- Provide relocation services for a period of 3 years to owner-occupied residential property owners who reside in the Relocation Area from 100 feet of the Project up to North Carolina Avenue. (Minimization)

These avoidance and minimization measures, except the items noted with an asterisk (*), have been considered in the preceding impact analysis. The complete list of Applicant-proposed avoidance and minimization measures related to noise and vibrations is also provided in Chapter 6.

4.12.12.2 Additional Potential Mitigation Measures

No additional mitigation measures for Noise and Vibration have been recommended by the Corps. Additional avoidance, minimization, and mitigation may be considered by the Corps in its decision-making process. Final mitigation measures may be adopted as conditions of the DA permit and documented in the Record of Decision (ROD).

4.13 AIR QUALITY

4.13.1 Methods and Impact Definitions

Impacts on Air Quality by Alternative 1 (Proposed Project) and the alternatives were evaluated by estimating the criteria pollutant and Hazardous Air Pollutant (HAP) emissions associated with each alternative's construction and operation. As discussed in Chapter 3, criteria pollutants of concern for this Project include CO, NO_2, O_3, $PM_{2.5}$, PM_{10}, and SO_2. NO_2 impacts are commonly evaluated by analyzing NO_x, which is done in this analysis. O_3 is not directly emitted, but rather formed in the air through a photochemical reaction of NO_x and VOCs, referred to as O_3 precursors. O_3 impacts are evaluated by analyzing NO_x and VOC emissions. All sources of criteria pollutant and HAP emissions that were reasonably foreseeable were included in this analysis. Air emissions were evaluated for the full build-out year 2038 to best represent the air emissions at full operating capacity. Accordingly, 2038 criteria pollutant and HAP emissions inventories represent the criteria pollutant and HAP emissions for all operating years after 2038, and a conservative estimate for interim years between opening year 2018 and full build-out year 2038.

4.13.1.1 Construction NAAQS Emissions Inventory

Construction period criteria pollutant emissions inventories of CO, NO_x, $PM_{2.5}$, PM_{10}, SO_2, and VOCs included emissions from construction equipment exhaust, haul truck trips for importing and exporting material, and worker and vendor commute to and from the construction sites. Pollutant emissions would also be caused by off-gassing emissions from solvents in architectural paints and asphalt paving. Additionally, particulate matter would be emitted from surface disturbance activities, building demolition, the material movement of imports and exports, and on-road vehicle activity. Pollutant emissions from each of these activities were quantified using the EPA Motor Vehicle Emissions Simulator (MOVES) model, EPA guidance, activity information provided by Palmetto

Railways, and assumptions and other sources where necessary. All criteria pollutant emission calculations, assumptions, guidance references, data, and model runs are included in the Air Quality and Climate Change Technical Memorandum (Appendix I).

4.13.1.2 Operational NAAQS Criteria Pollutant Emissions Inventory

Operational criteria pollutant emissions of CO, NO_x, $PM_{2.5}$, PM_{10}, SO_2, and VOCs included emissions from locomotive activity, Over-the-Road (OTR) truck trips and idling, Utility Tractor Rig (UTR) truck trips and idling, and worker commute. Locomotive pollutant emissions were estimated for off-terminal line haul activity, on-terminal line haul activity, and switch locomotive activity. Line haul locomotives are used to move freight. Switch locomotives are used to put rail cars together to form trains within or around a railyard. They are also referred to as “switchers.” Pollutant emissions from each of these activities were quantified using the EPA Motor Vehicle Emissions Simulator (MOVES) model, EPA guidance, activity information provided by Palmetto Railways, and assumptions and other sources where necessary. It is common for intermodal container transfer facilities to use off-road equipment such as forklifts and cranes during operations; however, Alternative 1 (Proposed Project) and the build alternatives would utilize electric equipment, including gantry cranes. Electric equipment does not directly emit air pollutants so pollutant emissions from these sources are not quantified. All criteria pollutant emission calculations, assumptions, and model runs are included in Appendix I.

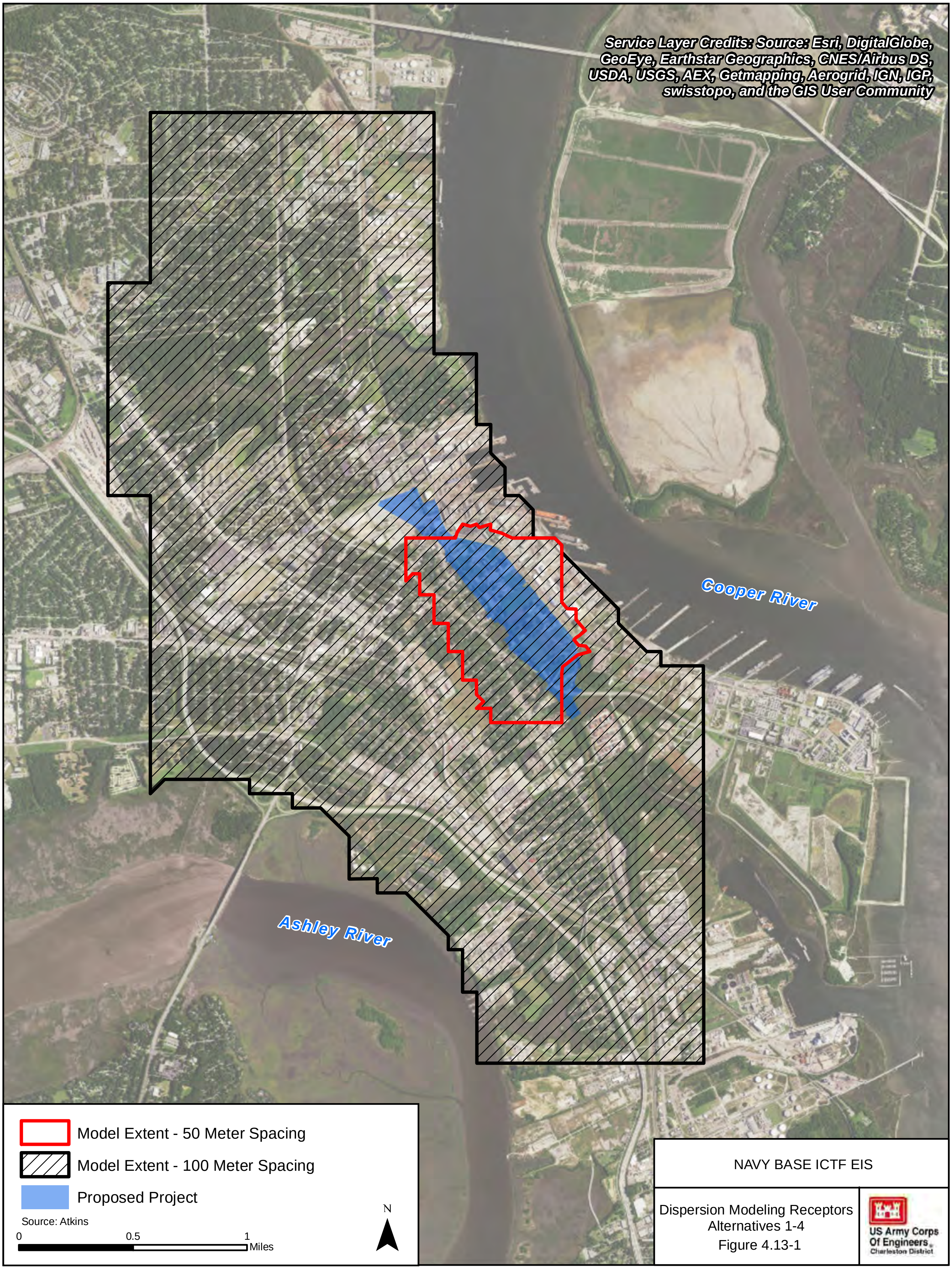
4.13.1.3 NAAQS Dispersion Modeling

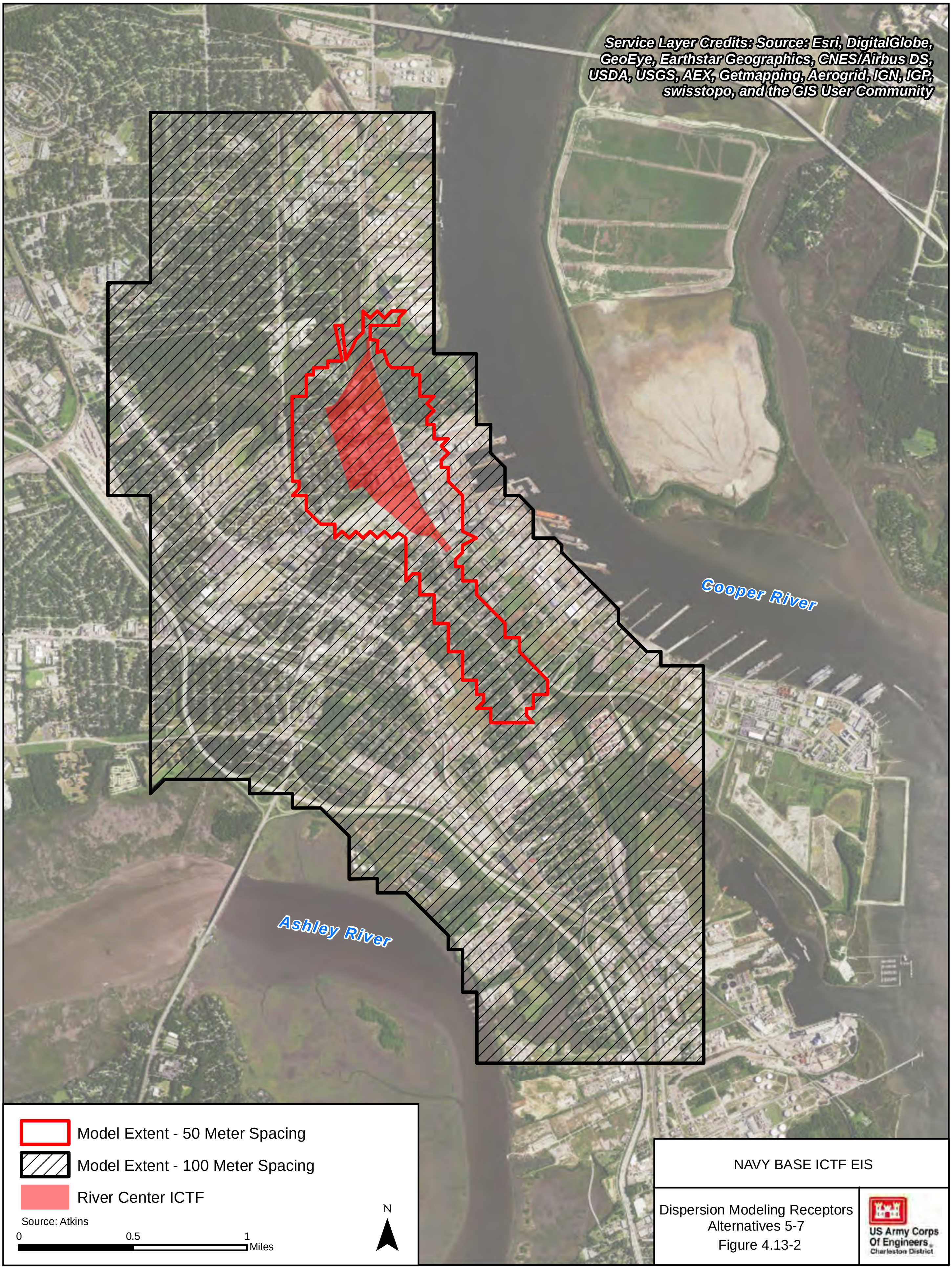
In addition to criteria pollutant emissions inventories, which are reported in tons of each pollutant, dispersion modeling was included in this analysis to evaluate compliance with the of CO, NO_2, $PM_{2.5}$, PM_{10}, and SO_2 NAAQS. All dispersion modeling calculations, assumptions, data, and model runs are included in Appendix I. As discussed in Section 3.13, lead would not be emitted from the Proposed Project and alternatives, and is not included in this analysis. Ozone is not emitted directly from the combustion of fuels, but is formed through photochemical reactions. Ozone is generally modelled at the regional scale and is not included in the dispersion modeling of this analysis. While emissions inventories provide valuable information of how much of each pollutant the Proposed Project and alternatives would emit annually, the inventories do not show how much of each pollutant would be in the air at any given time or location. Therefore, an air emissions inventory alone does not provide a direct correlation to air pollutant concentrations. When a pollutant is emitted from a source, such as exhaust from a passenger car, it is dispersed in the air and becomes less potent or less concentrated as it is dispersed. Concentration of the criteria pollutants emitted from the operation of the Proposed Project and alternatives were estimated using the AERMOD Dispersion Model.

The AERMOD Dispersion Model was selected as the appropriate dispersion model for criteria pollutants because it is a preferred or recommended dispersion model as listed in Appendix W by the

EPA (EPA 2005). The American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) was formed to introduce state-of-the-art modeling concepts into the EPA's air quality models. Through AERMIC, the modeling system, AERMOD, was introduced that incorporated air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain. The AERMOD Dispersion Model is a stationary source dispersion model. Although many of the pollutant sources of the Proposed Project and alternatives would be considered mobile sources, such as the UTR and OTR trucks traveling on roadways, these can be modeled as line sources in AERMOD, as is supported in SCDHEC guidance (SCDHEC 2001). For these reasons, AERMOD was selected as the appropriate dispersion model for criteria pollutants.

AERMOD requires meteorological, terrain, receptor, and pollutant source data inputs. Meteorology and terrain data were taken from SCDHEC. The model receptor grid extents and spacing included in the dispersion modeling for the Proposed Project and alternatives are shown in Figure 4.13-1 and Figure 4.13-2. Receptors grids were placed in the study area at 50 meters spacing between the boundaries of the Project site and River Center project site and 300 meters from them. Receptors grids were then placed at 100 meters spacing from 300 meters from the sites to at least a quarter mile (1,320 feet) from the pollutant source. More information on the model receptor grid is provided in Appendix I. The sources included in the model were proposed off-terminal line haul rail, on-terminal line haul rail, switch locomotives, UTR trucks on the private drayage road, UTR truck on-site idling, OTR trucks on public roads, OTR truck on-site idling, and on-road passenger vehicles. The OTR truck activity and worker commute from the Proposed Project and alternatives on public roadways could not be isolated. Rather, all passenger car and truck traffic were included in the roadway sources, as is presented in the transportation analysis (Appendix F – Transportation Analysis Technical Memorandum). The analysis in Appendix F includes over 200 roadway links; however, this air quality analysis has a more narrowed scope and does not need all roadways links modeled to provide a reasonable estimate of air quality impacts. To reduce the number of roadway links included in the air dispersion model, a screening process was applied, which limited the public roadways.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Cooper River
Ashley River
Model Extent - 50 Meter Spacing
Model Extent - 100 Meter Spacing
Proposed Project
Source: Atkins
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Dispersion Modeling Receptors
Alternatives 1-4
Figure 4.13-1
US Army Corps Of Engineers
Charleston District



NAVY BASE ICTF EIS

Dispersion Modeling Receptors
Alternatives 5-7
Figure 4.13-2

Model source input emission rates were developed for each source from the same data used to develop the operational criteria pollutant emissions inventories, as well as additional data taken from the Appendix F and other sources as necessary. In addition to emission rates, the pollutant sources in the AERMOD model also included inputs for plume width, plume height, and flagpole receptor height. To analyze criteria pollutant air quality impacts, the model outputs were added to the SCDHEC background concentrations and pollutant levels anticipated from the HLT at the CNC, which had not yet been operating at the time of the most recent ambient air monitoring. SCDHEC background concentrations for modeling purposes were used to establish a baseline of the existing air quality. Every criteria pollutant is not monitored within the community. Therefore, the most representative monitoring station was used as a proxy for the lack of local monitoring data. The source of background concentrations and their representativeness are included in Appendix I. The sum of these three concentrations represents the total estimated pollutant concentrations at the full build-out of the Proposed Project and were compared to the NAAQS. All dispersion modeling calculations, assumptions, data, and model runs are included in Appendix I.

4.13.1.4 Hazardous Air Pollutants (HAP)

The CAA Amendments of 1990 listed 188 HAPs and addressed the need to control toxic emissions from transportation. In 2001, EPA issued its first Mobile Source Air Toxics Rule, which identified 21 mobile source air toxic (MSAT) compounds as being HAPs that required regulation. In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment. These are acrolein, benzene, 1, 3-butidiene, diesel particulate matter (DPM) plus diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter. Therefore, this analysis focuses on the seven “priority” MSAT. Of the seven priority MSAT, DPM risk has been quantified and disclosed in the Health Risk Assessment section for Alternative 1 (Proposed Project) and alternatives. Further, DPM has become the dominant MSAT of concern. The remaining six MSAT (non-DPM HAPs) present a substantially lower health risk and, unlike the criteria pollutants, toxics do not have NAAQS, making evaluation of their impacts more subjective; however, generation of the non-DPM HAPs is provided herein for disclosure purposes. Acrolein is a prevalent pollutant in many communities; however, results of a short-term laboratory study conducted in 2010 raised significant questions about the consistency and reliability of acrolein monitoring results. It is one of the most difficult chemicals to measure in the air because it reacts easily with other chemicals to form other compounds thus complicating laboratory analysis. This means that although monitors detect acrolein in the air, precisely how much cannot be determined. In light of this uncertainty, EPA did not use acrolein monitoring data in evaluating the potential for health risks from exposure to air toxics in the School Air Toxics Monitoring Project. The EPA concluded that additional work is necessary to improve the accuracy of acrolein sample collection and analytical methods and is in the process of evaluating promising new technologies that may provide accurate data (EPA 2013). Although acrolein is a prevalent pollutant in many communities, quantifying it would include a higher level of uncertainty compared to the other listed HAPs. Therefore, acrolein was not quantified in this analysis. Once emissions inventories were completed for each Project alternative, the amount of non-DPM HAPs emitted were calculated. Non-DPM HAPs are determined as a ratio of criteria pollutants (i.e., VOCs) discharged (Table 4.13-1). The ratios were obtained from EPA document Air Toxic Emissions from On-Road Vehicles in MOVES2014 and are detailed in the table below (EPA 2015a).

Table 4.13-1
HAP Ratios

Priority MSAT (non-DPM HAP)[1]	Proxy Pollutant	Ratio of MSAT to Proxy Pollutant
Benzene	VOC	0.01291
1,3-Butadiene	VOC	0.00080
Formaldehyde	VOC	0.21744
Naphthalene	VOC	0.01630
Polycyclic organic matter[2]	VOC	0.00130

(1) Acrolein is a non-DPM HAP, however it was not quantified due to its level of uncertainty.

(2) Polycyclic organic matter defines a broad class of compounds that includes polycyclic aromatic compounds. The EPA document, Air Toxic Emissions from On-Road Vehicles in MOVES2014, provides ratios for fifteen polycyclic aromatic compounds. A sum of the ratios for the fifteen compounds was used to represent the overall ratio for polycyclic organic matter.

Notes: All ratios were taken for 2007 and later diesel vehicles.

Source: EPA 2015a.

4.13.1.5 Health Risk Assessment

A human Health Risk Assessment (HRA) is the process to estimate the nature and probability of adverse health effects in humans who may be exposed to chemicals in contaminated environmental media, now or in the future. An evaluation of DPM was conducted using EPA protocols as listed in the Air Toxics Risk Assessment Reference Library Volume 1 (EPA 2004). The HRA includes four basic steps, presented below.

Planning, Scoping, and Problem Formulation is performed to identify the assessment questions, state the quantity and quality of data needed to answer those questions, establish the scope of this analysis, provide an in-depth discussion of how the analysis will be done, outline timing and resource considerations, identify product and documentation needs, and identify who will participate in the overall process from start to finish, along with their roles. During this process, an identification and evaluation of available data and ancillary information about the study area will be performed to help identify key chemicals, sources, and potential exposures, to determine what kind of analyses can be performed, and to establish the data gaps which need to be filled.

As described above, DPM is the HAP of concern for the Proposed Project and alternatives. The primary source of DPM associated with the Proposed Project and alternatives is diesel engines, including the truck (UTR and OTR) and rail activity (line haul and switch locomotives). The concentration of DPM in the air would be necessary in evaluating its associated risk. DPM concentrations resulting from the Proposed Project and alternatives were modeled using the AERMOD dispersion model. The AERMOD Dispersion Model was selected as the appropriate dispersion model for DPM for the same reasons listed in section 4.13.1.3. The same data used in modeling criteria pollutants were also used for modeling DPM. All data, assumptions, and model information is provided in Appendix I.

Exposure Assessment is conducted to identify: (1) who is potentially exposed to air toxics; (2) what chemicals they may be exposed to; and (3) how they may be exposed to those chemicals, including the concentrations of chemicals in the air they breathe in.

Those who would be potentially exposed to air toxics from the Proposed Project and alternatives are people residing near the Project site and River Center project site. Residences within a quarter mile (1,320 feet) from the pollutant sources were included in the analysis. This population would be exposed to HAPs in the air; however, DPM is the pollutant of concern for this analysis because the other HAPs, which are listed in section 4.13.1.4, present a substantially lower health risk.

There are two exposure durations that are commonly used in exposure assessments: acute and chronic. Acute exposure refers to situations in which the exposure occurs over a short period of time (usually minutes, hours, or a day) and usually at relatively high concentrations. The averaging times commonly used to represent acute exposures concentrations are a 24-hour average, a 1-hour average, or a 15-minute average. Acute exposure may result in immediate respiratory and sensory irritation, chemical burns, narcosis, eye damage, and various other effects. Acute exposures also may result in longer-term health effects. Chronic exposure refers to situations in which the exposure occurs repeatedly over a long period of time (usually years to lifetime). Chronic exposures are relatively low in concentration and may result in health effects that do not show up immediately and that persist over the long term, such as cardiovascular disease, respiratory disease, liver and kidney disease, reproductive effects, neurological damage, and cancer (EPA 2004). Chronic exposure was included in this analysis due to the operational lifetime of the Proposed Project and alternatives, as well as the more severe health effects associated with chronic exposure.

Toxicity Assessment considers: (1) the types of adverse health effects associated with exposure to the chemicals in question; (2) the exposure circumstances associated with the effects (e.g., inhalation vs ingestion), and (3) the relationship between the amount of exposure and the resulting response (commonly referred to as the dose-response relationship).

DPM contains significant levels of fine particulates, which pose a significant health risk because they can pass through the nose and throat and lodge themselves in the lungs. These fine particles can cause lung damage and premature death. They can also aggravate conditions such as asthma and bronchitis. In addition, in its health assessment for diesel engine exhaust, EPA concluded that chronic inhalation exposure is likely to pose a lung cancer hazard to humans (EPA 2006b).

Depending on the type of effect and the chemical, there are two types of dose-response values that traditionally may be derived: predictive cancer risk estimates, such as the inhalation unit risk (IUR) estimate, and predictive non-cancer estimates, such as the reference concentration (RfC). Both types of dose-response values may be developed for the same chemical, as appropriate. The IUR is the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent via inhalation per μg/m^3 over a lifetime. The EPA's s Office of Air Quality Planning and Standards has chronic toxicological values for risk assessments of HAPs, however there is none listed for the IUR of diesel engine emissions (EPA 2014e). The California Air Resources Board (ARB), which is part of the California EPA, published a report on diesel exhaust that reviewed human epidemiological studies of occupationally exposed populations, which are useful for quantitative risk assessment. The report demonstrated that the IUR based on human epidemiological data ranges from 1.3×10^{-4} to 2.4×10^{-3} $(\mu g/m^3)^{-1}$. After considering the results of the meta-analysis of human studies, as well as the detailed analysis of railroad workers, the report concludes that 3×10^{-4} $(\mu g/m^3)^{-1}$ is a reasonable estimate of unit risk expressed in terms of diesel particulate (ARB 1998). Thus, this IUR is used in this analysis.

The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subpopulations) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The RfC is generally used in noncancer health assessments. The RfC of DPM is 5 μg/m^3 (EPA 2014e).

Risk Characterization is the integration of information on hazard, exposure, and toxicity to provide an estimate of the likelihood that any of the identified adverse effects would occur in exposed people. Specifically, chemical-specific dose-response toxicity information is mathematically combined with modeled or monitored exposure estimates to give numbers that represent estimates of the potential for the exposure to cause an adverse health outcome. Risk characterization should be transparent, clear, consistent, and reasonable.

Quantification of risk and hazard is the step where exposure concentrations in air are combined with applicable inhalation dose-response values (the IUR and RfC). Predictive excess cancer risk estimates are presented separately from noncancer hazard quotients.

For inhalation exposures, chronic cancer risks for individual air toxics are typically estimated by multiplying the estimate of long-term exposure concentration (EC) by the corresponding IUR for each pollutant to estimate the potential incremental cancer risk for an individual (EPA 2004):

$$\text{Risk} = \text{EC} \times \text{IUR}$$

Where:

Risk = Cancer risk to an individual (expressed as an upper-bound risk of contracting cancer over a lifetime);

EC = Estimate of long-term inhalation exposure concentration for a specific air toxic; and

IUR = the corresponding inhalation unit risk estimate for that air toxic.

Performing the estimate in this way provides an estimate of the probability of developing cancer over a lifetime due to the exposure in question. Because of the way this equation is written, the underlying presumption is that a person is exposed continuously to the EC for their full lifetime (usually assumed to be 70 years). The EC used in this analysis is the maximum concentration output from the AERMOD dispersion model over a residence. The concentration represents an annual average that is averaged over five years. Model inputs, data, and assumptions are provided in Appendix I.

The potential risks calculated for specific inhalation exposures are excess or incremental risks; that is, they are potential risks that are in addition to those risks already faced by the population under study for reasons other than exposure to air toxics (e.g., hereditary, lifestyle risks such as smoking). Estimates of excess cancer risk are usually expressed as a statistical probability. For example, an additional risk of contracting cancer of one chance in 1,000,000 means that for every 1,000,000 people that are exposed, in the way that we have presumed, one of those people may develop cancer over their lifetime.

For inhalation exposures, noncancer hazards are estimated by dividing the estimate of the chronic inhalation EC by the RfC (EPA 2004):

$$\text{Noncancer Hazard} = \text{EC} / \text{RfC}$$

Where:

EC = estimate of chronic inhalation exposure to that air toxic; and

RfC = the corresponding reference concentration for that air toxic.

The EC used in this analysis is the maximum concentration output from the AERMOD dispersion model over a residence. The concentration represents an annual average that is averaged over five years. Model inputs, data, and assumptions are provided in Appendix I.

It is important to address variability and uncertainty in risk characterizations, as scientific uncertainty is inherent in the risk assessment process.

Variability refers to true heterogeneity or diversity. For example, among a local community that is exposed to an air toxic originating from the same source, and with all people breathing the same contaminant concentration in ambient air, the risks from inhalation of the contaminated air will still vary among the people in the population. This may be due to differences in exposure (i.e., different people have different exposure frequencies and exposure durations), as well as differences in response (e.g., differences in metabolic processes of chemical uptake into target organs).

Uncertainty occurs because of a lack of knowledge. For example, we can be very certain that different people are exposed to contaminated air for different time periods, but we may be uncertain about how much variability there is in these exposure durations among the people in the population. Data may not be available concerning the amount of time specific people spend indoors at home, outdoors near home, or in other "microenvironments." Often, it is difficult to distinguish between uncertainty and variability in a risk assessment, particularly if available data are limited. For that reason, in many cases variability can be treated as a type of uncertainty in the risk assessment. Uncertainty is an inherent characteristic of each step of the risk assessment process.

Uncertainty, when applied to the process of risk assessment, is defined as "a lack of knowledge about specific factors, parameters, or models." Such uncertainties affect the confidence of any risk estimates that were developed for individuals exposed to the substances in question. It is important to keep in mind that many parameter values (e.g., emissions rates) may be *both* uncertain and variable. Also, the presence of uncertainty in risk assessment does not imply that the results of the risk assessment are wrong, but rather that the risks cannot be estimated beyond a certain degree of confidence (EPA 2004).

There is uncertainty inherent in the IUR and RfC. As described above, the ARB found a range of IUR values, and developed a reasonable value from the range. The RfC is also an estimate, with uncertainty spanning perhaps an order of magnitude. The EC taken from the AERMOD dispersion model also contains uncertainty, from both the AERMOD model inputs as well as the model itself. Even the perfect dispersion model is likely to have deviations from observed concentrations due to variations in unknown conditions (EPA 2005). The cancer risk equation presumes that a person is continuously exposed to the EC for 70 years. This means that the person would be standing outside their home continuously for 70 years. Further, the EC used in this analysis is the maximum concentration output from the AERMOD dispersion model over a residence. All nearby residents would not be exposed to this maximum concentration. In order to take into account the uncertainties in the science, the risk numbers used are plausible upper limits of the actual risk based on conservative assumptions. In actuality, the risk is probably somewhat lower than calculated, and in fact may be zero.

The full build-out year (2038) was selected for the Health Risk Assessment (HRA) rather than the opening year (2018) because the build-out would include full operation of the Project and worst-case traffic volumes on public roadways. The level of impact was determined based on the increment cancer risk and noncancer hazard. The No-Action Alternative served as the baseline condition and represents the projected 2038 traffic volumes, and rail operation in the study area without implementation of the Proposed Project. All HRA calculations and assumptions are included in Appendix I.

4.13.1.6 Impact Definitions

Impacts of criteria pollutants on air quality are analyzed by comparing Alternative 1 (Proposed Project) and alternatives criteria pollutant emissions inventories to the criteria pollutant emissions inventories of the study area (Tri-County area). Impacts are also analyzed by addressing if the criteria pollutant dispersion from the Proposed Project and alternatives would put the Tri-County area into non-attainment with the NAAQS. Impact definitions for criteria pollutants are in Table 4.13-2.

Table 4.13-2
Impact Definitions, Criteria Pollutants on Air Quality

Negligible	Minor	Major
Criteria pollutant emissions do not occur.	Criteria pollutant emissions would occur but not to the extent of putting the County in Non-Attainment.	Criteria pollutant emissions would occur to the extent of putting the County in Non-Attainment.

On July 28, 1987, Judge Robert Bork, writing for the D.C. Circuit Court of Appeals, remanded the vinyl chloride amendments to EPA, finding that the Agency had placed too great an emphasis on technical feasibility and cost rather than the provision of an "ample margin of safety" as required by the statue. The opinion also laid out a process for making decisions, consistent with the requirements of the law. The Bork opinion held that EPA must first determine a "safe" or acceptable" level considering only the potential health impacts of the pollutant. In September of 1989, EPA promulgated emission standards for several categories of benzene sources. EPA argued for the consideration of all relevant health information and established "presumptive benchmarks" for risks that would be deemed "acceptable." The goal, which came to be known as the "fuzzy bright line," is to protect the greatest number of persons possible to an individual lifetime risk no higher than one in one million and to limit to no higher than approximately 100 in one million the estimated maximum individual risk. The selection of even "fuzzy" risk targets placed greater emphasis on the development and communication of risk characterization results (EPA 2006b).

The level of total cancer risk that is of concern is a matter of personal, community, and regulatory judgment. In general, EPA considers excess cancer risks that are below about 1 per million to be so mall as to be negligible, and risks above 100 per million to be sufficiently large that some sort of remediation is desirable. Excess cancer risks that range between 1 per million and 100 per million are generally considered to be acceptable.

For noncancer hazard quotient, it is believed that a hazard quotient below 1 would have no appreciable risk that noncancer health effects would occur, although above 1 does not indicate an effect will definitely occur. The larger the hazard quotient value, the more likely it is that an adverse effect may occur (EPA 2015b). Impact definitions for HAPs are in Table 4.13-3.

Table 4.13-3
Impact Definitions, Hazardous Air Pollutants on Air Quality

Negligible	Acceptable	Unacceptable
HAPs emissions do not occur. Potential cancer risk would be below 1 per million. Potential noncancer hazard would be below 1.	HAPS emissions would occur. Potential cancer risk would be between 1 per million and 100 per million. Potential noncancer hazard would be above 1, but adverse effects are unlikely to occur.	HAPS emissions would occur. Potential cancer risk would be above 100 per million. Potential noncancer hazard quotient would be above 1 and adverse effects may occur.

4.13.2 No-Action Alternative

4.13.2.1 Construction Criteria Pollutant Emissions Inventory

Under the No-Action Alternative, application for the DA permit would be denied; the Proposed Project would not occur; CSX and NS would undertake operational and structural modifications to Ashley Junction and 7-Mile rail yards; and future use of the Proposed Project and River Center project sites would likely be mixed-use and industrial (e.g., rail-served warehousing distribution center). As such, the site would need to be built for these uses and construction activities would occur. Construction criteria pollutant emissions would be short term. Therefore, impacts resulting from the No-Action Alternative construction criteria pollutant emissions would be minor short-term adverse.

4.13.2.2 Operational Criteria Pollutant Emissions Inventory

Under the No-Action Alternative, existing rail yards would facilitate the transfer of the additional containers by rail. CSX and NS would do so by increasing the length of existing trains to accommodate more containers per train. Additional trains and locomotive engines would not be used under the No-Action Alternative. Therefore, for the No-Action Alternative there would be no increase in criteria pollutant emissions due to locomotive activity. The Corps assumes that the existing facility workers would be sufficient for the increase in container throughput; therefore, there is no increase in criteria pollutant emissions due to worker commute for the No-Action Alternative. Further, under the No-Action Alternative, the Proposed Project and River Center project sites would not be constructed and operated, including the private drayage road. Therefore, it is assumed that additional UTR trucks would not be operated under the No-Action Alternative, and OTR trucks would be used to transport all additional containers from existing terminals to the CSX and NS facilities. It is common for intermodal container transfer facilities to use off-road equipment, such as forklifts and cranes, in its operations; however, CSX and NS crane and forklift activity was unavailable. Although it is reasonable to assume that some activity would take place, criteria pollutant emissions from on-site off-road equipment was not quantified.

Therefore, criteria pollutant emissions due to operational activities of the No-Action Alternative would include running emissions from OTR truck trips and idling emissions from idling on-site at the Ashley Junction and 7-Mile rail yards. An idle time of 15 minutes was assumed per truckload. The operational criteria pollutant emissions inventory for the No-Action Alternative is in Table 4.13-4. Criteria pollutants emitted from the study area (Tri-County area) were taken from the 2011 EPA NEI and compared to the No-Action Alternative inventory in Table 4.13-5 (EPA 2015c).

Table 4.13-4
Annual Operational Criteria Pollutant Emissions Inventory, No-Action Alternative

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Off-Terminal Line Haul Locomotive	0	0	0	0	0	0
On-Terminal Line Haul Locomotive	0	0	0	0	0	0
Switch Locomotive	0	0	0	0	0	0
UTR Truck Running	0	0	0	0	0	0
UTR Truck Idling	0	0	0	0	0	0
OTR Truck Running	8.4	42.4	0.5	0.5	0.3	2.2
OTR Truck Idling	13.8	29.0	0.1	0.1	<0.1	4.2
Worker Commute	0	0	0	0	0	0
On-site Offroad Equipment	0	0	0	0	0	0
Total	**22.1**	**71.4**	**0.7**	**0.6**	**0.3**	**6.4**

Source: EPA 2014f.

Table 4.13-5
Comparison of Study Area Criteria Pollutant Emissions
Inventory to No-Action Alternative Emissions

Criteria Pollutant	Tri-County Area Emissions Inventory (ton)	No-Action Emissions Compared to Total Inventory (percentage)
CO	230,292.8	0.010%
NO_x	36,526.0	0.195%
PM_{10}	26,159.7	0.003%
$PM_{2.5}$	11,299.7	0.005%
SO_2	26,442.8	0.001%
VOC	122,145.5	0.005%

Notes: Percentages developed using No-Action Alternative emissions shown in Table 4.13-7.

Source: EPA 2015c, 2015m.

Criteria pollutant emissions from the No-Action Alternative would equal less than 1 percent of the total criteria pollutants emitted in the study area. Impacts of Criteria Pollutants from the Operational Inventory of the No-Action Alternative would be minor permanent adverse.

4.13.2.3 Criteria Pollutant Dispersion Modeling

As discussed in section 4.13.1.3, OTR truck activity and worker commute on public roadways could not be isolated and so all passenger car and truck traffic were included in the dispersion modeling for the Proposed Project and alternatives. After applying the screening process to the roadway links in the No-Action Alternative, 34 roadway sources were included in the dispersion modeling. All other pollutant sources (locomotive, UTR, and OTR idling activities) were not included in the dispersion modeling for the No-Action Alternative. As such, the air dispersion model outputs for the No-Action Alternative represent the concentrations, ppm, and ppb of criteria pollutants from selected roadway sources in the study area for 2038. These outputs were added to the SCDHEC background concentrations and the HLT estimated pollutant levels, which were added because they are not reflected in the monitoring for the study area, as the HLT had not yet been operating. No-Action Alternative dispersion modeling outputs, background concentrations, estimated HLT emissions, and NAAQS compliance demonstration are included the Table 4.13-6.

As shown in Table 4.13-6, criteria pollutants emitted from the No-Action Alternative, along with the background concentrations and projected criteria pollutant levels, would not exceed the applicable NAAQS; therefore, the No-Action Alternative would not put the Tri-County area into non-attainment for any NAAQS. Impacts to air quality from the No-Action Alternative on criteria pollutants would be minor permanent adverse.

Table 4.13-6
Criteria Pollutant Dispersion Modeling, No-Action Alternative

Pollutant		Average Time	AERMOD Output	Background Concentrations[(1)]	HLT	Total Impact	NAAQS	NAAQS exceeded ?
Carbon Monoxide		8-hour	0.046 ppm	0.80 ppm	0.14 ppm	0.986 ppm	9 ppm	No
		1-hour	0.073 ppm	1.27 ppm	0.504 ppm	1.847 ppm	35 ppm	No
Nitrogen Dioxide		1-hour	9.324 ppb	38.35 ppb	Not Modeled	47.674 ppb	100 ppb	No
		Annual	1.352 ppb	6.60 ppb	1.59 ppb	9.542 ppb	53 ppb	No
Particle Pollution	***$PM_{2.5}$***	Annual	0.066 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.672 μg/m^3	12 μg/m^3	No
		Annual	0.066 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.672 μg/m^3	15 μg/m^3	No
		24-hour	0.129 μg/m^3	16 μg/m^3	0.37 μg/m^3	16.499 μg/m^3	35 μg/m^3	No
	PM_{10}	24-hour	0.197 μg/m^3	49 μg/m^3	6.00 μg/m^3	55.197 μg/m^3	150 μg/m^3	No
Sulfur Dioxide		1-hour	0.128 ppb	16.0 ppb	Not Modeled	16.128 ppb	75 ppb	No
		3-hour	<0.001 ppm	0.014 ppm	0.057 ppm	0.071 ppm	0.5 ppm	No

Notes and Acronyms:

μg/m^3 = micrograms per cubic meter

NAAQS = National Ambient Air Quality Standard

ppm =parts per million

ppb = parts per billion

The maximum AERMOD impact output over a receptor is shown.

AERMOD outputs are in μg/m^3. Criteria pollutants in ppm and ppb were converted from μg/m^3 to their appropriate unit. The NAAQS for PM2.5 has primary and secondary standards for the annual averaging time; 12 μg/m^3 is the primary standard and 15 μg/m^3 is the secondary standard.

HLT impacts are shown for the year 2025, which is its full build-out year. These impacts are added because they are not reflected in the 2013 ambient air monitoring for the study area, as the SCPA Marine Container Terminal had not yet been operating.

(1) Background concentration values used are the most recent design values from the most representative or conservative site as posted on the SCDHEC website that are developed specifically for dispersion modeling (http://www.scdhec.gov/Environment/AirQuality/ComplianceandReporting/AirDispersionModeling/ModelingData/). Background concentration values are in μg/m^3. Criteria pollutants in ppm and ppb were converted from μg/m^3 to their appropriate unit.

Sources: SCDHEC 2015d, Lakes 2015, EPA 2015o.

4.13.2.4 Hazardous Air Pollutants (HAPs)

HAPs emitted from the No-Action Alternative the study area (Tri-County area) were taken from the 2011 EPA NEI HAPS and are compared in Table 4.13-7.

Table 4.13-7
Comparison of Study Area HAP Emissions to No-Action Alternative HAP Emissions

Priority MSAT	No-Action Alternative HAP Emissions (ton)	Tri-County Area HAP Emissions (ton)	Compared Percentage of HAPS from No-Action
Benzene	0.083	566.7	0.015%
1,3-Butadiene	0.005	125.4	0.004%
Formaldehyde	1.394	2,192.6	0.064%
Naphthalene	0.104	1,991.0	0.005%
Polycyclic organic matter	0.008	158.8	0.005%

Notes and Acronyms:

Acrolein is a non-DPM HAP, however it was not quantified or included due to its level of uncertainty.

The EPA NEI 2011 did not include emissions of naphthalene and Polycyclic organic matter. These emissions were calculated from the VOC emissions reported in the EPA NEI 2011 and the MSAT ratios listed in Table 4.13-1.

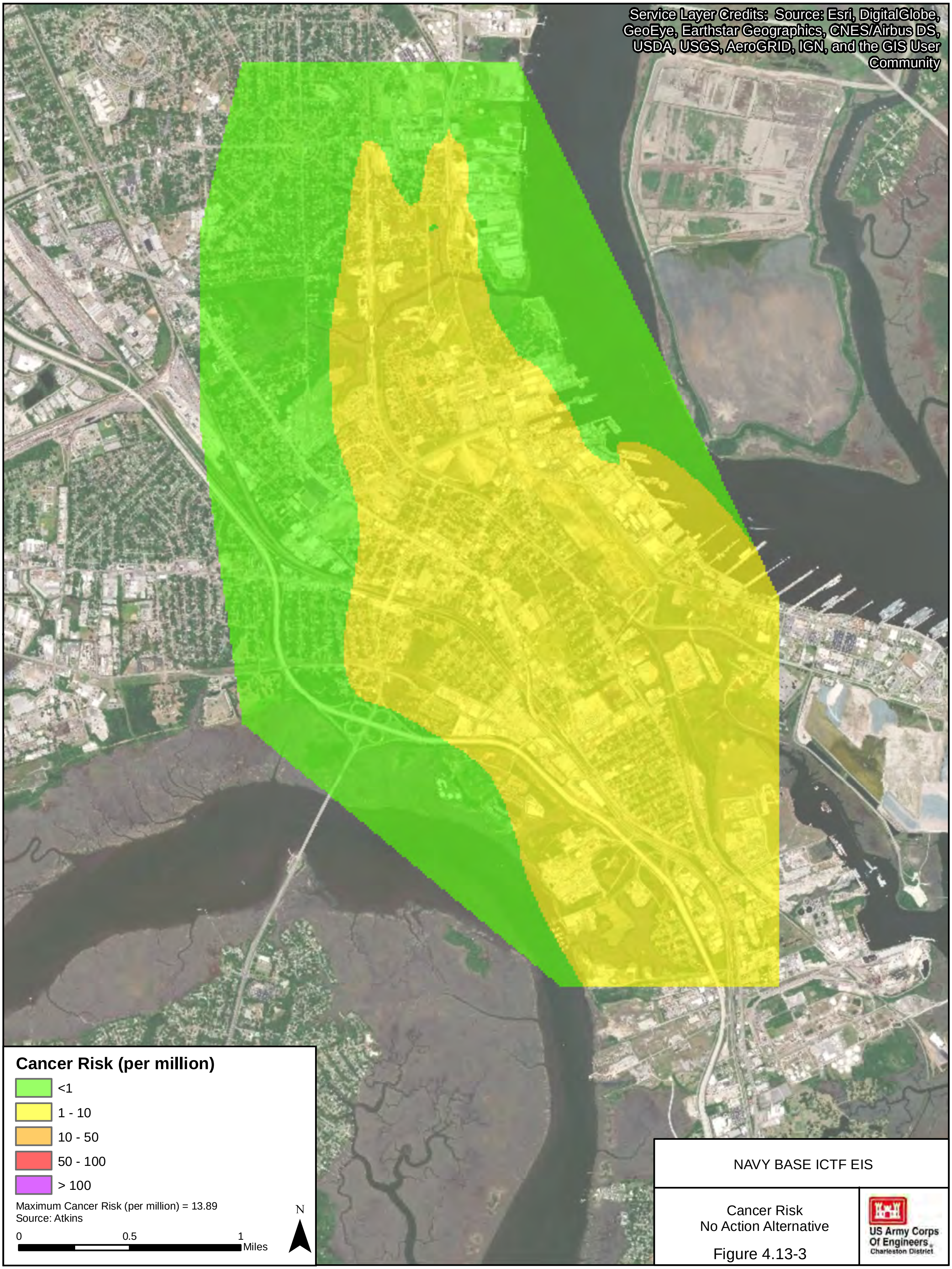
Source: EPA 2015a, 2015c, 2015m.

Non-DPM HAP emissions from the No-Action Alternative would each equal less than one-tenth of 1 percent of the total HAPs emitted in the study area. Impacts of non-DPM HAPs from the Operational Inventory of the No-Action Alternative would be acceptable.

4.13.2.5 Health Risk Assessment

The same model inputs and assumptions were used for the DPM dispersion modeling as for the criteria pollutant dispersion modeling, with the exception of gasoline passenger cars being excluded from the DPM modeling, represented as the Worker Commute Source Group. The No-Action Alternative therefore represents the projected 2038 traffic volumes, and rail operation in the study area for selected roadways. Under the No-Action Alternative, existing rail yards would facilitate the transfer of the additional containers by rail. As such, there would not be additional rail, UTR truck, OTR truck idling, or on-site offroad equipment activity at the Proposed Project and River Center project sites. There would be an increase in traffic volumes on public roadways, represented by the OTR Truck Running and Worker Commute Source Groups.

The AERMOD model output is in concentration of DPM ($\mu g/m^3$), which is then converted to cancer risk per million people and noncancer hazard. An emission density map of the cancer risk of the No-Action Alternative is in Figure 4.13-3. This figure is presented to demonstrate the dispersion of DPM



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Cancer Risk
No Action Alternative

Figure 4.13-3

and corresponding health risk over the potentially exposed population. All dispersion modeling assumptions, data, and HRA calculations are included in Appendix I.

The maximum potential cancer risk is the highest estimated cancer risk at a residence for the No-Action Alternative and is analyzed to demonstrate the worst-case scenario. Contribution by source group is shown in Table 4.13-8. As shown in Table 4.13-8, OTR Truck Running is the only source group contributing to the No-Action Alternative cancer risk. The table also shows the maximum noncancer hazard.

Table 4.13-8
Cancer Risk and Noncancer Hazard by Source Group, No-Action Alternative

Source Group	DPM Concentration ($\mu g/m^3$)	Cancer Risk (per million)	Noncancer Hazard	Source Group Contribution
Line Haul Rail	0.00000	0.00	0.000	0.00%
Switch Rail	0.00000	0.00	0.000	0.00%
UTR Truck Running	0.00000	0.00	0.000	0.00%
UTR Truck Idling	0.00000	0.00	0.000	0.00%
OTR Truck Running	0.03185	9.55	0.006	100.00%
OTR Truck Idling	0.00000	0.00	0.000	0.00%
Worker Commute	0.00000	0.00	0.000	0.00%
On-site Offroad Equipment	0.00000	0.00	0.000	0.00%
Total	**0.03185**	**9.55**	**0.006**	**100.00%**

Notes and Acronyms:

DPM = Diesel Particulate Matter

UTR = Utility Tractor Rigs

OTR = Over the Road

The Line Haul Rail Source Group includes emissions from both Off-Terminal Line Haul and On-Terminal Line Haul Rail.

UTR Truck Running is from the drayage road.

OTR Truck Running includes all trucks on public roadways.

Worker Commute was not included in DPM dispersion modeling because gasoline passenger cars were the assumed vehicle, which are not DPM sources.

Source: Lakes 2015, EPA 2004, 2015d.

The maximum potential cancer risk from the No-Action Alternative would occur near the intersection of U.S. Highway 78 (King Street Ext) and Discher because of the proximity of the I-26, U.S. Highway 78, and Meeting Street, which were all included in the dispersion model. The maximum potential cancer risk from the No-Action Alternative falls between 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). When discussing risks it is important to provide the size of risks in context.

The cancer risk is the likelihood, or chance, of getting cancer. The term "excess cancer risk" is used because people also have a "background risk" of about 4 in 10 chances of being diagnosed with cancer in their lifetimes (NCI 2015). In other words, in a million people, it is expected that 400,000 individuals would get cancer from a variety of causes. If there is a "one in a million" excess cancer risk from a given exposure to a contaminant, it means that if one million people are exposed to a carcinogen at a certain concentration over their lifetime, then one cancer above the background chance, or the 400,000th cancer, may appear in those million persons from that particular exposure. To further put risk in perspective, Figure 4.13-4 shows a variety of risks on a scale from 1 chance in 10 (100,000 per million), 1 chance in 10,000 (100 per million), to 1 chance per million (1 per million) (EPA 1991). A risk of 9.55 per million is close to the equivalent of 1 chance per 100,000 in Figure 4.13-4.

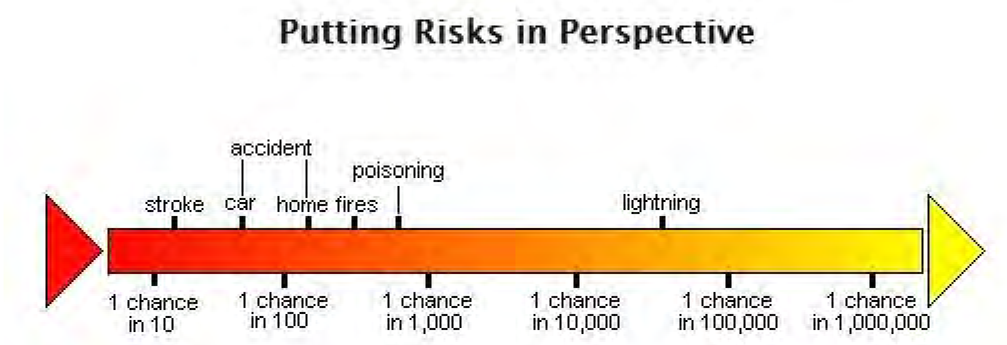


Figure 4.13-4: Putting Risks in Perspective (EPA 1991)

The maximum potential cancer risk from the No-Action Alternative falls between 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). Impacts from the potential maximum cancer risk from the No-Action Alternative would be acceptable. The maximum noncancer hazard for the No-Action Alternative would be below 1. Impacts from the No-Action Alternative from noncancer hazard would be negligible.

4.13.3 Alternative 1: Proposed Project (South via Milford / North via Hospital District)

4.13.3.1 Construction Criteria Pollutant Emissions Inventory

Under Alternative 1 (Proposed Project), criteria pollutant emissions from construction activities including operation of construction equipment, haul truck trips for the import and export of material, and commutes by construction workers and vendors would occur. Total criteria pollutant emissions from construction are shown below in Table 4.13-9.

Table 4.13-9
Total Construction Criteria Pollutant Emissions Inventory, Alternative 1 (Proposed Project)

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Construction Equipment Exhaust	149.5	345.1	22.0	21.4	0.5	36.2
Haul Truck Exhaust	10,305.1	26,701.9	1,158.9	1,124.2	31.7	2,445.3
Worker and Vendor Commute	12.0	1.8	<0.1	<0.1	<0.1	0.3
Architectural Coating	**0**	0	0	0	0	0.1
Asphalt Paving	**0**	0	0	0	0	0.2
Demolition	**0**	0	27.3	4.1	0	0
Surface Disturbance	**0**	**0**	**2.5**	**3.1**	**0**	**0**
Material Movement	**0**	0	30.0	4.5	0	0
On-Road Fugitive Dust	**0**	0	0.4	0.1	0	0
Total	**10,466.6**	**27,048.8**	**1,241.1**	**1,157.4**	**32.2**	**2,482.1**

Note: Construction activity is scheduled to occur over 5 years.

Sources: EPA 2010, 2015d, FHWA 2011b, CAPCOA 2013.

Alternative 1 (Proposed Project) construction criteria pollutant emissions would be short term and spread out over five years. Alternative 1 (Proposed Project) construction criteria pollutant emissions would result in a minor short-term adverse effect.

4.13.3.2 Operational Criteria Pollutant Emissions Inventory

Under Alternative 1 (Proposed Project), criteria pollutant emissions from operational activities including operation of locomotives, UTR trucks, OTR trucks, and commutes by workers would occur. Total criteria pollutant emissions from operation are shown below in Table 4.13-10. Criteria pollutants emitted from the study area (Tri-County area) were taken from the 2011 EPA NEI are compared with Alternative 1 (Proposed Project) criteria pollutant emissions inventory in Table 4.13-11.

Table 4.13-10
Total Annual Operational Criteria Pollutant Emissions Inventory, Alternative 1 (Proposed Project)

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Off-Terminal Line Haul Locomotive	8.1	9.4	0.2	0.1	<0.1	0.4
On-Terminal Line Haul Locomotive	9.2	10.7	0.2	0.2	<0.1	0.4
Switch Locomotive	5.4	3.0	<0.1	<0.1	<0.1	0.2
UTR Truck Running	0.4	1.0	<0.1	<0.1	<0.1	0.4
UTR Truck Idling	0.3	0.8	<0.1	<0.1	<0.1	0.3
OTR Truck Running	3.1	15.5	0.2	0.2	0.1	0.8
OTR Truck Idling	4.8	10.2	<0.1	<0.1	<0.1	1.5
Worker Commute	2.6	0.1	<0.1	<0.1	<0.1	0.5
On-site Offroad Equipment	0	0	0	0	0	0
Total	**34.0**	**50.7**	**0.7**	**0.6**	**0.2**	**4.6**

Sources: EPA 2010, 2009a, 1998, 2009b, 2015d, SCPA 2013, CAPCOA 2013.

Table 4.13-11
Comparison of Study Area Criteria Pollutant Emissions Inventory
to Alternative 1 (Proposed Project) Emissions

Criteria Pollutant	Tri-County Area Emissions Inventory (ton)	Proposed Project Alternative compared to Total Inventory (percentage)
CO	230,292.8	0.015%
NO_x	36,526.0	0.139%
PM_{10}	26,159.7	0.003%
$PM_{2.5}$	11,299.7	0.005%
SO_2	26,442.8	0.001%
VOC	122,145.5	0.004%

Source: EPA 2015a, 2015c, 2015m.

Criteria pollutant emissions from Alternative 1 (Proposed Project) would each equal less than 1 percent of the total criteria pollutants emitted in the study area, and as such, criteria pollutants from the operation of Alternative 1 (Proposed Project) would result in a minor permanent adverse impact. It should be noted that, with the exception of CO, the No-Action Alternative would emit approximately the same or more criteria pollutants annually than Alternative 1 (Proposed Project). This condition is due to the efficient operations and transport of goods under Alternative 1 (Proposed Project), including the use of Tier 4 switch locomotive engines and Tier 4 UTR trucks at full build-out (2038). Alternative 1 (Proposed Project) would also include a semi-automated facility that would reduce UTR and OTR truck idle times compared to the No-Action Alternative. All minimization measures applicable to Air Quality are listed in Section 4.13.12.

4.13.3.3 Criteria Pollutant Dispersion Modeling

Under Alternative 1 (Proposed Project), operations would be as described in Section 1.7.2. As such, criteria pollutant emissions from operational activities including operation of locomotives, UTR trucks, OTR trucks, and commutes by workers would occur. After applying the screening process to the roadway links in the alternative, 35 roadway sources were included in the dispersion modeling. All other pollutant sources (locomotive, UTR, and OTR idling activities) were also included in the dispersion modeling for the alternative. As such, the air dispersion model outputs for the alternative represent the concentrations, ppm, and ppb of criteria pollutants from selected roadway sources along with locomotive, UTR running and idling, and OTR idling activities associated with Alterative 1 (Proposed Project) in the study area for 2038. These outputs were added to the SCDHEC background concentrations and the HLT estimated pollutant levels, which were added because they are not reflected in the monitoring for the study area, as the HLT had not yet been operating. Project dispersion modeling outputs, background concentrations, the HLT estimated pollutant levels, and NAAQS compliance demonstration are included the Table 4.13-12. All dispersion modeling assumptions, calculations, and model output are included in Appendix I.

As shown in Table 4.13-12, criteria pollutants emitted from the operation of Alternative 1 (Proposed Project), along with the background concentrations and projected criteria pollutant levels, would not exceed the applicable NAAQS; therefore, Aternative 1 (Proposed Project) would not put the Tri-County area into non-attainment for any NAAQS. Impacts to air quality from the operation of Alternative 1 (Proposed Project) on criteria pollutants would be minor permanent adverse.

Table 4.13-12
Criteria Pollutant Dispersion Modeling, Alternative 1 (Proposed Project)

Pollutant		Average Time	AERMOD Output	Background Concentrations[(1)]	HLT	Total Impact	NAAQS	NAAQS exceeded?
Carbon Monoxide		8-hour	0.054 ppm	0.80 ppm	0.14 ppm	0.594 ppm	9 ppm	No
		1-hour	0.081 ppm	1.27 ppm	0.504 ppm	1.855 ppm	35 ppm	No
Nitrogen Dioxide		1-hour	56.552 ppb	38.35 ppb	Not Modeled	94.902 ppb	100 ppb	No
		Annual	5.805 ppb	6.60 ppb	1.59 ppb	13.995 ppb	53 ppb	No
Particle Pollution	***$PM_{2.5}$***	Annual	0.103 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.709 μg/m^3	12 μg/m^3	No
		Annual	0.103 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.709 μg/m^3	15 μg/m^3	No
		24-hour	0.252 μg/m^3	16 μg/m^3	0.37 μg/m^3	16.622 μg/m^3	35 μg/m^3	No
	PM_{10}	24-hour	0.364 μg/m^3	49 μg/m^3	6.00 μg/m^3	55.364 μg/m^3	150 μg/m^3	No
Sulfur Dioxide		1-hour	0.167 ppb	16.0 ppb	Not Modeled	16.167 ppb	75 ppb	No
		3-hour	<0.001 ppm	0.014 ppm	0.057 ppm	0.071 ppm	0.5 ppm	No

Notes and Acronyms:
See Table 4.13-6.
Sources: SCDHEC 2015c, Lakes 2015, EPA 2015o.

4.13.3.4 Hazardous Air Pollutants (HAPs)

Under Alternative 1 (Proposed Project), the Palmetto Railways Project would be operated as proposed. Operational non-DPM HAP emissions are shown in Table 4.13-13 and are compared with non-DPM HAPs emitted from the study area.

Table 4.13-13
Comparison of Study Area HAP Emissions to Alternative 1 (Proposed Project) HAP Emissions

Priority MSAT	Proposed Project Annual Operational HAP Emissions (ton)	Tri-County Area HAP Emissions (ton)	Compared Percentage of HAPS from Alternative 5
Benzene	0.059	566.7	0.010%
1,3-Butadiene	0.004	125.4	0.003%
Formaldehyde	0.990	2,192.6	0.045%
Naphthalene	0.074	1,991.0	0.004%
Polycyclic organic matter	0.006	158.8	0.004%

Source: EPA 2015a, 2015c, 2015m.

Non-DPM HAP emissions from Alternative 1 (Proposed Project) would each contribute to less than one-tenth of 1 percent of the total non-DPM HAPs emitted in the study area. Impacts of non-DPM HAPs from the Operational Inventory of Alternative 1 (Proposed Project) would be acceptable.

4.13.3.5 Health Risk Assessment

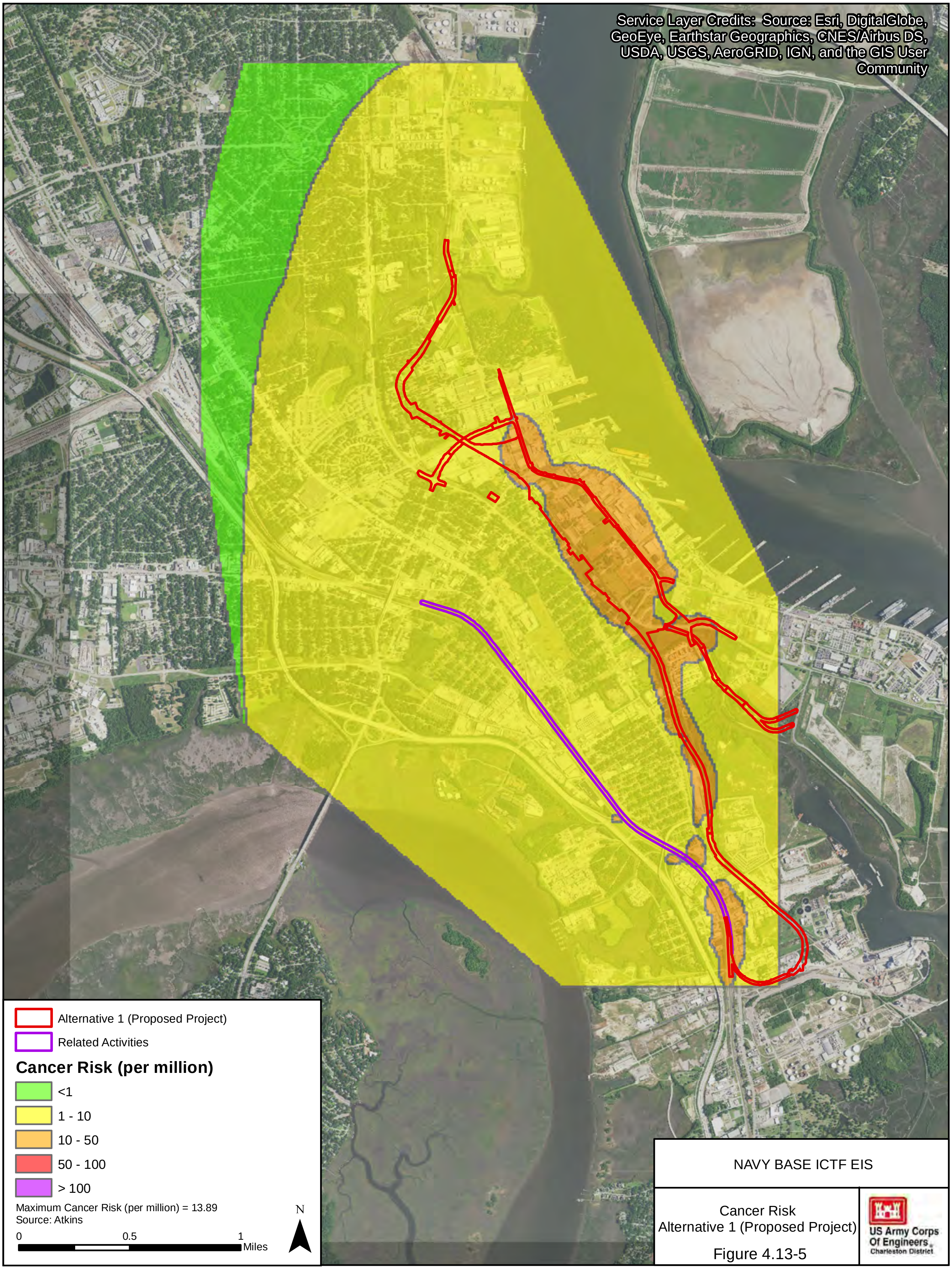
Alternative 1 (Proposed Project) includes emissions from line haul and switch rail, UTR trucks running on the private drayage road, UTR and OTR trucks idling on-site, OTR truck running on public roadways. An emission density map of the cancer risk of Alternative 1 (Proposed Project) is in Figure 4.13-5. This figure demonstrates the dispersion of DPM and corresponding health risk over the potentially exposed population. All dispersion modeling assumptions, data, and HRA calculations are included in Appendix I.

The maximum potential cancer risk is the highest estimated cancer risk at a residence for Alternative 1 (Proposed Project) and is analyzed to demonstrate the worst-case scenario. Contribution by source group is shown in Table 4.13-14. As shown in Table 4.13-14, line haul rail is the single largest source, contributing 37.73 percent of the highest estimated cancer risk. Emissions from OTR truck idling are the second largest contributor, at 30.78 percent. The table also shows the maximum noncancer hazard.

Table 4.13-14
Cancer Risk and Noncancer Hazard by Source Group, Alternative 1 (Proposed Project)

Source Group	DPM Concentration (μg/m^3)	Cancer Risk (per million)	Noncancer Hazard	Source Group Contribution
Line Haul Rail	0.01747	5.24	0.003	37.73%
Switch Rail	0.00107	0.33	0.0002	2.31%
UTR Truck Running	0.00041	0.12	0.00008	0.89%
UTR Truck Idling	0.00536	1.61	0.001	11.58%
OTR Truck Running	0.00774	2.32	0.002	16.72%
OTR Truck Idling	0.01425	4.28	0.003	30.78%
Worker Commute	0.00000	0.00	0.000	0.00%
On-site Offroad Equipment	0.00000	0.00	0.000	0.00%
Total	**0.04630**	**13.89**	**0.009**	**100.00%**

Notes and Acronyms:
See Table 4.13-8.
Source: Lakes 2015, EPA 2015o 2004.



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Cancer Risk
Alternative 1 (Proposed Project)

Figure 4.13-5

The maximum potential cancer risk from Alternative 1 (Proposed Project), would occur directly adjacent to the Proposed Project site due to on-site rail and truck activity. The cancer risk falls between the 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). When discussing risk it is important to provide the size of risks in context.

The cancer risk is the likelihood, or chance, of getting cancer. The term "excess cancer risk" is used because people also have a "background risk" of about 4 in 10 chances of being diagnosed with cancer in their lifetimes (NCI 2015). In other words, in a million people, it is expected that 400,000 individuals would get cancer from a variety of causes. If there is a "one in a million" excess cancer risk from a given exposure to a contaminant, it means that if one million people are exposed to a carcinogen at a certain concentration over their lifetime, then one cancer above the background chance, or the 400,000th cancer, may appear in those million persons from that particular exposure. To further put risk in perspective, Figure 4.13-4 shows a variety of risks on a scale from 1 chance in 10 (100,000 per million), 1 chance in 10,000 (100 per million), to 1 chance per million (1 per million) (EPA 1991). A risk of 13.89 per million is near the equivalent of 1 chance per 100,000 in Figure 4.13-4.

The maximum potential cancer risk from Alternative 1 (Proposed Project) falls between 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). Impacts from the potential maximum cancer risk from Alternative 1 (Proposed Project) would be acceptable. The maximum noncancer hazard for Alternative 1 (Proposed Project) would be below 1 and impacts from Alternative 1 (Proposed Project) from noncancer hazard would be negligible.

4.13.4 Alternative 2: Proposed Project Site (South via Milford / North via S-line)

4.13.4.1 Construction Criteria Pollutant Emissions Inventory

Under Alternative 2, the Palmetto Railways Project would be constructed as a variation of Alternative 1 (Proposed Project). Alternative 2 differs from Alternative 1 (Proposed Project) where the northern rail connection for NS would be located, and road and rail improvements would be adjusted accordingly to facilitate rail and road traffic as a result of the NS northern rail connection alignment. As such, construction of the rail alignments differs slightly from Alternative 1 (Proposed Project), and so construction equipment exhaust criteria pollutant emissions are different to reflect the change in length of the NS northern rail connection. Haul truck activities, worker and vendor commute, architectural coating, asphalt paving, material movement, and demolition were assumed to be the same as Alternative 1 (Proposed Project). Total criteria pollutant emissions from construction of Alternative 2 are shown below in Table 4.13-15.

Table 4.13-15
Total Construction Criteria Pollutant Emissions Inventory, Alternative 2

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Construction Equipment Exhaust	151.7	345.1	22.4	21.7	0.6	36.7
Haul Truck Exhaust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Worker and Vendor Commute	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Architectural Coating	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Asphalt Paving	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Demolition	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Surface Disturbance	**0**	**0**	**2.5**	**3.1**	**0**	**0**
Material Movement	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
On-Road Fugitive Dust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Total	**10,468.8**	**27,048.8**	**1,241.5**	**1,157.7**	**32.3**	**2,482.6**

Note: Construction activity is scheduled to occur over 5 years.

Sources: EPA 2010, 2015d, FHWA 2011b, CAPCOA 2013.

Impacts to Air Quality by Alternative 2 construction criteria pollutant emissions would be similar to Alternative 1 (Proposed Project).

4.13.4.2 Operational Criteria Pollutant Emissions Inventory

Under Alternative 2, the Palmetto Railways Project would be operated as proposed. As such, criteria pollutant emissions from operational activities would be the same as Alternative 1 (Proposed Project) and impacts would be the same as Alternative 1 (Proposed Project).

4.13.4.3 Criteria Pollutant Dispersion Modeling

Under Alternative 2, the Palmetto Railways Project would be operated as proposed. As such, criteria pollutant emissions from the operational activities would be the same as Alternative 1 (Proposed Project), with the exception of where the pollutants would be emitted due to the different rail track segments. Alternative 2 dispersion modeling outputs, SCDHEC background concentrations, HLT estimated pollutant levels, and NAAQS compliance demonstration are included the Table 4.13-21. All dispersion modeling assumptions, calculations, and model output are included in Appendix I.

As shown in Table 4.13-16, criteria pollutants emitted from the operation of Alternative 2, along with the background concentrations and projected criteria pollutants, would not exceed the applicable NAAQS; therefore, Alternative 2 would not put the Tri-County area into non-attainment for any criteria pollutants. Impacts to air quality from the operation of Alternative 2 on criteria pollutants would be minor permanent adverse.

4.13.4.4 Hazardous Air Pollutants (HAPs)

Under Alternative 2, the Palmetto Railways Project would be operated as proposed. As such, HAPs emissions from operational activities would be the same as Alternative 1 (Proposed Project) and impacts would be the same as Alternative 1 (Proposed Project).

Table 4.13-16
Criteria Pollutant Dispersion Modeling, Alternative 2

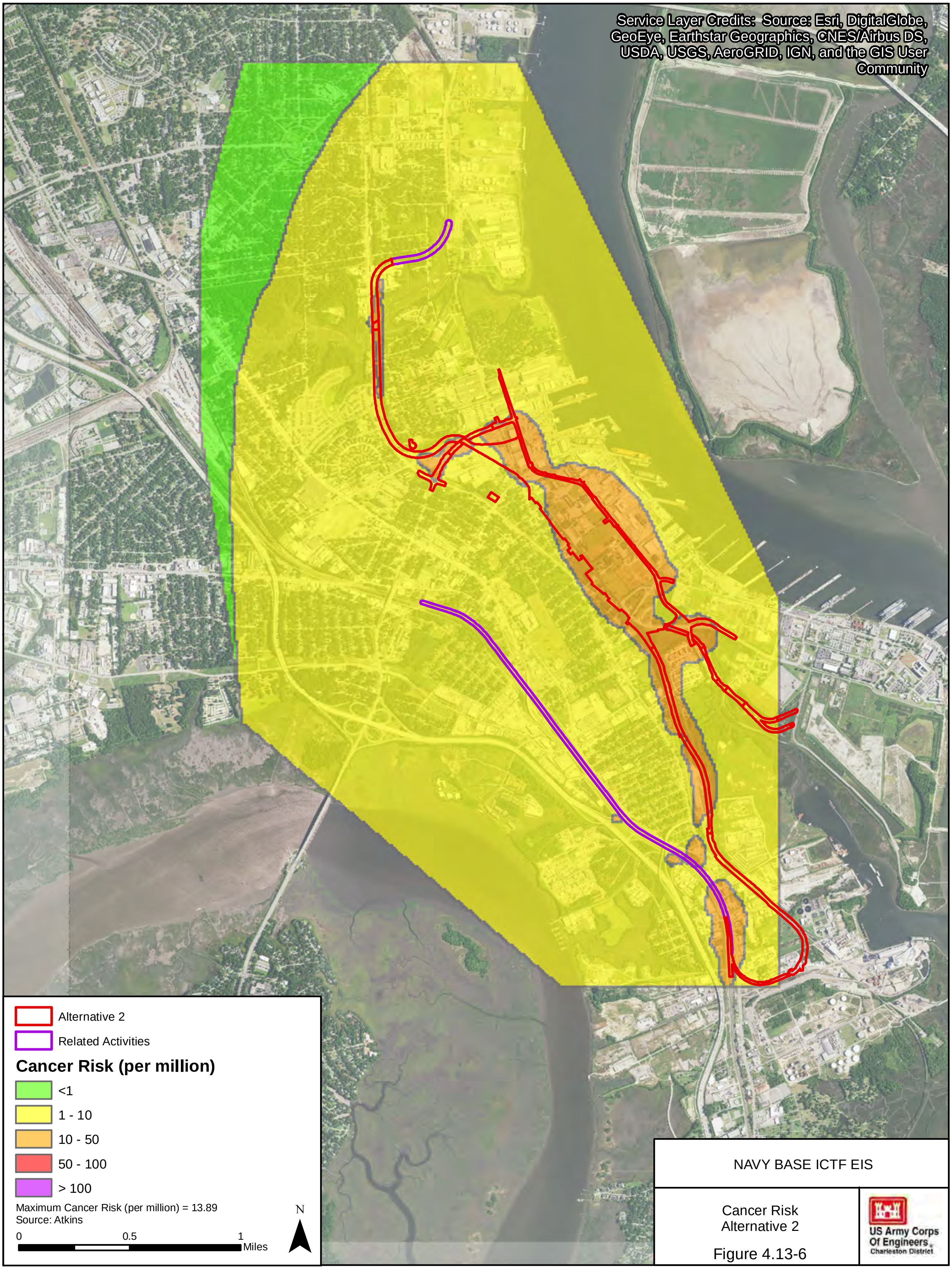
Pollutant		Average Time	AERMOD Output	Background Concentrations(1)	HLT	Total Impact	NAAQS	NAAQS Exceeded?
Carbon Monoxide		8-hour	0.054 ppm	0.80 ppm	0.14 ppm	0.994 ppm	9 ppm	No
		1-hour	0.081 ppm	1.27 ppm	0.504 ppm	1.855 ppm	35 ppm	No
Nitrogen Dioxide		1-hour	56.543 ppb	38.35 ppb	Not Modeled	94.893 ppb	100 ppb	No
		Annual	5.807 ppb	6.60 ppb	1.59 ppb	13.997 ppb	53 ppb	No
Particle Pollution	***$PM_{2.5}$***	Annual	0.103 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.709 μg/m^3	12 μg/m^3	No
		Annual	0.103 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.709 μg/m^3	15 μg/m^3	No
		24-hour	0.252 μg/m^3	16 μg/m^3	0.37 μg/m^3	16.622 μg/m^3	35 μg/m^3	No
	PM_{10}	24-hour	0.362 μg/m^3	49 μg/m^3	6.00 μg/m^3	55.362 μg/m^3	150 μg/m^3	No
Sulfur Dioxide		1-hour	0.167 ppb	16.0 ppb	Not Modeled	16.167 ppb	75 ppb	No
		3-hour	<0.001 ppm	0.014 ppm	0.057 ppm	0.071 ppm	0.5 ppm	No

Notes and Acronyms:
See Table 4.13-6.
Sources: SCDHEC 2015c, Lakes 2015, EPA 2015o.

4.13.4.5 Health Risk Assessment

An emission density map of the excess cancer risk of Alternative 2 is in Figure 4.13-6. This figure demonstrates the dispersion of DPM and corresponding health risk over the potentially exposed population. All dispersion modeling assumptions, inputs and outputs, and HRA calculations are included in Appendix I.

The maximum potential cancer risk is the highest estimated cancer risk at a residence for Alternative 2 and is analyzed to demonstrate the worst-case scenario. Contribution by source group is shown in Table 4.13-17. As shown in Table 4.13-17, line haul rail is the single largest source, contributing 37.48 percent of the highest estimated cancer risk. Emissions from OTR truck idling are the second largest contributor, at 30.76 percent. The table also shows the maximum noncancer hazard.



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Cancer Risk
Alternative 2

Figure 4.13-6

Table 4.13-17
Cancer Risk and Noncancer Hazard by Source Group, Alternative 2

Source Group	DPM Concentration (µg/m^3)	Cancer Risk (per million)	Noncancer Hazard	Source Group Contribution
Line Haul Rail	0.01736	5.21	0.003	37.48%
Switch Rail	0.00107	0.32	0.0002	2.31%
UTR Truck Running	0.00041	0.12	0.00008	0.89%
UTR Truck Idling	0.00536	1.61	0.001	11.57%
OTR Truck Running	0.00787	2.36	0.002	16.99%
OTR Truck Idling	0.01425	4.28	0.003	30.76%
Worker Commute	0.00000	0.00	0.000	0.00%
On-site Offroad Equipment	0.00000	0.00	0.000	0.00%
Total	**0.04632**	**13.90**	**0.009**	**100.00%**

Notes and Acronyms:
See Table 4.13-8.
Source: Lakes 2015; EPA 2004, 2015o.

The maximum potential cancer risk from Alternative 2 falls between 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). Impacts from the potential maximum cancer risk from Alternative 2 would be acceptable. The maximum noncancer hazard for the Alternative 2 would be below 1. Impacts from Alternative 2 from noncancer hazard would be negligible.

4.13.5 Alternative 3: Proposed Project Site (South via Kingsworth / North via Hospital)

4.13.5.1 Construction Criteria Pollutant Emissions Inventory

Under Alternative 3, the Palmetto Railways Project would be constructed as a variation of Alternative 1 (Proposed Project). Alternative 3 differs from Alternative 1 (Proposed Project) where the southern rail connection would be located, and road and rail improvements would be adjusted accordingly to facilitate rail and road traffic as a result of the southern rail connection alignments. As such, construction of the rail alignments differs slightly from Alternative 1 (Proposed Project), and so construction equipment exhaust criteria pollutant emissions are different to reflect the change in length of the southern rail connection. Haul truck activities, worker and vendor commute, architectural coating, asphalt paving, material movement, and demolition were assumed to be the same as Alternative 1 (Proposed Project). Total criteria pollutant emissions from construction of Alternative 3 are shown below in Table 4.13-18.

Table 4.13-18
Total Construction Criteria Pollutant Emissions Inventory, Alternative 3

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Construction Equipment Exhaust	143.3	330.7	21.1	20.5	0.5	34.7
Haul Truck Exhaust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Worker and Vendor Commute	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Architectural Coating	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Asphalt Paving	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Demolition	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Surface Disturbance	**0**	**0**	**2.5**	**3.1**	**0**	**0**
Material Movement	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
On-Road Fugitive Dust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Total	**10,460.4**	**27,034.4**	**1,240.2**	**1,156.5**	**32.2**	**2,480.6**

Note: Construction activity is scheduled to occur over 5 years.

Sources: EPA 2010, 2015d; FHWA 2011b; CAPCOA 2013.

Impacts to Air Quality by Alternative 3 construction criteria pollutant emissions would be similar to Alternative 1 (Proposed Project).

4.13.5.2 Operational Criteria Pollutant Emissions Inventory

Under Alternative 3, the Palmetto Railways Project would be operated as proposed. As such, criteria pollutant emissions from operational activities would be the same as Alternative 1 (Proposed Project) and impacts would be the same as Alternative 1 (Proposed Project).

4.13.5.3 Criteria Pollutant Dispersion Modeling

Under Alternative 3, the Palmetto Railways Project would be operated as proposed. As such, criteria pollutant emissions from the operational activities would be the same as Alternative 1 (Proposed Project), with the exception of where the pollutants would be emitted due to the different rail track segments. Alternative 3 dispersion modeling outputs, SCDHEC background concentrations, HLT estimated pollutant levels, and NAAQS compliance demonstration are included the Table 4.13-19. All dispersion modeling assumptions, calculations, and model output are included in Appendix I.

Table 4.13-19
Criteria Pollutant Dispersion Modeling, Alternative 3

Pollutant		Average Time	AERMOD Output	Background Concentrations(1)	HLT	Total Impact	NAAQS	NAAQS exceeded?
Carbon Monoxide		8-hour	0.054 ppm	0.80 ppm	0.14 ppm	0.594 ppm	9 ppm	No
		1-hour	0.081 ppm	1.27 ppm	0.504 ppm	1.855 ppm	35 ppm	No
Nitrogen Dioxide		1-hour	56.840 ppb	38.35 ppb	Not Modeled	95.190 ppb	100 ppb	No
		Annual	5.807 ppb	6.60 ppb	1.59 ppb	13.997 ppb	53 ppb	No
Particle Pollution	***$PM_{2.5}$***	Annual	0.103 µg/m^3	7.6 µg/m^3	0.006 µg/m^3	7.709 µg/m^3	12 µg/m^3	No
		Annual	0.103 µg/m^3	7.6 µg/m^3	0.006 µg/m^3	7.709 µg/m^3	15 µg/m^3	No
		24-hour	0.252 µg/m^3	16 µg/m^3	0.37 µg/m^3	16.622 µg/m^3	35 µg/m^3	No
	PM_{10}	24-hour	0.362 µg/m^3	49 µg/m^3	6.00 µg/m^3	55.362 µg/m^3	150 µg/m^3	No
Sulfur Dioxide		1-hour	0.167 ppb	16.0 ppb	Not Modeled	16.167 ppb	75 ppb	No
		3-hour	<0.001 ppm	0.014 ppm	0.057 ppm	0.071 ppm	0.5 ppm	No

Notes and Acronyms:

See Table 4.13-6.

Sources: SCDHEC 2015c, Lakes 2015, EPA 2015o.

As shown in Table 4.13-19, criteria pollutants emitted from the operation of Alternative 3, along with the background concentrations and projected criteria pollutants, would not exceed the applicable NAAQS; therefore, Alternative 3 would not put the Tri-County area into non-attainment for any criteria pollutants. Impacts to air quality from the operation of Alternative 3 on criteria pollutants would be minor permanent adverse.

4.13.5.4 Hazardous Air Pollutants (HAPs)

Under Alternative 3, the Palmetto Railways Project would be operated as proposed. As such, HAPs emissions from operational activities would be the same as Alternative 1 (Proposed Project) and impacts would be the same as Alternative 1 (Proposed Project).

4.13.5.5 Health Risk Assessment

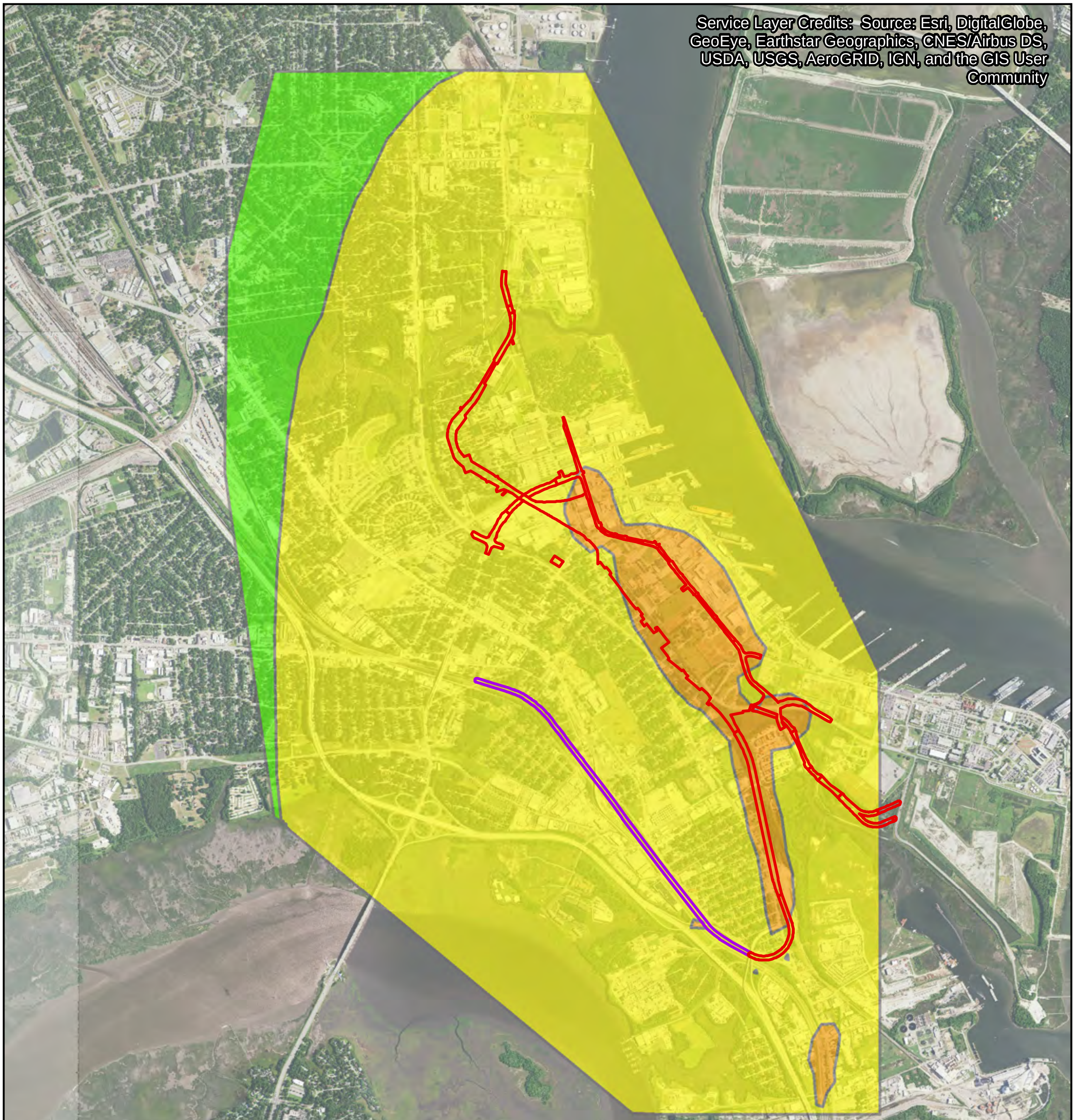
An emission density map of the cancer risk of Alternative 3 is in Figure 4.13-7. This figure demonstrates the dispersion of DPM and corresponding health risk over the potentially exposed population. All dispersion modeling assumptions, inputs and outputs, and HRA calculations are included in Appendix I.

The maximum potential cancer risk is the highest estimated cancer risk at a residence for Alternative 3 and is analyzed to demonstrate the worst-case scenario. Contribution by source group is shown in Table 4.13-20. As shown in Table 4.13-20, line haul rail is the single largest source, contributing 37.71 percent of the highest estimated cancer risk. Emissions from OTR truck idling are the second largest contributor, at 30.79 percent. The table also shows the maximum noncancer hazard.

Table 4.13-20
Cancer Risk and Noncancer Hazard by Source Group, Alternative 3

Source Group	DPM Concentration (μg/m^3)	Cancer Risk (per million)	Noncancer Hazard	Source Group Contribution
Line Haul Rail	0.01745	5.24	0.003	37.71%
Switch Rail	0.00107	0.32	0.0002	2.31%
UTR Truck Running	0.00041	0.12	0.00008	0.89%
UTR Truck Idling	0.00536	1.61	0.001	11.58%
OTR Truck Running	0.00774	2.32	0.002	16.72%
OTR Truck Idling	0.01425	4.28	0.003	30.79%
Worker Commute	0.00000	0.00	0.000	0.00%
On-site Offroad Equipment	0.00000	0.00	0.000	0.00%
Total	**0.04628**	**13.88**	**0.009**	**100.00%**

Notes and Acronyms:
See Table 4.13-8.
Source: Lakes 2015; EPA 2004, 2015o.



Alternative 3

Related Activities

Cancer Risk (per million)

<1

1 - 10

10 - 50

50 - 100

> 100

Maximum Cancer Risk (per million) = 13.89

Source: Atkins

0 0.5 1 Miles

N

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Cancer Risk
Alternative 3

Figure 4.13-7

US Army Corps Of Engineers Charleston District

The maximum potential cancer risk from Alternative 3 falls between 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). Impacts from the potential maximum cancer risk from Alternative 3 would be acceptable. The maximum noncancer hazard for the Alternative 3 would be below 1. Impacts from Alternative 3 from noncancer hazard would be negligible.

4.13.6 Alternative 4: Proposed Project Site (South via Milford)

4.13.6.1 Construction Criteria Pollutant Emissions Inventory

Under Alternative 4, the Palmetto Railways Project would be constructed as a variation of Alternative 1 (Proposed Project). Alternative 4 differs from Alternative 1 (Proposed Project) where trains would also enter and exit the Navy Base ICTF from a southern rail connection, and with proposed rail through the Hospital District that would stop short of Noisette Creek. As such, construction of the rail alignments differs from Alternative 1 (Proposed Project), and so construction equipment exhaust GHG emissions are different to reflect the change in length of the southern rail connection. Haul truck activities, worker and vendor commute, architectural coating, asphalt paving, material movement, and demolition were assumed to be the same as Alternative 1 (Proposed Project). Total criteria pollutant emissions from construction of Alternative 4 are shown below in Table 4.13-21.

Table 4.13-21
Total Construction Criteria Pollutant Emissions Inventory, Alternative 4

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Construction Equipment Exhaust	141.9	327.4	20.9	20.3	0.5	34.4
Haul Truck Exhaust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Worker and Vendor Commute	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Architectural Coating	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Asphalt Paving	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
	(Proposed Project)	(Proposed Project)	(Proposed Project)	(Proposed Project)	(Proposed Project)	(Proposed Project)
Demolition	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Surface Disturbance	**0**	**0**	**2.5**	**3.0**	**0**	**0**
Material Movement	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
On-Road Fugitive Dust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Total	**10,459.0**	**27,031.1**	**1,240.0**	**1,156.2**	**32.2**	**2,480.3**

Note: Construction activity is scheduled to occur over 5 years.

Sources: EPA 2010, 2015d, FHWA 2011b, CAPCOA 2013.

Impacts to Air Quality by Alternative 4 construction criteria pollutant emissions would be similar to Alternative 1 (Proposed Project).

4.13.6.2 Operational Criteria Pollutant Emissions Inventory

Under Alternative 4, the Palmetto Railways Project would be operated as proposed. As such, criteria pollutant emissions from operational activities would be the same as Alternative 1 (Proposed Project) and impacts would be the same as Alternative 1 (Proposed Project).

4.13.6.3 Criteria Pollutant Dispersion Modeling

Under Alternative 4, the Palmetto Railways Project would be operated as proposed. As such, criteria pollutant emissions from the operational activities would be the same as Alternative 1 (Proposed Project), with the exception of where the pollutants would be emitted due to the different rail track segments. Alternative 4 dispersion modeling outputs, SCDHEC background concentrations, HLT estimated pollutant levels, and NAAQS compliance demonstration are included the Table 4.13-22. All dispersion modeling assumptions, calculations, and model output are included in Appendix I.

Table 4.13-22
Criteria Pollutant Dispersion Modeling, Alternative 4

Pollutant		Average Time	AERMOD Output	Background Concentrations[1]	HLT	Total Impact	NAAQS	NAAQS Exceeded?
Carbon Monoxide		8-hour	0.056 ppm	0.80 ppm	0.14 ppm	0.996 ppm	9 ppm	No
		1-hour	0.078 ppm	1.27 ppm	0.504 ppm	1.852 ppm	35 ppm	No
Nitrogen Dioxide		1-hour	60.134 ppb	38.35 ppb	Not Modeled	98.484 ppb	100 ppb	No
		Annual	5.822 ppb	6.60 ppb	1.59 ppb	14.012 ppb	53 ppb	No
Particle Pollution	***$PM_{2.5}$***	Annual	0.103 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.709 μg/m^3	12 μg/m^3	No
		Annual	0.103 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.709 μg/m^3	15 μg/m^3	No
		24-hour	0.252 μg/m^3	16 μg/m^3	0.37 μg/m^3	16.622 μg/m^3	35 μg/m^3	No
	PM_{10}	24-hour	0.363 μg/m^3	49 μg/m^3	6.00 μg/m^3	55.363 μg/m^3	150 μg/m^3	No
Sulfur Dioxide		1-hour	0.170 ppb	16.0 ppb	Not Modeled	16.170 ppb	75 ppb	No
		3-hour	<0.001 ppm	0.014 ppm	0.057 ppm	0.071 ppm	0.5 ppm	No

Notes and Acronyms:

See Table 4.13-6.

Sources: SCDHEC 2015c, Lakes 2015, EPA 2015o.

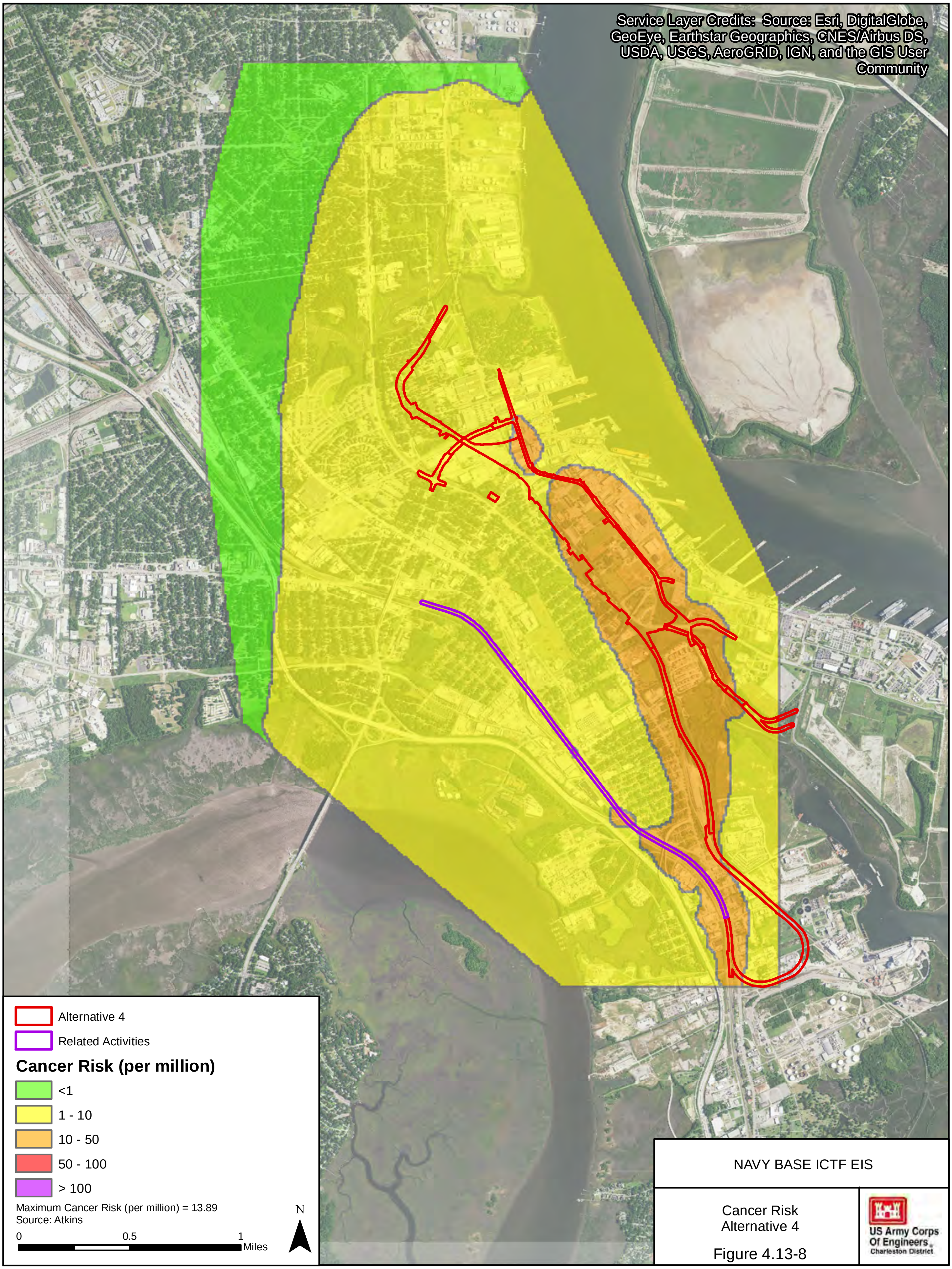
As shown in Table 4.13-22, criteria pollutants emitted from the operation of Alternative 4, along with the background concentrations and projected criteria pollutants, would not exceed the applicable NAAQS; therefore, Alternative 4 would not put the Tri-County area into non-attainment for any criteria pollutants. Impacts to air quality from the operation of Alternative 4 on criteria pollutants would be minor.

4.13.6.4 Hazardous Air Pollutants (HAPs)

Under Alternative 4, the Palmetto Railways Project would be operated as proposed. As such, HAPs emissions from operational activities would be the same as Alternative 1 (Proposed Project) and impacts would be the same as Alternative 1 (Proposed Project).

4.13.6.5 Health Risk Assessment

An emission density map of the cancer risk of Alternative 4 is in Figure 4.13-8. This figure demonstrates the dispersion of DPM and corresponding health risk over the potentially exposed population. All dispersion modeling assumptions, inputs and outputs, and HRA calculations are included in Appendix I.



NAVY BASE ICTF EIS

Cancer Risk
Alternative 4

Figure 4.13-8

The maximum potential cancer risk is the highest estimated cancer risk at a residence for Alternative 4 and is analyzed to demonstrate the worst-case scenario. Contribution by source group is shown in Table 4.13-23. As shown in Table 4.13-23, line haul rail is the single largest source, contributing 67.39 percent of the highest estimated cancer risk. Emissions from OTR truck running are the second largest contributor, at 13.71 percent. The table also shows the maximum noncancer hazard.

Table 4.13-23
Cancer Risk and Noncancer Hazard by Source Group, Alternative 4

Source Group	DPM Concentration (µg/m^3)	Cancer Risk (per million)	Noncancer Hazard	Source Group Contribution
Line Haul Rail	0.03983	11.95	0.008	67.39%
Switch Rail	0.00194	0.58	0.0004	3.28%
UTR Truck Running	0.00103	0.31	0.0002	1.74%
UTR Truck Idling	0.00224	0.67	0.0005	3.79%
OTR Truck Running	0.00810	2.43	0.002	13.71%
OTR Truck Idling	0.00596	1.79	0.001	10.08%
Worker Commute	0.00000	0.00	0.000	0.00%
On-site Offroad Equipment	0.00000	0.00	0.000	0.00%
Total	**0.05610**	**17.73**	**0.01**	**100.00%**

Notes and Acronyms:
See Table 4.13-8.
Source: Lakes 2015, EPA 2004, 2015o.

The maximum potential cancer risk from Alternative 4 falls between 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). Impacts from the potential maximum cancer risk from Alternative 4 would be acceptable. The maximum noncancer hazard for the Alternative 4 would be below 1. Impacts from Alternative 4 from noncancer hazard would be negligible.

4.13.7 Alternative 5: River Center Project Site (South via Milford / North via Hospital District)

4.13.7.1 Construction Criteria Pollutant Emissions Inventory

Alternative 5 is a variation of Alternative 1 (Proposed Project) with the ICTF being moved to the River Center project site. Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site. As such, construction of the rail and road alignments differs from Alternative 1 (Proposed Project), and so construction equipment exhaust criteria pollutant emissions are different to reflect the change in length of the rail connections and road segments. Haul truck activities, worker and vendor commute, architectural coating, asphalt paving, and material movement were assumed to be the same as Alternative 1 (Proposed Project). Demolition of buildings at the River Center project site would be different than that for Alternative 1 (Proposed Project), because of the difference in building square footage that would need to be demolished. Total criteria pollutant emissions from construction of Alternative 5 are shown below in Table 4.13-24.

Table 4.13-24
Total Construction Criteria Pollutant Emissions Inventory, Alternative 5

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Construction Equipment Exhaust	163.7	378.2	24.1	23.4	0.6	39.7
Haul Truck Exhaust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Worker and Vendor Commute	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Architectural Coating	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Asphalt Paving	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Demolition	0	0	42.6	6.5	0	0
Surface Disturbance	0	0	2.9	3.6	0	0
Material Movement	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
On-Road Fugitive Dust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Total	**10,480.8**	**27,081.9**	**1,258.9**	**1,162.3**	**32.3**	**2,485.6**

Note: Construction activity is scheduled to occur over 5 years.

Sources: EPA 2010, 2015d, FHWA 2011b, CAPCOA 2013.

Impacts to Air Quality by Alternative 5 construction criteria pollutant emissions would be similar to Alternative 1 (Proposed Project).

4.13.7.2 Operational Criteria Pollutant Emissions Inventory

Under Alternative 5, the Palmetto Railways Project would be operated as proposed, with the exception of UTR truck activity on the private drayage road. As such, criteria pollutant emissions from operational activities besides UTR truck running emissions would be the same as Alternative 1 (Proposed Project). The private drayage road in Alternative 5 is 2 miles long, which is twice the distance of the private drayage road in Alternative 1 (Proposed Project). To maintain the daily container throughput, twice as many UTR trucks at the same rate of daily truckloads are required for operating Alternative 5 compared to Alternative 1 (Proposed Project). Therefore, Alternative 5 has twice as many criteria pollutant emissions from UTR truck running as Alternative 1 (Proposed Project). Total criteria pollutant emissions from operation are shown below in Table 4.13-25. Criteria pollutants emitted from the study area (Tri-County area) were taken from the 2011 EPA NEI are compared with Alternative 1 (Proposed Project) criteria pollutant emissions inventory in Table 4.13-26.

Table 4.13-25
Annual Operational Criteria Pollutant Emissions Inventory, Alternative 5

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Off-Terminal Line Haul Locomotive	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
On-Terminal Line Haul Locomotive	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Switch Locomotive	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
UTR Truck Running	0.8	1.9	0.1	0.1	0.0	0.8
UTR Truck Idling	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
OTR Truck Running	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
OTR Truck Idling	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Worker Commute	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
On-site Offroad Equipment	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Total	**34.4**	**51.6**	**0.7**	**0.7**	**0.2**	**4.9**

Sources: EPA 2010, 2009a, 1998, 2009b, 2015d, SCPA 2013, CAPCOA 2013.

Table 4.13-26
Comparison of Study Area Criteria Pollutant Emissions
Inventory to Alternative 5 Emissions

Criteria Pollutant	Tri-County Area Emissions Inventory (ton)	Proposed Project Alternative Emissions Compared to Total Inventory (percentage)
CO	230,292.8	0.015%
NO_x	36,526.0	0.141%
PM_{10}	26,159.7	0.003%
$PM_{2.5}$	11,299.7	0.005%
SO_2	26,442.8	0.001%
VOC	122,145.5	0.004%

Source: EPA 2015a, 2015c, 2015m.

Criteria pollutant emissions from Alternative 5 would each equal less than 1 percent of the total criteria pollutants emitted in the study area. Impacts of criteria pollutants from the operational inventory of Alternative 5 would be minor permanent adverse.

4.13.7.3 Criteria Pollutant Dispersion Modeling

Under Alternative 5, the Palmetto Railways Project would be operated as proposed, with the exception of UTR truck activity on the private drayage road and the location of where the pollutants would be emitted due to the different rail track segments and site. Alternative 5 dispersion modeling outputs, SCDHEC background concentrations, HLT estimated pollutant levels, and NAAQS compliance demonstration are included the Table 4.13-27. All dispersion modeling assumptions, calculations, and model outputs are included in Appendix I.

Table 4.13-27
Criteria Pollutant Dispersion Modeling, Alternative 5

Pollutant		Average Time	AERMOD Output	Background Concentrations[1]	HLT	Total Impact	NAAQS	NAAQS Exceeded?
Carbon Monoxide		8-hour	0.058 ppm	0.80 ppm	0.14 ppm	0.998 ppm	9 ppm	No
		1-hour	0.087 ppm	1.27 ppm	0.504 ppm	1.861 ppm	35 ppm	No
Nitrogen Dioxide		1-hour	69.368 ppb	38.35 ppb	Not Modeled	107.718 ppb	100 ppb	**May Exceed**
		Annual	5.613 ppb	6.60 ppb	1.59 ppb	13.803 ppb	53 ppb	No
Particle Pollution	***$PM_{2.5}$***	Annual	0.109 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.715 μg/m^3	12 μg/m^3	No
		Annual	0.109 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.715 μg/m^3	15 μg/m^3	No
		24-hour	0.405 μg/m^3	16 μg/m^3	0.37 μg/m^3	16.775 μg/m^3	35 μg/m^3	No
	PM_{10}	24-hour	0.484 μg/m^3	49 μg/m^3	6.00 μg/m^3	55.484 μg/m^3	150 μg/m^3	No
Sulfur Dioxide		1-hour	0.140 ppb	16.0 ppb	Not Modeled	16.140 ppb	75 ppb	No
		3-hour	<0.001 ppm	0.014 ppm	0.057 ppm	0.071 ppm	0.5 ppm	No

Notes and Acronyms:
See Table 4.13-6.
Sources: SCDHEC 2015c, Lakes 2015, EPA 2015o.

As shown in Table 4.13-27, criteria pollutants emitted from the operation of Alternative 5, along with the background concentrations and projected criteria pollutants, may exceed the NAAQS for 1-hour NO_2. The EPA recommends a three-tiered screening approach to estimate ambient concentrations of NO_2 with Tier 1 being the most conservative approach resulting in higher NO_2 concentrations and Tier 3 being the most detailed approach resulting in lower NO_2 concentrations. The Tier 1 modeling approach was used in this analysis. Further refinement of the modeling to a Tier 2 or Tier 3 approach would likely produce results that would predict compliance and continued attainment with the NAAQS. Under full operation of Alternative 5, the Tri-County area may not remain in compliance with the NAAQS. Impacts to air quality from the operation of Alternative 5 on criteria pollutants would be minor adverse.

4.13.7.4 Hazardous Air Pollutants (HAPs)

Under Alternative 5, the Palmetto Railways Project would be operated as proposed, with the exception of UTR truck activity on the drayage road. The UTR truck activity in Alternative 5 would be double the activity in Alternative 1 (Proposed Project) to account for the double length of the private drayage road. Operational non-DPM HAP emissions from Alternative 5 are shown in Table 4.13-28 and are compared with non-DPM HAPs emitted from the study area.

Table 4.13-28
Comparison of Study Area HAP Emissions to Alternative 5 HAP Emissions

Priority MSAT	Annual Operational HAP Emissions (tons)	Tri-County Area HAP Emissions (tons)	Compared Percentage of HAPS from Alternative 5
Benzene	0.059	566.7	0.010%
1,3-Butadiene	0.004	125.4	0.003%
Formaldehyde	1.075	2,192.6	0.049%
Naphthalene	0.081	1,991.0	0.004%
Polycyclic organic matter	0.006	158.8	0.004%

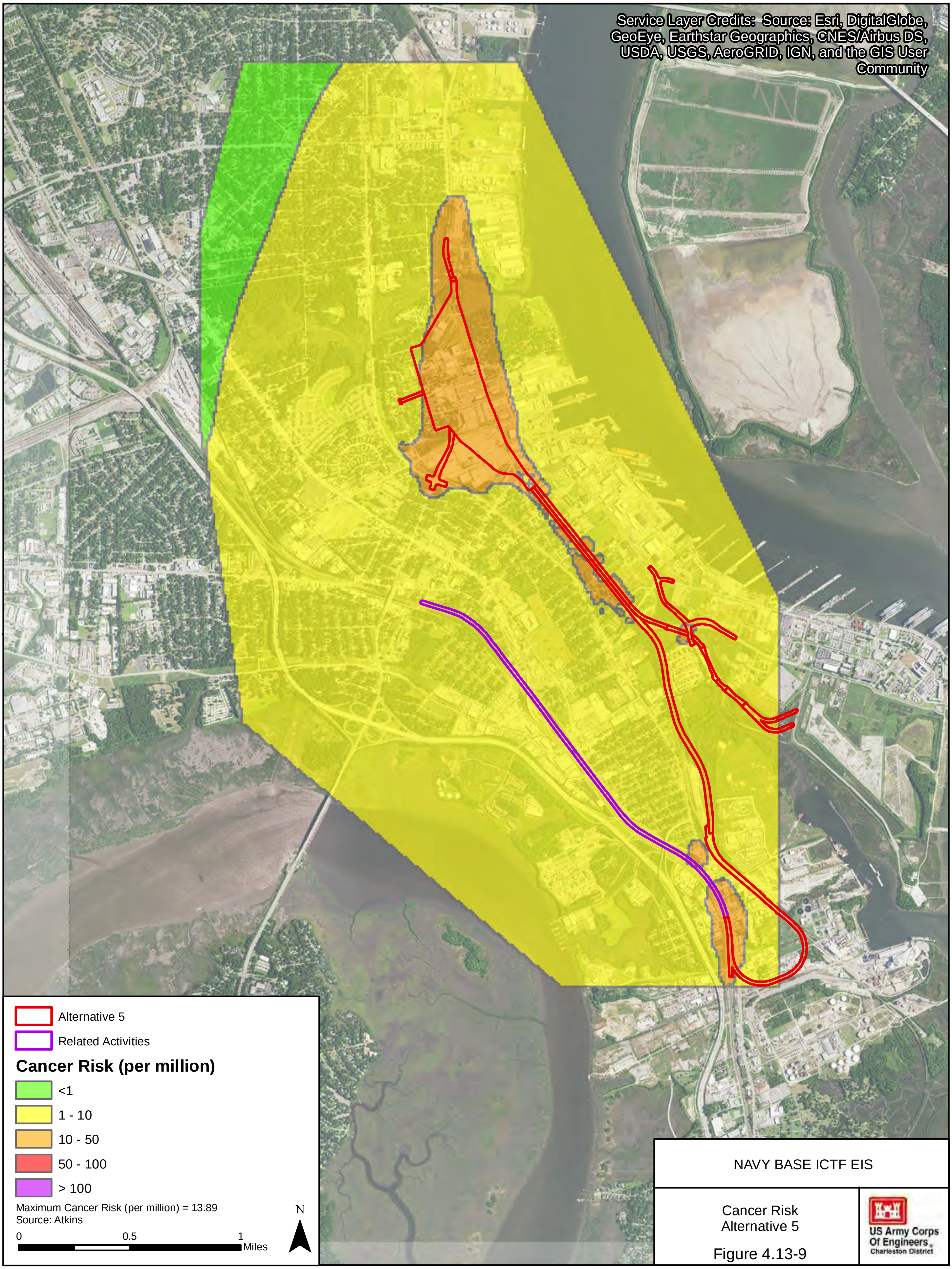
Source: EPA 2015a, 2015c, 2015m.

Non-DPM HAP emissions from Alternative 5 would each contribute to less than one-tenth of 1 percent of the total non-DPM HAPs emitted in the study area. Impacts of non-DPM HAPs from the operational inventory of Alternative 5 would be acceptable.

4.13.7.5 Health Risk Assessment

An emission density map of the cancer risk of Alternative 5 is in Figure 4.13-9. This figure demonstrates the dispersion of DPM and corresponding health risk over the potentially exposed population. All dispersion modeling assumptions, inputs and outputs, and HRA calculations are included in Appendix I.

The maximum potential cancer risk is the highest estimated cancer risk at a residence for Alternative 5 and is analyzed to demonstrate the worst-case scenario. Contribution by source group is shown in Table 4.13-29. As shown in Table 4.13-35, OTR Truck idling is the largest source, contributing 39.37 percent of the highest estimated cancer risk. Emissions from OTR truck running are the second largest contributor, at 29.61 percent. OTR truck running and idling contributions are higher in this alternative than in Alternatives 1-4 because the OTR truck driveway and on-site truck idling would occur on the western side of the River Center project site, which is closer to the potentially exposed population. The table also shows the maximum noncancer hazard.



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Alternative 5
Related Activities
Cancer Risk (per million)
<1
1 - 10
10 - 50
50 - 100
> 100
Maximum Cancer Risk (per million) = 13.89
Source: Atkins
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Cancer Risk
Alternative 5
Figure 4.13-9
US Army Corps
Of Engineers
Charleston District

Table 4.13-29
Cancer Risk and Noncancer Hazard by Source Group, Alternative 5

Source Group	DPM Concentration (µg/m^3)	Cancer Risk (per million)	Noncancer Hazard	Source Group Contribution
Line Haul Rail	0.01099	3.30	0.002	13.29%
Switch Rail	0.00116	0.35	0.0002	1.40%
UTR Truck Running	0.00125	0.38	0.0003	1.51%
UTR Truck Idling	0.01224	3.67	0.002	14.81%
OTR Truck Running	0.02448	7.34	0.005	29.61%
OTR Truck Idling	0.03255	9.77	0.007	39.37%
Worker Commute	0.00000	0.00	0.000	0.00%
On-site Offroad Equipment	0.00000	0.00	0.000	0.00%
Total	**0.08267**	**24.80**	**0.02**	**100.00%**

Notes and Acronyms:

See Table 4.13-8.

Source: Lakes 2015, EPA 2004 and 2015o.

The maximum potential cancer risk from Alternative 5 falls between 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). Impacts from the potential maximum cancer risk from Alternative 5 would be acceptable. The maximum noncancer hazard for the Alternative 5 would be below 1. Impacts from Alternative 5 from noncancer hazard would be negligible.

4.13.8 Alternative 6: River Center Project Site (South via Kingsworth / North via Hospital)

4.13.8.1 Construction Criteria Pollutant Emissions Inventory

Alternative 6 is a variation of Alternative 1 (Proposed Project), with the ICTF being moved to the River Center project site and the southern rail connection connecting to an existing rail line. Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site. As such, construction of the rail and road alignments differs from Alternative 1 (Proposed Project), and so construction equipment exhaust criteria pollutant emissions are different to reflect the change in length of the rail connections and road segments. Haul truck activities, worker and vendor commute, architectural coating, asphalt paving, and material movement were assumed to be the same as Alternative 1 (Proposed Project). Demolition of buildings at the River Center project site would be the same for Alternative 6 as for Alternative 5. Total criteria pollutant emissions from construction of Alternative 6 are shown below in Table 4.13-30.

Table 4.13-30
Total Construction Criteria Pollutant Emissions Inventory, Alternative 6

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Construction Equipment Exhaust	155.9	360.0	23.0	22.3	0.6	37.9
Haul Truck Exhaust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Worker and Vendor Commute	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Architectural Coating	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Asphalt Paving	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Demolition	0	0	42.6	6.5	0	0
Surface Disturbance	0	0	2.9	3.6	0	0
Material Movement	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
On-Road Fugitive Dust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Total	**10,473.0**	**27,063.7**	**1,257.8**	**1,161.2**	**32.3**	**2,483.8**

Note: Construction activity is scheduled to occur over 5 years.

Sources: EPA 2010, 2015d, FHWA 2011b, CAPCOA 2013.

Impacts to Air Quality by Alternative 6 construction criteria pollutant emissions would be similar to Alternative 1 (Proposed Project).

4.13.8.2 Operational Criteria Pollutant Emissions Inventory

Under Alternative 6, the Palmetto Railways Project would be operated as proposed, with the exception of UTR truck activity on the drayage road. The UTR truck activity in Alternative 6 would be the same as the activity in Alterative 5. As such, criteria pollutant emissions from operational activities would be the same as Alternative 5 and impacts would be the same as Alternative 5.

4.13.8.3 Criteria Pollutant Dispersion Modeling

Under Alternative 6, the Palmetto Railways Project would be operated as proposed, with the exception of UTR truck activity on the private drayage road and the location of where the pollutants would be emitted due to the different rail track segments and site. Alternative 6 dispersion modeling outputs, SCDHEC background concentrations, HLT estimated pollutant levels, and NAAQS compliance demonstration are included the Table 4.13-31. All dispersion modeling assumptions, calculations, and model outputs are included in Appendix I.

Table 4.13-31
Criteria Pollutant Dispersion Modeling, Alternative 6

Pollutant		Average Time	AERMOD Output	Background Concentrations(1)	HLT	Total Impact	NAAQS	NAAQS Exceeded?
Carbon Monoxide		8-hour	0.058 ppm	0.80 ppm	0.14 ppm	0.998 ppm	9 ppm	No
		1-hour	0.087 ppm	1.27 ppm	0.504 ppm	1.861 ppm	35 ppm	No
Nitrogen Dioxide		1-hour	69.369 ppb	38.35 ppb	Not Modeled	107.719 ppb	100 ppb	**May Exceed**
		Annual	5.613 ppb	6.60 ppb	1.59 ppb	13.803 ppb	53 ppb	No
Particle Pollution	*$PM_{2.5}$*	Annual	0.109 μg/m³	7.6 μg/m³	0.006 μg/m³	7.715 μg/m³	12 μg/m³	No
		Annual	0.109 μg/m³	7.6 μg/m³	0.006 μg/m³	7.715 μg/m³	15 μg/m³	No
		24-hour	0.405 μg/m³	16 μg/m³	0.37 μg/m³	16.775 μg/m³	35 μg/m³	No
	PM_{10}	24-hour	0.484 μg/m³	49 μg/m³	6.00 μg/m³	55.484 μg/m³	150 μg/m³	No
Sulfur Dioxide		1-hour	0.140 ppb	16.0 ppb	Not Modeled	16.140 ppb	75 ppb	No
		3-hour	<0.001 ppm	0.014 ppm	0.057 ppm	0.071 ppm	0.5 ppm	No

Notes and Acronyms:
See Table 4.13-6.
Sources: SCDHEC 2015c, Lakes 2015, EPA 2015o.

As shown in Table 4.13-37, criteria pollutants emitted from the operation of Alternative 6, along with the background concentrations and projected criteria pollutants, may exceed the NAAQS for 1-hour NO_2. The EPA recommends a three-tiered screening approach to estimate ambient concentrations of NO_2 with Tier 1 being the most conservative approach resulting in higher NO_2 concentrations and Tier 3 being the most detailed approach resulting in lower NO_2 concentrations. The Tier 1 modeling approach was used in this analysis. Further refinement of the modeling to a Tier 2 or Tier 3 approach would likely produce results that would predict compliance and continued attainment with the NAAQS. Under full operation of Alternative 6, the Tri-County area may not remain in compliance with the NAAQS. Impacts to air quality from the operation of Alternative 6 on criteria pollutants would be minor adverse.

4.13.8.4 Hazardous Air Pollutants (HAPs)

Under Alternative 6, the Palmetto Railways Project would be operated as proposed, with the exception of UTR truck activity on the drayage road. The UTR truck activity in Alternative 6 would be the same as the activity in Alterative 5. As such, HAPs emissions from operational activities would be the same as Alterative 5 and impacts would be the same as Alternative 5.

4.13.8.5 Health Risk Assessment

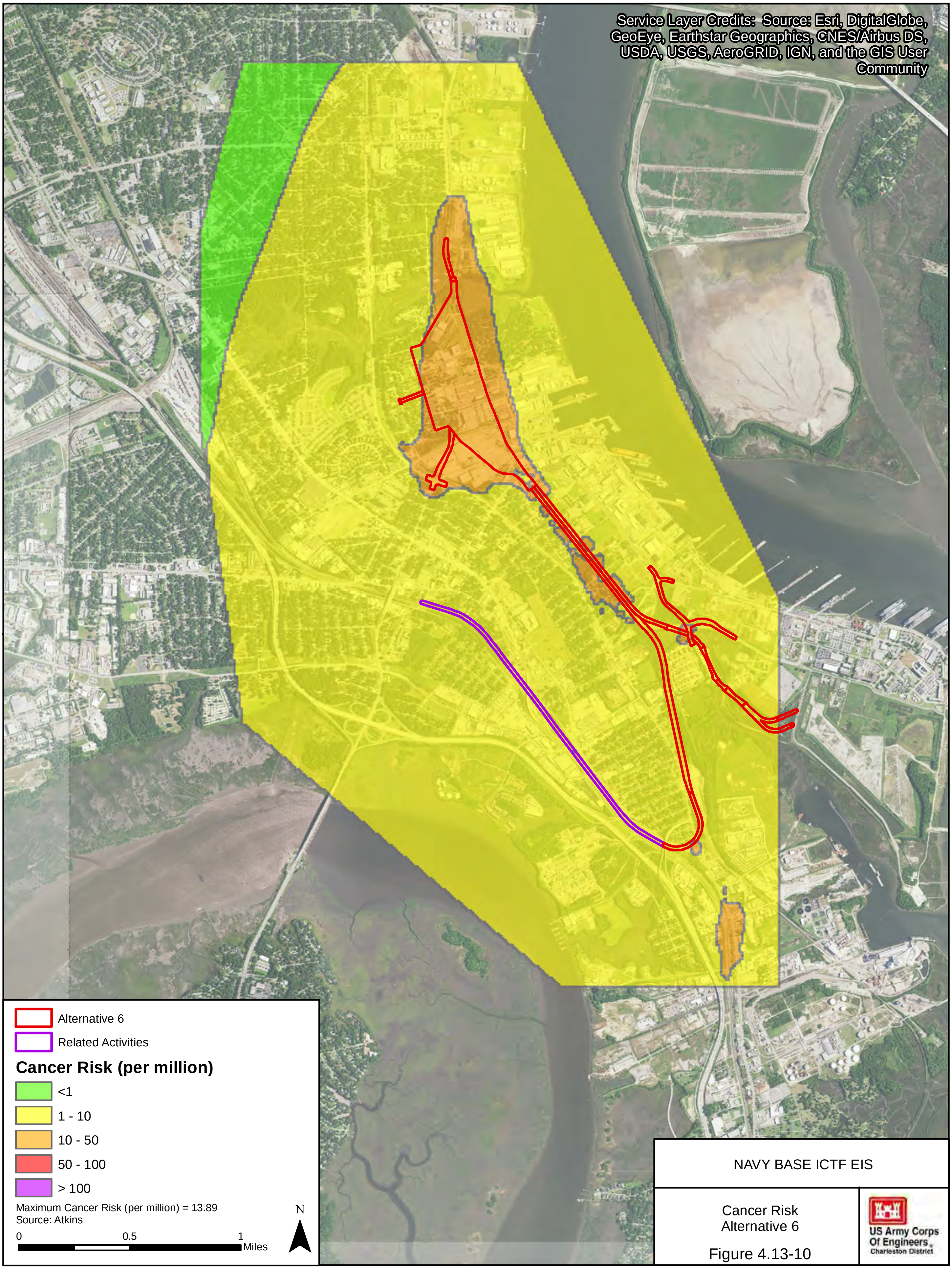
An emission density map of the cancer risk of Alternative 6 is in Figure 4.13-10. This figure demonstrates the dispersion of DPM and the corresponding health risk over all of the potentially exposed population. All dispersion modeling assumptions, inputs and outputs, and HRA calculations are included in Appendix I.

The maximum potential cancer risk is the highest estimated cancer risk at a residence for Alternative 6 and is analyzed to demonstrate the worst-case scenario. Contribution by source group is shown in Table 4.13-32. As shown in Table 4.13-32, OTR Truck idling is the largest source, contributing 39.38 percent of the highest estimated cancer risk. Emissions from OTR truck running are the second largest contributor, at 29.62 percent. The table also shows the maximum noncancer hazard.

Table 4.13-32
Cancer Risk and Noncancer Hazard by Source Group, Alternative 6

Source Group	DPM Concentration (μg/m^3)	Cancer Risk (per million)	Noncancer Hazard	Source Group Contribution
Line Haul Rail	0.01098	3.29	0.002	13.28%
Switch Rail	0.00116	0.35	0.0002	1.40%
UTR Truck Running	0.00125	0.38	0.0003	1.51%
UTR Truck Idling	0.01224	3.67	0.002	14.81%
OTR Truck Running	0.02448	7.34	0.005	29.62%
OTR Truck Idling	0.03255	9.77	0.007	39.38%
Worker Commute	0.00000	0.00	0.000	0.00%
On-site Offroad Equipment	0.00000	0.00	0.000	0.00%
Total	**0.08267**	**24.80**	**0.02**	**100.00%**

Notes and Acronyms:
See Table 4.13-8.
Source: Lakes 2015, EPA 2004, 2015o.



NAVY BASE ICTF EIS

Cancer Risk
Alternative 6

Figure 4.13-10

The maximum potential cancer risk from Alternative 6 falls between 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). Impacts from the potential maximum cancer risk from Alternative 6 would be acceptable. The maximum noncancer hazard for the Alternative 6 would be below 1. Impacts from Alternative 6 from noncancer hazard would be negligible.

4.13.9 Alternative 7: River Center Project Site (South via Milford)

4.13.9.1 Construction Criteria Pollutant Emissions Inventory

Under Alternative 7, a variation of Alternative 1 (Proposed Project) with the ICTF being moved to the River Center project site and trains would also enter and exit the Navy Base ICTF from a southern rail connection. Road and rail improvements would be adjusted accordingly to facilitate rail and road traffic at the new site. As such, construction of the rail and road alignments differs from Alternative 1 (Proposed Project), and so construction equipment exhaust GHG emissions are different to reflect the change in length of the rail connections and road segments. Haul truck activities, worker and vendor commute, architectural coating, asphalt paving, and material movement were assumed to be the same as Alternative 1 (Proposed Project). Demolition of buildings at the River Center project site would be the same for Alternative 7 as for Alternative 5. Total criteria pollutant emissions from construction of Alternative 7 are shown below in Table 4.13-33.

4.13.9.2 Operational Criteria Pollutant Emissions Inventory

Under Alternative 7, the Palmetto Railways Project would be operated as proposed, with the exception of UTR truck activity on the drayage road. The UTR truck activity in Alternative 7 would be the same as the activity in Alterative 5. As such, criteria pollutant emissions from operational activities would be the same as Alternative 5 and impacts would be the same as Alternative 5.

4.13.9.3 Criteria Pollutant Dispersion Modeling

Under Alternative 7, the Palmetto Railways Project would be operated as proposed, with the exception of UTR truck activity on the private drayage road and the location of where the pollutants would be emitted due to the different rail track segments and site. Alternative 7 dispersion modeling outputs, SCDHEC background concentrations, HLT estimated pollutant levels, and NAAQS compliance demonstration are included the Table 4.13-34. All dispersion modeling assumptions, calculations, and model outputs are included in Appendix I.

Impacts to Air Quality by Alternative 7 construction criteria pollutant emissions would be similar to Alternative 1 (Proposed Project).

Table 4.13-33
Total Construction Criteria Pollutant Emissions Inventory, Alternative 7

Activity	Criteria Pollutant (tons)					
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Construction Equipment Exhaust	159.6	368.6	23.5	22.8	0.6	38.8
Haul Truck Exhaust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Worker and Vendor Commute	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Architectural Coating	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Asphalt Paving	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Demolition	0	0	42.6	6.5	0	0
Surface Disturbance	0	0	2.9	3.6	0	0
Material Movement	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
On-Road Fugitive Dust	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)	Same as Alternative 1 (Proposed Project)
Total	**10,476.7**	**27,072.3**	**1,258.3**	**1,161.7**	**32.3**	**2,484.7**

Note: Construction activity is scheduled to occur over 5 years.

Sources: EPA 2010, 2015d, FHWA 2011b, CAPCOA 2013.

Table 4.13-34
Criteria Pollutant Dispersion Modeling, Alternative 7

Pollutant		Average Time	AERMOD Output	Background Concentrations(1)	HLT	Total Impact	NAAQS	NAAQS Exceeded?
Carbon Monoxide		8-hour	0.055 ppm	0.80 ppm	0.14 ppm	0.995 ppm	9 ppm	No
		1-hour	0.082 ppm	1.27 ppm	0.504 ppm	1.856 ppm	35 ppm	No
Nitrogen Dioxide		1-hour	66.321 ppb	38.35 ppb	Not Modeled	104.671 ppb	100 ppb	**May Exceed**
		Annual	5.591 ppb	6.60 ppb	1.59 ppb	13.781 ppb	53 ppb	No
Particle Pollution	***$PM_{2.5}$***	Annual	0.108 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.714 μg/m^3	12 μg/m^3	No
		Annual	0.108 μg/m^3	7.6 μg/m^3	0.006 μg/m^3	7.714 μg/m^3	15 μg/m^3	No
		24-hour	0.399 μg/m^3	16 μg/m^3	0.37 μg/m^3	16.769 μg/m^3	35 μg/m^3	No
	PM_{10}	24-hour	0.477 μg/m^3	49 μg/m^3	6.00 μg/m^3	55.447 μg/m^3	150 μg/m^3	No
Sulfur Dioxide		1-hour	0.140 ppb	16.0 ppb	Not Modeled	16.140 ppb	75 ppb	No
		3-hour	<0.001 ppm	0.014 ppm	0.057 ppm	0.071 ppm	0.5 ppm	No

Notes and Acronyms:

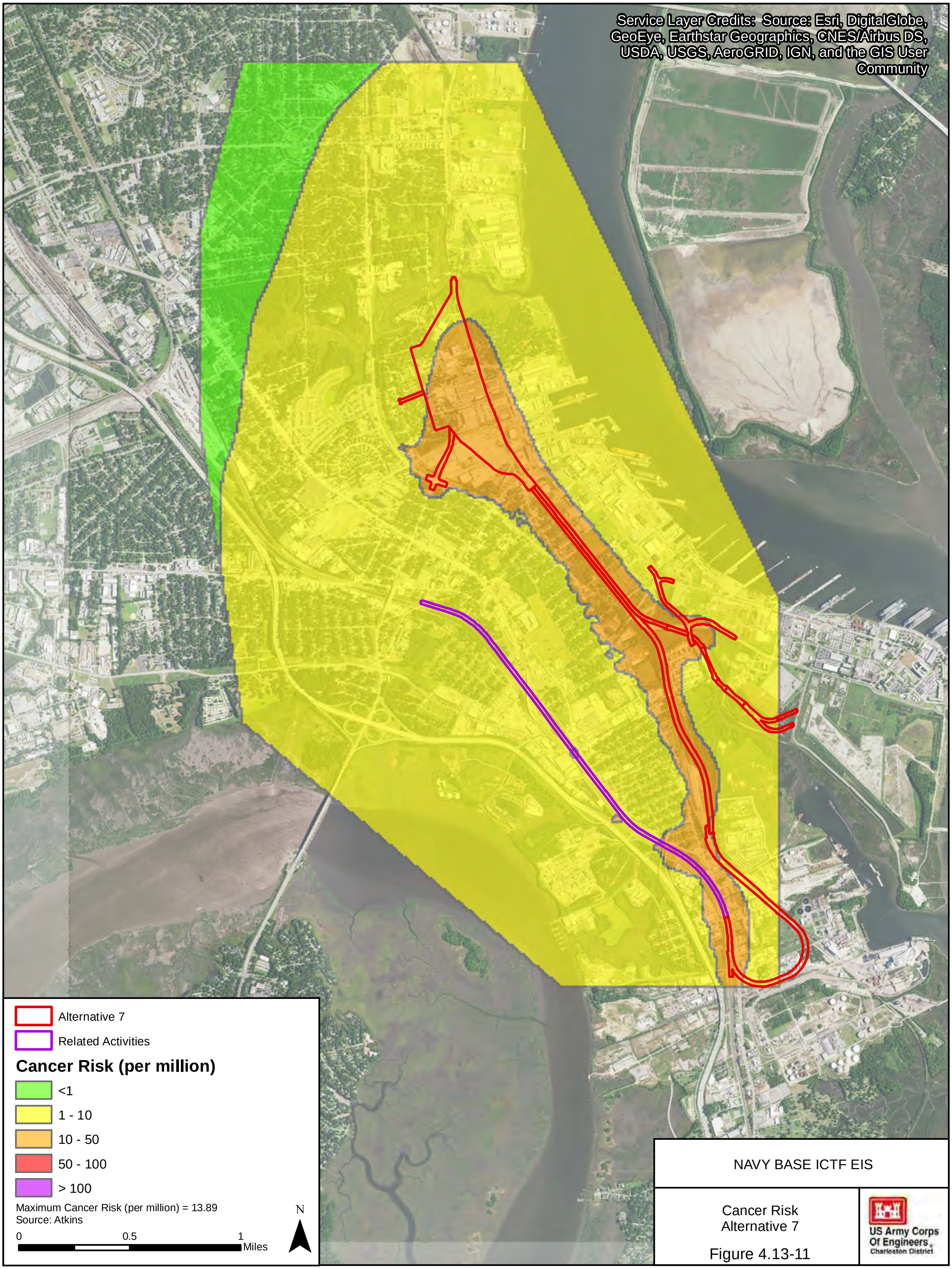
See Table 4.13-6.

Sources: SCDHEC 2015c, Lakes 2015, EPA 2015o.

As shown in Table 4.13-34, criteria pollutants emitted from the operation of Alternative 7, along with the background concentrations and projected criteria pollutants, may exceed the NAAQS for 1-hour NO_2. The EPA recommends a three-tiered screening approach to estimate ambient concentrations of NO_2 with Tier 1 being the most conservative approach resulting in higher NO_2 concentrations and Tier 3 being the most detailed approach resulting in lower NO_2 concentrations. The Tier 1 modeling approach was used in this analysis. Further refinement of the modeling to a Tier 2 or Tier 3 approach would likely produce results that would predict compliance and continued attainment with the NAAQS. Under full operation of Alternative 7, the Tri-County area may not remain in compliance with the NAAQS. Impacts to air quality from the operation of Alternative 7 on criteria pollutants would be minor adverse.

4.13.9.4 Hazardous Air Pollutants (HAPs)

Under Alternative 7, the Palmetto Railways Project would be operated as proposed, with the exception of UTR truck activity on the drayage road. The UTR truck activity in Alternative 7 would be the same as the activity in Alterative 5. As such, HAPs emissions from operational activities would be the same as Alternative 5 and impacts would be the same as Alternative 5.


Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Alternative 7
Related Activities
Cancer Risk (per million)
<1
1 - 10
10 - 50
50 - 100
> 100
Maximum Cancer Risk (per million) = 13.89
Source: Atkins
0
0.5
1
Miles
N
NAVY BASE ICTF EIS
Cancer Risk
Alternative 7
Figure 4.13-11
US Army Corps Of Engineers
Charleston District

4.13.9.5 Health Risk Assessment

An emission density map of the cancer risk of Alternative 7 is in Figure 4.13-11. This figure demonstrates the dispersion of DPM and corresponding health risk over the potentially exposed population. All dispersion modeling assumptions, inputs and outputs, and HRA calculations are included in Appendix I.

The maximum potential cancer risk is the highest estimated cancer risk at a residence for Alternative 7 and is analyzed to demonstrate the worst-case scenario. Contribution by source group is shown in Table 4.13-35. As shown in Table 4.13-35, OTR Truck idling is the largest source, contributing 39.38 percent of the highest estimated cancer risk. Emissions from OTR truck running are the second largest contributor, at 29.62 percent. The table also shows the maximum noncancer hazard.

Table 4.13-35
Cancer Risk and Noncancer Hazard by Source Group, Alternative 7

Source Group	DPM Concentration (μg/m^3)	Cancer Risk (per million)	Noncancer Hazard	Source Group Contribution
Line Haul Rail	0.01002	3.01	0.002	12.26%
Switch Rail	0.00116	0.35	0.0002	1.42%
UTR Truck Running	0.00125	0.38	0.0003	1.53%
UTR Truck Idling	0.01224	3.67	0.002	14.98%
OTR Truck Running	0.02448	7.34	0.005	29.96%
OTR Truck Idling	0.03255	9.77	0.007	39.84%
Worker Commute	0.00000	0.00	0.000	0.00%
On-site Offroad Equipment	0.00000	0.00	0.000	0.00%
Total	**0.08170**	**24.51**	**0.02**	**100.00%**

Notes and Acronyms:
See Table 4.13-8.
Source: Lakes 2015; EPA 2004, 2015o.

The maximum potential cancer risk from Alternative 7 falls between 1 per million and 100 per million, which is within the acceptable risk range (EPA 2006b). Impacts from the potential maximum cancer risk from Alternative 7 would be acceptable. The maximum noncancer hazard for the Alternative 7 would be below 1. Impacts from Alternative 7 from noncancer hazard would be negligible.

4.13.10 Related Activities

If the Palmetto Railways Project was constructed, new track would be constructed on a section of out-of-service CSX ROW to accept intermodal trains at the proposed new at-grade crossing at Meeting

Street. Construction would extend from the vicinity of Discher to Misroon Street. Existing track would be reactivated from Misroon Street into Ashley Junction, as needed. This Related Activity would apply to Alternatives 1, 2, 4, 5, and 7. Under Alternatives 3 and 6, the Related Activity construction would be the same as Alternatives 1, 2, 4, 5, and 7; however, construction of new track would begin at the proposed new at-grade crossing at Meeting Street in the vicinity of Kingsworth Avenue. Under Alternative 2 an additional Related Activity, reactivating an out-of-service ROW and constructing a new railroad bridge, would be required to connect the NS arrival/departure tracks lead track from the ICTF across a portion of marsh which drains to Noisette Creek to the existing NCTC track along Virginia Avenue.

The criteria pollutant emissions from the construction and operation of the related activity were included in the construction and operational criteria pollutant emissions inventories for Alternatives 1–7, as well as the non-DPM HAPs emission inventories. The related activity was also included in the dispersion modeling of the NAAQS and DPM. Therefore, impacts from the construction and operation of the related activity are analyzed in this analysis.

4.13.11 Summary of Impacts Table

Table 4.13-36 provides a summary of impacts on air quality from Alternative 1 (Proposed Project) and all other alternatives.

Table 4.13-36
Summary of Impacts, Air Quality

Alternative	Impacts of the Criteria Pollutants on Air Quality			Impacts of HAPs on Air Quality	
	Construction Emissions	Operational Emissions	NAAQS Dispersion Modeling	Non-DPM HAPs	DPM
No-Action	The No-Action Alternative would result in short-term construction period criteria pollutant emissions. Potential impacts would be minor short-term adverse.	The No-Action Alternative operational criteria pollutant emissions would be less than 1 percent of study area's criteria pollutant emissions. Potential impacts would be minor permanent adverse.	Criteria pollutants emitted from the No-Action Alternative, along with the existing and projected criteria pollutants, would not put the Tri-County area into non-attainment for any criteria pollutants and the NAAQS would remain in compliance. Potential impacts would be minor permanent adverse.	Non-DPM HAP emissions from the No-Action Alternative would each equal less than one-tenth of 1 percent of the total HAPs emitted in the study area. Potential impacts would be acceptable.	Potential excess cancer risk would be within the acceptable range. Impacts from cancer risk would be acceptable. The maximum noncancer hazard would be below 1. Potential impacts from noncancer hazard would be negligible.

Alternative	Impacts of the Criteria Pollutants on Air Quality			Impacts of HAPs on Air Quality	
	Construction Emissions	Operational Emissions	NAAQS Dispersion Modeling	Non-DPM HAPs	DPM
1: Proposed Project: South via Milford / North via Hospital District	Alternative 1 (Proposed Project) construction criteria pollutant emissions would be short term and spread out over five years. Potential impacts to air quality would be minor short-term adverse.	Alternative 1 (Proposed Project) operational criteria pollutant emissions would be less than 1 percent of study area's criteria pollutant emissions. Potential impacts would be minor permanent adverse.	Criteria pollutants emitted from Alternative 1 (Proposed Project), along with the existing and projected criteria pollutants, would not put the Tri-County area into non-attainment for any criteria pollutants and the NAAQS would remain in compliance. Potential impacts would be minor permanent adverse.	Non-DPM HAP emissions from Alternative 1 (Proposed Project) would each equal less than one-tenth of 1 percent of the total HAPs emitted in the study area. Potential impacts would be acceptable.	Potential excess cancer risk would fall within the acceptable range. Impacts from cancer risk would be acceptable. The maximum noncancer hazard would be below 1. Potential impacts from noncancer hazard would be negligible.
2: South via Milford / North via S-line	Potential impacts would be similar to Alternative 1 (Proposed Project).	Potential impacts would be the same as Alternative 1 (Proposed Project).	Potential impacts would be the similar to Alternative 1 (Proposed Project).	Potential impacts would be the same as Alternative 1 (Proposed Project)	Potential impacts would be the similar to Alternative 1 (Proposed Project)
3: South via Kingsworth / North via Hospital District	Potential impacts would be the similar to Alternative 1 (Proposed Project)	Potential impacts would be the same as Alternative 1 (Proposed Project)	Potential impacts would be similar to Alternative 1 (Proposed Project).	Potential impacts would be the same as Alternative 1 (Proposed Project).	Potential impacts would be the similar to Alternative 1 (Proposed Project).
4: South via Milford	Potential impacts would be the similar to Alternative 1 (Proposed Project)	Potential impacts would be the same as Alternative 1 (Proposed Project).	Potential impacts would be similar to Alternative 1 (Proposed Project).	Potential impacts would be the same as Alternative 1 (Proposed Project).	Potential impacts would be the similar to Alternative 1 (Proposed Project).
5: River Center Project Site: South via Milford / North via Hospital District	Alternative 5 construction criteria pollutant emissions would be short term and spread out over five years. Potential impacts to air quality would be minor short-term adverse.	Alternative 5 operational criteria pollutant emissions would be less than 1 percent of Study Area's criteria pollutant emissions. Potential impacts would be minor permanent adverse.	Criteria pollutants emitted from Alternative 5, along with the existing and projected criteria pollutants, may put the Tri-County area into non-attainment for the NO_2 1 hour NAAQS. Potential impacts would be minor adverse.	Non-DPM HAP emissions from Alternative 5 would each equal less than one-tenth of 1 percent of the total HAPs emitted in the Study Area. Potential impacts would be acceptable.	Potential excess cancer risk would fall within the acceptable range. Impacts from cancer risk would be acceptable. The maximum noncancer hazard would be below 1. Potential impacts from noncancer hazard would be negligible.
6: River Center Project Site: South via Kingsworth / North via Hospital District	Potential impacts would be similar to Alternative 5	Potential impacts would be the same as Alternative 5	Potential impacts would be similar to Alternative 5	Potential impacts would be the same as Alternative 5	Potential impacts would be similar to Alternative 5

Alternative	Impacts of the Criteria Pollutants on Air Quality			Impacts of HAPs on Air Quality	
	Construction Emissions	Operational Emissions	NAAQS Dispersion Modeling	Non-DPM HAPs	DPM
7: River Center Project Site: South via Milford	Potential impacts would be similar to Alternative 5	Potential impacts would be the same as Alternative 5	Potential impacts would be similar to Alternative 5	Potential impacts would be the same as Alternative 5	Potential impacts would be similar to Alternative 5

Criteria Pollutants Impact Definitions

Negligible = Criteria pollutant emissions do not occur.

Moderate = Criteria pollutant emissions would occur but not to the extent of putting the County in Non-Attainment.

Major = Criteria pollutant emissions would occur to the extent of putting the County in Non-Attainment.

Hazardous Air Pollutants Impact Definitions

Negligible = HAPs emissions do not occur. Potential cancer risk would be below 1 per million. Potential noncancer hazard would be below 1.

Acceptable =HAPS emissions would occur. Potential cancer risk would be between 1 per million and 100 per million. Potential noncancer hazard would be above 1, but adverse effects are unlikely to occur.

Unacceptable = HAPS emissions would occur. Potential cancer risk would be above 100 per million. Potential noncancer hazard quotient would be above 1 and adverse effects may occur.

4.13.12 Mitigation

4.13.12.1 Applicant's Proposed Avoidance and Minimization Measures

The Applicant has committed to several measures that avoid and/or minimize potential impacts of Alternative 1 (Proposed Project). These measures are taken from Palmetto Railways Mitigation Plan provided in Appendix N. Some of these measures are required under federal, state, and local permits; others are measures that Palmetto Railways has incorporated into the design and operations of Alternative 1 (Proposed Project). Each mitigation measure is also designated as one that either helps to avoid an impact or one that minimizes an impact.

- The Applicant is committed to implement options to minimize air emissions for the community and the environment of the region and executed an Air Quality Memorandum of Agreement (MOA) with South Carolina Department of Health and Environmental Control (SCDHEC). The facility will comply with all applicable requirements, conditions, and reporting and would maintain air pollution control equipment in accordance with such requirements and commitments found in the Air Quality MOA. The Air Quality MOA will expire by its term on December 31, 2019, unless otherwise terminated. Commitments outlined in the Air Quality MOA include:
  - SCDHEC Bureau of Air Quality commits to promptly and thoroughly review any regulatory determinations and respond to requested consultations by the Applicant. (Minimization)
  - SCDHEC commits to designate a point of contact who will make staff reasonably available to participate in discussions related to the design of the ICTF and review of operational and equipment options at future and existing Palmetto Railway facilities. (Minimization)

- SCDHEC commits to work cooperatively with Palmetto Railways in evaluating reasonable and proven practices and technologies to assist Palmetto Railways in meeting applicable environmental standards at the proposed and existing Palmetto Railways facilities while fairly accounting for environmental, economic, and competitiveness considerations. (Minimization)
- During the term of the MOA and for two years after operations begin at the ICTF, SCDHEC shall conduct an annual community meeting in the vicinity of the ICTF to update the community on relevant and pertinent environmental and health issues. Palmetto Railways shall use its best efforts to cooperate and assist SCDHEC with such community meeting as may be reasonably requested by SCDHEC. (Minimization)
- The Applicant commits to work cooperatively with SCDHEC staff to evaluate potential design, operation, and equipment options that are environmentally beneficial and fiscally feasible with demonstrated technologies and practices of intermodal facilities on the east coast in areas designated as attainment for implementation at the ICTF. Palmetto Railways will consider innovative technologies on a case-by-case basis. (Minimization)
- The Applicant commits that when major equipment reaches the end of its useful life and is retired, they will identify and replace such equipment with environmentally beneficial and fiscally feasible equipment and demonstrated technology of intermodal facilities on the east coast in areas designated as attainment then currently available. Enterprise (MBE) firms will be provided opportunities on the project. An example of this commitment, replacement equipment for retired equipment will include engines that meet the federal Tier 3 or higher emission standard. (Minimization)
- The Applicant will designate one (1) individual as the point of contact with SCDHEC related to the implementation of the Air Quality MOA. (Minimization)
- The Applicant will contribute fifty thousand dollars ($50,000.00) towards ambient air quality initiatives in conjunction and coordination with SCDHEC and the Medical University of South Carolina on air quality initiatives in the Charleston region, for which SCDHEC will serve as the lead and point of contact. (Minimization)
- The Applicant will include in its contractor bid documents and in the construction contract for the ICTF the terms, conditions, and provisions set forth in the Air Quality MOA to ensure the implementation of best management practices (BMPs) and minimize air emissions during the construction of the ICTF. (Minimization)

- Once operational, the ICTF will reduce truck traffic on local roads by providing additional intermodal capacity and encouraging the use of rail to transport containers, thereby improving fuel efficiency and reducing emissions. (Minimization)
- The ICTF will be a semi-automated facility that minimizes air quality emissions during operations as a result of increased efficiencies during the handling and processing of containers. (Minimization)
- The project will use electric wide-span gantry cranes that emit zero air emissions versus diesel-powered lift equipment. (Minimization)

- An automated gate system will be utilized for the over-the-road (OTR) trucks entering/ exiting the facility from the Wando Welch and North Charleston Container Terminals and an optical character recognition (OCR) portal at the connection from the facility (drayage road) to the HLT to reduce on-site idle times of trucks. (Minimization)
- Use of automated gates at at-grade crossings to reduce emissions due to reduced truck idling. (Minimization)
- The Applicant will provide access to air quality and health assessment data as requested to evaluate health impacts. (Minimization)
- The Applicant will support the South Carolina Ports Authority (SCPA) efforts to implement a container barge service to transfer containers between Wando Welch Terminal and a yet-to-be- determined wharf location at the former CNC in North Charleston for transport via intermodal rail at the proposed ICTF. Transferring containers between terminals via barge transportation will help to alleviate truck congestion on the interstate system, specifically I-526 between the Wando Welch Marine Container Terminal on Long Point Road and I-26, and minimizing impacts of air emissions. This service would work in conjunction with the Hugh K. Leatherman, Sr. Terminal (HLT) and the ICTF drayage road efforts in alleviating truck congestion on the area local roads and interstate system. *(Minimization)
- Implement dust control measures (such as watering unpaved work areas, temporary and permanent seeding and mulching, covering stockpiled materials, and using covered haul trucks). (Minimization)
- Construct an earthen berm between the processing and classification tracks and adjacent neighborhoods. (Minimization)
- Comply with Air Quality State Construction and Operating permit requirements, conditions, and reporting. (Minimization)
- Operate and maintain air pollution control equipment in accordance with permit requirements. (Minimization)
- Use Tier 4 Utility Tractor Rigs (UTR) at full build out (2038) on the private drayage road to transfer containers to the ICTF versus transferring the same containers using over the road trucks on public roadways to minimize emissions. (Minimization)
- Limit switching activity within the ICTF to Tier 4 locomotive engines by full build-out (2038). (Minimization)

4.13.12.2 Additional Potential Mitigation Measures

No additional mitigation measures for Air Quality have been recommended by the Corps. Additional avoidance, minimization, and mitigation may be considered by the Corps in its decision-making process. Final mitigation measures may be adopted as conditions of the DA permit and documented in the Record of Decision (ROD).