

4.17 HUMAN HEALTH AND SAFETY

4.17.1 Methods and Impact Definitions

Alternative 1 (Proposed Project) has the potential to impact the human health and safety of the community surrounding it. Each of the other resource sections in this document was reviewed to determine if there would be potential associated impacts to human health and safety. Affected Environment and Environmental Consequences sections for Water Quality (Section 3.3/4.3), Visual Resources and Aesthetics (Section 3.11/4.11), Noise and Vibrations (Section 3.12/4.12), Air Quality (Section 3.13/4.13), Hazardous, Toxic, and Radioactive Waste (Section 3.15/4.15), and Socio-economics and Environmental Justice (3.16/4.16) describe existing conditions and provide inventories of known and potential risks due to Alternative 1 (Proposed Project) and the Project alternatives to human health and safety.

The purpose of this environmental consequences section is to compile and document potential impacts to the human health and safety of construction workers during construction, operations staff during the operation, and residents in the community surrounding the facility.

Adverse impacts to human health and safety may occur if the project activities create new health hazards that are not currently present, worsen existing health conditions, or increase emergency response times.

4.17.2 No-Action Alternative

The No-Action Alternative would involve the construction of rail-served warehousing and mixed-use development on the Project site and River Center project site. Potential risks to human health and safety under the No-Action Alternative are identified by impact type.

4.17.2.1 Worker Safety

Under the No-Action Alternative, the potential for direct worker health impacts from heavy equipment is similar to the existing condition risk potential. Any ongoing monitoring of known hazardous material sites would continue in accordance with previous permit requirements and BMPs. Existing worker health conditions would generally be expected to continue. Therefore, there would be a negligible impact to worker health and safety with the No-Action Alternative.

4.17.2.2 Drinking Water Quality

As noted in Section 4.3, water supply sources for all of North Charleston are located outside of the study area (Bushy Park Reservoir and Edisto River) and would not be impacted by others from construction activities or disturbance of known contaminated groundwater sources. Therefore, there

would be a negligible impact to human health and safety from drinking water quality impacts with the No-Action Alternative.

4.17.2.3 Noise and Vibration

Noise is defined as unwanted sound. According to the EPA, human health concerns related to noise include “stress-related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity” (EPA 2014d). Potential noise from the proposed facility has been identified as a major concern of local residents. The noise and vibration analysis includes four types of potential noise impacts that could affect human health. These impact types are traffic noise, rail noise (includes horns), rail vibration, and operational noise from the Project site.

For the Chicora-Cherokee residential community west of the Project site, ambient noise conditions were estimated using the field-measured existing noise levels in the community. From the measurement data for these locations provided in Section 3.12, the average existing ambient noise level of 51 dB(A) is estimated for the Chicora-Cherokee community adjoining the Project site. Due to operations of the future rail-served warehousing and distribution center as described for the No-Action Alternative, the ambient noise level in the community is assumed to grow by 2 to 4 dB(A) in 24 years from 2014 to 2038. As a result, the No-Action ambient noise level of approximately 54 dB(A) [51 + 3 = 54] is estimated for the community in 2038.

Ambient noise is also assessed for the residential community of CNYOQ Historic District, east of the River Center project site. From the 2014 field noise measurements described in Section 3.12.4 for locations at Manley Avenue (Table 3.12.1, locations M17 and M18), the average existing ambient noise level of 56 dB(A) is estimated for the community. With a 3 dB(A) growth to 2038, the No-Action ambient noise level would be expected to be around 59 dB(A) for this community. This No-Action ambient noise level is used for assessing the operational noise impact of the River Center project site.

Traffic Noise

As noted in Section 4.12 Noise and Vibration, the No-Action Alternative represents the future without Alternative 1 (Proposed Project) and is used as a baseline from which to compare the action alternatives. For noise resulting from traffic, the averaged loudest-hour noise levels for the No-Action Alternative would increase by 1 to 5 dB(A) versus the existing 2013 condition for most of the noise receptors. This increase would be caused by growth of traffic volumes, including an increase in the number of heavy trucks during the loudest hour projected for the No-Action Alternative.

Rail Noise

The future rail operations for the No-Action Alternative reflect the growing number of train occurrences or increasing average length of trains not related to the Project alternatives that will be generated by various developments in North Charleston and elsewhere. A number of the existing

noise-sensitive land uses (defined as residences, schools, churches, hospitals, parks, etc.) would be located within the 2038 No-Action Alternative noise contours from the tracks as the result of the general non-Project related developments. The 2038 No-Action ambient noise levels in the vicinity of the future tracks are estimated below 60 dB(A) DNL. This estimate is based on the field-measured existing noise levels in the study area as described in Section 3.12 and adjusted for design year 2038. The No-Action noise level increase versus the existing condition for rail activity does not constitute a noise impact.

Rail Vibration

The ground-borne vibration levels generated by train activities at vibration-sensitive receptors along the existing railroad segments would remain steady for the No-Action Alternative for the 2038 design year. Rail vibration effects are unlikely; however, a single-family residence at 2312 Taylor Street is currently located at a distance of 23 feet from the centerline of the existing Reads Branch track segment at Rivers Avenue, which is very close to the vibration impact threshold distance of 20 feet. Due to this proximity, train activities on the track would potentially generate some vibration effects for the receptor exceeding the vibration impact criterion even under the existing and No-Action conditions.

Noise and Vibration Human Health Impact Summary

As a result, there would be no impacts to human health and safety from noise and vibration associated with the No-Action Alternative.

4.17.2.4 Air Quality

The quality of ambient air plays an important role in the health of the public. Exposure to pollutants is associated with numerous effects on human health, including increased respiratory symptoms, hospitalization for heart or lung disease, and even premature death. The EPA sets NAAQS limits to protect human health. Section 3.13.2 describes each of the criteria air pollutants for which a NAAQS has been established and their known health effects. As stated in Section 3.13 (Air Quality), the Charleston region currently meets all NAAQS, but ozone levels in North Charleston are relatively high due to industrial and mobile sources in the area.

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. 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. Criteria pollutants emitted from the No-Action Alternative, along with the existing and projected criteria pollutants, 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. 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.

Air Quality Human Health Impact Summary

The No-Action Alternative would result in a minor impact to human health and safety from air quality impacts.

4.17.2.5 Hazardous Materials

As documented in Section 4.15 (HTRW), the No-Action Alternative results in a minor impact from the potential to encounter 10 known contaminated sites. Minor impacts result from excavation activities, exposure to contaminated groundwater from dewatering in excavation areas, demolition of (unknown number of) structures with asbestos and/or metals-based paints, and minor and/or major (depending on location) impacts from potential accidental spills; however, with implementation of BMPs during construction and operation (Section 4.15.3.2), there is a negligible impact to human health from hazardous waste and materials.

4.17.2.6 Community Safety and Emergency Response Times

The No-Action Alternative would have negligible impacts to safety and emergency response if redevelopment occurred to include rail-served warehousing and distribution facilities and if daily average time delays for commuters are similar to those experienced under existing conditions.

In addition, Charleston County EMS has adopted the following response time goals for urban/suburban areas:

- Acceptable – Response time less than 8 minutes 80 percent of the time
- Marginal – Response time between 8 and 15 minutes
- Unacceptable – Response time greater than 15 minutes

4.17.2.7 Light and Glare

Light and glare can have a variety of adverse health effects. There is limited to no lighting currently on the Project site and River Center project site, and no nighttime port activities. Existing lighting is for security, street illumination (e.g., street lights), and what is required to operate low-level cranes. Future development could increase levels of light and glare above existing conditions; however, this level of light and glare would be consistent with adjacent land uses and likely result in no impact to

viewers and/or adjacent residents during nighttime. Therefore, there would be no impact to human health and safety from light and glare with the No-Action Alternative.

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

Section 1.7 details the design elements of Alternative 1 (Proposed Project) and operations of the proposed facility. Potential risks to human health and safety during construction and operation of Alternative 1 (Proposed Project) are identified by impact type.

4.17.3.1 Worker Safety

Construction and operation of the ICTF involves features and activities that can expose workers to potential injuries, illnesses, or fatalities; however, the potential risk of injury from Project facilities is considered low, because of the design features included with Alternative 1 (Proposed Project), safety precautions and training measures that would be implemented by the Applicant during construction and operation of the facility, and compliance with safety guidelines (Section 4.17.12.1). Therefore, there would be a negligible impact to worker health and safety with Alternative 1 (Proposed Project).

4.17.3.2 Drinking Water Quality

As identified for the No-Action Alternative, drinking water supply sources for all of North Charleston are located outside of the study area (Bushy Park Reservoir and Edisto River) and would not be impacted by Alternative 1 (Proposed Project) from construction activities or from disturbance of known contaminated groundwater sources. Therefore, there would be a negligible impact to human health and safety from drinking water quality impacts with Alternative 1 (Proposed Project).

4.17.3.3 Noise and Vibration

Impacts from traffic, rail (includes horns), construction, and operational noise from the Project site under Alternative 1 (Proposed Project) were identified by comparing the increase in noise over the No-Action Alternative (existing condition). Impact levels are defined as:

- 0 to 3 dB(A) increase in $L_{eq(h)}$ is a no or negligible impact
- 3 to 5 dB(A) increase in $L_{eq(h)}$ is a minor impact
- 5 to 10 dB(A) increase in $L_{eq(h)}$ is a moderate impact
- Increase in $L_{eq(h)}$ greater than 10 dB(A) is a major impact

Following the FTA recommendation, the ground-borne vibration level of 80 VdB from infrequent train pass by events typical for the Project alternatives is considered the impact criterion for vibration-sensitive land uses, such as residences and other buildings where people normally sleep (Category 2). Unlike the relative noise impact criteria that are based on a comparison of the future

build alternatives with the No-Action Alternative, the vibration impact criterion is “absolute” in that the vibration impact is likely when a build alternative’s predicted vibration level exceeds the vibration velocity threshold indicated above. Also in contrast to the aggregate Leq or DNL metrics used for the noise impact criteria, which combine multiple noise events within a certain time period, the vibration impact criterion applies to individual train pass by events.

Traffic Noise

Alternative 1 (Proposed Project) results in a negligible impact from traffic noise when compared to the No-Action alternative.

Rail Noise

The noise contours along the rail segments between Dorchester Road to Misroon Street (existing) (Segments 1, 2, and 3), Hackemann Avenue to Discher Street (existing) (Segment 7), and Avenue B and the ICTF facility (proposed) (Segment 5) would expand considerably under Alternative 1 as compared to the No-Action Alternative. Regarding train and train horn noise, under Alternative 1 (Proposed Project), the number of residences that will have a major impact is 0, moderate impact is 145, and minor impact is 25. Alternative 1 (Proposed Project) would result in minor to moderate impacts [[3 to 10 dB(A)] along several segments due to increased rail activity and new track builds.

Rail Vibration

Potential rail vibration impacts were evaluated for land uses identified along the selected railway segments and included 76 receptors. These locations can be found in Appendix H. Based on the evaluation, it was determined that receptors located at a distance less than 20 feet from the track centerline would experience rail vibration impacts (defined as 80 VdB). Under Alternative 1, none of the receptors are located at a distance less than 20 feet from the track centerline; therefore, rail vibration effects would be unlikely for the 76 receptors analyzed. The ground-borne vibration generated by train activities would produce no or negligible impact for the vibration-sensitive receptors along the railroad segments in the study area in comparison with the 2038 No-Action Alternative. As a result, there would be negligible rail vibration impacts for Alternative 1 (Proposed Project) in comparison with the 2038 No-Action Alternative.

Construction Noise

The average construction noise levels at the nearest residential land uses (residential receptors located 10 feet away from the foot of the berm) would meet the established criterion of 80 dB(A) during the general demolition/grading phase and the on-site ICTF yard construction phase. For short periods of time over the earthen berm construction (15 days) and pile driving activities (total of 90 days), the average noise levels are expected to exceed the acceptable criterion of 80 dB(A). Several potential scenarios of the equipment distribution over the northern rail connection construction area

for a ground cut section (trench) and sound walls adjacent to St. Johns Avenue and Avenue F under Alternative 1 were modeled. For the nearest noise-sensitive receptors (residential and St. John Catholic Church and School) located at approximately 100 feet from the trench and/or sound wall, the estimated average construction noise levels would vary between 74 and 79 dB(A), thus below the established construction noise criterion of 80 dB(A). Construction activities of the predicted noise levels would be clearly audible over the existing ambient noise in the surrounding communities, but may be tolerable due to the interim nature of the disturbance. The earthen berm construction and pile driving activities would be short-term, but still generate minor to moderate noise impacts with potential adverse community reaction.

Operational Noise

Exterior noise impacts from Alternative 1 (Proposed Project) operations are determined in comparison with the 2038 No-Action Alternative exterior noise levels for the community adjacent to the site (see Table 4.12-5). The impacts for the nearest receptors (10 feet from the berm) are summarized in Table 4.12-14 for daytime and nighttime conditions. Daytime noise impact (7:00 a.m. to 10:00 p.m.) is most important to consider as this can affect people's activities outside their homes. The exterior noise levels from the ICTF operations would exceed the No-Action ambient noise level in the Chicora-Cherokee communities during daytime hours by up to 7 dB(A). Such an increase constitutes a moderate noise impact for the residential land uses nearest to the Project site (as defined in Table 4.12-6). For the second row of homes along the earthen berm, assuming some shielding from the first row of homes, the daytime noise impact from the ICTF operations could be up to 4 dB(A), which is a minor impact. For the third row of homes, a negligible daytime noise impact below 3 dB(A) would likely be produced due to shielding from both the first and second rows of homes. It is anticipated that negligible daytime noise impacts below 3 dB(A) would be generated by the ICTF operations at distances beyond approximately 180 feet from the earthen berm.

Ambient noise associated with ICTF operations could expose the adjacent residential areas to exterior noise level increases over the No-Action ambient of 4 to 7 dB(A) during daytime hours (defined as 7:00 a.m. to 10:00 p.m.) and 14 to 17 dB(A) during nighttime hours (defined as 10:00 p.m. to 7:00 a.m.). When compared to the No-Action ambient, this would equate to a major impact during the nighttime hours to exterior noise levels. However, the nighttime hours are generally associated with sleep. Refer to subsection 4.12.3.5 for information on exterior to interior noise reduction, sleep disturbance, and sleep disturbance health effects. Interior noise levels are not anticipated to disrupt sleep. In general, minor to moderate exterior daytime impacts and major exterior nighttime impacts would result from operational noise associated with Alternative 1 (Proposed Project).

Additive Noise Impacts

The impacts indicated for each noise source generally relate to different groups of affected receptors, which are analyzed separately in this document and Appendix H. For example, receptors that would

experience rail noise impacts (located along certain track segments), would, for the most part, not be subject to noise impacts from vehicular traffic, ICTF construction, or ICTF operations. Exceptions to the general rule above include noise sensitive receptors located along several of the road segments in the study area. For Alternative 1 (Proposed Project), additive noise impacts would be negligible in the vicinity of Virginia Avenue for traffic and rail noise and minor to moderate in the vicinity of St. Johns Avenue for traffic and rail noise (see Section 4.12.10).

Noise and Vibration Human Health Impact Summary

Within the study area, the composite impacts of noise and vibration would be negligible. However, in localized areas (within close proximity to the ICTF and/or several segments of new track [see Section 4.12]) impacts of exterior noise would be minor to moderate (daytime) and major (nighttime). Refer to subsection 4.12.3.5 for information on exterior to interior noise reduction. Interior noise levels are not anticipated to disrupt sleep. Included as a mitigation measure, the construction of an earthen berm along the western boundary of the Project site boundary reduces the number of noise sensitive receivers affected by operational noise from the facility. Additional noise mitigation measures for Alternative 1 (Proposed Project) include a cut-section (trench), four sound walls (See Figure 4.12-15), and the option for qualified owners to have the right to relocate if they so choose (Chapter 6 and Appendix N). As a result of proposed mitigation, the overall impact to human health and safety from noise and vibration with Alternative 1 (Proposed Project) would be minor.

4.17.3.4 Air Quality

Proposed Project construction criteria pollutant emissions would be short term and spread out over 5 years. Potential impacts to air quality would be minor short-term adverse. Operational criteria pollutant emissions would be less than 1 percent of the 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.

Air Quality Human Health Impact Summary

The overall impact to human health and safety from air quality impacts by Alternative 1 (Proposed Project) would be minor permanent adverse. Due to air quality concerns in the community; a Air Quality Memorandum of Agreement (MOA) between the Applicant and SCDHEC was executed on

October 26, 2016, and commits to several air quality initiatives (see the Community Mitigation Plan in Appendix N for additional details and a copy of the Air Quality MOA).

4.17.3.5 Hazardous Materials

Impacts to human health and safety from hazardous materials by Alternative 1 (Proposed Project) are similar to the No-Action Alternative. A minor impact results from the potential to encounter 23 known contaminated sites. Minor impacts result from excavation activities, exposure to contaminated groundwater from dewatering in excavation areas, and the demolition of approximately 150 structures with asbestos and/or metals-based paints. There is no anticipated involvement with the Macalloy Superfund site. There is potential for minor and/or major impacts from accidental spills on the Project site from the use of ASTs (diesel fuels), storage of other minor amounts of solvents on the premises, and from containers containing hazardous materials. However, with implementation of BMPs during construction and operation (Section 4.15.11), there is a negligible impact to human health from hazardous waste and materials.

4.17.3.6 Community Safety and Emergency Response Times

Community safety and emergency response impacts associated with Alternative 1 (Proposed Project) are related to the construction of an additional at-grade crossing and an increase in truck volumes on local streets. Construction of the rail and ROW improvements at Meeting Street for the southern rail connection would result in one new major at-grade rail crossing. This new at-grade rail crossing would have a minor indirect adverse impact to community safety by introducing a new conflict point between trains and automobiles, bicycles, and pedestrians. There are existing bike lanes and sidewalks along Meeting Street at the location of this proposed new at-grade crossing.

This new at-grade crossing may also have a minor adverse impact on emergency response times for certain locations, because there is the potential for Meeting Street to be blocked for approximately 11 minutes⁹⁸, four times a day in design year 2038, when the trains are entering and leaving the ICTF. Detour routes are available, such as the elevated Stromboli Avenue and Cosgrove-McMillan Overpass, but the detour could increase response times, depending on the location of the emergency. The community of Union Heights would also experience a minor adverse impact to emergency response, if a train related to Alternative 1 (Proposed Project) was blocking access on both east and west access points as it navigated the U-turn.

In the northern portion of the Navy Base ICTF, the grade separation of Cosgrove Avenue with multi-use path over proposed rail tracks on the Project site would preserve east-west mobility for automobiles, bicycles, and pedestrians, and would preserve access to the eastern portion of the northern study area for emergency responders.

⁹⁸ Based on an 8,000-foot train traveling at 10 miles per hour through the crossing.

During Project scoping, the City of Charleston identified its acquirement of approximately 16 acres of land north of Herbert Street for the construction of a new public service operations center for Police, Fire and Public Service. The City of Charleston identified a concern that the southern rail connection would extend through a portion of the proposed operations center facility affecting the size of the facility and access to/from the property. The City of Charleston also noted that the emergency access and daily access to the site are critical to their planned operations center to enable the City of Charleston to provide essential police, fire, and public safety services to residents. Mitigation for impacts is included in Appendix N.

Community Safety and Emergency Response Time Human Health Impact Summary

While there are short-term adverse construction related impacts and long-term adverse operational impacts to emergency response times under Alternative 1 (Proposed Project), the overall impact is minor, because response times would be longer than those under the No-Action Alternative; however, alternate routes for emergency responders are available. In addition, transportation studies will be conducted to further examine potential impacts to surrounding the ICTF. The Surface Transportation Study and Crossing Analysis will examine impacts and make recommendations on potential transportation improvements that could potentially improve the surrounding transportation network and routes for emergency response. See Section 4.8.1 for additional information on these studies. The overall impact to human health and safety from community safety and emergency response impacts associated with Alternative 1 (Proposed Project) would be minor.

4.17.3.7 Light and Glare

New sources for light and glare associated with Alternative 1 (Proposed Project) include the 85-foot-tall mast lighting that would be illuminated from dusk to dawn, as well as new train activity using the arrival and departure tracks. As per Palmetto Railways' proposed mitigation measures, the lighting on the ICTF would be directed downward and shielded to reduce spill light onto adjacent residential uses, and the photometric design would result in less than 0.5 foot-candles outside of the Project site. Analysis of lighting effects on residential structures adjacent to the Project site within the Chicora-Cherokee Neighborhood indicate that illumination would result in the desired mitigation of light illumination of less than 0.5 foot-candles (Appendix B). As a result of these mitigation measures, the impact intensity from high mast lighting would result in a negligible, permanent adverse impact. Lighting of the ICTF during night time would not be of sufficient illumination as to disturb sleep and other nighttime activities off of the Project site.

When trains operate at night, train headlights could shine into residential windows at points where the track turns, primarily affecting structures within the Hospital District (e.g., near McMillan Avenue and St. Johns Avenue). This effect would be similar to the flash of vehicle headlights, although substantially more intense. Residences and other structures within the Hospital District are most

likely to be affected by train headlamps at night, with the likelihood of no more than 2 trains at night with full build-out. Only those residences within 800 feet of the direct beam of the trains would be affected, though intervening vegetation, trees, and other structures would help to block the light. Although the effect of train lighting on viewers in locations where the tracks curve could be intense, the effect would be momentary and occur seldom, and few viewers over a minimal geographic area would be impacted. There would be a minor adverse impact from light and glare as a result of new train activity.

Light from increased truck traffic along the drayage road would not be anticipated to affect adjacent residential uses given the earthen berm and walls that would be constructed at the western boundary of the Project site.

Light and Glare Human Health Impact Summary

There would be minor adverse impacts to human health and safety from light and glare for Alternative 1 (Proposed Project).

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

Section 2.4 summarizes the design elements of Alternative 2 and operations of the proposed facility. Potential risks to human health and safety during construction and operation of Alternative 2 include:

4.17.4.1 Worker Safety

Potential risks to worker safety under Alternative 2 would be similar to Alternative 1 (Proposed Project). The impact to worker health and safety is negligible for the same reasons identified for Alternative 1 (Proposed Project).

4.17.4.2 Drinking Water Quality

The impact to human health and safety from drinking water quality impacts under Alternative 2 would be similar (negligible) to Alternative 1 (Proposed Project).

4.17.4.3 Noise and Vibration

Impacts from traffic, rail (includes horns), construction, and operational noise from the Project site under Alternative 2 were identified by comparing the increase in noise over the No-Action Alternative (existing condition).

Traffic Noise

Alternative 2 would result in a negligible impact, similar to Alternative 1 (Proposed Project), from traffic noise when compared to the No-Action alternative.

Rail Noise

Under Alternative 2, new build rail segments would be built from O'Hear Avenue to the ICTF facility in the vicinity and south of crossing 19 (Segment 6). Noise from trains along these stretches of track would impact eight residences along the first segment and 10 residences along the southern continuation of the rail line parallel to Spruill Avenue. Impacts along these rail segments would be moderate to major. It should be noted that land uses in closer proximity to the track path may need to be demolished to construct the track. Regarding train and train horn noise, under Alternative 2, the number of residences that will have a major impact is four, moderate impact is 133, and minor impact is 25. Alternative 2 would result in impacts similar to Alternative 1 (Proposed Project), from rail noise (minor to moderate) when compared to the No-Action Alternative.

Rail Vibration

Under Alternative 2, impacts from ground-borne vibration generated by train activities would be negligible and similar to Alternative 1 (Proposed Project).

Construction Noise

Noise conditions related to the ICTF construction activities under Alternative 2 are the same as those estimated under Alternative 1 (minor to moderate and short term).

Operational Noise

Noise impacts from the Project site operations under Alternative 2 are the same as the ones estimated for Alternative 1 (minor to moderate for daytime noise and major for exterior nighttime noise).

Additive Noise Impacts

For Alternative 2, additive noise impacts would be negligible in the vicinity of Virginia Avenue and Spruill Avenue for traffic and rail noise (see Section 4.12.10).

Noise and Vibration Health Impact Summary

The overall impact to human health and safety from noise and vibration impacts by Alternative 2 would be similar to impacts with Alternative 1 (Proposed Project).

4.17.4.4 Air Quality

Impacts to Air Quality by Alternative 2 construction criteria pollutant emissions would be similar to Alternative 1 (Proposed Project). Criteria pollutant emissions and impacts from operational activities would be the same as Alternative 1 (Proposed Project). Criteria pollutants emitted from the operation of Alternative 2, along with the existing 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. Non-DPM HAPs emissions from operational activities and impacts would be the same as Alternative 1 (Proposed Project). 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.

Air Quality Human Health Impact Summary

The overall impact to human health and safety from air quality impacts by Alternative 2 would be similar (minor, permanent adverse) to Alternative 1 (Proposed Project).

4.17.4.5 Hazardous Materials

Impacts to Human Health and Safety from hazardous materials by Alternative 2 would be similar to Alternative 1 (Proposed Project), except there are 30 fewer buildings that would be demolished reducing the potential to encounter asbestos and/or metals-based paints and 22 known contaminated sites. However, with implementation of BMPs during construction and operation (Section 4.15.11) there would be a negligible impact to human health from hazardous waste and materials.

4.17.4.6 Community Safety and Emergency Response Times

Impacts to community safety and emergency response under Alternative 2 would be similar to those under Alternative 1 (Proposed Project), however there are several differences. Under Alternative 2, the northern rail connection would be relocated along Spruill Avenue within existing ROW to the S-line, and turn east along Aragon Avenue to the existing NCTC rail line. As a result of the rail alignment, a cul-de-sac would be constructed at the southern end of St. Johns Avenue. The former Charleston Naval Complex gate at Turnbull Avenue will be open to provide future access between St. Johns Avenue and Noisette Boulevard. Same as Alternative 1 (Proposed Project), Alternative 2 creates a new at-grade rail crossing at the intersection of Meeting Street and Herbert Street and at O'Hear Avenue south of Bexley Street.

Alternative 2 results in a minor adverse impact to human health from delay to emergency response times for the same reasons as Alternative 1 (Proposed Project).

4.17.4.7 Light and Glare

The overall impact to human health and safety from light and glare by Alternative 2 would be similar (minor) to Alternative 1 (Proposed Project).

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

Section 2.4 summarizes the design elements of Alternative 3 and operations of the proposed facility. Potential risks to human health and safety during construction and operation of Alternative 3 include:

4.17.5.1 Worker Safety

Potential risks to worker safety under Alternative 3 would be similar to Alternative 1 (Proposed Project). The impact to worker health and safety would be negligible for the same reasons identified for Alternative 1 (Proposed Project).

4.17.5.2 Drinking Water Quality

The impact to human health and safety from drinking water quality impacts under Alternative 3 would be similar (negligible) to Alternative 1 (Proposed Project).

4.17.5.3 Noise and Vibration

Impacts from traffic, rail (includes horns), construction, and operational noise from the Project site under Alternative 3 were identified by comparing the increase in noise over the No-Action Alternative (existing condition).

Traffic Noise

Under Alternative 3, impacts from traffic noise when compared to the No-Action alternative would be the same (negligible) as Alternative 1 (Proposed Project).

Rail Noise

A new build rail segment from Meeting Street to Spruill Avenue in the vicinity of crossing 20 (Segment 8) would be built under Alternative 3, and noise from trains would impact 10 noise sensitive receivers along the segment. The noise impact for these receivers would be minor to moderate. Land uses in closer proximity to the track path may be demolished in the construction of the rail track for this alternative. Under Alternative 3, the proposed rail configuration between Avenue B and the ICTF facility (Segment 5) is identical to the Alternative 1 alignment and would impact the same receivers. A moderate noise impact is estimated for these land uses. Regarding train and train horn noise, under

Alternative 3, the number of residences that will have a major impact is 0, moderate impact is 140, and minor impact is 28.

Rail Vibration

Under Alternative 3, impacts from ground-borne vibration generated by train activities would be similar (negligible) to Alternative 1 (Proposed Project).

Construction Noise

Noise conditions related to the ICTF construction activities under Alternative 3 are the same as those estimated under Alternative 1 (minor to moderate and short-term).

Operational Noise

Noise impacts from the Project site operations under Alternative 3 are the same as those estimated for Alternative 1 (minor to moderate for daytime noise and major for exterior nighttime noise).

Additive Noise Impacts

For Alternative 3, additive noise impacts would be negligible in the vicinity of Virginia Avenue for traffic and rail noise and minor to moderate in the vicinity of St. Johns Avenue for traffic and rail noise (see Section 4.12.10).

Noise and Vibration Health Impact Summary

The overall impact to human health and safety from noise and vibration impacts by Alternative 3 would be similar to impacts under Alternative 1 (Proposed Project).

4.17.5.4 Air Quality

Impacts to Air Quality by Alternative 3 construction criteria pollutant emissions would be similar to Alternative 1 (Proposed Project). Criteria pollutant emissions and impacts from operational activities would be the same as Alternative 1 (Proposed Project). Criteria pollutants emitted from the operation of Alternative 3, along with the existing 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. Non-DPM HAPs emissions from operational activities and impacts would be the same as Alternative 1 (Proposed Project). 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.

Air Quality Human Health Impact Summary

The overall impact to human health and safety from air quality impacts by Alternative 3 (minor, permanent adverse) would be similar to Alternative 1 (Proposed Project).

4.17.5.5 Hazardous Materials

Impacts to Human Health and Safety from hazardous materials by Alternative 3 would be similar to Alternative 1 (Proposed Project), except there are 10 fewer buildings that would be demolished reducing the potential to encounter asbestos and/or metals-based paints and only 11 known contaminated sites. However, with implementation of BMPs during construction and operation (Section 4.15.11), there is a negligible impact to human health from hazardous waste and materials.

4.17.5.6 Community Safety and Emergency Response Times

Impacts to community safety and emergency response under Alternative 3 would be similar to those under Alternative 1 (Proposed Project), however there are several differences. The southern rail connection would connect to an existing rail line near Kingsworth Avenue (and adjacent to existing rail and ROW); therefore, the existing at-grade crossings of Pittsburgh Avenue and Discher Street would not be impacted with ICTF train occurrences and the new at-grade crossing of Meeting Street at Herbert Street would not be created for Alternative 3. Alternative 3 would create at-grade crossings, of both Meeting Street and Spruill Avenue near Kingsworth Avenue.

The new at-grade rail crossings would have a minor indirect adverse impact to community safety by introducing new conflict points between trains and automobiles, bicycles, and pedestrians. There are existing bike lanes and sidewalks along Meeting Street and Spruill Avenue at the location of these proposed new at-grade crossings.

These new at-grade crossings may also have a moderate adverse impact on emergency response times for certain locations, because there is the potential for Meeting Street and Spruill Avenue to be blocked for approximately 11 minutes⁹⁹, four times a day in design year 2038, when the trains are entering and leaving the ICTF. Detour routes are available such as the elevated Stromboli Avenue and Cosgrove-McMillan Overpass, but the detour could increase response times, depending on the location of the emergency. The community of Union Heights, Windsor, and Howard Heights might also have a moderate adverse impact to emergency response if a train related to the Alternative 3 was blocking access on both east and west access points as it navigated the U-turn.

⁹⁹ Based on an 8,000-foot train traveling at 10 miles per hour through the crossing.

Community Safety and Emergency Response Human Health Impact Summary

Alternative 3 would result in minor adverse impacts to emergency response times, similar to Alternative 1 (Proposed Project), with localized moderate impacts to emergency response that would not occur under Alternative 1 (Proposed Project).

4.17.5.7 Light and Glare

The overall impact to human health and safety from light and glare by Alternative 3 would be similar to Alternative 1 (Proposed Project).

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

Section 2.4 summarizes the design elements of Alternative 4 and operations of the proposed facility. Potential risks to human health and safety during construction and operation of Alternative 4 include:

4.17.6.1 Worker Safety

Potential risks to worker safety under Alternative 4 would be similar to Alternative 1 (Proposed Project). The impact to worker health and safety is negligible for the same reasons identified for Alternative 1 (Proposed Project).

4.17.6.2 Drinking Water Quality

The impact to human health and safety from drinking water quality impacts under Alternative 4 would be similar (negligible) to Alternative 1 (Proposed Project).

4.17.6.3 Noise and Vibration

Impacts from traffic, rail (includes horns), construction, and operational noise from the Project site under Alternative 4 were identified by comparing the increase in noise over the No-Action Alternative (existing condition).

Traffic Noise

Under Alternative 4, impacts from traffic noise when compared to the No-Action alternative would be the same (negligible) as Alternative 1 (Proposed Project).

Rail Noise

Under Alternative 4, the noise contours along the rail segment from north of Dorchester Road to Misroon Street (Segments 1, 2 and 3) and from Hackemann Avenue to Discher Street (Segment 7) would be significantly expanded in comparison to the No-Action Alternative. Regarding train and

train horn noise, under Alternative 3, the number of residences that will have a major impact is 0, moderate impact is 209, and minor impact is 70.

Rail Vibration

Under Alternative 4, impacts from ground-borne vibration generated by train activities would be similar (negligible) to Alternative 1 (Proposed Project).

Construction Noise

Noise conditions related to the ICTF construction activities under Alternative 4 would be the same (minor to moderate and short-term) as the ones estimated under Alternative 1.

Operational Noise

Noise impacts from the Project site operations under Alternative 4 would be the same (minor to moderate for daytime noise and major for exterior nighttime noise) to the ones estimated for Alternative 1.

Additive Noise Impacts

For Alternative 4, no additive noise impacts are anticipated.

Noise and Vibration Health Impact Summary

The overall impact to human health and safety from noise and vibration impacts by Alternative 4 would be similar to impacts under Alternative 1 (Proposed Project).

4.17.6.4 Air Quality

Impacts to Air Quality by Alternative 4 construction criteria pollutant emissions would be similar to Alternative 1 (Proposed Project). Criteria pollutant emissions and impacts from operational activities would be the same as Alternative 1 (Proposed Project). Criteria pollutants emitted from the operation of Alternative 4, along with the existing 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. Non-DPM HAPs emissions from operational activities and impacts would be the same as Alternative 1 (Proposed Project). 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.

Air Quality Human Health Impact Summary

The overall impact to human health and safety from air quality impacts by Alternative 4 (minor permanent adverse) would be similar to Alternative 1 (Proposed Project).

4.17.6.5 Hazardous Materials

Impacts to Human Health and Safety from hazardous materials by Alternative 4 would be similar to Alternative 1 (Proposed Project). However, with implementation of BMPs during construction and operation (Section 4.15.11) there would be a negligible impact to human health from hazardous waste and materials.

4.17.6.6 Community Safety and Emergency Response Times

Impacts to community safety and emergency response under Alternative 4 would be similar to those under Alternative 1 (Proposed Project), however there are several differences. Alternative 4 is a variation of Alternative 1 (Proposed Project) where all trains would enter and exit the ICTF from a southern rail connection. Proposed rail through the Hospital District would stop short of Noisette Creek.

Under Alternative 4, trains would use the southern rail alignment to Milford Street. Since there would be no northern rail connection, Alternative 4 would not impact the at-grade crossings of Rivers Avenue, Virginia Avenue, and Avenue B. Alternative 4 would have twice as many ICTF train occurrences than Alternative 1 (Proposed Project), eight per day, at the at-grade crossings along the southern alignment. The community of Union Heights might also have a moderate adverse impact to emergency response, if a train related to the Alternative 4 was blocking access on both east and west access points as it navigated the U-turn.

Community Safety and Emergency Response Human Health Impact Summary

Alternative 4 would result in minor adverse impacts to emergency response times, similar to Alternative 1 (Proposed Project).

4.17.6.7 Light and Glare

The overall impact to human health and safety from light and glare by Alternative 4 is similar (minor) to Alternative 1 (Proposed Project).

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

Section 2.4 summarizes the design elements of Alternative 5 and operations of the proposed facility on the River Center project site. Potential risks to human health and safety during construction and operation of Alternative 5 include:

4.17.7.1 Worker Safety

Construction and operation of Alternative 5 involves features and activities that can expose workers to potential injuries, illnesses, or fatalities; however, the potential risk of injury from Project facilities is considered low because of the design features included with Alternative 5, safety precautions and training measures that would be implemented by the Applicant during construction and operation of the facility, and compliance with safety guidelines (Section 4.17.12.1). Therefore, there would be a negligible impact to worker health and safety with Alternative 5.

4.17.7.2 Drinking Water Quality

As identified for the No-Action Alternative, drinking water supply sources for all of North Charleston are located outside of the study area (Bushy Park Reservoir and Edisto River) and would not be impacted by Alternative 5 construction activities or from disturbance of known contaminated groundwater sources. Therefore, there would be a negligible impact to human health and safety from drinking water quality impacts with Alternative 5.

4.17.7.3 Noise and Vibration

Impacts from traffic, rail (includes horns), construction, and operational noise from the Project site under Alternative 5 were identified by comparing the increase in noise over the No-Action Alternative (existing condition).

Traffic Noise

Alternative 5 would result in a minor to moderate impact to 18 receptors in the Chicora-Cherokee community exposed to traffic noise from the proposed drayage road from the River Center project site through the Proposed Project site.

Rail Noise

Under Alternative 5, operations on the rail segment from north of Dorchester Road to Misroon Street (Segments 1, 2 and 3), Hackemann Avenue to Discher Street (Segment 7), and Pittsburg Avenue to the ICTF facility (Segment 10), north of crossing 17 would increase in comparison to the No-Action Alternative, similar to Alternative 1 (Proposed Project). Regarding train and train horn noise, under

Alternative 5, the number of residences that will have a major impact is 0, moderate impact is 142, and minor impact is 25.

Rail Vibration

Under Alternative 5, the ground-borne vibration generated by train activities would produce no or negligible impact for the vibration-sensitive receptors along the railroad segments in the study area in comparison with the 2038 No-Action Alternative. Rail vibration effects would be unlikely for the 76 receptors analyzed.

Construction Noise

For Alternative 5, the average construction noise levels at the nearest residential land uses would meet the established criterion of 80 dB(A) during the general demolition/grading phase and the on-site ICTF yard construction phase. For short periods of time over the sound wall construction and other pile driving activities, the average noise levels are expected to exceed the accepted criterion and produce a minor to moderate short-term adverse impact. Construction activities would be clearly audible over the existing ambient noise in the community, but may be tolerable due to the interim nature of the disturbance. The pile driving activities would be short-term.

Operational Noise

Noise impacts from the River Center operations are based on exterior levels and were determined in comparison with the 2038 No-Action Alternative noise levels for the community adjacent to the site (see Table 4.12-5). The impacts for the nearest receptors are summarized in Table 4.12-21 for daytime and nighttime conditions. Daytime noise impact (7:00 a.m. to 10:00 p.m.) is most important to consider, as this can affect people's activities outside their homes. The exterior noise levels from the ICTF operations would exceed the daytime No-Action ambient noise level at the edge of the CNYOQ Historic District during daytime hours by up to 2 dB(A), which is a negligible impact (as defined in Table 4.12-6). Loud operations like rail car coupling would be audible at the nearest residences but, in general, operational noise levels would remain comparable to the ambient noise. Homes east of Manley Avenue and beyond are also expected to experience negligible or no noise impact from daytime ICTF operations due to increased distance and shielding effect from other homes.

Ambient noise associated with ICTF operations could expose the adjacent residential areas to exterior noise level increases over the No-Action ambient of 0 to 2 dB(A) during daytime hours (defined as 7:00 a.m. to 10:00 p.m.) and 9 to 12 dB(A) during nighttime hours (defined as 10:00 p.m. to 7:00 a.m.). When compared to the No Action ambient, this would equate to a moderate to major impact during the nighttime hours to exterior noise levels. However, the nighttime hours are generally associated with sleep. Refer to subsection 4.12.7.5 for information on exterior to interior noise reduction and sleep disturbance. Interior noise levels are not anticipated to disrupt sleep.

Additive Noise Impacts

For Alternative 5, additive noise impacts would be negligible in the vicinity of Virginia Avenue for traffic and rail noise because rail-generated DNL at these residences are much lower than DNL sound levels generated by traffic noise and rail noise does not provide a noticeable effect in addition to traffic noise (Table 4.12-26). Under the River Center Alternatives (5, 6, and 7), a new rail track segment would run from Pittsburg Avenue to the ICTF along the new Port drayage road in the vicinity of the eastern neighborhood boundary of the Chicora-Cherokee community. The predicted traffic noise levels from UTR trucks on the drayage road would combine with the rail noise under Alternatives 5 and 6, and the additive level of up to 65 dB(A) DNL would exceed the No-Action level (53 dB(A) by up to 12 dB(A)), generating a major additive noise impact for those receptors (Table 4.12-26). Noise sensitive receptors along Noisette Boulevard in the vicinity of the River Center site would experience both traffic noise and ICTF operational noise under River Center Alternatives (5, 6, and 7). The operational noise range would essentially remain unaffected when taking into account traffic noise. As the result, the River Center project site operational noise levels would, on average, exceed the noise levels generated by traffic on Noisette Boulevard, and the noise impact analysis of sub-section 4.12.7.5 remains valid.

Noise and Vibration Health Impact Summary

Within the study area the composite impacts of noise and vibration would be negligible. However, in localized areas (within close proximity to the River Center project site and/or several segments of track (see Section 4.12), impacts of noise would be minor to moderate (daytime) and major (nighttime). Refer to subsection 4.12.7.5 for information on exterior to interior noise reduction and sleep disturbance. Interior noise levels are not anticipated to disrupt sleep. Included as a mitigation measure, the construction of a sound wall along the eastern boundary of the River Center project site boundary reduces the number of noise sensitive receivers affected by operational noise from the facility.

4.17.7.4 Air Quality

Under 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. 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 NO₂ 1-hour NAAQS. Potential impacts would be minor adverse. Non-DPM HAP emissions from the River Center Alternatives 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.

Air Quality Human Health Impact Summary

Under Alternative 5, the Tri-County area may be in non-attainment for NO₂. This and other air quality impacts could result in a minor, permanent adverse impact to human health and safety.

4.17.7.5 Hazardous Materials

Impacts to Human Health and Safety from hazardous materials by Alternative 5 would be similar to Alternative 1 (Proposed Project), except 82 fewer buildings would be demolished. As a result, there is the potential to encounter asbestos and/or metals-based paints at 24 known contaminated soil sites. However, with implementation of BMPs during construction and operation (Section 4.15.11) there would be a negligible impact to human health from hazardous waste and materials.

4.17.7.6 Community Safety and Emergency Response Times

Community safety and emergency response impacts associated with Alternative 5 are generally related to the construction of the additional at-grade crossing and an increase in truck volumes on local streets.

Alternative 5 would result in a potential major adverse impact to emergency response times due to delays at at-grade crossings compared to the No-Action Alternative, because it would eliminate several east-west routes in the study area. McMillan Avenue and Reynolds Avenue would no longer provide a connection from Spruill Avenue to Noisette Boulevard. Cosgrove Avenue east of Spruill Avenue would only provide access to the River Center project site. The closest EMS station is located on Dorchester Road west of the study area. Emergency responders coming from the west side of the study area would have to go north of Noisette Creek then east to connect to Noisette Boulevard to access properties along the Cooper River. Emergency responders dispatching from Fire Station 2 on the corner of Carner Avenue and Clement Avenue would have to travel south to the future Stromboli Avenue Bridge over rail tracks then north on the improved Bainbridge Avenue to access properties on the Cooper River.

Similar to Alternative 1 (Proposed Project), construction of the rail and ROW improvements at Meeting Street for the southern rail connection would result in one new major at-grade rail crossing. This new at-grade rail crossing would have a potential minor, direct adverse impact to community safety by introducing a new conflict point between trains and automobiles, bicycles, and pedestrians. There are existing bike lanes and sidewalks along Meeting Street at the location of this proposed new at-grade crossing.

Similar to Alternative 1, there would be the potential for Meeting Street to be blocked by a train for approximately 11 minutes¹⁰⁰, four times a day in design year 2038, when the trains are entering and leaving the River Center ICTF. The CARTA Superstop is located at the corner of Cosgrove Avenue and Rivers Avenue. Alternative 5 would result in a high volume of trucks (2,161 trucks per day in 2018) traveling on Cosgrove Avenue to access the ICTF. These trucks could pose a safety concern to pedestrians walking to and from the buses.

Community Safety and Emergency Response Human Health Impact Summary

Alternative 5 would result in major adverse impacts to emergency response times due to delays at at-grade crossings and limited east-west access. In addition, Alternative 5 would also result in a minor impact to community safety due to an additional conflict point at the Meeting Street at-grade crossing. As a result, major impacts to human health and safety would result from Alternative 5.

4.17.7.7 Light and Glare

Under Alternative 5, light and glare impacts resulting from the high-mast lights on the ICTF would be similar to Alternative 1 (Proposed Project), which would result in a negligible, permanent adverse impact. Nighttime train activity would result in a negligible impact, as there would be few curvatures on the southern route to Milford Street where residences would be affected, including the Chicora-Cherokee Neighborhood.

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

Section 2.4 summarizes the design elements of Alternative 6 and operations of the proposed facility on the River Center project site. Potential risks to human health and safety during construction and operation of Alternative 6 include:

4.17.8.1 Worker Safety

Potential risks to worker safety under Alternative 6 would be similar to Alternative 5. The impact to worker health and safety is negligible for the same reasons identified for Alternative 5.

4.17.8.2 Drinking Water Quality

The impact to human health and safety from drinking water quality impacts under Alternative 6 is the same (negligible) as Alternative 5.

¹⁰⁰ Based on an 8,000-foot train traveling at 5 miles per hour through the crossing.

4.17.8.3 Noise and Vibration

Impacts from traffic, rail (includes horns), construction, and operational noise from the Project site under Alternative 6 were identified by comparing the increase in noise over the No-Action Alternative (existing condition).

Traffic Noise

Under Alternative 6, impacts from traffic noise when compared to the No-Action alternative would be the same (negligible except for minor to moderate traffic noise impact for the 18 residential land uses in the Chicora-Cherokee community) as Alternative 5.

Rail Noise

Under Alternative 6, the noise contours along the rail segment from north of Dorchester Road to Misroon Street (Segments 1, 2 and 3) and from Hackemann Avenue to Discher Street (Segment 7), would be significantly expanded in comparison to the No-Action Alternative. A proposed rail segment from Meeting Street to Spruill Avenue in the vicinity of crossing 20 (Segment 8) would be built under Alternative 6, and noise from trains would impact 10 noise sensitive receivers along the segment. Land uses in closer proximity to the track path may be demolished for construction of the proposed rail track. The proposed new rail segment between Spruill Avenue and the ICTF facility (Segment 9) would impact 23 noise sensitive receivers in the Chicora-Cherokee communities. Regarding train and train horn noise, under Alternative 6, the number of residences that will have a major impact is 0, moderate impact is 146, and minor impact is 28.

Rail Vibration

Under Alternative 6, impacts from ground-borne vibration generated by train activities would be similar (negligible) to Alternative 5. For the receptors located closer than 100 feet from the curved track near Kingsworth Avenue (Segment 8), vibration impact might occur under Alternative 6 due to the rail curvature (the strength of the potential impact cannot be assessed, because no methodology exists to quantify vibration levels at receptors located near a segment of curved track).

Construction Noise

Noise conditions related to the ICTF construction activities under Alternative 6 would be the same as those estimated under Alternative 5 (minor to moderate and short-term).

Operational Noise

Noise impacts from the Project site operations under Alternative 6 would be the same as those estimated for Alternative 5 (negligible exterior daytime and moderate to major exterior nighttime).

Additive Noise Impacts

For Alternative 6, additive noise impacts would be similar to Alternative 5.

Noise and Vibration Health Impact Summary

Alternative 6 would have similar impacts to human health and safety from noise and vibration impacts as Alternative 5.

4.17.8.4 Air Quality

Impacts to Air Quality by Alternative 6 construction criteria pollutant emissions would be similar to Alternative 5. Criteria pollutant emissions and impacts from operational activities would be the same as Alternative 5. Criteria pollutants emitted from Alternative 6, along with the existing and projected criteria pollutants, may put the Tri-County area into non-attainment for the NO₂ 1 hour NAAQS. Potential impacts would be minor adverse. Non-DPM HAPs emissions from operational activities and impacts would be the same as Alternative 5. 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.

Air Quality Human Health Impact Summary

The overall impact to human health and safety from air quality impacts by Alternative 6 would be similar to Alternative 5 (minor permanent adverse).

4.17.8.5 Hazardous Materials

Impacts to Human Health and Safety from hazardous materials by Alternative 6 would be similar to Alternative 5, except there are 10 fewer buildings that would be demolished reducing the potential to encounter asbestos and/or metals-based paints and with 12 fewer known contaminated sites. However, with implementation of BMPs during construction and operation (Section 4.15.11) there is a negligible impact to human health from hazardous waste and materials.

4.17.8.6 Community Safety and Emergency Response Times

Impacts to community safety and emergency response under Alternative 6 would be similar to those under Alternative 5, however there are differences. The southern rail connection would connect to an existing rail line near Kingsworth Avenue (and adjacent to existing rail and ROW); therefore the existing at-grade crossings of Pittsburgh Avenue and Discher Street would not be impacted with ICTF train occurrences, and the new at-grade crossing of Meeting Street at Herbert Street would not be created for Alternative 6. Alternative 6 would create at-grade crossings of both Meeting Street and Spruill Avenue near Kingsworth Avenue.

The new at-grade rail crossings would have a minor indirect adverse impact to community safety by introducing new conflict points between trains and automobiles, bicycles, and pedestrians. There are existing bike lanes and sidewalks along Meeting Street and Spruill Avenue at the location of these proposed new at-grade crossings.

These new at-grade crossings may also have a major adverse impact on emergency response times for certain locations because there is the potential for Meeting Street and Spruill Avenue to be blocked for approximately 11 minutes¹⁰¹ in design year 2038, four times a day, when the trains are entering and leaving the Navy Base ICTF. Detour routes are available along the southern rail connection such as the elevated Stromboli Avenue. There would be no detour route available in the northern portion of the River Center project site and no Cosgrove-McMillan Overpass, increasing response times depending on the location of the emergency. The community of Union Heights, Windsor, and Howard Heights might also have a moderate adverse impact to emergency response if a train related to the Alternative 6 was blocking access on both east and west access points as it navigated the U-turn.

The City of Charleston's planned public service operation center would not be impacted by Alternative 6.

Community Safety and Emergency Response Human Health Impact Summary

Alternative 6 would result in major adverse impacts to emergency response times (similar to Alternative 5) with localized moderate impacts to emergency response. As a result, major impacts to human health and safety would result from Alternative 6.

4.17.8.7 Light and Glare

The overall impact to human health and safety from light and glare by Alternative 6 would be similar to Alternative 5.

4.17.9 Alternative 7: River Center Site (South via Milford)

Section 2.4 summarizes the design elements of Alternative 7 and operations of the proposed facility on the River Center Site. Potential risks to human health and safety during construction and operation of Alternative 7 include:

4.17.9.1 Worker Safety

Potential risks to worker safety under Alternative 7 would be similar to Alternative 5. The impact to worker health and safety is negligible for the same reasons identified for Alternative 5.

¹⁰¹ Based on an 8,000-foot train traveling at 10 miles per hour through the crossing.

4.17.9.2 Drinking Water Quality

The impact to human health and safety from drinking water quality impacts under Alternative 7 would be similar (negligible) to Alternative 5.

4.17.9.3 Noise and Vibration

Impacts from traffic, rail (includes horns), construction, and operational noise from the River Center site under Alternative 7 were identified by comparing the increase in noise over the No-Action Alternative (existing condition).

Traffic Noise

Under Alternative 7, impacts from traffic noise when compared to the No-Action alternative would be the same (negligible except for minor to moderate traffic noise impact for the 18 residential land uses in the Chicora-Cherokee community) as Alternative 5.

Rail Noise

Under Alternative 7, the noise contours along the rail segment from north of Dorchester Road to Misroon Street (Segments 1, 2 and 3) and from Hackemann Avenue to Discher Street (Segment 7); would be significantly expanded in comparison to the No-Action Alternative. A new build rail segment from Pittsburg Avenue to the ICTF facility at the River Center project site (Segment 10) would only be built for the southern alignment under Alternative 7. Regarding train and train horn noise, under Alternative 7, the number of residences that will have a major impact is 0, moderate impact is 268, and minor impact is 80.

Rail Vibration

Under Alternative 7, impacts from ground-borne vibration generated by train activities would be similar (negligible) to Alternative 5.

Construction Noise

Noise conditions related to the ICTF construction activities under Alternative 7 would be the same as those estimated under Alternative 5 (minor to moderate and short-term).

Operational Noise

Noise impacts from the Proposed Project site operations under Alternative 7 are the same as those estimated for Alternative 5 (negligible exterior daytime and moderate to major exterior nighttime).

Additive Noise Impacts

For Alternative 7, with higher train volumes at the track segment from Pittsburg Avenue to ICTF along the new Port drayage road in the vicinity of the eastern neighborhood boundary of the Chicora-Cherokee community, the additive traffic/rail DNL of up to 71 dB(A) would exceed the No-Action levels by up to 18 dB(A), producing a major additive noise impact at the nearest residences. The second and third rows of residences along the property line are also expected to experience somewhat lesser major to moderate additive noise impacts. Noise sensitive receptors along Noisette Boulevard in the vicinity of the River Center project site would experience both traffic noise and ICTF operational noise under River Center project site Alternatives (5, 6, and 7). The operational noise range would essentially remain unaffected when taking into account traffic noise. As the result, the River Center Site operational noise levels would, on average, exceed the noise levels generated by traffic on Noisette Boulevard, and the noise impact analysis of sub-section 4.12.7.5 remains valid.

Noise and Vibration Health Impact Summary

Alternative 7 would have similar impacts to human health and safety from noise and vibration impacts as Alternative 5.

4.17.9.4 Air Quality

Impacts to Air Quality by Alternative 7 construction criteria pollutant emissions would be similar to Alternative 5. Criteria pollutant emissions and impacts from operational activities would be the same as Alternative 5. Criteria pollutants emitted from Alternative 7, along with the existing and projected criteria pollutants, may put the Tri-County area into non-attainment for the NO₂ 1-hour NAAQS. Potential impacts would be minor adverse. Non-DPM HAPs emissions from operational activities and impacts would be the same as Alternative 5. 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.

Air Quality Human Health Impact Summary

The overall impact to human health and safety from air quality impacts by Alternative 7 would be minor permanent adverse.

4.17.9.5 Hazardous Materials

Impacts to Human Health and Safety from hazardous materials by Alternative 7 would be similar to Alternative 5. With implementation of BMPs during construction and operation (Section 4.15.11) there would be a negligible impact to human health from hazardous waste and materials.

4.17.9.6 Community Safety and Emergency Response Times

Impacts to community safety and emergency response under Alternative 7 would be the similar to those under Alternative 5, however there are several differences. Alternative 7 is a variation of Alternative 5 where trains would also enter and exit the Navy Base ICTF from a southern rail connection. Proposed rail through the Hospital District would stop short of Noisette Creek.

Under Alternative 7, trains would use the southern rail alignment to Milford Street. Alternative 7 would have twice as many ICTF train occurrences than Alternative 5, eight per day, at the at-grade crossings along the southern alignment. The community of Union Heights might also have a moderate adverse impact to emergency response if a train related to Alternative 7 was blocking access on both east and west access points as it navigated the U-turn. In addition, the construction of the drayage road from the River Center project site under Alternative 7 limits east-west mobility throughout the study area.

Community Safety and Emergency Response Human Health Impact Summary

Alternative 7 would result in a major adverse impact to human health from delay to emergency response times for the same reasons as Alternative 5.

4.17.9.7 Light and Glare

The overall impact to human health and safety from light and glare by Alternative 7 would be similar to Alternative 5 (negligible).

4.17.10 Related Activities

Section 2.4 summarizes the Related Activities associated with the action alternatives. Potential risks to human health and safety during construction and operation of Related Activities include:

4.17.10.1 Worker Safety

Potential risks to worker safety from Related Activity are similar to all of the action alternatives. The impact to worker health and safety would be negligible for the same reasons identified for Alternative 1 (Proposed Project).

4.17.10.2 Drinking Water Quality

The impact to human health and safety from drinking water quality impacts under the Related Activities would be negligible.

4.17.10.3 Noise and Vibration

There would be a negligible impact to Human Health and Safety by Related Activities from rail noise. The increase in rail noise would be barely perceptible when compared to existing condition.

4.17.10.4 Air Quality

There is a minor impact to Human Health and Safety from air quality impacts by Related Activities from operational emissions.

4.17.10.5 Hazardous Materials

There is a minor to major impact to Human Health and Safety from Related Activities from potential accidental spills on the rail tracks. However, with implementation of BMPs during construction and operation (Section 4.15.11 and 4.15.3.2), there is a negligible impact to human health from hazardous waste and materials.

4.17.10.6 Community Safety and Emergency Response Times

There would be a minor impact from delay at at-grade crossings from increased rail traffic.

4.17.10.7 Light and Glare

The overall impact to human health and safety from light and glare would be negligible.

4.17.11 Summary of Impacts Table

Table 4.17-2 summarizes the environmental consequences to human health and safety from Alternative 1 (Proposed Project) and all the alternatives.

Table 4.17-2
Summary of Impacts, Human Health and Safety

Alternative	Direct Health Impacts from Individual Sources Summary						Light and Glare
	Worker Safety	Drinking Water Quality	Noise and Vibration	Air Quality	Hazardous Materials	Community Safety and Emergency Response Times	
No-Action	Negligible impact.	Negligible impact to drinking water supply as drinking sources are located outside of the study area.	No impact	Minor impact from air quality	Negligible impact from hazardous materials due to implementation of BMPs during construction and operation.	Negligible impact as delay would be similar to existing conditions	No impact from light and glare.

Direct Health Impacts from Individual Sources Summary							
Alternative	Worker Safety	Drinking Water Quality	Noise and Vibration	Air Quality	Hazardous Materials	Community Safety and Emergency Response Times	Light and Glare
1: Proposed Project: South via Milford / North via Hospital District	Negligible impact resulting from design features of the Proposed Project, safety precautions and training measures, and compliance with safety guidelines.	Negligible impact to water supply as drinking sources are located outside of the study area.	Negligible impact from traffic noise and vibration; minor to moderate impact (several areas) from rail noise, construction noise (short-term), and operational noise (daytime). Major nighttime operation noise impacts. Additive noise impacts: negligible [Virginia Avenue (Traffic + Rail Noise)] minor to moderate [St. Johns Avenue (Traffic + Rail Noise)]. Overall impact to human health is minor with mitigation measures.	Minor permanent adverse impact from air quality as the Tri-County area is in attainment for criteria pollutants and the NAAQS would remain in compliance. Potential impacts from non-DPM HAP emissions would be acceptable. Potential excess cancer risk and cancer risk would be acceptable. Potential impacts from noncancer hazard would be negligible.	Negligible impact from hazardous materials due to implementation of BMPs during construction and operation.	Potential minor adverse impact on emergency response times and minor indirect adverse impact to community safety.	Negligible effect from high mast lighting, minor, permanent adverse impact from light and glare associated with nighttime train head lamps to residential structures along curvatures of the track.
2: South via Milford / North via S-line	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).

Direct Health Impacts from Individual Sources Summary							
Alternative	Worker Safety	Drinking Water Quality	Noise and Vibration	Air Quality	Hazardous Materials	Community Safety and Emergency Response Times	Light and Glare
3: South via Kingsworth / North via Hospital District	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project) with localized moderate impacts to emergency response.	Similar to Alternative 1 (Proposed Project).
4: South via Milford	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project), but no additive noise impacts.	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project).	Similar to Alternative 1 (Proposed Project) with localized moderate impacts to emergency response.	Similar to Alternative 1 (Proposed Project).

Direct Health Impacts from Individual Sources Summary							
Alternative	Worker Safety	Drinking Water Quality	Noise and Vibration	Air Quality	Hazardous Materials	Community Safety and Emergency Response Times	Light and Glare
<p>5: River Center Site: South via Milford / North via Hospital District</p>	<p>Negligible impact resulting from design features of the Proposed Project, safety precautions and training measures, and compliance with safety guidelines.</p>	<p>Negligible impact to water supply as drinking sources are located outside of the study area.</p>	<p>Negligible impact from operational noise (daytime) and vibration; minor to moderate impact (several areas) from traffic noise, rail noise, and construction noise (short-term). Moderate to Major exterior nighttime impact. Additive noise impacts: negligible (daytime) moderate to major (nighttime) [Noisette Boulevard (Traffic + Operations)], negligible [Virginia Avenue (Traffic + Rail Noise)], and major [Port drayage road (Traffic + Rail)]</p>	<p>Minor impact to air quality as the Tri-County area may be in non-attainment for NO₂. Potential impacts from non-DPM HAP emissions would be acceptable. Potential excess cancer risk and cancer risk would be acceptable. Potential impacts from noncancer hazard would be negligible.</p>	<p>Negligible impact from hazardous materials due to implementation of BMPs during construction and operation.</p>	<p>Major impact to emergency response times and minor impact to community safety.</p>	<p>Negligible effect from high mast lighting and negligible effect from nighttime train head lamps due to lack of curvatures (and affected residences) on the southern arrival/departure tracks.</p>
<p>6: River Center Site: South via Kingsworth / North via Hospital District</p>	<p>Similar to Alternative 5.</p>	<p>Similar to Alternative 5.</p>	<p>Similar to Alternative 5.</p>	<p>Similar to Alternative 5.</p>	<p>Similar to Alternative 5.</p>	<p>Similar to Alternative 5 with additional localized moderate impacts to emergency response.</p>	<p>Similar to Alternative 5.</p>

Direct Health Impacts from Individual Sources Summary							
Alternative	Worker Safety	Drinking Water Quality	Noise and Vibration	Air Quality	Hazardous Materials	Community Safety and Emergency Response Times	Light and Glare
7: River Center Site: South via Milford	Similar to Alternative 5.	Similar to Alternative 5.	Similar to Alternative 5, but additive noise impacts: major [Port drayage road (Traffic + Rail)], negligible (daytime), moderate to major (nighttime) [Noisette Boulevard (Traffic + Operations)].	Similar to Alternative 5.	Similar to Alternative 5.	Similar to Alternative 5 with additional localized moderate impacts to emergency response.	Similar to Alternative 5.

Note: The purpose of this analysis is to compile and document potential impacts to the human health and safety of construction workers during construction of the Proposed Project, operations staff during the operation of the Proposed Project, and residents in the community surrounding the Proposed Project. Adverse impacts to human health and safety may occur if the Proposed Project activities create new health hazards that are not currently present, worsen existing health conditions, or increase emergency response times. Each of the other resource sections in this document was reviewed to determine if there would be potential associated impacts to human health and safety. Affected Environment and Environmental Consequences sections for Water Quality (Section 3.3/4.3), Visual Resources and Aesthetics (Section 3.11/4.11), Noise and Vibrations (Section 3.12/4.12), Air Quality (Section 3.13/4.13), Hazardous, Toxic, and Radioactive Waste (Section 3.15/4.15), and Socioeconomics and Environmental Justice (3.16/4.16) describe existing conditions and provide inventories of known and potential risks due to the Proposed Project and alternatives to human health and safety.

4.17.12 Mitigation

4.17.12.1 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.

- Provide around-the-clock security through a combination of security fencing, video cameras, and other security measures. (Minimization)
- Conduct construction and operations in accordance with appropriate regulations, permits, best practices, and codes. (Minimization)
- Employ the use of automated switches to eliminate the need for train crews to get out of trains to manually throw switches and thus enhancing the safety of railroad workers and additionally reducing grade crossing closures. (Minimization)
- Use of inter-box connector (IBC) carts to provide enhanced safety for railroad workers by avoiding slip, trip, and fall incidents while accessing railcars to (un)lock IBCs on containers. (Minimization)
- Employ the use of an automated gate system to eliminate the need for railroad workers to complete inbound, container and chassis damage inspections by walking in a congested gate area thus enhancing safety of railroad workers and potentially reducing grade crossing closures. (Minimization)
- Safety precautions and training measures would be implemented by the Applicant during construction and operation of the facility, and safety guidelines would be complied with. (Minimization)
- Use of state of the art equipment to minimize sound emissions during operations. (Minimization)
- Design and construct a cut section (trench), sound walls, a landscaped berm within a 100-foot buffer for noise reduction to adjacent neighborhoods. (Minimization)
- See Section 4.12.12 for a complete list of mitigation for potential noise and vibration impacts.
- Design and construct a semi-automated facility that minimizes emissions during operations. (Minimization)
- Contribute \$50,000 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. (Minimization)
- See Section 4.13.12 for a complete list of mitigation for potential air quality impacts.

- Continue planned removal of hazardous materials at the site. (Minimization)
- Install additional water monitoring wells at the site. (Minimization)
- Implementation of BMPs and SPCC at the site. (Minimization)
- See Section 4.15.12 for a complete list of mitigation for potential impacts from Hazardous materials.
- To minimize the impact of lights from the site on adjacent areas, all operating lights will be directed downward to shield light sources minimizing any light bleed off the facility footprint. (Minimization)
- Design the facility to minimize visual impacts including a cut section (trench) and an earthen berm within a 100-foot buffer between the facility and adjacent neighborhoods. LED lighting fixtures will be installed over bridges and other areas where practical. (Minimization)
- Completed a photometric design for intermodal facility high-mast lighting that would result in less than 0.5-foot-candles outside of the property boundary. (Minimization)
- See Section 4.11.12 for a complete list of mitigation for potential impacts from light and glare.
- Continue to cooperate with the appropriate emergency services personnel within the Cities of North Charleston and Charleston to address emergency response coordination and other specific issues as they arise. (Minimization)
- Examine emergency service benefits and gather input from local emergency service providers as part of the Surface Transportation Impact Study. (Minimization)
- Study the need for grade separated crossings as part of the Crossing Analysis. (See Transportation MOA in Appendix N). * (Minimization)
- Provide detour routes (elevated Stromboli Avenue and Cosgrove-McMillan Overpass). (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 Human Health and Safety is also provided in Chapter 6.

4.17.12.2 Additional Potential Mitigation Measures

No additional mitigation measures for Human Health and Safety 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).