrade roads, bridges, culverts, power lines, and water and sewer lines in various areas of CRJMTC. Several of the main and auxiliary roads on CRJMTC have been repaved within the last 5 years. The general appearance of the areas of CRJMTC outside of the CIS footprint and former RVAAP is orderly and well maintained.

There are no formally recognized aesthetic or visual resources on the CRJMTC site. In general, relatively dense forest cover and limited topographic relief over most of CRJMTC limit line-of-sight visibility and inhibit large-scale landscape viewing (Ogden, 2000). Overall, site views are dominated by extensive areas of forest, expanses of open area used as training ranges, views of fencing and abandoned buildings from the RVAAP along interior plant roads, and small brick and other military buildings near the main entrance off SR 5.

Moderately rich wildlife viewing is available in most habitat areas, particularly in wetlands, secondary successional scrub-brush lands, and mature forest. The hardwood forest areas provide vibrant color displays in the fall, although views from any one area are limited by the surrounding vegetation (Ogden, 2000).

The visual character and the viewshed at CRJMTC are influenced by the installation's timber management and harvesting program. CRJMTC is divided into ten forest management compartments, which are subdivided into timber cutting units. The forest at CRJMTC is managed through selective harvesting in these units so that a continuous forest canopy is maintained. This selective harvesting avoids noticeable changes to the viewshed inside CRJMTC. The minor visual changes in some areas may be noticed by CRJMTC personnel, but would not be noticeable by most viewers, especially the public outside the CRJMTC boundary (OHARNG, 2008). A sandstone gorge with locally severe topographic relief near the northern boundary of CRJMTC (in the South Fork Eagle Creek drainage west of Wadsworth Road) has been recognized for its visual qualities and relatively rare and pristine hemlock white pine-hardwood forest along with a moderately diverse vegetative understory (Ogden, 2000). This area, Wadsworth Glen, is one of the most important natural areas in northeastern Ohio. It is an aesthetically attractive area because of the scenery that includes steep rock walls (40 to 60 feet high), hemlocks, and ferns (OHARNG, 2008a). Public views of this area within the CRJMTC boundary are generally not available because of lack of public access and the limited sight distance within which views of this area could be seen.

Night views of CRJMTC from public areas are largely dependent on the intensity of natural lighting and, to a lesser degree, artificial light sources. Typically, nighttime visibility of natural features is limited. The main entrance into CRJMTC off SR 5 has security lighting and tall light fixtures; however, this point is the only area from which glare or skyglow originating from the CRJMTC site could be seen. Streetlights (not downward directed) are present on some residential streets in the neighborhoods located just outside the perimeter, such as Greenleaf Road south of CRJMTC.

3.4.16.2.2.1 Cultural and Historic Sites

The NHPA requires federal agencies to take into account the effect of their actions on cultural resources. Cultural resources may be affected when a potential project may directly or indirectly alter any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that diminishes the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. The visual character of historic or cultural resources could be affected through such changes as physical destruction or damage, removal of the property from its historic location, change of the character of the property’s use or of physical features within the property's setting that contribute to its historic significance, and introduction of visual elements that diminish the integrity of the property's significant historic features (BLM, 2012).

Phase I archaeological surveys completed at CRJMTC installation prior to any ground disturbing activities such as timber harvests, training activities, or construction indicate that most potential cultural or historic resources are remnants of 19^{th} and 20^{th} Century farmsteads. There are nine historic properties that are eligible for the NRHP located at CRJMTC. Eight of these historic properties are archaeological sites and one property is a stone arch bridge. None of these properties are within the CIS footprint APE. The historic properties are approximately 1.5 to 2.5 miles away from the CIS footprint APE and approximately 0.5 to 3.0 miles from the facility relocation APEs (refer to Section 3.4.9 Land Use). Given the distance of these historic properties from the location of the CIS footprint and the lack of visual elements as determining factors in their eligibility for the NRHP, there is no possibility that these historic properties would be subject to visual impacts from potential construction of the CIS (Ludt, 2014).

The nearest NRHP listed properties to the CIS footprint are multiple properties in the town of Ravenna and elsewhere in Ravenna Township. The NRHP-listed and eligible resources in Table 3.4.16-2 were identified as those that could be potentially visually impacted based on distance from the site and terrain and other features between the CRJMTC site and each listed property.

Table 3.4.16-2 National Register of Historic Places - Listed and Eligible Resources Near CRJMTC

Name on the Register	Date Listed	Location	City or Town	Approximate Distance from CRJMTC Boundary (nearest point)
Cottage Hill Farm	May 6, 1993	5555 Newton Falls Rd., east of Ravenna	Ravenna Township	0.4 mile east-southeast (hilly topography and presence of forest obscure views beyond immediate vicinity)
Stone arch bridge	Determined eligible June 1998	Wadsworth Road near north boundary of CRJMTC property	Windham Township	Onsite (substantial forest cover and distance prevent views)
Multiple homestead historic sites	Determined eligible	Various locations on CRJMTC	Ravenna and Windham Townships	Onsite (substantial forest cover and distance prevent views)
Sources: NRHP, 2014; Ludt, 2014.				

Based on visual impact assessment fieldwork in November 2014, Cottage Hill Farm is situated on private property at the top of a hill in an area characterized by winding streets, hilly topography, and heavy forest cover. Access to this private property was not available; however, based on views from the surrounding areas, the view from Cottage Hill Farm would extend only over its own property and the immediate vicinity, which has very similar views as those from this property.

The NRHP eligible stone arch bridge on the CRJMTC site is not visible outside of a few hundred feet beyond its location in light of the heavy forest cover surrounding the bridge. The linear view in the area of the bridge encompasses forest and Wadsworth Road toward both the northern CRJMTC security fence and the portion of Wadsworth Road south of the bridge.

Further information on these resources is included in the CRJMTC Section 3.4.4 Cultural Resources.

3.4.16.2.2.2 Representative Views

Figure 3.4.16-2 shows the locations where many of the photographs discussed in this section were taken on and around CRJMTC. Figures 3.4.16-3 through 3.4.16-5 show views representative of CRJMTC and some of the areas of the CRJMTC CIS footprint. The photo numbers on Figure 3.4.16-2 correspond to the last digits of the figure number in the text for the photo locations. For example, the location of Photo 3 corresponds to the photo shown as Figure 3.4.16-3. Photos located outside the area shown on the map view are not labeled.

3.4.16.2.3 Visual Character of the Linear Corridors

The existing offsite linear corridors serving CRJMTC would be adequate to accommodate the CIS with water and electrical service. Design work is ongoing to determine the locations of the offsite and onsite corridors that would be needed to serve the CIS facilities. On CRJMTC new utilities, if needed, would be installed within a 25-foot corridor on each side of existing roads. The corridor boundary of 25 feet on each side of roads would also apply to utilities that would need to be installed outside of CRJMTC. Refer to Section 3.4.13 Utilities for more information on utilities. Any new utility corridor to serve the CIS, if needed, would follow the existing roads across the CRJMTC to the point where it would transition to an offsite corridor.

Linear corridors in the area typically appear as cleared or low vegetation (grass) corridors through secondary growth forest. An example of the appearance of this type of area is shown on Figure 3.4.16-5; a transmission line corridor would have a similar appearance to this perimeter area on CRJMTC.

3.4.16.2.4 Visual Character of the Surrounding Area

The Ravenna/Kent, Ohio area features a relatively flat landscape that is extensively forested, with a moderate degree of development interspersed. Because forest shielding of most views beyond several hundred feet of major roads or highways is common in this area, the CRJMTC area would generally not be considered visually sensitive with the exception of public recreation areas such as West Branch State Park.

CRJMTC is largely shielded from public view except in the area along SR 5 as it runs past the main entrance. Drivers proceeding west along the highway approaching CRJMTC would first see the chain link, barbed wire topped security fence running along the property boundary parallel and just north of the highway ROW. Drivers would begin to see some of the site infrastructure, such as taller light poles and electrical distribution lines, about 2,200 feet east of the entrance. The main entrance, security booth, several of the onsite brick buildings, an assembly of tanks and helicopters, and several large solar panels are visible from the highway going past CRJMTC. Visibility for eastbound drivers on SR 5 is not as extensive because of forest closer to the highway and larger blocks of forest west of the main entrance that do not allow views from the highway until drivers are closer to the entrance. Rooftops of some of the buildings close to the entrance begin to be visible over the forest about 1,600 feet west of the entrance. Drivers have a largely unobstructed view into the site entrance and surrounding area over a distance of about 2,400 feet.

3.4.16.2.4.1 Potentially Sensitive Viewpoints

Typically, potentially visually sensitive locations include residential areas, recreation areas, or parks and tourist attractions. There is one recreation/park area in the vicinity of the CRJMTC CIS that could be considered visually sensitive. The potentially visually sensitive recreational area is West Branch State Park, located approximately 400 feet south of and on the opposite (south) side of SR 5 from the CRJMTC main entrance. The main feature of West Branch State Park is the 6,332-acre Michael J. Kirwan Reservoir (USACE, 2015a). These areas can be seen on Figures 3.4.16-2 (Photo Locations) and 3.4.16-1 (Viewshed Map).

Existing CRJMTC main entrance infrastructure and other features are somewhat visible from certain vantage points in the northern portion of West Branch State Park and from an approximately 2,400-foot stretch of SR 5. The portion of the park along the highway has perimeter forest vegetation that creates a minor obstruction effect on the view, but does not block the view (refer to Figures 3.4.16-6 and 3.4.16-7). West Branch State Park has existing man-made features such as overhead distribution lines, electric transmission lines, and concrete dam and road infrastructure that reduce the level of visual sensitivity in the northern portion of the park. Because CRJMTC has been an existing facility in various forms since the early 1940s and generally appears unobtrusive from West Branch State Park, it is likely to be accepted by most observers and recreational users as part of the expected view in the area.

3.4.16.2.4.2 Night Views

At night, lighting is concentrated near the CRJMTC main entrance security booth, which makes it plainly visible along SR 5. The area visible from the highway at night is generally confined to that illuminated by the security lighting, which is limited to the entry drive and security booth and temporary parking area just inside the entrance. The main entrance lighting could be seen dimly from certain vantage points south of SR 5. Refer to Figure 3.4.16-8 for a night view toward the CRJMTC main entrance from the West Branch State Park access road extending off Newton Falls Road on the south side of the highway (just over 900 feet south-southwest of the CRJMTC entrance). This area is somewhat screened by a hedgerow of large trees, but otherwise has a direct view of the CRJMTC entrance.

There is little artificial night lighting in the immediate vicinity of the CRJMTC installation. Along some local roads near residential areas in proximity to the site, including Newton Falls Road (south) and Garrett Road (west), there are occasional unshielded streetlights that shine out into the surrounding area.

3.4.16.3 Environmental Consequences and Mitigation – Visual/Aesthetics - CRJMTC

3.4.16.3.1 Construction – Baseline Schedule

This section presents the impacts and mitigation for visual/aesthetics under the baseline schedule.

3.4.16.3.1.1 Environmental Consequences

Onsite Impacts (CIS Facility and CRJMTC Installation)

Construction would first require clearing the woody and shrubby vegetation from the project site, dewatering the interceptor installation area, and constructing the access roads to the multiple groups of buildings that are part of the site. As indicated in Section 2.9.2, up to 941 acres would be cleared for the CIS footprint, mostly forest and scrub-shrub vegetation, which includes mission support facilities.

Site Clearing and Construction Activities. Activities contributing to visual impacts would include clearing of trees and vegetation and associated piles of vegetative debris, and views of workers cutting the debris to smaller sizes or otherwise preparing it for sale or disposal. Views of construction workers and machinery, including bulldozers, chainsaws, and logging equipment, would be seen onsite during the site clearing stage. The overall view of the site would change from largely natural or unmaintained rural landscape and forest to a denuded, flat expanse of soil through the site preparation and utilities construction stage. Under groundwater and other service lines and underground and aboveground lines as needed to connect the CIS facilities into the local substation and electrical grid would appear during this time, with soil from buried lines being stockpiled, as well as accumulations of power line poles and other equipment in various areas of the site. The number of visible construction workers would substantially increase after site clearing, particularly with the onset of heavy construction. Incoming and outgoing vehicular traffic at the CRJMTC main entrance would likewise increase. Use of the mission support facilities near the entrance may also be increased, a factor which would be visibly apparent to motorists on SR 5.

The majority of the visual impacts from CIS construction would be confined to the interior of CRJMTC and would be most visible to personnel working there or members of the public permitted to access CRJMTC for recreation. Public views of the major clearing and construction locations would be very limited by the shielding effect of the dense tree cover between the perimeter of CRJMTC and the interior of the property. The cantonment area construction west of the main entrance would be visible for a short stretch to motorists SR 5, and Newton Falls Road traffic may have an occasional glimpse of structures through intervening stands of trees (the depths of which would be several hundred feet) and distance.

National Guard personnel or other parties hunting, training, visiting, or working at CRJMTC, depending on their areas of travel, could have clear views of all construction activities from the interior of CRJMTC, including demolition of various buildings; relocation of training ranges to different parts of the property; vegetation clearing; development of denuded areas; presence of construction equipment, workers, and traffic; and establishment of new secure areas from which non-CIS personnel are excluded. These visual impacts to National Guard personnel and members of the public permitted to access CRJTC for recreation would be minimal and largely temporary because of the likelihood that they would be very short in duration, personnel knowledge that CRJMTC has military use as its primary purpose and that land use and visual aspects may change at any time, and the location of general use training areas in separate parts of the property from the CIS footprint.

Visual impacts from cut and fill on the CRJMTC CIS footprint would be noticeable at various times because large excavated soil piles would appear and diminish as work is started and completed at various construction locations within the footprint. Near the end of construction, there would be no noticeable soil piles or piles of other excavated material because the estimated quantities to be cut and those to be filled are balanced.

Fugitive Dust. A primary concern at many large construction sites is the potential for visible dust to be created by construction equipment traffic or windborne clouds of dust rising from cleared areas. Construction the potential CIS would involve large acreages of exposed soil and soil stockpiles after clearing is completed. This exposed soil may become windborne and, if present in large quantities, could accumulate on surfaces inside and outside the site, including vegetation, residences, vehicles, and other nearby features. This type of fugitive dust could create a negative visual impression of the area as being unclean or less scenic than it would otherwise be if construction were not ongoing. Similarly, the visible presence of construction equipment exhaust, especially after machines are started after a period of suspended construction work (such as a weekend, holiday, or weather delay) or longer idle period before being used again at the site, may give the visual impression of air pollution in the area. Refer to Section 3.4.1 Air Quality for further information about air emissions during construction.

Litter. Improperly discarded waste from construction worker meals, material packaging, and other activities may also become windborne and accumulate along fence lines or on properties outside the site, degrading the viewshed on the site and in the surrounding area and potentially creating a negative impression of the project from the perspective of local residents.

Erosion and Sedimentation. Erosion and sedimentation from storm water runoff entraining bare soil in the onsite cleared areas, if not properly controlled, could change the appearance of onsite streams near the construction area from the typical clear to a brown, sediment-filled or cloudy and turbid appearance. However, such impacts would be very short-term or negligible with the implementation of BMPs.

Views of Construction Equipment and Facilities. Aspects of construction that may also negatively affect public and/or local perceptions of the viewshed could include the location of large aboveground oil or gasoline storage tanks near construction areas, the presence of increased fencing and fenced areas, temporary parking and storage of construction equipment and materials, and large expanses of gravel surfacing over a formerly natural area. These types of changes may represent a positive impact to some viewers in terms of economic activity, while others may perceive this view in a negative way associated with the removal of the natural features that have been present over a long period of time at CRJMTC.

Summary of Onsite CIS Footprint. Because of the general lack of visual sensitivity of the CRJMTC area and the low likelihood of visual impacts outside CRJMTC, the potential CIS's impacts on the aesthetics of the CRJMTC area would likely be minor from a public perspective. From the viewpoint of the staff inside the installation, the visual impact would be moderate because of the large degree of change over a 941-acre area from largely forested with occasional run-down buildings to an expansive cleared site featuring new buildings and structures; however, this type of change would be expected on a military property where uses of certain portions of the property may change based on training needs. There would be visual impacts related to increased traffic, but these are expected to be confined to a portion of SR 5 that has a large degree of forest screening of the view from other motorists and residences in the area.

Overall, the magnitude of visual impacts would be minor to moderate, mostly because of traffic increases that would be visually obvious and the baseline construction duration for the potential CIS deployment. The construction impacts could be considered long-term temporary. The extent of impacts, which are largely onsite with limited offsite impacts mostly from traffic in and out of the site on SR 5, would be considered localized and would not be noticeable in the wider region around the CRJMTC site.

Linear Corridors and Substation - Onsite

Utility-related construction and installation of any new utilities needed would occur both outside CRJMTC (new 2-acre electric substation and lines along existing road ROWs) as well as along existing CRJMTC interior installation roads. Utilities installed in existing road ROWs may impact an area of up to 25 feet out from road edges on both sides of roads where they are installed.

The visual impacts from construction at the new substation, the location of which has not yet been finalized, would depend on the environmental features surrounding the 2-acre site. Visual impacts would be moderated if the substation is constructed in an area removed from main local trafficways and residences and surrounded by forest vegetation; however, visual impacts would be greater if the substation is located in an agricultural area or open field or is near frequently used local roads or near residential areas. Linear corridor impacts would be experienced by both the public and onsite personnel, as utility lines would parallel existing roads on and offsite.

These impacts would be very similar to the onsite construction impacts and would be temporary and minor because of the small area involved and the likelihood that at least part of the substation site would be screened from view by surrounding forest. Construction visual impacts from linear corridors outside the CRJMTC site would be more clearly visible, but would likely be in areas where infrastructure alongside roads is already present, which would somewhat reduce the degree of perceived impact and more easily blend with existing scenery.

If utilities were installed on CRJMTC along existing roads, depending on the location along the road, there may be a clear view of these construction activities from the Newton Falls Road and Greenleaf Road CRJMTC auxiliary gate for local residents looking in, or for a very short time as drivers pass the approximately 120-foot wide drive into the gate off Newton Falls Road. If utilities were installed far from the area visible from the auxiliary gate, there would be no visibility to the public because of the distance from public viewpoints and the degree of screening by forested areas. The residence located on the southeast side of the intersection of Greenleaf Road and Newton Falls Road may have views of construction personnel, activities, equipment, and any attendant dust or exhaust if utility construction was being undertaken close to the gate area and on the west side of Greenleaf Road inside the gate. The residence southeast of Greenleaf Road and Newton Falls Road is about 270 feet from the CRJMTC auxiliary gate.

Offsite Impacts (Beyond CRJMTC Installation)

Most construction impacts, such as visible dust and exhaust, landscape scars, visible equipment, decreased forest from thinning, views of the security fences around the disturbed areas, additional truck traffic, and the presence of workers and construction equipment, would occur below the tree line of the forest around the perimeter of CRJMTC. Impacts would primarily be visible to nearby locations with no screening forest cover, such as the main entrance gate area, and a small potential for views of distant utility corridor work at one or two residences just outside the auxiliary CRJMTC gate off Greenleaf Road and Newton Falls Road. Based on visual assessment fieldwork and the CIS footprint, the surrounding area beyond these points would not have views into the CIS footprint during construction.

According to U.S. Army fieldwork studies conducted in 1963, in summer in a deciduous or coniferous forest, visibility was found to be limited to 330 feet or less into the forest in about 95 percent of cases. Visibility is between 100 and 200 feet in approximately 50 percent of cases, and visibility in forests with greater amounts of understory growth and taller understory plants decrease visibility distances. In deciduous forests, visibility is generally about 40 percent greater in winter versus summer, or up to approximately 460 feet into a typical deciduous forest (DoD, 1964). The forested area between most residents nearest to CRJMTC along the south side of Newton Falls Road and the CRJMTC property boundary ranges from about 140 feet in most locations to approximately 350 feet at some points. North of this forested area, there is a further distance of approximately 2,900 feet in various stages of succession, from unmaintained fields to mature forest, between the Newton Falls Road residences and the CIS footprint. Based on the visual impact assessment field visit, there is substantial variety of types, heights, and spreads of vegetation in these unmaintained forested areas, even without leaves on most trees. Because of this forest screening and the substantial distance between the residences and the nearest edge of cleared area for the CIS footprint, views of the CIS from Newton Falls Road would not be available.

Large infrastructure projects could be perceived to compromise what residents feel is part of the quality of life in this region and the character of an area. Recreational users of West Branch State Park and other areas near CRJMTC may experience viewshed impacts depending on the season, especially during early morning and later evening hours when the construction lighting for the project would be most visible and would have the highest contrast with the surrounding unlit environment. However, screening by forest vegetation between the CIS footprint and these natural areas would prevent major viewshed impacts beyond those within CRJMTC.

Moderate adverse impacts to visual aesthetics of the site and vicinity would generally occur from the construction of a CIS at CRJMTC because of the visual shielding of most of the site from public view by forest.

Transportation. Construction of a CIS at CRJMTC would involve increased traffic, especially during the heavy construction period (as discussed in Section 2.5.1). The main entrance to the facility north of SR 5 would be used as the construction entrance. There would be a large amount of vehicle and human traffic in the cantonment area directly west-northwest of the entrance during construction or upgrades to the mission support facilities being installed at that location.

Visual impacts from transportation during construction would be most noticeable to residents or other users of the area near CRJMTC, especially regarding the increased quantity of vehicles that would be using SR 5 and nearby highways. For transportation of CIS components to the site at night, the lighting on vehicles and their headlights in greater quantities than the typical area traffic would be the most noticeable impact. Visual impacts of transportation of CIS components to the site from Cleveland Harbor would not be distinguishable from impacts of normal, existing traffic on highways along the route except for the potentially larger size and slower speed of the transport vehicles. Because the construction traffic near the site would vary with the stages of construction and views of increased traffic would be temporary and spread out over time across the baseline construction period, and it would not be expected that nearby residents would spend long intervals observing the traffic, visual impacts from transportation would be minor. Refer to Section 3.4.12 Transportation for further information about transportation during construction.

Lighting. Nighttime construction activities and associated temporary construction lighting are not expected to be part of CIS construction; however, there would be minimal impact from lighting during construction because lighting would be used only where needed, would be downward directed, and would be used for the minimum time needed to perform the work. There would also be substantial forest screening that would block direct views of lighting except at the main entrance to CRJMTC so that noticeable construction lighting impacts would largely be limited to skyglow visible above the CIS footprint from residents in the surrounding area. It is not expected that constant security lighting would be used during construction because the construction site is located inside an access-controlled military installation.

Linear Corridors. Utilities installed in existing road ROWs may impact an area of up to 25 feet out from road edges on both sides of roads where they are installed. The visual impacts of these offsite corridors would be very similar to impacts for onsite linear corridors, except that the offsite corridors would have their entire extents in public ROWs that would be visible to motorists on local roads and highways and to pedestrians and cyclists using area sidewalks and roads. Because the offsite utilities would be installed along existing road corridors and most roads already have cleared and maintained ROWs of 15 to 20 feet on each side, any forest or other vegetation clearing required and the visual impact from clearing and construction of the line would be relatively minimal, and substantially less than creating an entirely new corridor cleared through forest. The general area around CRJMTC is not considered scenic or visually sensitive except at West Branch State Park; therefore, offsite utilities should have only a minor visual impact on existing road corridors as long as the state park is avoided.

Cultural and Historic Sites. There are nine historic properties that are eligible for the NRHP located at CRJMTC. Eight of these historic properties are archaeological sites and one property is a stone arch bridge. None of these properties are within the CIS footprint APE. The historic properties are approximately 1.5 to 2.5 miles away from the CIS footprint APE and approximately 0.5 to 3.0 miles from the facility relocation APEs (refer to Sections 3.4.4 Cultural Resources and 3.4.9 Land Use). Given the distance of these historic properties from the location of the CIS footprint and the lack of visual elements as determining factors in their eligibility for the NRHP, there is no possibility that these historic properties would be subject to visual impacts from potential construction of the CIS.

The potential CIS would not be visible from any of the NRHP listed or eligible sites in the vicinity of CRJMTC. The general forest cover in the area that serves to screen views, as well as the topography and the distance to the listed properties preclude the possibility of views from these properties being impacted by construction of the potential CIS. Visual impacts to cultural and historic sites would, therefore, be minor.

Baseline Construction - Overall Visual Impact Summary

Minor to moderate public (offsite) visual impacts would consist mainly of views of utility infrastructure and increased traffic on area roads. There would be a slight potential for brief public glimpses of construction from the CRJMTC main entrance. Overall, there would be minor to moderate onsite impacts from forest removal and clearing, and the potential for fugitive dust.

Nighttime impacts would be minor because construction would mainly be performed during the daytime. There would also be a greater potential for skyglow and visibility of heavily screened lighting impact, mainly from the CRJMTC main entrance, during the winter season when lighting is needed at the start and end of each day of construction work.

3.4.16.3.1.2 Mitigation

The following impact minimization and mitigation measures may be implemented to reduce visual impacts in the CIS footprint area during construction.

The size of the CIS footprint would be compacted as much as feasible while still meeting military-specified clearances and distances for each type of building that is part of the CIS. CIS facility buildings would be designed to use materials and colors that avoid high visual contrast with the existing surroundings to the extent feasible.

Existing facilities would be used to the extent feasible so that additional structures and linear corridors may not need to be constructed. CRJMTC, as a more developed and heavily used military property, has existing buildings and services that would partially accommodate the CIS.

CIS preconstruction activities would include tree and brush clearing on the site, dewatering, grading, road building, and upgrading of existing utilities. Preservation of a buffer of existing forest between CRJMTC and the CIS footprint boundaries would minimize the potential for visual impacts from public and nearby residential viewpoints. Consideration would be given to further limiting the removal of trees and other vegetation during construction to minimize visual impacts, especially with regard to clearing and construction that would be visible from the main entrance.

Dust control measures, potentially including water spray onto construction roads and gravel surfacing on bare, heavily trafficked areas, would be used to control visible dust from construction areas in the CIS footprint. Erosion control and storm water BMPs would also be implemented during construction. Refer to Sections 3.4.9 Land Use and 3.4.14 Water Resources for further information about dust and erosion control measures to be used.

Disturbed areas within utility ROWs would be reseeded with grass, but large bushes and trees would be prevented from growing in these areas as part of routine maintenance activities. Permanently cleared ROWs on such corridors would be visible wherever a line of sight between the observer and ROW in question occurs (mainly road and wetland crossings).

Light trespass and skyglow impacts would be reduced through the use of fully recessed International Dark Sky Association approved light fixtures throughout the CIS footprint. This practice would reduce the lighting impacts on nearby areas more heavily visited by the public during weekends and in evenings during the summer, such as West Branch State Park south of CRJMTC and SR 5. Temporary construction lights would be directed downward, would be the minimum size and number needed to do the work, and would only be used onsite for the amount of time they are needed.

3.4.16.3.2 Construction – Expedited Schedule

3.4.16.3.2.1 Environmental Consequences

Visual impacts would be very similar during the expedited schedule and the baseline schedule; the clear difference would be the earlier timeframe when the visual impacts would begin to occur with regard to the construction schedule, the greater intensity of the impacts, and the increase in the number of overlapping impacts with many activities occurring concurrently during the expedited schedule work. The visual impacts would not be major, largely because of the high degree of forest screening, even with almost constant day and night large truck traffic, although the higher level of traffic would be clearly noticeable in the immediate area of the main CRJMTC entrance. At night, vehicle headlights and construction lighting would be visible to some area residences at almost all times during the nighttime work and the shorter daylight seasons (late fall, winter, and early spring).

Construction temporary lighting would be installed sooner than in the baseline and more lights would be used at the same time to accomplish more of the work more quickly.

Although impact minimization measures such as wetting of roads, addition of gravel surfacing, and adherence to speed limits would be implemented during the expedited construction, the continuous high level of construction activity on the site would be likely to raise substantial amounts of visible dust, particularly because the site would be fully cleared rather than cleared only in areas where structure construction would occur. With no vegetation remaining to stabilize the soil, especially in dry and/or windy conditions, the heavy construction machinery traffic would sink into the soil, grind the top layer and compress the soil, and potentially release large quantities of dust as traffic increases during construction.

Expedited Construction – Overall Visual Impact Summary. Visual impacts from expedited construction would be moderate with the greater intensity of construction activities and vehicle traffic from the compressed/expedited schedule and more skyglow from use of construction lighting all night, every night.

3.4.16.3.2.2 Mitigation

Mitigation for visual/aesthetic impacts for the expedited schedule would be the same as those described for the baseline schedule.

3.4.16.3.3 Operation

3.4.16.3.3.1 Environmental Consequences

After construction activities are complete, visual impacts would remain at a relatively constant level for the remainder of the life of the CIS facility, especially for observers in the CIS footprint and CRJMTC.

Outside CRJMTC, the view would become familiar in time to the residents in the area around CRJMTC such that the increased level of traffic and glimpses of the CIS facility buildings near the main entrance would be an expected part of the view. Impacts to views from other areas would be negligible largely because of the degree of visual screening that would be present between the CIS footprint and most public views into CRJMTC.

During the growing seasons especially, the CIS buildings and cleared security areas would be screened from almost all viewpoints, with potential very limited visibility to the public only from SR 5. In the winter with no leaves on most trees, the potential visibility of the structures would increase slightly, but views from any location other than the main entrance area at SR 5 would be very unlikely. The very short time that passing motorists would have views into the CIS from SR 5 would not be long enough to cause indirect impacts related to the visual impacts of CIS operation.

Fugitive Emissions. Visible air emissions would be possible, but unlikely, from the occasional maintenance start of the oil-fired power plant. Refer to Section 3.4.1 Air Quality for further information about air emissions during operation.

Traffic. Transportation activities during operation would not impact the aesthetic character of the CRJMTC area. Operation of the CIS would involve a level of traffic greater than what was present before construction, but much less than the volume of traffic during the time construction was at its height. During operation, it is likely that various shifts of workers would arrive at the CIS at different times, lessening the visual impact of traffic on roads near CRJMTC. Traffic in general into and out of the site would be more regular, with less noticeable surges except for slight visible increases during traditional rush hour times on weekday mornings and evenings. Refer to Section 3.4.12 Transportation for further assessment of traffic impacts during CIS operation.

Views of Operation Equipment and Facilities. Simulation of the appearance of the CIS from the one potential public viewpoint is generally not feasible because of the extremely limited views that would be available and the difficulty of realistic simulation of views from this perspective. The view from this point, the main entrance, is shielded by trees and the topography of the site that slopes upward from the entrance in the direction of the CIS footprint, then back downward at the location of the mission support buildings, then up again before dropping down again in the main CIS area. Refer to Figure 3.4.16-9 for a simulation of the estimated night view of the CRJMTC entrance at night with the potential CIS fully lit.

Because of changes in seasonal vegetation cover, visual impacts of the CIS during the growing season when trees are leafed out would be less than those simulated and described herein. MDA and the CRJMTC environmental staff may choose to reduce the forest or treeline clearing in the area close to the main entrance public view so that the potential for visual impacts would be further lessened.

No direct public views would occur except those from cars passing the main entrance on SR 5; otherwise, any direct view of the CIS facilities would only be available from inside the installation boundary.

Lighting. Permanent lighting for security on buildings and in perimeter areas would be International Dark Sky Association approved, fully recessed, downward-directed LED lights designed to minimize light pollution at night. This design, along with any vegetation left in place to help obscure the light, would ensure that the CIS lighting creates the least possible light trespass, glare, and skyglow for viewers and the public at neighboring properties.

The most noticeable continuing visual effect during operation would be the CIS lighting and its impacts on those who work or recreate at the installation, live nearby, or visit CRJMTC. The main concern about lighting would be light pollution or trespass during evening, night, and early morning hours that could disturb nearby residents. Therefore, the potential CIS would be configured such that the potential for any visual impact to the public, including impacts from lighting, would be very minor because of the substantial amount of forest screening and the facility's location at the interior of CRJMTC rather than near its boundaries.

Security lighting around each block of buildings for the CIS would increase the visibility of the facility in the early morning, evening, and at night in comparison to its current, largely unlit state. The lighting to be used at the site would be Dark Sky approved, fully recessed, downward-directed LEDs to minimize light trespass, light pollution, glare, and skyglow effects and to keep the lighting focused on the secure area around each group of CIS buildings. Because of their design, these light fixtures would not have major skyglow effects above the height of the lights. A simulated nighttime view of the CIS lighting from the main entrance is shown on Figure 3.4.16-9.

Nighttime views for any users of the northern portion of West Branch State Park would not likely be perceptibly different from the existing view of the installation because the entrance area is already well lit; additional lighting farther into the site and screened by trees would not be readily noticeable to park users. In addition, most recreational users of West Branch State Park are likely to use the reservoir for recreational activities; views of CRJMTC and the potential CIS are blocked from the reservoir by forested areas.

No FAA lighting would be required on the CIS structures because of the estimated maximum 50-foot height of potential CIS facilities, which would not trigger the 200-foot threshold for FAA lighting requirements.

Overall, largely because of the fully recessed design of the lighting, the distance from residences, and the forested areas would remain in place during operation, the visual impact from operation of a CIS at CRJMTC would be minor in that it would not be noticeable in most areas except at night, when the lights may contribute to a soft skyglow over the site in contrast to the largely unlit surrounding area. The visual impact for drivers passing by the limited view area into the main entrance of CRJMTC would be minor because of its transitory nature. Likewise, visual impacts on nearby residences would be minor because of the intervening trees along both sides of SR 5 that would block views of the CIS.

As depicted by the photo simulation, nighttime visual impacts would be minor, and possibly imperceptible during periods of fog, precipitation, or similar atmospheric conditions.

Cultural and Historic Sites. There are nine historic properties that are eligible for the NRHP located at CRJMTC. Eight of these historic properties are archaeological sites and one property is a stone arch bridge. None of these properties are within the CIS footprint APE. The historic properties are approximately 1.5 to 2.5 miles away from the CIS footprint APE and approximately 0.5 to 3.0 miles from the facility relocation APEs (refer to Sections 3.4.4 Cultural Resources and 3.4.9 Land Use). Given the distance of these historic properties from the location of the CIS footprint and the lack of visual elements as determining factors in their eligibility for the NRHP, there is no possibility that these historic properties would be subject to visual impacts from operation of the CIS.

The potential CIS would not be visible from any of the NRHP listed or eligible sites in the vicinity of CRJMTC. The general forest cover in the area that serves to screen views, as well as the topography and the distance to the listed properties, preclude the possibility of the views from these properties being impacted by operation of the CIS. Because of the distance and topography between the NRHP listed properties and the CIS facilities and because of the minimal lighting levels expected to be used, it is also unlikely that skyglow or other night lighting during the CIS facilities' operation would be visible from cultural or historic sites. Visual impacts to cultural and historic sites would, therefore, be minor.

Operation – Overall Visual Impact Summary. Negligible to minor aesthetic impacts would occur during operation. The visual impacts from operation and CIS lighting would be negligible, with minor skyglow effects being the main expected impact.

3.4.16.3.3.2 Mitigation

Mitigation for visual impacts during operation would be similar to the mitigation during construction in a general sense, and would include implementation of measures such as dust control if needed, although traffic and activity would be potentially creating dust at a much lower level during operation because roads and other surfaces would likely be covered by additional gravel layers and would have already been upgraded for use during CIS operation. It is unlikely that any nearby residents would have views of the CIS during operation except when they drive past the CRJMTC main entrance. MDA does not currently plan to plant vegetative screening or include other visual impact mitigation measures because the post-CIS appearance of CRJMTC would be similar to its existing appearance for members of the public. Individual residences would not experience views of the CIS from their locations.

The CIS lighting plan would also seek to minimize aesthetic impacts and consider effects on night sky views including using Dark Sky approved lighting throughout the CIS footprint. Skyglow from operation of the CIS would be visible in the area surrounding CRJMTC; however, the forest buffer around the CIS would reduce this effect except on cloudy nights, when it would be more noticeable as a slightly lighter area above the facility because of the light reflection off the clouds and back down toward viewers on the ground. Skyglow effects would be minimized during operation through use of fully recessed light fixtures that direct all light downward so that there is no glare from direct observation of the lights and very little light travels outside the area being lit or upward toward the sky.

Figure 3.4.16-1 Preliminary Viewshed Map - CRJMTC

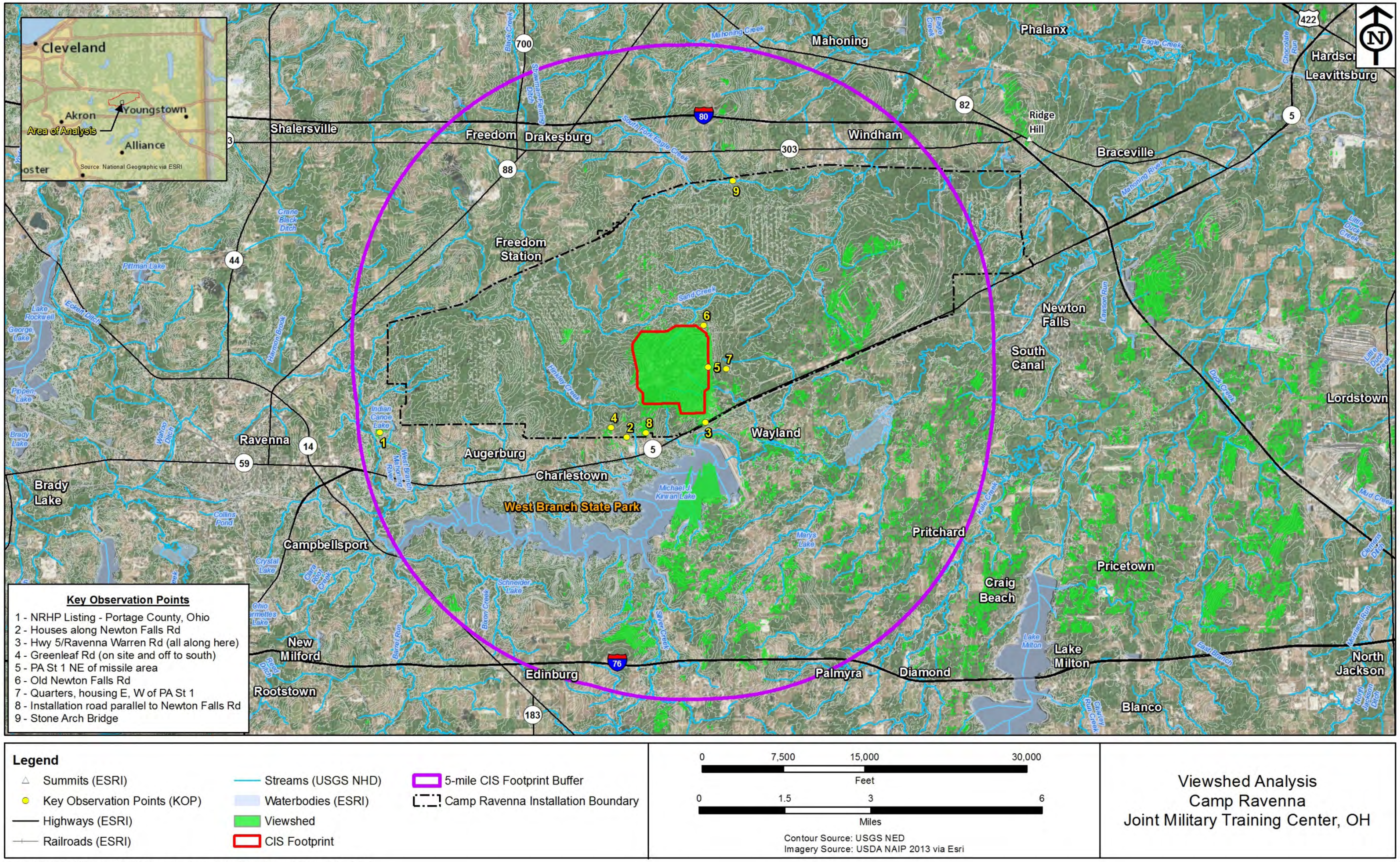

Figure 3.4.16-2 Photo Locations – CRJMTC

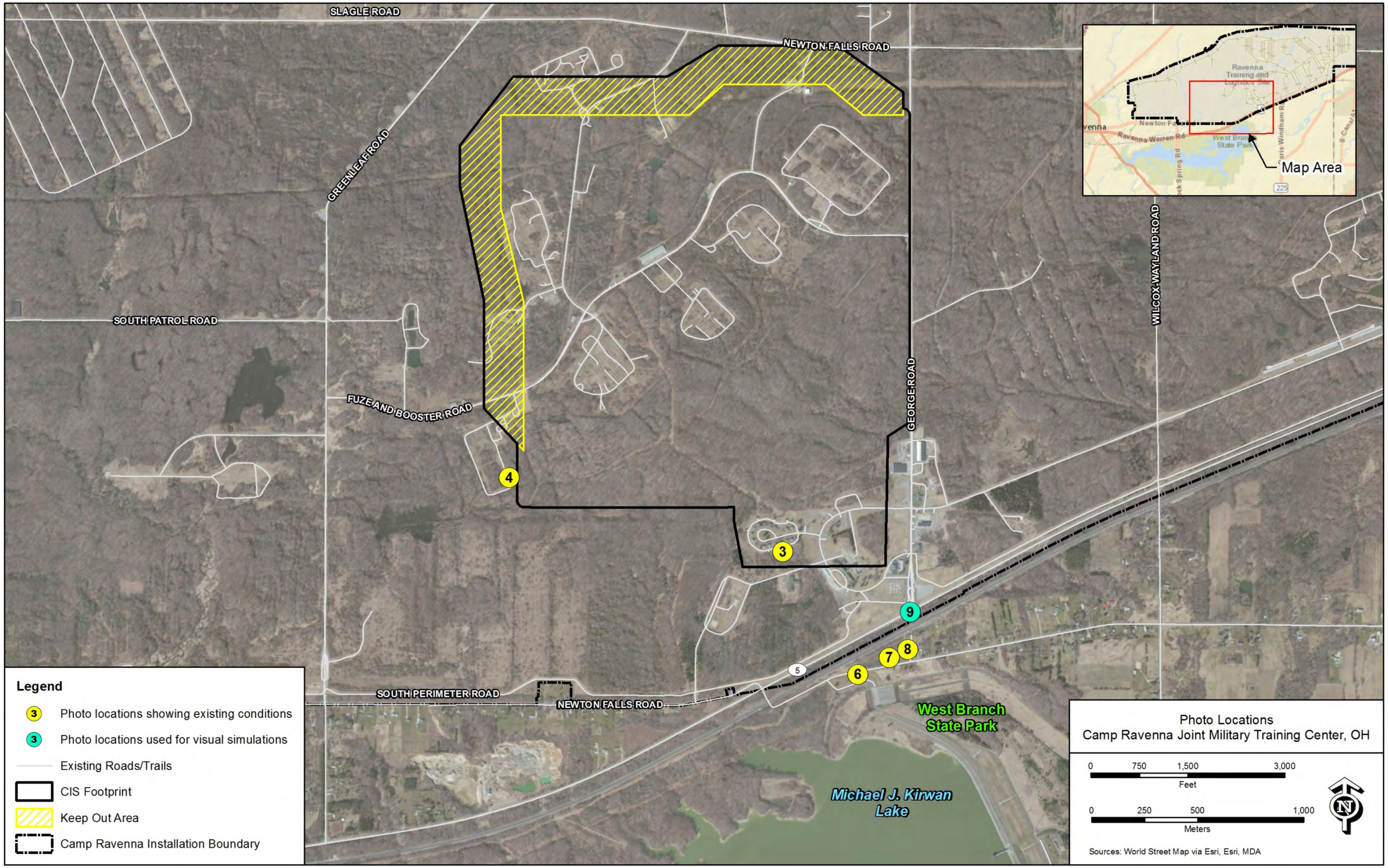

Figure 3.4.16-3 Representative View – CRJMTC Cantonment Area

Photo Description: View of existing interior cantonment housing area, looking west-southwest (housing units would be demolished).

Figure 3.4.16-4 View of Load Line 8 – CRJMTC

Photo Description: Interior view of Load Line 8 looking south (location is about 348 feet west of southwesternmost portion of CIS footprint). Red balloon (center, at far end of view) at 50 foot height indicates forest height and degree of visual screening in the area.

Figure 3.4.16-5 Representative View of CRJMTC Perimeter

Photo Description: Public view from extreme southwest corner of CRJMTC perimeter fence toward east-northeast, showing clear perimeter and tall forest that would act as a visual screen. This view is also representative of the general appearance of a transmission line corridor in the CRJMTC area.

Figure 3.4.16-6 Potentially Sensitive Viewpoint – CRJMTC

Photo Description: Public view from West Branch State Park top of dam embankment toward northwest and CRJMTC CIS footprint showing the degree of visual screening from forest.

Figure 3.4.16-7 Potentially Sensitive Viewpoint – Daytime View – CRJMTC

Photo Description: Daytime public view from West Branch State Park access road northeast toward CRJMTC entrance.

Figure 3.4.16-8 Potentially Sensitive Viewpoint – Nighttime View – CRJMTC

Photo Description: Nighttime public view of existing CRJMTC main entrance lighting from about 1,300 feet southwest at West Branch State Park access road off Newton Falls Road.

Figure 3.4.16-9 Simulated Nighttime View from CRJMTC Entrance

Photo Description: Simulated public nighttime view of full security lighting from CRJMTC main entrance (without vegetation screening or current main entrance lighting).

3.4.17 Cumulative Impacts – CRJMTC

Cumulative impacts are defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR Part 1508.7). Cumulative impacts can result from individually minor but collectively substantial actions taking place over a period of time.

Several steps are involved in determining cumulative impacts. First, the significant cumulative effects issues associated with the potential action must be identified and the assessment goals defined. Second, the geographic scope or boundaries must be established; this is often referred to as the "project impact zone." Third, the timeframe for the analysis must be determined taking into consideration the timeframe of the project-specific analysis. Lastly, other actions affecting the resources, ecosystems, and human communities of concern should be identified. (CEQ, 1997)

In order to evaluate cumulative impacts due to a potential CIS at CRJMTC, construction projects within or near CRJMTC were identified which may be impacting or providing contributing impacts to resources within the same geographic area, spatial timeframes, and duration as the potential CIS (CEQ, 1997). Factors Specific criteria considered for identifying applicable projects included the following:

- Geographic boundaries – the project must occur within the same site boundaries (installation), community, and/or region as the potential CIS.
- Timeframe – the project must be ongoing or occur within the same timeframe as the anticipated CIS project construction.
- Impacts to resources – the project must impact the same resources as evaluated in this EIS (e.g. air quality, biological resources, etc.).

CRJMTC personnel and the Portage County Regional Planning Commission were contacted to identify projects within the installation, community, or region of CRJMTC which could result in cumulative impacts in conjunction with construction of the potential CIS. In addition, the Ohio State Transportation Implementation Plan 2016 - 2019 Project List was reviewed to identify ODOT projects within the geographic region of the CIS (ODOT, 2016).The following is a summary of the past, present, or foreseeable future projects that were identified (CRJMTC, 2015f; CRJMTC, 2016; ODOT, 2016; BVSPC, 2016c).

<u>Past Projects</u>

There were no past projects identified.

<u>Present Projects</u>

- **On-going IRP remedial actions** - As described in Section 3.4.7 Hazardous Materials/Hazardous Waste, IRP removal actions, especially those for AOCs within the

CIS footprint, are on-going at CRJMTC. Soil remediation is expected to occur from 2016 to 2018 and groundwater monitoring and investigation to occur through 2018. This project would be anticipated to impact the following resources: soils and geology, groundwater, and biological. However, impacts are expected to be insignificant because these areas which occur within the CIS footprint would be remediated prior to construction.

- **Sewer and water line additions** - As described in Section 3.4.13 Utilities, a commercial sewer and water line construction project was initiated in 2015 and will be completed by mid-2016. This project will provide a large capacity water and wastewater services to CRJMTC, including the area directly adjacent to the CIS footprint. The project is being installed by horizontal directional drilling with a minor amount of open trench digging where necessary within the existing roadside. No tree clearing or wetland fill will result. Project impacts to resources (evaluated in this EIS) are not significant (CRJMTC, 2015f).
- **Automated Record Fire Range** - As described in Section 3.4.12 Transportation, an Automated Record Fire Range is currently being constructed with completion expected in late 2016. The project involves clearing of approximately 29 acres of forest and filling in of 2.8 acres of wetlands and 235 linear feet of streams. Compensatory mitigation was completed in 2015 for these impacts; therefore, project impacts to wetlands and streams are not significant (CRJMTC, 2015f).

Foreseeable Future Projects

- **Multipurpose Machine Gun Range** - As described in Section 3.4.12 Transportation, a multipurpose machine gun range is currently scheduled for construction in 2019 – 2021. The project involves clearing of approximately 30 acres of forest and filling in of 4.6 acres of wetlands and 261 linear feet of streams. Compensatory mitigation was completed in 2015 for these impacts; therefore, project impacts to wetlands and streams are not significant (CRJMTC, 2015f).

It has been determined that the projects identified by CRJMTC and listed above would not have a significant impact to the resources evaluated in this EIS. Due to the limited number and small scale of these projects, when combined with the impacts resulting from the potential CIS, cumulative impacts to all resources evaluated in this EIS are expected to be insignificant.