



Final Environmental Impact Statement and Section 4(f) Determination



ALL ABOARD FLORIDA

Intercity Passenger Rail Project

Orlando to Miami, Florida

Volume I: Text

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Prepared by:

USDOT Federal Railroad Administration
1200 New Jersey Avenue SE
Washington, DC 20590
Proponent: All Aboard Florida



**ALL ABOARD FLORIDA– ORLANDO TO MIAMI, FLORIDA INTERCITY
PASSENGER RAIL PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT**

Submitted Pursuant to National Environmental Policy Act 42 U.S.C 4332(2)(c)

by the

U.S. Department of Transportation
Federal Railroad Administration (FRA)

And Cooperating Agencies

U.S. Army Corps of Engineers – Jacksonville District

U.S. Coast Guard – Seventh Coast Guard District

Federal Aviation Administration – Orlando Airports District Office

AUG 04 2015

Date of Approval


for Federal Railroad Administration

ABSTRACT

All Aboard Florida LLC (AAF), a private corporation, is proposing to construct and operate intercity passenger rail between Orlando and Miami, Florida. FRA is undertaking this environmental review because AAF has applied for a loan through the Railroad Rehabilitation and Improvement Financing program. AAF proposes to implement the Project through a phased approach. This FEIS evaluates Phase II of the Project which includes adding a second track within 128.5 miles of the existing Florida East Coast Railroad right-of-way between West Palm Beach and Cocoa, constructing a new approximately 40-mile long railroad line parallel to State Road 528 between Cocoa and Orlando International Airport, and constructing a new vehicle maintenance facility south of the airport. The Project would also improve grade crossings, bridges, signalization, and add new communications and train control systems. The FEIS evaluates a range of alternatives considered for the Project, and evaluates in detail three alignment alternatives. Alternative E has been selected as the preferred alternative. This EIS considers environmental impacts and mitigation that would result if the Project is built, in the following areas: land use, transportation, air quality, noise and vibration, climate change, water resources, navigation, wetlands, natural biological systems, wildlife, essential fish habitat, migratory bird habitat, threatened and endangered species, floodplains, social and economic effects, environmental justice communities, visual resources, cultural resources, Section 4(f) resources, public health and safety, and economic effects, in addition to secondary and cumulative impacts and short-term construction impacts. Given that operations would cover the full corridor from Orlando to Miami, this EIS analyzes the cumulative effects of completing both phases of the Project, although the impacts exclusively from Phase I have already been addressed in the 2012 EA and FONSI and will not be reanalyzed in the DEIS. AAF can proceed at this time with construction of Phase I based upon the FONSI. The bulk of the information related to Phase I is drawn from the 2012 EA. FRA concluded that it was important to provide a comprehensive look at the environmental impacts of both phases in one environmental document.

Additional information concerning this document may be obtained by contacting the following:
Mr. John Winkle, Federal Railroad Administration, 1200 New Jersey Avenue SE, MS-20,
Washington, DC 20590 (john.winkle@dot.gov).

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Summary

This is the Federal Railroad Administration's (FRA) Final Environmental Impact Statement (FEIS) for the proposed All Aboard Florida Intercity Passenger Rail Service Project (the Project). This summary is intended to assist readers in understanding the Project, the environmental review process, the alternatives that were evaluated, and the environmental effects of the Project. Identified mitigation measures and Project commitments are included in Chapter 7.

About the Project

All Aboard Florida – Operations LLC (AAF) is proposing to construct and operate a privately owned and operated intercity passenger railroad system that will connect Orlando and Miami, with intermediate stops in Fort Lauderdale and West Palm Beach, Florida.

AAF has applied for federal funds through the Railroad Rehabilitation and Improvement Financing (RRIF) program, which is a loan and loan guarantee program administered by the Federal Railroad Administration (FRA) as described in 49 Code of Federal Regulations (CFR) part 260. Under this program, the FRA Administrator is authorized to provide direct loans and loan guarantees that may be used to acquire, improve, or rehabilitate rail equipment or facilities or to develop new intermodal or railroad facilities. Because AAF has applied for a loan under FRA's RRIF program, FRA is required under the National Environmental Policy Act (NEPA) to conduct an analysis of the potential environmental impacts resulting from the Project. NEPA compliance is a prerequisite for RRIF approval, and FRA will not approve the Project for a RRIF loan until the NEPA process is complete. A RRIF loan, if approved, would be part of an overall capital structure put in place by AAF to finance the infrastructure improvements. FRA's action with respect to the Project is limited to reviewing AAF's application for a RRIF loan. Once the service is operational, however, it will be subject to applicable FRA safety regulations.

AAF proposes to implement the Project through a phased approach. Phase I would provide rail service on the West Palm Beach to Miami section while Phase II would extend service to Orlando. Phase I would provide passenger rail service along the 66.5 miles of the Florida East Coast Railway (FECR) Corridor connecting West Palm Beach, Fort Lauderdale, and Miami. AAF has obtained private financing for Phase I and is proceeding to implement Phase I, which is illustrated on Figure S-1.

FRA and AAF conducted an environmental review of Phase I in 2012/2013, including preparing and issuing both an Environmental Assessment (EA) (*Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida*) and a Finding of No Significant Impact (FONSI) (AAF 2012; FRA 2013a). Phase I of the Project, as described in the 2012 EA, includes constructing three new stations (West Palm Beach, Fort Lauderdale, and Miami), purchasing five train sets, adding a second track along most of the 66.5-mile corridor, and adding 16 new daily round-trip intercity passenger train trips (32 one-way trips) on the West Palm Beach to Miami section of the FECR Corridor. FRA concluded that Phase I has independent utility (that is, it could be advanced and serve a transportation need even if Phase II were not constructed).

As a result of the environmental review process conducted by FRA in cooperation with AAF for Phase I, AAF is authorized to construct the Phase I component of the Project as reviewed and approved in the 2012 EA and FRA's subsequent FONSI. Since the FONSI, AAF proposed and FRA has evaluated a new location for the proposed Fort Lauderdale Station and issued a re-evaluation decision that found no significant difference from the location evaluated in the 2012 EA. Also since the FONSI, AAF proposed and FRA has evaluated a new location in West Palm Beach for the proposed Fort Lauderdale layover and maintenance facility. FRA has issued a Supplemental EA and FONSI for this facility.

Considering Phase II of the Project and RRIF loan approval as separate federal actions, FRA has undertaken a NEPA review of the proposed extension. Given that operations would cover the full corridor from Orlando to Miami, this FEIS analyzes the cumulative effects of completing both phases of the Project, although the impacts exclusively from Phase I have already been addressed in the 2012 EA and 2013 FONSI and will not be reanalyzed in the FEIS. AAF can proceed at this time with construction of Phase I based upon the FONSI and incorporating the mitigation measures identified therein. The bulk of the information in this FEIS related to Phase I is drawn from the 2012 EA. FRA concluded that it was important to provide a comprehensive look at the environmental impacts of both phases in one environmental document.

Phase II of the Project includes constructing a new railroad line parallel to State Road (SR) 528 between the Orlando International Airport (MCO) and Cocoa, constructing a new Vehicle Maintenance Facility (VMF) on property owned by the Greater Orlando Airport Authority (GOAA), constructing track through MCO to connect the VMF to SR 528, adding a second track within 128.5 miles of the FECR Corridor between West Palm Beach and Cocoa, and additional bridge replacement or rehabilitation between Miami and West Palm Beach. The proposed service would use a new intermodal facility at MCO that is being constructed by GOAA as an independent action. The Project includes purchasing five additional passenger train sets, and would add 16 new round-trip intercity passenger train trips (32 one-way trips) on the new railroad segment and on the FECR Corridor between Cocoa and West Palm Beach. No additional trips beyond those considered in the 2012 EA (16 round-trip intercity passenger train trips [32 one-way trips]) would be added on the West Palm Beach to Miami section.

About the NEPA Process

FRA is the lead federal agency responsible for conducting the NEPA environmental review process for the Project. FRA manages financial assistance programs for rail capital investments and has certain safety oversight responsibilities with respect to railroad operations.



- Explanation of Features**
- MCO Segment
 - E-W Corridor
 - N-S Corridor
 - Phase I (MPB-M Corridor)
 - Interstate Highways
 - Proposed Stations - Phase I (WPB-M Corridor)
 - Proposed Station (By Others)

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

Project Location		
All Aboard Florida Intercity Passenger Rail Project		
		S-1

Approvals by several federal agencies, including the FRA, U.S. Army Corps of Engineers (USACE), U.S. Coast Guard (USCG), Federal Aviation Administration (FAA), Federal Highway Administration (FHWA), U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) are necessary to implement the Project.

An Environmental Impact Statement (EIS) is a document required by NEPA that describes the environmental effects of a project to inform decision-makers and the public. NEPA is a federal environmental law that facilitates public disclosures and establishes policies for federal agencies to study a reasonable range of alternatives and assess environmental impacts of projects. An EIS must be prepared by a federal agency for any major federal action significantly affecting or with the potential to significantly affect the quality of the natural and built environment. Environmental effects can be both positive (beneficial) or negative (adverse).

NEPA and the Council on Environmental Quality's implementing regulations define the general framework for preparing an EIS. FRA also has its own, more specific, guidelines for implementing NEPA. The NEPA process typically includes these steps:

- Notice of Intent – a notice, published in the Federal Register, notifying the public of the federal agency's intent to prepare an EIS, defining the project and informing the public how to comment on the project. FRA published the Notice of Intent for the AAF Project on April 15, 2013.
- Scoping – an early and open process for identifying significant issues related to a project. As part of the scoping process, agencies and the public are invited to participate and provide comment. A series of public scoping meetings for the Project were held in April and May 2013 in Orlando, Fort Pierce, West Palm Beach, Fort Lauderdale, and Miami and an agency scoping meeting was held in April 2013. Agencies and the public provided input that informed the scope and content of the environmental studies conducted for the FEIS, including concerns about noise and vibration impacts, navigation impacts, wildlife and protected species impacts, safety impacts, and impacts to traffic operations at grade crossings. The public comments also indicated in interest in additional stations and the opportunity to include a bicycle trail within the railroad right-of-way (ROW).
- Draft EIS (DEIS) – the purpose of the DEIS is to disclose all environmental effects associated with the project alternatives, whether they are adverse or beneficial and allow the public to review and comment on the document. FRA prepared and published a DEIS on September 26, 2014 in coordination with the FAA, USACE and USCG, and informed the public through a notice in the Federal Register, newspaper ads, and press releases. Public information meetings on the DEIS were held during the 75-day public comment period.
- Final EIS (FEIS) – the purpose of the FEIS is to disclose all environmental effects associated with the project alternatives, whether they are adverse or beneficial, and to identify the preferred alternative. The FEIS also includes all comments received on the DEIS, and responds to those comments. FRA has prepared and published this FEIS in coordination with the FAA, USACE, and USCG, and informed the public through a notice in the Federal Register, newspaper ads, and press releases. The FEIS responds to public and agency comments on the DEIS.
- Record of Decision (ROD) – the purpose of a ROD is for the agency to provide at the time of its decision a concise public record of that decision that identifies FRA's selected alternative, identifies

the alternatives considered, and states how FRA's decision was made. The ROD issuance completes the NEPA process. FRA may not approve a RRIF loan request before the ROD has been finalized. FRA indicated in the DEIS that the agency intended to issue a combined FEIS/ROD pursuant to Pub. L. 112-141, 126 Stat. 405, Section 1319(b) unless FRA determined that statutory criteria or practicability considerations precluded issuance of such a combined document. Given the very substantial public interest in the Project, FRA has decided not to issue a combined FEIS/ROD for this Project and this FEIS does not contain FRA's ROD for the All Aboard Florida Intercity Passenger Rail Project Miami to Orlando, FL.

Public Review

FRA released the DEIS on FRA's website for public review on September 19, 2014, and published the Notice of Availability on September 26 (Federal Register Vol. 79, No. 187). The DEIS was available to the public on the FRA's website (<https://www.fra.dot.gov/Page/P0672>) and at public libraries throughout the Project Study Area. Copies were sent to elected officials, federal, and state agencies, and municipalities. FRA requested all comments be submitted by December 3, 2014, a 75-day comment period.

During the public comment period, FRA held eight public information meetings to provide the public with the opportunity to learn about the Project, ask questions, and obtain information about the Project and the DEIS, and to comment on the DEIS. Comments were accepted at the meetings in writing or orally, with the assistance of a court stenographer. FRA provided information on display boards, handouts, a rolling PowerPoint presentation, and video simulations. Technical experts for most environmental categories (for example, alternatives, wetlands, navigation, noise and vibration, wildlife, cultural resources, and traffic) were present to answer questions. FRA chose this format, rather than a series of public hearings, to enable members of the public to become informed about the DEIS and the Project and to facilitate answering public questions. Approximately 2,681 persons attended the public meetings and provided 1,565 comments at the meetings.

During the comment period for the Draft Environmental Impact Statement, FRA received over 15,400 comments. The comments covered a wide range of issues and represented viewpoints from government agencies, organizations, business groups, businesses, residents, and property owners. FRA has reviewed all of the comments, many of which were form letters. Comments fell into several broad categories: support, general opposition, opposition based on specific concerns, and detailed and substantive comments concerning information provided in the DEIS.

Approximately 5,960 of the submittals generally supported the Project, and 9,500 were generally opposed. Most comments came from individuals in the general public, living, working, or having property interests in the Project Study Area, particularly residents of Martin, St. Lucie, and Indian River Counties. Most comments from the public indicated that individuals did not want passenger rail operating within the FECR Corridor along the Florida coast, and preferred that AAF select an alternative alignment further inland. A substantial number of people commented on the potential impacts on boaters associated with increased closures of the three moveable bridges along the corridor. Substantive comments are addressed in the appropriate sections of the FEIS and in Chapter 1, *Introduction*, which identifies and provides FRA's responses to general comments and to comments

that appeared frequently in individual and form letters, and to which FRA can provide general responses.

Purpose of the Project

As identified by AAF, the purpose of the Project is to provide reliable and convenient intercity passenger rail transportation between Orlando and Miami, Florida (the Project Corridor, see Figure 1.1-1), by extending (in Phase II) the previously reviewed Phase I AAF passenger rail service between West Palm Beach and Miami and by maximizing the use of existing transportation corridors. This transportation service would offer a safe and efficient alternative to automobile travel on congested highway corridors, add transportation capacity within those corridors (particularly Interstate 95 [I-95]), and encourage connectivity with other modes of transportation such as light rail, commuter rail, and air transportation.

The additional purpose of Phase I of the Project, as stated in the 2013 FONSI for that initial project, is to “provide intercity passenger rail service that addresses South Florida’s current and future needs to enhance the transportation system by providing a transportation alternative for Floridians and tourists, supporting economic development, creating jobs and improving air quality” (FRA 2013a).

Alternatives Considered in this EIS

In order to identify and consider alternatives that will satisfy this purpose, including the Project’s feasibility as a private enterprise, AAF identified its primary objective, which is to provide an intercity rail service that is sustainable as a private commercial enterprise. The two principal components of this objective are the basis for developing the criteria and framework for evaluating the Project alternatives. AAF’s two primary goals are to:

- Provide a reliable and convenient intercity rail service between Orlando and Miami with an approximate 3-hour trip time between the terminal stations; and
- Provide an intercity rail service that is sustainable as a private commercial enterprise. Sustainable means that the rail service can attract sufficient riders to meet revenue projections and operate at an acceptable profit level.

As required by NEPA, FRA has reviewed the alternatives analysis, required AAF to evaluate alternatives other than the proposed action, and has verified the analyses.

The FEIS evaluates the No-Action Alternative as a baseline to compare the effects of the “build” (Action) Alternatives. The No-Action Alternative involves no changes to the rail line within the FECR Corridor beyond regular maintenance and improvements that have been currently planned and funded. Under the No-Action Alternative, existing freight operations and infrastructure would be maintained by FECR. The demand for freight capacity is expected to grow along the North South Corridor (N-S Corridor) regardless of the Project. Based on anticipated operations data for the 2016 target date for the Project, the average number of freight trains per day is expected to increase from 10 to 14 (in 2013) to 20, along with an increase in the average train length to 8,150 feet. The No-Action Alternative would also include future planned and funded roadway, transit, air, and other intermodal improvements likely to be completed within the Project Study Area by the 2016 target date.

AAF conducted a tiered alternatives analysis that first evaluated four routes to connect Orlando (at the planned GOAA Intermodal Station) with the planned West Palm Beach Station on the FECR Corridor and identified the FECR Corridor Alternative as the only feasible route. This alternative would extend service from the West Palm Beach station north along the FECR ROW to the Cocoa area, then parallel SR 528 (the BeachLine Expressway) to MCO. In the second level of analysis, AAF identified and evaluated route modifications to connect the SR 528 corridor to the Intermodal Station on the west and with the FECR ROW on the east. The third level evaluated alignment alternatives parallel to SR 528. Three Action Alternatives were retained for detailed evaluation in the FEIS: Alternative A, Alternative C, and Alternative E. Table S-1 summarizes the main characteristics of the three Action Alternatives.

Operations and ridership would be the same for all three Action Alternatives. AAF would provide regularly scheduled, hourly service with an approximately 3-hour trip time. The intercity passenger rail service would operate with new diesel-electric locomotives and single-level coach trains. Passenger operations would include 16 round-trip passenger trains per day. Maximum operating speeds would range from 79 to 125 miles per hour (mph), depending upon the location along the route. Operating speeds will be greatest along the SR 528 corridor where there would be no highway-rail grade crossings. From the station at MCO to West Palm Beach, service would be non-stop, as there are no intermediate stations proposed. According to a ridership and revenue forecast commissioned by Florida East Coast Industries and prepared by Louis Berger Group (LBG) for the Project, the most conservative total annual ridership would amount to approximately 3.5 million in 2019. Among the 2019 Project totals, approximately 2.0 million would be short distance trips (Ft. Lauderdale – Miami, West Palm Beach – Miami, West Palm Beach – Ft. Lauderdale) and 1.5 million would be long distance trips (Orlando – Southeast Florida). Total annual ridership is predicted to exceed 4.0 million by year 2030.

Each of the three Action Alternatives would include a new rail corridor extending north through MCO to SR 528 (the MCO Segment), including the proposed VMF; a new rail alignment along the East-West Corridor, which is on the south side of the SR 528 ROW owned by the Central Florida Expressway Authority (CFX) and the Florida Department of Transportation (FDOT) from MCO to the FECR Corridor in Cocoa (E-W Corridor); and would use the existing FECR ROW from Cocoa to West Palm Beach (the N-S Corridor). Within the N-S Corridor, the Project largely consists of restoring a second track, modifying several curves to accommodate higher speeds, and replacing or repairing bridges across waterways.

Each of the three Action Alternatives would include a new VMF located on GOAA property south of MCO. No new stations would be constructed as part of the Project. The Project would incorporate a new Positive Train Control system and associated infrastructure, and would install pole-mounted warning horns at 117 grade crossings where severe noise impacts would occur in the absence of mitigation. In addition, each alternative would improve at-grade crossings with new safety equipment in accordance with the FRA Diagnostic Team recommendations.

Each of the alternatives also includes two activities on the WPB-M Corridor that were not previously evaluated: modifications to seven bridges within the WPB-M Corridor and minor track modifications at the Miami Viaduct.

Segment/Project Element	No-Action	Alternative A	Alternative C	Alternative E
MCO	No construction	4.5-mile new rail corridor	4.5-mile new rail corridor	4.5-mile new rail corridor
E-W Corridor	No construction	1.5-mile new rail corridor west of Narcoossee Road 17.5-mile new rail corridor within current SR 528 CFX ROW 15-mile new rail corridor within FDOT and utility ROWs 5 new bridges over water	1.5-mile new rail corridor west of Narcoossee Road 17.5-mile new rail corridor along boundary of current SR 528 CFX ROW 15-mile new rail corridor within FDOT and utility ROWs 5 new bridges over water	1.5-mile new rail corridor west of Narcoossee Road 17.5-mile new rail corridor 100 feet south of current SR 528 CFX ROW 15-mile new rail corridor within FDOT and utility ROWs 5 new bridges over water
N-S Corridor	No construction – Freight trips increase to 20 trips/day in 2016	128.5 mile corridor between Cocoa and WPB 3-mile track improvements N of Cocoa connection Add second track, straighten curves, Reconstruct 18 bridges	128.5 mile corridor between Cocoa and WPB 3-mile track improvements N of Cocoa connection Add second track, straighten curves, Reconstruct 18 bridges	128.5 mile corridor between Cocoa and WPB 3-mile track improvements N of Cocoa connection Add second track, straighten curves, Reconstruct 18 bridges
WPB-M Corridor	No construction – Freight increases to 20 trips/day in 2016	66.5-mile corridor Add second track Reconstruct 7 bridges	66.5-mile corridor Add second track Reconstruct 7 bridges	66.5-mile corridor Add second track Reconstruct 7 bridges
VMF	No construction	New VMF on south portion of GOAA property Construct 1 new bridge	New VMF on south portion of GOAA property Construct 1 new bridge	New VMF on south portion of GOAA property Construct 1 new bridge
Stations	MCO Intermodal Station	West Palm Beach Fort Lauderdale Miami	West Palm Beach Fort Lauderdale Miami	West Palm Beach Fort Lauderdale Miami
Passenger Trips	None	16 RT (32 trains)	16 RT (32 trains)	16 RT (32 trains)
Ridership	0	3.5M	3.5M	3.5M

The three Action Alternatives are the same except for the portion of the E-W Corridor along the CFX section of SR 528. Alternative E, the preferred alternative, would be a new rail alignment 200 feet south of the existing SR 528 CFX ROW, within land acquired by CFX for future highway expansion. The proposed alignment of Alternative E enables the railroad to be constructed at-grade within the SR 528 segment and would only require the perpendicular crossing of the main roadway for each of the interchanges along SR 528 instead of all of the roadway approaches and ramps. Alternative A differs from Alternative E within the SR 528 (CFX) ROW section of the E-W Corridor, from SR 417 to SR 520, where this alternative would be entirely within the existing SR 528 ROW. Alternative C differs from Alternative E within this section of the E-W Corridor, where the new rail alignment would run along the edge of the existing SR 528 CFW ROW. Alternatives A and C would require structures to cross all of the highway ramps and cross-streets.

After additional analysis subsequent to the publication of the DEIS and in response to public comments provided on the DEIS, AAF identified Alternative E as the Preferred Alternative and proposed action. The CFX Board found that the land required for Alternatives A and C is not surplus and is therefore not available for the AAF Project. FRA has evaluated AAF's analysis and concurs that Alternative E is the agency's preferred alternative that would fulfill its statutory mission and responsibilities, considering economic, environmental, technical and other factors.

Chapter 3, *Alternatives*, provides a detailed discussion of the alternatives analysis process and a detailed description of each of the alternatives retained for evaluation in this FEIS.

Environmental Effects

This FEIS evaluates the environmental effects, both beneficial and adverse, associated with the three Action Alternatives and based on a comparison to the No-Action Alternative. The Project has the potential to adversely affect land use, transportation (particularly traffic at-grade crossings), noise and vibration, water resources, wetlands and floodplains, biological communities, protected species, social and economic conditions, cultural resources, parks and recreation areas, and utilities. However, mitigation measures would be required that will reduce these potential adverse effects. The Project would also have beneficial environmental effects, such as traffic diversion from I-95 and other highways, economic growth, air quality improvements, and energy consumption improvements during operation.

Land Use

The land use analysis included an inventory of existing land use as well as the evaluation of local land use plans applicable to the Project Area. Potential direct effects include the potential for permanent land use conversions and consistency with local land use plans.

Direct impacts to land use along the MCO Segment and N-S Corridor are the same for all three Action Alternatives. AAF would lease land within MCO for the VMF and railroad ROW and would lease land from CFX and FDOT to construct the E-W Corridor. All construction along the N-S Corridor would occur within the FECR right-of-way and would not require any land acquisition. AAF will acquire an additional 93.7 acres of land along the E-W Corridor, including nine parcels of property in Orange County accounting for 45.1 acres that are zoned as residential; however, their acquisition and use will not result in residential displacements. Land acquisition in Brevard County includes three parcels zoned as commercial

(21.2 acres) and one parcel zoned as industrial (0.5 acres). No commercial or industrial operations would be displaced due to property acquisitions or use in Brevard County. AAF is also in the process of acquiring a property interest from the Florida East Coast Railway (FECR) in Brevard County that accounts for 26.9 acres and is zoned as locally accessed railroad property. The Project is conceptually consistent with land use plans and the plans of the transportation stakeholders (GOAA, CFX, and FDOT).

Section 5.1.1, *Land Use*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Transportation

The transportation analysis included Annual Average Daily Volume (AADT) obtained from FDOT for the two largest arterials, by volume, for each county through which the Project would pass. Highway capacity analysis for the 10 at-grade railroad crossings and intersections were conducted in accordance with the standard methodology presented in the Highway Capacity Manual (TRB 2010).

The Project would have the same transportation impacts under all three Action Alternatives, as they would include the same effects on existing rail and highway infrastructure, have the same ridership and effects on vehicle miles traveled, and would have the same number and locations of at-grade crossings.

There are no existing freight rail operations along the MCO Segment or E-W Corridor; therefore, no impacts to freight rail operations would occur along these segments. The N-S Corridor has been designed to cause no adverse impact on freight operations and has an assumed beneficial impact on freight operations. Infrastructure modifications and upgrades from a mostly single-track system to a mostly double-track system would improve freight efficiencies, as represented by increases in average operating speeds. The Project would have a beneficial impact on the passenger rail transportation network between Orlando and West Palm Beach by providing potential customers with an alternative means of transportation.

AAF expects riders for the Project to be primarily diverted from automobile modes (69 percent of forecast ridership). The Project would have the beneficial impact of removing 335,628 auto vehicle trips per year from the regional roadway network in 2016 and 1.2 million vehicles in 2019.

The proposed passenger rail service would divert 10 percent of its long-distance riders from private intercity motorbus services, which totals approximately 152,630 annual bus passenger trips per year. The proposed service would divert 10 percent of its riders from the air service market, which totals approximately 152,630 annual aviation passenger trips per year. About 2 percent of the AAF long-distance ridership is forecast to come from Amtrak passenger rail services. In 2019, this amounts to approximately 30,526 annual trips diverted from Amtrak, which is about 4 percent of Amtrak's 2012 ridership in South Florida.

The Project would not impact local vehicular traffic along the MCO Segment or the E-W Corridor, as there would be no at-grade crossings. The N-S Corridor would result in some degradation in Levels of Service at the grade crossings and intersections studied, with greater percentages of time within an hour of operation under unacceptable roadway conditions than under the No-Action Alternative. With just three train crossings per hour, the majority of each hour of operation would not be affected by the introduction of passenger train service. Typical at-grade crossings (intersections of local roads with the

FECR Corridor) would be closed an average of 54 times per day (three times per hour), with closure times ranging from 1.7 minutes (passenger) to 2.8 minutes (freight). The total hourly closure would range from 4.2 minutes per hour to 4.5 minutes per hour, an increase of approximately 2 minutes per hour in comparison to the No-Action Alternative.

Section 5.1.2, *Transportation*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Navigation

Impacts to navigable waters and navigation would be the same for Alternatives A, C, and E, as each would include the same bridge improvements. Existing fixed bridges would be replaced, or new fixed bridges would be constructed to maintain the existing vertical and horizontal clearances and maintain existing navigation conditions. There would be no loss in existing clearance for the proposed new rail bridge over the St. Johns River and no change in the structure or the dimensions of the opening for the St. Lucie River or Loxahatchee (Jupiter) River bridges. Under all Action Alternatives, the moveable bridges (St. Lucie River and the Loxahatchee River) would be closed more frequently to accommodate the increased number of trains. AAF has developed an operating plan that minimizes the number and duration of closures; however, the total daily closure time at each bridge and vessel wait times would increase substantially in comparison to the No-Action Alternative, particularly on peak-season weekends. AAF is proposing to mitigate for this increased closure time by implementing new measures to notify mariners of the bridge closure times and to make closure times more predictable. These mitigation measures will reduce delays and help to reduce queue lengths and times.

Subsequent to the publication of the DEIS and in response to public comment on the DEIS, AAF further evaluated the potential impacts of the No-Action Alternative and Action Alternatives with respect to closures of the St. Lucie and Loxahatchee Bridges and expected vessel wait times. Model simulation results on vessel queuing, non-zero wait time, average wait time, and boat arrivals show that the most likely vessel wait time would increase under all Action Alternatives.

Phase I of the Project would also affect moveable bridge closure times and vessel wait times on the New River in Fort Lauderdale, similar to the St. Lucie and Loxahatchee Bridges. FRA conducted an environmental review of Phase I in 2012/2013, including preparing and issuing both an Environmental Assessment (EA) (*Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida*) and a Finding of No Significant Impact (FONSI). AAF has obtained private financing for Phase I and is proceeding to implement Phase I.

Section 5.1.3, *Navigation*, describes navigation impacts in detail, while Section 5.4.3, *Economic Conditions*, describes economic impacts to the marine industry. Chapter 7, *Mitigation Measures and Project Commitments*, describes the proposed mitigation measures.

Air Quality

The air quality analysis evaluated the emission of air pollutants from the Project, the resulting concentrations of pollutants in the regional areas, and carbon monoxide concentrations at intersections affected by changes in traffic patterns. This evaluation applied primary and secondary air quality

standards identified by the National Ambient Air Quality Standards (NAAQS) to evaluate if the Project might cause any new violation of the NAAQS, increase the frequency or severity of any existing violations, or delay attainment of any NAAQS.

As compared to the No-Action Alternative, air quality effects of the Project would be identical, as each alternative would provide a similar travel time and would have the same ridership and vehicle miles traveled (VMT) reductions. All six counties crossed by the Project are in attainment for all criteria pollutants. The Project would provide a net regional air quality benefit as compared to the No-Action Alternative. Air quality in the region would be improved through the reduction of vehicles from the roads and highways as riders move instead to the proposed passenger rail service between Orlando and West Palm Beach. The Project would decrease emissions of carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO₂), volatile organic compounds (VOCs), particulate matter less than 10 microns in diameter (PM₁₀) and particulate matter less than 2.5 microns in diameter (PM_{2.5}) by 2016. By 2030, the Project would reduce CO emissions by 1,654 tons, NO_x by 192 tons, VOCs by 59 tons and PM₁₀ by 7 tons.

A detailed hot-spot modeling evaluation of intersections was not conducted as part of the air quality analysis because traffic volumes and congestion at grade crossings, and therefore CO emissions, would be lower than those evaluated as part of the 2012 EA for the West Palm Beach to Miami segment, which did not exceed air quality criteria. Analysis of CO emissions from vehicles queuing at grade crossings under proposed passenger train cycles produced an expected impact of less than 1 ton per day, a *de minimis* impact pursuant to EPA standards.

Section 5.2.1, *Air Quality*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Noise and Vibration

Noise and vibration have been assessed according to guidelines specified in FRA's *High-Speed Ground Transportation Noise and Vibration Impact Assessment* guidance manual, the Federal Transit Administration's (FTA) *Noise and Vibration Impact Assessment* guidance manual, and the FHWA guidelines as defined for Florida application by FDOT for traffic operations (FRA 2012a; FTA 2006; FDOT 2011c).

There would be no adverse noise impacts in the MCO Segment. Along the E-W Corridor, noise impacts would be primarily due to the increased noise propagation from elevated portions of track. There is potential for 105 moderate and five severe noise impacts at residential receptors and one moderate impact at an institutional receptor. Along the N-S Corridor, the use of wayside (pole-mounted) horns would eliminate any severe impacts and would reduce noise levels in comparison to the No-Action Alternative.

Noise mitigation along elevated portions of track may include sound barriers on the edge of the elevated structures to mitigate potential severe impacts. AAF is committed to mitigating impacts from the increased frequency of warning horn use at highway-rail at-grade crossings with the installation of stationary wayside horns at each of the grade crossings where severe, unmitigated impacts would occur. AAF is committed to cooperating with local jurisdictions should they seek to establish quiet zones in lieu of wayside horns.

A supplemental noise impact assessment was conducted for the three movable bridges along the N-S Corridor: St. Lucie River, Loxahatchee River, and New River. Following FTA/FRA guidelines, the supplemental noise analysis results and impact contours indicate no impact to any noise-sensitive land uses; therefore, no additional noise impacts were identified by this supplemental bridge noise impact assessment.

The greatest potential for vibration impact is along the N-S Corridor due to the increase (approximately doubling) of vibration events. There is no potential vibration impact along the MCO Segment. Along the E-W Corridor, there is the potential for vibration impact at 118 residential and 12 institutional receptors. There would be potential vibration impacts at 3,317 residential, 513 institutional receptors, as well as 18 other vibration-sensitive land uses (TV studios, recording studios, auditoriums, and theaters) along the N-S Corridor. AAF would minimize vibration impacts by wheel and rail maintenance that will control unacceptably high vibration levels. Vibration levels would be minor and would not exceed the threshold for structural damage to fragile buildings.

Noise during construction would affect residences and other buildings close to the Project Area, particularly where pile driving is required for bridge construction.

Section 5.2.2, *Noise and Vibration*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts. Chapter 7, *Mitigation Measures and Project Commitments*, describes the proposed mitigation measures.

Farmland Soils

Farmland soils within the Project Study Area with any level of designation by the Natural Resources Conservation Service (NRCS) were identified and mapped relative to the location of the Project. Direct impacts to prime and unique farmland soils from constructing the Project are limited to the E-W Corridor for all three Action Alternatives. Farmland Conversion Impact Rating forms were completed and submitted to NRCS. According to the results of the NRCS evaluation, there would be no significant impact to farmland soils.

Section 5.2.3, *Farmland Soils*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Hazardous Materials and Solid Waste Disposal

Several potential sources of soil or groundwater contamination are within or adjacent to the Project footprint. A contamination screening evaluation was performed and included a records search and review of historical aerials. A field reconnaissance was also conducted for sites rated medium and high-risk in proximity to the Project footprint.

The Project has the potential to encounter contaminated soils or groundwater, or to require the removal of waste material such as railroad ties, creosote-treated bridge timbers, or demolition material. The potential effects of the Action Alternatives would be the same. GOAA reported that no contaminated sites were located within 500 feet of the Project for the MCO Segment (including the VMF). The contaminated sites evaluation for the E-W Corridor identified 16 potentially contaminated sites within the 500-foot detailed evaluation area. However, all of the potentially contaminated sites are outside the planned

construction areas and impacts from the existing contaminated areas are not anticipated. A total of 337 potentially contaminated sites are within the 200-foot detailed search radius along the 128.5-mile N-S Corridor. As the proposed upgrades for this portion of the Project would be completely within the existing FECR Corridor and would result in minimal subsurface disturbance, there would be no impacts from existing contaminated areas. The Project would not substantially increase operational hazardous materials or hazardous waste. During construction, the Project would include proper handling, use, and disposal of hazardous materials and waste and would be compliant within all appropriate tracking and reporting requirements. Consequently, none of the three Action Alternatives would affect the transfer, storage, or transportation of pollutants.

Section 5.2.4, *Hazardous Materials and Solid Waste Disposal*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Coastal Zone Management

The Project lies within the designated Florida Coastal Zone and requires a federal consistency determination under the Coastal Zone Management Act (CZMA). Direct effects to the “natural resources of the coastal zone,” including both aquatic and marine resources, would result from all elements of the Project, including construction of the VMF, bridge and rail construction along the E-W Corridor, and bridge construction along the N-S Corridor. Portions of the N-S Corridor are within or adjacent to Coastal and Aquatic Managed Areas. Bridge construction/reconstruction would affect small areas of aquatic resources within the Indian River and the Jensen Beach-Juniper Inlet Aquatic Reserve. Each of the three Action Alternatives is consistent with applicable coastal zone policies; however, several provisions of the Florida Coastal Management Program would require mitigation. The Florida State Clearinghouse concurs with this finding, as detailed in a letter to FRA dated March 3, 2015 (FDEP, 2015).

Section 5.2.5, *Coastal Zone Management*, provides a detailed discussion of coastal zone consistency.

Climate Change

Florida faces direct, immediate, and severe impacts from climate change through rising sea level and the possibility of more intense storms. Calculations for emission of greenhouse gases (GHG) carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) show the Project would decrease emissions as a result of decreased automobile VMT. CO₂ emissions would decrease by 19,617 tons/year in 2019 and 31,477 tons/year in 2030. CH₄ emissions would decrease by 4.7 and 5.7 tons/year, respectively, and N₂O emissions by 5.0 and 6.1 tons/year in 2019 and 2030. Sea level rise effects for the MCO Segment and E-W Corridor are anticipated to be minimal for the 2030 and 2060 planning horizons, as these segments of the Project are at higher elevations and further from the coast. The N-S Corridor and WPB-M Corridor were assessed for vulnerability, as these corridors are along the coast and cross several coastal water bodies. Bridge structures will have increased vulnerability over time; potential infrastructure damage may result from flooding, tidal damage, and/or storms.

Section 5.2.6, *Climate Change*, provides a detailed discussion of climate change effects.

Water Resources

Surface water and groundwater resources, including navigable waters, Outstanding Florida Waters (OFWs), and impaired water bodies, were evaluated for potential impacts based on water availability, quality, use, and associated regulations.

Direct permanent impacts to waterways include installing concrete pilings and abutments within surface waters during bridge construction. Each of the alternatives would include constructing 31 new or replacement bridges over waterways, of which six would cross OFWs. New impervious surfaces (pavement and buildings) would be constructed in the MCO Segment for the VMF and would require stormwater management systems to protect surface and groundwater quality. Along the E-W Corridor, the proposed railroad would convert existing pervious land to a ballasted railroad bed and unpaved access road, resulting in minor changes to stormwater runoff and infiltration. AAF will implement best management practices (BMPs), which are often required as part of the environmental review permit process and would comply with all Florida Department of Environmental Protection (FDEP) and local ordinances. Therefore, there would be no significant impacts to surface waters and groundwater resources.

Section 5.3.1, *Water Resources*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts. Chapter 7, *Mitigation Measures and Project Commitments*, describes the proposed mitigation measures.

Wild and Scenic Rivers

The closest Wild and Scenic River designated segment of the Loxahatchee River is approximately four river miles upstream from the N-S Corridor in Palm Beach County. No impact would occur to Wild and Scenic Rivers from the Project, which would not be located in or visible from a Wild and Scenic River segment.

Wetlands

The Project would have moderate direct and indirect effects to wetlands. The quantified impacts, effects, and methodology for each Alternative is presented in Section 5.3.3 of the FEIS. Wetlands would be filled to construct portions of the N-S, VMF, and the E-W Corridor for all alternatives. Wetland impacts at the VMF have largely been permitted by the USACE under a prior permit issued to GOAA. Bridge construction along the E-W, N-S, and WPB-M Corridors would have minor effects on wetlands due to installing new pilings, abutments and riprap protection, and cutting mangrove vegetation beneath the bridges. Based on the comparable level of design presented in the DEIS, Alternative A would result in 128 acres of direct impacts to aquatic resources (wetlands and surface waters). Alternative C would directly impact 167 acres of aquatic resources and Alternative E would directly impact 159 acres of aquatic resources. Subsequent to the DEIS, AAF has further developed the engineering design for Alternative E and has revised its estimate of wetland impacts to a total of 263 acres of loss (excavation, filling and other impacts)(see Section 5.3.3.). The Project would have indirect effects on wetland quality and functions along the E-W Corridor; however, these would be minor since the wetlands are already affected by proximity to the heavily traveled SR 528 corridor. All wetlands impacts would be mitigated through the

purchase of appropriate mitigation bank credits from Federally approved mitigation banks. AAF will complete functional assessments to ensure the compensatory mitigation is commensurate with the functional loss.

Section 5.3.3, *Wetlands*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts. Chapter 7, *Mitigation Measures and Project Commitments*, describes the proposed mitigation measures.

Floodplains

Impacts to areas subject to flooding were evaluated using the base flood elevation published on the Federal Emergency Management Agency's Flood Insurance Rate Maps.

All three Action Alternatives would require construction within the mapped 100-year floodplain. The E-W Corridor crosses several floodplains, primarily those associated with the Econolockhatchee River and the St. Johns River. The N-S Corridor uses the existing FECR ROW, which crosses numerous floodplains primarily associated with coastal waters and estuaries. Alternative A would affect the least amount of floodplains, approximately 138 acres. Both Alternatives C and E would affect approximately 195 acres of floodplains. These impacts are not avoidable due to the extent of floodplains throughout the Project footprint. The construction design of each Action Alternative would minimize potential harm to the floodplains by retaining existing elevations where feasible, constructing stormwater mitigation measures and retention ponds, and minimizing fill in sensitive areas.

Section 5.3.4, *Floodplains*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Biological Resources and Natural Ecological Systems

Natural habitats within the Project Study Area support biological diversity, wildlife, and fish. Many of these natural habitats are directly adjacent to existing transportation facilities and have reduced habitat functions. Direct impacts to biological resources and natural ecological systems from the Project would result from the loss of natural vegetation along the E-W Corridor, south of SR 528.

The Project would result in varying impacts to natural upland habitat. Alternative A would cause 93 acres of direct loss of upland vegetation. Alternative C would directly impact approximately 122 acres of uplands and Alternative E would directly impact approximately 109 acres of uplands. For each alternative, the greatest loss of upland habitat would be to forested plant communities. The potential loss of wildlife habitat could result in indirect or secondary effects to wildlife such as habitat fragmentation and associated "edge effects," the loss of genetic diversity of plant and animal populations, increased competition for resources, and physical or psychological restrictions on movements caused by some feature within a corridor that wildlife are unwilling or unable to cross. It is also possible that the operation of the Project could displace some individual wildlife populations that are sensitive to noise and vibration. However, these effects are negligible due to the existing effects of SR 528 and other transportation facilities.

Essential fish habitat (EFH) is defined as those waters and substrates necessary to support fish for spawning, breeding, feeding, or growth to maturity. Habitat Areas of Particular Concern (HAPC) are subsets of EFHs that are particularly important to the long-term productivity of populations of one or

more managed species, or are particularly vulnerable to human induced degradation. The evaluation of EFHs and HAPC included potential impacts to fisheries. Impacts under Alternatives A, C, and E would be generally similar for all fisheries. The Project would have unavoidable minor impacts to EFH and HAPC. Direct impacts associated with the Project would result from placing rip-rap/fill for the bridge approaches, placing bridge pilings, and excavating where existing timber pilings will be replaced. The NMFS has concurred that the Project would not have a significant adverse effect on EFHs.

Impacts to biological resources and natural ecological systems have been minimized due to the fact that the E-W Corridor would be developed immediately adjacent to an existing transportation corridor and would not significantly increase fragmentation and noise impacts that do not already exist in this area. The Project includes a new wildlife crossing adjacent to the Tosohatchee Wildlife Management Area (WMA) to facilitate future movement along the Florida Wildlife Corridor.

Erosion and sedimentation would be controlled using BMPs, such as silt fences and turbidity curtains, in accordance with an approved Erosion and Sedimentation Control Plan, during construction of the bridges.

Section 5.3.5, *Biological Resources and Natural Ecological Systems*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts. Chapter 7, *Mitigation Measures and Project Commitments*, describes the proposed mitigation measures.

Threatened and Endangered Species

The Project would potentially affect habitats used by federal and state listed wildlife and plant species. The Federal Endangered Species Act of 1973 (ESA) defines an endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range.” The ESA also defines a threatened species as “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” The ESA protects species listed as endangered or threatened on a national basis.

Each of the Action Alternatives could potentially impact the following federally listed species and/or their habitats: West Indian manatee, sea turtles, smalltooth sawfish, Audubon’s crested caracara, wood stork rookeries, Florida scrub-jay, red-cockaded woodpecker, , and the eastern indigo snake. Results of scrub-jay field surveys conducted along the N-S Corridor document the presence of scrub-jays at Savannas Preserve State Park and indicate it is likely scrub-jays will occur within the rail corridor at times. The Project is anticipated to result in an “incidental take” of this species; however, this will not jeopardize the continued existence of the species or affect local populations. AAF has purchased mitigation credits to offset these impacts.

Johnson’s seagrass, may occur in a number of waterways in the vicinity of the N-S Corridor, but surveys conducted at the river crossings indicated that this species is not located within the Project Study Area and would not be directly affected by the Project. Despite the disturbed habitat located in the FECR ROW, it has been determined fragrant prickly-apple is located within the FECR Corridor and pre-construction surveys will determine if this species would be affected by the proposed construction activities. Several other plant species have been documented within the adjacent Jonathan Dickinson State Park and other protected natural areas.

Potential impacts to state listed species and/or their habitats include the Sherman's fox squirrel, burrowing owl, Florida sandhill crane, limpkin, little blue heron, roseate spoonbill, snowy egret, the southeastern American kestrel, tricolored heron, white ibis, mangrove rivulus, gopher tortoise (and its associated eastern indigo snake, Florida mouse, Florida pine snake, short-tailed snake, and gopher frog habitat), wading bird rookeries, American oyster catcher, and reddish egret habitat.

AAF has proposed specific mitigation for potential temporary and permanent impacts to the habitat of state and federally listed species, in addition to conducting pre-construction surveys for rare animal species (caracara, red-cockaded woodpecker, gopher tortoise, sand skink, and listed plants) and plant species that may occur within the construction area. A gopher tortoise relocation permit will provide authorization to move all commensal species other than the eastern indigo snake to an adjacent habitat outside construction limits.

The USFWS and NMFS, PRD are the lead federal agencies for ESA compliance. Both agencies have independently assessed the effects of the Project on federally listed species. The USFWS found that the Project is "not likely to adversely affect" the Audubon's crested caracara, the American alligator, the wood stork, or the eastern indigo snake; and may affect, but is not likely to adversely affect, the West Indian manatee, the gopher tortoise, the loggerhead sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, hawksbill sea turtle, smalltooth sawfish, the blue-tailed mole skink, or the Florida sand skink. USFWS will issue a Biological Opinion which will include Reasonable and Prudent Measures, Terms and Conditions, and Conservation Recommendations which AAF will be required to adhere to. NMFS has provided a letter of concurrence stating the proposed work is not likely to adversely affect: the smalltooth sawfish and sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback). The project will not affect Atlantic sturgeon, shortnose sturgeon, and Johnson's seagrass, or result in an adverse modification of Johnson's seagrass- designated critical habitat. NMFS does not believe hawksbill or leatherback sea turtles will be present or affected because of their very specific life history, sheltering, and foraging requirements, which are not met in or near the action area- hawksbills are associated with coral reefs while leatherbacks are a deepwater, pelagic species. Smalltooth sawfish, loggerhead sea turtles (Northwest Atlantic Ocean distinct population segment), green sea turtles, and Kemp's ridley sea turtles may be found in or near the action area.

Section 5.3.6, *Threatened and Endangered Species*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts. Chapter 7, *Mitigation Measures and Project Commitments*, describes the proposed mitigation measures.

Communities and Demographics

Information collected from the United States Census Bureau (USCB), county websites, and municipal websites were reviewed and incorporated, as appropriate, to describe the community structure and demographic profiles along the Project corridor. Adverse impacts to communities and demographics are those that involve long-term residential displacement and neighborhood fragmentation or the loss of continuity between neighborhoods.

The E-W Corridor would be predominantly within the SR 528 ROW between Orlando and Cocoa and would not cross any residential neighborhoods; therefore, no neighborhood fragmentation would occur. No residential displacement would occur, as the E-W Corridor would not require the use of developed

residential properties. The N-S Corridor would not result in residential displacement, neighborhood fragmentation, or the loss of continuity between neighborhoods, as it is entirely within the existing FECR Corridor. The relocated Fort Lauderdale Station would not adversely affect any communities.

Section 5.4.1, *Communities and Demographics*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Environmental Justice

Federal environment impact analysis standards require review and determination to assess whether a project has a disproportionate adverse effect on minority or low-income populations.

This environmental justice evaluation included the use of demographic data collected from the 2010 U.S. Census and 2010 American Community Survey. The Project Study Area for this evaluation included census tracts within 1,000 feet of the of the proposed or existing railroad alignments. Thresholds to determine meaningfully greater high minority and low-income populations include census tracts where minority populations are 10 percent higher than the combined total for the six counties crossed by the Project (37.4 percent) and census tracts where low-income populations are 10 percent higher than the combined total for the six counties crossed by the Project (22.4 percent).

There would be no disproportionate impacts to environmental justice communities along the MCO Segment, as there are no minority or low-income populations within the census tract encompassing this segment. Neither the E-W Corridor nor the N-S Corridor would result in residential displacement, job loss, or neighborhood fragmentation due to the use of property; therefore, there would be no disproportionate impacts to environmental justice communities from changes in land use. Although changes in noise would affect 109 residential parcels (105 moderate and four severe impacts) along the E-W Corridor, none of these parcels are within environmental justice communities. Potential impacts resulting from changes to noise in environmental justice communities would not be appreciably more severe or greater in magnitude than the impacts experienced by non-environmental justice communities along the N-S Corridor. There would be no adverse vibration impacts to environmental justice communities along the E-W Corridor under the Project, and mitigation would limit any changes in vibration along the N-S Corridor such that there would be no resulting vibration impacts.

Section 5.4.2, *Environmental Justice*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Economic Conditions

Impacts to economics are those that involve the displacement of businesses, changes in employment, and the loss of real estate taxes as well as beneficial effects from construction-period spending or long-term economic changes. With the Project, the MCO Segment and N-S Corridor would not result in the reduction of municipal property tax revenues. The E-W Corridor would require the acquisition of several privately owned parcels outside the SR 528 ROW, but would not result in a significant loss of property tax revenues in Orange or Brevard Counties. The relocated Fort Lauderdale Station, within the WPB-M Corridor, would require acquisition of three parcels adjoining the Florida East Coast Corridor. These businesses are

expected to relocate elsewhere in Fort Lauderdale. None of the Action Alternatives would result in any business or job losses.

An economic analysis of potential economic impacts associated with increased average vessel wait times for the three movable bridges at St. Lucie River, Loxahatchee River, and New River represented an impact of less than 0.1 percent daily cost increase as compared to the No-Action Alternative.

Phase I and Phase II of the Project would have long-term direct economic benefits through the creation of approximately 1,100 cumulative jobs through 2021 and labor income valued at nearly \$294 million through 2021. Construction of the Project would have a direct total economic impact of \$915.6 million, with the largest benefit to be had in Orange County at \$302.2 million (WEG 2014). Project operations would have a direct total economic impact of \$507.2 million between 2016 and 2021, with an average direct economic impact of \$84.5 million per year (WEG 2014).

Section 5.4.3, *Economic Conditions*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Public Health and Safety

The Project would have an overall beneficial effect on public health, safety, and security in the rail corridor. While greater frequency of trains may increase the frequency of opportunities for conflict between trains and vehicles or people, safety improvements at crossings, an upgraded Positive Train Control system, enhanced security, and improved communications among emergency responders would minimize potential conflicts and their consequences. The benefits resulting from decreased congestion and the potential for fewer vehicular crashes and fewer air emissions indicate that there will be no significant negative impacts on public health and safety.

In response to a Diagnostic Safety Review conducted by the FRA Office of Railroad Safety – Highway Rail Crossing and Trespasser Program Division, AAF has voluntarily agreed to incorporate recommended grade crossing safety improvements related to the introduction of passenger rail service, in conjunction with county and municipal execution of amendments to existing crossing license agreements. The range of grade crossing improvements includes pedestrian gates, Vehicle Presence Detection, four and three quadrant gates, locked gates, raised medians, and other crossing improvements as appropriate. The proposed grade crossing improvements and locations are shown in Tables 3.3-8 to 3.3-12.

The Action Alternatives are anticipated to have the same effects on accessibility and would benefit elderly and handicapped individuals by providing a transportation option that will enhance mobility and livability in their communities. The AAF trains and stations would comply with the Americans with Disabilities Act (ADA) requirements. Preliminary design plans indicate that AAF trains will be single level, fully accessible coaches, with no stairs or other obstacles to impede movement on board trains. Every coach car will have ADA compliant restrooms.

Section 5.4.4, *Public Health and Safety*, describes these environmental impacts in detail.

Historic Properties

The methodology for identifying cultural resources has been developed in conjunction with the State Historic Preservation Officer (SHPO) and is similar to previous SHPO-approved methodologies that have been applied to other large-scale transit projects.

Section 5.4.5, *Historic Properties*, contains FRA's Findings of Effect under Section 106 of the National Historic Preservation Act of 1966, as amended. No National Register of Historic Places (NRHP) listed or eligible resources were identified within the MCO Segment. One NRHP-eligible resource has been identified in the direct effects area of potential effect (APE) for the E-W Corridor – the FECR Historic District, which is located at the east end of the E-W Corridor in Cocoa at the intersection with the N-S Corridor. FRA determined that constructing the E-W Corridor would have no adverse effect on the FECR Historic District.

NRHP listed or eligible resources were identified within the N-S Corridor and include the FECR Railway Historic District and several historic railroad bridges. The Project would have no adverse effect on the historic district. SHPO has concurred with the 2012 EA that the use of the historic rail line and restoration of passenger rail service would not constitute an adverse effect (FRA 2013). The Project will require that two historic bridges (Eau Gallie River and St. Sebastian River), which are individually eligible for the NRHP, be demolished; FRA has determined that the Project would have an adverse effect on these two bridges. Two additional bridges that are individually eligible for the NRHP will be rehabilitated, and seven bridges that are contributing elements will also be demolished and replaced with modern structures; FRA has determined that replacing the contributing bridges has “no adverse effect” under Section 106 and therefore represents a *de minimis* impact under Section 4(f). The adverse effect to historic railroad bridges under Section 106 is subject to a Section 4(f) Evaluation, presented in Chapter 6, *Section 4(f) Evaluation*.

Based on the information available, FRA has determined that the Project would have no adverse effect on archaeological sites within the APE for direct impacts for the N-S Corridor. The no adverse effect finding is based on the condition that AAF will continue to consult with SHPO through the design process, as needed, and will adhere to the stipulations of the MOA to ensure appropriate sensitivity to the previously recorded archaeological sites located within the APE.

The Project would have no direct or indirect effects (noise, vibration, or change in setting) to the historic resources adjacent to the N-S Corridor. The relocated Fort Lauderdale Station would have no effect on nearby historic properties. A conditional “no adverse effect finding” is anticipated based on the condition that consultation with the SHPO will continue through the design process in order to ensure compatibility and appropriate sensitivity to the FECR Railway Historic District and bridge resources.

Section 5.4.5, *Historic Properties*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Park and Recreation Lands

The Project would not adversely affect (“use”) any public parks, recreation areas, or wildlife refuges. Collectively, these properties are protected under Section 4(f) of the Department of Transportation Act, as are historic properties and cultural resources. The MCO Segment is within the property boundaries of

MCO and no parks or recreation lands are located on this property. The E-W Corridor (and SR 528) is adjacent to two recreation resources (the Tosohatchee WMA and the Canaveral Marshes Conservation Area); however, constructing the E-W Corridor would not require acquisition of new ROW within the property limits of these resources. Thirty-one recreational resources are along the N-S Corridor. The existing N-S Corridor bisects two of these recreation resources (the Hobe Sound National Wildlife Refuge and Jonathan Dickinson State Park). All construction would take place within the existing FECR-owned ROW and would not require acquisition of new ROW within Section 4(f) resource property limits. Two of the 31 identified recreation resources along the N-S Corridor are also Section 6(f) resources (North Sebastian Conservation Area and Sawfish Bay Park). The N-S Corridor would not cross either resource and no land acquisition within either resource would be required.

The Project would not affect the use of parks or recreation resources adjacent to the Project in regards to noise, vibration, aesthetics, or access. Noise and vibration generated by the Project would be compatible with the intended use of these parks and recreation resources. Existing viewsheds along the Project would be consistent with existing conditions at MCO, along the SR 528 ROW (E-W Corridor), and the FECR Corridor (N-S Corridor).

The E-W Corridor would be constructed as an overpass as not to interrupt the use of Long Bluff Road within the Tosohatchee WMA. Construction would avoid temporary road closures to the extent practicable. If temporary road or lane closures are necessary, AAF, in association with FRA, would coordinate with the land managing agencies of the Section 4(f) recreational resources (Florida Fish and Wildlife Conservation Commission [FWC]). To ensure the safety of the users of Jonathan Dickinson State Park, AAF would implement at-grade crossing improvements where the N-S Corridor crosses Southeast Jonathan Dickinson Way.

Section 5.4.6, *Recreation and Other Section 4(f) Resources*, describes these environmental impacts in detail. Chapter 6, *Section 4(f) Determination*, provides additional information on FRA's Section 4(f) process, alternatives evaluation and mitigation measures. Chapter 7, *Mitigation Measures and Project Commitments*, also describes the proposed mitigation measures.

Visual and Scenic Resources

The Project is anticipated to have only minor effects on visual and scenic resources, primarily associated with new bridges over waterways and new communications towers along the E-W Corridor. The effects of all three Action Alternatives are expected to be similar within each segment of the Project with some minor differences. The existing viewshed of the MCO Segment and N-S Corridor would remain primarily unchanged. Motorists traveling along SR 528 would generally be able to see the new railroad in the E-W Corridor to the south.

The viewshed of motorists traveling east on SR 528 crossing the St. Johns River would be somewhat obstructed because the rail bridge would be higher than the SR 528 bridge. The views for boaters on the St. Johns River looking north towards SR 528 would not change substantially as the rail bridge would be parallel to SR 528 and would be similar to the size and structure of SR 528 over the river. Views would be the same for Alternatives A, C, and E, as all three Action Alternatives would be on the same alignment at this location.

The viewshed of motorists traveling on existing roads crossing SR 528, including motorists on I-95, would change minimally. The new rail overpasses would be constructed parallel to SR 528 and would be similar to the size and structure of the SR 528 Bridge over I-95.

Section 5.4.7, *Visual and Scenic Resources*, describes these environmental impacts in detail.

Utilities and Energy Resources

The evaluation of utilities and energy resources included a review of county-developed interactive mapping services for current utility locations and urban service areas and national databases for the current locations of underground pipelines.

Action Alternatives A, C, and E may require portions of existing utilities be relocated outside the track footprint where the proposed track crosses underground utilities. Where the proposed track crosses under overhead utilities, relocation or reconstruction may be necessary to provide the required vertical clearance over the tracks to accommodate utility lines and equipment.

Some buried utilities may be present in the MCO Segment. The proposed VMF is currently served by all necessary utilities (Orlando Utilities Commission 2013). Constructing the VMF would affect a large infiltration ditch originally constructed to serve the City of Orlando wastewater treatment facility, which is no longer functioning. Constructing the VMF, therefore, would not affect any utilities.

The E-W Corridor crosses several stormwater management features associated with SR 528. For Alternative A, a power line access road would be accommodated within the existing SR 528 ROW using retaining walls for the railroad. For Alternatives C and E, a new maintenance access road would be constructed south of the railroad and would be a shared maintenance road with AAF. The Project would intersect two existing pipelines. Alternative A may require portions of these pipelines be relocated.

Electrical transmission/distribution lines, above and below ground, are located along and within the FECR ROW in the N-S Corridor. In some locations, poles will require relocation in order to accommodate the new mainline track and upgraded crossings. Any relocation of poles is expected to be minimal.

The locomotives are planned as diesel-electric units and will not place any additional load on the existing electrical and utility services. Based on the estimated annual quantities of diesel consumption, the impact on energy resources would be negligible. The increase in electrical service/demand due to signals is minimal and will require no major changes or construction of electrical or other utility infrastructure.

Section 5.4.8, *Utilities and Energy Resources*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Cumulative Effects

Under NEPA regulations (40 CFR part 1508.7), a cumulative effect is defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”

The cumulative effects of the Project were analyzed for each of the alternatives, as compared to the baseline condition (the No-Action Alternative). The evaluation was conducted for a selected set of resources within certain temporal and spatial boundaries, in reference to historical trends or effects from other specific projects and that are (for the most part) regulated by various governmental agencies. The cumulative effects evaluation focused on those resources that would be affected by the Project including:

- Land Use;
- Transportation;
- Air Quality;
- Noise;
- Water Resources;
- Floodplains;
- Wetlands;
- Protected Species; and
- Social and Economic environment.

The other resources evaluated in Chapter 5, *Environmental Consequences*, are expected to be little affected or not affected by any of the Project alternatives and/or would not be adversely affected by past or reasonably foreseeable actions in the Project Study Area.

As documented in Section 5.5, *Cumulative Impacts*, the Project is not anticipated to result in cumulative impacts that would be collectively significant and adverse. With respect to transportation, air quality, and economic resources, the Project would have beneficial cumulative impacts.

Comparing the Alternatives

Table S-2 summarizes the anticipated environmental effects of each of the alternatives for the AAF Intercity Passenger Rail Service Project.

		Action Alternatives		
Resource	No-Action Alternative	Alternative A	Alternative C	Alternative E
Land Use	No Effect	Minor land acquisition (93.7 acres); remaining land leased from GOAA, CFX, FDOT. Consistent with land use and transportation plans.		
Transportation	Increases in automobile volume on SR 528, I-95 and Florida's Turnpike would increase congestion and delays	Beneficial effects by increased freight traffic efficiencies. The Project would remove 335,628 auto vehicle trips per year from the regional roadway network in 2016 and 1.2 million vehicle trips per year in 2019. The MCO Segment and E-W Corridor would not have an adverse effect on local vehicle transportation, while the N-S Corridor would increase the number of roadway grade crossing closures.		
Navigation	Increased freight operations would increase the number of closures at the St. Lucie River, Loxahatchee River and New River Bridges	The three moveable bridges would be closed more frequently with the Project and would affect navigation. The improved track infrastructure will decrease the duration of any single bridge closure by allowing increased train speeds. Mitigation measures proposed by AAF would reduce delays and queuing at the bridges.		
Air Quality	VMT would continue to increase resulting in increased air pollutant emissions	Alternatives A, C, and E would provide a net regional air quality benefit through a reduction in VMT and associated air pollutant emissions.		
Noise and Vibration	Noise and vibration would increase as a result of increased freight traffic	Noise effects along the E-W Corridor would occur at elevated portions of track and along the N-S Corridor at-grade crossing locations. The use of pole-mounted horns at grade crossings would reduce noise levels to below existing conditions. Vibration effects would be caused by an increase (approximately double) in vibration events.		
Farmland Soils	No effect	No significant effects		
Hazardous Materials and Waste	Potentially contaminated sites previously not identified would not be assessed or mitigated	No effect on the transfer, storage, or transportation of pollutants. The Project would not substantially increase operational hazardous materials or hazardous waste.		
Coastal Zone Management	Consistent	Consistent		
Climate Change	VMT would continue to increase resulting in increased greenhouse gas emissions	GHG emissions for CO ₂ , CH ₄ , and N ₂ O were calculated and the Project would decrease emissions as a result of decreased automobile VMT. Bridge structures in the N-S Corridor and WPB-M Corridor will have increased vulnerability over time; potential infrastructure damage may result from flooding, tidal damage, and/or storms.		
Water	No effect	The proposed VMF would add impervious surfaces for pavement and buildings. Appropriate stormwater BMPs would be included in Project design to reduce impacts to water quality. The Project would require stormwater management facilities along the E-W Corridor and may require modification of stormwater ditches along the N-S Corridor.		
Wild and Scenic Rivers	No effect	No effect		
Wetlands	No effect	130 acres of wetland loss	167 acres of wetland loss	160 acres of wetland loss based on the same data as Alternatives A and C. Updated wetland loss calculated as 263 acres of direct and indirect impact.
Floodplains	No effect	138 acres of floodplain affected. Negligible effect on flood storage or flooding.	195 acres of floodplain affected. Negligible effect on flood storage or flooding.	
Biological Resources and Natural Ecological Systems	No effect	93 acres of upland habitat loss. Minor indirect and secondary impacts to wildlife.	122 acres of upland habitat loss. Minor indirect and secondary impacts to wildlife.	109 acres of upland habitat loss. Minor indirect and secondary impacts to wildlife.

		Action Alternatives		
Resource	No-Action Alternative	Alternative A	Alternative C	Alternative E
Essential Fish Habitat	No effect	No significant effect. BMPs to protect fish habitat would be implemented during bridge construction, and habitat impacts would be offset by the purchase of mitigation credits.		
Threatened and Endangered Species	No effect	No adverse effect. Mitigation measures will be used during construction, particularly within waterways, and additional pre-construction surveys will be undertaken as required by state and federal agencies. AAF has purchased mitigation credits to offset incidental effects to Florida scrub-jay populations.		
Communities and Demographics	No effect	No adverse effect		
Environmental Justice	No effect	No disproportionate adverse effects		
Economics	No effect	Beneficial long- and short-term effects. During construction, the Project will generate jobs and labor income and increase the state GDP. The Project will increase federal, state, and local tax revenues during construction and during subsequent operations. The Project would have long-term direct economic benefits to local communities through the creation of jobs.		
Public Health and Safety	No effect	Overall beneficial effect on public health, safety, and security. AAF trains will comply with ADA requirements.		
Cultural Resources	No adverse effect	Demolition of historic railroad bridges would be an adverse effect under Section 106 and would be considered a "use" under Section 4(f).		
Parks, Recreation Areas and Wildlife Refuges	No effect	No use of land from parks, recreation areas, or wildlife refuges and no effect on the use of these properties.		
Visual and Scenic Resources	No effect	The existing viewsheds of the MCO Segment and N-S Corridor would remain primarily unchanged. Views would be changed, but not significantly, for motorists traveling along SR 528 and along roads and highways that cross SR 528.		
Utilities and Energy Resources	Energy consumption for private automobiles would increase commensurate with the increase in annual vehicle-miles traveled.	Portions of existing utilities may need to be relocated outside the track footprint where the proposed track crosses underground utilities. Relocation or reconstruction of overhead utilities may be necessary to provide the required vertical clearance over the tracks. The relocation of poles is expected to be minimal. The Project would require minimal electrical demand and would result in a long-term decrease in energy consumption through increased travel efficiency.		

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How to Read this Document

Purpose of this Environmental Impact Statement

This Environmental Impact Statement (EIS) has been prepared by the Federal Railroad Administration (FRA) to disclose the environmental consequences of a proposed action, and to inform decision-makers and the public of any reasonable alternatives that would avoid or minimize adverse impacts to the natural or human environment. In this instance, the EIS will be used by each of the Federal agencies that are considering an action on the proposed All Aboard Florida Intercity Passenger Rail Project (Project) - the FRA, the U.S. Army Corps of Engineers, the U.S. Coast Guard, the Federal Aviation Administration (FAA), and the Federal Highway Administration - to help plan their actions and make decisions.

Acronyms, Abbreviations and Glossary

All of the technical terms and abbreviations used in this document are listed and defined in the section *Acronyms and Abbreviations/Glossary*, which follows the *How to Read this Document* pages.

References

Reference documents are cited in the text in an abbreviated format (author date). Full citations for all references, including web addresses for electronic documents are provided in Chapter 9, *References*.

Index

This document contains an index to major topics and issues that can help readers quickly locate information on specific topics.

Appendices and Supporting Material

The text and figures that comprise this EIS are supported by a series of appendices that contain material that is too lengthy to include in the body of the EIS. As stated in the Council on Environmental Quality's National Environmental Policy Act (NEPA) regulations, an EIS should be kept concise and be no longer than absolutely necessary to comply with NEPA and the regulations. Each of these appendices is numbered to correspond to the relevant chapter and section of the EIS. Material that may be found in the appendices includes detailed maps of the Project area, detailed noise and vibration analysis results, information on rare species and fisheries, cultural resources, and documentation of agency coordination and consultation.

Chapter 1 – Introduction

Chapter 1 briefly describes the history of the Project, the relationship of Phase I (West Palm Beach to Miami passenger rail service and infrastructure improvements) to Phase II (Orlando to West Palm Beach

passenger rail service and infrastructure improvements), defines each Phase, and identifies the actions that the FRA and other Federal agencies are responsible for.

Chapter 2 – Purpose and Need

Chapter 2 briefly describes the purpose of the Project and the transportation needs that the Project will address.

Chapter 3 – Alternatives

This chapter contains a detailed description of Phase II of the Project, which includes a new Vehicle Maintenance Facility on property to be leased at the Orlando International Airport (MCO); new track infrastructure within MCO; new track infrastructure parallel to State Road 528 (SR 528 or the Beachline); and improvements to the track infrastructure within the Florida East Coast Railroad right-of-way from Cocoa to West Palm Beach. Phase II also includes reconstructing seven bridges between West Palm Beach and Miami. This chapter also describes the future No-Action Alternative, which provides a base scenario against which to compare the effects of the Project. The Alternatives chapter also describes a three-level screening process which first evaluated four different route alternatives connecting Orlando with Miami; evaluated five alternatives to connect the SR 528 corridor with the MCO facility and with the Florida East Coast Railroad Corridor (FECR corridor) right-of-way; and evaluated five alternative alignments along the SR 528 corridor. The three alternatives that are evaluated in Chapter 5, *Environmental Consequences*, are described in detail. The applicant has identified Alternative E as its Preferred Alternative.

Chapter 4 – Affected Environment

This chapter describes the existing (2013) environmental conditions along the Project corridor from MCO to West Palm Beach, and summarizes relevant information from the 2012 Environmental Assessment for West Palm Beach to Miami. These baseline conditions provide a context for understanding the impacted resources and to familiarize the reader with the geography, land use, demographics, physical environment, natural resources, and cultural resources associated with the Project corridor.

Chapter 5 – Environmental Consequences

This chapter describes the environmental consequences of the No-Action Alternative and the three alternatives considered for the Project. Impacts are considered for the resource categories of land use and transportation; air quality, noise and vibration; natural resources; and social, economic and cultural resources. For each category, the analysis considers direct impacts, indirect impacts, short-term construction-period impacts, and the cumulative impacts of the Project along with reasonably foreseeable past, present, and future impacts.

Chapter 6 – Section 4(f) Evaluation

Because the Project will require that two bridges eligible for the National Register of Historic Places be demolished, an evaluation under Section 4(f) of the Department of Transportation Act is included in this document. Section 4(f) states that the Secretary of Transportation may not approve any project that

requires the use of any property protected under Section 4(f) unless there is no feasible and prudent alternative to the use of such land, and the project includes all possible planning to minimize harm resulting from the use. This chapter describes the proposed action, alternatives that were considered, and planning to mitigate for adverse effects.

Chapter 7 – Mitigation and Project Commitments

This chapter describes the measures considered to minimize, avoid, and/or mitigate potential adverse impacts from the Project.

Chapter 8 – Public Involvement

This chapter describes the efforts of the FRA and the proponent, All Aboard Florida, to inform the public about the Project, and to solicit input on the Project and the scope of this EIS.

Where to Find Information about Specific Resources

Chapters 4 and 5 of this EIS provide information about the existing environment (Chapter 4) and the impacts of the Project (Chapter 5) on the range of environmental resource categories specified by the Council on Environmental Quality (CEQ) NEPA Regulations, FRA's NEPA Guidance, and FAA's NEPA Regulations. The table below lists all of these resource categories and where the reader can find information on existing conditions and Project impacts.

Resource Categories Evaluated in this Environmental Impact Statement			
Resource (FRA)	Impact Category (FAA) ¹	Location in EIS	
		Chapter 4, Affected Environment	Chapter 5, Environmental Consequences
Air Quality	Air Quality	Section 4.2.1	Section 5.2.1
Climate Change		Not applicable	Section 5.2.6
Coastal Zone Management	Coastal Resources	Section 4.2.5	Section 5.2.5
Communities and Demographics	Socioeconomic Impacts, Environmental Justice and Children's Health and Safety Risks	Section 4.4.1	Section 5.4.1
Construction Impacts	Construction Impacts	Not applicable	Section 5.2.2
Cumulative Impacts	(applies to all categories)	Not applicable	Section 5.4.9
Economic Conditions	Socioeconomic Impacts	Section 4.4.4	Section 5.4.4
Environmental Justice	Socioeconomic Impacts, Environmental Justice and Children's Health and Safety Risks	Section 4.4.2	Section 5.4.2
Farmland Soils	Farmlands	Section 4.2.3	Section 5.2.3
Biological Resources and Natural Ecological Systems	Fish, Wildlife and Plants	Section 4.3.5	Section 5.3.5
Floodplains	Floodplains	Section 4.3.4	Section 5.3.4
Hazardous Materials and Solid Waste Disposal	Hazardous Materials, Pollution Prevention and Solid Waste	Section 4.2.4	Section 5.2.4
Land Use	Compatible Land Use	Section 4.1.1	Section 5.1.1
Migratory Birds	Fish, Wildlife and Plants	Section 4.3.5	Section 5.3.5
Navigation		Section 4.1.3	Section 5.1.3
Noise	Noise	Section 4.2.2	Section 5.2.2
Recreation and Other Section 4(f) Resources	Department of Transportation Act, Section 4(f)	Section 4.4.6	Section 5.4.6
Public Health and Safety	Socioeconomic Impacts, Environmental Justice and Children's Health and Safety Risks (in part)	Section 4.4.4	Section 5.4.4
Threatened and Endangered Species	Fish, Wildlife and Plants	Section 4.3.6	Section 5.3.6
Transportation and Traffic	Socioeconomic Impacts, Environmental Justice and Children's Health and Safety Risks	Section 4.1.2	Section 5.1.2
Utilities and Energy Resources	Natural Resources and Energy Supply	Section 4.4.8	Section 5.4.8
Vibration		Section 4.2.2.2	Section 5.2.2
Visual and Scenic Resources	Light Emissions and Visual Impacts	Section 4.4.7	Section 5.4.7
Water Resources	Water Quality	Section 4.3.1	Section 5.3.1
Wetlands	Wetlands	Section 4.3.3	Section 5.3.3
Wild and Scenic Rivers	Wild and Scenic Rivers	Section 4.3.2	Section 5.3.2

¹ FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*. March 20, 2006.

Acronyms and Abbreviations/Glossary

Acronyms

AADT	Annual Average Daily Traffic
AAF	All Aboard Florida – Operations LLC
AAR	Association of American Railroads
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ACSC	Areas of Critical State Concern
ADA	Americans with Disabilities Act
APE	Area of Potential Effect
AQCR	Air Quality Control Region
AQI	air quality index
AREMA	American Railway Engineering and Maintenance-of-Way Association
ASLRRA	American Short Line and Regional Railroad Association
ASM	Areas of Special Management
AST	above ground storage tank
ASTM	American Society of Testing and Materials
BA	Biological Assessment
BBCS	Florida Department of Environmental Protection Bureau of Beaches and Coastal Systems
BCT	Broward County Transit
BGEPA	Bald and Golden Eagle Protection Act
BLS	Bureau of Labor Statistics
BMP	Best Management Practice
CAAA	Clean Air Act Amendments
CAMA	Florida Department of Environmental Protection’s Office of Coastal and Aquatic Managed Areas
CEQ	President’s Council on Environmental Quality
CFA	Core Foraging Areas
CFR	Code of Federal Regulation

CFX	Central Florida Expressway Authority
CH ₄	methane
CLG	Certified Local Governments
CO	carbon monoxide
CO ₂	carbon dioxide
CR	County Road
CRAS	Cultural Resource Assessment Survey
CRM	Cultural Resource Management
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	decibels
dba	A-weighted decibel
DEIS	Draft Environmental Impact Statement
DEO	Department of Economic Opportunity
EA	Environmental Assessment
EDM	Environmental Data Management, Inc.
EDR	Environmental Data Resources, Inc.
EEL	Environmentally Endangered Lands
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
ERP	Florida Department of Environmental Protection Environmental Resource Permit
ESA	Endangered Species Act
E-W Corridor	East-West Corridor
FAA	Federal Aviation Administration
FAC	Florida Administrative Code
FCMP	Florida Coastal Management Program
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDHR	Florida Division of Historic Resources
FDOT	Florida Department of Transportation

FECR Corridor	Florida East Coast Corridor
FECI	Florida East Coast Industries, Inc.
FECR	Florida East Coast Railway LLC
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHSRA	Florida High Speed Rail Authority
FHWA	Federal Highway Administration
FIHS	Florida Interstate Highway System
FIRM	Flood Insurance Rate Map
FLAQS	Florida's Air Quality System
FLEPPC	Florida Exotic Pest Plant Council
FLL	Fort Lauderdale-Hollywood International Airport
FLUCCS	Florida Land Use, Covers and Forms Classification System
FMC	Fishery Management Councils
FMSF	Florida Master Site File
FNAI	Florida Natural Area Inventory
FONSI	Finding of No Significant Impact
FPL	Florida Power & Light Company
FPPA	Farmland Protection and Policy Act
FRA	Federal Railroad Administration
FS	Florida Statutes
FTA	Federal Transit Administration
FTE	Florida Turnpike Enterprise
FWC	Florida Fish and Wildlife Conservation Commission
FY	fiscal year
GBN	ground-borne noise
GHG	Greenhouse Gas
GIS	Geographic Information System
GOAA	Greater Orlando Airport Authority
HAPC	Habitat Areas of Particular Concern
HSA	Highway Safety Act
HSR	Hal Scott Regional Preserve

Hz	hertz
I-4	Interstate 4
I-95	Interstate 95
ICU	Intersection Capacity Utilization
LBG	Louis Berger Group
L _{dn}	A-weighted average day-night sound level
L _{eq} (h)	A-weighted hourly equivalent sound level
LEDPA	Least Environmentally Damaging Practicable Alternative
LRT	light rail
LOS	Level of Service
L RTPs	Long Range Transportation Plans
M	million
MCO	Orlando International Airport
MIA	Miami International Airport
MIC	Miami Intermodal Center
MINWR	Merritt Island National Wildlife Refuge
MOA	Memorandum of Agreement
MP	Mile Post
mph	miles per hour
MPO	Metropolitan Planning Organizations
MRS	Munitions Response Sites
MSA	Metropolitan Statistical Area
msl	mean sea level
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NB	northbound
n.d.	not dated
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
nm	nautical mile
NMFS	National Marine Fisheries Service

NO ₂	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO _x	oxides of nitrogen
NPDES	USEPA National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
N-S Corridor	North-South Corridor
NWI	National Wetland Inventory
O ₃	ozone
OFW	Outstanding Florida Waters
OOCEA	Orlando Orange County Expressway Authority
OUC	Orlando Utilities Commission
Pb	lead
PD&E	Project Development and Environment
PM	particulate matter
PM ₁₀	particulate matter sized 10 micrometers or less
PM _{2.5}	particulate matter sized 2.5 micrometers or less
ppb	parts per billion
ppm	parts per million
PTC	Positive Train Control
ROW	right-of-way
RRIF	Railroad Rehabilitation and Improvement Financing
SAFMC	South Atlantic Fishery Management Council
SB	southbound
SEL	Sound Exposure Level
SFECC	South Florida East Coast Corridor Study
SFECCTA	South Florida East Coast Corridor Transit Analysis
SFRC	South Florida Rail Corridor
SFRTA	South Florida Regional Transportation Authority
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Officer

SIP	State Implementation Plan
SJRWMD	St. Johns River Water Management District
SO ₂	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasures Plan
SR	State Road
SRPP	Strategic Regional Policy Plans
SSA	sole source aquifer
SWAPP	Source Water Assessment and Protection Program
SWIM	Surface Water Improvement and Management
SWPPP	Storm Water Pollution Prevention Plan
THPO	Tribal Historic Preservation Officer
TOD	Transit-Oriented Development
TSR	Tosohatchee State Reserve
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USCB	United States Census Bureau
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tank
V/C	volume to capacity
VdB	vibration decibels
VMF	Vehicle Maintenance Facility
VMT	vehicle miles traveled
VOC	volatile organic compound(s)
WEG	The Washington Economics Group, Inc.
WMA	Wildlife Management Area
WMD	Water Management Districts

Glossary

A

Accessibility: The ease with which a site or facility may be reached by passengers and others necessary to the facility's intended function. Also, the extent to which a facility is usable by persons with disabilities, including wheelchair users.

Action Alternative: An alternative that proposes some action in contrast to the No-Action Alternative.

Adverse: Negative or detrimental.

Affected Environment: The physical, biological, social, and economic setting potentially affected by one or more of the alternatives under consideration.

Air Pollution: A general term that refers to one or more chemical substances that degrade the quality of the atmosphere.

Alignment: The horizontal and vertical route of a transportation corridor or path.

Allelopathic: Beneficial or harmful effects of one plant on another plant from the release of biochemicals.

Americans with Disabilities Act (ADA): Federal regulation establishing legal requirements for accessibility for those with disabilities.

Anthropogenic: Relating to, or resulting from the influence of, human beings on nature.

Aquatic Managed Areas: Submerged lands and select coastal uplands managed by the Florida Department of Environmental Protection's Office of Coastal and Aquatic Managed Areas. The Office manages 41 aquatic preserves, three National Estuarine Research Reserves and the Florida Keys National Marine Sanctuary.

Aquifer: Subsurface geologic unit (rock or sediment) that contains and transmits groundwater.

Area of Critical State Concern: An area containing, or having a significant impact upon, environmental or natural resources of regional or statewide importance.

Area of Potential Effect (APE): The geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36CFR800, 800.16.d).

Artesian conditions: Artesian conditions exist where an inclined aquifer is overlain and underlain by impervious rock layers.

At-Grade: At ground surface level; used to describe roadways, track alignments, and road-track intersections.

Attainment: An air basin is considered to be in attainment for a particular pollutant if it meets the federal or state standards set for that pollutant. See also **Maintenance** and **Nonattainment**.

A-Weighted Sound Level: A measure of sound intensity that is weighted to approximate the response of the human ear so it describes the way sound will affect people in the vicinity of a noise source.

B

Ballasted Track: Railways installed over a specific type of crushed rock that is graded to support heavily loaded rolling stock.

Baseline: Foundation or basis to use for comparison purposes.

Best Management Practices (BMPs): Methods designed to minimize adverse effects to the environment. Examples of BMPs include practices for erosion and sedimentation controls, watering for dust control, perimeter silt fences, rice straw bales, and sediment basins.

Biodiversity: An assessment of the numbers, types, and relative abundance of plant and animal species in natural (biotic) communities. Biodiversity encompasses species richness as well as the genetic differences among individuals, abundance or variety of habitats, communities, ecosystems, and landscapes where species occur.

Biological Resources: Plant and wildlife species, terrestrial and aquatic habitats (including jurisdictional waters), and habitats of concern (including sensitive plant communities, critical habitat, core recovery areas, mitigation banks, and wildlife corridors).

Bubble Curtain: An underwater system that produces bubbles in a deliberate arrangement serving as a barrier in order to break up the propagation of sound waves.

C

Capital Cost: The total cost of acquiring an asset or constructing a project.

Carbon Dioxide (CO₂): A colorless, odorless gas that occurs naturally in the atmosphere; fossil fuel combustion emits significant quantities of CO₂.

Carbon Monoxide (CO): A colorless, odorless gas generated in the urban environment primarily by the incomplete combustion of fossil fuels in motor vehicles.

Census Block: A subdivision of a census block group (or, prior to 2000, a block numbering area), a block is the smallest geographic unit for which the U.S. Census Bureau tabulates 100-percent data. Many census blocks correspond to individual city blocks bounded by streets; but census blocks – especially in rural areas – may include many square miles and may have some boundaries that are not streets.

Central Florida Expressway Authority (CFX): District agency of the State of Florida responsible for building and operating an expressway system to support the Central Florida area. Subsequent to the DEIS, the Authority was re-named the Central Florida Expressway Authority (CFX).

Class IV Track: The class of a section of track determines the maximum possible running speed limits and the ability to run passenger trains. Class IV Track is characterized by a maximum freight train speed of 60 miles per hour (mph) and passenger train speed of 80 mph.

Class VI Track: The class of a section of track determines the maximum possible running speed limits and the ability to run passenger trains. Class VI Track is characterized by a maximum freight and passenger train speed of 110 miles per hour (mph).

Clean Air Act (CAA): The law that defines the U.S. Environmental Protection Agency's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The CAA protects the general public from exposure to airborne contaminants that are known to be hazardous to human health.

Clean Water Act (CWA): The primary federal law protecting the quality of the nation's surface waters, including wetlands. The CWA regulates discharges and spills of pollutants, including hazardous materials, to surface waters and groundwater.

Construction: The act or process of building.

Cooperating Agency: Any agency invited by the lead federal agency that has agreed to participate in the NEPA process, and has legal jurisdiction over, or technical expertise regarding, environmental impacts associated with a proposed action.

Corridor: A geographic belt or band that follows the general route of a transportation facility (e.g., highway or railroad).

Cowardin Classification System: A comprehensive classification system of wetlands and deepwater habitats developed for the U.S. Fish and Wildlife Service in 1979. Under this system, wetlands are of two basic types: coastal (also known as tidal or estuarine wetlands) and inland (also known as non-tidal, freshwater, or palustrine wetlands).

Criteria Pollutants: Pollutants for which federal and state air quality standards have been established: carbon monoxide (CO), sulfur oxides (SO_x), nitrogen oxides (NO_x), ozone (O₃), particulate matter with a diameter of 10 microns or less (PM₁₀), particulate matter with a diameter of 2.5 microns or less (PM_{2.5}), and lead (Pb).

Critical Habitat: Designated areas that provide suitable habitat for federally listed threatened or endangered species, and in which are the geographical locations and physical features essential to the conservation of a particular species.

Cultural Resources: Resources related to the tangible and intangible aspects of cultural systems, living and dead, that are valued by a given culture or contain information about the culture. Cultural resources include, but are not limited to, sites, structures, buildings, districts, and objects associated with or representative of people, cultures, and human activities and events.

Cumulative Impact: (1) CEQ – the result of two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts; (2) NEPA – an impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

D

Decibel (dB): A logarithmic measurement of noise intensity.

Degreasers: Chemical products/substances that remove greases and oils from surfaces.

Demographics: Quantifiable statistics of a given population such as race, age, sex, income, etc.

Demucking: To remove muck or peat to provide a stable substrate for construction.

Detention Pond: A pond designed to temporarily store and slowly release runoff.

Disproportionately High Adverse Effects: An Environmental Justice term used to describe the unequal treatment to low income and minority populations as a result of a proposed project and action. Executive Order 12898 directs each federal agency to identify and address disproportionately high and adverse human health or environmental effects of its projects and actions.

Disturbance: A discrete natural or human-induced event that causes a change in the condition of an ecological system.

E

Ecosystem: An interconnected network of living organisms, including people, and their local physical environment; often viewed as an ecological unit.

Ecotone: A transitional zone between two communities containing the characteristic species of each.

Effect: A change in the condition or function of an environmental resource or environmental value as a result of human activity.

Endangered Species: Any species listed under the federal Endangered Species Act as being in danger of or threatened with extinction throughout all or most of its range.

Environmental Impact Statement (EIS): Documentation required by the National Environmental Policy Act (NEPA) for certain actions "significantly affecting the quality of the human environment." An EIS is a decision-making tool that presents detailed analysis of a proposed action and alternatives to the proposed action. The EIS presents the project's potential effects – both beneficial and adverse – and any mitigation measures to reduce adverse effects.

Environmental Justice: Identifying and addressing the potential for disproportionately high and adverse effects of programs, policies, and activities on minority and low-income populations.

Erosion: Process by which earth materials are worn down by the action of flowing water, ice, or wind.

Essential Fish Habitat: Includes all types of aquatic habitat—wetlands, coral reefs, seagrasses, rivers—where fish spawn, breed, feed, or grow to maturity.

Estuary: A tidal body of water where salt water from an ocean mixes with fresh water from a river.

Ethnicity: A grouping or categorization of people based on shared cultural traits such as ancestral origin, language, custom, or social attitude.

Exotic Species: Plant or animal species introduced into an area where they do not occur naturally; non-native species.

F

Farmland of Statewide Importance: Farmlands that are similar to prime farmlands but are less valuable because they have steeper slopes, less ability to retain moisture in the soil, or other characteristics that limit their use. To qualify as Farmland of Statewide Importance, a property must have been used for production of irrigated crops at some time during the previous 4 years.

Feasible: Capable of being implemented.

Federal Endangered Species Act (Federal ESA): The federal ESA and subsequent amendments (Sections 7, 9, and 10) provide guidance for conserving federally listed species and the ecosystems upon which they depend.

Federal Railroad Administration (FRA): An agency within the U.S. Department of Transportation that administers financial assistance programs and regulates the operation and safety of freight and passenger rail throughout the United States.

Floating Turbidity Barrier: Designed to contain and control the dispersion of silt in a water body. Often implemented in areas with marine construction, pile driving, site work or dredging activities.

Footprint: The area covered by a facility or affected by construction activities.

G

General Conformity Rule: The requirement that federal, state, tribal, and local governments in air quality nonattainment or maintenance areas ensure that federal actions conform to the initiatives established in the applicable state implementation plan or tribal implementation plan.

Geographic Information System (GIS): An information management system designed to store and analyze data referenced by spatial or geographic coordinates.

Grade Crossing: The intersection of a railroad and a highway at the same elevation (grade); an intersection of two or more highways; an intersection of two railroads. Same as at-grade crossing.

Grade-Separated: At different elevations; on separate levels.

Greater Orlando Airport Authority (GOAA): Operating agency for the Orlando International Airport and Orlando Executive Airport in Orlando, Florida.

Greenhouse Gases: A class of air pollutants believed to contribute to the greenhouse global warming effect, including nitrogen oxides (NO_x), hydrocarbons (HC), and carbon dioxide (CO₂).

Groundwater: Water contained and transmitted through open spaces within rock and sediment below the ground surface.

H

Habitat: An environment where plants or animals naturally occur; an ecological setting used by animals for a particular purpose (e.g., roosting habitat or breeding habitat).

Hazardous Materials: Any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety, or the environment, if released.

Hazardous Waste: A hazardous material that is no longer of use and will be disposed of. Hazardous waste is regulated by the U.S. Environmental Protection Agency under the Resource Conservation and Recovery Act.

Headway: The time between buses, trains, or other transit vehicles at a given point. For example, a 15-minute headway means that one bus arrives every 15 minutes.

Historic Property, or Historic Resource: Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36CFR800, 800.16.l).

Hydric: Relating to, characterized by, or requiring considerable moisture.

Hydrocarbons: Various organic compounds, including methane, emitted principally from the storage, handling, and combustion of fossil fuels.

Hydroperiod: The seasonal pattern of the water level of a wetland.

Hydrostratigraphic unit: A body of rock that forms a distinct hydrologic unit with respect to the flow of ground water.

I

Impact: A change in the condition or function of an environmental resource or environmental value as a result of human activity.

Impervious Surface: Surface covered by impenetrable materials, such as parking lots and buildings, that increases the potential for water runoff and reduces the potential for groundwater recharge.

Important Farmland: Categorized as **Prime Farmland, Farmland of Statewide**

Importance, or Unique Farmland. The categories are defined according to U.S. Department of Agriculture land inventory and monitoring criteria.

Indirect Impact: The consequences of a project's direct impacts. These impacts are generally not quantifiable and may occur over a larger area or a longer period.

Induced Growth: An indirect impact of a project triggering community growth (increases in population, development, etc.) that is influenced and stimulated by the Proposed Action.

Infrastructure: The facilities required for a societal function or service (such as transportation and utility infrastructure – roads, bridges, railroads, pipelines, power lines, etc.).

Interlocking: An arrangement of train signal apparatus that prevents conflicting movements through an arrangement of tracks such as junctions or crossings.

Intermodal: Transportation that involves more than one mode (e.g., walk, bike, auto, transit, taxi, train, bus, and air) during a single journey.

Intermodal Station: A transit station that provides connections among more than one mode of transportation.

Invertebrate: Organisms lacking a vertebral column.

L

Lead (Pb): A stable element that can have toxic effects and that persists and accumulates in the environment, humans, or animals.

Lead Agency: The public agency that has the principal responsibility for carrying out or approving a project or action and is responsible for preparing environmental review documents in compliance with CEQ and/or NEPA.

L_{eq}: A measure of the average noise level during a specified period of time.

L_{eq}(h), dBA: Equivalent or average noise level for the noisiest hour, expressed in A-weighted decibels.

Level of Service (LOS): A rating using qualitative measures to characterize operational conditions within a traffic stream and their perception by motorists and passengers.

M

Maintenance: An air basin that was formerly in nonattainment but now meets the established standards for that pollutant. See also **Attainment** and **Nonattainment**.

Mesoscale: Describes an air quality analysis at the regional level.

Metapopulation: A group of spatially separated populations of the same species which interact at some level.

Microscale: Describes an air quality analysis for a localized area such as an intersection.

Mitigation: Action or measure undertaken to minimize, reduce, eliminate, or rectify the adverse impacts of a project, practice, action, or activity.

Mitigation Bank: A large block of land that is preserved, restored, and enhanced for the purpose of mitigating for projects that impact special-status species, wetlands or otherwise vegetated biological communities.

Mobility: Movement of people across areas.

Monospecific: Relating to or consisting of only one species.

N

National Ambient Air Quality Standards (NAAQS): Federal standards stipulating the allowable ambient concentrations of specific criteria pollutants.

National Environmental Policy Act (NEPA): Federal legislation that establishes national policies and goals for the protection of the environment and requires federal agencies to consider the environmental impacts of major federal projects or decisions, to share information with the public, to identify and assess reasonable alternatives, to identify appropriate measures to mitigate potential impacts, and to coordinate efforts with other planning and environmental reviews taking place. Codified at: 42 U.S.C.A. § 4331 et seq.

Nitrogen Oxides (NO_x): A class of pollutant compounds that include nitrogen dioxide (NO₂) and nitric oxide (NO), both of which are emitted by motor vehicles. See **Criteria Pollutants**.

No-Action: Under NEPA, refers to an alternative under which no action would be taken (no infrastructure would be built and no new management or operational practices would be instituted).

Nonattainment: An air basin that exceeds federal or state standards for a particular pollutant.

See also **Attainment** and **Maintenance**.

Nonpoint Source Pollution: Pollution that collects from a wide area and cannot be traced to a single source. Examples include pesticides or fertilizers that wash into rivers or percolate through the soil into groundwater.

Notice of Intent (NOI): Formal notice published in the Federal Register by the federal lead agency stating that an EIS will be prepared for a proposed project.

National Priorities List/Superfund List: A federal list of sites that have been identified as posing an immediate public health hazard and where an immediate response is necessary.

O

On-time Performance: The level of success of the train service remaining on the published schedule. Factors that influence on-time performance include traffic, accidents, detours, weather, increased ridership, and breakdowns.

Orlando-Orange County Expressway Authority (OOCEA): District agency of the State of Florida responsible for building and operating an expressway system to support the Central Florida area. Subsequent to the DEIS, the Authority was re-named the Central Florida Expressway Authority (CFX).

Over-grade Bridge: A bridge structure located above standard grade.

Ozone (O₃): A photochemical oxidant that is a major cause of lung and eye irritation in urban environments.

P

Particulate Pollution: Air pollution such as dust, soot, and smoke that is irritating but usually not poisonous. Particulate pollution also can include bits of highly toxic solid or liquid substances. Of particular concern are particles smaller than, or equal to, 10 microns (PM₁₀) or 2.5 microns (PM_{2.5}) in size.

Passing Track: A track connected to the main line on both ends that allows a train to stop for commercial reasons (in a station for example) or operating purposes (to deal with a delayed train) and that allows other trains to pass.

Phase II Investigation: Part of an Environmental Site Assessment, which assesses whether identified historic on-site or off-site hazardous uses have impacted the soil and/or groundwater conditions beneath a property.

Pile Bent: Two or more piles driven in a row transverse to the long dimension of a structure and fastened together by capping and (sometimes) bracing.

Pile Bent Cap: Structural members placed on, and usually fastened to, the top of a pile and used to transmit loads into the pile or group of piles and, in the case of a group, to connect them into a pile bent.

Pine Flatwoods: The most extensive terrestrial ecosystem in Florida characterized by low, flat topography and relatively poorly drained, acidic, sandy soil.

Point Source Pollution: Pollution that can be traced to a single source (e.g., a smokestack at a factory).

Polychlorinated Biphenyls (PCBs): Chemicals used in electrical transformers, hydraulic equipment, capacitors, and similar equipment.

Positive Train Control (PTC) Infrastructure: Integrated command, control, communications, and information systems for controlling train movements that improve railroad safety by significantly reducing the probability of collisions between trains, casualties to roadway workers, and damage to equipment.

Positive Train Control (PTC) Systems: The Rail Safety Improvement Act requires that railroads implement PTC systems to prevent train-to-train collisions on certain rail lines by the end of 2015.

Potentially Contaminated Site: Land that may contain substances in or under the land that are potentially hazardous to health or the environment, but have not been tested yet for contamination.

Poverty Level: The income at which a family or individual is considered poor. In 2009 the U.S. Census Bureau defined the poverty level for a family of four as an income of \$21,954 or less.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Preferred Alternative: The alternative identified as preferred by the lead agency or project proponent (the applicant's preferred alternative).

Prime Farmland: Rural land that has the best combination of physical and soil chemistry characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses.

Public Transportation: Includes bus, trolley bus, streetcar or trolley car, subway or elevated, railroad, ferryboat, and taxicab service.

Purpose and Need: The reason(s) why a project or action is undertaken, and the need(s) it is intended to meet or fulfill.

R

Reasonably Foreseeable Future Action: Those future actions that are likely to occur or probable, rather than those that are merely possible. Used in determining indirect and cumulative impacts for a Proposed Action.

Regulated waste: Pathological and microbiological wastes containing blood or other potentially infectious materials.

Retention Pond: A pond designed to hold and infiltrate most or all of the runoff that it receives.

Ridership: The number of people who ride a transportation system.

Right-of-Way: A legal right of passage over a defined area of real property. In transit usage, the corridor along a roadway or railway that is controlled by a transit or transportation agency/authority.

Riparian: Relating to, living, or located on the bank of a natural water course, lake, or tidewater.

S

Scoping: A process used under NEPA to determine the scope of issues to be addressed and for identifying the significant issues related to the proposed action or project to be addressed in an EIS (under NEPA).

Seagrass: A group of grass-like, flowering plants which grow in sub-tidal marine environments.

Secondary Impact: Reasonably foreseeable indirect consequences to the environment caused by a proposed project that would occur either in the future or in the vicinity of, but not the same location as, the direct impacts associated with the project.

Section 4(f): Provisions originally enacted as Section 4(f) of the U.S. Department of Transportation Act of 1966 codified in 49 United States Code, Subtitle I, Section 303(c). Section 4(f) addresses the potential for conflicts between transportation needs and the protection of land for recreational use and resource conservation by providing protection for publicly owned parkland, recreation areas, and historic sites from use. Specifically, the provisions prohibit the Secretary of Transportation from approving any program or project that would require the use of any publicly owned land from a public park, recreation area, wildlife or waterfowl refuge, or land of an historic site of national significance as determined by the officials having jurisdiction over these lands unless there are no feasible and prudent alternatives to the use of these lands.

Section 6(f): Section 6(f) of the Land and Water Conservation Fund Act of 1964 prohibits the conversion of property acquired or developed with funds granted through the act to a nonrecreational purpose without the approval of the National Park Service. Section 6(f) directs the

Department of the Interior to ensure that replacement lands of equal value (monetary), location, and usefulness are provided as conditions to such conversions.

Sensitive Natural Communities: Communities of plants and wildlife interacting in the same ecosystem whose extent has been much reduced in the state and which are locally rare.

Sensitive Receiver: Noise-sensitive locations where increased annoyance can occur, such as residences, schools, hotels/motels, medical facilities, or other vibration-sensitive receivers.

Sensitive Receptors: Locations considered more sensitive to adverse effects from air pollution (e.g., residences; preschools and kindergarten through grade 12 schools; daycare centers; health-care facilities such as hospitals, retirement homes, and nursing homes; and parks and/or playgrounds).

Shared-use Track: Use of the same track and corridor by two transit modes (light rail transit vehicles and heavy rail, or passenger and freight).

Significant: In CEQ usage, describes an impact that is sufficiently adverse, intense, or prolonged to require mitigation. In NEPA, to determine an impact is significant the context and intensity (the degree to which the effects on quality of human environment are controversial, whether the action threatens a violation of federal, state or local law, and others) of the action must be considered.

Sole Source Aquifer (SSA): An aquifer designated by the United States Environmental Protection Agency (USEPA) as the sole or principal source of drinking water for an area pursuant to § 1424(e) of the federal

Safe Drinking Water Act, as amended. USEPA defines a sole or principal source aquifer as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas can have no alternative drinking water source(s) that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water.

Sound Exposure Level (SEL): A time-integrated metric (i.e., continuously summed over a time period) that quantifies the total energy in the A-weighted sound level measured during a transient noise event. SEL accounts for both the duration and the loudness of a noise event.

Special-Status Species: Plants and animals that are legally protected under the federal Endangered Species Act of 1973, the Florida Endangered Species Act, or other regulations, such as those species that meet the definitions of rare or endangered under CEQ Guidelines Sections 15380 and 15125.

State Implementation Plan (SIP): Statewide plan for complying with the federal Clean Air Act. The SIP consists of narrative, rules, and agreements that Florida will use to clean up polluted areas.

Stormwater Pollution Prevention Plan (SWPPP): A plan that specifies site management activities to be implemented during site development, including construction stormwater best management practices, erosion and sedimentation controls, dewatering (nuisance water removal), runoff controls, and construction equipment maintenance.

Sulfur Oxides (SO_x): Sulfur-oxygen compounds that include the important criteria pollutants sulfur dioxide (SO₂) and sulfur trioxide (SO₃).

Surficial Aquifer: The surficial aquifer system in Florida includes any otherwise undefined aquifers that are present at land surface. The surficial aquifer is mainly used for domestic, commercial, or small municipal supplies (Florida Department of Environmental Protection).

Surficial Geology: Unconsolidated geologic materials lying on top of bedrock. Common surficial materials include sand and gravel, glacial tills, and clay and silts.

Switch: A mechanical installation enabling trains to be guided from one track to another at a railway junction.

T

Take: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (as defined in Section 3 of the **federal ESA**).

Tangent: Meeting a curve or surface in a single point if a sufficiently small interval is considered.

Terminal Station: The first or last station of a passenger railway route.

Traditional Cultural Properties and Resources (TCPs): Places associated with the cultural practices or beliefs of a living community that are rooted in that community's history. Examples of TCPs include, but are not limited to, any place where people practice a ritual activity or festival; any place where something happened that is of significance to a group or community and is referred to in stories; any place that is a vital and beloved part of the community and that may give the community a special identity or defining character.

Train Control System: System of railroad equipment designed to ensure safety by monitoring locations of trains and providing analysis and reporting.

Train set: A complete single train, including engine(s) and cars.

Travel Time: The time spent traveling from a place of origin to a place of destination. Total travel time includes the time required to reach a station or an airport, time spent waiting for the next scheduled train or flight, time spent getting to the boarding area, time spent checking and retrieving luggage, time spent getting a rental car or taxi, as well as time spent to reach the final destination.

U

Under-grade Bridge: A bridge structure located below standard grade.

Unique Farmland: Farmland with soils of lower quality than either **Prime Farmland** or **Farmland of Statewide Importance**, but still used for the production of crops. To qualify as unique farmland, a property must have been in crops at some time during the previous 4 years.

V

V/C Ratio: Volume to capacity ratio; describes the relationship between the amount of traffic a roadway was designed to carry and the amount of traffic it actually carries. Related to the **Level of Service (LOS)** the roadway can provide.

Vehicle Maintenance Facility (VMF): A dedicated facility for vehicle fueling, maintenance, repair and washing.

Vertebrate: Organisms with a vertebral column (fish, reptiles, amphibians, birds and mammals).

Viaduct: A long and high bridge composed of several small spans for carrying a railroad over a valley, gorge, or other topographic feature.

Vibration: A rapid linear motion of a particle or of an elastic solid about an equilibrium position.

Viewshed: The total area visible from a single observer position, or the total area visible from multiple observer positions. Viewsheds include scenes from highways, trails, campgrounds, towns, cities, or other viewer locations.

Visual Character: The physical attributes of the landscape.

Visual Quality: The character or inherent features of a viewshed.

Visual Resources: The natural and artificial features of a landscape that characterize its form, line, texture, and color.

Volatile Organic Compounds (VOCs): Colorless gaseous compounds originating, in part, from the evaporation and incomplete combustion of fuels. In the presence of sunlight VOCs react to form ozone, a pollutant regulated by the Clean Air Act Amendments.

W

Waters of the United States: The federal CWA defines waters of the United States as (1) All waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign

commerce, including all waters subject to the ebb and flow of the tide; (2) All interstate waters including interstate wetlands; and (3) All other waters, such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce (33 CFR 328.3[a]).

Watershed: The area that contributes water to a drainage system or stream.

Wayside Signaling: A visual form of railway signaling which uses elevated flags or balls.

Wetland: An area of land with soil that is saturated with moisture, either permanently or seasonally. According to the U.S. Army Corps of Engineers Wetland Delineation Manual, three criteria must be satisfied to classify an area as a jurisdictional wetland: (1) a predominance of plant life that is adapted to life in wet conditions (hydrophytic vegetation), (2) soils that saturate, flood, or pond long enough during the growing season to develop anaerobic conditions in the upper part (hydric soils), and (3) permanent or periodic inundation or soils saturation, at least seasonally (wetland hydrology).

Wildlife Corridor: A belt of habitat that is essentially free of physical barriers such as fences, walls, and development, and connects two or more larger areas of habitat, allowing wildlife to move between physically separate areas.

X

Xeric: Relating to, characterized by, or containing little moisture.

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1 Introduction

This Final Environmental Impact Statement (FEIS) evaluates a proposal by All Aboard Florida - Operations LLC (AAF) to institute intercity passenger rail service between Orlando and Miami, Florida with station stops in Orlando, West Palm Beach, Fort Lauderdale, and Miami (Project). The Project would consist of a 235-mile intercity passenger rail service with an anticipated three-hour travel time.

The Federal Railroad Administration (FRA) is the lead federal agency responsible for conducting the environmental review and preparing the National Environmental Policy Act (NEPA) environmental documentation related to the Project described in this FEIS. FRA published a Notice of Intent to prepare an Environmental Impact Statement (EIS) for the Project in the Federal Register on April 15, 2013 (Appendix 8.1-A). On September 26, 2014, FRA released a Draft Environmental Impact Statement (DEIS) for public review and comment¹. This FEIS responds to public comments on the Draft Environmental Impact Statement (DEIS) and describes changes to the Project since the DEIS was released.

1.1 Project Background

AAF is a subsidiary of Florida East Coast Industries, LLC (FECI), which is a transportation, infrastructure and commercial real estate company based in Coral Gables, Florida. FECR, an affiliate of FECI, owns the right-of-way (ROW) and existing railroad infrastructure within the corridor between Jacksonville and Miami, over which FECR operates a freight rail service (FECR Corridor). AAF has an exclusive, perpetual easement granted by FECR whereby AAF may develop and operate the proposed passenger service within the FECR Corridor. AAF will operate the proposed passenger rail service within the FECR Corridor in coordination with FECR's continued freight service.

AAF has applied for federal funds through the Railroad Rehabilitation and Improvement Financing (RRIF) program, which is a loan and loan guarantee program administered by FRA as described in 49 Code of Federal Regulations (CFR) part 260. Under the RRIF program, the FRA Administrator is authorized to provide direct loans and loan guarantees that may be used to acquire, improve, or rehabilitate rail equipment or facilities, or develop new intermodal or railroad facilities. Because AAF has applied for a loan under FRA's RRIF program, FRA is required under NEPA to conduct an analysis of the potential environmental impacts resulting from the Project. NEPA compliance is a prerequisite for RRIF approval, and FRA will not approve the Project for a RRIF loan until the NEPA process is complete. A RRIF loan, if approved, would be part of an overall capital structure put in place by AAF to finance the infrastructure improvements. FRA's action with respect to the Project is limited to reviewing AAF's application for a RRIF loan. FRA is responsible for the proper completion of the NEPA process and analyzing Alternatives to meet the project Purpose and Need and the requirements of NEPA and associated statutes, regulations, and other requirements.

¹ Federal Register 79:57930, September 26 2014



- Explanation of Features**
- MCO Segment
 - E-W Corridor
 - N-S Corridor
 - WPB-M Corridor
 - Interstate Highways
 - Proposed Stations - WPB-M Corridor
 - Proposed Station (By Others)

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

Project Location		
All Aboard Florida Intercity Passenger Rail Project		
		1.1-1

1.1.1 Phased Approach to Project Implementation

AAF proposes to implement the Project through a phased approach. Phase I will provide rail service on the West Palm Beach to Miami section while Phase II would extend service to Orlando. Phase I will provide passenger rail service along the 66.5 miles of the Florida East Coast Railroad (FECR) Corridor connecting West Palm Beach, Fort Lauderdale, and Miami. AAF has obtained private financing for Phase I and is proceeding to implement Phase I, which is illustrated in Figure 1.1-1.

FRA and AAF conducted an environmental review of Phase I in 2012/2013, including preparing and issuing both an Environmental Assessment (EA) (*Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida*) and a Finding of No Significant Impact (FONSI) (AAF 2012; FRA 2013a). The 2012 EA is available at www.fra.gov/page/P0590 (and attached to this FEIS as Appendix 1.1-A1) and the FONSI is attached to this DEIS as Appendix 1.1-A2. Phase I of the Project, as described in the 2012 EA, includes constructing three new stations (West Palm Beach, Fort Lauderdale, and Miami), purchasing five train sets, adding a second track along most of the 66.5-mile corridor, and adding 16 new round-trip intercity passenger train trips (32 one-way trips) on the West Palm Beach to Miami section of the FECR Corridor. FRA concluded that Phase I has independent utility; that is, it could be advanced and serve a transportation need even if Phase II was not constructed. FRA has made no decision under the RRIF program as to whether a loan would be provided for Phase I.

Since the FONSI, AAF proposed and FRA has evaluated a new location for the proposed Fort Lauderdale Station and issued a re-evaluation decision that found no significant difference from the location evaluated in the 2012 EA. Also since the FONSI, AAF proposed and FRA has evaluated a new location in West Palm Beach for the proposed Fort Lauderdale layover and maintenance facility. FRA issued a Supplemental EA for public review of this new site concurrent with this DEIS, and subsequently issued a FONSI for this element of Phase I. The re-evaluation document for the Fort Lauderdale Station is provided in Appendix 3.3.1-A1. The Supplemental EA and FONSI for the layover and maintenance facility are provided in Appendix 3.3.1-A2.

1.1.2 Phase II – Loan Application and Environmental Review

Considering the FRA approval of a RRIF loan for Phase II of the Project as a separate federal action, FRA has undertaken a NEPA review of the proposed extension. Given that operations would cover the full corridor from Orlando to Miami, this FEIS analyzes the cumulative effects of completing both phases of the Project, although the impacts exclusively from Phase I have already been addressed in the 2012 EA and FONSI and will not be reanalyzed in the FEIS. The bulk of the information related to Phase I is drawn from the 2012 EA. FRA concluded that it was important to provide a comprehensive look at the environmental impacts of both phases in one environmental document.

Phase II of the Project includes constructing a new railroad line parallel to State Road (SR) 528 between the Orlando International Airport (MCO) and Cocoa, constructing a new Vehicle Maintenance Facility (VMF) on property owned by the Greater Orlando Airport Authority (GOAA), constructing track through MCO to connect the VMF to SR 528, adding a second track within 128.5 miles of the FECR Corridor between West Palm Beach and Cocoa, and additional bridge work between Miami and West Palm Beach.

The proposed service would use a new intermodal facility at MCO that is being constructed by GOAA as an independent action. The Project includes purchasing five additional passenger train sets, and would add 16 new round-trip intercity passenger train trips (32 one-way trips) on the new railroad segment and on the FECR Corridor between Cocoa and West Palm Beach. No additional trips beyond those considered in the 2012 EA (16 round-trip intercity passenger train trips, 32 one-way trips) would be added on the West Palm Beach to Miami section.

1.2 Proposed Action

AAF will secure financing and will own the system and be responsible for the Project's development, construction, operation, and maintenance. The proposed action for Phase II of the Project includes four discrete geographic segments: a terminal segment at MCO (MCO Segment), an East-West Corridor between MCO and Cocoa (E-W Corridor), a North-South Corridor between Cocoa Beach and West Palm Beach (N-S Corridor), and the corridor between West Palm Beach and Miami (the WPB-M Corridor) (Figure 1.1-1).

1.2.1 MCO Segment

The MCO Segment is located on GOAA property. At the MCO terminus, AAF would construct a new VMF and related rail infrastructure. The Project would provide passenger rail service to the new South Terminal Intermodal Station being planned and constructed by GOAA as a separate action. The proposed intermodal station has been evaluated in two previous EAs (Federal Aviation Administration [FAA] and GOAA 1998; Federal Transit Administration, Florida Department of Transportation [FDOT], and GOAA 2005). The FAA has recently issued a re-evaluation for this facility due to the lapse of time since the prior FONSI was issued (FAA 2013). Since the new South Terminal Intermodal Station has not been constructed, this FEIS addresses the cumulative environmental consequences of a new rail passenger station in Orlando serving the Project. Previous proposals for rail service have also studied a VMF at MCO, although not in the currently-proposed location or configuration. The MCO Segment would require that AAF execute a lease with GOAA for the new track and VMF, subject to FAA's review and approval.

1.2.2 E-W Corridor

The approximately 35-mile E-W Corridor between MCO and Cocoa is proposed along the SR 528 alignment, and would be a dedicated rail corridor parallel to the highway. A new railroad within this corridor would cross several state highways (SR 417 and SR 520) and Interstate 95 (I-95), and would connect with the N-S Corridor in Cocoa. The new rail infrastructure would include new tracks; bridges over and under highways; bridges over waterways; new signalization; and new communication and train control systems. The E-W Corridor would require that AAF execute leases with the Central Florida Expressway Authority (CFX, formerly the Orlando-Orange County Expressway Authority) and FDOT, and secure Federal Highway Administration (FHWA) approval for occupancy of the I-95 ROW. Subsequent to the publication of the DEIS, AAF has identified Alternative E as its preferred alternative within the E-W Corridor. Alignment Alternative E would be located approximately 200 feet south of the current SR 528 right-of-way within the CFX segment, on property acquired by CFX for its future highway improvements. This alignment would be within the SR 528 right-of-way in the FDOT segment, east of SR 520.

1.2.3 N-S Corridor

The N-S Corridor is a 128.5-mile segment of the existing active FECR Corridor between Cocoa and West Palm Beach. The FECR Corridor was originally built as a double-track railroad, but today it is mostly a single-track system with several sidings. The roadbed for the second track in the corridor still exists and would be used for the additional track improvements needed for the Project. The improvements would include relocating and upgrading existing tracks, as well as installing new tracks. The Project would also include improving or replacing existing bridges and grade crossings, as well as new signalization, and new communication and train control systems.

1.2.4 WPB-M Corridor

The WPB-M Corridor is a 66.5-mile segment of the existing active FECR ROW between West Palm Beach and Miami. Phase II of the Project includes reconstructing seven bridges over waterways within the WPB-M Corridor between West Palm Beach and Miami that were not evaluated in the 2012 EA. Because this construction is part of Phase II, the environmental effects on these waterways are considered in this FEIS.

The 2012 EA described the infrastructure improvements included in Phase I of the Project, including relocating and upgrading existing tracks as well as installing new tracks. Within the WPB-M Corridor, Phase I of the Project would include improving grade crossings, as well as new signalization, new communication and train control systems, and proposed stations at West Palm Beach, Fort Lauderdale, and Miami.

1.3 Federal Agency Actions and Legislative Authority

FRA is the lead agency for NEPA review for the Project. Pursuant to NEPA (42 USC § 4321 *et seq.*), Council on Environmental Quality (CEQ) NEPA regulations (40 CFR parts 1500-1508), and the FRA's Procedures for Considering Environmental Impacts (NEPA Procedures) (FRA 1999), FRA has evaluated in this FEIS the potential environmental and related impacts of constructing and operating the intercity passenger rail service between Orlando and Miami. The FRA action that is the subject of this FEIS is the approval of a RRIF loan. The U.S. Army Corps of Engineers (USACE), U.S. Coast Guard (USCG), and FAA, because of their jurisdiction, are cooperating agencies for this environmental review.

FRA requested that the USACE act as a cooperating agency on the EIS, and the USACE agreed. The Project may impact waters of the United States within the jurisdiction of the USACE under its authority granted by the Clean Water Act, Section 404 (33 U.S.C § 1344, as amended), or navigable water of the United States within the jurisdiction of the USACE under its authorities granted by Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 USC § 401); and Section 14 of the RHA of 1899, as amended (33 USC § 408) (taking possession of, use of, or injury to harbor or river improvements). In the preparation of the EIS, USACE has provided special expertise with respect to environmental issues concerning the potential discharge of dredged or fill materials into waters of the United States or the construction of any structure in, over, or under navigable waters of the United States. USACE has also provided FRA with all EIS documentation requirements that are unique to its Regulatory Program outlined in 33 CFR part 325 Appendix B (i.e., which would not be addressed by FRA in FRA's implementation of its NEPA requirements). An example of a requirement that is unique to the USACE Regulatory Program and may be applicable to the USACE's

participation as a cooperating agency is the identification and analysis of the Least Environmentally Damaging Practicable Alternative (LEDPA) and Public Interest Review as a requirement for compliance with the Section 404 permit program. USACE will complete its own Record of Decision including a Clean Water Act - Section 404(b)(1) determination, public interest evaluation, R&HA Section 10, and engineering analysis to determine whether to issue authorization pursuant to R&HA Section 14 (33 USC § 408) permit applications. On October 27, 2014 the USACE issued a Public Notice concerning AAF's Section 404 and Section 10 permit application. This Public Notice and the subsequent comments received by the USACE are provided in Appendix 1.1-B.

FRA requested that USCG act as a cooperating agency on the EIS, and the USCG agreed. The Project may impact waters of the United States within the jurisdiction of USCG under its authority granted by Section 9 of the R&HA and through the U.S. Department of Transportation Act of 1969. USCG, as authorized under 33 CFR § 115.70, is responsible for maintaining navigational adequacy of bridges. The purpose of these Acts is to preserve the public right of navigation and to prevent interference with interstate and foreign commerce. The General Bridge Act of 1946, as amended, the R&HA of 1899, as amended, and the Act of March 23, 1906, as amended, all require the location and plans of bridges and causeways across the navigable waters of the United States be submitted to and approved by the Secretary of Homeland Security prior to construction. The General Bridge Act of 1946 is cited as the legislative authority for bridge construction in most cases. These Acts placed the navigable waters of the United States under the exclusive control of the USCG to prevent any interference with their navigability by bridges or other obstructions except by express permission of the United States Government.

FRA requested that FAA act as a cooperating agency on the EIS, and the FAA agreed. The Project will require FAA review and approval over changes to the GOAA property. Under 49 USC §401, the FAA has jurisdiction over the layout of airports, including but not limited to approval of airport layout plans, airspace, and facility development. The Project will require that FAA approve the Airport Layout Plan Modifications, Project elements that occupy air space, and lease agreements between GOAA and AAF.

Other applicable legislative authority includes:

- Under 41 USC §4601, if federal assistance is provided to a project, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and its implementing regulations detailed in 49 CFR part 24 are applicable if land acquisition is required.
- Under 23 USC §111, for the portions of the Project that would be within the existing I-95 ROW under the jurisdiction of FHWA, the implementing regulations in 23 CFR § 1.23 provide FHWA authority over approval of temporary or permanent occupancy or use within the boundaries of federal-aid highways.

Table 1.4-1 Permits or Approvals Required for the Project	
Agency	Permit/Approval
Federal Highway Administration	Concurrence for Highway ROW Occupancy
U.S. Army Corps of Engineers	Clean Water Act Section 404 Permit Rivers and Harbors Act Section 10 Permit and Section 14 (33 USC § 408) modification approval
Federal Aviation Administration	Airport Layout Plan Modification approval Approval of air space and facility development stormwater ponds Review of lease agreements
U.S. Fish and Wildlife Service	Endangered Species Act Section 7 concurrence
National Marine Fisheries Service	Endangered Species Act Section 7 concurrence Magnuson-Stevens Fishery Conservation and Management Act – Essential Fish Habitat
U.S. Coast Guard	Bridge Permits Drawbridge Operation Regulatory changes (potential)
Florida State Historic Preservation Office	National Historic Preservation Act Section 106 Concurrence
Florida Department of Environmental Protection	Clean Water Act Section 401 Water Quality Certification Environmental Resource Permit (for the E-W and N-S Corridors) Sovereign Submerged Lands Approval for bridges Coastal Zone Management Act
South Florida Water Management District	Clean Water Act Section 401 Water Quality Certification Environmental Resource Permit (for the MCO Segment) De Minimis Exemption for Upland Track Work ROW Permits for Work Over Canals under USCG Jurisdiction Coastal Zone Management Act
St. John's River Water Management District	Clean Water Act Section 401 Water Quality Certification De Minimis Exemption for Upland Track Work ROW Permits for Work Over Canals under USCG Jurisdiction Coastal Zone Management Act
Florida Department of Transportation	Occupancy and Use Permit ROW Permit
Florida Fish and Wildlife Conservation Commission	Gopher Tortoise Permit
Orange County	Wetland Conservation Area Impact Permit Wetland Conservation Area Determination Building Permit (for Vehicle Maintenance Facility)
Broward County	Bridge Permit
Miami-Dade County	Bridge Permit

1.4 Permits, Licenses, and Other Regulatory Requirements

Approvals by several federal agencies, including FRA, FAA, USACE, USCG, FHWA, U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) would be necessary to implement the Project. Constructing and operating the Project evaluated in this FEIS will also require permits issued by state agencies. AAF will be responsible for securing the permits and approvals listed in Table 1.4-1, and will be required to comply with additional regulations, including:

- Carrying out the mitigation measures and commitments resulting from the Endangered Species Act, Section 7, consultation with the USFWS and NMFS; and
- Carrying out the mitigation measures and commitments resulting from the National Historic Preservation Act, Section 106, consultation with the Florida State Historic Preservation Officer, and the federally recognized tribes within Florida.

1.5 Development of this Environmental Impact Statement

As it has in the past, FRA has used a third party contracting process in preparing this FEIS. FRA does not have appropriated funds to support the development of EISs for RRIF loan applications. As a result, FRA requires the applicant to engage the services of a qualified consultant approved by FRA to assist FRA in preparing the EIS. Consistent with a memorandum of agreement among the parties, the third party contractor is paid for by AAF but reports to and takes direction from FRA. In developing the proposed action, AAF engaged the services of consultant firms to prepare engineering designs for the Project and to prepare technical reports documenting existing environmental conditions and analyses of environmental consequences. FRA's third party contractor reviewed all materials provided by AAF; assisted FRA in determining that this information was complete, accurate, and relevant; and assisted FRA in the preparation of this FEIS. FRA has reviewed the FEIS to comply with the requirements of 40 CFR 1506(c), and takes responsibility for its scope and contents.

1.6 Organization of this Environmental Impact Statement

This FEIS has been developed in compliance with CEQ NEPA regulations and FRA NEPA procedures. It documents the purpose of and need for the Project (Chapter 2, *Purpose and Need for the Proposed Action*); describes the proposed action and other alternatives evaluated in this FEIS, as well as alternatives considered but withdrawn (Chapter 3, *Alternatives*); describes the affected environment within the Project Study Area (Chapter 4, *Affected Environment*); describes the environmental impacts of the alternatives, including the No-Action Alternative (Chapter 5, *Environmental Consequences*); provides a Section 4(f) Evaluation (Chapter 6, *Section 4(f) Evaluation*); identifies the mitigation measures and commitments (Chapter 7, *Mitigation Measures and Project Commitments*); and describes the public outreach and coordination conducted during the NEPA process (Chapter 8, *Summary of Public Involvement Process and Tribal Coordination*).

This FEIS focuses on the environmental impacts of the Project that is the subject of the federal agency action: FRA's approval of the RRIF loan application for the All Aboard Florida Intercity Passenger Rail Service Project from Orlando to West Palm Beach. The FEIS has also been developed to satisfy the NEPA requirements of the federal cooperating agencies: the FAA, USACE, and USCG. In order to present a comprehensive picture of the cumulative effects of the Project that is the subject of AAF's RRIF loan

application, in combination with the effects of Phase I (West Palm Beach to Miami), this FEIS incorporates information from the 2012 EA entitled *Environmental Assessment and Section 4(F) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami*; identifies any changes in project design since the 2012 EA and 2013 FONSI; and evaluates the effects of those changes.

1.7 Public and Agency Comment Summary

During the comment period for the Draft Environmental Impact Statement, FRA received over 15,400 comments. The comments covered a wide range of issues and represented viewpoints from government agencies, organizations, business groups, businesses, residents and property owners. Comments were submitted in several formats:

- By email
- By US mail
- At public meetings (written)
- At public meetings (oral, transcribed by a court reporter).

FRA has reviewed all of the comments, many of which were form letters. Comments fell into several broad categories:

- Support
- General opposition
- Opposition based on specific concerns
- Detailed and substantive comments concerning information provided in the DEIS.

Approximately 5,960 of the submittals generally supported the Project, and 9,500 were generally opposed. Most comments came from individuals in the general public, living, working or having property interests in the Project area, particularly residents of Martin, St. Lucie and Indian River Counties. Most comments from the public indicated that individuals did not want passenger rail operating within the FECR Corridor along the Florida coast, and preferred that AAF select an alternative alignment further inland. A substantial number of people commented on the potential impacts on boaters associated with increased closures of the three moveable bridges along the corridor.

Substantive comments are addressed in the appropriate sections of the FEIS. This section identifies and provides FRA's responses to general comments and to comments that appeared frequently in individual and form letters, and to which FRA can provide general responses.

1.7.1 FRA's Role and the DEIS

Public Funding

Many commenters suggested that issuing a RRIF loan to AAF would be a direct use of taxpayer dollars for the benefit of private enterprise. Commenters suggested that RRIF loans were originally intended for a different purpose and that AAF should not qualify for this type of loan. Commenters also discussed the

issuance of tax-free private activity bonds by the Florida Development Finance Corporation (FDFC) and stated that these bonds are a form of taxpayer subsidy.

Commenters suggested that taxpayer dollars should be invested more prudently. Many commenters suggest that the RRIF loan, if granted, would be at significant risk of default because historically, passenger trains do not make money and it is unlikely that AAF will be profitable. Low ridership could result in a loan default or a request for government subsidies. If AAF does not succeed, taxpayers would assume all liability for the loan.

Response

The RRIF program was originally established by the federal Transportation Equity Act for the 21st Century (TEA-21) enacted by Congress in 1998. Under the RRIF program, FRA can provide direct loans and loan guarantees to finance the development of railroad infrastructure by public or private sponsors of intermodal and rail projects, such as AAF. Eligible projects include the acquisition, development, improvement, or rehabilitation of intermodal or rail equipment or facilities, including track, bridges, yards, buildings, and shops. AAF is eligible for RRIF financing, which is awarded at the discretion of the FRA Administrator.

The FDFC is an entity of the State of Florida. FRA has no relationship with that entity and no responsibility over its actions. Issues concerning the FDFC's potential issuance of tax-exempt bonds are outside the scope of this FEIS, which has been prepared in connection with FRA's consideration of a RRIF loan application.

Intercity passenger rail is recognized as a viable and needed service, given the level of travel activity and the existing and growing congestion on Florida's highways. FRA can consider public benefits, in the form of new passenger rail service, and/or potential economic development as a result of additional rail services, as part of the decision whether or not to issue RRIF loans.

The DEIS and FEIS reviews of the Project have followed and adhered to NEPA guidelines for transparency and public involvement. NEPA compliance is a prerequisite for RRIF approval, and FRA will not approve the Project for a RRIF loan until the NEPA process is complete.

As for profitability and risk of default, FRA determined, and documented in the DEIS/FEIS, that a major criterion for success of the AAF rail service is ridership. AAF undertook a ridership study to make a business case for high-speed rail that would not rely on grants or operating subsidies, and would be financeable and profitable. The ridership study has been reviewed by the FRA. A RRIF loan, if approved, would be part of an overall capital structure put in place by AAF to finance the infrastructure improvements. RRIF funding is a loan, not a grant, so it must be repaid with interest, with the funding backed by collateral provided by AAF.

The DEIS Was Not Independent or Objective

Many comments were received stating that the DEIS was not objective nor was it prepared by an independent contractor. Commenters believe that AAF selected the contractor, paid for the analysis, and provided the content of the DEIS. They requested an independent review of the Project impacts and mitigation plans.

Response

The DEIS and the entire review process is owned by the FRA. The FRA is the lead federal agency and will ultimately decide if, how, and when a Record of Decision is issued. The FRA chose the consulting firm of Vanasse Hangen Brustlin Inc. (VHB) to assist them in completing the DEIS as the lead independent consultant. The consultant works directly for the FRA and conducted an impartial analysis as required by the FRA. The FRA does not have the appropriated funds to support the development of an EIS, and therefore requires AAF to provide the funds to pay for the independent analysis. A project sponsor paying for the government review process is a common practice among development projects for the FRA, FAA, and other federal agencies. For further explanation regarding funding for this Project and the selection of the independent consultant, please refer to Section 1.5, *Development of this Environmental Impact Statement*.

1.7.2 Alternatives

Comments on alternatives and the proposed action focused on the selection of the overall route alternative between Orlando and West Palm Beach, station locations, and ridership estimates.

Alternatives

Many commenters suggested that the alternatives analysis presented in the DEIS was flawed, and that a more westerly route—the CSX, Florida Turnpike, or Interstate 95 corridor—should have been selected rather than the FECR railroad corridor. Many noted that the FECR route along the coast travels through densely populated and environmentally sensitive areas, compared to a westerly route. Many commenters believe a westerly route would have a smaller effect on the quality of life and economic vitality of Florida residents because it would travel through areas of lower population density.

Response

The CSX route, Florida Turnpike route, and I-95 route were all evaluated in the Level 1 alternatives screening process (Section 3.2.1). AAF evaluated alternatives under the primary screening criteria of meeting the purpose and need, feasibility to construct and operate, and impacts to the environment. Because AAF is a for-profit private enterprise, alternatives were evaluated primarily in the light of whether they could be constructed and operated in accordance with AAF's financial model. AAF selected the FECR Corridor as its preferred alternative because it meets the purpose and need while remaining feasible to construct and operate based on ridership and cost projections and potential environmental impacts. The FRA has reviewed AAF's analysis and validated the conclusions.

AAF does not have operating rights needed for the CSX route, which would also require extensive upgrades to the track, grade crossings, and new infrastructure. AAF would also need to purchase or lease land from many different public and private landowners. The CSX route alternative would also result in the highest potential adverse direct and indirect impacts to wetlands and protected species, and may require acquisition of conservation land for a total distance of 13 miles. Due to land access, logistics, and environmental impacts, the CSX route is not feasible to implement.

The Florida Turnpike route would require a new 100-foot wide ROW along most of the route, as there is insufficient land within the highway ROW to support the 2-track railroad, and would require new tracks,

grade crossings, and infrastructure. AAF would need to bridge over, or tunnel under, each of the existing highway interchanges, substantially increasing construction costs. AAF would need to purchase or lease land from many public and private landowners, including the Florida Turnpike Authority. This route would also result in high potential adverse direct and indirect effects to wetlands. Due to land access, logistics, and environmental impacts, the Florida Turnpike route is not feasible to implement.

The I-95 route would require new tracks, grade crossings, and infrastructure. AAF would need to purchase or lease land from many public and private landowners, including FDOT and FHWA. AAF would need to bridge over, or tunnel under, each of the existing highway interchanges, substantially increasing construction costs. The I-95 route would also result in the second highest potential adverse direct and indirect impacts to wetlands and protected species. Due to land access, logistics, and environmental impacts, the I-95 route is not feasible to implement.

Stations

Commenters objected that communities along the “Treasure Coast” north of West Palm Beach would suffer negative effects from increased passenger and freight rail traffic (noise, bridge closures, grade crossing delays and traffic congestion, etc.) but receive none of the benefits (convenient travel, potential jobs from transit-oriented development, tourism, etc.) of nearby passenger rail station stops. Many commenters requested that AAF provide stations along the N-S Corridor between West Palm Beach and Cocoa.

Response

AAF has no plans in place at this time to provide direct passenger rail service to Martin, St. Lucie and Indian River counties through the construction of stations and the use of regular, intermittent or skip-stop service. It was determined, and documented in the DEIS/FEIS, that a major criterion for success of the AAF rail service is ridership. The ridership study indicated that an approximate 3-hour rail service trip time between Miami and Orlando is one of the most critical factors in the service meeting ridership goals. With the current planned stations the trip time is approximately 3 hours between Miami and Orlando. The addition of stops beyond the four stops planned at this time would increase overall trip time and negatively impact achieving the number of passengers (ridership) critical for overall Project success. AAF has not precluded additional stations as demands warrant in the future. Brevard County is currently evaluating options for a possible station and locations where such a station, in the future, might be located. Indian River, Martin, and St. Lucie counties can also undertake ridership studies to determine if stations are feasible.

Ridership

Many commenters noted that AAF’s ridership study has not been made publicly available and that AAF projections are unsubstantiated. Further, commenters suggest ridership and vehicle miles traveled reductions presented in the DEIS are contradictory. Commenters also suggest that the projected level of ridership is unlikely to be attained. Many commenters suggest that Florida does not have conditions to support the success of AAF and that the Amtrak service currently operating between Miami and Orlando has low ridership. Some commenters suggested that since AAF will be operating in the same market as Tri-Rail and Amtrak, a third rail system is redundant.

Response

AAF developed a twelve-month ridership study, updated in 2015 (Appendix 3.2.1-B) to make a business case for high-speed rail that would not rely on grants or operating subsidies, and would be financeable and profitable. Because this detailed study contains confidential business information AAF has not released the complete study to the public. Based on this study and its financial analysis, AAF is confident that a profitable passenger rail service can be operated between Orlando and Miami.

In response to comments, FRA has reviewed ridership estimates provided in the EIS (Chapter 3 and Section 5.2.1) and corrected the document where necessary for consistency.

AAF serves a different market than both Amtrak and Tri-Rail. The AAF service will be significantly faster than Amtrak on the Orlando-Miami route, and faster than Tri-Rail on the West Palm Beach – Miami route, and will offer a higher level of passenger comfort. The AAF service will be more competitive for last-minute or flexible trips between Orlando and West Palm Beach or Miami.

1.7.3 Transportation

Grade Crossing Traffic

Many commenters expressed concern that the Project would increase traffic congestion and travel delays, especially in downtown areas, as a result of increased grade crossing closures. Commenters stated that the impact analysis presented in the DEIS underestimated the congestion and delays that would result from the Project, particularly in town centers that already experience high levels of seasonal traffic.

Response

As part of the DEIS, traffic congestion was analyzed at select grade crossings along the corridor. The grade crossings analyzed are the two crossings in each county with the highest annual traffic volumes, as well as the adjacent two intersections (to represent the worst case scenario). Existing annual traffic volumes were converted to peak hour traffic volumes using conversion factors that calculate the 100th highest hourly volume, consistent with FDOT standards (Florida Department of Transportation 2009 Quality/Level of Service Handbook). The analysis found that typical at-grade crossings (intersections of local roads with the FECR Corridor) would be closed an average of 54 times per day (3 times per hour), with average closure times ranging from 1.7 minutes (passenger) to 2.8 minutes (freight). The total average hourly closure would range from 4.2 minutes per hour to 4.5 minutes per hour, an increase of approximately 2 minutes per hour in comparison to the No-Action Alternative.

In addition to calculating the delay at each of the identified crossings, the EIS determined the levels-of-service (LOS) at each crossing. LOS is an industry standard metric for the delay experienced by automobiles at an intersection and its values for signalized intersections range from LOS A (less than ten seconds of delay per vehicle) to LOS F (over 80 seconds of delay per vehicle).

By 2016, the delay at each intersection would increase slightly, but only four of the 30 intersections would see their LOS decline from acceptable levels of service (A-D) to unacceptable levels of service (E or F) or see an increase in delay at an intersection that is already experiencing an unacceptable level of service (E or F). By 2036, the number of intersections with similar declines would increase from four to nine (out of 30 total). For the most part, these intersections with declines in LOS due to the Project in 2016 and 2036

would be operating at an unacceptable LOS without the project, and the effect of the Project at these locations would be minimal.

Freight

Many commenters suggested that the infrastructure improvements to the FECR corridor would allow the FECR to increase freight train trips beyond the levels identified in the DEIS. They noted that increased freight traffic is expected because of the planned widening of the Panama Canal, but was not acknowledged in the DEIS. Many commenters were skeptical of the financial viability of passenger train service and believe the Project is a means to secure taxpayer funding for rail upgrades that would benefit the freight service.

Response

The DEIS/FEIS analysis incorporates 20 through freight trains, which is consistent with the latest available freight forecasts from FECR. In addition, there are local freight trains that operate a variety of short routes from Jacksonville to Miami and these are included in the modeling where appropriate. If, hypothetically, the volume of cargo moved along the corridor increases due to the growth of port activity, additional units can be moved in existing double-stack trains with corresponding increases in average train length, thereby reducing the need for new train sets. Due to the imbalance in freight traffic, occasionally trains currently operate with empty cars, enabling the railroad to absorb increases in freight without increases in train length. Increases in freight train length was incorporated into the DEIS modeling. Containerization has facilitated added capacity without any new train starts. In fact, FECR has previously responded to community concerns by running fewer, but longer, trains as opposed to many shorter trains. These trains used to be 7,500 feet, but now they range from 9,000 to 10,000 feet. FECR's freight forecast takes into account that not everything that arrives at the port will be transported by the FECR railroad. Freight will also move by truck and possibly the CSX freight system.

1.7.4 Navigation

Many commenters asserted that the DEIS underestimated the effects of increased closures of the moveable bridges along the St. Lucie River, Loxahatchee River, and New River on recreational and commercial boat traffic. Many specific comments were provided to the FRA, which are addressed in Section 5.1.3 of the FEIS. In general, commenters stated that the number of boats using each waterway was underestimated; the number of boats that would be delayed would be greater than indicated in the DEIS; queues of waiting boats would be longer, due to limitations on how many boats can pass through the bridge opening at a time; and that the increased queueing would decrease safety due to the need for boats to maintain headways while queueing. Commenters stated that these delays, inconvenience to boaters, and safety problems would have significant effects on quality of life, the viability of maritime businesses located upriver of the bridges, and on the value of waterfront property upriver of the bridges. In addition, many commenters believe that the duration of bridge closure times are underestimated. The age of these bridges and tendency to get "stuck" is a concern. Some commenters were concerned that if freight trains were required to wait for a passenger train to cross the drawbridge, the stopped freight train could block multiple grade crossings in town centers.

With regard to commercial navigation in particular, the St. Lucie River's role in linking the Atlantic Ocean and Gulf of Mexico via the Okeechobee Waterway was noted as a significant function that would be affected by more frequent bridge closures.

Response

In response to comments and using updated information provided by local communities, AAF has revised the navigation impact analysis. Findings of this revised analysis can be found in Section 5.1.3. The navigation impact analysis in the DEIS used boat count data from winter 2014 and considered average day values to estimate impacts. For this FEIS, the navigation impact analysis was revised and uses summer 2014 data, which represents a busier time for marine traffic and a higher number of boat crossings. The revised analysis compares the higher level of boat traffic experienced on a high-volume weekend day to average day conditions for all summer 2014 data. This revised analysis presents a more realistic picture of peak season boat operations and Project effects on navigation.

Section 5.1.3 has been updated to respond to substantive comments, including the role of the St. Lucie River, and to address safety concerns. Section 5.4.3 also provides information on economic impacts to the maritime industry and waterfront properties. AAF has confirmed that trains waiting to cross a moveable bridge will not be stopped across grade crossings, and that AAF would update railway and bridge infrastructure to accommodate the passenger rail and ensure that operations run smoothly.

In its comment letter on the DEIS, the U.S. Coast Guard stated that "The Coast Guard has not made the determination that the proposed increases in waterway closures would meet the reasonable needs of navigation. Any such determination will happen through a separate rulemaking process and not as part of the NEPA process." The Coast Guard also indicated that it is "very likely that future regulatory action will be required for these bridges."

All of the mitigation measures described in Section 7.2.2 would be in place to minimize effects to boaters and maritime businesses. AAF would implement a series of mitigation measures to reduce vessel delays at the three operable bridges (see Section 7.2.2). These measures would include publishing a set schedule for each bridge, consistent with existing USCG regulations; providing public access to bridge closure schedules; and implementing a notification sign/signal/horn at each location with countdowns to indicate the times at which the bridge will begin to open and close. Additionally, AAF will establish a point of contact with first responders and emergency personnel to promptly respond to unforeseen waterway emergencies. AAF will also rehabilitate the lift mechanisms on all three moveable bridges, thereby ensuring more reliable openings and closings.

1.7.5 Physical Environment

Air Quality

Some commenters raised concerns that the air quality and greenhouse gas emissions estimates omitted emissions from motor vehicles stopped at grade crossings, as well as from boats stopped at the three drawbridges. They requested that the FEIS include an analysis of air quality at congested grade crossings, particularly in downtown areas.

Response

An analysis of the projected air quality impacts at grade crossings has been completed as part of the FEIS. The detailed analysis of these grade crossings is presented in Section 5.2.1. The overall emissions were calculated for all of the criteria pollutants for both 2016 and 2036. The operations of new passenger trains would increase local emissions from vehicle queuing typically by less than 50 percent compared to normal traffic and freight emission levels. Emissions from grade crossing vehicle queuing with passenger trains were generally significantly less than one ton per day, which constitutes a *de minimis* impact on overall emission levels. Total emissions from all sources (normal cycle, freight and passenger) generally amount to less than one ton/day with the exception of NO_x emissions for Banyan Boulevard and Northlake Boulevard crossings (Palm Beach County). Emissions at those two crossings are still considered *de minimus* pursuant to EPA standards

Noise

Many members of the public stated that the current freight trains create noise impacts, even at a considerable distance from the tracks. They felt that the DEIS did not take this into account, and underestimated the effects of noise from trains passing-by. Other concerns include the noise effects on historic buildings, which are not insulated to prevent the penetration of sound. Commenters were also concerned that the passenger rail service would cause freight trains to operate at night, increasing nighttime noise effects.

Response

A noise impact assessment was completed within the Project Study Area according to FTA, FRA and FDOT guidelines. As stated in section 5.2.2 *Noise and Vibration*, prior to mitigation, the Project has the potential to cause long-term adverse noise impacts to residents and properties primarily along the N-S Corridor, as well as along some elevated sections of the E-W corridor. Impacts are determined based on the potential for increases in future noise conditions due to changes caused by the Project. The FRA is responsible for enforcing compliance with the Environmental Protection Agency railroad noise emission limits (40 CFR Part 210) of existing freight trains. The enforcement and compliance of existing freight train noise emissions is outside the scope of this Project and FEIS.

According to FTA/FRA noise impact assessment guidelines, noise impact has been assessed at all sensitive receptors, including historic buildings with noise-sensitive use, at exterior locations. Interior noise conditions are not considered when assessing potential impact. Noise is only an adverse effect on historic properties if a quiet setting is an important element of the significance of the property (for example, a historic church). None of the historic resources within the noise impact area require a quiet setting.

Nighttime train operations are an important factor when considering potential noise impact since a 10-decibel penalty is applied to events that occur between 10:00 PM and 7:00 AM. The Project takes into account the projected number of freight and passenger train events and whether they would occur during the day or night. The specific distribution of daytime and nighttime train events are based on AAF Modeling Assumptions Report (May 2013) and the proposed passenger rail schedule.

The AAF has committed to installing wayside horns at 117 grade crossings between Cocoa and West Palm Beach. The pole-mounted wayside horns will substantially reduce the noise footprint when compared to

the existing train-mounted warning horns for both passenger and freight trains. Therefore, the noise will significantly decrease with the use of pole mounted horns as compared to the current use of train mounted horns. AAF has also agreed to work with local jurisdictions to implement quiet zones. Where quiet zones are established, pole-mounted horns will not be required.

Vibration

Some commenters raised concerns that increased noise and vibration levels would increase the effects of vibration on people and buildings, especially to historic and other sensitive buildings. Commenters raised concerns that the noise and vibration impacts of double-stacked or otherwise faster or larger freight trains following the Panama Canal widening were underestimated.

Response

AAF conducted a vibration impact assessment within the Project Study Area according to FTA, FRA, and FDOT guidelines (Appendix 5.2.2-C). Vibration impact from train operations has been assessed at all sensitive receptors as categorized by the FTA/FRA including residences and historic structures with vibration-sensitive use. The potential for vibration impact that would cause structural damage has been assessed at all buildings adjacent to the railroad. FRA has independently reviewed AAF's vibration analysis and validated the conclusions.

AAF completed a vibration impact assessment for potential structural damage to adjacent buildings and determined that there would be no potential impact due to the construction of the Project. Vibration levels from freight and passenger train operations rarely exceed limits for potential structural damage outside the railroad right-of-way.

The vibration impact assessment is based on FTA/FRA general vibration curves for freight and passenger train operations. These generalized curves are based on a wide range of train operating conditions. The length and speed of freight trains used in the assessment are based on AAF modeling assumptions and FECR data on train operations. Double-stacked freight cars are not expected to increase vibration conditions, since the weight of the cargo must still be below the limitations of the freight car and track design as it is with single-stack cargo.

1.7.6 Natural Environment

Many commenters suggested that the DEIS should more thoroughly address the impacts to natural habitats, wetlands, wildlife, and particularly rare species.

Wildlife and Wildlife Corridors

Commenters stated that there have not been adequate field investigations or analysis of the impacts of a second track and increased higher-speed train traffic on wildlife, and that wildlife crossings should be provided in the E-W and N-S corridors.

Response

FECR has been operating along the existing railroad corridor, the N-S Corridor, for more than 100 years and wildlife crossings were not established at the time the railroad was built. AAF is not changing existing

conditions or exacerbating existing barriers to wildlife movement and therefore does not propose to construct any new wildlife passages along the FECR Corridor.

AAF is discussing the design of the railroad bridges and culverts crossing the Econlockhatchee River, its tributary, and Little Creek with representatives of the USACE, St. Johns River Water Management District, Florida Fish and Wildlife Conservation Commission, and the Orange County Environmental Protection Division. During these discussions, AAF proposed to develop wildlife crossings at these overpasses. The migratory characteristics of three large mammals known to inhabit the corridor (Florida black bear, white-tail deer, and Florida panther) were evaluated. Due to the size and sensitivity of the Florida black bear it was used as the species in the development of corridor/bridge design. This enabled the needs of other species to be met as part of the design.

Florida Scrub-Jay

Several commenters suggested that the DEIS should discuss whether or not the addition of tracks would involve the removal of natural habitat, specifically that of scrub-jays, and that the DEIS did not adequately document all known scrub-jay territories.

Response

As documented in Section 4.3.6 of this FEIS, occupied scrub-jay habitat is found in many areas adjacent to the FECR Corridor. The results of the scrub-jay field survey documented presence of scrub-jays at Savannas Preserve State Park, and observations of scrub-jays crossing the tracks indicate it is likely scrub-jays will occur within the rail corridor at times. The Project will result in passenger trains passing through these areas at maximum speeds ranging from 79 mph to 125 mph at a frequency of 32 trips per day. The increase in train frequency as well as the higher operational speeds in comparison to the existing freight rail service increase the likelihood scrub-jays will collide with a train resulting in an “incidental take.” Scrub-jays are cooperative breeders, meaning a breeding pair that defend a territory are usually assisted by helpers, and a member of the breeding population is replaced from a large pool of these helpers. This cooperative breeding strategy buffers the population from losses of individuals by providing a quick replacement for a lost breeder. Therefore the anticipated “incidental take” will not jeopardize the continued existence of the species or dramatically affect the local population.

Under the ESA Section 7, the USFWS has requested formal consultation on the Florida scrub-jay, which is being led by USACE on behalf of FRA, the lead agency for this FEIS. As part of the official consultation, USFWS is preparing a Biological Opinion for scrub-jays in association within the proposed action. AAF has agreed to purchase two scrub-jay credits to mitigate for potential “incidental takes” of individual scrub-jays.

Listed Plant Species

Several commenters stated that protected plant species were known to occur within or near the FECR right-of-way, and had not been identified in the DEIS.

Response

Sections 4.3.6 and 5.3.6 of the FEIS have been revised to include additional listed plant species identified by commenters. Preliminary surveys to determine the presence of threatened or endangered species and delineate wetland boundaries were conducted within areas of the N-S Corridor where the construction

footprint would go beyond the existing and historic railroad tracks and ballast. These surveys did not identify any threatened or endangered plant species within the FECR Corridor; however, the entire ROW has not been surveyed. AAF is coordinating with federal and state agencies as well as land managers and biologists within public lands to determine the potential presence of protected plant species within the FECR ROW and to identify appropriate areas in which surveys will be conducted prior to construction.

1.7.7 Social and Economic Environment

The majority of comments received by the FRA were related to the social and economic environment, including concerns about maintaining the quality of life in small town centers along the FECR Corridor, impacts to residential property values, effects on small businesses and environmental justice communities, as well as safety and emergency vehicle response.

Quality of Life

Many commenters asserted that the quality of life along the corridor would be significantly affected due to added traffic congestion at grade crossings, added boat traffic at bridges, added noise, a general disruption to normal everyday life, and that effects of the additional train traffic would be incompatible with the quiet small-town settings along the N-S Corridor.

Response

The FECR Corridor is an active freight rail corridor, currently experiencing approximately 14 round-trip freight trains per day. In recent years, the number of freight trains was substantially higher, with 24 daily trains in 2006. The AAF passenger service would not be introducing a new rail element along this corridor, and the incremental effects of adding passenger trains would not significantly degrade the quality of life in municipalities and communities along the rail line.

While the addition of passenger rail service would increase noise and result in more grade crossing closures, these effects would not be significant (as demonstrated in Chapter 5), and would comply with FTA, FRA, and FDOT guidelines. In addition, AAF has proposed a number of mitigation measures, such as the use of pole-mounted horns to decrease noise, to reduce the effects on communities, and to provide safety improvements at grade crossings.

Economic Impacts to Municipalities

Many commenters noted that communities and tax payers will be responsible for the maintenance of grade crossings. Commenters suggested that the maintenance of grade crossings is expensive and would be a burden to communities, and that the DEIS did not take this into account.

Response

The State of Florida requires municipalities to fund the maintenance of grade crossing equipment within their jurisdictions. The FECR Corridor has been in existence for approximately 100 years and crossing maintenance has been part of its existence since the crossings were first installed. The Project will result in minor increases in the annual cost of maintaining grade crossing equipment due to the addition of a second track, as set forth in the FDOT *Schedule of Annual Cost of Automatic Highway Grade Crossing Traffic Control Devices (725-090-41)*. Costs may increase where the type of grade crossing traffic control device is upgraded (for example, where the railroad infrastructure changes from a single track to a double track,

or where a two-quadrant gate is replaced with a four-quadrant gate). There will also be a small increase in the periodic cost of roadway resurfacing at the grade crossings, which typically occurs every 5 to 10 years based on the volume of highway traffic. Maintenance at grade crossings will be performed by the FECR and funded according to a crossing license agreement specific to each crossing. There would not be any new grade crossings associated with the AAF passenger rail service.

Residential Property Values

Commenters stated that the DEIS did not adequately evaluate the effects of the Project on residential property values. They indicated that train traffic associated with the Project would increase noise levels, worsen roadway congestion, reduce safety, and limit waterfront access. These impacts would lower property values along the rail line, which would cause undue economic hardship for local governments and property owners. Lower property values would reduce municipal property tax revenues, thereby limiting local governments' ability to provide community benefits. Lower property values would also reduce personal wealth. Impacts to noise, traffic, safety, and waterfront access resulting from the Project would make it difficult for property owners to sell their real estate holdings. The combination of lower property values and a deteriorating real estate market would be particularly harmful to Environmental Justice communities.

In addition, commenters stated that the DEIS does not adequately address the Project's potential to adversely impact the real estate market along the New River, Loxahatchee River, and St. Lucie River. Increased bridge closures and associated navigational delays would lower waterfront property values, particularly for properties up river from the impacted bridges. Lower property values would reduce municipal tax revenues and personal wealth. Increased bridge closures and associated navigational delays would also make it difficult to sell properties along these waterways, which include multi-million dollar homes. Few people, if any, would want to buy waterfront property when the Project would inhibit their enjoyment of the water. Some commenters suggested that the inability to sell these properties may lead to increased foreclosures and a downturn in the regional economy.

Response

The FECR Corridor is an active freight rail corridor, currently with approximately 14 round-trip freight trains per day under current conditions, projected to increase to 20 by 2019. In recent years, the number of freight trains was substantially higher, with 24 daily trains in 2006. The AAF passenger service would not be introducing a new rail element along this corridor, and the incremental effects of adding passenger trains would not significantly degrade the quality of life in municipalities and communities along the rail line. AAF would not introduce significant new disruption, noise, traffic, or other effects that could affect property value. Properties along the railroad are already valued according to their proximity to the rail line. An FRA study "neither established nor excluded the possibility of adverse effects on property values." It did, however, generally conclude, "other things equal, being within 1,000 feet of an operating rail line depresses the sale price of a property from 5 percent to 13 percent on average." Because the FECR was established over 120 years ago and has been in continuous operation since the late 1800s, any impact of the railroad on the valuation of nearby properties, up or down, would have already occurred long ago and would not be substantially changed by the added passenger trains.

With respect to waterfront property along the New River, Loxahatchee River or St. Lucie River, the Project would result in increased closings of the moveable bridges. However, the moveable bridges would remain in operation and these rivers would continue to be open to navigation as required by the Coast Guard. Properties along these rivers with docks would continue to have boat access both upriver and downriver. Therefore, the Project is not expected to affect the value of these properties.

Adverse Effects on Businesses

Commenters stated that the DEIS did not adequately evaluate the effects of the Project on businesses located in small downtown areas along the N-S Corridor. They believed that increased noise and congestion from the Project would discourage customers, particularly tourists, which would force businesses to close, increase retail vacancies, and reduce sales tax revenue. These impacts would also limit future development along the rail line.

Response

The FECR Corridor is an active freight rail corridor, currently with approximately 14 round-trip freight trains per day under current conditions, projected to increase to 20 by 2019. In recent years, the number of freight trains was substantially higher, with 24 daily trains in 2006. The AAF passenger service would not be introducing a new rail element along this corridor, and the incremental effects of adding passenger trains would not significantly degrade the viability of businesses located in town centers along the rail line. The FECR Corridor has supported freight and/or passenger rail service on a continuous basis for more than 100 years, and existing downtowns along with their commercial properties largely developed around these conditions. AAF would not introduce significant new disruption, noise, traffic, or other effects that could affect businesses.

As noted in Section 5.2.2.2, the Project would have no permanent noise impacts along the N-S Corridor due to the use of wayside horns. Future noise levels along the N-S Corridor would be comparable to existing noise levels for mainline segments and substantially lower than existing noise levels at grade crossings. If municipalities believe further noise reduction is necessary, there is the option of seeking Quiet Zone designation under 49 CFR part 222. A Quiet Zone is “a section of a rail line at least one-half mile in length that contains one or more public crossings at which locomotive horns are not routinely sounded.” Quiet Zones are proposed by municipalities, designed in accordance with FRA standards, and approved by FRA. Municipalities are responsible for funding all improvements and equipment maintenance associated with Quiet Zones within their jurisdictions. AAF has committed to working with local municipalities to develop Quiet Zones as an alternative to the use of wayside horns.

As noted in Section 5.1.2.2, grade crossings would be closed an average of three times per hour, which would leave the majority of each hour of operation unaffected by the introduction of passenger train service. An increase in the number of crossing events would cause additional closures; however, the closures due to the passing of passenger trains would be much shorter than closures from existing freight traffic.

Given the minimum impact to noise and local traffic conditions, the additional 16 passenger rail round trips per day is not expected to result in an adverse impact to businesses within small downtowns along the N-S Corridor. There are many locations across the United States, particularly in the Northeast, where intercity passenger rail or commuter rail has been re-instated on out-of-service rail lines or on active

freight lines that pass through town centers. There have been no demonstrated downturns in local businesses following the re-introduction of rail service. Downtown businesses are, however, affected by factors such as regional economics, jobs, tourism, parking, and the development of malls and big-box retail stores in areas outside of the downtown.

Environmental Justice Communities

Environmental justice was an issue raised by many commenters. These comments stated that the DEIS did not provide adequate data to support its claims pertaining to environmental justice, and that several local environmental justice communities were not identified in the DEIS. Commenters indicated that the Project would disproportionately impact minority and low-income populations as a result of job loss, depreciated property values, safety risks, and increased noise and vibration. Low-income populations would be especially vulnerable to these impacts, as they are less likely to be able to relocate, if so desired, due to financial limitations. Another concern raised by commenters was that in some environmental justice communities, residents lack cars and regularly cross the FECR tracks mid-block to access jobs, shopping, schools, and services. With the improvements to the track infrastructure and more frequent faster trains, this convenient access would be cut off and would adversely affect the ability of environmental justice populations to access jobs and services.

Response

In response to comments, FRA has reviewed the designations of environmental justice communities and the analysis of impacts, and updated Section 5.4.2 of this FEIS. As noted in Section 5.4.2.1, the FEIS based identification of environmental justice communities on census tracts within 1,000 feet of the proposed or existing railroad alignments with minority and low-income populations greater than 50 percent or meaningfully greater than the general population. Thresholds used to determine meaningfully greater minority and low-income populations included census tracts where minority and low-income populations are 10 percent higher than the combined total for the six counties crossed by the Project, 37.4 percent and 22.4 percent, respectively. This approach was developed in accordance with the CEQ's guidance document on environmental justice and approved by FRA (CEQ 1997). Any census tract or community that the FEIS did not identify as an environmental justice community was determined to be too far from the proposed or existing railroad alignments to be adversely impacted by the Project.

No environmental justice community would be disproportionately impacted by the Project. There would be no forced residential displacements, job loss, or neighborhood fragmentation due to the acquisition and/or use of land. The Project would not cause severe noise or vibration impacts within environmental justice communities.

The FECR was established over 120 years ago and has been in continuous operation since the late 1800s, long before most of the current abutting properties were constructed. Any hypothetical impact of the railroad on the valuation of nearby properties, up or down, would have already occurred long ago.

With respect to access between environmental justice communities and jobs/services/school access, all such unauthorized pedestrian crossings are both illegal trespass and unsafe under current conditions. The infrastructure and safety improvements that are incorporated in the Project will reduce illegal and unsafe trespass on the rail line, and improve safety for area residents by adding sidewalks at grade crossings. This is not a disproportionate adverse impact to environmental justice communities.

AAF will conduct ROW Field Surveys to observe, document, and provide recommendations to minimize trespassing by employing fencing, warning signage, public outreach/information, and other appropriate measures as required. AAF will also develop a Hazard Analysis and System Safety Program Plan prior to the start of operations, which will identify potential system risks based on an evaluation of potential risk severity and frequency. These measures will be applied universally, including both environmental justice and non-environmental justice communities.

Safety

Many commenters stated that the passenger train service would create unacceptable safety hazards along the N-S Corridor, particularly where the corridor crosses through small town centers. Some commenters voiced concerns that faster and more frequent train trips could reduce safety for residents – specifically children playing, biking, or skating, and the elderly walking – especially because they are accustomed to the slow speed of freight trains. Others noted that currently there are many informal walking paths across the tracks, and if these are no longer available that pedestrians and bicyclists would be required to cross at a roadway grade crossing where there is no sidewalk or bike lane, increasing the hazard to pedestrians.

Some commenters voiced concerns that faster trains increases the risk of derailments. Commenters worried that a high speed passenger train derailing or colliding with another vehicle in a downtown area could cause widespread harm and damage. In addition, some residents questioned whether trains containing hazardous material would travel through their communities. Many commenters asked if the corridor would be “sealed” as required for High Speed Rail service.

Response

Consistent with FRA safety requirements, which are not part of the NEPA process, AAF will develop a Hazard Analysis and System Safety Program Plan prior to the start of operations. These documents will identify potential system risks based on an evaluation of potential risk severity and frequency. The Hazard Analysis that AAF is developing in advance of the start of train service, per federal regulations, will identify collision hazards and will make an assessment of the potential frequency and severity of these incidents. This is not a NEPA requirement.

AAF is responsible for ensuring that legal crossings along the corridor are safe and comply with existing regulations. AAF will work with Florida Operation Lifesaver, a statewide, non-profit public awareness and education program to ensure compliance with existing regulations regarding railroad crossings. AAF will work to install pedestrian gates at crossings where local municipalities that agree to maintain such gates.

AAF has committed to complying with the FRA’s guidelines for rail crossing safety as specified for higher speed passenger rail services. AAF will incorporate all of the Sealed Corridor design treatments identified in the Grade Crossing Diagnostic Evaluation, where applicable, along the entire AAF service route.

As part of the Project, a Positive Train Control (PTC) system will be implemented along the entire corridor. This system will include integrated command, control, communications, and information systems for controlling train movements which improves railroad safety by significantly reducing the probability of collisions between trains, casualties to roadway workers, and damage to equipment.

Freight trains traveling along the FECR Corridor are currently equipped to haul hazardous materials. Although there is no set schedule, hazardous materials are hauled on an average of once per week. FECR adheres to a safety program for existing freight service that includes:

- **Education and Awareness:** All FECR employees receive training throughout the year as required by law and by company policy.
- **Test/Audits:** FECR management teams conducts unannounced safety and compliance audits to ensure that employees are working in the safest environment possible.
- **Compliance/Prevention:** FECR ensures that potentially unsafe behaviors or circumstances are addressed immediately and any incidents are investigated in a timely manner.
- **Recognition:** Employee recognition is a key component of any successful safety program. FECR employees share in the success of the safety program through functions designed to promote safe work habits and recognize safety accomplishments throughout the year.

FECR has consistently been recognized for their safety record through receipt of performance rewards, including five E.H. Harriman Awards since 2005. The E.H. Harriman Award was an annual award presented to American railroad companies in recognition for outstanding safety achievements.

Emergency Vehicle Response

Many commenters voiced concerns that more frequent train trips will affect public safety vehicle response times because of the increased number of grade crossing closures. Commenters noted that the majority of hospitals, medical centers and fire stations along the N-S Corridor are west of the FECR Corridor, while the majority of residents live on the east side. Residents expressed fears that the increased number of crossing closures associated with the Project would delay ambulances and fire trucks from reaching victims or hospitals. Commenters also indicated concerns that the increased number of grade crossing closures would block emergency evacuation routes in coastal communities.

Response

Upgrades to road crossings will be coordinated with and/or communicated to local emergency responders, as activations at the road crossings are expected to be more frequent with the increased frequency of train traffic. However, the delays are also expected to be minimal, as the passenger trains should clear a typical crossing in less than a minute. This improved communication with emergency responders will have an overall beneficial effect on minimizing potential conflicts and their consequences.

1.7.8 Public Outreach

Many residents along the AAF corridor commented on the format of the public information meetings held during the DEIS comment period. Many people were misinformed that these would be public hearings, which would have allowed residents along the N-S Corridor to speak on a particular issue. Many commenters felt the open house/information meeting format did not allow the public to express their concerns about the Project.

Response

The FRA advertised and hosted eight public meetings, using an open house format. The FRA advertised these open houses in local newspapers, on the FRA's website, on the AAF project website, and in an email blast. All of these communications characterized the meetings as Public Information Meetings that would provide the public with an opportunity to ask questions and discuss the DEIS with FRA and Project staff. The FRA chose the 'public information meeting' format versus the 'public hearing' format in order to obtain more comments and allow more people the opportunity to express their concerns, either in writing on the comment form provided, or with the court stenographer available to take verbal comments at each of the public information meetings. Considering other federal agencies' use of the 'information meeting' format under the NEPA process, FRA determined that this format was more conducive to hearing everyone's comments as well as informing those members of the public who were there how to obtain additional information about the Project. At a public hearing, FRA would not have been able to answer questions or discuss the Project with interested members of the public. FRA NEPA procedures do not require a public hearing during the review of an EIS.

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2 Purpose and Need for the Proposed Action

2.1 Introduction

All Aboard Florida LLC (AAF) proposes to institute intercity passenger rail service between Orlando and Miami, Florida with station stops in Orlando, West Palm Beach, Fort Lauderdale, and Miami. The Project would consist of a 235-mile long intercity passenger rail service with an anticipated three-hour travel time. Improvements needed to support the service would include both construction within existing railroad rights-of-way (ROW) and new construction outside of existing railroad corridors. AAF has applied for a loan from the Federal Railroad Administration (FRA) to fund a portion of the costs of building the Project and acquiring equipment. If approved and constructed, AAF would be responsible for covering the costs of operating its services and for repaying FRA the borrowed funds in accordance with financial terms that would be agreed upon by AAF and FRA. As a private applicant, AAF has identified the basic components of the project it is proposing to build and operate, and has identified the purpose and need for the Project. Given the private sector nature of the Project, FRA has independently validated the purpose and need for the Project identified by AAF to assure that this Environmental Impact Statement (EIS) appropriately articulates that purpose and need consistent with the National Environmental Policy Act (NEPA), its implementing regulations and procedures, and related statutes and regulations.

2.2 Purpose

The purpose of the Project is to provide reliable and convenient intercity passenger rail transportation between Orlando and Miami, Florida (the Project Corridor), by extending (in Phase II) the previously reviewed Phase I AAF passenger rail service between West Palm Beach and Miami and by maximizing the use of existing transportation corridors. This transportation service would offer a safe and efficient alternative to automobile travel on congested highway corridors, add transportation capacity within those corridors (particularly Interstate 95), and encourage connectivity with other modes of transportation such as light rail, commuter rail, and air transportation.

The additional purpose of Phase I of the Project, as stated in the Finding of No Significant Impact (FONSI), is to “provide intercity passenger rail service that addresses South Florida’s current and future needs to enhance the transportation system by providing a transportation alternative for Floridians and tourists, supporting economic development, creating jobs and improving air quality.” (Appendix 1.1-A2)

Some commenters on the DEIS stated their opinion that the purpose is defined too narrowly and excludes consideration of other alternatives. FRA has developed this statement in accordance with CEQ Regulations (40 C.F.R 1502.13) which state that an EIS shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action. For this project, AAF is the project proponent and is responsible for defining the purpose of the proposed project that FRA is reviewing in this EIS. FRA has issued a FONSI for AAF’s Phase I project, which is currently under construction. It is reasonable for AAF to define the purpose of Phase II as extending the

previously-reviewed passenger rail system. This statement of AAF's purpose did not unreasonably constrain the analysis of alternatives presented in Chapter 3 of this EIS.

2.3 Need

The Project is needed to provide a fast, sustainable, and reliable means of travel that responds to the transportation needs of the existing population as well as future population growth. The need for the Project stems from several factors: increasing congestion on the I-95 corridor and State Road (SR) 528, long travel times, limited existing capacity, limited and constrained opportunities for corridor expansion, limited alternative modes of transportation, and increasing travel demand generated by growth in population and tourism. Transportation demand and travel growth in Florida is outgrowing the capacity available on the existing and future transportation network between Orlando and Miami (Louis Berger Group 2013). Increasing population, employment, and tourism continue to elevate travel demand in the Project Corridor, as documented by population and employment forecasts from the Office of Economic and Demographic Research and Florida Department of Economic Opportunity (FDEO) (Office of Economic and Demographic Research 2013; FDEO 2013). Transportation options between these two cities have become more limited with the decline of air service in the Project Corridor, limits on roadway expansions, and the lack of adequate, reliable alternative modes of transportation (Louis Berger Group 2013). As a result, AAF has concluded that there is a need for a safe, efficient, reliable transportation alternative to the dominant mode of travel (automobile). Finally, with funding at the state and national level being limited, there is a need for a privately operated passenger railroad project. FRA concurs that the Project could help address a need for improved transportation in the markets that would be served.

These existing and future transportation conditions and resulting needs are described in more detail below.

2.3.1 Congestion on Existing Road Systems

The Project Corridor and transportation network are shown in Figure 2.3-1. There are two main north-south interstate highways along the southeast coast of Florida, I-95 and Florida's Turnpike, which is a toll road. These two roads run roughly parallel to the east coast of Florida and connect Orlando with Miami, as well as intermediate destinations. The current travel time between Orlando and Miami via automobile is approximately 4 hours via SR 528 to I-95 and 3 hours, 30 minutes via Florida's Turnpike. These times can vary substantially based on traffic, congestion, weather, and other factors.



Explanation of Features

- FEC Corridor
- E-W Corridor
- - - CSX Corridor
- - - I-95 Corridor
- - - Florida's Turnpike
- Amtrak Corridor
- Major Airports
- Proposed Stations - WPB-M Corridor
- Proposed Station (By Others)

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

Project Corridor		
All Aboard Florida Intercity Passenger Rail Project		
		2.3-1

According to the United States Department of Transportation's (USDOT) Federal Highway Administration (FHWA), the annual average daily traffic (AADT) on I-95 between Orlando and Miami is between 48,500 and 283,774, depending on the location (Louis Berger Group 2013). Florida's Turnpike, which parallels I-95 in southeastern Florida, has an AADT of between 26,000 and 113,369, depending on the location (Louis Berger Group 2013). Traffic levels on these two corridors are expected to grow by 52 percent between 2007 and 2040 as population and vehicular travel in Florida increases (Louis Berger Group 2013). By 2040, traffic volume is expected to be at or exceeding capacity for almost all segments (Table 2.3-1).

Highway	Segment	County	2007 AADT	2040 AADT	2007 V/C	2040 V/C
Florida's Turnpike	South of U.S. 441	Osceola	30,050	45,818	0.71	1.01
	North of SR 60	Osceola/ Okeechobee/ Indian River/ St. Lucie/ Indian River	26,000	39,642	0.53	0.79
	North of SR 706	Indian River/ St. Lucie/ Martin/ Palm Beach	36,000	54,890	0.57	0.87
	North of SR 870	Palm Beach/ Broward	94,200	143,629	0.94	1.42
	North of SR 820	Broward	113,369	172,857	1.12	1.71
Interstate 95	South of SR 528	Brevard/ Indian River/ St. Lucie/ Martin	48,500	73,949	0.87	1.25
	North of SR 706	Palm Beach	70,954	108,185	0.72	1.05
	North of SR 870	Broward/ Palm Beach	274,277	418,198	1.31	2.00
	North of SR 820	Broward	283,774	432,678	1.07	1.64

Source: Louis Berger Group. 2013. All Aboard Florida Ridership and Revenue Study: Summary Report. September 2013.

Florida's existing transportation infrastructure is overloaded due to a substantial increase in population, business, and tourism over the last 30 years (I-95 Corridor Coalition 2013). Without further improvements to the existing I-95 corridor, by 2035 100-percent of the urban segments within the I-95 corridor will be under "heavy congestion, and 55 percent of the non-urban segments will see increased congestion" (I-95 Corridor Coalition 2013). Mobility is hampered in Florida because of chronic congestion and delays due to inadequate roadway capacity and the inability to expand most of the State's urban roadway capacity, according to Florida Department of Transportation (FDOT) and FHWA research (FDOT 2010; FHWA 2005a). Under the Intermodal Surface Transportation Efficiency Act of 1991, FDOT established a limit of ten lanes (five lanes in either direction) at any location on the Florida Interstate Highway System (FIHS) (FRA 2005). This limit to capacity was further solidified in 2002 and 2003, when FDOT procedures 525-030-250-f and 525-030-255-c (FDOT Procedures) set up specific criteria for widening all roads on the FIHS. These FDOT Procedures were based on 2000 legislation (Section 225.02(3) of the Florida Statutes [FS]), which establishes criteria that must be considered when determining the number of lanes on the FIHS. The criteria include consideration of multi-modal

alternatives and considerations of local comprehensive plans and approved metropolitan long range transportation plans. The FDOT Procedures (FDOT 2003) note:

“Nothing in Section 335.02 (3) FS precludes a number of lanes in excess of ten lanes. However, before the Department may determine the number of lanes should be more than ten, the availability of [right-of-way] (ROW), and the capacity to accommodate other modes of transportation within the existing ROW must be considered.”

The need for a solution to the problem of roadway congestion has been recognized by many, including FDOT. In June 2009, FDOT released the *Florida Rail Project Plan: Policy Element* (FDOT 2009) concluding, among other things, that:

“In spite of recent slowing of growth due to a downturn in the national and state economy, by 2030 more than 25 million people will call Florida home, an increase of over 35 percent since 2007. The expected growth in population over the long-term reinforces the value of investing in rail as part of a multimodal transportation strategy to more efficiently accommodate the mobility needs of future populations.” (FDOT 2009)

2.3.2 Safety on the Existing Highway System

On a national level, comparing miles traveled via commercial aircraft, trains, and automobiles on highways, auto travel on highways has the highest rate of passenger fatalities per mile traveled. In 2011, more than 34 percent of all transportation fatalities involved occupants of passenger cars, while there were no fatalities related to passenger rail (USDOT 2012). These statistics indicate that a passenger rail system would provide a safer travel option than passenger cars traveling on I-95 and other area highways.

2.3.3 Alternative Modes of Transportation – Orlando to Miami

The transportation alternatives to cars for travel within the Orlando to Miami corridor currently include passenger train, airplane, and motor bus. Amtrak currently operates two separate train services in the Project Corridor, the Silver Star and Silver Meteor (both between New York City, New York and Miami, Florida). There are two southbound trains per day and two northbound trains per day. The travel time between Orlando and Miami on the two Amtrak services is between 5 hours, 45 minutes and 7 hours, 34 minutes. Annual ridership on these two routes was 23,300 (Louis Berger Group 2013). Ridership on Amtrak in the Project Corridor has grown by over 8 percent (compounded annually) since 2006 (Louis Berger Group 2013). By 2030, these volumes are expected to grow to 120,000 passengers per year (Louis Berger Group 2013).

Intercity train travel in the Project Corridor is limited by reliability issues, infrequent service, and a long overall travel time, among other factors (Louis Berger Group 2013). The Amtrak services operate for only a small portion of their route on tracks owned by Amtrak, with the rest of their route primarily on tracks owned by CSX Corporation or FDOT. The number of trains that they are able to operate is limited by the time slots available from CSX. With limited control over the primary causes of delay, Amtrak’s Silver Service/Palmetto line had a 66-percent on-time performance in February 2014, and 60-percent on-time performance for the previous 12 months. The primary causes of delay were train interferences

(39 percent of the total delay, of which 84 percent occurred on the CSX-dispatched line) and track and signal problems (25 percent of the total delay, of which 79 percent occurred on the CSX lines) (Amtrak 2014). This low on-time performance means that by the time a southbound train gets to Orlando, it can be anywhere between 2 and 3 hours late.

American Airlines, United Airlines, and Silver Airways provide air service between Orlando and Miami, Silver Airways and Spirit Airlines provide service between Orlando and Fort Lauderdale, and Silver Airways provides service between Orlando and West Palm Beach. The average flight time is 60 minutes, which does not include the time required to reach the airport, pass security, and board the aircraft. Several smaller airlines and charter services provide service between the various smaller “executive” airports in the region. In total, there are more than 30 flights per day between Orlando International Airport (MCO) and the West Palm Beach (PBI)/Fort Lauderdale (FLL)/Miami Airports (MIA). There are 244 daily and 88,900 annual passengers who travel between Orlando and Miami via airplane (Louis Berger Group 2013). In 2012, 96,112 daily and 35.1 million annual passengers used MCO and 108,969 daily and 39.5 million annual passengers used Miami Airport (MCO n.d.). By 2030, the number of passengers is expected to grow to 74M per year, an increase of 45 percent (Louis Berger Group 2013).

Air travel within Florida is limited by the availability of flights, increasing prices, and delays. Currently, there are only two major, national air carriers that provide service between Central and Southeast Florida. This limitation on competition has resulted in higher prices and fewer options to travel within the state (prices have increased by almost 15 percent in the last 10 years) (USDOT 2013). Increasing delays have also made air travel less reliable; in 2012, approximately 18 to 23 percent of all flights in the Project Corridor were considered “late” by the FAA (Table 2.3-2).

Route	Total Number of Flights	Total Number of Delayed Flights	Percent of Flights Delayed
Orlando - Miami	3,496	802	23
Orlando - Fort Lauderdale	1,468	266	18

Source: BTS. 2013. Summary Statistics, Origin and Destination Airport: January 1, 2012 to January 1, 2013. <http://apps.bts.gov/xml/ontimesummarystatistics/src/ddisp/OntimeSummarySelect.xml?tname=OntimeSummaryBothData>. Accessed September 12, 2013.

Greyhound Bus Service offers a variety of motor coach services between Orlando and Miami, and intermediate destinations, with 20 daily departures. The average trip time varies between 4 and 7 hours. There are approximately 10 southbound buses and 10 northbound buses between the two cities each day. Trip time is strongly influenced by highway congestion.

Multiple local transit operating authorities provide connecting service in areas around the proposed stations. These transit providers do not provide service over the entire length of the Project Corridor. The only transit service currently operating along part of the Project Corridor is the South Florida Regional Transportation Authority (SFRTA), which operates the “Tri-Rail” commuter train service between West Palm Beach and Miami. SFRTA operates commuter train service on the CSX railroad ROW, which is

approximately one mile west of the Florida East Coast Railway Corridor ROW. Tri-Rail service has 17 stations within this 72-mile corridor, with a total travel time of approximately 1 hour, 50 minutes. There are 25 southbound and 25 northbound trains per weekday within this southern portion of the corridor (SFRTA 2013a).

Based on the available data, trip times for alternative modes of long-distance intercity transportation are often unreliable and roadway congestion is increasing due to limited capacity for expansion.

2.3.4 Population, Employment, and Tourism Growth

Growth in population, employment, and tourism is anticipated to exacerbate existing highway congestion and increase the demand for alternative modes of transportation (Louis Berger Group 2013). Florida has a current population of 19 million people, which is expected to increase by almost 5M people in the next 20 years (Figure 2.3-2). The cities at the two ends of the Project Corridor are among the five largest in Florida, with increasing population growth. Orlando, at the northern end of the Project Corridor, is the fourth largest city in Florida and had the second highest population growth in the state. Miami, at the southern end of the Project Corridor, is the second largest city in Florida (BEBR 2011a; Schlueb 2013).

As of June 2013, the Florida economy employed approximately 8,751,000 people according to the United States Department of Labor, Bureau of Labor Statistics (BLS) (BLS 2013). In the last two years, employment in Florida has grown by over 450,000 people and the number of people employed is approaching pre-recession levels (BLS 2013). Since 2011, employment in the combined Metropolitan Statistical Areas (MSAs) has grown by three percent or more per year (Table 2.3-3).

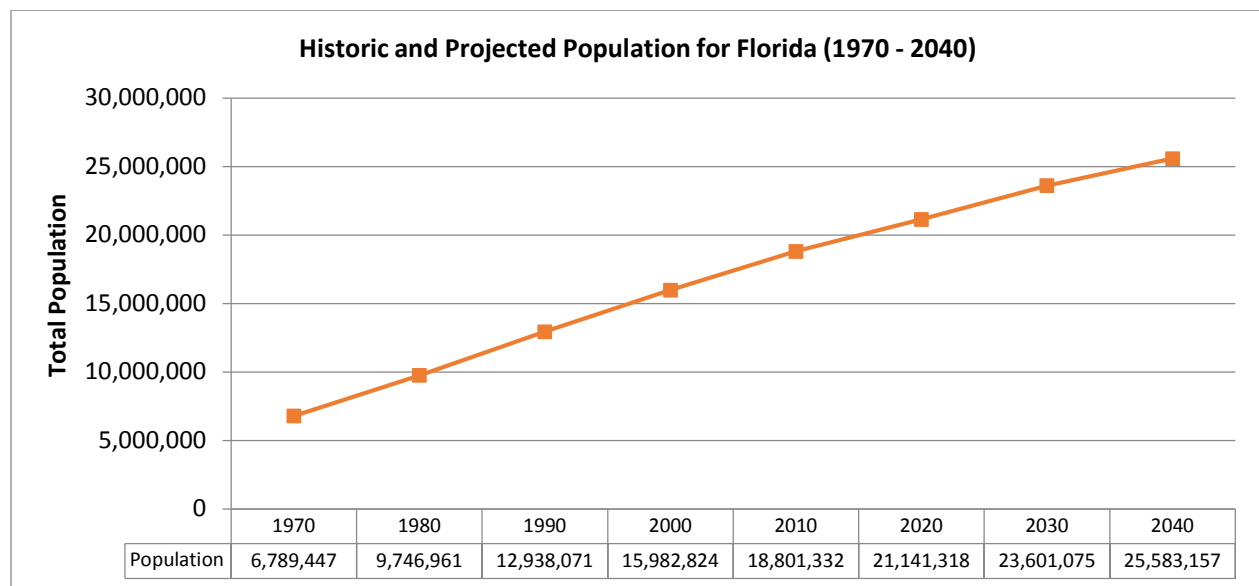


Figure 2.3-2 Projected Population for the State of Florida

Source: Office of Economic and Demographic Research. 2013. *Total County Population: April 1, 1970-2040*. <http://edr.state.fl.us/Content/population-demographics/data/CountyPopulation.pdf>. Accessed September 22, 2013.

Year	Miami-Fort Lauderdale-Pompano Beach		Orlando-Kissimmee-Sanford		Total	
	Employment	Growth Rate (%)	Population	Growth Rate (%)	Population	Growth Rate (%)
2003	2,440,482	-	885,928	-	3,326,410	-
2004	2,486,155	1.9	920,858	3.9	3,407,013	2.4
2005	2,561,772	3.0	971,929	5.5	3,533,701	3.7
2006	2,647,953	3.4	1,016,278	4.6	3,664,231	3.7
2007	2,765,416	4.4	1,062,268	4.5	3,827,684	4.5
2008	2,698,722	-2.4	1,052,279	-0.9	3,751,001	-2.0
2009	2,515,298	-6.8	992,687	-5.7	3,507,985	-6.5
2010	2,524,021	0.3	991,964	-0.1	3,515,985	0.2
2011	2,606,069	3.3	1,014,675	2.3	3,620,744	3.0
2012	2,698,050	3.5	1,050,951	3.6	3,749,001	3.5

Source: BLS. 2013. *Local Area Unemployment Statistics*. <http://data.bls.gov/pdq/querytool.jsp?survey=la>. Accessed September 13, 2013.

Orange County and Miami-Dade County are the main centers of employment in the Project Corridor. This concentration of employment leads to a substantial jobs-housing imbalance for some counties in the corridor that are more residential, which leads to longer home-to-work travel. According to the 2010 American Community Survey 5-year estimates, more than 20 percent of employed populations within St. Lucie, Martin, Osceola, and Broward Counties work outside of their counties or state of residence (Table 2.3-4). Data on the counties in which these populations are employed are not readily available.

In 2012, 91.4 million people visited Florida for tourist purposes, including theme parks in Orlando, beaches along the coast, and other attractions (Visit Florida 2013a). Although the majority of these visitors came from the United States, a growing number come from international locations. In 2012, 50 percent of all visitors arrived via airplane (Visit Florida 2013a). Orlando is the most visited destination in the United States, with over 50 million visitors a year. The number of visitors has increased from approximately 49 million in 2008 to 57 million in 2012, and is forecast to reach more than 59 million in 2014 (Visit Orlando 2014). Miami saw 4.1 million cruise passengers embark in 2010 (Miami-Dade County 2014), and saw 13.9 million visitors in 2012, with a nine percent increase in hotel occupancy from 2008 to 2013 (Greater Miami Convention Center and Visitors Bureau 2014). As discussed previously, there are few transportation options connecting Orlando and Miami other than private automobiles.

County	Population	
	% Employed in County of Residence	% Employed Out of County of Residence
Orange County	86.3	13.8
Osceola County	48.8	51.2
Brevard County	92.1	7.9
Indian River County	82.9	17.1
St. Lucie County	64.3	35.7
Martin County	65.7	34.3
Palm Beach County	87.5	12.4
Broward County	77.2	22.9
Miami-Dade County	92.0	8.0

Note: Numbers may not add to 100 due to rounding.

Source: U.S. Census Bureau. 2010b 2006-2010 American Community Survey 5-Year Estimates: S0801, Commuting Characteristics by Sex. <http://factfinder2.census.gov/>. Accessed September 12, 2013.

The increasing number of people living, working and visiting the Project Corridor will result in a greater number of people traveling in the corridor. This increase in travel between Orlando and Miami, Florida places increased pressure on the highways and other modes serving the region.

2.3.5 Financing and Public Initiatives

A number of public agencies and private entities have studied the development of an intercity passenger rail system in Florida. Intercity passenger rail is recognized as a viable and needed service, given the level of travel activity and the existing and growing congestion on Florida's highways. Tables 2.3-5 and 2.3-6 provide a summary of prior rail legislation and high speed rail legislation in Florida from 2000 to 2010 (FDOT 2010). Available funding for capital and operating costs of transportation projects is limited at the state and national level, and none of these projects have advanced, primarily due to lack of funding. At a national level, funding for the capital cost of highway/transit projects has remained flat in the latest transportation authorization budget (*Moving Ahead for Progress in the 21st Century, Federal Public Transportation Act of 2012*). Florida has not committed to funding the operating and capital costs for the Tampa to Miami High Speed Rail project due to limited resources.

Date/Title	Description
2000 Constitutional Amendment on High Speed Rail Approved by Florida Voters	Florida's voters adopted an amendment to the Constitution of the State of Florida that mandated the construction of a high-speed transportation system in the state. The amendment required the use of train technologies that would operate at speeds in excess of 120 miles per hour and would consist of dedicated rails or guideways separated from motor vehicle traffic. The system was to link the five largest urban areas of Florida and construction was mandated to begin by November 2003.
2001 Florida Legislature Enacts the Florida High Speed Rail Authority Act	Florida Legislature enacted the Florida High Speed Rail Authority Act and created the Florida High Speed Rail Authority (FHSRA). The FHSRA was charged with the responsibility for planning, administering, and implementing a high-speed rail system.
2001 High Speed Rail Authority Issues Vision Plan	The FHSRA crafted a vision for a high-speed rail network linking the major population centers of Florida. The FHSRA's long-term vision for a statewide high-speed rail system included the provision for high-speed rail along Florida's east coast, linking Jacksonville and Miami.
2002 Report to the Governor and the Legislature Issued	The FHSRA issued a request for proposal in 2002 to design, build, operate, maintain, and finance an initial high-speed rail service between Tampa and Orlando. The cost estimate was \$2.4 billion. The route was planned to begin near the Tampa Central Business District and travel parallel to Interstate 4 into Orlando, then to the MCO, along with a future extension into St. Petersburg. A Draft Environmental Impact Statement (DEIS) was prepared for Tampa-Orlando project in 2003 and a Final EIS was released in 2005 (re-evaluation and Record of Decision in 2010).
2003 Funding Vetoed by Governor Jeb Bush	Governor Jeb Bush vetoed funding approved by the Legislature for the High Speed Rail project and for the continuation of activities by the Board. The FHSRA was able to continue the project development and environmental process and procurement process with funds previously earmarked by the federal government.
2004 Constitutional Requirement is Repealed	Growing concern over the costs of implementing a high-speed rail network led to efforts to repeal the amendment. In November 2004, Florida voters chose to overturn the original amendment, resulting in the removal of the constitutional mandate.
2009 Florida Rail Project Plan	The 2009 Florida Rail Plan was an update to the 2006 Florida Freight and Passenger Rail Plan and built upon previous rail planning efforts, including the 2006 Florida Intercity Passenger Rail Vision Plan. The Project was developed in response to this policy plan.

Date/Title	Description
December 2009 Florida Statewide Passenger Rail Commission created	Governor Charlie Crist signed House Bill 1B, creating the Florida Statewide Passenger Rail Commission. The commission will monitor Florida's passenger rail systems, advise the Florida Department of Transportation concerning passenger rail service, evaluate passenger rail policies, and provide advice and recommendations to the legislature.

Source: Florida House of Representatives. 2009. *HB 1B – Transportation*. <http://www.myfloridahouse.gov/Sections/Bills/billsdetail.aspx?BillId=42784>. Accessed September 21, 2013.

2.4 Project Objectives

AAF identified its primary objective for the Project, which is to provide an intercity rail service that is sustainable as a private commercial enterprise. Sustainable means that the rail service can attract sufficient riders to meet revenue projections and operate at an acceptable profit level. FRA agrees that there is an identified need for a reliable and convenient intercity passenger rail service between Orlando and Miami and that the private sector nature of the proposal requires that the system operate as a sustainable private commercial enterprise.

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3 Alternatives

The Council on Environmental Quality (CEQ) regulations that implement the National Environmental Policy Act of 1969 (NEPA) state that the alternatives section is the heart of an Environmental Impact Statement (EIS) (40 CFR § 1502.14). Those regulations and accompanying guidance, *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations* (CEQ 1981), require a federal decision-maker, in this case the Federal Railroad Administration (FRA), to:

- Develop and describe the range of alternatives capable of achieving the purpose and need (1505.1(e)), including alternatives not within the jurisdiction of the lead agency and the No-Action Alternative (1502.14(d)); and
- Rigorously explore and objectively evaluate these alternatives, and provide reasons why the lead agency eliminated certain alternatives from further study (1502.14(a)).

This chapter describes the process through which the Proposed Action (Build) Alternatives and the No-Action Alternative for the All Aboard Florida Intercity Passenger Rail Service Project, Phase II, Orlando to West Palm Beach were identified and evaluated, and provides a detailed description of the alternatives evaluated in this Final Environmental Impact Statement (FEIS). This chapter also identifies and describes All Aboard Florida LLC's (AAF) Preferred Alternative, FRA's preferred alternative, and responds to substantive comments on the Draft Environmental Impact Statement (DEIS). Because the project is proposed by a private entity, FRA has presented AAF's preferred alternative as well as the agency's preferred alternative. As required by NEPA, FRA has reviewed the alternatives analysis, required AAF to evaluate alternatives other than the proposed action, and has verified the analyses.

The environmental impacts of each of the alternatives that were carried forward from this screening process are evaluated in Chapter 5, *Environmental Consequences*, of this FEIS.

3.1 Proposed Action

All Aboard Florida (AAF) is proposing to construct and operate a privately owned, intercity passenger railroad system that will connect Orlando and Miami. Phase I of the Project includes infrastructure improvements, stations, and initial passenger rail service from West Palm Beach to Miami. Phase I, which FRA determined has independent utility, and which was the subject of a FRA-led Environmental Assessment (EA) and finding of no significant impact (FONSI) in 2012. Because Phase I has independent utility and can be constructed without constructing Phase II, the NEPA analysis is in full compliance with federal regulations.

Phase II of the Project would extend that service to Orlando by maximizing the use of existing transportation corridors. As noted in Chapter 2, *Purpose and Need for the Proposed Action*, AAF identified its primary objective, which is to provide an intercity rail service that is sustainable as a private commercial enterprise. "Sustainable" services means that the rail operator can attract sufficient riders to meet revenue projections and operate at an acceptable profit level. The two principal components of this

objective are the basis for developing the criteria and framework for evaluating the Project alternatives. The two primary goals are to:

- Provide a reliable and convenient intercity rail service between Orlando and Miami with an approximate 3-hour trip time between the terminal stations; and
- Provide an intercity rail service that is sustainable as a private commercial enterprise. Sustainable means that the rail service can attract sufficient riders to meet revenue projections, and can operate at an acceptable profit level.

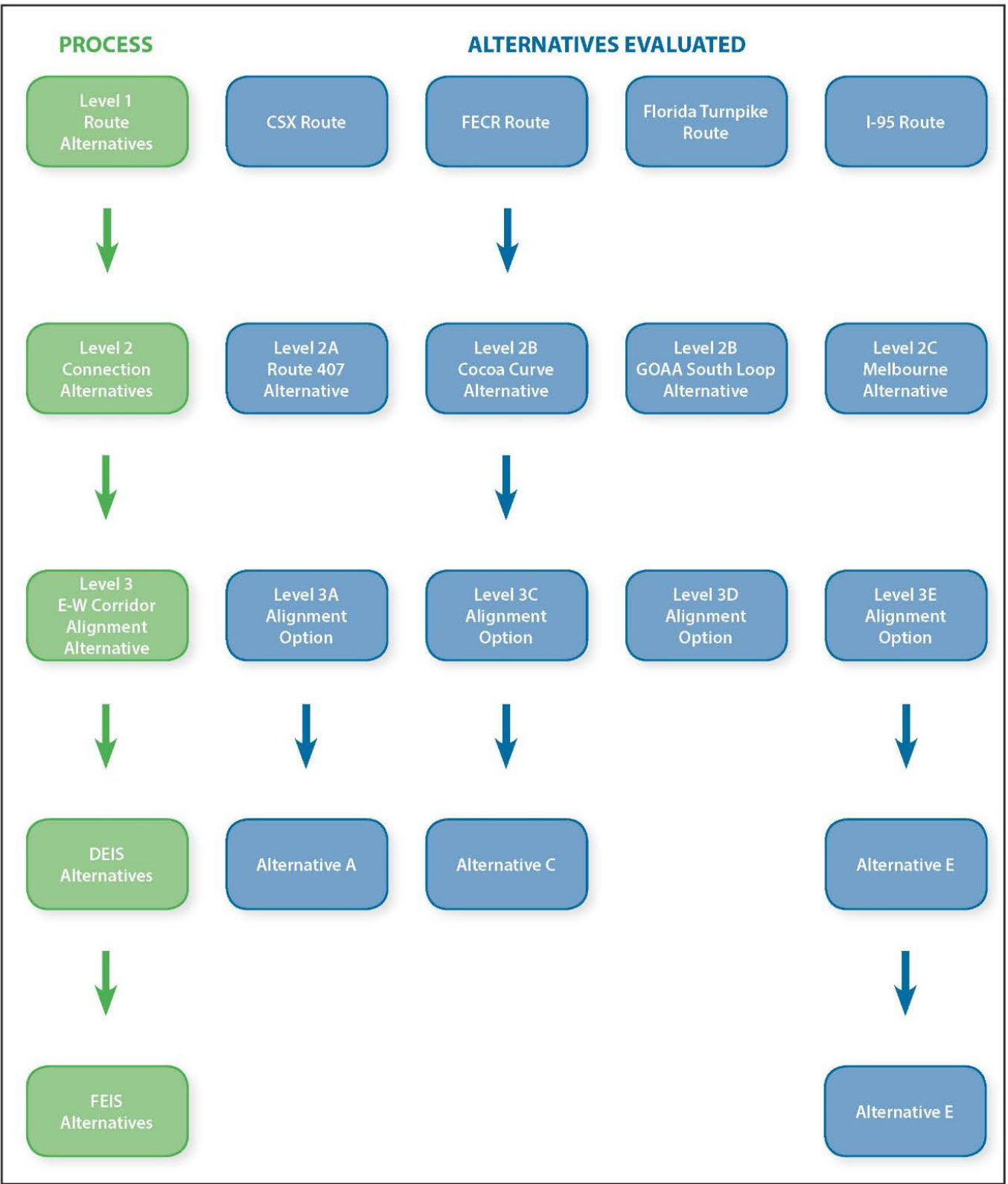
3.2 Alternatives Identification and Screening

This section describes the alternatives that were identified and developed for the Project and the criteria used to evaluate each alternative. The analysis also included a preliminary comparison of potential impacts to key environmental resources. Alternatives were identified and screened in an iterative, three-level process:

- Level 1 identified and screened overall routes connecting Orlando with the previously reviewed West Palm Beach to Miami service, and identified a preferred route alternative.
- Level 2 was more fine-grained and evaluated segment alternatives within the preferred route.
- Level 3 evaluated alternatives within one segment (the Central Florida Expressway Authority [CFX], formerly the Orlando-Orange County Expressway Authority-controlled segment of the East-West Corridor) of the preferred route.

Figure 3.2-1 shows the screening process graphically. In order to identify and consider alternatives that will satisfy the Project's purpose, including its feasibility as a private enterprise, AAF developed evaluation criteria, including six critical determining factors (Critical Determining Factors) that must be met in order for AAF to be able to proceed with the Project. These screening criteria recognize that AAF is a private enterprise that cannot rely on government operating subsidies and that does not have the authority to acquire property by eminent domain (condemnation). To be feasible as a private enterprise, AAF must be able to:

- Provide reliable and convenient intercity passenger rail transportation connecting Orlando and Miami, Florida, by extending previously reviewed passenger rail service between West Palm Beach and Miami;
- Gain access to the lands on which alternatives are proposed through viable acquisitions, leases, licenses, permits, or other arrangements that do not preclude the feasibility of the Project as a private enterprise;
- Deliver a travel time that will meet the ridership targets necessary for a sustainable commercial initiative;
- Commence construction in the near term in order to control costs, as delayed or increased construction times would add to the cost of construction and would delay initiating revenue service;



Alternatives Screening Process		
All Aboard Florida Intercity Passenger Rail Project		
		3.2-1

- Remain in close proximity to existing or planned transportation corridors in order to limit land acquisitions and related impacts; and
- Limit cost of development, including cost of land acquisitions, access, construction, and environmental mitigation.

AAF identified the alternatives at each level, and developed and applied screening criteria to determine whether each alternative was reasonable and capable of being implemented in accordance with these overall objectives. FRA has independently evaluated AAF's analysis, validated assumptions, and has prepared the following summary of the alternatives evaluation process.

3.2.1 Level 1 - Route Alternatives

AAF evaluated four route alternatives to connect the Greater Orlando Airport Authority's (GOAA) proposed Intermodal Facility at the Orlando Airport (MCO) with the West Palm Beach Station (the terminus of Phase I). These route alternatives were developed and evaluated by other entities in previous planning initiatives to connect Orlando and Miami through intercity passenger rail. The two most recent studies were the *Florida High Speed Rail Express Service from Orlando to Miami*, proposed by the Florida Rail Enterprise in 2009 (Florida Rail Enterprise 2009) as part of the American Recovery and Reinvestment Act High Speed Rail initiative, and the *Orlando-Miami Planning Study* conducted by the Florida High Speed Rail Authority in 2003 (HNTB 2003).

The four route alternatives evaluated by AAF in Level 1 were:

- The CSX Route Alternative
- The Florida's Turnpike Route Alternative
- The Interstate 95 (I-95) Route Alternative
- The Florida East Coast Railroad (FECR) Route Alternative

3.2.1.1 Screening Criteria

The primary screening criteria used at this level were developed to assess (1) whether the alternative satisfies the purpose and need of the Project, (2) whether the alternative is feasible to construct and operate (satisfies AAF's specified Critical Determining Factors), and (3) to what degree the alternative would have impacts to key environmental resources.

Access to Land

The alternatives analysis assumes that a 100-foot wide right-of-way (ROW) would be required for the rail corridor to construct a single and double-track system and to accommodate stormwater management elements, utilities, signal equipment, and maintenance roads. As AAF does not have the authority to condemn land through the use of eminent domain, it can only obtain access to property through negotiating agreements with property owners. Agreements may include lease arrangements with the owners of existing ROW or purchasing property. This criterion was evaluated based on the estimated number of properties crossed by the alternative, using a geographic information systems (GIS) analysis.

Land access contributes to the logistical feasibility of an alternative, as the number of parcels requiring acquisition is directly related to the cost of the Project and the time of execution, due to the time necessary to complete transactions. The need for land access also contributes to risk, since any party that was not willing to enter into negotiations could block construction.

Some alternatives require that AAF negotiate an agreement for perpetual access to and operation of a shared use environment with other railroads. A shared-use environment is one in which freight and passenger trains operate over the same network. Both types of trains must share common resources such as track, signaling, and traffic control facilities, as well as terms regarding dispatching and priority. The shared-use arrangement is challenging because passenger and freight trains operate at different speeds (freight trains are limited to 70 mph) and passenger trains frequently need to pass freight trains going in the same direction. This passing movement uses both tracks of a two-track line, and can interfere with movements in the opposite direction. The Train Dispatcher is responsible for determining the order in which trains will move, and for determining which train will be delayed. Although operational priority is established in the individual agreements, in practice in shared-use environments where the freight operator controls the line, passenger service is frequently delayed by freight. Amtrak's Silver Service/Palmetto line had a 66-percent on-time performance in February 2014, and 60-percent on-time performance for the previous 12 months. The primary causes of delay were train interferences (39 percent of the total delay, of which 84 percent occurred on the CSX-dispatched line) and track and signal problems (25 percent of the total delay, of which 79 percent occurred on the CSX lines) (Amtrak 2014). This low on-time performance means that, by the time a southbound train gets to Orlando, it can be anywhere between 2 and 3 hours late. Negotiating shared-use agreements presents the risk of delays to the schedule, and the risk that the controlling railroad would not agree to acceptable terms for a shared use environment. Any alternative requiring extensive acquisitions or use negotiations would have substantial cost, delay, and risk, which affect the determination of whether an alternative is commercially viable.

Commenters stated that AAF should attempt to negotiate a shared-use agreement for tracks west of the FECR Corridor. Based on the dispatching and on-time performance issues detailed above, a shared-use agreement with CSX and Amtrak would not enable AAF to provide reliable service, which would not satisfy the project purpose.

Activities associated with an alternative that could potentially delay the completion of the Project and thus increase Project costs include the need to negotiate with numerous parties for land acquisition or access as well as other uncertainties. For purposes of this screening process, access to land involves the need to obtain satisfactory railroad operating agreements, land acquisition to construct a new rail connector across West Palm Beach, land acquisition from private land owners, and leasing land within public transportation ROW.

Logistics

Logistics includes the subcategories of train signaling and control systems and route length, time, and schedule. The ability to use existing rail technology and infrastructure was an important factor in the alternatives screening process. This criterion considers the level of difficulty, costs, and risks associated with constructing an entirely new rail corridor or adapting an existing rail corridor. Constructing new at-

grade or grade-separated crossings and bridges would introduce significant costs and would not meet the purpose and need of the Project.

Train Signaling and Control Systems

The Project is subject to all regulatory requirements governing the safe operation of passenger rail. These regulations require rail signaling, control and communications systems, including the current requirement for Positive Train Control (PTC) systems (49 CFR part 236; subpart I). Corridors that currently have no signaling and control systems would require constructing and testing new systems, which would delay construction and operations of the proposed intercity passenger rail.

Route Length, Time and Schedule

The economic viability of the Project is dependent on ridership. A ridership study (Appendix 3.2.1) was used to develop ridership projections. The study determined that ridership is based on travel time, the amount of time required to reach an AAF station, and the frequency of service. Travel time is dependent on route length and operating speeds, which depend on infrastructure features such as curvature and density of development near at-grade crossings. The study also found that trip time is the most sensitive predictor of ridership, (see Section 3.5, *Ridership*). The study found that the ridership necessary for a sustainable commercial venture was obtained with a total trip time of 3 hours 15 minutes or less. Therefore, the goal for the Project is to provide an approximately 3-hour trip time, targeting travel times of less than 3 hours 15 minutes. The convenience of a reduced trip time and a reliable service is necessary in order to ensure a viable Project.

Environmental Impacts

The potential environmental impacts of each alternative were evaluated at this level based on the amount of each resource present within a 300-foot wide corridor centered on the track. This corridor includes the 100-foot ROW in which direct consequences (losses) of the resource would be anticipated, and an additional 100 feet on either side of the ROW where indirect effects to the resource could occur. This criterion serves as an estimate of potential mitigation costs, which are assumed to be proportional to the acres of wetland loss. Environmental impacts, depending on their severity and the quality of affected resources may affect Project viability.

Commenters noted that the DEIS did not consider the effects of rising sea level and storm surge in the Level 1 screening analysis. This was not a consideration in the preliminary screening because sea level rise is not anticipated to affect AAF's ability to operate within the FECR corridor. Climate change impacts are considered in Chapter 5, *Environmental Consequences*.

Wetlands and Waterways

The potential direct and indirect impacts to wetlands were estimated based on a GIS analysis, and include the acreage of wetlands within the 300-foot construction footprint (150 feet from the center line of the rail on each side) of each route alternative. Impacts to waterways at this level of the alternatives analysis were assessed based on the number of new bridges over waterways that would be required.

Commenters stated that the DEIS should have included the analysis of practicable alternatives under the Section 404 (b)(1) Guidelines, since the U.S. Army Corps of Engineers (USACE) is a cooperating agency. It should be noted the USACE will complete its Section 404 (b)(1) Guidelines analysis and public interest review in its record of decision following publication of the Final EIS.

Conservation Lands

Publicly owned conservation lands are protected under Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303). The potential direct and indirect impacts to conservation lands were assessed based on the miles of conservation land crossed by or adjacent to each alternative.

Threatened and Endangered Species

Potential direct and indirect impacts to federal- and state-listed threatened and endangered species were evaluated based on information provided by the Florida Fish and Wildlife Conservation Commission, and included:

- Bald eagle nest locations;
- Florida wood stork nesting areas;
- Florida scrub-jay habitats; and
- Recorded observations for additional federal and state listed species.

Impacts were assessed based on the number of listed species observations within or adjacent to the 300-foot corridor for each alternative. The analysis did not include plant species or aquatic species such as the West Indian manatee.

3.2.1.2 Description and Analysis of Route Alternatives

The four route alternatives would use existing transportation infrastructure to the extent feasible. The description of the CSX, Florida Turnpike, and I-95 Route Alternatives is based on information from the 2003 *High Speed Rail Study* (HNTB 2003). This study assumed that each route alternative would support high-speed rail service within a dedicated ROW adjacent to existing rail or highway ROW, to the extent feasible. The four route alternatives (Figure 3.2-2) are described below.

CSX Route Alternative

The CSX Route Alternative (Figure 3.2-2) would extend from the West Palm Beach Station to the GOAA Intermodal Station. This route would depart from the FECR ROW, require a new rail connection between the FECR and CSX corridors north of West Palm Beach (0.45 miles), and connect to the existing CSX Sanford Subdivision rail corridor. This route would follow the CSX corridor to State Route (SR) 27 west of Haines City, then follow SR 27 north to Interstate 4 (I-4) in Orlando. From I-4, the route would follow either SR 417 or SR 528 to the GOAA Intermodal Station. The southern portion assumes shared use of the existing CSX infrastructure. The northern portion would require a new dedicated ROW along the west side of SR 27, and would be constructed within the median of I-4. Property acquisition between Orlando and West Palm Beach was estimated as 1,200 acres. This route would be approximately 264 miles from

Orlando to Miami, with an estimated trip time of 3 hours and 15 minutes, not including likely delays in the shared-use environment. As stated previously, this route currently experiences low on-time performance due to the share-use environment. By the time a southbound train gets to Orlando, it can be anywhere between 2 and 3 hours late.

Based on land access, logistics, and environmental impacts, this alternative does not meet the screening evaluation criteria and is, therefore, not feasible to implement. Although portions of the CSX Route may allow a shared-use operating environment, extensive upgrades to the track, grade crossings, and infrastructure would be required. AAF does not have operating rights on the CSX portion of this route, and would have to negotiate agreements for a shared use environment. This creates increased risk of significant delays to the schedule, as well as the risk that CSX would not be willing to enter into such a transaction. In other portions of the route, AAF would need to purchase or lease land from many different public and private landowners, including properties in or immediately north of West Palm Beach for a new rail connector, which results in a substantial impact on the time required to complete construction. As previously discussed, this also substantially increases the risk that AAF would not be able to acquire all of the property required for this alternative. Due to the long trip length and speed reductions, this route alternative would not provide a trip time consistent with the ridership target needed to sustain a viable private enterprise. With respect to environmental criteria, this alternative would also result in the highest potential adverse direct and indirect impacts to wetlands and protected species, and may require acquisition of conservation land for an aggregate distance of 13 miles (AMEC 2014d).

Florida's Turnpike Route Alternative

The Florida's Turnpike Route Alternative (Figure 3.2-2), as described in the 2003 *High Speed Rail Study*, would extend from the Miami station to the GOAA Intermodal Station. This route would depart from the FECR Corridor, require a new rail connection between the FECR Corridor and Florida's Turnpike corridors north of West Palm Beach (4.5 miles), then follow the Turnpike to Boggy Creek Road south of MCO. This route would then extend north to the terminal station. This alternative assumes that a new 100-foot wide ROW would be required along most of the route, as there is insufficient land within the highway ROW to support the 2-track railroad. New ROW would also be needed to minimize curves. Property acquisition between Orlando and Miami was estimated as 2,678 acres. This route would be approximately 226 miles from Orlando to Miami, with an estimated trip time of 3 hours.

Based on land access, logistics, and environmental impacts, this alternative does not meet the screening evaluation criteria and is, therefore, not feasible to implement. Extensive new construction of track, grade crossings, and infrastructure would be required, including a completely new train signaling and control system, as this route does not currently support rail infrastructure. AAF would need to purchase or lease land from many different public and private landowners, including the Florida Turnpike Authority and private properties in or immediately north of West Palm Beach, for a new rail connector. This would result in a substantial impact on the time required to complete construction. As previously discussed, this also substantially increases the risk that AAF would not be able to acquire all of the property required for this alternative. This route alternative would provide a trip time consistent with the ridership target needed to sustain a viable private enterprise. With respect to environmental criteria, this alternative would also result in high potential adverse direct and indirect effects to wetlands (AMEC 2014d).



Explanation of Features

- FECR Corridor
- Tri-Rail
- ⋯ CSX Corridor
- - - Turnpike Corridor
- - - I-95 Corridor

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

N-S Corridor Alternatives		
All Aboard Florida Intercity Passenger Rail Project		
		3.2-2

I-95 Route Alternative

The I-95 Route Alternative (Figure 3.2-2), as described in the 2003 *High Speed Rail Study*, would extend from West Palm Beach station to the GOAA Intermodal Station. This route would depart from the FECR Corridor, require a new rail connection between the FECR Corridor and I-95 corridor north of West Palm Beach (2 miles), and follow the I-95 corridor to U.S. 192 near Melbourne, where it would diverge and follow SR 528 west to MCO. This alternative assumes that a new 100-foot wide ROW would be required along most of the route, as there is insufficient land within the highway ROW to support the 2-track railroad. New ROW would also be needed to minimize curves. Property acquisition between Orlando and West Palm Beach was estimated as 1,890 acres. This route would be approximately 229 miles from Orlando to Miami, with an estimated trip time of 3 hours. (AMEC 2014d).

Based on land access, logistics, and environmental impacts, this alternative does not meet the screening evaluation criteria and is, therefore, not feasible to implement. Extensive new construction of track, grade crossings, and infrastructure would be required, including a completely new train signaling and control system, as this route does not currently support rail infrastructure. AAF would need to purchase or lease land from many different public and private landowners, including Florida Department of Transportation (FDOT) and private properties in or immediately north of West Palm Beach for a new rail connector. This would result in a substantial impact on the time required to complete construction. Negotiating land access agreements results in a substantial impact on the time required to complete construction and substantial risk to the ability to secure access to the land required for the rail corridor. This route alternative would provide a trip time consistent with the ridership target needed to sustain a viable private enterprise. With respect to environmental criteria, this alternative would also result in the second highest potential adverse direct and indirect impacts to wetlands and protected species (AMEC 2014d).

FECR Route Alternative

The FECR Route Alternative (Figure 3.2-2), would extend from West Palm Beach Station to the GOAA Intermodal Station. From the West Palm Beach Station, the alignment would follow the FECR Corridor to Cocoa, where it would diverge and follow SR 528 west to MCO. As described in the 2003 *High Speed Rail Study*, this alternative assumes that the AAF service would operate in a shared-use environment within the FECR Corridor, and that a 60- to 100-foot wide ROW would be necessary to accommodate the track and infrastructure between the FECR Corridor and MCO. Because AAF and FECR are owned by the same company, Florida East Coast Industries (FECI), AAF has the right to develop passenger rail service within the FECR Corridor, and has negotiated an agreement for shared use of the FECR rail line. Property acquisition between Orlando and West Palm Beach was initially estimated as 418 to 423 acres. This route would be approximately 235 miles from Orlando to Miami, with an estimated trip time of 3 hours (AMEC 2014d).

Based on land access, logistics, and environmental impacts, this alternative is feasible to implement. AAF has the right to use the FECR Corridor between West Palm Beach and Cocoa. The FECR Corridor is an active freight railroad, in continuous use for over 100 years. Originally constructed with two tracks, the railroad currently operates with a single track. Bridges, signals, and railroad infrastructure are in place, but would need to be upgraded to accommodate passenger rail service, and the second track would need

to be restored. New construction of track, grade crossings, and infrastructure would be required only along the segment between MCO and Cocoa.

Some commenters noted that the FECR Route Alternative would require purchase or lease of land from more than five landowners (as stated in the DEIS) in order to construct the East-West (E-W) Corridor. Additionally, a commenter noted that conservation easements would be needed near SR 417. The E-W ROW will be within an easement or leased area based on agreements with FECR, FDOT, CFX and GOAA. The purchase of private property (44.3 acres) by AAF will be required to complete the corridor. Property has been purchased, or is under consideration for purchase, and will result in all construction conducted within the corridor ROW. Acquiring the necessary land would have a negligible effect on the time required to complete construction because these public agencies have entered into lease agreements with AAF, which are currently in escrow.

Commenters noted that the 2003 *High Speed Rail Study* concluded that the FECR Route Alternative would have the worst environmental impacts of any of the routes evaluated. However, the 2003 study evaluated an alternative with significantly different infrastructure than the proposed project, and included a completely grade-separated parallel railroad.

This route alternative would provide a trip time consistent with the ridership target needed to sustain a viable private enterprise (AMEC 2014d). With respect to environmental criteria, this alternative would also minimize potential adverse direct and indirect impacts to wetlands and protected species because it maximizes the use of the existing rail corridor. Use of the FECR Corridor would return the existing rail corridor to its prior dual-track system, and maximizes the use of existing rail infrastructure including grade crossings, bridges, and signal systems. Because AAF has the right to develop passenger rail service within the West Palm Beach to Cocoa corridor, no land access, rail access, or acquisition is required on this segment, and there is a reasonable likelihood that the Project can be completed on schedule. Use of this existing developed rail corridor would minimize impacts to environmental resources between West Palm Beach and Cocoa.

3.2.1.3 Route Alternatives Screening

The four Level 1 Route Alternatives were evaluated using screening criteria specific to the overall Project objectives and the level of design available for these routes. This section describes the screening criteria and how the criteria were applied to identify a preferred route. Table 3.2-1 presents the results of the Level 1 screening analysis. Shaded cells indicate that the alternative does not satisfy the screening criterion. As shown in Table 3.2-1, the CSX, Florida's Turnpike, and I-95 Route Alternatives do not meet the overall screening criteria.

Many commenters suggested that the alternatives analysis presented in the DEIS was flawed, and that a more westerly route—the CSX, Florida Turnpike, or Interstate 95 corridor—should have been selected rather than the FECR railroad corridor. Many noted that the FECR Route Alternative along the coast travels through densely populated and environmentally sensitive areas, compared to a westerly route. Many commenters believe a westerly route would have a smaller effect on the quality of life and economic vitality of Florida residents because it would travel through areas of lower population density.

		Alternative			
Criterion	Metric	CSX	Florida Turnpike	I-95	FECR
Land Access	Requires new rail connector across West Palm Beach	Yes ⁴	Yes	Yes	No
	Requires RR operating agreement for shared use	Yes	No	No	Yes ⁵ (in place)
	Requires land from private landowners	Substantial (1,556 parcels)	Substantial (211 parcels)	Substantial (743 parcels)	Minor (44 acres)
	Requires lease from public transportation agencies	Yes	Yes	Yes	Yes (in place)
Logistics					
Use of Existing Infrastructure	Does the alternative use existing infrastructure?	Partially ⁶	No	No	Partially ⁶
Train Signaling and Control Systems	Does the alternative have a rail signal and control system in place?	Partially ⁶	No	No	Partially ⁶
Route Length and Time	Does the alternative meet the target travel time (3 hrs. 15 min. or less)?	264 miles Time > target	226 miles Time = target	229 miles Time = target	235 miles Time = target
Environmental					
Wetlands and Waterways ¹	Amount of resource directly or indirectly affected	268 acres	243 acres	272 acres	188 acres
Conservation Lands ²	Amount of resource potentially affected	13 miles	9 miles	12 miles	0 miles
Threatened and Endangered Species ³	Number of habitats directly or indirectly affected	14	10	3	11

Source: AMEC 2014d, *Addendum to Technical Memorandum 3, Screening Analysis for Alternatives Identification*.

1 Within a the construction footprint (100-feet wide for new track)

2 Miles crossed or adjacent to the alternative

3 Within a 300-foot corridor centered on the track

4 This is already programmed in the FDOT District 4 work program and will be built regardless of this Project.

5 This cell is not shaded because AAF and FECR are owned by the same company, FECL, and AAF has negotiated an agreement for shared use of the FECR rail line.

6 Partially indicates that these alternatives have at least some existing infrastructure that could be used in the Project. For example, both CSX and FECR have existing N-S railroads, and some railroad segments with signaling / control systems.

Because AAF is a for-profit private enterprise, alternatives were evaluated primarily in the light of whether they could be constructed and operated in accordance with AAF's financial model. AAF selected the alternative that would deliver the targeted ridership and that would have acceptable construction and operating costs. AAF selected the FECR Corridor as the preferred Level 1 alternative because this

presented the most favorable construction and operating costs, with trip times that are predicted to yield high ridership.

The CSX Route Alternative does not meet the Project purpose. Trip times would exceed the 3-hour 15-minute target. AAF does not have operating rights needed for the CSX route, which would also require extensive upgrades to the track, grade crossings, and new infrastructure. AAF would also need to purchase or lease land from many different public and private landowners. Because of the considerable number of private land acquisitions, the Project could not be constructed in a reasonable time frame and would not be feasible if AAF was unable to purchase these properties. Because it requires an operating agreement with CSX, there is a potential that an acceptable operating agreement would not be developed and this route would not be feasible. In addition, the CSX Route Alternative would have the second-highest level of wetland loss based on wetland acreage.

The CSX route alternative would also result in the highest potential adverse direct and indirect impacts to protected species, and may require acquisition of conservation land for a total distance of 13 miles. Due to land access, logistics, and environmental impacts, the CSX Route Alternative is not feasible to implement.

The Florida Turnpike Route Alternative does not meet the Project purpose. The Florida Turnpike Route Alternative would require a new 100-foot wide ROW along most of the route, as there is insufficient land within the highway ROW to support the 2-track railroad. AAF would need to purchase or lease land from many public and private landowners, including the Florida Turnpike Authority. Because of the substantial number of private land acquisitions, the Project could not be constructed in a reasonable time frame and would not be feasible if AAF was unable to purchase these properties. This alternative would require new tracks, grade crossings, and infrastructure. AAF would need to bridge over, or tunnel under, each of the existing highway interchanges. Because it requires entirely new rail infrastructure, signal and control systems, this alternative would not be feasible. In addition, the Florida Turnpike Route Alternative would have the third-highest level of wetland loss based on wetland acreage. For these reasons, the Florida Turnpike Route Alternative is not feasible to implement.

The I-95 Route Alternative does not meet the Project purpose. AAF would need to purchase or lease land from many public and private landowners, including FDOT. Because of the substantial number of private land acquisitions, the Project could not be constructed in a reasonable time frame. This alternative would not be feasible if AAF was unable to purchase these properties. The I-95 route would require new tracks, grade crossings, and infrastructure. AAF would need to bridge over, or tunnel under, each of the existing highway interchanges, substantially increasing construction costs. Because it requires entirely new rail infrastructure, signal and control systems, this alternative would not be feasible. In addition, the I-95 Turnpike Route Alternative would have the highest level of wetland loss, and would have high direct and indirect effects to protected species. For these reasons, the I-95 route is not feasible to implement.

The FECR Route Alternative meets the Project purpose. Trip times would meet the 3-hour target. Because of the small number of private land acquisitions, the Project could be constructed in a reasonable time frame and would be feasible. Because it does not require entirely new rail infrastructure, signal and control systems, this alternative would be feasible. In addition, the FECR Alternative would have the lowest level of wetland loss based on wetland acreage, although impacts to threatened and endangered species habitats could be greater than for the Florida's Turnpike and I-95 alternatives.

AAF evaluated alternatives under the primary screening criteria of meeting the purpose and need, feasibility to construct and operate, and impacts to the environment. Because AAF is a for-profit private enterprise, alternatives were evaluated primarily in the light of whether they could be constructed and operated in accordance with AAF's financial model. AAF selected the alternative that would deliver the targeted ridership and that would have acceptable construction and operating costs. AAF selected the FECR Corridor as the preferred Level 1 Route Alternative because this presented the most favorable construction and operating costs, with trip times that are predicted to yield high ridership. The FRA has reviewed AAF's analysis and validated the conclusions. The USACE will complete its Section 404 (b)(1) Guidelines analysis and public interest review in its record of decision following publication of the Final EIS.

3.2.2 Level 2 – Corridor Connection Alternatives

The FECR Route Alternative (connecting Orlando at the proposed GOAA Intermodal Station to the proposed AAF West Palm Beach Station) consists of a sequence of connected segments. The segments include the western terminus at MCO (the MCO Segment), the East-West Corridor (E-W Corridor), the connection between the E-W and the North-South Corridors (E-W/N-S Connector), and the North-South Corridor (N-S Corridor). The N-S Corridor consists of the existing FECR Corridor.

The four alternatives described and evaluated in this section assume use of the E-W Corridor and the N-S Corridor, and differ in two locations: the alignment that connects the MCO terminus with the E-W Corridor, and the alignment that connects the E-W Corridor with the N-S Corridor.

3.2.2.1 Level 2 Screening Criteria

The screening criteria used for the Level 2 analysis are the same as used in the Level 1 Route Alternatives screening process. Three criteria, Time of Execution, Cost of Construction and Engineering Design, and Grade Crossings/Bridges, were added to help refine the analysis.

Time of Execution

The timing and duration of construction is an important consideration in evaluating feasibility as a private enterprise, as delayed or increased construction times would add to the cost of construction and would delay initiating revenue service.

At-Grade Crossings and Railroad Bridges

The alternatives analysis considers the number of existing at-grade crossings that would have to be modified and the number of new at-grade crossings that would need to be constructed where a grade-separated crossing was not feasible or necessary. The total number of at-grade crossings would potentially impact train speeds as trains must reduce speeds in some areas with at-grade crossings. New at-grade crossings would add to the Project cost and would impact traffic on local roads. Improvements or widening of existing at-grade crossings would also impact Project cost. The number of at-grade crossings for each alternative was estimated using GIS mapping.

The alternatives analysis also considers the number of new bridges over waterways or highways that would be required for each alternative. Bridge construction would impact Project cost and schedule, as

bridges require longer construction time than at-grade railroad infrastructure. The number of new or modified bridges associated with each alternative was estimated using GIS mapping. For the FECR Corridor, the analysis includes those existing bridges that would require modification or replacement.

3.2.2.2 Alternative Level 2A – SR 407 Alternative (Connection Alternative 1A)

Alternative 2A (Figure 3.2-3) consists of four segments. The AAF tracks would originate at the proposed Vehicle Maintenance Facility (VMF) location, extending north to the proposed GOAA Intermodal Station at the future MCO South Terminal. From the GOAA Intermodal Station, the alignment would parallel the North Airport Boulevard through the airport, cross under the North Crossfield Taxiway and the Mid Crossfield Taxiway (both of which were designed and constructed to accommodate a transit line). The alignment would curve to the east and would parallel SR 528. All land for the railway alignment would be leased from GOAA and FDOT. The E-W Corridor would parallel SR 528 on the south side. The rail line would turn north off of the SR 528 ROW at the Challenger Memorial Parkway interchange. Connection Alternative 2A would then proceed northeast, cross over SR 407, and travel along the eastern ROW of SR 407. It would transition from SR 407 to the Orlando Utilities Commission (OUC) transmission line corridor. Alternative 2A would follow the transmission line northeast to Delespine, Florida and then transition in a generally southeast direction onto the FECR Railway (N-S Corridor) at milepost (MP) 160.5.

3.2.2.3 Alternative Level 2B – Cocoa Curve (Connection Alternative 1B)

Alternative 2B, the Cocoa Curve Connection, would be the same as Alternative 2A from MCO through the E-W Corridor. It would follow the SR 528 ROW to the Industry Road interchange. At this point, the alignment would rise up on an embankment, cross Industry Road via a bridge, return to grade and cross under SR 528 to the south side at the interchange with U.S. 1 and merge with the N-S Corridor at MP 167 (Figure 3.2-3).

3.2.2.4 Alternative Level 2B – with GOAA South Loop Alternative (Connection Alternative 1C)

Another alternative was developed based on a modification of Alternative 2B. The GOAA South Loop would leave the GOAA Intermodal Station to the south, partially on new alignment, parallel SR 417, and use the existing OUC freight tracks. This rail line would connect with the E-W Corridor just west of the SR 528 and Econlockhatchee River crossing (Figure 3.2-3). The remaining sections of this alternative would be identical to the other Alternative 2B.

The GOAA South Loop Alternative would place the passenger trains on the existing OUC freight tracks. OUC uses this railroad to transport coal to the power plant north of SR 528. This would mean that AAF would need to operate in a shared use environment, affecting the operation and speed at which AAF's passenger trains would be able to travel. Speed is critical in this area in order to achieve the overall travel times that are targeted for the Orlando to Miami trip. The GOAA South Loop Alternative would use OUC's existing rail corridor from south of the GOAA property up to the International Corporate Park (ICP) Boulevard. The existing curved OUC alignment restricts train speeds and can only accommodate approximately 60 mph average speeds in this stretch, without further land acquisition to straighten the curves. In order for AAF to use the OUC tracks, AAF would need to negotiate an access and operating agreement, including terms regarding the manner in which freight and passenger trains would share track, signaling, and traffic control facilities as well as terms regarding dispatching and priority.



Explanation of Features

- E-W Corridor (SR 528)

Connection Alternatives

- ⋯ Alternative 1A (SR 407)
- · - Alternative 1B (Cocoa Curve)
- - - Alternative 1C (Melbourne South Loop)
- N-S Corridor (FEC Corridor)
- - - MCO Segment
- ⋯ GOAA South Loop
- Proposed Station (By Others)

Corridor Connection Alternatives		
All Aboard Florida Intercity Passenger Rail Project		
		3.2-3

Data Sources: 2012 ESRI, AAF 2012, AMEC 2012

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The need for such an agreement that would be mutually acceptable to both AAF and OUC presents risks to the Project, including schedule, cost, and overall feasibility.

The total length of the segment from ICP Boulevard to the proposed VMF is 12.2 miles rather than 12.5 miles to the proposed GOAA Intermodal Station. There are approximately eight existing roadway grade crossings along the GOAA South Loop Alternative that would require grade-separated crossings (road bridging over rail) due to high traffic volumes. The alignment and grade separations would require ROW access from about 100 parcels with this alternative. The rail alignment passes near several residential communities, and AAF considers that there is a substantial potential for opposition from these communities that increases risk for the Project.

This alternative is not consistent with GOAA's future plans (GOAA 2012a, 2012b, 2013). GOAA's planned multi-modal connections incorporate the OUC railroad to provide commuter rail and light rail to the Lake Nona Medical City, University of Central Florida, and other destinations. The combined use of the OUC corridor for freight, passenger, commuter, and light rail would require substantial infrastructure modifications and the crossing movements at the intermodal station would present operational and safety concerns.

3.2.2.5 Alternative Level 2C – Melbourne South Loop Alternative

Alternative 2C, the Melbourne South Loop, would be the same as Alternative 2B from MCO through the western portion of the E-W corridor (Figure 3.2-3). It would diverge from the SR 528 ROW west of the SR 520 interchange, approximately 1.5 miles east of the Dallas Boulevard interchange, cross through private property, and connect with the N-S Corridor in Melbourne. The proposed alignment was developed to follow existing transportation and utility infrastructure to the extent possible, and to minimize impacts to environmental resources. The route would follow a southerly alignment and then turn east to parallel the north side of Nova Road. The route would continue east, cross the St. Johns River and then turn south to parallel the west side of I-95 before curving east to cross over I-95 and a proposed new interchange for Ellis Road.

The portion of this alternative on private land is approximately 45.6 miles long and results in an overall routing that is 3.3 miles longer than Alternative 2B between the same beginning and ending points due to the circuitous routing of the alignment that would be necessary through private properties. These curves would restrict speeds to 60 mph.

The Melbourne South Loop (Alternative 2C) is estimated to increase travel time by approximately 12 minutes over other connection alternatives due to the need for reduced speeds at grade crossings and curves.

3.2.2.6 Level 2 Alternatives Evaluation

Table 3.2-2 presents the results of the Level 2 screening analysis. Shaded cells indicate that the alternative does not satisfy the screening criterion. As shown in the table, Level 2 Alternative 2A does not meet the Project purpose because it would not deliver a trip time of less than 3 hours 15 minutes, and because it could not be constructed in the short-term. Because of the substantial number of private land acquisitions, this alternative could not be constructed in a reasonable time frame and would not be feasible if AAF was

unable to purchase these properties. This alternative has the -highest wetland impacts based on acres of wetland lost.

Criterion	Metric	2A	2B	2B GOAA	2C
Time of Execution	Can the alternative be constructed in the near-term?	No	Yes	No	No
Logistics					
Land Access	Number of landowners	279	5	100	63
At-Grade Crossings	Number of new or extended crossings	8	0	8 (existing)	16
Bridges	Number of new or reconstructed bridges over waterways/over roads	27/10	27/10	27/8	26/37
Route Length and Time	Does the alternative meet the target travel time (3 hrs. 15 min. or less)?	248 miles Time> target	235 miles Time= target	233 miles Time>target	238 miles Time>targ et
Environmental					
Wetlands and Waterways ¹	Amount of resource directly or indirectly impacted	243 acres	188 acres	226 acres	227 acres
Conservation Lands ²	Amount of resource potentially impacted	7 miles	5 miles	9 miles	5 miles
Threatened and Endangered Species ¹	Number of habitats directly or indirectly impacted	33	16	22	16

Source; AMEC 2014d, *Addendum to Technical Memorandum 3, Screening Analysis for Alternatives Identification*.

1 Within a 300-foot corridor centered on the track

2 Miles crossed or adjacent to the alternative

Alternative 2B meets the Project purpose because it would deliver a trip time of less than 3 hours 15 minutes, and because it could be constructed in the short-term. Because of the few private land acquisitions, this alternative could be constructed in a reasonable time frame and would be feasible because AAF has secured agreements to purchase these properties. This alternative has the lowest wetland impacts based on the acres of wetland loss.

Alternative 2B with GOAA South Loop does not meet the Project purpose because it would not deliver a trip time of less than 3 hours 15 minutes, and because it could not be constructed in the short-term. Because of the substantial number of private land acquisitions, this alternative could not be constructed in a reasonable time frame and would not be feasible if AAF was unable to purchase these properties. This alternative has the third-highest wetland impacts based on the acres of wetland loss.

Alternative 2C does not meet the Project purpose because it would not deliver a trip time of less than 3 hours 15 minutes, and because it could not be constructed in the short-term. Because of the

substantial number of private land acquisitions, this alternative could not be constructed in a reasonable time frame and would not be feasible if AAF was unable to purchase these properties. This alternative has the second highest wetland impacts based on the acres of wetland loss, would result in substantial habitat fragmentation along the new alignment route.

3.2.3 Level 3 Screening – East-West Corridor Alignment Options

The FECR Route Alternative (Alternative 2B) described above would follow the SR 528 alignment between MCO and the FECR Corridor, maximizing the use of existing transportation infrastructure. Several variations of this route—the E-W Corridor—were developed based on the existing ROW and adjacent land uses, as well as the future development plans of the transportation agencies. Based on these considerations, AAF determined that new rail could be accommodated within the FDOT-controlled segment of SR 528, west of the SR 520 interchange, and that a lease of the FDOT ROW was feasible. This within-ROW alignment minimizes impacts to natural and social resources. From MCO to SR 520, SR 528 is controlled by CFX, and is largely bordered by undeveloped land to the south. Level 3 evaluates the E-W Corridor alignment options developed within the CFX segment (SR 417 to SR 520) to evaluate alternatives which would minimize environmental impacts and which were compatible, to varying degrees, with future plans for highway improvement.

3.2.3.1 Screening Criteria

Two additional criteria were used to screen the E-W Corridor alignment options. These criteria, Stakeholder (Planning) Consistency and stormwater management (as a subcategory of Logistics) are unique considerations at this level of evaluation, and are relevant to the determination of practicability.

Planning Consistency

This criterion evaluates the extent to which each alternative for the E-W Corridor (parallel to SR 528) is consistent with the plans of transportation stakeholders and other adjacent property owners.

Portions of the E-W Corridor are within the jurisdiction of GOAA, CFX, and FDOT, each of which has plans for future expansion and operation. The feasibility of each alternative must be evaluated based on the compatibility of the alignment with stakeholder plans. Alternatives that are consistent with the plans of each entity could be accomplished through access agreements or leases, within the current or future ROW of each transportation agency, and would not require negotiating land purchase with numerous property owners outside of the transportation ROW. As previously discussed under Logistics, the number of parcels to be acquired affects costs and schedule, and presents a risk that owners could block construction by refusing to sell. Specific agency plans are described below.

- GOAA has plans to develop the eastern portion of the property. GOAA's proposed East Airfield Development Area would develop all of the area south of SR 528 and west of North Narcoossee Road for aircraft support (hangars, cargo, and maintenance facilities), airport support, stormwater management, and a fuel farm (GOAA 2009).

- CFX’s plan to expand SR 528 includes additional lanes to the outside so that it is in total an 8-lane roadway with an open median, and adding or modifying eight interchanges. CFX has already expanded two mainline toll plazas to accommodate the future widening (OOCEA 2008).
- FDOT’s plan to expand SR 528 east of SR 520 includes widening by an additional one to two lanes, creating a four- to six-lane roadway in total, partially toward the median and partially to the outside.

Each E-W Corridor Alignment Option was evaluated based on consistency with future plans, as well as the willingness of these transportation entities to assume certain costs of completion, operation, or maintenance of facilities such as bridges or interchanges. An alternative is reasonable and practicable only where the controlling entity (GOAA, CFX, or FDOT) is willing to accept the location or added cost of an alternative.

In addition to planned transportation improvements of these three agencies, AAF has considered current and future development plans of adjacent property owners.

Logistics

Additional logistical considerations in the Level 3 alternatives analysis for the E-W Corridor include stormwater management.

Stormwater Management

Stormwater management systems are required to capture and treat runoff during and after construction. Where an alignment option is close to the existing highway, the existing stormwater system may be able to accommodate the runoff from the railroad as well as both existing and planned future highway facilities. Options that are farther from the existing highway would require new separate stormwater systems that would increase the cost and complexity of construction and future maintenance.

3.2.3.2 Alignment Option 3A

E-W Corridor Alignment Option 3A would construct a new 60-foot wide rail line within the SR 528 ROW east of SR 417 (Figures 3.2-4 and 3.2-5). The 60-foot ROW would accommodate two tracks, but would not include a parallel access road for maintenance of the rail alignment, as the rail line could be reached from SR 528. Land required to construct Option 3A would be leased from CFX and FDOT. However, since the publication of the DEIS, CFX has evaluated this alternative and finds that it is not feasible. This alignment would require extensive retaining walls and bridges in order to minimize its footprint and accommodate existing and future SR 528 infrastructure without extending outside the ROW. Option 3A requires bridge viaducts to cross eight interchanges, with extensive bridging and elevated facilities. These complex components would increase design time, construction time, and costs.

In a letter to FRA (December 3, 2014, Appendix 3.2.3), CFX stated that Alignment Option 3A (referred to as Alternative A) “...could potentially impact the future operations and expansion of SR 528.”

Additionally, “The Authority would not grant permission for this option.” Based on CFX’s comments, Alignment Option 3A is not feasible to construct.

Although several agencies (U.S. Environmental Protection Agency, National Marine Fisheries Service, and the Florida Environmental Protection Department) indicated that Alignment Option 3A would have the least environmental impacts; therefore would be their environmentally preferred alternative, it is not feasible to construct because the land is not available to AAF.

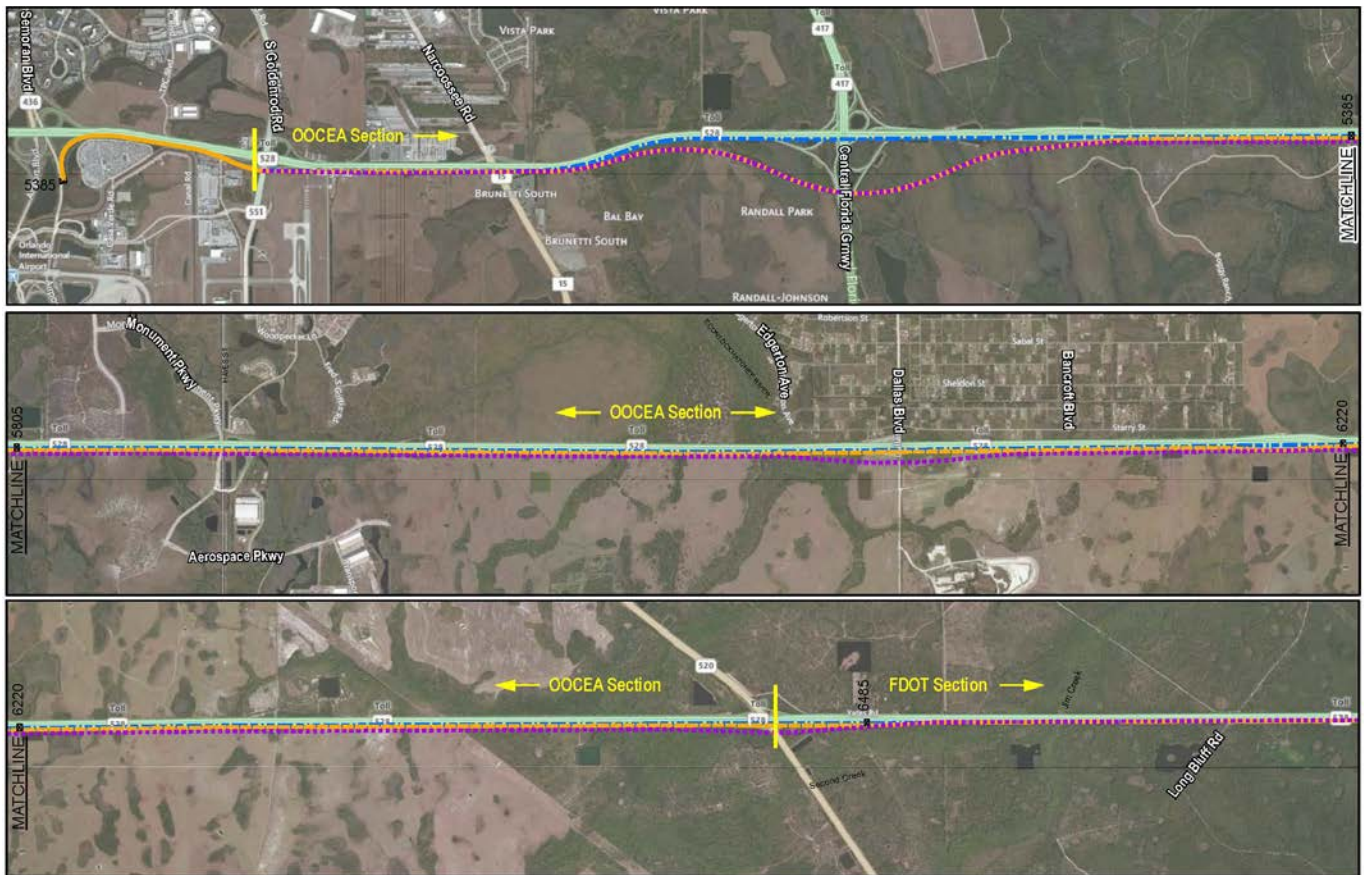
3.2.3.3 Alignment Option 3C

E-W Corridor Alignment Option 3C would create a new 100-foot wide rail alignment (in order to construct two tracks and a parallel maintenance access road) that “straddles” the SR 528 southern ROW line within the CFX segment, with approximately 10 feet of the proposed rail line width within the ROW and approximately 90 feet of the rail line width south of the ROW (Figures 3.2-4 and 3.2-5). This alternative would include a parallel access road for maintenance of the rail alignment. CFX would acquire the land, which would then be leased by AAF. According to AAF, Option 3C would not preclude future expansion of SR 528. Within the FDOT segment, Option 3C would be identical to Option 3A. Option 3C requires bridge viaducts to cross eight interchanges, with extensive bridging and elevated facilities. These complex components would increase design time, construction time, and costs. A minor variant of this alternative (Option 3B) was developed during early planning, but was dismissed by AAF because the interchange configurations were not acceptable to CFX and were not compatible with CFX’s future expansion plans.

AAF has secured lease agreements with FDOT that would allow the construction of Option 3C; however, since the publication of the DEIS, the CFX Board determined that it is not feasible to construct because “...locating the tracks within the 528 right of way will limit the Authority’s future opportunities for maintaining and expanding its system and possibly result in increased costs.” (Appendix 3.2.3). Therefore, FRA has determined that Option 3C is not reasonable or feasible to construct.

3.2.3.4 Alignment Option 3D

E-W Corridor Alignment Option 3D represents a new rail line location with an alignment separated from the SR 528 ROW for 17.4 miles (parallel to SR 528) within the CFX segment of SR 528. Under Option 3D, the proposed 100-foot wide E-W Corridor (in order to construct two tracks and a parallel maintenance access road) would be located approximately 400 feet south of the SR 528 southern ROW boundary line. Within the FDOT segment, Option 3D would be identical to Option 3A. Within the CFX segment, the adjacent property owners have stated that they would not be willing to sell this land to AAF.



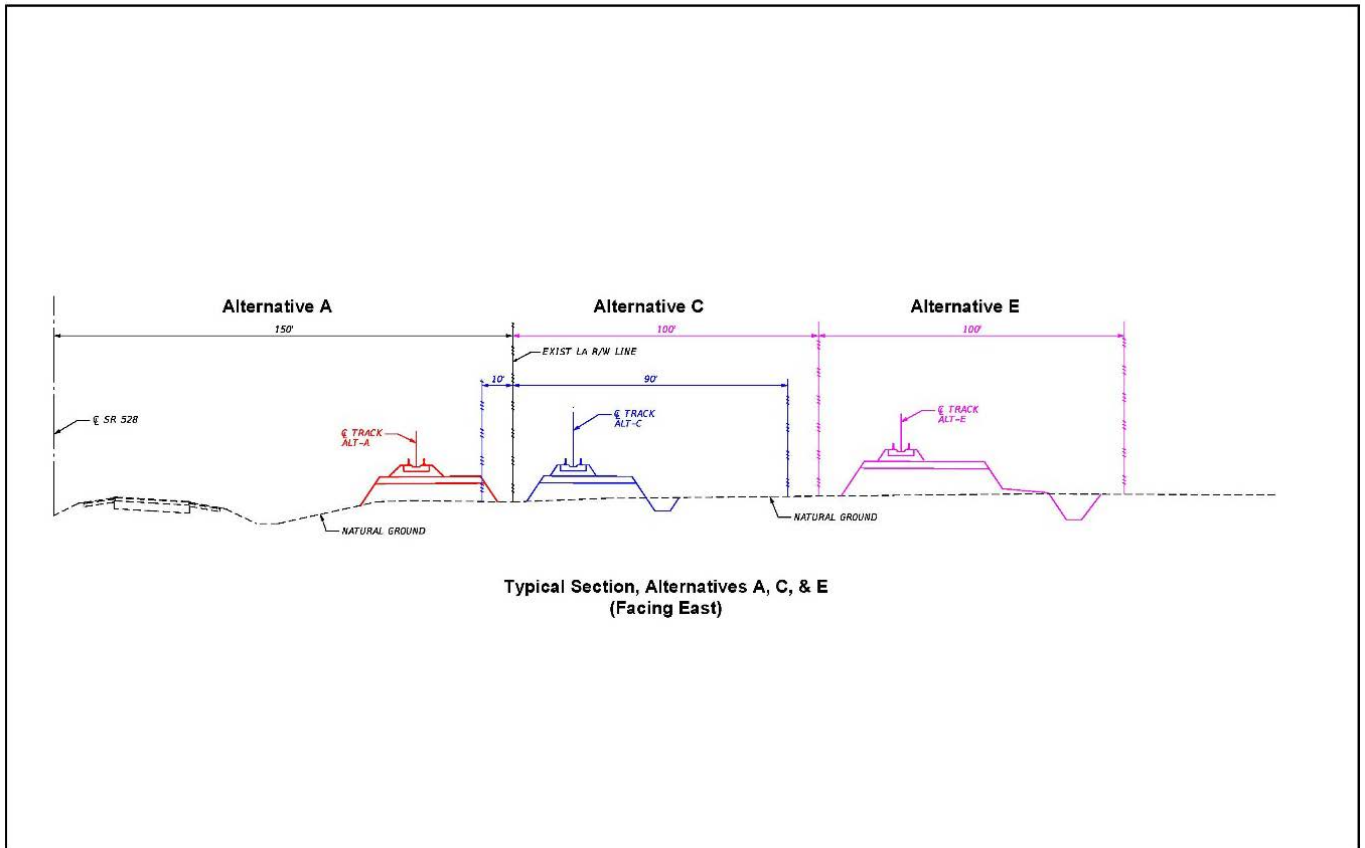
- Explanation of Features**
- E-W Corridor - Alternative A
 - E-W Corridor - Alternative C
 - E-W Corridor - Alternative E
 - MCO Segment

Data Sources: ESRI 2012, NVM 2012, AMEC 2013

CFX Section of the E-W Corridor, Alignments Alternatives A, C, and E		
All Aboard Florida Intercity Passenger Rail Project		
		3.2-4

3.2.3.5 Alignment Option 3E

E-W Corridor Alignment Option 3E would be located on average between 100 and 200 feet south of the southern edge of the existing SR 528 ROW with the exception of two interchanges (Figures 3.2-4 and 3.2-5). At the Dallas Boulevard interchange the proposed rail line would be approximately 700 feet south of the current SR 528 ROW. This option would include a parallel access road for maintenance of the rail alignment. At the SR 520 interchange the proposed rail line would be approximately 500 feet south of the current SR 528 ROW. The Option E alignment would be an average of 100 feet wide in order to construct two tracks and a parallel maintenance access road. Land required to construct Option E would be leased from CFX and FDOT. CFX would acquire the land south of the existing ROW limits to accommodate future highway widening and a transit corridor, and would lease an approximately 100-foot wide strip to AAF. AAF would secure lease agreements with FDOT and CFX that would allow the construction of Option 3E, provided CFX was able to acquire all of the necessary property. Option 3E would not preclude future expansion of SR 528. Within the FDOT segment, Option 3E would be identical to Option 3A. Because Option 3E is substantially south of SR 528, it would not require crossing the eight interchanges along SR 528 and would be primarily constructed at-grade within the CFX segment. This would reduce design and construction time, as well as construction costs. Alignment Option 3E is therefore feasible to construct because AAF has access to the required land.



Typical Section, Alignment Alternatives A, C, & E within CFX Section		
All Aboard Florida Intercity Passenger Rail Project		
NTS		3.2-5

3.2.3.6 Summary – East-West Alignment Options

Table 3.2-3 provides a summary of the East-West corridor screening analysis. Based on this analysis, Alignment Option 3D was dismissed from further consideration because it would require a significant amount of land acquisition from private entities that have indicated that they are not willing to sell the land. Therefore, Option 3D is not a feasible option. Alignment Option 3D would also have the highest amount of wetland impacts. Alignments 3A, 3C and 3E were retained for additional analysis. However, since the publication of the DEIS, CFX has evaluated these alternatives and determined that it would not grant authorization/right-of-way to AAF to construct Alignment Options 3A and 3C (Appendix 3.2.3). FRA has therefore determined that these are not reasonable or feasible because they are not available to AAF.

Criterion	Metric	3A	3C	3D	3E
Cost of Construction	Estimated Cost	\$1.5B	\$1.5B	\$1.4B	\$1.4B
Time of Execution	Can the alternative be constructed by 2016?	No ¹	No ¹	No ²	Yes
Planning Consistency	Consistency with plans of transportation agencies and landowners	Yes	Yes	No	Yes
Logistics					
Land Access	Can access be secured by project start date?	No	No	No	Yes
Stormwater Management	Is a new separate stormwater system required?	No	No	Yes	Yes
Bridges	Number of new or reconstructed bridges over roads	37 ³	37	34	34
Route Length and Time	Does the alternative meet the target travel time (3 hrs. 15 min. or less)?	235 miles Time=target	235 miles Time=target	235 miles Time=target	235 miles Time=target
Environmental					
Wetlands and Waterways	Amount of resource directly affected	130 acres	167 acres	178 acres	160 acres
Conservation Lands ⁴	Amount of resource potentially affected	5 miles	5 miles	5 miles	5 miles

Source: AMEC 2014d, Addendum to Technical Memorandum 3, Screening Analysis for Alternatives Identification.

- 1 Construction time extended due to bridges
- 2 Construction time extended due to land acquisition
- 3 Values are for the entire Alternative, Orlando to Miami
- 4 Miles crossed or adjacent to the alternative

3.2.4 Vehicle Maintenance Facility Alternatives

The Project includes a dedicated VMF located at the northern terminus of the route (Figure 3.2-6). AAF evaluated two sites: the proposed site, located on GOAA property south of MCO, and a second location along SR 528 east of Dallas Boulevard.



Explanation of Features

- Proposed VMF Layout
- Limit of Lease Area

Data Sources: ESRI 2012, NVM 2012, AMEC 2013

Proposed VMF Layout		
All Aboard Florida Intercity Passenger Rail Project		
		3.2-6
Path: F:\FECI\FECI_GDB\WKD\GIS\WMA\Location_KJS_Rev1.mxd		

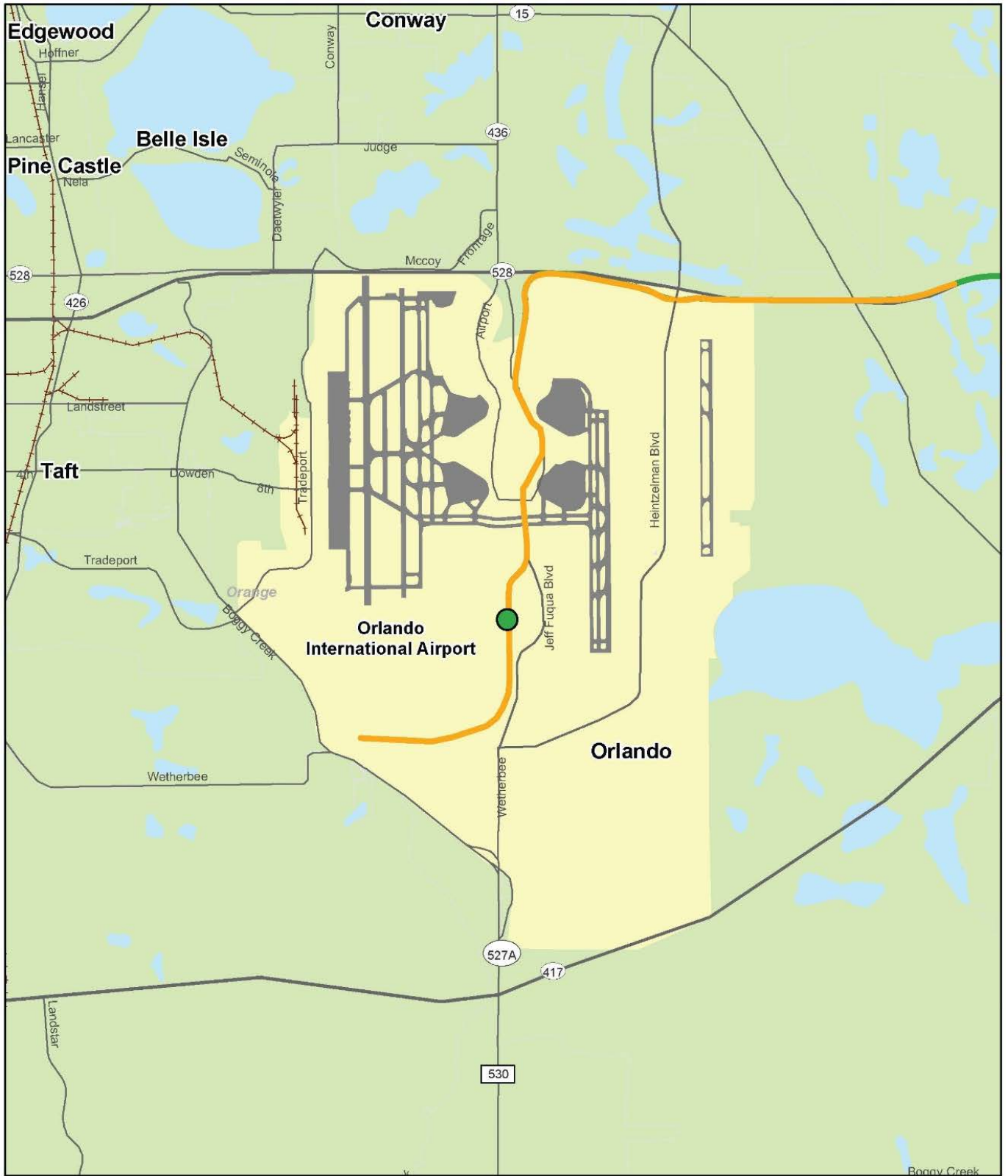
AAF selected the GOAA site because it would be consistent with future plans by GOAA and others for SunRail and other commuter rail systems, as well as be consistent with future expansion plans for the airport (GOAA 2012a, 2012b, 2013). The site is less than 2 miles from the GOAA Intermodal Facility, and would minimize non-revenue trip costs between the VMF and the station. GOAA has already secured wetland permits for portions of the proposed site (USACE 1996), and all necessary utilities are already available at the site. Based on cost, logistics, and environmental impacts, this alternative is feasible to implement.

A site along the south side of SR 528, east of Dallas Boulevard, was proposed by an abutting landowner. This site is 16 miles from the GOAA Intermodal Station, and would result in increased non-revenue costs to move empty trains between the VMF and the station at the start and end of each run. This site would require fill of approximately 67 acres of wetland, and the only available utility is electricity. Due to the distance from fuel providers, an on-site fuel tank farm (propane, diesel, and other required fuels) would be needed. Previous subsurface investigations showed that sections of this site have unsuitable muck subsoils that would require removal and replacement with suitable structural fill materials. This alternative would have substantially higher costs, logistic problems, and environmental impacts than the GOAA site and was, therefore, dismissed.

3.2.5 Station Alternatives

The Project includes one station between Orlando and West Palm Beach, the proposed GOAA Intermodal Facility that is being planned and constructed by GOAA (Figure 3.2-7). According to GOAA, work on this facility has begun and construction is expected to be completed in 2018. AAF selected this location because it would be consistent with GOAA's plans for future intermodal connections, including connections to the airport's People Mover system. AAF determined that no other location with the same intermodal connectivity is available in Orlando. A site in downtown Orlando would add travel time, and would not deliver the approximately three-hour trip time required to meet the ridership targets necessary for a sustainable commercial initiative. Additional stations along the N-S Corridor (for example, Cocoa, Melbourne, or Fort Pierce) were not considered because any additional stations would increase travel time between Orlando and Miami to an unacceptable duration of greater than 3 hours 15 minutes. A duration of less than 3 hours 15 minutes is required to ensure sustainable rail service. However, the Project would not preclude future stations.

Commenters objected that communities along the "Treasure Coast" north of West Palm Beach would experience negative effects of increased passenger rail traffic (noise, bridge closures, grade crossing delays and traffic congestion, etc.) but receive none of the benefits of convenient travel, potential jobs from transit-oriented development, tourism, etc. of nearby passenger rail station stops. Many commenters requested that AAF provide stations along the N-S Corridor between West Palm Beach and Cocoa.



Explanation of Features

- E-W Corridor
- MCO Segment
- Proposed MCO Intermodal Station

Data Sources: 2012 ESRI

MCO Intermodal Station Location		
All Aboard Florida Intercity Passenger Rail Project		
		3.2-7

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Project # 0003-12-0212

AAF has no plans in place at this time to provide direct passenger rail service to Martin, St. Lucie, or Indian River counties through the construction of stations and the use of regular, intermittent or skip-stop service. A major criterion for success of the AAF rail service is ridership. The ridership study (Appendix 3.2.1) indicated a rail service trip time of 3 hours 15 minutes or less between Miami and Orlando is one of the most critical factors in the service meeting ridership goals. With the current planned stations the trip time is approximately 3-hours between Miami and Orlando. The addition of stops beyond the four stops planned at this time would increase overall trip time and negatively impact achieving the number of passengers (ridership) critical for overall Project success. AAF has not precluded additional stations as demands warrant in the future. Brevard County is currently evaluating options for a possible station and locations where such a station, in the future, might be located. Indian River, Martin, and St. Lucie counties may decide to identify station locations and cooperate with AAF on a predevelopment process to determine if stations are feasible. Development of any future stations which are not currently planned as part of the Project would undergo independent environmental review as required.

3.3 Alternatives Studied in Detail in the EIS

Chapter 5, *Environmental Consequences*, of this FEIS provides a detailed analysis of the environmental impacts of the No-Action Alternative and three Action Alternatives (Alternative A, Alternative C, and Alternative E). Each of the three Action Alternatives incorporates the same proposed action for these components: the MCO Segment and VMF, the E-W Corridor parallel to SR 528, and the N-S Corridor within the FECR Corridor. The three alternatives differ with respect to the alignment within the 17.4-mile segment of the E-W Corridor between the MCO Segment and SR 520 (within the CFX-controlled portion of SR 528 between SR 417 and SR 520). These alternatives were designed to accommodate CFX's long-term plan to expand the overall cross-section of SR 528 to an 8-lane roadway, as described in the agency's *SR 528 Multi-Use/Multi-Modal Corridor Study* (OOCEA 2008). They were also designed to be flexible depending upon the outcome of ongoing property negotiations between FECR, FDOT, CFX, and private landowners.

Commenters noted that the analysis in the DEIS was based on 30 percent design plans and that the EIS should be updated based on 90 percent design plans. Consistent with standard practice, environmental compliance is completed during the preliminary (30 percent) design phase. Following these initial planning efforts, more detailed design plans are typically developed once the NEPA process has been completed. AAF will develop more detailed design plans as part of the environmental permit application process.

AAF executed a lease agreement with CFX that allows them to construct any of the three alternatives, pending a CFX Board vote establishing that the land to be occupied by AAF is "surplus." AAF has provided design concepts, which have been reviewed by CFX, that show any of the three alternatives can be constructed provided CFX was able to acquire all of the necessary property, and not preclude future BeachLine Expressway widening. The CFX Board voted against declaring any of the land within their existing ROW to be "surplus." Therefore, Alternatives A and C have been dismissed since it would not be possible to lease the land. According to the CFX Board, Alternative E is the only feasible alternative. Therefore, Alternative E is the Preferred Alternative. All land acquisitions required for this segment of the Project would be carried out by CFX.

The sections below provide a detailed description of the No-Action Alternative and the three Action Alternatives studied in this FEIS. Section 3.4 provides information on the operations common to all

alternatives, and Section 3.5 provides information on ridership, which would be the same for each alternative. AAF estimates a 2016 completion date for Phase I and Phase II, assuming project financing and equipment are available. Ridership is anticipated to increase from 2016 to 2019, and remain stable after 2019. The analyses in this FEIS are based on these assumptions.

3.3.1 Phase I

This section provides a description of Phase I of the Project, based on information presented in the 2012 *Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida* (2012 EA). As summarized in Section 1.1 of the 2012 EA, Phase 1 would provide intercity passenger rail on a 66-mile corridor from West Palm Beach to Miami, within the FECR railroad ROW. Three new stations would be located in the central business districts of West Palm Beach, Fort Lauderdale and Miami. The existing track would be upgraded, with 49.2 miles of new second main line track, 8.3 miles of siding rehabilitation, and new track signal controls. Existing highway and pedestrian at-grade crossings would be upgraded to enhance safety. Three bridges would have a second track added but would not require construction in the water (C-15 Canal, Cypress Creek Canal, and Snake Creek Canal). Hourly service would be provided, consisting of 16 daily roundtrip trains.

Subsequent to the publication of the 2012 EA and the FONSI issued by the FRA in 2013 (2013 FONSI), AAF proposed shifting the proposed Fort Lauderdale Station building to the opposite (west) side of the tracks, along NW 2nd Avenue between NW 4th Street and Broward Boulevard. On March 27, 2014 FRA issued a Re-Evaluation that determined the new location would not change the environmental impacts identified in the 2012 EA and previously found to be not significant (Appendix 3.3.1-A1).

Subsequent to the publication of the 2012 EA and 2013 FONSI, AAF has proposed a shift of the proposed Fort Lauderdale VMF to an existing freight rail yard in West Palm Beach. Concurrently with the DEIS, FRA prepared a Supplemental Environmental Assessment (SEA) for this facility (Appendix 3.3.1-A2). A FONSI was issued on January 29, 2015 (Appendix 3.3.1-A3). The SEA and FONSI are available on the FRA website at www.fra.dot.gov.

The Project's Phase I environmental impacts were evaluated in the 2012 EA and FRA's 2013 FONSI (Appendix 1.1-A1 and A2); it was confirmed that the West Palm Beach to Miami phase of the Project would have no significant environmental impacts (FRA 2013). The effects of this phase of the Project, also described as the West Palm Beach-Miami Segment (WPB-M Segment), are considered in this FEIS in order to provide a complete description of the cumulative environmental impacts of the Project. Subsequent sections of this FEIS will also describe changes to the WPB-M Segment since the publication of the 2012 EA and 2013 FONSI and subsequent re-evaluations.

3.3.2 No-Action Alternative

The No-Action Alternative involves no changes to the rail line within the FECR Corridor beyond regular maintenance and improvements that have been currently planned and funded and assumes that this project could not be constructed. Under the No-Action Alternative, existing freight operations and infrastructure would be maintained by FECR. The No-Action Alternative would also include future planned and funded roadway, transit, air, and other intermodal improvements likely to be completed within the Project study area by the 2016 target date. To support the NEPA analysis, existing operations were

documented and anticipated future freight operations were forecasted. Table 3.3-1 shows the anticipated future freight operations within the FECR Corridor that would occur in the absence of the Project. Under the No-Action Alternative, freight trains would continue to operate under current maximum operating speed limits of 60 mph.

Day	2013 (Existing)		2016	
	Number of trains per day (7:00 AM-10:00 PM)	Number of trains per night (10:00 PM-7:00 AM)	Number of trains per day (7:00 AM-10:00 PM)	Number of trains per night (10:00 PM-7:00 AM)
Monday	10	5	16	8
Tuesday	11	6	16	9
Wednesday	11	6	17	9
Thursday	10	7	15	9
Friday	11	5	12	6
Saturday	6	3	8	2
Sunday	4	6	11	6
Total	63	38	95	49
Average Trains per Day	14		20	

Source: AAF. 2013a. Modeling Assumptions. May 2013. Report.

Many DEIS comments received stated that freight operations were underestimated because of the upcoming Panamax expansion and the dredging and rail infrastructure improvements planned at Port Miami and Port Everglades to accommodate the larger post-Panamax expansion container ships. The anticipated increase in future freight traffic, including the increase in freight traffic as a result of the post-Panamax expansion, is included in the No-Action Alternative based on FECR's business case projections of future freight demands.

The DEIS/FEIS analysis incorporates 20 through freight trains, which is consistent with the latest available freight forecasts from FECR. In addition, there are local freight trains that operate a variety of short routes from Jacksonville to Miami and these are included in the modeling where appropriate. If, hypothetically, the volume of cargo moved along the corridor increases due to the growth of port activity, additional units can be moved in existing double-stack trains with corresponding increases in average train length, thereby reducing the need for new train sets. Due to the imbalance in freight traffic, occasionally trains currently operate with empty cars, enabling the railroad to absorb increases in freight without increases in train length. Increases in freight train length was incorporated into the DEIS modeling. Containerization has facilitated added capacity without any new train starts. In fact, FECR has previously responded to community concerns by running fewer, but longer, trains as opposed to many shorter trains. These trains used to be 7,500 feet, but now they range from 9,000 to 10,000 feet. FECR's freight forecast takes into account that not everything that arrives at the port will be transported by the FECR railroad. Freight will also move by truck and possibly the CSX freight system.

Some commenters also stated that the No-Action Alternative should include AAF's Phase I, West Palm Beach to Miami Passenger Rail because Phase I has been reviewed under NEPA and portions of that

project are currently under construction. FRA agrees that Phase I is included in the No-Action Alternative, but the environmental effects of Phase I are described in this FEIS (the WPB-Miami Corridor) in order to fully describe the cumulative effects of the complete Orlando to Miami Passenger Rail project.

Currently, the prevailing train control system on the FECR Corridor is commonly known as a “cab with wayside” type system. It utilizes wayside color light signals at interlockings that control safe switching of trains from mainline track to mainline track, or mainline track to controlled sidings. These signals are remotely controlled by dispatchers from an operations control center in Jacksonville, Florida. Safe braking distance is maintained through automatic signals (also color lights) used as intermediates between controlled interlocking signals. The control system is “route-signaling” augmented by in-cab signals that display the state of the wayside signals continuously in the locomotive cab via electronic coded track. This electronic coded track also provides broken rail detection. FECR is not required by FRA regulations to implement a new signal system that will provide positive train control (PTC) by 2015 (49 CFR part 229) because it is not a Class I railroad.¹ PTC systems are integrated command, control, communication, and information systems for controlling train movements with safety, security, precision, and efficiency. PTC systems are comprised of digital data link communication networks, continuous and accurate positioning systems such as Nationwide Differential Global Positioning Systems, on-board computers with digitized maps on locomotives and maintenance-of-way equipment, in-cab displays, throttle-brake interfaces on locomotives, wayside interface units at switches and wayside detectors, and control center computers and displays.

Under the No-Action Alternative, it is assumed that land use development would continue consistent within the approved and adopted local comprehensive, master and/or visioning plans of each municipality. For the purposes of this analysis, it was also assumed that only planned and funded improvements will be completed.

3.3.3 Alternative A

Alternative A (Figure 3.3-1) includes four segments:

- The MCO Segment, which includes the proposed VMF and new railroad infrastructure between the VMF and the E-W Corridor;
- The E-W Corridor on new alignment (Alternative Option 3A) between MCO and Cocoa, paralleling SR 528;
- The N-S Corridor within the FECR ROW between Cocoa and West Palm Beach; and
- The WPB-Miami Corridor within the FECR ROW between West Palm Beach and Miami (the Phase I Project evaluated in the previous EA and FONSI). Since the publication of the 2012 EA and 2013 FONSI, AAF has determined that it is necessary for the Phase II Project to reconstruct seven bridges over waterways, and to modify the turnout at the Miami Viaduct. The Project evaluated in this EIS also includes bridge reconstruction within the WPB-M Corridor within the FECR ROW.

¹ Class I: Carriers having annual carrier operating revenues of \$250 million or more after applying the railroad revenue deflator formula (49 CFR part 1201).

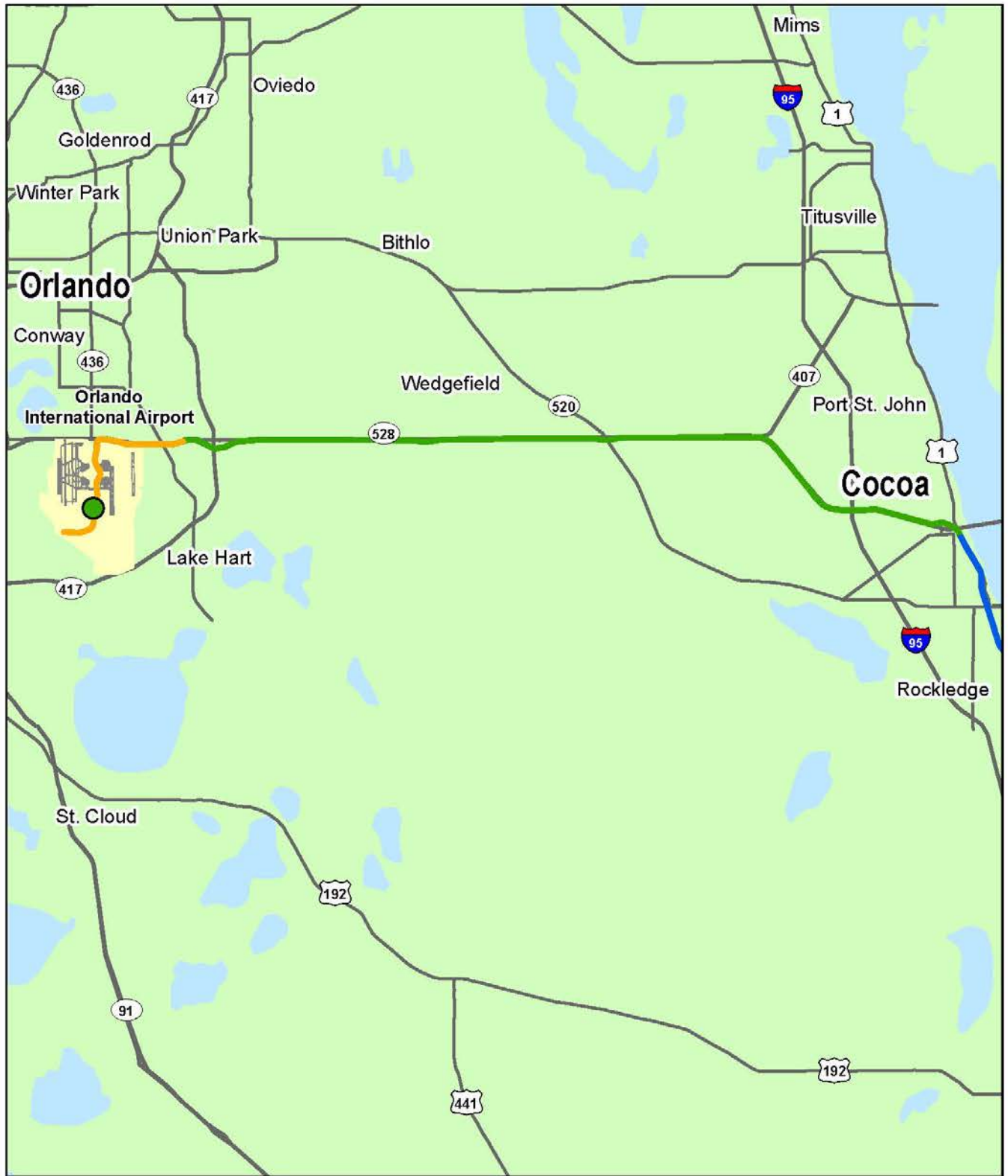


Explanation of Features

- N-S Segment
- SR 528 Corridor
- WPB-M Corridor
- MCO Segment
- Major Airports
- Proposed Stations - WPB-M Corridor
- Proposed Station (By Others)

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

Alternative A		
All Aboard Florida Intercity Passenger Rail Project		
		3.3-1



Explanation of Features

- E-W Corridor
- N-S Corridor
- MCO Segment
- Proposed Station (By Others)

MCO Segment and E-W Corridor		
All Aboard Florida Intercity Passenger Rail Project		
		3.3-2

Generally, the Project includes additional rail infrastructure improvements from Orlando to West Palm Beach, including new track, new bridges, drainage systems and the development of all communications, signaling, safety and security systems. A new signal system would be implemented as part of the Project that will provide a PTC overlay system with a back office server in the operations control center to achieve compliance with 49 CFR part 229.

This alternative also builds on and incorporates Phase I of the Project and includes two modifications of the previously reviewed WPB-M Segment. Alternative A would be identical to Alternative E except for the Mid-Section of the E-W Corridor (Figure 3.2-3). Detailed plans of Alternative A are provided in Appendix 3.3.3-A1 through 3.3.3-A5.

Because CFX stated that it would not grant permission for Alignment Option 3A, Alternative A is not reasonable and has been dismissed.

Alternative A differs from Alternative E only in the Middle Section of the East-West Corridor (SR 417 to SR 520). This section is approximately 15.5 miles long and is unique to Alternative A. East of SR 417, Alternative A would be within the SR 528 ROW. The alignment would be comprised of mostly a single new track, but would require extensive retaining walls and bridges in order to minimize its footprint and accommodate existing and future SR 528 infrastructure. Constructing a new rail line along this corridor would require stormwater features to capture and treat the runoff. Drainage would be comingled with the existing SR 528 drainage ditch. The proposed ROW in this section is an average of 60 feet wide and would impact approximately 127 acres of land.

This section of Alternative A would begin at grade east of SR 417 and would rise up to an embankment almost 7,000 feet west of the interchange with ICP Boulevard. The alignment would alternate between embankment and bridge structure to span the proposed interchange with Innovation Way (a planned roadway in this vicinity), ICP Boulevard, the CSX Rail Line, and Farm Access Road #1. After a short section at-grade, the alignment would again alternate between bridges and embankments to cross the Econlockhatchee River and the interchange with Dallas Boulevard, which would be expanded in the future as part of improvements to SR 528. The alignment would be on an embankment in the vicinity of the Dallas Mainline Toll Plaza and would remain at grade until Farm Access Road #2 and SR 520, which would be crossed using bridges. The structures in this section are listed in Table 3.3-2.

Bridge	Proposed Structure Length (ft)	Proposed Structure Width (ft)	Number of Spans
Innovation Way, ICP Boulevard, CSX Rail	5,500	17	70
Beachline Entrance (at ICP)	1,500	17	17
BeachLine Exit	1,300	17	15
Beachline Entrance (at Farm Access Road #1)	1,300	17	15
Farm Access Road #1	200	17	3
Econolockhatchee River	1,700	17	21
Dallas Boulevard Off-Ramp	500	17	6
Dallas Blvd	165	17	2
Future Dallas Boulevard On-Ramp	250	17	4
Future Dallas Boulevard Interchange	1,200	17	17
Beachline Entrance (at Farm Access Road #2)	1,300	17	15
Farm Access Road #2	180	17	3
Beachline Exit (at Farm Access Road #2)	800	17	10
SR 520	215	17	2
Beachline Exit (at SR 520)	800	17	10
Ramp Connecting SR 520 to SR 528	1,300	17	16

3.3.4 Alternative C

Alternative C includes four segments: the MCO Segment, which includes the proposed VMF and new railroad infrastructure between the VMF and the E-W Corridor; the E-W Corridor on new alignment (Option 3C) between MCO and Cocoa, paralleling SR 528; the N-S Corridor within the FECR ROW between Cocoa and West Palm Beach, and the WPB-M Corridor within the FECR ROW. This alternative also builds on and incorporates Phase I of the Project and includes two modifications of the previously reviewed WPB-M Segment. Alternative C would be identical to Alternative E except for the Mid-Section of the E-W Corridor (Figure 3.2-3; see Appendix 3.3.4 for detailed plans).

Because CFX stated that it would not grant permission for Alignment Option 3C, Alternative C is not reasonable and has been dismissed.

Alternative C differs from Alternative E only in the middle section of the E-W Corridor as described below. East of SR 417, Alternative C “straddles” the SR 528 southern ROW line in this section, with 10 feet of the proposed rail alignment width within the existing SR 528 ROW and approximately 90 feet extending south of the existing SR 528 ROW (Figure 3.2-4). This alternative includes an access road. This alternative is an average of 100 feet wide and will impact approximately 225 acres of land to construct the new rail line. In accordance with the draft lease agreement with CFX, CFX would acquire the land and lease the railroad ROW to AAF. The alignment would be comprised of mostly a single new track, but would require extensive retaining walls and bridges in order to minimize its footprint and accommodate existing and

future SR 528 infrastructure. Constructing a new rail line along this corridor will require stormwater features to capture and treat the runoff. Stormwater from the proposed rail line will drain to its own, new stormwater management system and will not come along with SR 528 drainage.

East of SR 417 Alternative A would rise up to an embankment almost 1,700 feet west of the interchange with ICP Boulevard. The alignment would alternate between embankment and bridge structure to span the proposed interchange with Innovation Way (a planned roadway in this vicinity), ICP Boulevard, the CSX Rail Line, and Farm Access Road #1. After a short section at-grade, the alignment would again alternate between bridges and embankments to cross the Econlockhatchee River and the interchange with Dallas Boulevard (which would be expanded in the future as part of improvements to SR 528). The alignment would be on embankment in the vicinity of the Dallas Mainline Toll Plaza and would remain at grade until Farm Access Road #2 and SR 520, which would be crossed using bridges. The structures in this section are listed in Table 3.3-3.

Bridge	Proposed Structure Length (ft)	Proposed Structure Width (ft)	Number of Spans
Innovation Way Ramp over RR	350	35	3
Innovation Way over Rail	400	150	4
SR 528 Ramp to Innovation Way	350	35	3
ICP Boulevard/RR	350	14	3
ICP Boulevard Ramp	350	14	4
Future Farm Access Road #1 Ramp	400	14	5
Farm Access Road #1	200	14	3
Future Farm Access Road #1 Ramp	350	14	4
Econlockhatchee River	249	14	3
Dallas Boulevard off-Ramp	850	14	10
Dallas Blvd	165	14	2
Future Farm Access Road #2 Ramp	400	14	5
Farm Access Road #2	180	14	3
Future Farm Access Road #2 Ramp	300	14	4
Ramp Connecting SR 528 to SR 520	420	14	5
SR 520	300	14	4
Ramp Connecting SR 520 to SR 528	300	14	4

3.3.5 Alternative E

Alternative E is AAF's preferred alternative and proposed action. It includes four segments: the MCO Segment, which includes the proposed VMF and new railroad infrastructure between the VMF and the E-W Corridor; the E-W Corridor on new alignment (Option 3E) between MCO and Cocoa, paralleling SR 528;

the N-S Corridor within the FECR ROW between Cocoa and West Palm Beach, and the WPB-M Segment within the FECR ROW. This alternative also builds on and incorporates Phase I of the Project and includes two modifications of the WPB-M Segment. Alternative E would be identical to Alternatives A and C except for the middle section of the E-W Corridor (Figure 3.2-3; see Appendix 3.3.5-A for detailed plans). The proposed alignment of Alternative E enables the railroad to be constructed at-grade within the SR 528 segment and would only require a perpendicular grade-separated crossing of the main roadway for each of the interchanges along SR 528 instead of all of the roadway approaches and ramps.

Commenters suggested that the 30-foot-wide median along a portion of SR 528 should be studied as an alternative alignment. This alternative alignment would be for the portion of Alternative E that swings south of the SR 528/SR 417 interchange along the E-W corridor, from Narcoossee Road into the center median of SR 528 to 0.5 miles east of International Corporate Park Boulevard, a distance of 6.7 miles. The Median Alternative was developed in coordination with the CFX in light of challenges with it acquiring all of the property needed for the portion of Alternative E south of the SR 528/SR 417 interchange and as a result of public comments. The Median Alternative was presented to the CFX Board. The Board members agreed that the existing Alternative E alignment is CFX's Preferred Alternative (Appendix 3.2.3). However, if condemnation of the necessary property is not finalized, this alternative alignment may be necessary.

3.3.5.1 MCO Segment

The MCO Segment (Figure 3.3-2) is approximately 4.5 miles long (starting from the VMF) and would consist of two tracks, extending from the VMF to the east of SR 436. The track would be at-grade between the VMF and the Intermodal Terminal Complex, where it would rise on structure to a three-track station with center platforms. The track would return to grade and would parallel North Airport Boulevard, crossing under Mid Crossfield Taxiways F and E. Tug Roads #2 and #4, and the A2 Service Road, would be realigned and lowered to allow the track to pass over these service roads. The track would pass under North Crossfield Taxiway J and the Cargo Road, requiring the Cargo Road Ramp be re-aligned. The Crossfield Taxiway bridges were constructed with an extra bay to accommodate future rail; however, the Cargo Road Bridge would be widened for the AAF tracks. The proposed track would continue at-grade around the west and north sides of the Employee Parking Lot before joining the E-W Corridor along the south side of SR 528 east of SR 436. The FAA must review all leases and/or agreements between AAF and GOAA prior to execution and have a determination of object/no object.

3.3.5.2 East-West Corridor

The E-W Corridor between Orlando and Cocoa, which is approximately 35 miles long, would require all new rail infrastructure, structures, and systems (Figure 3.3-2). The E-W Corridor would begin at the north end of the MCO Segment (SR 436) and then parallel SR 528, a transportation corridor controlled by two public transportation agencies:

- The approximately 20 miles from SR 436 to SR 520, which is, or will be, controlled by CFX (pending additional land acquisition involving private landowners); and
- The eastern-most 15 miles, which is owned by FDOT (pending additional land acquisition by AAF from one private landowner).

From Orlando to Cocoa, AAF plans to maintain track conditions in accordance with FRA safety standards permitting maximum train speeds of 125 mph (FRA 2012b and 2012c). Standard FDOT highway fencing, or its equivalent, would be installed throughout the length of the corridor, and all road crossings would be grade-separated. Based on coordination with the natural resource agencies, the standard fencing may be modified or substituted with fencing appropriate to discourage wildlife crossings where unmitigated impacts may exist. The following sections provide detailed descriptions of each section of the E-W Corridor. The west and east sections of the E-W Corridor, described below, are common to the three alternatives (A, C, and E) while the central section differs for each.

West Section of the E-W Corridor (SR 436 to SR 417)

This section is approximately 4.5 miles long and is common to all alternatives. It would begin at the northern terminus of the MCO Segment on GOAA property (SR 436), and follow an at-grade route consistent with GOAA's planned expansion. Access to land owned by GOAA is subject to agreements being negotiated between AAF and GOAA on the ultimate alignment and approach.

The alignment, comprised of two tracks, would continue at grade and pass under Goldenrod Road, as planned for the design of the interchange. Between Goldenrod Road and Narcoossee Road, the alignment would travel along the south side of SR 528, including constructing a bridge over the on-ramp at Narcoossee Road, and begin to straddle the property line between the properties owned by CFX and GOAA. The alignment would be at grade and would begin to climb above grade on fill as it approaches the SR 528/Narcoossee Road interchange. The eastbound off-ramp at the interchange would be re-aligned and the rail alignment would pass over this ramp and Narcoossee Road using a bridge. To accommodate the proposed alignment, Jetport Drive and a drainage canal would also be realigned. A new stormwater detention pond would be located at the southwest corner where the alignment crosses Narcoossee Road. East of the SR 528/Narcoossee Road interchange the alignment would continue above grade for 3,000 feet before returning to an at-grade elevation. The alignment would begin to climb above grade again west of the SR 528/SR 417 interchange, which it crosses using an overhead bridge before returning back to grade. No at-grade crossings would be required in this segment. As described in Table 3.3-4, there would be three structures in this section; all would be approximately 35 feet wide.

Structure	Proposed Structure Length (ft)	Proposed Structure Width (ft)	Number of Spans
Goldenrod Road Tunnel	300	34	NA
Narcoossee Road and Ramp Bridges	400, 170, 650	34	4, 1, 6
SR 417 Tunnel	700	34	7

Middle Section of the E-W Corridor (SR 417 to SR 520)

East of SR 417, Alternative E would diverge to the south and would be located on average between 100 and 200 feet south of the southern edge of the existing SR 528 ROW (Figure 3.2-4) with the exception of two interchanges. Around the interchange at Dallas Boulevard the proposed rail line would be approximately 700 feet south to the centerline of SR 528 and at the SR 520 interchange the proposed rail line would be approximately 500 feet south to the centerline of the SR 528.

This alternative includes an access road and is an average of 100 feet wide and will require approximately 225 acres of land for the construction of the new rail line. In accordance with the lease agreement with CFX, CFX would acquire the land and lease the railroad ROW to AAF. The alignment would be comprised of mostly a single new track but would require extensive retaining walls and bridges in order to minimize its footprint and accommodate existing and future SR 528 infrastructure. Constructing a new rail line along this corridor will require stormwater features to capture and treat the runoff. Stormwater from the proposed rail line will drain to its own, new stormwater management system (will not comingle with SR 528 drainage).

This section of Alternative E would begin at grade east of SR 417 and would rise up to an embankment and bridge to cross ICP Boulevard, the CSX Rail Line, Econlockhatchee River, and Dallas Boulevard. Farm Access Roads #1 and #2 would be closed. Alternative E would cross SR 520 on a bridge. The structures in this section, based on the conceptual design, are listed in Table 3.3-5.

Bridge	Proposed Structure Length (ft)	Proposed Structure Width (ft)	Number of Spans
ICP Boulevard/RR	160	17	2
ICP Boulevard Ramp	190	17	2
Econlockhatchee River	144	17	4
Dallas Blvd	165	17	2
SR 520	215	17	2

East Section of the E-W Corridor (SR 520 to N-S Corridor)

This section is approximately 15 miles long and would be comprised of two tracks. This section is common to all alternatives. The segment begins west of SR 520 where the alignment would be at grade and then climb above grade onto an embankment 1,000 feet west of the William Beardall Tosohatchee State Reserve. The alignment would then pass over Second Creek and Jim Creek on bridges and remain elevated for 5,500 feet, after which it would return to grade level. To climb over Long Bluff Road, the alignment would again rise onto an embankment and an above-grade bridge for a total distance of 3,500 feet before returning to grade. This would continue until 1,500 feet before Taylor Creek, at which point the alignment would use a series of bridges and semi-retained fill to cross Taylor Creek and the St. Johns River. The alignment would

pass south of the SR 528/SR 407 interchange. New retention ponds would be built in the middle of the interchange.

East of the SR 528/SR 407 interchange, the alignment would be mostly at-grade except for one small embankment and bridge section over an unnamed creek. Three retaining ponds would be built adjacent to the alignment in this area. Approaching I-95, the alignment would rise up to an embankment and would bridge the interchange with SR 528 and I-95. A new retention pond would be constructed in the southeast quadrant of the I-95/SR 528 interchange. AAF would acquire property at the interchange with Industry Road and I-95.

Immediately east of the SR 528/I-95 interchange, the alignment would follow the Cocoa Curve connection to the N-S Corridor. It would shift to the north side of SR 528 using a bridge and embankment, and would return to grade until the SR 528/Industry Road interchange. At this point, the alignment would rise up on an embankment, cross Industry Road on a bridge, return to grade and cross under SR 528 to the south side at the interchange with U.S. 1. AAF would like to construct a pond/borrow pit in the northeast quadrant of this location. At the end of this section, the E-W Corridor would merge with the N-S Corridor (discussed below). No at-grade crossings would exist in this section. Table 3.3-6 lists the structures in this section.

Bridge	Proposed S Structure Length (ft)	Proposed S Structure Width (ft)	Number of Spans
Second Creek	350	34	5
Jim Creek	250	34	4
Long Bluff Road	80	34	1
Future Wildlife Crossing	60	34	2
Taylor Creek	150	34	3
St. Johns River	550	34	13
Un-named Creek	100	34	1
Pine Street	80	34	1
I-95 Ramp	187	34	2
I-95 Ramp	222	34	2
I-95	288	34	2
I-95 Ramp	71	34	1
I-95 Ramp	115	34	1
SR 528	1,200	34	11
Industry Road	180	34	2
SR 528 (tunnel)	260	34	NA

3.3.5.3 North-South Corridor

The approximately 128.5 miles of the N-S Corridor between Cocoa and West Palm Beach (Figure 3.3-3) is part of a larger existing 351-mile system currently operating as a freight railroad and is common to all alternatives. FECR, an affiliate of AAF's parent company, operates the mainline track within the FECR Corridor from Miami to Jacksonville, with direct rail access to South Florida's ports and a high reliability and safety record. FECR owns the fee simple title in the ROW and owns the existing railroad infrastructure within the corridor over which FECR operates this freight rail service. AAF owns the permanent, perpetual and exclusive rights, privileges and easements on, over, and across all of the real property within FECR's mainline ROW located in the State of Florida, for the passenger rail purposes that would be provided by AAF through the Project.

Originally, the entire FECR system was built and operated as a double track railroad but, since the early 1970s, much of the double track has been removed to balance railroad service needs with capacity, operating, and maintenance costs. The railroad subgrade embankments and track bed still exist in most places along the system and the consolidated sub-base, primary drainage systems and bridge substructures remain for a complete, double-track railroad system. Existing ROW widths are typically at least 100 feet throughout the existing system. The existing system was built and is maintained to FRA Class IV track standards, permitting freight and passenger operations. Ruling grades are predominantly 0.3 percent with the horizontal alignment predominantly tangent, with typical curves 2 degrees or less. In isolated locations where curves exceed 2 degrees, operating speeds are reduced.

Improvements to the N-S Corridor for the Project would take place entirely within the existing developed FECR Corridor. The FECR Corridor today is mostly a single-track system with several sidings. The roadbed for the original second track would be used for the additional track improvements. This would include upgrades to, and relocation of, existing tracks, as well as installing new tracks. The proposed improvements include upgrades to bridges and grade crossings, as well as new signalization, new communication systems, and PTC systems. In addition to the track construction between Cocoa and West Palm Beach, 18 bridges will be reconstructed to accommodate the second track.

The new construction and improvements proposed along the FECR Corridor are:

- Improve approximately 128.5 miles of rail line;
- Add approximately 109 miles of new second track;
- Add eight miles of new third track;
- Reconstruct or replace 18 bridges;
- Upgrade highway and pedestrian crossings; and
- Upgrade signals and grade crossings.

The sections below provide detailed descriptions of each element.



Explanation of Features

- E-W Corridor
- N-S Corridor
- WPB-M Corridor
- Proposed Station - WPB-M Corridor
- Major Airport

N-S Corridor		
All Aboard Florida Intercity Passenger Rail Project		
		3.3-3

Track

The N-S Corridor would primarily consist of two tracks from Cocoa to West Palm Beach. As the majority of the existing FECR alignment is a single track, this would require constructing an additional second track within the existing ROW. AAF plans to install a third track in some portions of the N-S Corridor. All construction would be within the existing FECR ROW. Triple track, like double track, is a series of adjacent mainline tracks built to allow multiple train movements at various speeds and directions. Unlike passing sidings or “storage tracks”, which are constructed to hold trains that have come to a complete stop, triple track is like an additional lane on a highway built to keep traffic flowing. The AAF and FECR operating plan does not call for holding trains in any triple track section. Approximately eight miles total of third track would be constructed within the FECR right-of-way in the following approximate locations (for more information, please refer to the track charts included in Appendix 3.3.3-A4 and 3.3.3-A5).

Brevard County:

- At the northern end of the corridor, in the vicinity of SR 528;
- In the vicinity of Poinset Road;
- North of Gus Hipp Boulevard;
- In the vicinity of Carver Street;
- South of Suntree Boulevard;
- South of Sarno Road; and
- In the vicinity of University Boulevard/Apollo Boulevard.

Indian River County:

- In the vicinity of 16th Street.

St. Lucie County:

- In the vicinity of Indian River Drive; and
- South of Savannah Road.

Martin County:

- In the vicinity of Pinewood Street.

The existing track would be modified to reduce the overall curvature and increase the maximum allowable operating speeds for the train. This work would all be constructed in the existing ROW:

Brevard County:

- In the vicinity of MP 170.94/Dixon Boulevard;
- In the vicinity of MP 174.47/Barton Boulevard;
- In the vicinity of MP 177.97/McIver Lane; and
- In the vicinity of MP 202.5/North of Valkaria Road.

Indian River County:

- In the vicinity of MP 221.23/73rd Street;
- In the vicinity of MP 225.44/41st Street;

- In the vicinity of MP 226.22/Pickerill Lane;
- In the vicinity of MP 229.02/Glendale Road; and
- In the vicinity of MP 230.98/9th Lane SW.

St. Lucie County:

- In the vicinity of MP 243.30/Savannah Road;
- In the vicinity of MP 245.49/North of E. Midway Road;
- In the vicinity of MP 250.02;
- In the vicinity of MP 251.93.

Martin County:

- In the vicinity of MP 255.75/NE Skyline Drive;
- In the vicinity of MP 260/NE Dixie Highway;
- In the vicinity of MP 265.80/SE Golf Trail;
- In the vicinity of MP 267.3/SE Cove Road;
- In the vicinity of MP 273.31/SE Oleander Street; and
- In the vicinity of MP 274.9/Water Street.

Palm Beach County:

- In the vicinity of MP 282.66/Seminole Avenue;
- In the vicinity of MP 289.31/Kyoto Gardens Drive;
- In the vicinity of MP 290.81/Entrada Way; and
- In the vicinity of MP 291.9/Richard Road.

From Cocoa to West Palm Beach, AAF plans to build and maintain track conditions in accordance with FRA safety standards that permit maximum passenger train speeds of 110 mph and maximum freight train speeds of 75 mph (FRA 2012b and 2012c). Speed limits are restricted in certain locations due to track curves, junctions, bridges, or other infrastructure. Table 3.3-7 lists locations where speed limits will be reduced. Track charts are included in Appendix 3.3.3-A4 and 3.3.3-A5.

To maintain this track classification, AAF will complete infrastructure improvements to the mainline, including replacing the second mainline track, reconstructing existing crossovers and adding crossovers to facilitate operational efficiencies. The corridor will be fenced in locations where an FRA hazard analysis review determines that fencing is required for safety; this will be in populated areas where restricting access to the rail corridor is necessary for safety. Fencing will not be used in natural areas, where such fences could interfere with wildlife movement.

Location	Milepost	Maximum Speed	
		Freight	Passenger
Eau Gallie curve	189	70	90
Hall curve	191	70	90
Melbourne Curve	195	70	80
St. Sebastian River	212	55	60
Fort Pierce (Taylors Creek to Moores Creek)	241	40	40
Fort Pierce (Junction)	243	70	80
Rio (Palmetto Ave south to St Lucie Bridge)	257.5-261	60-35	60-35
Salerno curve	268	65	75
Hobe Sound NWR curve	274-275	60	60
Loxahatchee (Jupiter) Bridge north approach	282-283	55	60

Drainage

Drainage would be accommodated using an existing channel along the east or west side of the ROW. In some cases, this would require relocating existing drainage channels within the ROW.

At-grade Crossings

As part of the planning for the Project, the FRA's Office of Railroad Safety - Highway Rail Crossing and Trespasser Program Division conducted a Diagnostic Safety Review, the results of which are included in the "On-Site Engineering Report" parts 1 and 2 (Appendix 3.3.5-B). The Diagnostic Safety Review consists of a simple survey procedure utilizing experienced individuals from several sources (including representatives from the FRA and FECR, as well as state and local departments of transportation; the diagnostic team). The diagnostic team evaluated each of the crossings in the field, identified its deficiencies and came to a consensus on the recommended improvements. These recommended improvements are listed below in Tables 3.3-8 through 3.3-12. Road crossings that are not listed in the table were evaluated by the diagnostic team but no improvements were recommended. As part of its infrastructure program, AAF will pay the cost of the recommended grade crossing safety improvements related to the introduction of passenger rail service, in conjunction with county and municipal execution of amendments to existing crossing license agreements. AAF will, after execution of amendments to existing crossing license agreements, ensure that, where defined sidewalks exist, pedestrian crossing gates will be installed to ensure pedestrian safety.

There are 170 highway-rail grade crossings within the N-S Corridor, of which 159 are at-grade and 11 are grade-separated (Appendix 3.3.5-C). The ultimate number of at-grade crossings may increase or decrease depending upon the distances required for the PTC entry track or permanent road closures. Of the 159 at-grade crossings, all but three use active warning devices with a minimum of flashing lights, gates, and bell(s), and a substantial number of crossings have cantilevers or bridges for lane coverage of flashers. These crossing warning systems are operated by either phase motion detection or crossing predictor

units. FECR is responsible for maintenance of the crossing equipment. To mitigate noise impacts from train horns AAF will install pole-mounted horns at highway-rail grade crossings where needed to reduce a “severe” noise impact unless the community establishes a quiet zone (see Appendix 3.3.5-D). The grade crossings are described in more detail in Appendix 3.3.5-C. The range of grade crossing improvements includes:

- **Pedestrian Gates:** Pedestrian gates would only be installed at locations where there is an agreement with municipalities to maintain the gates.
- **Vehicle Presence Detection:** Public and private crossings between 80-110 MPH would be equipped with Vehicle Presence Detection (VPD), where the presence of a vehicle within a crossing area for a fixed length of time would be reported through the Cab Signaling system, allowing trains to slow down/stop before reaching the crossing.
- **Other Treatments (gates/raised medians, etc.):** Other treatments include:
 - **Four Quadrant Gates:** Four-quadrant gate systems consist of a series of automatic flashing light signals and gates in which the gates extend across both the approach and the departure side of roadway lanes. Unlike two-quadrant gate systems, four-quadrant gates provide additional visual constraints and inhibit nearly all traffic movements over the crossing after the gates have been lowered.
 - **Three Quadrant Gates:** Three quadrant gates are a variation of four quadrant gates, consisting of two entrance gates and one exit gate.
 - **Locked Gate with Dispatcher Permission:** Locked gates can be opened upon receipt of permission from the train’s dispatcher, who monitors and controls track access.
 - **100-150 foot non-traversable medians:** 100-150 foot non-traversable medians are installed at locations with existing 3-quadrant gates or less, and may physically prevent motorists from driving around lowered crossing gates.
 - **Close:** In some cases, the diagnostic team recommended that grade crossings be closed, due to issues with roadway geometry, site lines, or low volumes of traffic.

As shown in Tables 3.3-8 through 3.3-12, four at-grade crossings are recommended to be closed, and three are recommended to be closed if it is not feasible to install four-quadrant gates. FRA recommends “sealed corridor treatments” at all highway grade crossings where train speeds are expected to exceed 79 mph. Sealed corridor treatments, as described above, include four-quadrant gates, median separators, or other crossing devices to prevent vehicles from entering a grade crossing.

Street Name	City/Town	Milepost	DOT #	Proposed Action
Dixon Blvd.	Cocoa	171.52	272 095 K	Three-Quadrant Gate
Highland Drive	Cocoa	172.45	272 866 L	Three-Quadrant Gate
Peachtree Street	Cocoa	172.90	272 096 S	Sealed (four Quadrant Gates)
Rosa Jones Blvd.	Cocoa	173.51	272 099 M	100-Foot Non-Traversable Medians
Barton Blvd.	Rockledge	175.02	272 101 L	Three-Quadrant Gate
Eyster Blvd.	Rockledge	175.57	272 908 V	Sealed (four Quadrant Gates)
Rinker Way	Rockledge	176.10	272 908 V	Locked gate with dispatcher permission
Gus Hipp Blvd	Rockledge	177.13	272 926 T	Three-Quadrant Gate
Carver Road	Bonaventure	179.14	272 109 R	Three-Quadrant Gate
Ansin Road	Bonaventure	179.40	272 110 K	Three-Quadrant Gate
Viera Blvd.	Bonaventure	180.28	272 976 W	Three-Quadrant Gate
Suntree Blvd.	Pineda	182.65	272 115 U	100-Foot Non-Traversable Medians
Post Road	Pineda	186.86	272 117 H	Sealed (four Quadrant Gates)
Parkway Avenue	Melbourne	187.91	272 118 P	100-Foot Non-Traversable Medians
Lake Washington	Melbourne	188.70	272 926 T	Sealed (four Quadrant Gates)
Masterson Street	Melbourne	189.32	272 121 X	Sealed (four Quadrant Gates)
Aurora Road	Melbourne	189.68	272 122 E	Sealed (four Quadrant Gates)
Creel Street	Melbourne	189.92	272 123 L	Close or four quadrant gate if unable to close
Eau Galle Blvd.	Melbourne	190.10	272 112 T	Sealed (four Quadrant Gates)
Sarno Road	Melbourne	190.58	272 125 A	Three-Quadrant Gate
So. Babcock St.	Melbourne	192.39	272 128 V	100-Foot Non-Traversable Medians
Hibiscus Ave	Melbourne	193.75	272 132 K	100-Foot Non-Traversable Medians
Silver Palm Ave	Melbourne	193.83	272 133 S	Sealed (four Quadrant Gates)
Seminole Ave	Melbourne	193.89	272 134 Y	Three-Quadrant Gate/Possible One-way street
East Fee Avenue	Melbourne	194.00	272 135 F	Three-Quadrant Gate
Lincoln Avenue	Melbourne	194.07	272 136 M	Sealed (four Quadrant Gates). Possible one-way street to be determined through traffic study.
Palmetto Ave	Melbourne	194.13	272 137 U	100-Foot Non-Traversable Medians
Strawbridge Ave	Melbourne	194.19	272 138 B	100-Foot Non-Traversable Medians
Jernigan Avenue	Melbourne	195.02	272 143 X	Close
University Blvd.	Melbourne	195.34	272 144 E	100-Foot Non-Traversable Medians
Hessey Avenue	Palm Bay	197.36	272 146 T	Close/three quadrant gate if unable to close
Palm Bay Road	Palm Bay	197.46	272 147 A	Sealed (four Quadrant Gates)
Malabar Road	Malabar	199.94	272 149 N	Sealed (four Quadrant Gates)
Jordan Blvd.	Malabar	201.50	272 150 H	100-Foot Non-Traversable Medians
Valkaria Road	Grant Valkaria	203.00	272 151 P	100-Foot Non-Traversable Medians
1st Street	Grant Valkaria	205.61	272 152 W	Three-Quadrant Gate

Shell Pit Road	Grant Valkaria	207.13	272 153 D	Three-Quadrant Gate
Senne Road	Grant Valkaria	208.13	272 154 K	100-Foot Non-Traversable Medians
Barefoot Blvd.	Micco	208.99	272 155 S	Three-Quadrant Gate
Micco Road	Micco	209.23	272 156 Y	Three-Quadrant Gate
Main Street	Sebastian	214.42	272 161 V	Three-Quadrant Gate
Old Dixie Hwy	Sebastian	216.00	272 163 J	Sealed (four Quadrant Gates)
Schumann Drive	Sebastian	216.59	272 164 R	Three-Quadrant Gate
99th Street	Sebastian	217.61	272 165 X	Three-Quadrant Gate
Barber Street	Sebastian	218.03	272 974 H	100-Foot Non-Traversable Medians
Wabasso Road	Winter Beach	219.58	272 168 T	Three-Quadrant Gate
Hobart Road	Winter Beach	220.70	272 170 U	Sealed (four Quadrant Gates)
69th Street	Winter Beach	221.80	272 172 H	Sealed (four Quadrant Gates)
Winter Beach Rd.	Winter Beach	222.32	272 173 P	Three-Quadrant Gate
Hawks Nest	Vero Beach	223.18	272 175 D	
53rd Street	Vero Beach	223.90	273 108 M	Three-Quadrant Gate
49th Street	Vero Beach	224.42	272 177 S	Sealed (four Quadrant Gates)
45th Street	Vero Beach	224.94	272 178 Y	Three-Quadrant Gate
43rd Street	Vero Beach	225.12	272 179 F	Sealed (four Quadrant Gates)
41st Street	Vero Beach	225.46	272 180 A	Three-Quadrant Gate
32nd Street	Vero Beach	226.65	273 047 Y	Three-Quadrant Gate
26th Street	Vero Beach	227.06	272 189 L	Sealed (four Quadrant Gates)
14th Avenue	Vero Beach	227.14	272 190 F	Close
23rd Street	Vero Beach	227.31	272 191 M	Sealed (four Quadrant Gates)
21st Street	Vero Beach	227.48	272 192 U	Close/three quadrant gate if unable to close
16th Street	Vero Beach	228.02	272 195 P	100-Foot Non-Traversable Medians
12th Street	Vero Beach	228.66	272 196 W	Sealed (four Quadrant Gates)
Glendale Road	Vero Beach	229.19	272 197 D	Sealed (four Quadrant Gates)
4th Street	Vero Beach	229.75	272 198 K	Sealed (four Quadrant Gates)
1st Street	Vero Beach	230.15	272 199 S	Three-Quadrant Gate
Oslo Road	Vero Beach	231.31	272 200 J	100-Foot Non-Traversable Medians

Source: Federal Railroad Administration, On-Site Engineering Field Report - Part 2, September 23, 2014.

Street Name	City/Town	Milepost	DOT #	Proposed Action
Highlands Drive SE	Vero Beach	232.86	272 201 R	100-Foot Non-Traversable Medians
Private Road	Indrio	233.90	272 204 L	Private (locked with procedures seeking permission from RR Dispatch to cross)
Private Road	Indrio	234.50	272 205 T	Private (locked with procedures seeking permission from RR Dispatch to cross)
Harbor Branch Rd	Indrio	235.10	272 206 A	Sealed (four Quadrant Gates)
Wilcox Road	Indrio	235.60	272 207 G	Sealed (four Quadrant Gates)
Michigan Street	Indrio	236.10	272 208 N	Sealed (four Quadrant Gates)
Rouse Road	Indrio	236.70	272 209 V	Sealed (four Quadrant Gates)
Torpey Road	Indrio	237.10	272 210 P	Sealed (four Quadrant Gates)
Milton Road	Indrio	237.80	272 211 W	Sealed (four Quadrant Gates)
Chamberlain Blvd.	Indrio	238.40	272 213 K	Sealed (four Quadrant Gates)
St. Lucie Lane	Indrio	238.80	272 214 S	Sealed (four Quadrant Gates)
Tarmac Road	Indrio	239.20	272 215 Y	Private (equip with Four-Quadrant gates and VPD)
Shimoner Ln	Indrio	239.50	272 217 M	Private (equip with Four-Quadrant gates and VPD)
No. Bch. Causeway	Indrio	239.80	272 218 U	Sealed (four Quadrant Gates)

Source: Federal Railroad Administration, On-Site Engineering Field Report - Part 2, September 23, 2014.

Street Name	City/Town	Milepost	DOT #	Proposed Action
Avenue A	Fort Pierce	241.30	272 238 F	100-foot non-traversable medians
Orange Avenue	Fort Pierce	241.50	272 239 M	Three-Quadrant Gate
Savannah Road	Fort Pierce	243.80	272 330 F	Sealed (four Quadrant Gates)
Midway Road	Walton	246.30	272 331 M	Sealed (four Quadrant Gates)
Walton Road	Walton	252.50	272 332 U	Sealed (four Quadrant Gates)

Source: Federal Railroad Administration, On-Site Engineering Field Report - Part 1, March 20, 2014.

Street Name	City/Town	Milepost	DOT #	Proposed Action
County Line Road	Rio	255.30	272 336 W	Sealed (four Quadrant Gates)
Skyline Drive	Rio	255.50	272 337 D	Sealed (four Quadrant Gates)
Pitchford Lnd	Rio	256.20	272 338 K	Private (equip with Four-Quadrant gates and VPD)
Jenson Beach Blvd.	Rio	256.80	272 340 L	Sealed (four Quadrant Gates)
Miracle Way	Rio	257.10	272 341 T	Private (locked with procedures seeking permission from RR Dispatch to cross)
Palmetto Drive	Rio	257.40	272 342 A	Sealed (four Quadrant Gates)
Florida Street	Stuart	262.30	272 349 X	Sealed (four Quadrant Gates)
SR A1A	Stuart	262.50	272 350 S	Sealed (four Quadrant Gates)
Monterey Road	Stuart	263.30	272 353 M	Sealed (four Quadrant Gates)
Seaward Street	Salerno	266.50	272 356 H	Close (only crossing to be closed along 110 MPH segment)
Salerno Road	Salerno	266.60	272 357 P	Sealed (four Quadrant Gates)
Broward Street	Salerno	266.80	272 358 W	Sealed (four Quadrant Gates)
Cove Road	Salerno	267.14	272 359 D	Sealed (four Quadrant Gates)
SR A1A	Salerno	268.65	272 360 X	150-foot non-traversable medians
Osprey Street	Salerno	270.90	272 934 K	Sealed (four Quadrant Gates)
Crossrip Street	Salerno	271.40	272 362 L	Sealed (four Quadrant Gates)
Pettway Street	Hobe Sound	272.70	272 365 G	Sealed (four Quadrant Gates)
Bridge Road	Hobe Sound	274.10	272 366 N	Sealed (four Quadrant Gates)
Gleason Street	Hobe Sound	274.50	272 367 V	Sealed (four Quadrant Gates)
Park Road	Hobe Sound	277.70	272 370 D	100-foot non-traversable medians
County Line Road	Hobe Sound	280.90	272 372 S	100-foot non-traversable medians

Source: Federal Railroad Administration, On-Site Engineering Field Report - Part 1, March 20, 2014.

Street Name	City/Town	Milepost	DOT #	Proposed Action
Indiantown Road	Jupiter	283.60	272 377 B	Three-Quadrant Gate
Toney Penna Dr.	Jupiter	284.20	272 378 H	Sealed (four Quadrant Gates)
Fred Small Road	Jupiter	286.20	273 020 P	Sealed (four Quadrant Gates)
Donald Ross Road	Palm Beach Gardens	287.20	272 379 P	Three-Quadrant Gate
Hood Road	Palm Beach Gardens	288.50	272 380 J	Three-Quadrant Gate
RCA Blvd.	Palm Beach Gardens	290.30	272 382 X	Sealed (four Quadrant Gates)
Burns Road	Palm Beach Gardens	290.80	272 383 E	Three-Quadrant Gate
Lighthouse Drive	Palm Beach Gardens	291.70	272 384 L	Sealed (four Quadrant Gates)
Richard Road	Palm Beach Gardens	292.20	272 385 T	Sealed (four Quadrant Gates)
Park Ave	Lake Park	293.30	272 387 G	Sealed (four Quadrant Gates)
Silver Beach Road	Lake Park	293.75	272 389 V	Sealed (four Quadrant Gates)
Blue Heron Blvd.	Rivera Beach	294.90	272 390 P	Three-Quadrant Gate
Flagler Street	Rivera Beach	295.15	272 399 B	Sealed (four Quadrant Gates)
Inlet Blvd.	Rivera Beach	295.45	272 400 T	Sealed (four Quadrant Gates)
49th Street	West Palm Beach	296.30	272 240 G	100-foot non-traversable medians
45th Street	West Palm Beach	296.65	272 403 N	100-foot non-traversable medians
36th Street	West Palm Beach	297.10	272 405 C	100-foot non-traversable medians
30th Street	West Palm Beach	297.40	272 406 J	Sealed (four Quadrant Gates)
Hunter Street	West Palm Beach	303.18	272 450 W	Close

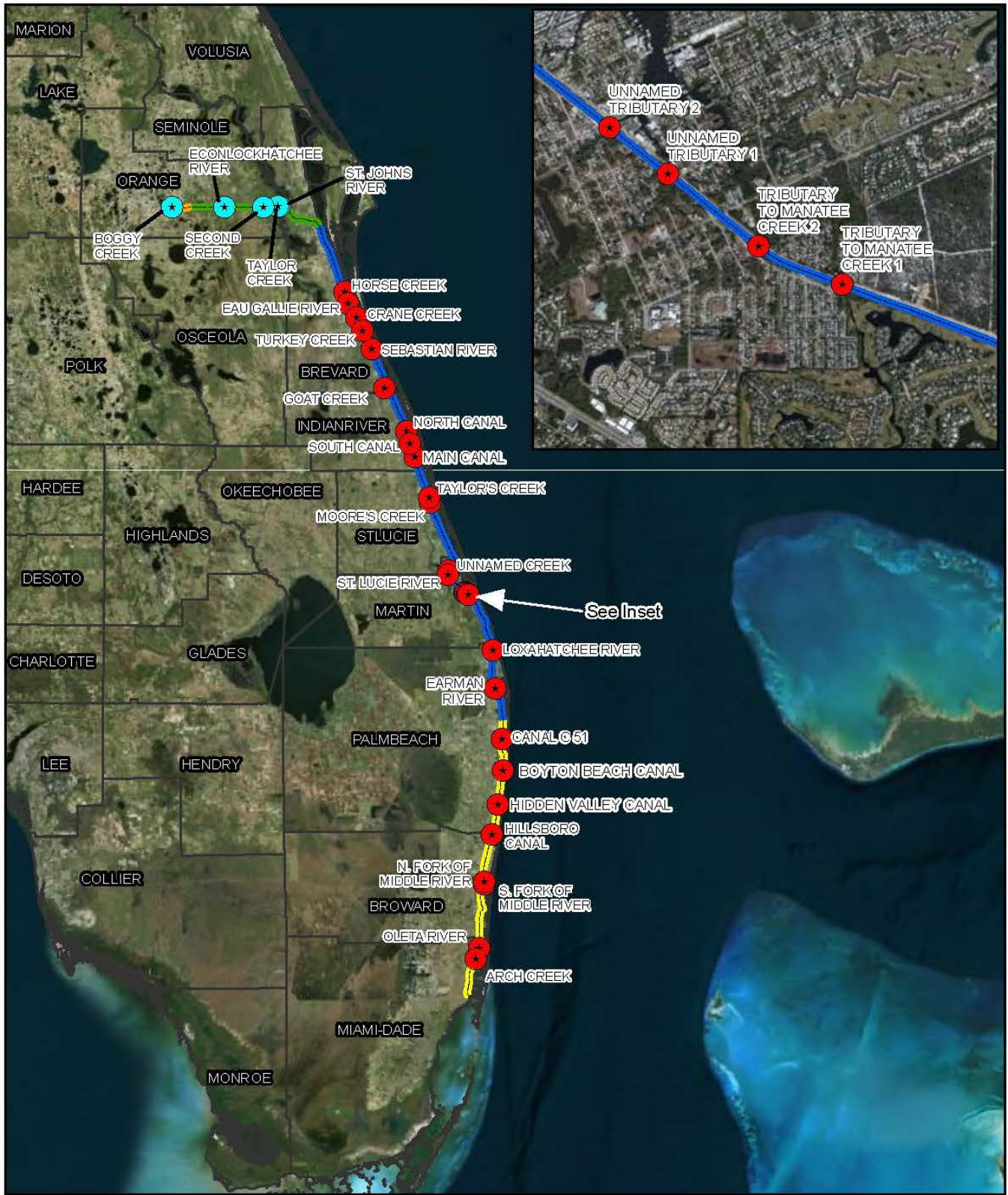
Source: Federal Railroad Administration, On-Site Engineering Field Report - Part 1, March 20, 2014.

Bridge and Structures

Bridge construction over waterways in the N-S Corridor would be required at the 19 locations listed in Table 3.3-13, either to rehabilitate the existing bridges (two locations), replace the original bridge with two new single-track bridges (nine locations), or retain the existing bridge and construct a new single-track bridge adjacent to the existing (eight locations) (Figure 3.3-4). Bridge plans are currently at the conceptual design level. Seventeen new fixed-span bridges would be constructed; 16 are in-water or over water and one is over a roadway. All new structures would be concrete, supported on concrete pilings, and would retain the existing vertical and horizontal clearances. The Project also includes rehabilitating the two moveable bridges at the St. Lucie River and Loxahatchee (Jupiter Inlet) River as part of Phase II

Bridge	Existing	Number of New Single-Track Bridges	Length (ft)	Width (ft)	Number of Spans
Horse Creek	Retain	1	72	16	3
Eau Gallie River	Demolish	2	580	16	(15) ¹
Crane Creek	Demolish	2	660	16	(17)
Turkey Creek	Demolish	2	180	16	3
Goat Creek	Demolish	2	120	16	5
St. Sebastian River	Demolish	2	1625	16	(43)
North Canal	Retain	1	100	16	4
Main Canal	Retain	1	118	16	4
South Canal	Retain	1	125	16	5
Taylor Creek	Rehabilitate	0	210	16	8
Moore's Creek	Retain	1	72	16	3
Rio Waterway	Demolish	2	95	16	4
St. Lucie River	Rehabilitate	0	1270	24	49
Salerno Waterway	Retain	1	40	16	2
Salerno Waterway 2	Demolish	2	103	16	4
Manatee Tributary 1	Demolish	2	34	16	1
Manatee Tributary 2	Demolish	2	34	16	1
Loxahatchee River	Rehabilitate	0	585	28	9
Earman River	Retain	1	175	16	7

¹ Number of spans has not been determined for the new structure. (X) is number of existing spans.



Explanation of Features

- Existing Bridges
- Proposed Bridges
- MCO Segment
- E-W Corridor
- N-S Corridor
- WPB-M Corridor

Data Sources: ESRI Bing Maps 2012 Imagery, FRA 2012, AMEC 2013

Existing and Proposed Bridges over Waterways		
All Aboard Florida Intercity Passenger Rail Project		
		3.3-4

Path: F:\Project\GIS\Map\Bridges\MapKey.mxd

Project# 00-65-12-021.2

Several comments on the DEIS concerned bridges. Commenters noted that the existing Taylor Creek bridge is too low for boat access, and that the City of Fort Pierce had completed a study that recommended opening up Taylor Creek. They recommended that the Project should include improvements to the Taylor Creek bridge to increase its vertical clearance. The Taylor Creek bridge is in suitable condition for the proposed passenger rail and does not require replacement. The Taylor Creek bridge is approximately 0.3 miles south of the SR A1A at-grade crossing, and 0.1 mi north of the railroad turnout to the former Union Carbide Plant and Fisherman's Wharf, as well as the at-grade crossing for Avenue H. Raising the Taylor Creek bridge would require raising the adjacent grade crossings and the approaches on both SR A1A and Avenue H, and would require that the railroad spurs be abandoned. AAF has determined that it is not feasible to raise the bridge due to cost and logistics, and FRA concurs with this determination.

Many commenters were concerned that AAF was not proposing to replace the three moveable bridges (the St. Lucie River Bridge and the Loxahatchee [Jupiter] River Bridge are in the Phase II Project, while the New River Bridge is in the Phase I Project (described in Section 3.3.5.4.) Commenters stated that these bridges are old and failing, and that they need to be replaced with either new moveable structures that provide greater reliability and greater horizontal clearance, or by new elevated bridges. In particular, many commenters stated that the DEIS did not provide reliable cost estimates for replacing the drawbridges with new fixed bridges and, therefore, cannot reasonably dismiss these alternatives.

AAF has committed to replacing or repairing the mechanical and electrical systems for each of the three moveable bridges to ensure their operational condition and reliability is maintained, and recognizes that this is essential to the successful operation of the passenger rail system and continued operation of the freight rail system, as well as to maintaining the navigational capacity of each waterway. AAF is not proposing to replace these bridges because they are structurally sound and do not require reconstruction or replacement for the proposed passenger rail service.

AAF has evaluated several alternatives and associated costs for replacing the movable bridges with high-level fixed bridges. Two options were evaluated for the high-level fixed bridges, one for passenger trains only and the other for all trains. In the analysis of these potential bridges, the new bridges are presumed to have a height that matches the nearest adjacent fixed bridge. While detailed cost estimates have not been performed for these options, operational logistics, limitations of surrounding property, and order of magnitude estimates establish that none of the alternatives are sufficiently feasible to warrant further consideration. Infrastructure and operational considerations are provided in Table 3.3-14.

3.3.5.4 West Palm Beach – Miami Corridor

The Project within the WPB-M Segment remains the same as the project evaluated in the 2012 EA and 2013 FONSI. Phase I of the Project includes reconstructing the former second track within the FECR ROW from West Palm Beach to Miami and constructing new passenger rail stations in West Palm Beach, Fort Lauderdale, and Miami.

Table 3.3-14 Moveable Bridge Replacement Alternatives Analysis			
Alternative	St. Lucie River	Loxahatchee River	New River
High-Level Fixed Bridge, Passenger Trains Only	<p>Not feasible because:</p> <ul style="list-style-type: none"> Multiple grade crossings on either side of the bridge would need to be permanently closed to accommodate the bridge approaches. Due to the height of the bridge and the required gradients, there is insufficient vertical clearance between top of rail and the underside of the US-1 Bridge which crosses above the tracks. 	<p>Not feasible because:</p> <ul style="list-style-type: none"> Multiple grade crossings on either side of the bridge would need to be permanently closed to accommodate the bridge approaches. There is insufficient Right-of-Way for an adjacent double-track and current track modeling necessitates a double-track bridge at this location in order to meet operational constraints. Requires a significant track outage to make the rail connection at the shorelines. This will negatively impact freight operations. The FECR industry tracks (CEMEX) north of the bridge would need to be changed to a stub-ended operation, introducing unfavorable inefficiencies and subsequent adverse impacts to the rail network. The current bascule bridge will still be required for freight trains. 	<p>Not feasible because:</p> <ul style="list-style-type: none"> Due to the height of the bridge and the required gradients, there is insufficient room to bring the tracks down to grade prior to reaching the Fort Lauderdale station.
High-Level Fixed Bridge, All Trains	<p>Not feasible because:</p> <ul style="list-style-type: none"> Multiple grade crossings on either side of the bridge would need to be permanently closed to accommodate the bridge approaches. Due to the height of the bridge and the required gradients, there is insufficient vertical clearance between top of rail and the underside of the US-1 Bridge which crosses above the tracks. 	<p>Not feasible because:</p> <ul style="list-style-type: none"> Multiple grade crossings on either side of the bridge would need to be permanently closed to accommodate the bridge approaches. There is insufficient Right-of-Way for an adjacent double-track and current track modeling assumes a double-track bridge at this location in order to meet operational constraints. Requires phased construction, which impacts current freight operations with a bascule bridge. Requires significant track outage to make the rail connection at the shorelines. This will negatively impact freight operations. The FECR industry tracks (CEMEX) north of the bridge would need to be changed to a stub-ended operation, introducing unfavorable inefficiencies and subsequent adverse impacts to the rail network. 	<p>Not feasible because:</p> <ul style="list-style-type: none"> Due to the height of the bridge and the required gradients, there is insufficient room to bring the tracks down to grade prior to reaching the Fort Lauderdale station. This would preclude mixed freight and passenger service and is not a feasible option.

Source: AAF, 2015.

As mentioned in the Phase II discussion of the N-S Corridor above (Section 3.3.5.3), many commenters were concerned that the New River Bridge is old and failing and needs to be replaced with either a new moveable structure that provides greater reliability and greater horizontal clearance, or a new elevated bridge. Many of these commenters noted that a feasibility study for Tri-Rail had evaluated several alternatives for the New River Bridge and stated the DEIS did not provide reliable cost estimates for replacing this drawbridge with new a fixed bridge and, therefore, this alternative cannot be reasonably dismissed.

AAF has committed to replacing or repairing the mechanical and electrical system for the New River Bridge to ensure its operational condition and reliability is maintained, and recognizes that this is essential to the successful operation of the passenger rail system and continued operation of the freight rail system, as well as to maintaining the navigational capacity of each waterway. AAF is not proposing to replace this bridge because it is structurally sound and does not require reconstruction or replacement for the proposed passenger rail service.

AAF has evaluated alternatives and associated costs for replacing the New River Bridge with a high-level fixed bridge. Two options were evaluated for the high-level fixed bridges, one for passenger trains only and the other for all trains. In the analysis of these options, the new bridge is presumed to have a height that matches the nearest adjacent fixed bridge. While detailed cost estimates have not been performed for this option, operational logistics, limitations of surrounding property, and order of magnitude estimates establish that none of the alternatives are sufficiently feasible to warrant further consideration. Infrastructure and operational considerations are provided in Table 3.3-14.

New elements of the Phase II Project that were not previously evaluated in the WPB-M Segment include replacing or reconstructing seven bridges over waterways. This EIS, therefore, includes a description and evaluation of the proposed replacement and/or rehabilitation of these seven bridges between WPB and Miami.

Bridges

As shown in Table 3.3-6, AAF proposes to improve seven bridges within the WPB-M Segment to accommodate the proposed second track. As long-range operational flexibility for full operations from Orlando to Miami has been further studied and understood, AAF has determined that double-tracking these bridges would be warranted for Phase II operations. As shown in Table 3.3-15, four bridges would be rehabilitated, and three would require construction to replace the original bridge with two new single-track bridges (the two Middle River crossings and the Oleta River). At five locations the existing bridges will be retained and AAF will construct new single-track bridges adjacent to the existing structures (Figure 3.3-4). All new structures would be concrete, supported by concrete pilings, and would retain the existing vertical and horizontal clearances. As explained above, the moveable bridge at the New River in Fort Lauderdale would be rehabilitated as part of Phase I.

Bridge	Existing	Number of New Single-Track Bridges	Length (ft)	Width (ft)	Number of Spans
West Palm Beach Canal	Retain	1	200	16	9
Boynton Canal	Retain	1	154	16	6
Hidden Valley Canal	Rehabilitate	-	171	22	6
Hillsboro Canal	Retain	1	206	16	8
Cypress Creek Canal	Retain	-			
North Fork Middle River	Demolish	2	192	16	8
South Fork Middle River	Demolish	2	192	16	8
New River	Rehabilitate	-	210	30	6
Tarpon River	Retain	-			
Dania Canal	Rehabilitate	-	79	30	1
Oleta River	Demolish	2	82	16	3
Snake Creek Canal	Rehabilitate	-	160	27	7
Arch Creek	Retain	1	75	16	1
Biscayne Park Canal	Retain	-			
Little River Canal	Retain	-			
Warner Creek	Retain	-			
Avenue C	Retain	1	33	16	2

Fort Lauderdale Station

Subsequent to the publication of the 2012 EA and 2013 FONSI, AAF shifted the proposed Fort Lauderdale Station building to the opposite (west) side of the tracks, along NW 2nd Avenue between NW 4th Street and Broward Boulevard. On March 27, 2014 FRA issued a Re-Evaluation that determined the new location would not change the environmental impacts identified in the 2012 EA and previously found to be not significant (Appendix 3.3.1-A1).

West Palm Beach Vehicle Maintenance Facility

Subsequent to the publication of the 2012 EA and 2013 FONSI, AAF shifted the proposed Fort Lauderdale VMF to an existing freight rail yard in West Palm Beach. The AAF 2012 EA and 2013 FONSI evaluated a VMF to support AAF passenger service at an existing rail maintenance yard in Fort Lauderdale (Andrews Yard) owned and operated by FECR. However, the Andrews Yard location is unavailable in a configuration necessary for AAF's use at this time; therefore, AAF has identified an alternative location. The new location (the WPB Rail Yard), is an active FECR freight layover yard currently used for staging and building freight trains. This site is 0.9 miles north of the West Palm Beach Station, the terminus of the Phase I Project evaluated in the 2012 EA. FRA prepared a Supplemental EA and FONSI (January 29, 2015) for this facility which is available for public review on the FRA website (www.fra.dot.gov/page/P072).

3.3.5.5 Orlando Vehicle Maintenance Facility

AAF's proposed Orlando VMF would occupy approximately 47 acres of land leased from GOAA (subject to FAA review and approval), and would include four storage tracks, a maintenance building with five tracks, and a secondary maintenance building. The two buildings would occupy approximately 216,000 square feet and 60,000 square feet, respectively. The smaller building would include an EPA-certified paint booth. Planned operations at the VMF, such as vehicle fueling, maintenance, repair and washing include use of hazardous materials (primarily petroleum products, lubricants and degreasers). The typical materials that would be stored and used at the VMF include diesel fuel, motor oils, lubricants, and degreasers. Current conceptual plans include two 10,000-gallon aboveground storage tanks for diesel fuel and one 500-gallon aboveground storage tank for gasoline. The VMF would also provide overnight train storage at the north end of the Project. The facility would have 80 to 90 employees, with a 90-space parking lot. Access to the facility would be from Boggy Creek Road (SR 527A/530).

3.3.5.6 Positive Train Control (PTC) System

PTC is a system designed to prevent train-to-train collisions, derailments caused by excessive speeds, unauthorized train movements in work zones, and the movement of trains through switches left in the wrong position. PTC networks enable real-time information sharing between trains, rail wayside devices, and "back office" applications, concerning train movements, speed restrictions, train position and speed, and the state of signal and switch devices. The Rail Safety Improvement Act of 2008 and the corresponding FRA regulations require passenger and major freight railroads to implement PTC on major freight lines and all new passenger lines.

AAF will implement a PTC system throughout the Project, including the E-W Corridor between Orlando and Cocoa, and the N-S Corridor between Cocoa and Miami. The new PTC system will be interoperable between the AAF and FECR trains. AAF will outfit 55 FECR locomotives as well as its own locomotives to avoid any incompatibility issues. AAF will also expand and supplement FECR's Digicon Digital Traffic Control systems and add a new Back Office Server to satisfy FRA's requirements (49 CFR part 236). The system will also use the existing Parallel Infrastructure LLC's fiber optic system within the FECR Corridor.

Along the N-S Corridor and WPB-M Segment, AAF will use the existing FECR Radio Base Stations. Parallel Infrastructure LLC (a subsidiary of FEIC) currently owns six radio towers on the FECR Corridor, with an additional 11 towers in the planning process.

The existing and future Parallel Infrastructure towers will be considered for use as part of the PTC system, with additional towers placed along the E-W Corridor and N-S Corridor where required. AAF will commission a propagation and interference study to determine where towers are required, tower spacing, and tower height. AAF anticipates that two core communications towers will be needed to support the PTC system on the E-W Corridor: an existing tower at City Point in Cocoa, and a new tower to be located along SR 528 approximately 20 miles west of City Point. This tower would be either a monopole or lattice construction and would be 60 to 100 feet in height. Additionally, an approximate 55 poles (monopoles), 30 to 60 feet in height, will be required along the E-W Corridor to support the PTC and to provide WiFi. All of the proposed poles would be located within the AAF 100-foot ROW.

DEIS commenters requested the location of the additional 11 towers. AAF has been working closely with FECR to advance the proposed PTC strategy in conjunction with FRA's Office of Safety. The next step in this process is for FECR/AAF to submit to FRA an Implementation Plan for PTC. In recent months, AAF/FECR have been collectively exploring two alternate strategies for implementing PTC, one an Enhanced Traffic Management System (ETMS) based approach, and the other is an Enhanced Automatic Train Control (E-ATC) approach. Both of these PTC strategies have been approved by FRA. Regardless of which PTC system is selected, existing FECR infrastructure will be utilized to its greatest extent, including signal antenna masts, communications antenna masts, and cellular towers. A new fiber backbone will be installed as part of the AAF project with each signal and highway-rail grade crossing accessible to the fiber. Utilization of the fiber backbone will minimize the necessity for new wayside antenna masts. As noted above, FECR/AAF will submit to FRA a PTC Implementation Plan, which will identify the proposed approach and will include any new tower locations if found to be necessary. All tower locations would be within the FECR right-of-way.

3.4 Operations

The Project's planned service between Orlando and Miami would consist of 16 revenue round-trips leaving hourly in each direction from 5:00 AM to 9:00 PM, with planned stops at the two intermediate stations in West Palm Beach and Fort Lauderdale. The last Orlando-bound revenue train would arrive in Orlando at 12:10 AM and the last Miami-bound revenue train would arrive in Miami at 11:10 PM.

To support the NEPA analysis, AAF and FECR developed forecasts for future freight operations and travel times for passenger and freight operations. Total scheduled travel time, including stops, is anticipated to be 3 hours, 10 minutes between the terminal stations. Station to station travel time would be 1 hour, 50 minutes from Orlando to West Palm Beach, and 1 hour, 20 minutes from West Palm Beach to Miami. The planned operating speed has three components: a maximum speed of 125 mph from Orlando to Cocoa; a maximum speed of 110 mph from Cocoa to West Palm Beach; and a maximum speed of 79 mph from West Palm Beach to Miami. Table 3.3-16 depicts the projected average operating speeds for passenger and freight rail service by county and the net change in freight rail average operating speed over today's performance. The E-W Corridor from MCO to Cocoa would be a dedicated-use corridor with only passenger service and no grade crossings, while the N-S Corridor would be a shared-use corridor with freight and passenger service and grade crossings.

From Cocoa to West Palm Beach, AAF plans to build and maintain track conditions in accordance with FRA safety standards that permit maximum passenger train speeds of 110 mph and maximum freight train speeds of 75 mph (FRA 2012b and 2012c). Speed limits are restricted in certain locations due to track curves, junctions, bridges, or other infrastructure. Table 3.3-7 lists locations where speed limits will be reduced (see Track Charts, Appendix 3.3.3-A4 and 3.3.3-A5).

County	2013 Freight/ 2016 No-Action Alternative (mph)	2016 Freight (with Project) (mph)	2016 Passenger (mph)	Change in Average Freight Speed with Project (mph)
Orange	N/A ¹	N/A	68.47 ²	N/A ¹
Brevard	31.95	40.97	93.77	9.02
Indian River	38.57	43.45	103.34	4.88
St. Lucie	33.48	35.55	93.38	2.07
Martin	31.76	37.06	76.96	5.30
Palm Beach	34.89	40.42	75.37	5.53
Broward	31.57	38.11	61.72	6.54
Miami-Dade	39.63	39.91	55.67	-0.72

Source: AAF. 2013a. Modeling Assumptions. May 2013. Report.

1 Only the E-W Corridor enters Orange County, which does not carry freight traffic

The intercity passenger rail service would operate with new diesel-electric locomotives and single-level coach trains. The rolling stock for the Project would consist of ten train sets. Eight train sets would be required to be in concurrent operation along the AAF route to deliver regularly scheduled, hourly-service frequency. Each train set would be comprised of two locomotives, and seven coach-type passenger cars (two Business Cars, a Café/Economy Car, four Economy Coach Cars). In addition, AAF would procure one spare locomotive and one spare café car. The two-locomotive arrangement provides redundant push/pull operation and would assure smooth operations up to the maximum speed of 125 mph even with an expansion of the train set to nine cars, if needed. The fleet and all facilities (stations and maintenance) are designed to accommodate expansion to nine-car trains. Five train sets would be stored in the VMF near MCO with the remaining five train sets being stored at the West Palm Beach VMF or Miami Station.

The floor height of the train cars would be the same height as the proposed station platforms and will enable level boarding of all the passenger cars. The entire train would fully conform to Americans with Disabilities Act (ADA) access compliance requirements. To provide easy and safe train boarding and de-boarding and to minimize the dwell time at stations, passengers would be distributed evenly along the platform. When AAF passengers purchase their tickets, they would select their seat, similar to the experience of airline passengers today. Along with each seat assignment, the tickets would indicate a number that coordinates with large numbering on each coach door location along the platform where the customer should wait to enter the train. These large numbers would be also affixed along the platform edge to assist with wayfinding. Uniform consistency of the AAF train sets would simplify this procedure, and give comfort to passengers that they have confirmed seating, and know exactly where it will be. These train features would support the planned dwell times at intermediate stations of 1 minute.

3.5 Ridership

AAF commissioned the Louis Berger Group to develop an investment grade ridership and revenue forecast for this Project. The study was based upon substantial research and development of a travel demand forecasting model. AAF commissioned a peer review to validate the study. A summary of the *Ridership and Revenue Study* is provided in Appendix 3.2.1-A. FRA has reviewed this summary. In May, 2015, AAF released an updated version of the summary and ridership study, provided in Appendix 3.2.1-B. FRA has reviewed but has not validated this updated study.

Many commenters questioned AAF's ridership projections and noted that the full ridership study has not been made publicly available for review. Commenters also suggest that the projected level of ridership is unlikely to be attained. Many commenters suggest that Florida does not have conditions to support the success of AAF, because the Amtrak service currently operating between Miami and Orlando has low ridership. Some commenters suggested that since AAF will be operating in the same market as Tri-Rail and Amtrak, a third rail system is redundant and would not attract the predicted ridership.

AAF developed a twelve-month ridership study to make a business case for high-speed rail that would not rely on grants or operating subsidies, and would be financeable and profitable. The ridership study has been reviewed by the FRA. However, this detailed study contains confidential business information and AAF has not released the complete study to the public. Based on this study and its financial analysis, AAF is confident that a profitable passenger rail service can be operated between Orlando and Miami. The report indicates that Amtrak's low ridership is related to the long travel time and unreliable service, and that Tri-Rail is a short-distance commuter rail system serving a different pool of potential riders.

In response to comments, FRA has reviewed ridership estimates provided in the EIS (this chapter as well as Section 5.2.1) and corrected the document where necessary for consistency.

3.5.1 Methodology

The ridership study assessed the existing and future intercity travel market, attributes of the current modes of travel, and estimated future growth in travel. Specific elements of the study included:

- Establishing the market size and catchment area using data on current levels of travel by auto, rail, air, and bus, as well as information on traveler origin and destination patterns. The summary estimates that as a result of the Project, the central Florida to Southeast Florida travel market would draw over 50 million person-trips annually.
- Identifying the travel network and the schedule, journey time, and costs of all modes of travel using the network.
- Establishing growth rates for the overall market based on trends in each segment.
- Using stated preference surveys to understand how travelers make mode choices based on access time, in-vehicle time, headways, and cost.
- Estimating diversion from existing modes of travel to AAF intercity passenger rail and ridership volumes on each city-pair segment of the AAF system.
- Testing the sensitivity of the ridership model to changes in key forecast assumptions.

Key assumptions of the ridership forecast include:

- The study area was limited to the metropolitan areas of Central and Southeast Florida.
- Trip tables for auto travel were developed based on information from Metropolitan Planning Organizations (MPOs), planning agencies, and operators of other transit services.
- Station market catchment areas were developed as boundaries for the market area.
- Growth in the future travel market was assumed to keep pace with regional projections in growth of populations and households. The published forecasts of Amtrak, Tri-Rail, and the FAA were used to model future rail and air modes of travel.
- Congested auto travel times were used to account for station access and long-distance auto travel times.
- The forecast assumed that short distance vehicle occupancies were 2.2 persons per auto while long distance auto occupancies equaled 2.38 persons per auto.
- Induced demand potential was included in the model, based on methods used in prior Florida high speed rail studies.
- The model assumes that AAF would initiate service in 2016, and that ridership would grow to a stable volume after 3 years.

Sensitivity tests were conducted to determine the change in ridership associated with changes in model assumptions, including trip time, frequency of service, time to access a station, changes in auto travel time, changes in fuel costs, and changes in air fares.

AAF's 2013 *Ridership and Revenue Study* (Appendix 3.2.1-A) provided ridership estimates for three scenarios:

- Base Case – the most conservative scenario. This does not include potential future changes in the transportation network, potential connections with other transit systems, or marketing initiatives.
- Investment Case – an intermediate scenario that includes future connections to other transit services and marketing initiatives targeted to resort customers and travel packagers.
- Management Case – the most optimistic scenario. This includes a broader range of marketing initiatives such as frequent rider loyalty programs, block ticket agreements with resorts and educational institutions, increased potential connections with other transit systems.

AAF's 2015 updated *Ridership and Revenue Study* (Appendix 3.2.1-B) provided an updated analysis of the Management Case only. In preparing this update, AAF revised its assumptions and evaluated additional sources of ridership and marketing strategies.

3.5.2 Ridership Projections

Table 3.3-17 presents AAF's ridership estimates for the four scenarios evaluated in the *Ridership and Revenue* studies. For NEPA purposes, this EIS evaluates only the most conservative, Base Case, scenario in the 2013 study. The other scenarios may have greater benefits (with respect to air quality and

economics) but would not have any greater environmental impacts than the Base Case. The ridership analysis forecasts that passenger rail ridership would total approximately 3.5 million annual riders in 2019 (Table 3.3-17). Of these, approximately 2 million annual riders would be making short distance trips using Phase I of the Project (Fort Lauderdale-Miami, West Palm Beach-Miami, West Palm Beach-Fort Lauderdale). Phase II of the Project, connecting Orlando to West Palm Beach, would add approximately 1.5 million riders making long distance trips (Orlando-Southeast Florida). AAF projects that total annual ridership would exceed 4 million by year 2030. These ridership estimates predict that the AAF rail service will capture 7.2 percent of the long distance market share (Orlando to Miami) and 5.6 percent of the combined long distance and short distance market share. Rail ridership will be drawn from the following modes:

- 69 percent of the forecast riders will shift from long distance automobile travel;
- 10 percent of the forecast riders will shift from airline travel;
- 10 percent of the forecast riders will shift from bus travel;
- 2 percent of the forecast riders will shift from Amtrak rail services; and
- 9 percent of the forecast riders will be from new or “induced” trips.

Analysis Case	Short-Distance Service (West Palm Beach to Miami)	Long-Distance Service (Orlando to Southeast Florida)	Total
Base Case	1,944,500	1,526,300	3,470,800
Investment Case	2,010,900	2,002,100	4,013,000
Management Case (2013 Study)	2,671,556	2,434,300	5,105,856
Management Case (2015 Study)	2,813,200	2,534,100	5,347,300

Source: Louis Berger Group. 2013. *All Aboard Florida Ridership and Revenue Study: Summary Report*. September 2013.

Sensitivity analyses showed that forecasted AAF ridership was sensitive to travel factors such as train running time, service frequency, access time to stations, competing auto travel times, fuel costs, and competing airline fares. An increase of 10 percent in running time (approximately 18 minutes) would result in an approximately 7-percent decrease in forecast ridership (and vice versa). An increase in the frequency of service by 20 percent would result in a 5.4-percent increase in ridership.

The ridership analysis also estimated the number of automobiles that would be removed from the region’s roadways (Table 3.3-18). In 2016 the study estimates that approximately 336,000 cars would be removed with approximately 209,000 coming from short distance trips and 126,000 coming from long distance trips. By 2030, this estimate increases to 1.35 million annual automobiles removed from the roadways.

Year	Short Distance Service	Long Distance Service	Total
2016 ¹	209,896	125,733	335,628
2019 ²	723,005	442,937	1,165,942
2030	815,471	530,228	1,345,699

Source: Louis Berger Group. 2013. *All Aboard Florida Ridership and Revenue Study: Summary Report*. September 2013. Prepared for Florida East Coast.

1 2016 is the anticipated first year of revenue service

2 2019 is the anticipate year at which ridership reaches planned full-service levels.

3.6 Preferred Alternative

AAF has identified Alternative E as its Preferred Alternative because it is the only alternative that is reasonable and feasible to construct. This alternative would include a new rail corridor extending north through MCO to SR 528 (the MCO Segment); a new rail alignment 200 feet south of the SR 528 ROW (the E-W Corridor) from MCO to SR 520 and then within the SR 528 FDOT ROW to the FECR Corridor in Cocoa; and would use the existing FECR ROW from Cocoa to West Palm Beach (the N-S Corridor). AAF has secured lease agreements with GOAA, CFX, and FDOT to construct the MCO and E-W Corridors, and has an operating agreement with FECR to use the N-S corridor and construct the necessary infrastructure improvements. CFX would acquire the land south of the existing ROW limits to accommodate future highway widening and a transit corridor, and would grant an easement of an approximately 100-foot wide strip to AAF.

The location of the proposed Project should not impede the ability for FDOT or the CFX to expand SR 528 to an 8-lane facility extending from Orlando International Airport to I-95; CFX's conceptual plans to reconstruct the Dallas Boulevard interchange, which includes a southerly shift in the SR 528 mainline; nor the ability to extend the Osceola County Expressway Authority's proposed Northeast Connector Expressway to intersect with SR 528. As stated by the CFX Authority, Alternative E is the only acceptable alternative for CFX and the Authority is pursuing obtaining the right of way necessary to implement this option. FRA has evaluated AAF's analysis and concurs that Alternative E is its preferred alternative that would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors.

3.7 Summary

As required by NEPA, this FEIS presents the alternatives developed for the Project, and evaluates these alternatives in light of their ability to satisfy the Project purpose and meet the primary objective of the Project (to provide reliable and convenient intercity rail service that is sustainable as a private commercial enterprise while maximizing the use of existing infrastructure). This chapter describes the alternatives identified within each of the connected segments of the Project, and reports the results of applying screening criteria. The chapter presents the reasons why each alternative was either withdrawn or retained, and describes in detail the No-Action Alternative and the three Action Alternatives evaluated in this FEIS. These Action Alternatives (Alternative A, Alternative C, and Alternative E) differ only in the

location of the proposed tracks in the 15.5-mile segment of the E-W Corridor parallel to SR 528 between the interchanges with SR 417 and SR 520. All other elements of the Action Alternatives are identical. The CFX Board found that Alternatives A and C are not reasonable and feasible; therefore Alternative E is the Preferred Alternative. Chapter 5, *Environmental Consequences*, of this FEIS provides an evaluation of the environmental impacts of the three Action Alternatives, in comparison to the No-Action Alternative. Chapter 5 also describes the environmental impacts of activities within the Phase I WPB-M Segment that were not previously evaluated in the 2012 EA and 2013 FONSI and subsequent re-evaluations, including the seven new or reconstructed bridges over waterways and minor changes to the Miami Viaduct, and summarizes the environmental consequences as described in the 2012 EA.

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4 Affected Environment

This chapter describes the affected environment in which the All Aboard Florida (AAF) Passenger Rail Project (Project) would be constructed and operated. Characteristics of the surrounding area are given to familiarize the reader with the geography, land use, demographics and economics, and the physical and natural environment. The Council on Environmental Quality (CEQ) regulations at 40 CFR § 1502.15 require that an Environmental Impact Statement (EIS)

“shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in a statement shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced.”

The level of information provided in this chapter for each resource is proportionate to that resource’s potential to be affected by the Project. The baseline conditions presented in this chapter reflect 2013 Existing Conditions or the most recent year for which data are available. Information on the affected environment is presented in a north-to-south order:

- Orlando International Airport (MCO) Segment (MCO Segment) – the portion of the Project on Greater Orlando Airport Authority (GOAA) property;
- East-West Corridor (E-W Corridor) – from the GOAA property line to the connection with the Florida East Coast Railway (FECR) corridor in Cocoa;
- North-South Corridor (N-S Corridor) – the FECR Corridor from Cocoa to West Palm Beach, the terminus of the Project evaluated in this EIS; and
- West Palm Beach-Miami Corridor (WPB-M Corridor) – the FECR Corridor from West Palm Beach to Miami that was previously evaluated as Phase I.

4.1 Land Use and Transportation

This section provides an overview of the existing land uses and transportation systems within the Project Study Area. The Project Study Area for these resources includes the portion of central and southeast Florida proximate to the Project, including the counties through which it passes. The Project Study Area for land use includes the 50-foot wide existing track bed along the N-S Corridor plus 125 feet on either side (east and west) and a 50-foot central track bed plus 125 feet on either side (north and south) for each of the E-W Corridor alternatives.

4.1.1 Land Use

This section describes the methods used to evaluate existing land uses and provides an overview of the land uses and land use plans and policies within the Project Study Area.

4.1.1.1 Methodology

Florida Land Use, Cover and Forms Classification System (FLUCCS) geographic information systems (GIS) data derived from the South Florida Water Management District (SFWMD) and the St. Johns River Water Management District (SJRWMD) were the primary sources of data (SFWMD 2008; SJRWMD 2009). The land use data presented in this section include the FLUCCS category designation (with description), acreage, and aerial cover (by percent) of each mapped land use within the Project Study Area (FDOT 1999). 'Predominant' land uses are those categories of land use, as represented by mapped land use, that encompass at least 10 percent of the total aerial cover of the Project Study Area.

4.1.1.2 Affected Environment

This section describes the existing land uses and provides an overview of the land uses and land use plans and policies within the Project Study Area, for each segment of the Project.

Existing Land Uses

The MCO Segment is on GOAA property. Primary land uses include Transportation, Water, and undeveloped lands. Transportation land uses include airport infrastructure and parking lots. Existing land uses along the MCO Segment are shown in Appendix 4.1.1.

The E-W Corridor crosses Orange and Brevard Counties. The western terminus of the E-W Corridor is in the City of Orlando in Orange County, while the eastern terminus of the E-W Corridor is in the City of Cocoa in Brevard County. Land uses adjacent to the E-W Corridor within Orlando are primarily Transportation, Commercial and Services, and undeveloped lands. Land uses adjacent to the E-W Corridor within Cocoa are primarily Transportation, Low Density Residential, Commercial and Services, and undeveloped lands. The remaining areas along the E-W Corridor are primarily Transportation, Cropland and Pastureland, and undeveloped land adjacent to State Road (SR) 528. Figures 4.1.1-A2 through 4.1.1-A38 in Appendix 4.1.1 depict the existing land uses along the E-W Corridor as well as the incorporated municipal boundaries of Orlando and Cocoa.

The E-W Corridor passes through the Innovation Way Overlay Area, the unincorporated community of Wedgefield, and the Tosohatchee Wildlife Management Area (WMA). The Innovation Way Overlay Area is a designated special use area in Orange County, (Orange County Planning Division 2013). The intent of the Innovation Way Overlay Area is to promote high tech business jobs and growth, along with quality housing, new schools, parks, trails, and natural spaces. Amendment 2006-1-B-FLUE-2 also includes a multi-modal transportation plan. The unincorporated community of Wedgefield is west of the SR 520 interchange, and has a total population of 6,679 within a land area of 23.4 square miles, for a population density of approximately 285.4 persons per square mile (USCB 2012). The WMA is east of the SR 520 interchange, and is managed by the Florida Fish and Wildlife Conservation Commission (FWC). The WMA consists of 30,701 acres within the St. Johns River Watershed (FWC 2013).

The N-S Corridor, which is entirely a Transportation land use and within the existing FECR Corridor, crosses Brevard, Indian River, St. Lucie, Martin, and Palm Beach counties. The existing FECR Corridor within the Project Study Area is typically 100 feet wide and has had freight and/or passenger service within the corridor throughout its 100-year plus history. The FECR Corridor is largely parallel to U.S. Route 1 or Route 1A1. Land uses transition from high density, central business district urban, to medium density residential, to industrial and commercial uses, with extensive areas of vacant and/or undeveloped land along the corridor. The N-S Corridor passes through the central business districts of Melbourne, Vero Beach, Fort Pierce, Stuart, Port Salerno, and Jupiter. The predominant land uses adjacent to the N-W Corridor in each county are shown in Appendix 4.1.1 and include:

- Brevard County: Commercial and Services, Transportation, and Medium Density Residential;
- Indian River County: Commercial and Services, Industrial, and undeveloped lands;
- St. Lucie County: Low Density Residential and undeveloped lands, with some Medium Density Residential, Commercial and Services in Fort Pierce;
- Martin County: Transportation, Medium Density Residential, Commercial and Services, and undeveloped lands; and
- Palm Beach County: Transportation, Commercial and Services, and Medium Density Residential.

The N-S Corridor passes through several incorporated municipalities: Cocoa, Melbourne, Sebastian, Vero Beach, St. Lucie Village, Fort Pierce, Stuart, Jupiter, Palm Beach Gardens, Riviera Beach, and West Palm Beach. More information on these municipalities is provided in Section 4.4.1, *Communities and Demographics*. Appendix 4.1.1 depicts the existing land uses along the N-S Corridor as well as any incorporated municipal boundaries crossed by this segment.

The WPB-M Corridor crosses Palm Beach, Broward, and Miami-Dade Counties. The existing FECR Corridor within the Project Study Area is typically 100 feet wide and has had freight and/or passenger service within the corridor throughout its 100-year plus history. The existing FECR Corridor traverses established and heavily developed areas of the three counties. Land uses transition from high density, central business district urban, to medium density residential, to industrial and commercial uses. Little vacant and/or undeveloped land exists along the corridor. Established neighborhoods and communities have evolved in conjunction with the corridor due to the age of the existing corridor. The WPB-M Corridor passes through the central business districts of West Palm Beach, Fort Lauderdale, and Miami. The West Palm Beach Station area is within the designated Downtown Planned Unit Development. The Fort Lauderdale Station area is within the Regional Activity Center/West Mixed-Use Area, and the Miami Station area is currently designated as High-Density Residential area.

Land Use Plans

As per the Chapter 163, Part II, Florida Statutes (FS) (the Community Planning Act), local governments in the State of Florida are required to create, adopt, and maintain a comprehensive plan to guide and manage future development. Amendments to the Comprehensive Plan are typically made twice per year, and may include changes to the future land use designation of public or private properties, changes to the schedule of capital improvements necessary to support future population

growth, or amendments to goals, objectives, and/or policies for growth management. Private development must conform to any applicable local comprehensive plans, or elements or portions thereof (Florida Legislature 2012). Table 4.1.1-1 lists the relevant land use plans for those counties crossed by the Project.

Title	Last Update	Preparer
Growth Management Plan, City of Orlando	2011	City of Orlando, Planning Division
Orange County, Florida; Comprehensive Plan 2010-2030, Destination 2030	2012	Orange County Community, Environmental, and Development Services; Planning Division
The 1988 Brevard County Comprehensive Plan	2011	Brevard County Planning and Development
Indian River County 2020 Comprehensive Plan	2006	Indian River County, Planning Division
St. Lucie County Comprehensive Plan	2010	St. Lucie County, Planning Division
Martin County Comprehensive Growth Management Plan	2013	Martin County Growth Management Department
Palm Beach County, 1989 Comprehensive Plan	2013	Palm Beach County, Planning Division
West Palm Beach Master Plan Update	2009	City of West Palm Beach
Fort Lauderdale Downtown Master Plan	2007	City of Fort Lauderdale
2025 Downtown Miami Master Plan	2009	Miami Downtown Development Authority

Many commenters suggested the Final Environmental Impact Statement (FEIS) should review all relevant comprehensive plans and community redevelopment plans. As the Project is a regional-scale action, the Draft Environmental Impact Statement (DEIS) primarily reviewed comprehensive plans at the county level. Since the Project would not result in substantial land use conversions in the communities it traverses (see Section 5.1.1, *Land Use*), conditions of land use consistency would not change. For that reason, the FEIS did not review land use planning documents other than those identified in Table 4.1.1-1. The 2060 Florida Transportation Plan (FDOT 2011d) was also reviewed for planning consistency. The 2012 *Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida* (2012 EA) reviewed land use planning consistency for the Phase I stations, which are currently under construction.

4.1.2 Transportation

This section provides an overview of the existing transportation infrastructure within the Project Study Area. Transportation infrastructure includes automobile, motorbus, pedestrian, train, and aviation.

4.1.2.1 Rail Transportation

There are three primary north-south rail corridors in the Project Study Area. One corridor runs along the east coast of Florida between Jacksonville and Miami and is owned by FECR. According to the FECR operations data from 2012, this route consists of four flat switching yards, 72 industry turnouts, and 21 over-grade and under-grade bridges. CSX owns tracks through the center of the state between Winter

Haven and Palm Beach that connect to a third set of tracks owned by the State of Florida between Palm Beach and Miami (South Florida Rail Corridor). There is no existing rail infrastructure in the E-W Corridor.

Existing Passenger Train Service

The National Railroad Passenger Corporation (Amtrak) provides passenger rail service between Orlando and Miami on their Silver Star and Silver Meteor services. These services originate in New York City and operate between Orlando and Miami via CSX tracks to West Palm Beach and the South Florida Rail Corridor tracks between West Palm Beach and Miami. These services stop at ten stations including Orlando, Kissimmee, Winter Haven, West Palm Beach, and Miami. One train operates per service each day in each direction with travel times ranging from 5 hours, 45 minutes to 7 hours, 34 minutes. The average round trip cost for the service is \$100.00 for one adult passenger. In 2012, ridership for the entire Silver Star service was 425,794 passengers, while ridership for the entire Silver Meteor service was 375,164 passengers. Combined ridership was 800,958 annual passengers (Brookings 2013). Figure 4.1.2-1 depicts the Amtrak service.

The South Florida Regional Transit Authority (SFRTA) serves the Project Study Area with commuter rail service between Mangonia Park in West Palm Beach and Miami (approximately 70 miles), called "Tri-Rail." Only the northernmost station, Mangonia Park, is within the Orlando to West Palm Beach study area. Tri-Rail operates on the South Florida Rail Corridor and serves 17 stations with 25 southbound (SB) and 25 northbound (NB) trains per weekday, and 15 SB/15 NB trains per weekend day. The travel time between West Palm Beach and Miami is 1 hour, 40 minutes. Tri-Rail has a zone based fare system which ranges from \$2.50 to \$6.90 per trip. Fare discounts are available. Average monthly ridership for 2012 ranged from less than 12,000 to over 14,000 riders, which is an increase over the previous year (SFRTA 2013b). Figure 4.1.2-2 shows the Tri-Rail service.

Existing Freight Rail Service

Regular freight traffic currently operates within the FECR Corridor from Jacksonville to Miami. The freight track within the FECR Corridor was evaluated from Mile Post (MP) 170 in Cocoa (Brevard County) to MP 299 in West Palm Beach (Palm Beach County). The existing freight traffic consists of an average of 14 trains per day with a low of nine daily trains on Saturday and a high of 17 daily trains Tuesday through Thursday. This includes both NB and SB trains. The average train length is 8,150 feet, which includes two locomotives and 101 cars. Regular freight traffic also operates within the CSX/South Florida Rail corridors from Orlando to Miami. Figure 4.1.2-3 shows the CSX tracks in the Project Study Area.

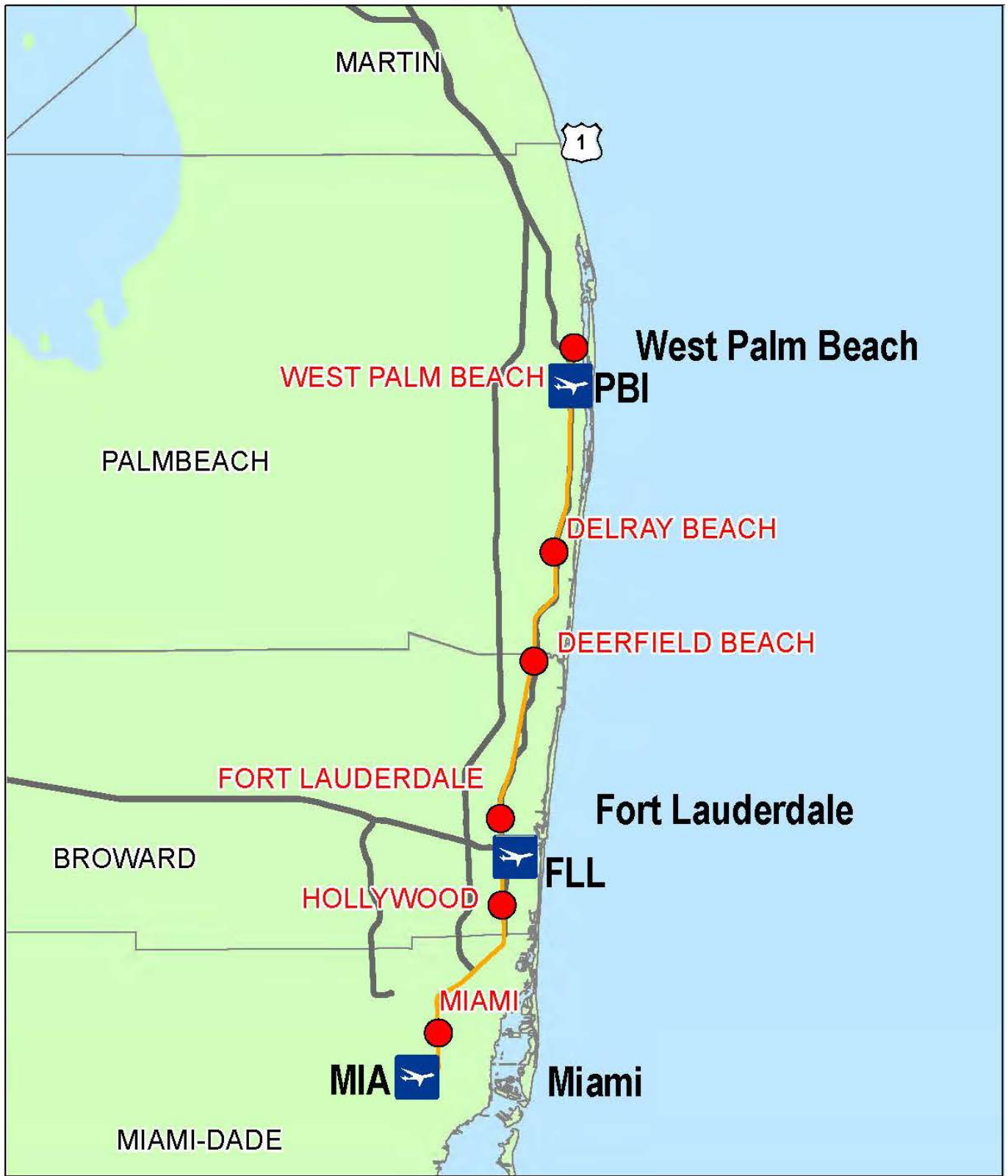


Explanation of Features

- Amtrak Stations
- Amtrak Alignment
- Major Airports

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

Amtrak System		
All Aboard Florida Intercity Passenger Rail Project		
		4.1.2-1



Explanation of Features

-  Tri-Rail
-  Major Airports
-  Tri-Rail Stations

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

Tri-Rail System		
All Aboard Florida Intercity Passenger Rail Project		
		4.1.2-2



Explanation of Features

- CSX Alignments
- Major Airports

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

CSX System		
All Aboard Florida Intercity Passenger Rail Project		
		4.1.2-3

4.1.2.2 Inter-City Motorbus Service

Miami Orlando Shuttle Bus provides five bus trips daily, seven days a week between Orlando and West Palm Beach. From West Palm Beach the route follows Florida's Turnpike, passing through Fort Pierce and Kissimmee before arriving in Orlando. It takes about 4 hours and the average round trip cost for the service is \$60.00 for one adult passenger (Miami Orlando Shuttle Bus 2014).

Greyhound provides passenger bus service between Orlando and West Palm Beach. The route runs four times daily from Orlando to West Palm Beach. From West Palm Beach the route follows Florida's Turnpike, passing through Fort Pierce and Kissimmee before arriving in Orlando. It takes about 4 hours one way and the average round trip cost for the service is \$60.00 for one adult passenger (Greyhound 2014).

RedCoach provides passenger bus service between Orlando and West Palm Beach. The route north to south (Orlando to West Palm Beach) runs along Florida's Turnpike, passing through Fort Pierce before arriving in Orlando. The route runs four times daily on Tuesday, Wednesday, Thursday, and Saturday. This route also runs two times daily on Monday, Friday, and Sunday. The route south to north (West Palm Beach to Orlando) runs along Florida's Turnpike, passing through Fort Pierce before arriving in West Palm Beach. The route runs four times daily on Monday, Tuesday, Wednesday, and Saturday. This route also runs two times daily on Thursday, Friday, and Sunday. It takes about 3 hours one way and the average round trip cost for the service is \$100.00 for one adult passenger (RedCoach USA 2014).

4.1.2.3 Local Transit Service

Orlando, West Palm Beach, Fort Lauderdale, and Miami all have local transit service that circulates within each jurisdiction.

LYNX is the transit operator in Orlando; it provides local, limited, and express bus service throughout Orange, Seminole, and Osceola Counties and portions of Lake, Volusia, and Polk Counties. MCO is currently served by multiple local bus routes that provide connections to Walt Disney Universal Studios, the Florida Mall, and Downtown Orlando. Local bus fare is \$2.00.

Palm Tran is the primary transit operator in Palm Beach County, providing local and express bus service throughout Palm Beach County. Local bus fare is \$1.50.

Broward County Transit (BCT) provides local bus service within Fort Lauderdale, and connects Broward County to multi-modal transit options in Palm Beach and Miami-Dade Counties. BCT operates 285 fixed route buses along 43 bus routes on weekdays and 28 to 30 bus routes on weekends. BCT fares range between \$1.75 for regular service and \$2.35 for express service. Senior, youth, disabled, and Medicare discounts are available, which reduce regular service to \$0.85 and express service to \$1.15. Children less than 40 inches in height ride free (Broward County Transit 2013).

Miami-Dade Transit is the transit operator in Miami-Dade County; they provide local, limited stop, and express bus and rail service throughout Miami-Dade County. The single ride fare is \$2.00.

Several counties and municipalities along the N-S Corridor provide local transit services, including the Sebastian Go-Line Transit Service, Martin County's transit system, and the Treasure Coast Connector.

4.1.2.4 Aviation System

Orlando, West Palm Beach, Fort Lauderdale, and Miami all have international airports with multiple commercial flights each day. In 2012, 96,112 daily and 35.1 million annual passengers used MCO (MCO n.d.) and 108,969 daily and 39.5 million annual passengers used Miami International Airport (MIA) (MIA 2013). There are 244 daily and 88,900 annual passengers who travel between Orlando and Miami via airplane (Louis Berger Group 2013). American Airlines, United Airlines, and Silver Airways provide air service between Orlando and Miami, Silver Airways and Spirit Airlines provide service between Orlando and Fort Lauderdale, and Silver Airways provides service between Orlando and West Palm Beach. The average flight time is 60 minutes, which does not include the time required to reach the airport, pass security, and board the aircraft. Several smaller airlines and charter services provide service between the various smaller “executive” airports in the region. In total, there are more than 30 flights per day between MCO and the West Palm Beach (PBI)/Fort Lauderdale (FLL)/Miami (MIA) Airports. There are 244 daily and 88,900 annual passengers who travel between Orlando and Miami via airplane (Louis Berger Group 2013). In 2012, 96,112 daily and 35.1 million annual passengers used MCO and 108,969 daily and 39.5 million annual passengers used MIA (MCO n.d.). By 2030, the number of passengers is expected to grow to 74 million per year, an increase of 45 percent (Louis Berger Group 2013).

Melbourne International Airport (MLB) has commercial air service (Delta, US Airways) serving Atlanta and Charlotte. St. Lucie County International Airport (FPR) currently has no scheduled air carrier service.

4.1.2.5 Roadway Network

The Project Study Area includes the regional road network between Orlando and Miami, and the local road system.

Regional Roadway Network

The primary regional roadways between Orlando and West Palm Beach are shown in Figure 4.1.2-4 and include SR 528 (which runs east-west), Florida’s Turnpike (which runs northwest-southeast) and Interstate 95 (I-95) (which runs north-south). SR 528 is a 53.5-mile partial toll road that is operated and maintained by the Central Florida Expressway Authority (CFX) from Sand Lake Road to SR 520, and by the Florida Department of Transportation (FDOT) from Interstate 4 (I-4) to Sand Lake Road and from SR 520 to its eastern terminus at SR 401. The roadway has four to six lanes in each direction. The CFX section has two toll plazas. The FDOT sections are not tolled. Florida’s Turnpike is a multi-lane, limited access toll road that is operated and maintained by the Florida Turnpike Enterprise (FTE) from Wildwood to Miami. The FTE section in the Project Study Area has six toll plazas. I-95 is a multi-lane limited access interstate highway that is operated and maintained by FDOT that covers the entire length of the state of Florida.

The Level of Service (LOS) and Average Annual Daily Traffic (AADT) for the highways were determined from the FDOT District 4 and 5 Generalized Tables and the FTE (FDOT 2011a and 2011b; CFGIS 2012). Overall the LOS through the analyzed roadway corridors has reasonably stable flow, at or near free flow traffic (LOS C), which is the target for highway systems outside urbanized areas according to FDOT. There are several segments within the roadway corridors where the LOS approaches an unstable flow in traffic, LOS D, but according to FDOT LOS D is the target for highway systems inside urbanized areas. Therefore, these highways currently meet or exceed the LOS standard for state highway systems according to FDOT.



Data Sources: 2012 ESRI

Regional Roadway Network		
All Aboard Florida Intercity Passenger Rail Project		
		4.1.2-4

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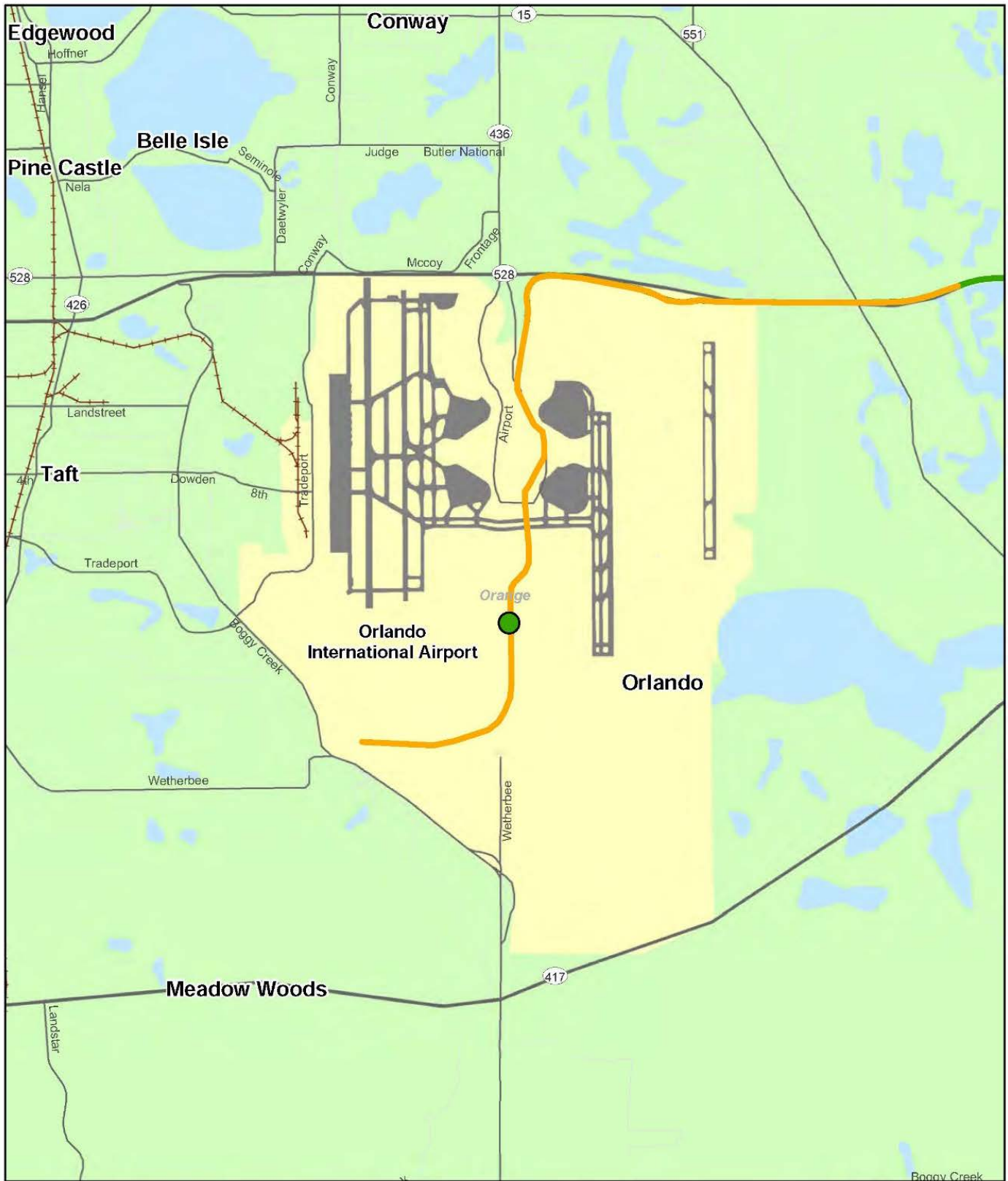
The average travel time between Orlando and Miami via automobile is 4 hours via I-95 and 3 hours, 30 minutes via Florida's Turnpike. The travel time between MCO and I-95 on SR 528 is 31 minutes. Table 4.1.2-1 shows the volume and operating conditions on major area highways.

Highway	County	Lanes	Average Annual Daily Traffic	Level of Service
State Road 528	Orange	4-6	30,000-78,300	B-C
	Brevard	4	20,200-30,000	B
Interstate 95	Brevard	4-6	26,500-55,000	B-C
	Indian River	4	38,000-41,000	B
	St. Lucie	6-8	35,000-67,000	B-C
	Martin	6	39,000-66,500	B-C
Florida's Turnpike	Palm Beach	10	66,000-179,500	B-D
	Orange	4	55,900	C
	Osceola	4	25,300-55,900	B-C
	Indian River	4	26,400	B
	Okeechobee	4	26,400	B
	St. Lucie	4	26,400-40,700	B
	Martin	4	35,700-40,700	B
	Palm Beach	4	35,700-56,300	B-C

Source: FDOT. 2011a. *2011 SHS LOS Maps*. Secure download from Chon Wong, District 4 Contact. Received May 2013; FDOT. 2011b. *Florida's Turnpike AADT and LOS Request*. Email from Kim Cromartie Samson, Florida's Turnpike Enterprise to author. Received May 2013; Central Florida Geographic Information Systems. 2012. District 5 LOS Spreadsheet for 2012. <http://www.cfgis.org/FDOT-Resources/TrafficData.aspx>. Accessed May 7, 2012.

Local Roadway Network

MCO is south of SR 528 and north of SR 417 (the Central Florida Greenway). Roadway access from the north is primarily from Jeff Fuqua Boulevard and from the south on the South Access Road (Figure 4.1.2-5). Vehicular volumes for the South Access Road (County Road [CR] 530/Boggy Creek Road) are shown in Table 4.1.2-2. Table 4.1.2-1 also includes traffic information for the access roads serving the three Phase I stations evaluated in the 2012 EA. Access to the West Palm Beach Station would be from Quadrille Street and 6th Street. Access to the Fort Lauderdale Station would be from Broward Boulevard to NE 2nd Avenue, and access to the Miami Station would be from NW 1st Avenue. Table 4.1.2-2 shows the current daily traffic volumes and LOS for these roads.



Explanation of Features

- E-W Corridor
- MCO Segment
- Proposed Station (By Others)

Data Sources: 2012 ESRI

Local Roadway Network at MCO	
All Aboard Florida Intercity Passenger Rail Project	
4.1.2-5	

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Project # 6003-12-0212

Project Element	Access Road	Segment	Average Annual Daily Traffic	Level of Service
Vehicle Maintenance Facility (VMF)	County Road (CR) 530/Boggy Creek Road	North of Airport Park Drive	13,000	E
VMF	CR530/Boggy Creek Road	Weatherbee to East Weatherbee	9,300	E
West Palm Beach Station	Quadrille Street	Banyan Boulevard to Flagler Memorial Bridge	10,900	B
Fort Lauderdale Station	Broward Boulevard	Avenue of the Arts to S Andrews Avenue	50,500	C
Miami Station	NW 1 st Avenue	NW 2 nd Ave to NW 1 st Ave	4,600	B

Source: City of Orlando, Planning Division. 2011. Growth Management Plan, City of Orlando: Transportation Element. http://www.cityoforlando.net/planning/cityplanning/PDFs/GMP/2012/jan/04_Transportation_GOPs_Supp_5.pdf. December 2011. Accessed August 7, 2013.

4.1.2.6 At-grade Crossings

The N-S Corridor crosses 159 roadways at grade between Cocoa and West Palm Beach (AAF 2013c). A summary of the total number of public and private at-grade crossings by county, within the N-S Corridor, is provided in Table 4.1.2-3. A summary of existing freight operations is provided in Table 4.1.2-4. As shown in Table 4.1.2-4, grade crossings are typically closed for 240 seconds (4 minutes) per train, generally once per hour. Phase I of the Project crosses 183 roadways at-grade, as described in Section 3.3.1.3 of the 2012 EA.

County	Length of Corridor (miles)	Number of At-grade Crossings
Brevard	42	55
Indian River	21	30
St. Lucie	22	21
Martin	26	27
Palm Beach	18	26
Totals	87	159

Source: AAF. 2013c. FECR Grade Crossing Estimate Spreadsheet. Received via email from Alex Gonzalez on March 7, 2013.

Table 4.1.2-4 Summary of Existing (2011) Freight Operating Characteristics and Average Crossing Closures within the N-S Corridor

County	Time to Activate and Close the Gate (sec) ¹	Avg. Train Length (ft.)	Avg. Train Speed (mph) ³	Time to Clear (sec)	Time to Bring the Gate Back Up (sec)	Total Time to Activate and Clear (sec)	Crossings (Trains per Day)	Closure (min/day)	Maximum Crossings per Hour ²	Maximum Delay per Hour (min) ⁴
Brevard	30	8150	28.5	195	15	240	18	72.0	1	4.0
Indian River	30	8150	28.5	195	15	240	18	72.0	1	4.0
St. Lucie	30	8150	28.5	195	15	240	18	72.0	1	4.0
Martin	30	8150	28.5	195	15	240	18	72.0	1	4.0
Palm Beach	30	8150	59.4	94	15	139	18	41.6	1	2.3

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013.

- 1 FRA regulations require 20 seconds to activate and close the gate prior to the train entering the railroad crossing and 10 seconds to bring the gate back up. FDOT uses 30 seconds to activate and close the gate prior to the train entering the railroad crossing and 15 seconds to bring the gate back up. To account for the worst-case scenario, FDOT timings were used in this analysis.
- 2 Maximum crossings per hour includes north-bound and south-bound trains combined
- 3 2011 freight speed for Palm Beach, Martin, St. Lucie, Indian River, and Brevard Counties was obtained from Section 3.3.1.1 of the Environmental Assessment for the All Aboard Florida Passenger Rail Project – West Palm Beach to Miami, Florida, dated October 31, 2012.
- 4 Maximum Delay per Hour calculated as the Total Time to Activate and Clear multiplied by the Maximum Crossings per Hour.

4.1.3 Navigation

The United States Coast Guard (USCG) has reviewed the Project and determined that six of the proposed bridges (the new bridge across the St. Johns River parallel to SR 528, and the proposed replacement bridges across the Eau Gallie River, St. Sebastian River, Crane Creek, Turkey Creek, and the Hillsboro Canal in Broward County) will require bridge permits (USCG letter May 1, 2013, Appendix 4.1.3-A). The USCG requested that a navigation analysis of these bridges be included in the EIS (USCG letter July 24, 2013, Appendix 4.1.3-A). This detailed analysis is provided in Appendix 4.1.3-B1 and B2, *Navigation Discipline Report* and its *New River Bridge Closures* addendum.

The USCG determined (USCG letter May 1, 2013) that an additional twelve bridges that would be reconstructed as part of the Project are exempt from obtaining bridge permits. The reasons provided by the USCG for their exemption include that they are either not navigable other than by rowboats, canoes, or small motorboats and existing navigational clearances would be maintained; fall under the Coast Guard Authorization Act of 1982; or are not subject to tidal influence, not used for substantial interstate or foreign commerce, and not susceptible to such use in their natural or potentially improved condition. USCG did not make any findings concerning other fixed-span bridges where superstructure replacement would be required to accommodate the proposed second track, therefore no analyses were performed for these bridges.

At a meeting held on August 12, 2013 (see Appendix 4.3.1 for meeting notes), USCG indicated that information on the operations of all moveable bridges within the Project Study Area would be required to determine if there would be any operational effects on navigation. This FEIS evaluates Phase II of the Project, which would extend service from West Palm Beach to Orlando. Phase I of the Project, which was the subject of previous environmental review, includes the segment from West Palm Beach to Miami. As

shown in Figure 4.3.1-1, the St. Lucie and Loxahatchee River Bridges are within the N-S Corridor (Phase II of the Project) and the New River Bridge is within the WPB-M Corridor (Phase I of the Project, currently under construction). This FEIS includes evaluation of the New River Bridge in response to comments received on the DEIS.

This section provides a summary of existing navigational conditions for the proposed new fixed bridge over the St. Johns River and for three existing moveable bridges (Figure 4.3.1-1):

- The St. Lucie River (St. Lucie/Martin County);
- The Loxahatchee River (also known as the Jupiter River, Martin/Palm Beach County); and
- The New River in Fort Lauderdale (Broward County).

Information is also provided for five waterways that have fixed bridges that will be replaced:

- Eau Gallie River (Brevard County)
- Crane Creek (Brevard County)
- Turkey Creek (Brevard County)
- St. Sebastian River (Brevard/Indian River County)
- Hillsboro Canal (Palm Beach/Broward County).

4.1.3.1 Methodology

This section describes the methods used to evaluate existing vessel traffic at the three moveable bridges and to evaluate existing economic conditions associated with the maritime industry at these locations.

This study considers data presented in previous traffic studies performed by others, and includes detailed analyses and simulation modeling results based on current and future freight train operations, proposed passenger rail, and recent boat traffic surveys. These studies and analyses included:

- Literature reviews of vessel traffic studies conducted at each bridge;
- Summaries of 2014 vessel traffic surveys gathered through video assessments;
- Summaries of bridge closure data;
- A detailed analysis of the existing vessel traffic and bridge schedules;
- Results from a discrete-event simulation model of vessel traffic.

Vessel Traffic

Vessel traffic on the New River, Loxahatchee River, and St. Lucie River were characterized based on a traffic survey and video survey conducted in winter 2014 and updated based on information provided by local authorities for the St. Lucie and Loxahatchee rivers.



Explanation of Features

- Movable Bridges
- N-S Corridor
- WPB-M Corridor

Movable Bridges		
All Aboard Florida Intercity Passenger Rail Project		
		4.1.3-1

Path: F:\FEC\FECI_GDB\MX\DAE\IS\AAF Project Area Movable Bridges.mxd

As described in the 2014 Navigation Discipline Report (Appendix 4.1.3-B1), winter 2014 video recordings from cameras located at FECR's bridges at the St. Lucie River, Loxahatchee River, and New River were provided by FECR. In response to public comments, videos from the summer season were obtained and boat count data were incorporated into a revised analysis (Appendix 4.1.3-B2). The winter videos contain approximately two to three weeks of data and the summer videos contain approximately two to three months of data. These data were used to quantify the number and types of recognizable vessels that pass under the bridges under existing conditions. Summer boat count data were not available for the New River Bridge so boat counts were estimated based on the observances at the other two bridges and based on available winter data (AMEC Foster Wheeler 2015). The raw data collected during the winter includes the number and size of commercial and recreational vessels that pass under the bridges. The summer data includes the number of vessels but does not identify commercial and recreational vessels. These data were summarized and organized to show differences and patterns between and within weekdays, weekends, and different times of the day (AMEC 2014a; AMEC Foster Wheeler 2015).

Bridge Operations

Video recordings provided by FECR were used to collect bridge operation data for FECR's bridges at Loxahatchee River and St. Lucie River. The time of day when the bridge initially begins to close was recorded, and train schedule times were recorded relative to this initial closure time.

Existing bridge operations data for the New River Bridge could not be collected from the video provided by FECR. The location of the camera did not provide a line of sight on the bridge itself. Instead, information on current bridge operations and vessel traffic at the New River Bridge was gathered through monitoring of live video feed available at this location: <http://www.microseven.com/tv/livevideo-esplanade.html>. This effort was conducted for five days during the winter season for vessel traffic, including weekdays and one full weekend. Live video feed data collection included vessel direction (heading east or west), vessel type (commercial or recreational), vessel size, bridge operations (closing times, the time the train arrives, and time it clears the bridge), as well as pictures of the vessels crossing (AMEC 2014a). Bridge operations for existing (2013) conditions are provided in Section 5.1.3.

4.1.3.2 Existing Navigation Conditions

This section describes the nine waterways and the existing (2013) navigation conditions and operations at each waterway.

St. Johns River

The St. Johns River at SR 528 is a non-tidal navigable waterway approximately 280 feet wide, and is a shallow meandering river without a designated channel. The SR 528 bridges (the eastbound and west-bound lanes are on separate parallel bridges) are supported on concrete pilings, including one set of pilings in the center of the river. These bridges provide approximately 16 feet of vertical clearance over the river. The St. Johns River receives minimal boat traffic, almost solely from recreational use and airboat tours. There are no existing public boat ramps with access to the river at the SR 528 crossing. The closest public boat ramps with direct access to the river are 6 miles north at the SR 50 bridge and approximately 6 miles south at the SR 520 bridge.

St. Lucie River

The St. Lucie River is a tidal waterway located in St. Lucie and Martin Counties, with the railway bridge located in Martin County. The St. Lucie River Bridge is located about 5.9 miles from the St. Lucie River's inlet and is between the U.S. A1A (Dixie Highway) bridge (a drawbridge with an approximately 100-foot opening) and the U.S. 1 bridge, a fixed-span structure. The railroad bridge is a low single-track, concrete-piling supported structure with a drawbridge. This operable bridge has a vertical clearance of 7 feet and a horizontal clearance of 40 feet. Although this bridge remains open to the waterway to allow a continuous flow of vessel traffic, it closes an average of 10 times daily to accommodate freight rail service. While closed, most vessels (with the exception of small recreational vessels less than 16 feet size class) are unable to pass through the bridge, and queue while waiting for the bridge to re-open (AMEC 2014a). The bridge is approximately 8.2 miles above the outlet of the river at Sawfish Point and the inlet to the Indian River Lagoon. Immediately upriver from the bridge is the confluence of the North and South Forks of the St. Lucie River and the County Line Canal.

The primary bridges crossing the St. Lucie River, within the constraints of waterfront development, include three operable bridges and ten stationary bridges. Operable bridges include the St. Lucie River Bridge and the Dixie Highway Bridge, located at the confluence, approximately 5.92 miles and 5.97 miles from the St. Lucie River inlet, respectively and a railroad bridge located in the South Fork at the Okeechobee Waterway.

The St. Lucie River system is an active recreational boating area, primarily servicing smaller recreational vessels. However, because it is part of the Okeechobee Waterway, the St. Lucie River also supports commercial boating including barge traffic. The St. Lucie River going inbound, or up river, has a broad river channel at its confluence with the Indian River Lagoon, which provides mariners with access to the Atlantic Ocean and the Intracoastal Waterway. From the St. Lucie Bridge, the St. Lucie River travels inland southwestward to South Fork where it enters the St. Lucie Canal (Okeechobee Waterway) and continues generally west southwestward to Port Mayaca where the canal enters Lake Okeechobee. The Okeechobee Waterway provides a route across the state of Florida from the St. Lucie River to Punta Rassa, approximately 90 miles south of the entrance to Tampa Bay on Florida's west coast. Public and private marine facilities are concentrated in the eastern portions of the river and include seven marinas and four boat ramps. There are numerous marinas downriver (in Stuart and Port Salerno) as well as upriver immediately above the bridge. There are 15 public and private marinas on the St. Lucie River. The number of slips at these marinas ranges from eight to nearly 200, with 439 total slips and an average of approximately 35 slips per marina. Marinas occur throughout the St. Lucie River but many are concentrated near the St. Lucie River Bridge (AMEC 2014a).

The drawbridge is currently kept in the open condition and lowered for freight train passage, in accordance with USCG Drawbridge Operation Regulations at 33 CFR 111.317(c). Freight trains at the St. Lucie River Bridge average 32 mph. Under existing conditions, an average of 14 freight trains cross the St. Lucie River Bridge per day with an average closure time of 21 minutes. The average of the total weekday closure time is 241 minutes (4.01 hours) per day and the average of the total weekend closure time is 165 minutes (2.74 hours) per day (AMEC 2014a).

The vessel traffic data in the winter show an average of 102 vessel crossings per day (Min=28; Max=263) from Monday to Friday, compared to about 315 vessels (Min=157; Max=413) per day on a weekend.

Sundays had the most vessel activity, with a range of 296 to 395 vessel counts (AMEC 2014a). Based on information provided by St. Lucie County, the vessel traffic data in the summer are higher than the vessel traffic data in the winter, 28 percent higher on weekdays, 62 percent higher on Saturdays, and 64 percent higher on Sundays (AMEC Foster Wheeler 2015).

As shown in Table 4.1.3-1, in winter the average count of commercial vessels per day ranged from 2 to 21, with an average of 7 vessels and 12 vessels passing through the St. Lucie Bridge on weekdays and weekends respectively. The average count of recreational vessels per day ranged from 26 to 406. Table 4.1.3-2 shows the boat count volume increases from winter to summer 2014. In the peak summer season, the average weekday boat count was 140, which increased to 454 on Saturdays and 563 on Sundays.

	St. Lucie River	Loxahatchee River	New River
<i>Recreational Vessels</i>			
Minimum	26	5	64
Maximum	406	500	356
Average	117	148	166
<i>Commercial Vessels</i>			
Minimum	2	0	29
Maximum	21	14	59
Average	4	9	49
<i>Total Vessels</i>			
Minimum	28	5	99
Maximum	413	502	508
Average	121	157	215

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.
 1 Vessel traffic was assessed during January daylight hours, from 6:00 AM to 6:30 PM

	St. Lucie River	Loxahatchee River	New River ¹
Weekdays (Monday through Friday)	28%	58%	58%
Saturdays	62%	151%	151%
Sundays	64%	84%	84%

Source: AMEC Foster Wheeler. 2015. *Rail/Marine Traffic Simulation Using Summer Boat Traffic Data for the AAF Passenger Rail Project from Orlando to Miami, Florida*. January 2015.

1 Summer boat count data were not available for the New River Bridge. To approximate summer traffic at the New River, winter boat counts were escalated based on the increases observed at the Loxahatchee River Bridge. Between the two other bridge locations, the Loxahatchee River Bridge represents the more conservative approach.

Loxahatchee River (Jupiter River)

The Loxahatchee River is a tidal waterway located in Martin and Palm Beach Counties, with the railway bridge located in Palm Beach County. The river has three main forks that flow to the central embayment area before heading out the Jupiter Inlet (AMEC 2014a). The waterway is popular for recreational boating and related activities such as fishing. According to FWC, in 2012, there were 15,702 registered vessels in Martin County and 38,363 registered vessels in Palm Beach County (FWC 2012b). The primary bridges crossing the Loxahatchee River include two operable bridges and three stationary bridges. Operable bridges include the U.S. 1 Jupiter Federal Bridge and the Loxahatchee River Bridge located at the confluence, 0.9 miles and 1.3 miles from the Jupiter Inlet, respectively. Stationary bridges include the Route A1A Bridge, the Tequesta Drive Bridge, and the Loxahatchee River Road Bridge (AMEC 2014a).

The Loxahatchee River Bridge is immediately adjacent to the Intracoastal Waterway (Hobe Sound to the north, Lake Worth Creek to the south) and is about 1.3 miles west of the Jupiter Inlet (AMEC 2014a). The railroad bridge was constructed for two tracks, although only one track is currently maintained. The concrete-pile supported structure is an approximately 600-foot long structure with a drawbridge. The bridge has a vertical clearance of 4 feet and a horizontal clearance of 40 feet (AMEC 2014a). The bridge is parallel to the U.S. 1 Bridge, a fixed-span structure.

The Loxahatchee River supports a marine industry that primarily services smaller recreational vessels. There are hundreds of private docks upriver from the bridge along the Loxahatchee River and the C-18 Canal. Downriver, along the Intracoastal Waterway and Jupiter Inlet, there are numerous private docks and several marinas. Public and private marine facilities are concentrated in the eastern portions of the river and include seven marinas and four boat ramps, all of which are located within Palm Beach County. The number of slips at these marinas ranges from 30 to 130, with 534 total slips and an average of approximately 72 slips per marina. Marinas on the Loxahatchee River comprise less than one fourth of all marinas in Palm Beach County. The largest concentration of marinas on the Loxahatchee River is located along the Jupiter Inlet east of the Loxahatchee River Bridge, while the majority of the marinas in Palm Beach County are located along the Intracoastal Waterway. No waterfront hotels or restaurants that cater specifically to mariners are located on the Loxahatchee River (AMEC 2014a).

With the exception of a commercial area and marine facilities near Jupiter Inlet, waterfront development is predominantly private residences, which provide approximately 135 private slips and 1,061 private docks. While the Loxahatchee River is located in both Martin and Palm Beach counties, waterfront development and marine facilities are overwhelmingly concentrated in Palm Beach County. This is largely due to the Wild and Scenic River designation that applies to the Loxahatchee River for most of its reach in Martin County. The Wild and Scenic River segment is four miles upriver from the bridge, as discussed in Section 4.3.2. The Loxahatchee River is used for recreational boating and as a travel corridor to and from residences to access the Atlantic Ocean via the Jupiter Inlet and the Intracoastal Waterway. Wild and Scenic River designated portions of the Loxahatchee River are accessible to smaller vessels only, and is a destination for wildlife viewing (AMEC 2014a).

The drawbridge is currently kept in the open condition and lowered for freight train passage in accordance with USCG Drawbridge Operation Regulations at 33 CFR 111.299. Freight trains at the Loxahatchee River Bridge average 33 mph. Under 2013 conditions, an average of 14 freight trains cross the bridge per day. The RTC model shows a total of 10 bridge closures per day with an average closure

time of 19 minutes. The average of total weekday closure time is 214 minutes (3.57 hours) per day and the average of the total weekend closure time is 156 minutes (2.6 hours) per day (AMEC 2014a).

The vessel traffic data in the winter show an average of 108 vessels per day (Min=5; Max=335) from Monday to Friday, compared to about 271 vessels (Min=119; Max=502) per day on a weekend. As shown in Table 4.1.3-2, the average count of commercial vessels per day ranged from zero to 14 and the average count of recreational vessels per day ranged from five to 500. Both commercial and recreational vessel passage increased on weekend days. High vessel activity was observed during four different weekday holidays (around New Years and Presidents day) with vessel counts in the range of 200 to 335. When vessel traffic data from holidays are not included in the average vessel count for the weekdays, this average value drops to an average of 65 vessels per day. Sundays had the highest vessel activity, with exception of the holidays, with a range of 119 to 502 vessel counts. The average vessel count for Monday appears high, but these results include data from January 20, 2014, which was a holiday, and thus represents an unusual vessel count for Mondays as compared with data from Monday January 27, 2014 (AMEC 2014a). As shown in Table 4.1.3-2, the vessel traffic data in the summer are higher than the vessel traffic data in the winter: 58 percent higher on weekdays, 151 percent higher on Saturdays, and 84 percent higher on Sundays (AMEC Foster Wheeler 2015). In the peak summer season, the average weekday boat count was 182, which increased to 564 on Saturdays and 582 on Sundays.

New River

The New River originates in the Everglades and flows east to the Atlantic Ocean, entirely within Broward County. The New River is an extensive branched tidal waterway in Fort Lauderdale, which discharges to the ocean at Port Everglades. The waterway travels from the Intracoastal Waterway east to the west past residences and through the Central Business District of the City of Fort Lauderdale. West of the Central Business District, the river splits into North and South forks. The North Fork of the New River is a shallow meandering tributary, bordered primarily by residences with private docks. The South Fork is a wider, deeper tributary, which supports larger vessels and is bordered by residences and commercial marine industries. Most marinas at the South Fork are located approximately 2.5 to 3.5 miles from the New River Bridge, and numerous boat yards extend to approximately 6.8 miles from the New River Bridge (AMEC 2014a).

The New River has a robust waterfront industry, with vessel traffic utilizing a broad array of public and private marine facilities including 12 marinas and four boat ramps; there are also four boat/yacht clubs, two waterfront restaurants, and two waterfront hotels that cater to mariners. The marinas range in scale from five slips to more than 190 slips, with an average of approximately 42 slips per marina. Marinas on the New River comprise approximately one third of all marinas in Broward County. The largest concentration of marinas is located on the South Fork of the New River approximately two miles west of New River Bridge (AMEC 2014a). The majority of Fort Lauderdale's recreational boating industry (repair facilities, boatyards, boat sales, equipment sales) are also west of the bridge. Residential and commercial development occurs along the navigable extent of the New River, which provides approximately 280 private slips and 3,750 private docks. Hundreds of private docks, with boats up to 100 feet long, are also upriver of the bridge. According to a Broward County vessel traffic study (Mote Marine Laboratory 2005), recreational boating represents an estimated \$8.8 billion segment of the local economy. In addition to private recreational boats, the New River is also used by commercial sightseeing vessels.

The New River going inbound (or up river) starts at river markers five and six. The river is approximately 450 feet wide through marker 11 where the river makes an “S” turn to marker 12, known as the Tarpon Bend. Beyond marker 12 and into the Central Business District, the river is on average less than 150 feet wide, but can be as little as 100 feet wide at some narrower turns. This section of the river can be too narrow for larger vessels, which can include yachts up to 140 feet in length. Towboats are often utilized to tow 100-foot yachts and larger vessels up and down the New River to and from several large boat yards that cater to yachts (e.g., Lauderdale Marine Center). All of the commercial vessels; such as the tour boats, tow boats and fuel barge boats; as well as bridges (including the FECR New River Bridge), monitor very high frequency (VHF) channel 9.

The New River Bridge is located approximately 4 miles west of the New River’s inlet. The FECR railroad bridge, a 2-track bascule bridge, crosses the waterway west of St. Andrews Avenue. The river at this location is approximately 135 feet wide. The bridge has a vertical clearance of four feet and a horizontal clearance of 60 feet (AMEC 2014a). The bridge is currently kept in the open position and lowered for freight train passage in accordance with USCG Drawbridge Operation Regulations for the St. Lucie and Loxahatchee (Jupiter) Rivers. Although there are no specific regulations for the New River Bridge, regulations for the New River state:

“The draw of the Andrews Avenue bridge, mile 2.3 at Fort Lauderdale, shall open on signal; except that, from 7:30 a.m. to 9 a.m. and 4:30 p.m. to 6 p.m., Monday through Friday, except Federal holidays, the draw need not open. The draw need not open for inbound vessels when the draw of the Florida East Coast Railroad bridge, mile 2.5 at Fort Lauderdale is in the closed position for the passage of a train. Public vessels of the United States, tugs with tows, and vessels in distress shall be passed at any time.”
(33 CFR 117.313(b))

A bridge operation survey performed through observations of live feed shows that the New River Bridge is closed on average 19 minutes per closure.

Based on the January 2014 FECR video, an average of 157 vessel crossings occurred at the New River Bridge (Min=99; Max=289) on a daily basis (6:00 AM to 6:30 PM) from Monday through Friday compared to an average of 356 vessels (Min=262; Max=508) per day on a weekend day. As shown in Table 4.1.3-2, the average count of commercial vessels per day ranged from 29 to 59 and the average count of recreational vessels per day ranged from 64 to 356. There was an increase in recreational vessel traffic by approximately 64 percent during the weekend; an increase in commercial crossings during the weekend was not observed during this two-week assessment. Both Sundays observed during this two week video assessment (January 19 and January 26) had the most vessel activity, with a total 304 and 508 vessel counts from 6:00 AM to 6:30 PM, respectively. Wednesdays and Thursdays reported the lowest vessel activity with an average of 114 and 136 vessel counts, respectively. The average vessel count for Monday is likely higher than normal since it includes data from January 20, 2014, which was a holiday (AMEC 2014a).

The average vessel count observed during the February 2014 New River live feed observations was lower than values obtained from the January 2014 New River Bridge video assessment (Table 4.1.3-2). However, the density of traffic was similar throughout the week, with lower vessel traffic on Thursdays and an increase in vessel traffic over the weekend. A higher traffic of recreational vessels was observed

compared to commercial vessels. Most commercial vessel trips account for those made by taxi boats, the Jungle Queen, a sightseeing riverboat cruise, and towing services (AMEC 2014a). As discussed in the Methodology section, summer vessel traffic data were not available and summer volumes were estimated based on the percent increases documented for the St. Lucie and Loxahatchee Rivers. As shown in Table 4.1.3-2, the estimated vessel traffic data in the summer are higher than the vessel traffic data in the winter, with 58 percent higher on weekdays, 151 percent higher on Saturdays, and 84 percent higher on Sundays (AMEC Foster Wheeler 2015). In the peak summer season, the estimated average weekday boat count was 248, which increased to 760 on Saturdays and 745 on Sundays.

Eau Gallie River

The Eau Gallie River is a tidal river, tributary to Indian River, in Eau Gallie, Brevard County. The fixed FECR railroad bridge crosses the waterway immediately west of Harbor City Boulevard. The river at this location is approximately 575 feet wide. The multiple-span bridge provides a vertical clearance at mean high water of 11.3 feet, with a 48-foot horizontal clearance. Boating activities are concentrated on the east side of the bridge, with two major marinas between the bridge and the Indian River Lagoon (AMEC 2013d). Boat traffic under the Eau Gallie River Bridge is limited to small open fishing boats or personal watercraft with a maximum 10-foot height.

Crane Creek

Crane Creek is a tidal waterway in Melbourne, Brevard County, tributary to Indian River. The FECR railroad bridge crosses the waterway immediately west of the U.S. 1 (Dixie Highway) bridge. The river at this location is approximately 650 feet wide. The multiple span bridge provides a vertical clearance of approximately 15 feet, with a 48-foot horizontal clearance. Boat traffic is limited as capacity is restricted by an approximately 4-foot water depth under the center of the bridge (AMEC 2013d). There are no commercial marinas or docking facilities upriver of the bridge, and few private docks with small shallow-draft boats.

Turkey Creek

Turkey Creek is a tidal waterway in Palm Bay, Brevard County, tributary to Indian River. The FECR railroad bridge crosses the waterway immediately west of the U.S. 1 (Dixie Highway) bridge. The creek at this location is approximately 180 feet wide. The multiple span bridge provides a vertical clearance of approximately 11 feet, with a 54-foot horizontal clearance. The waterway is used by small pontoon boats and personal watercraft (AMEC 2013d). There are no commercial marinas or docking facilities upriver of the bridge, and few private docks with small shallow-draft boats.

St. Sebastian River

The St. Sebastian River is a tidal waterway on the border between Brevard and Indian River Counties. The FECR railroad bridge crosses the waterway 1.25 miles upriver of the U.S. 1 (Dixie Highway) bridge. The river at this location is approximately 1,624 feet wide. The multiple span bridge provides a vertical clearance of approximately 13 feet and a 48-foot horizontal clearance. Boating activity is primarily east

of the bridge (AMEC 2013d). The waterway is used by small boats and personal watercraft. There are no commercial marinas or docking facilities upriver of the bridge and few private docks.

Hillsboro Canal

The Hillsboro Canal is a tidal waterway on the border between Palm Beach and Broward Counties. The FECR railroad bridge crosses the waterway immediately west of the SR 811 (Dixie Highway) bridge. The waterway at this location is approximately 207 feet wide. The multiple span bridge provides a vertical clearance of approximately 9 feet with a 28-foot horizontal clearance. Boating activity is primarily east of the bridge, and there are no commercial marinas west of the bridge (AMEC 2013d). A marine business that provides dry storage is located west of the FECR bridge. Boats at the private docks west of the bridge are primarily small powerboats less than 30 feet long.

4.2 Physical Environment

This section provides information on the physical environment in the Project Study Area, with respect to air quality, noise and vibration, farmland soils, hazardous materials and solid waste, and coastal zone management. The Project Study Area for these resources includes the portion of central and southeast Florida proximate to the Project, including the counties through which it passes.

4.2.1 Air Quality

This section provides the baseline regional air quality conditions within the Project Study Area. The air quality provisions that are applicable to the Project include the 1990 Clean Air Act Amendments (CAAA) (42 USC § 7401, et. seq.), and the National Environmental Policy Act (NEPA) requirements as specified in the CEQ's Regulations for Implementing the National Environmental Policy Act (40 CFR parts 1500-1508) (U.S. Environmental Protection Agency 2008a; CEQ 2005a).

The CAAA requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for six "criteria" pollutants considered harmful to public health and the environment (EPA 2012b). The NAAQS identify two types of air quality standards: primary and secondary. Primary standards provide public health protection, including protecting the health of "sensitive" populations, such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Air quality in a given location is determined by the concentration of various pollutants in the atmosphere. The NAAQS are established by the EPA for criteria pollutants, including: ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter equal to or less than 10 microns in diameter (PM₁₀) and 2.5 microns in diameter (PM_{2.5}), and lead (Pb) (40 CFR Part 50). NAAQS represent maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect public health and welfare. Transportation sources, particularly motor vehicles, are the primary source of CO, NO₂, and volatile organic compounds (VOCs). The State of Florida ambient air quality standards are the same as the NAAQS (EPA 2012b). The NAAQS are presented in Table 4.2.1-1.

Pollutant		Primary/Secondary	Averaging Time	Level	Form	
Carbon Monoxide		Primary	8-hour	9 ppm	Not to be exceeded more than once per year.	
			1-hour	35 ppm		
Lead		Primary and secondary	Rolling 3 month average	0.15/m ³ . ¹	Not to be exceeded.	
Nitrogen Dioxide		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years.	
		Primary and secondary	Annual	53 ppb ²	Annual Mean.	
Ozone		Primary and secondary	8-hour	0.075 ppm ²	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.	
Particle Pollution		PM _{2.5}	Primary	Annual	12 µg/m ³	Annual mean, averaged over 3 years.
			Secondary	Annual	15 µg/m ³	Annual mean, averaged over 3 years.
			Primary and secondary	24-hour	35 µg/m ³	98th percentile, averaged over 3 years.
		PM ₁₀	Primary and secondary	24-hour	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years.
Sulfur Dioxide		Primary	1-hour	75 ppb ⁴	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.	
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year.	

Source: EPA. 2013. National Ambient Air Quality Standards (NAAQS). <http://www.epa.gov/ttn/naaqs/>. June 11, 2013. Accessed September 27, 2013.

ppm parts per million

ppb parts per billion

µm/m³ micrometers per cubic meter

- 1 Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m³ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
- 2 The official level of the annual NO₂ standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
- 3 Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard (“anti-backsliding”). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.
- 4 Final rule signed June 2, 2010. The 1971 annual and 24-hour SO₂ standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

The CAAA resulted in states being divided into attainment and non-attainment areas with classifications based upon the severity of their air quality problem. A non-attainment area is an area that has had measured pollutant levels that exceed the NAAQS and that has not been designated to attainment. The CAAA established emission reduction requirements that vary by an area's classification. The attainment status of each of the pollutants of concern is discussed below.

All six counties within the Project Study Area for the MCO Segment, E-W Corridor, and N-S Corridor are designated as attainment areas for all criteria pollutants. In addition, the three counties within the WPB-M Corridor (Palm Beach, Broward, and Miami-Dade) are designated as attainment for all criteria pollutants. The following sections describe these criteria pollutants and report air quality monitoring data that further characterize the existing air quality conditions within the Project Study Area.

Criteria Pollutants

Air quality is affected by stationary sources (industrial development) and mobile sources (motor vehicles). Air quality at a given location is a function of several factors, including the quantity and type of pollutants emitted locally and regionally, and the dispersion rates of pollutants in the region. Primary factors affecting pollutant dispersion are wind speed and direction, atmospheric stability, temperature, the presence or absence of inversions, and topography. Transportation sources, particularly motor vehicles, are the primary source of CO, oxides of nitrogen (NO_x), and VOCs. In the presence of heat and sunlight, NO_x and VOCs chemically react to form O₃. NO₂ is one of a group of highly reactive gasses known as NO_x. PM and SO₂ are primarily emitted from stationary sources that burn fossil fuels, such as power plants (FRA and FDOT 2010).

Air pollution is of concern because of its demonstrated impacts on human health. Of special concern are the respiratory effects of these criteria pollutants and their potential toxic effects, as described below.

Ozone (O₃): Ozone (also known as smog) is a strong oxidizer and an irritant that affects the lung tissues and respiratory functions. Exposure to O₃ can impair the ability to perform physical exercise; can result in symptoms such as tightness in the chest, coughing, and wheezing; and can ultimately result in asthma, bronchitis, and emphysema. The majority of ground-level O₃ is formed as a result of complex photochemical reactions in the atmosphere involving VOCs, NO_x, and high temperatures. The State of Florida is in attainment for O₃.

Carbon Monoxide (CO): CO is a colorless, odorless, poisonous gas produced by incomplete burning of carbon in fuel. The health threat from CO is most serious for those who suffer from cardiovascular disease, particularly those with angina and peripheral vascular disease. All six counties within the Project Study Area are designated as attainment areas for CO.

Nitrogen Dioxide (NO₂): NO₂ is a highly reactive gas that can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Repeated exposure to high concentrations of NO₂ may cause acute respiratory disease in children. Because NO₂ is an important precursor in the formation of O₃, control of NO₂ emissions is an important component of overall pollution reduction strategies. The two primary sources of NO₂ in the U.S. are fuel combustion and transportation. All six counties within the Project Study Area are designated as attainment areas for NO₂.

Sulfur Dioxide (SO₂): SO₂ is emitted primarily from stationary source coal and oil combustion, steel mills, refineries, pulp and paper mills, and non-ferrous smelters. High concentrations of SO₂ may aggravate existing respiratory and cardiovascular disease; asthmatics and those with emphysema or bronchitis are the most sensitive to SO₂ exposure. SO₂ also contributes to acid rain, which can lead to the acidification of lakes and streams and damage vegetation. All six counties within the Project Study Area are designated as attainment areas for SO₂.

Particulate Matter (PM₁₀ and PM_{2.5}): PM is a mixture of tiny particles that vary greatly in shape, size, and chemical composition; their composition may include metals, soot, soil, and dust. PM₁₀ includes larger, coarse particles, whereas PM_{2.5} includes smaller, fine particles. Sources of coarse particles include crushing or grinding operations, and dust from paved or unpaved roads. Sources of fine particles include all types of combustion activities (motor vehicles, power plants, wood burning) and certain industrial processes. Exposure to PM₁₀ and PM_{2.5} levels exceeding current standards can result in increased lung- and heart-related respiratory illness. The EPA has concluded that finer particles are more likely to contribute to health problems than those greater than 10 microns in diameter. All six counties within the Project Study Area are designated as attainment areas for PM₁₀ and PM_{2.5}.

Airborne Lead (Pb): Airborne Pb can be inhaled directly or ingested indirectly by consuming lead contaminated food, water, or non-food materials such as dust or soil. Fetuses, infants, and children are most sensitive to Pb exposure. Pb has been identified as a factor in high blood pressure and heart disease. Exposure to Pb has declined dramatically in the last 10 years as a result of the reduction of Pb in gasoline and paint, and the elimination of Pb from soldered cans. All six counties within the Project Study Area are designated as attainment areas for Pb.

Greenhouse Gases: Greenhouse gases include water vapor, CO₂, CH₄ (methane), N₂O (nitrous oxide), ground-level O₃, and fluorinated gases such as chlorofluorocarbons and hydrochlorofluorocarbons. These gases trap heat in the atmosphere and regulate the Earth's temperature. Global climate change is a transformation in the average weather of the Earth, which is measured by changes in temperature, wind patterns, and precipitation. Scientific consensus has identified human-related emission of greenhouse gases above natural levels as a significant contributor to global climate change (NCADAC 2013).

Air Quality Monitoring

Air quality monitoring in Florida is managed by the Florida Department of Environmental Protection (FDEP), which publishes statewide air quality and permitting regulations. The FDEP divides the state's counties into six districts based on their geography within the state. Air quality monitoring data from FDEP's Florida's Air Quality System (FLAQS) rates air quality conditions using an air quality index (AQI) (FDEP 2013b). The AQI utilizes a numerical scale that indicates the degree of air pollution. The qualitative descriptors of the FLAQS AQI include: Good, Moderate, Unhealthy for Sensitive Groups, Unhealthy, Very Unhealthy, and Hazardous. The FLAQS reported yearly AQI data, from 2005 to 2007, for monitored pollutants in Orange, Brevard, St. Lucie, and Palm Beach Counties (FDEP 2013b). FLAQS yearly AQI data for monitored pollutants in Indian River and Martin Counties, for this same monitoring period, were not available.

		Pollutant												
		Carbon Monoxide (ppm)		Lead ($\mu\text{m}/\text{m}^3$)		Nitrogen Dioxide (ppb)		Ozone (ppb)		PM ₁₀ ($\mu\text{m}/\text{m}^3$)	PM _{2.5} ($\mu\text{m}/\text{m}^3$)		Sulfur Dioxide (ppb)	
Averaging Time		8-hr	1-hr	Qtrly	3-mo	Annual	1-hr	1-hr	8-hr	24-hr	Annual	24-hr	3-hr	1-hr
Florida standard		9	35	1.5	0.15	50	--	120	--	150	--	--	500	--
NAAQS		9	35	1.5	0.15	53	100	--	75	150	15	35	--	75
Highest averaging time reading	Orange	2	15	--	--	5	37	93	79	39	9.8	31	4	7
	Brevard	--	--	--	--	--	--	83	72	23	7.6	24	4	7
	St. Lucie	--	--	--	--	--	--	78	70	--	--	--	--	--
	Martin	--	--	--	--	--	--	74	70	--	9.1	30	--	--
	Palm Beach	--	--	--	--	4	49	81	66	50	--	--	4	5

Source: FDEP. 2011. *Air Monitoring Report*. http://www.dep.state.fl.us/air/air_quality/techrpt/amr11.pdf. Accessed August 9, 2013.

Notes: ppm = parts per million
 $\mu\text{m}/\text{m}^3$ = micrometers per cubic meter
 ppb = parts per billion
 -- = Monitoring Data not available

Existing air quality is monitored throughout the State of Florida. Table 4.2.1-2 compares the highest 24-hour readings and the annual averages recorded in 2011, where available, to the federal and state air quality standards by county for all counties within the Project Study Area.

The MCO Segment is in Orange County, which is located within the Central Florida Interstate Air Quality Control Region (AQCR). The Central Florida Interstate AQCR is designated as an attainment area for all NAAQS pollutants (EPA 2012a). For Orange County and the group of monitored pollutants of CO, NO₂, SO₂, O₃, PM₁₀, and PM_{2.5}, an AQI descriptor of Good was reported for 73 to 81 percent of the days through the 3-year monitoring period (FDEP 2013b). An AQI descriptor of Moderate was reported for 17 to 25 percent of the days through the same monitoring period. AQI descriptors of Unhealthy for Sensitive Groups and Unhealthy were reported for 2 percent and less than 1 percent, respectively, of the days within this period.

The E-W Corridor crosses both Brevard and Orange Counties. Like Orange County, Brevard County is also within the Central Florida Intrastate AQCR. The annual data available indicated that for Brevard County and the group of monitored pollutants of O₃, PM₁₀, and PM_{2.5}, an AQI descriptor of Good was reported for 83 to 91 percent of the days through the 3-year monitoring period. An AQI descriptor of Moderate was reported for 9 to 16 percent of the days through the same monitoring period. AQI descriptors of Unhealthy for Sensitive Groups and Unhealthy were reported for 1 percent and less than 1 percent, respectively, of the days within this period.

The N-S Corridor crosses portions of five counties: Brevard, Indian River, St. Lucie, Martin, and Palm Beach Counties. As previously stated, Brevard County is located within the Central Florida Intrastate AQCR. Indian River, St. Lucie, Martin, and Palm Beach Counties are located within the Southeast Florida Intrastate AQCR. Like the Central Florida Intrastate AQCR, the Southeast Florida Intrastate AQCR is also designated as an attainment area for all NAAQS pollutants (EPA 2012a). The annual data available indicated that:

- For St. Lucie County and the group of monitored pollutants of NO₂, O₃, and PM_{2.5}, an AQI descriptor of Good was reported for 84 to 91 percent of the days through the 3-year monitoring period. An AQI descriptor of Moderate was reported for 9 to 16 percent of the days through the same monitoring period. An AQI descriptor of Unhealthy for Sensitive Groups was reported for less than 1 percent of the days within this period.
- For Palm Beach County and the group of monitored pollutants of CO, NO₂, SO₂, O₃, PM₁₀, and PM_{2.5}, an AQI descriptor of Good was reported for 84 to 90 percent of the days through the 3-year monitoring period. An AQI descriptor of Moderate was reported for 10 to 15 percent of the days through the same monitoring period. An AQI descriptor of Unhealthy for Sensitive Groups was reported for less than 1 percent of the days within this period.

The primary type of emissions contributing to air pollution in the Project Study Area is mobile source emissions from combustion engines such as automobiles. Table 4.2.1-3 shows existing mobile source emissions for 2008, the most recent year available, for the Phase II Project area.

County	CO		SO _x		NO _x		PM ₁₀		VOC	
	Tons per Year	Tons per Day	Tons per Year	Tons per Day	Tons per Year	Tons per Day	Tons per Year	Tons per Day	Tons per Year	Tons per Day
Brevard	121,189	332	2,850	8.0	17,819	48.9	1,050	2.8	5,732	15.7
Indian River	29,870	82	49	0.1	3,521	9.6	212	0.6	3,480	9.5
St. Lucie	49,265	135	111	0.3	6,107	16.7	316	0.9	5,645	15.5
Martin	48,055	132	244	0.7	5,831	16.0	350	1.0	6,198	17.0
Palm Beach	234,409	642	832	2.3	26,636	73.0	1,554	4.3	25,221	69.1

Source: EPA. 2008c. The National Emissions Inventory. <http://www.epa.gov/ttn/chief/net/2008inventory.html>. Accessed October 14, 2013.

4.2.2 Noise and Vibration

This section presents background on fundamentals and metrics used to describe noise and vibration, an inventory of noise- and vibration-sensitive land use in the Project Study Area, and characterizes existing noise and vibration conditions.

Noise and vibration are assessed according to guidelines specified in the Federal Railroad Administration's (FRA) *High-Speed Ground Transportation Noise and Vibration Impact Assessment* guidance manual, the Federal Transit Administration's (FTA) *Noise and Vibration Impact Assessment*

guidance manual, and the Federal Highway Administration (FHWA) guidelines as defined for Florida application by FDOT for traffic operations (FRA 2012a; FTA 2006; FDOT 2011c).

4.2.2.1 Noise

Noise is defined as unwanted sound or, more specifically, a sound that is undesirable because it interferes with communication or is annoying (EPA 1976). Human response to noise can vary according to the type and characteristics of the noise source, the distance between the noise source and the receptor, the sensitivity of the receptor, and the time of day.

Due to the wide range of sound levels that commonly exist in the environment, sound is expressed in decibels (dB), a unit of measure based on a logarithmic scale. A 10-dB increase in noise level corresponds to a doubling in perceived loudness. Sound levels are typically measured and reported according to the A-weighted decibel (dBA), which relates to the human response to sound at different frequencies. The frequency of sound is measured in terms of Hertz (Hz). Humans can normally detect sounds ranging from about 20 to 15,000 Hz. “A-weighting” adjusts the sound level at different frequencies to approximate the human ear’s sensitivity because sounds are not heard equally well. Humans are most sensitive to frequencies in the 1,000 to 4,000 Hz range. A-weighted sound levels are commonly used in measurement of community environmental noise. Unless otherwise noted, all decibel measurements presented in this noise analysis are dBA. Figure 4.2.2-1 provides examples of the maximum noise levels of individual events from activities that result in varying degrees of sound levels in dBA, though it does not include all train operating conditions.

Environmental noise fluctuates over time, so noise levels over a stated period of time (1 hour) are commonly represented by the “equivalent sound level,” L_{eq} . The “day-night average” sound level (L_{dn}) is a noise metric that represents the equivalent sound energy over a 24-hour period, with a 10-dB penalty added to noise events occurring between 10:00 PM and 7:00 AM. This penalty is intended to compensate for generally lower background noise levels at night and the additional annoyance of nighttime noise events. L_{dn} takes into account how loud noise events are, how long they last, how often they occur, and whether they occur during the day or night.

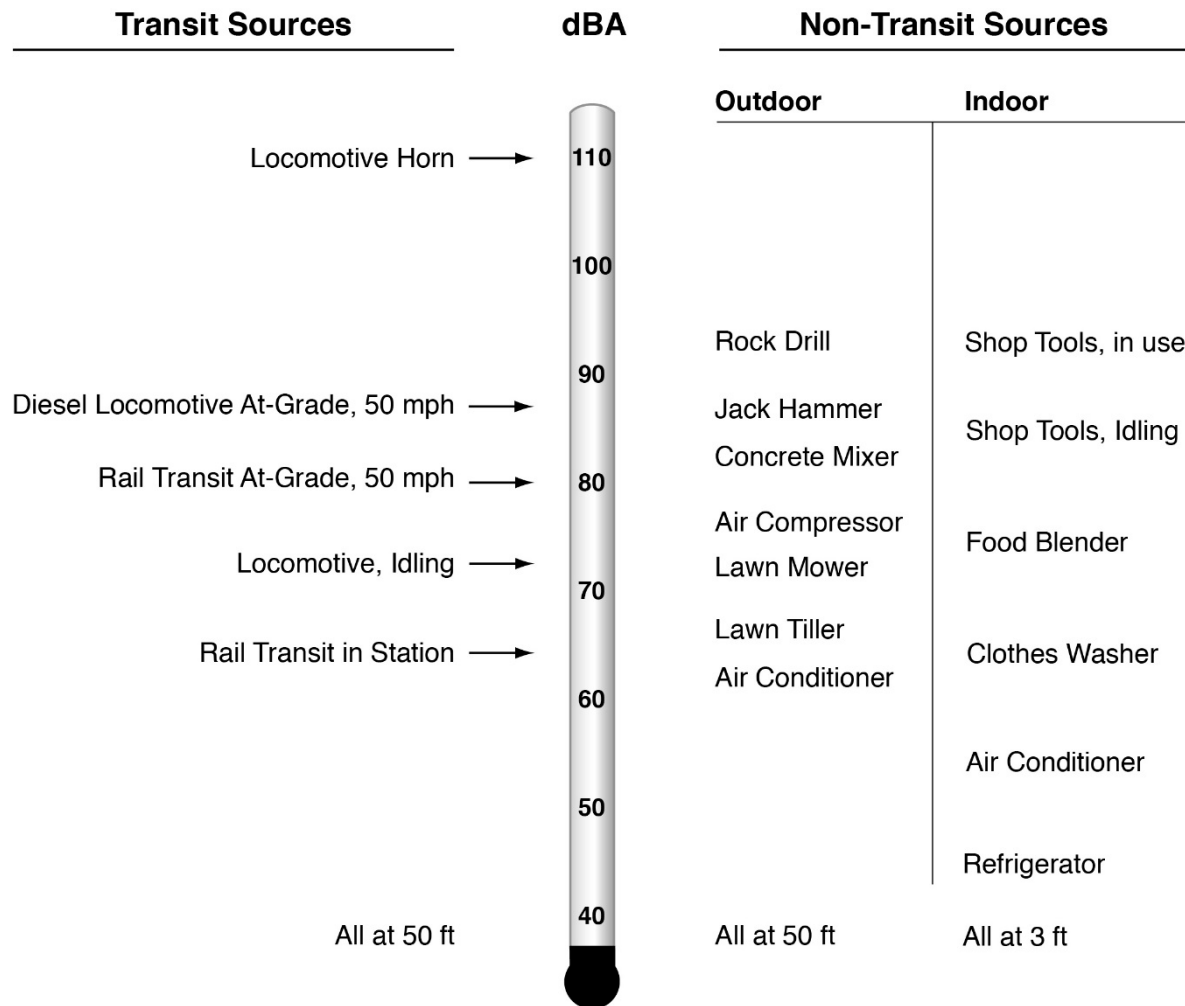


Figure 4.2.2-1 Sound Levels of Typical Noise Sources and Noise Environments

Source: Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006.

Methodology

The Project Study Area for noise extends approximately 2,500 feet from the rail corridor and the Project Study Area for vibration extends approximately 600 feet. These study areas include all land uses that are sensitive to noise or vibration (“sensitive receptors”).

As shown in Table 4.2.2-1, FRA and FTA guidelines separate noise-sensitive land uses into three categories based on sensitivity. Category 1 land uses include areas where quiet is an essential element in their intended purpose, such as land set aside for serenity and quiet, outdoor amphitheaters, concert pavilions, recording studios, concert halls, and National Historic Landmarks with significant outdoor use. Buildings where nighttime sensitivity to noise is important are defined as Category 2, and include homes, hospitals, and hotels. The noise metric used for Category 2 land uses is Ldn, which describes the average

24-hour noise environment with emphasis given to noise generated during nighttime hours (10:00 PM to 7:00 AM). Category 3 land uses include institutional facilities that are used primarily during daytime and evening hours, such as schools, libraries, theaters, places of worship, and certain historical sites and parks. The noise metric used for Category 1 and 3 land uses is the loudest-hour L_{eq} which occurs during the times that the location is being used (such as during school hours).

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor $L_{eq}(h)^1$	A tract of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
2	Outdoor Ldn	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq}(h)^1$	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites, parks, campgrounds, and recreational facilities are also included.

Source: Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. USDOT Report Number FTA-VA-90-1003-06, May 2006.

1 L_{eq} for the noisiest hour of transit-related activity during hours of noise sensitivity

Existing noise conditions have been determined at a range of distances from existing and future noise sources and grouped in sections with similar conditions. Noise levels from fixed-guideway transit sources, highway transit sources, and general ambient sources were modeled to characterize existing noise conditions in the study area. Both highways and rail lines are considered to be linear noise sources. As the distance from the linear sources decreases the noise level decreases until eventually existing noise is dominated instead by other general noise sources. For this assessment, sections of the study area have been grouped based on:

- Proximity to rail or roadway noise sources;
- Existing and proposed train operations;
- Proximity to railroad crossings where horn noise is present; and
- Whether the proposed rail line would be at-grade or on an elevated structure.

Along the E-W Corridor, existing noise conditions are generally dominated by roadway traffic. Along the N-S Corridor, existing noise conditions are generally dominated by freight rail operations. Existing noise conditions along the N-S Corridor have been modeled based on existing FECR freight operations in Brevard, Indian River, St. Lucie, Martin, and Palm Beach Counties. Reference noise levels from the FTA Manual have been used for modeling existing freight train operations including locomotives, rail cars, crossing signals,

and warning horns. Daily train operations were obtained from AAF as well as the FRA Crossing Inventory (FRA n.d.). Based on existing conditions, freight trains are on average 8,150 feet in length, and consist of two locomotives (89 feet each) and 101 rail cars (79 feet each). Approximately half of the freight operations occur at night (10:00 PM to 7:00 AM) and half during the day (7:00 AM to 10:00 PM) (FRA n.d.). Daily operations frequency and average speed is summarized in Table 4.2.2-2. For the average speeds provided, an 8,150-foot train results in a noise exposure duration ranging from 1.7 to 2.1 minutes per event for any given receiver along the corridor.

County	Speed (mph)	Total Daily Trains	Daily Trains/Hour	Total Trains in Day (7:00 AM to 10:00 PM) ¹	Day Trains/Hour	Total Trains in Night (10:00 PM to 7:00 AM) ¹	Night Trains/Hour
Brevard (NS)	53.8	18	0.75	9	0.6	9	1.00
Indian River	54.2	18	0.75	9	0.6	9	1.00
St. Lucie	47.8	18	0.75	9	0.6	9	1.00
Martin	44.4	18	0.75	9	0.6	9	1.00
Palm Beach	54.3	18	0.75	9	0.6	9	1.00

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013.

Existing noise exposure at highway-rail grade crossings along the N-S Corridor have been calculated separately from mainline segments. Noise within ¼-mile of crossings has been modeled based on reference levels for locomotive horns and crossing bells. The existing noise levels at distances farther than 50 feet have been modeled based on the general approach that sound from a linear noise source decreases by 4.5 dB per doubling of distance. The attenuation of sound from intervening building structures has also been considered. In characterizing existing and future noise conditions, the population density has been used to determine whether there would be intervening buildings and how much attenuation those buildings would provide.

Affected Environment

Existing noise conditions along the MCO Segment are dominated by aircraft operations at MCO, and are within the airport's 65 dB DNL contour for aviation noise (GOAA 2009).

Along the E-W Corridor, noise from SR 528 is the dominant existing noise source. Noise levels were estimated using FRA guidelines for interstate highways, which are based on data from the FHWA highway traffic noise model (Barry and Regan 1978). Table 4.2.2-3 provides the estimated noise levels, in relation to distance from the source. This table shows that existing noise levels range from 50 to 75 Ldn depending on proximity to the highway.

Distance From Interstate Highways (feet) ^{1,2}	Existing Noise Exposure (L _{dn})
10-49	75
50-99	70
100-199	65
200-399	60
400-799	55
800 and up	50

Source: Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. USDOT Report Number FTA-VA-90-1003-06, May 2006.

1 Distances do not include shielding from intervening rows of buildings.

2 Roadways with four or more lanes that permit trucks, with traffic at 60 mph.

In areas away from major roads or railroad lines, ambient noise is typically dominated by local streets and community activities. According to the EPA, ambient noise in these areas can be related to population density (EPA 1974). Estimates of population density within the Project Study Area were made using census block data from the 2010 U.S. Census. The number of census blocks per population density category and ambient noise level per county is presented in Table 4.2.2-4.

Population Density (people per sq. mile)	Existing Noise Exposure (L _{dn})	Orange	Brevard	Indian River	St. Lucie	Martin	Palm Beach
<1000	35 to 45	6	34	16	10	10	2
1000 – 3000	50	2	18	17	1	11	21
3000 – 10000	55	0	8	2	0	9	24
10000 – 30000	60	0	0	0	0	0	1
>30000	65	0	0	0	0	0	0

Source: Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. USDOT Report Number FTA-VA-90-1003-06, May 2006; USCB. 2010a. *Census 2010*. <http://factfinder2.census.gov/>. Accessed September 13, 2013.

Table 4.2.2-5 presents a summary of the existing noise conditions at a distance of 50 feet from the N-S Corridor. This table shows that existing noise conditions range from 74 to 82 L_{dn} at a distance of 50 feet from the railroad.

Phase I (the WPB-M Corridor), as described in Section 3.1.7.2 of the 2012 EA, is within a highly developed urban region with high ambient noise levels because of its proximity to central business districts, highways, and the existing freight operations. Because there is an existing freight rail line and substantial highway traffic, the existing noise levels were calculated based on the FTA Guidance Manual. Section 3.1.7.2 of the 2012 EA states that the existing freight trains generate noise levels of 67 dBA L_{dn} at 50 feet from the tracks. Warning horn noise is 74 dBA L_{dn} at 50 feet, within ¼ mile of each at-grade crossing. Warning horns are the dominant noise sources near grade crossings.

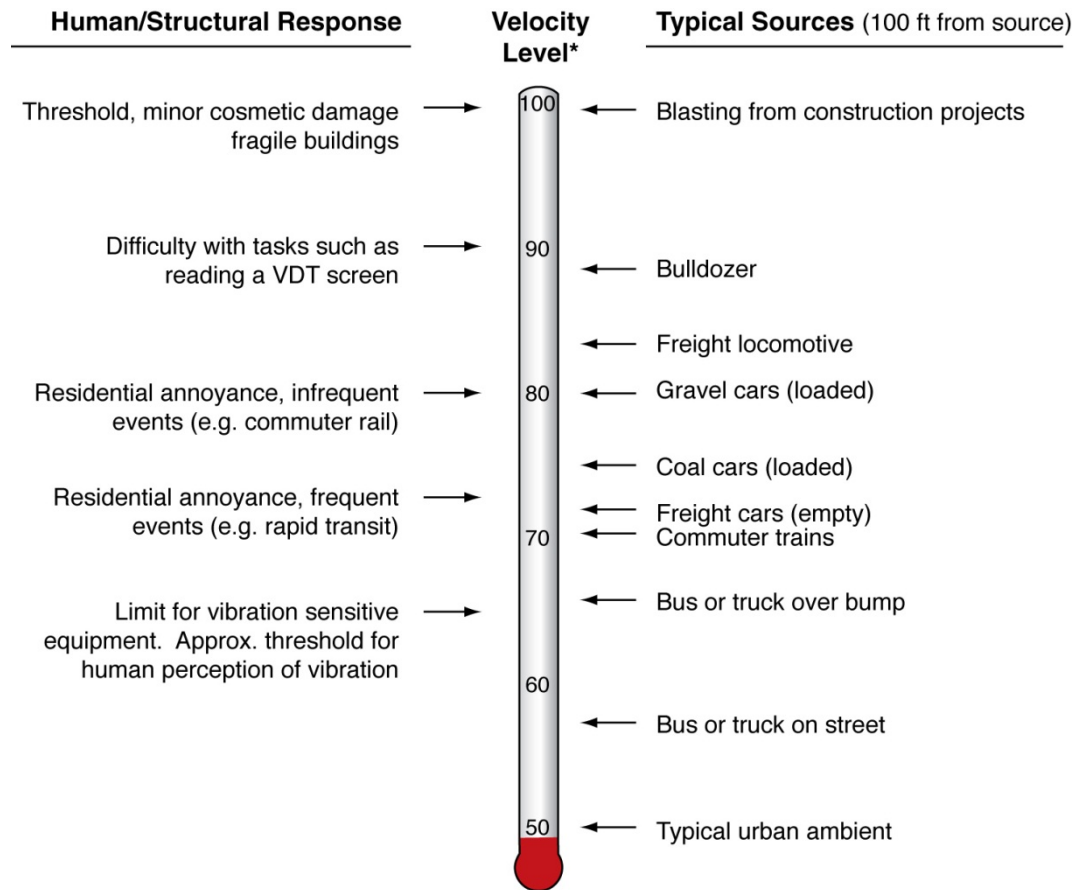
County	Track Condition	Noise at 50 Feet		
		L _{eq} (day)	L _{eq} (night)	L _{dn}
Brevard	Mainline	66.4	68.6	74.7
	Crossing	73.9	76.1	82.3
Indian River	Mainline	66.4	68.6	74.8
	Crossing	73.9	76.1	82.3
St. Lucie	Mainline	65.6	67.8	74.0
	Crossing	73.8	76.0	82.1
Martin	Mainline	65.1	67.4	73.5
	Crossing	73.7	75.9	82.1
Palm Beach	Mainline	66.4	68.7	74.8
	Crossing	73.9	76.1	82.3

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013. Report.

4.2.2.2 Vibration

Vibration is the oscillating motion of a structure or material that can result in perceptible movement of building floors, rattling of windows, shaking of items on shelves, and rumbling sounds. Vibration may be described in terms of the acceleration, velocity, or displacement that occurs during the oscillatory motion (FTA 2006). For describing the human response to vibration, the vibration velocity expressed in decibels (VdB) with a reference value of one micro-inch per second is used. The vibration levels that commonly exist in the environment range from approximately 40 to 100 VdB. At low amplitude, vibration may interfere with sensitive equipment. At higher amplitude, vibration may be perceptible to humans and cause annoyance. At very high amplitude, vibration can cause damage to susceptible buildings. Figure 4.2.2-2 presents typical levels of ground-borne vibration.

Vibration that propagates into buildings can cause the floors, walls, and ceilings of a room to radiate sound called ground-borne noise (GBN). GBN normally is characterized as a low-frequency 'rumbling' sound. GBN is often not a concern for at-grade transit sources and buildings with windows and doors exposed to the transit sources because the contribution of noise from airborne paths can be more significant than the contribution of GBN.



* RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second

Figure 4.2.2-2 Typical Levels of Ground-Borne Vibration

Source: Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006.

Figure 4.2.2-3 depicts the basic concept of ground-borne vibration and GBN for a rail system. When train wheels roll on rails, the forces between the wheels and the rails generate vibration that is transmitted through the rails, rail bed, and soils into building structures. How efficiently vibration propagates into adjacent buildings is dependent upon the operating conditions and type of train, the track design, the geologic characteristics of the surrounding soil, and the construction of the building.

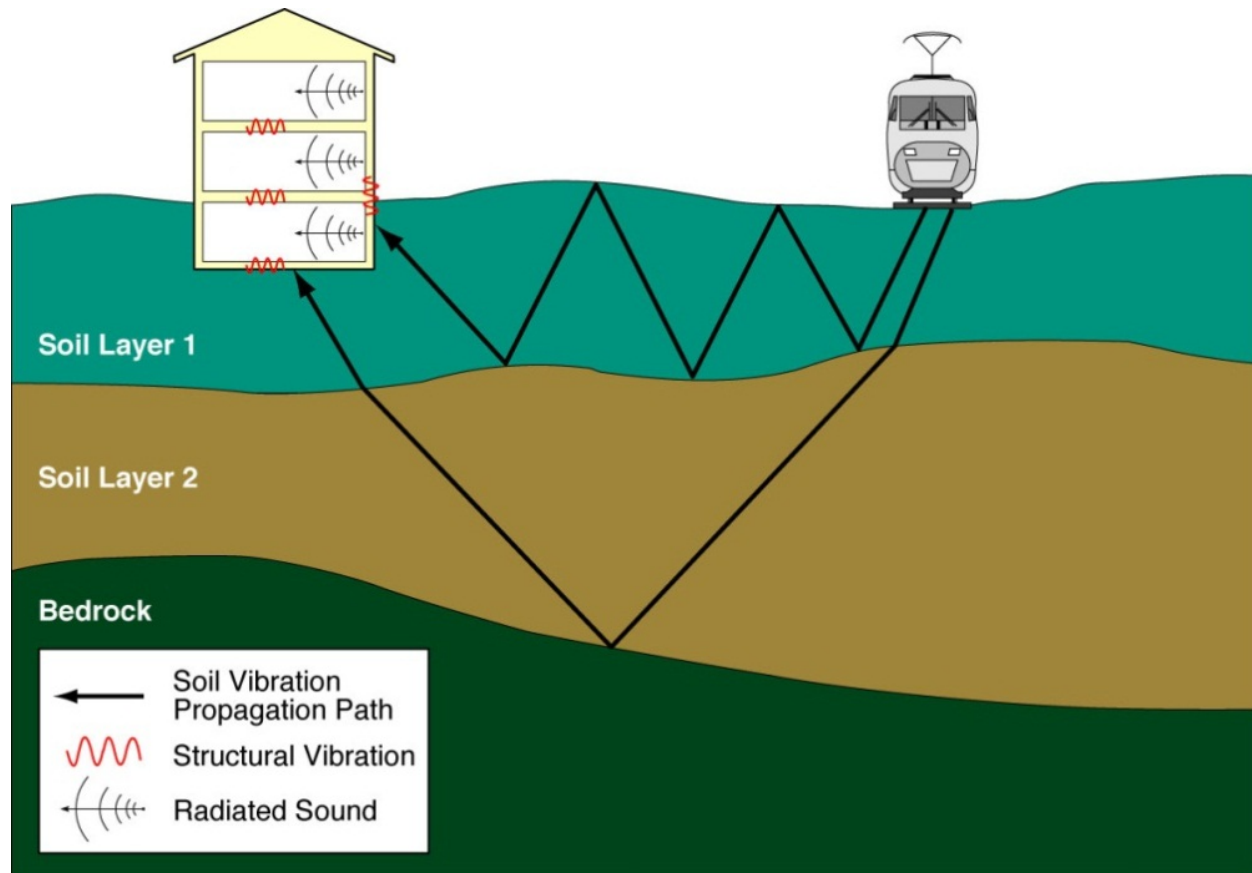


Figure 4.2.2-3 Propagation of Ground-Borne Vibration and Ground-Borne Noise into Buildings

Source: Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. USDOT Report Number FTA-VA-90-1003-06, May 2006.

Methodology

Similar to noise, FRA and FTA separate vibration-sensitive land use into three categories based on the sensitivity to vibration (FTA 2006). Vibration Category 1 – High Sensitivity include those buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance. Examples of Category 1 buildings are vibration-sensitive research and manufacturing, hospitals with vibration-sensitive equipment, and university research operations (concert halls and other special-use facilities are covered under a special designation). The vibration limits associated with these buildings are based on acceptable vibration for moderately vibration-sensitive equipment with vibration isolation systems. Vibration Category 2 – Residential covers all residential land uses and any buildings where people sleep, such as hotels and hospitals. Vibration Category 3 – Institutional includes land uses that do not have vibration-sensitive equipment, but still have the potential for activity interference, such as schools, churches, and quiet offices.

There are also buildings that can be very sensitive to vibration and noise but do not fit into any of the three categories such as concert halls, TV and recording studios, and theaters. These buildings have their own impact criteria and are treated separately from the categories described above.

Existing vibration levels were based on FTA generalized curves for ground-borne vibration versus distance from the track (see Figure 4.2.2-4), providing an estimate of existing vibration levels from freight trains and rubber-tired vehicles such as buses and trucks. These general curves estimate ground vibration outside buildings and do not take into account effects from different soil types or building construction.

Affected Environment

Existing vibration conditions in the study area are dominated by vehicular sources on the E-W Corridor (primarily SR 528) and by existing freight operations on the N-S Corridor and on the WPB-Miami Corridor. The FTA generalized vibration curves, presented in Figure 4.2.2-4, show that the existing vibration level from a freight train at 50 mph is estimated to be 84 VdB at 50 feet. A rubber-tired vehicle traveling at 30 mph, such as a bus or truck, generates substantially less vibration with an estimated level of 63 VdB.

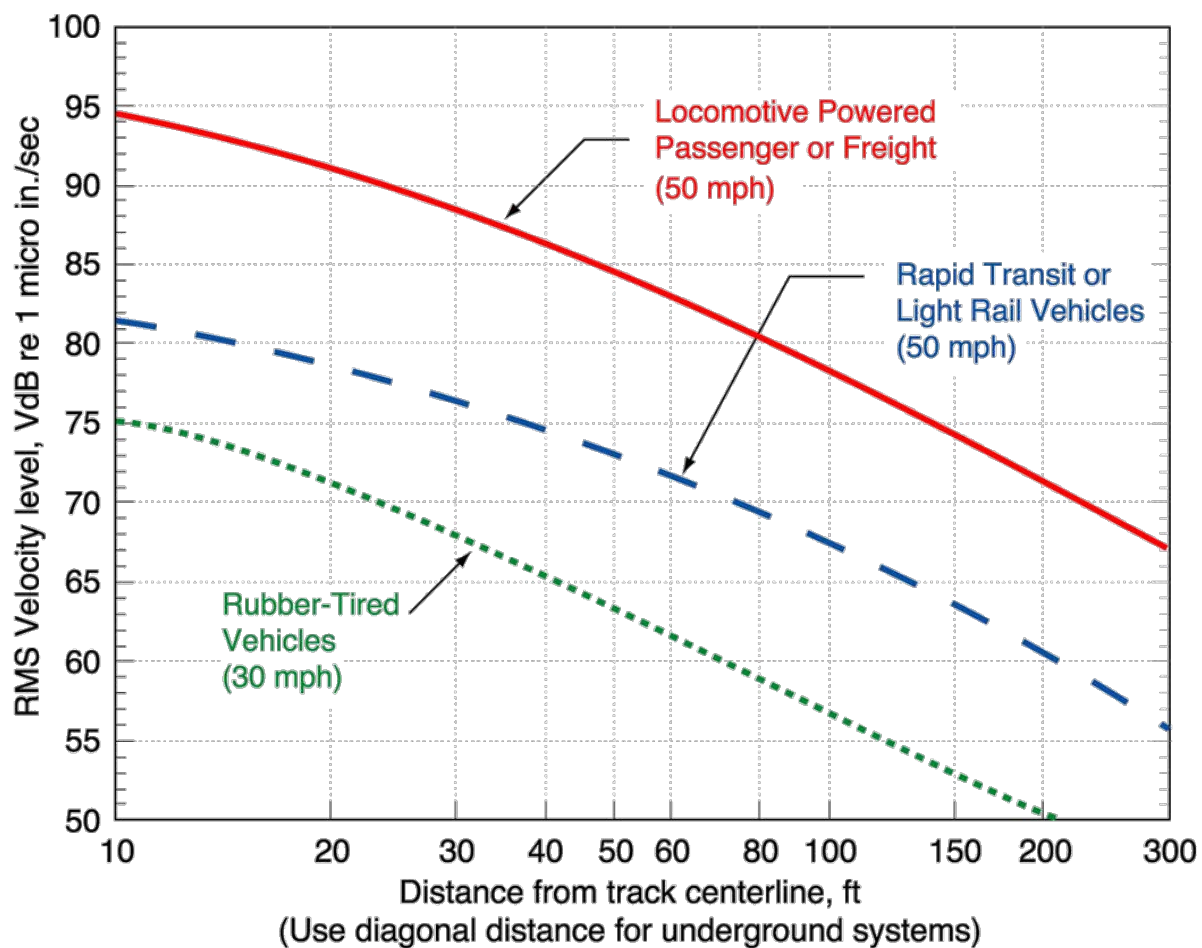


Figure 4.2.2-4 Generalized Vibration Curves for Trains and Rubber-Tired Vehicles

4.2.3 Farmland Soils

The Farmland Protection Policy Act (FPPA) limits the conversion of significant agricultural lands to non-agricultural uses as a result of federal actions (7 USC § 4201, et seq.). The determination of whether or not farmlands are subject to FPPA requirements is based on soil type; the land does not have to be actively used for agriculture. The FPPA regulates four types of farmland soils:

- Prime Farmland;
- Unique Farmland;
- Farmland of Statewide Importance; and
- Farmland of Local Importance.

Farmland subject to FPPA requirements can be pastureland, forested, or other land types, but not open water or developed urban or transportation areas.

Prime farmland is defined by the U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) as "land that has the best combination of physical and chemical characteristics" for agriculture. This includes land with these characteristics used for livestock or timber production but not land that is already urbanized or used for water storage. Unique farmland is defined as "land other than prime farmland that is used for production of specific high-value food and fiber crops," with such crops defined by the Secretary of Agriculture. Farmland of statewide or local importance is farmland other than prime or unique farmland that "is used for the production of food, feed, fiber, forage or oilseed crops" (USDA 2012).

4.2.3.1 Methodology

Farmlands with any level of designation by the NRCS were identified and mapped relative to the Project (Figure 4.2.3-1) (USDA 2013).

4.2.3.2 Affected Environment

The most recent farmland soils inventory for Florida, completed in 2002, identified 1,041,600 acres of prime farmland. Between 2002 and 2007 approximately 8,100 acres of this prime rural land was converted to developed land (Farmland Information Center 2014).

MCO Segment

All lands within the MCO Segment have been developed or are utilized for nonagricultural purposes. No prime farmland or unique farmland is present.



Explanation of Features

- MCO Segment
- E-W Corridor
- N-S Corridor
- WPB-M Corridor
- Farmland Soils

Data Sources: ESRI Bing Maps 2012 Imagery, FEMA 2012, FRA 2012, AMEC 2013

Farmland Soils		
All Aboard Florida Intercity Passenger Rail Project		
		4.2.3-1

Path: F:\FEC\FECL_GDB\MXD\VEIS\Location Map of Farmland Soils2.mxd

East-West Corridor

The E-W Corridor is within Orange and Brevard Counties, and crosses areas that contain citrus, forage, and vegetable agricultural operations. Table 4.2.3-1 indicates the active farmland located within the E-W Corridor. Prime farmland soils are located along the E-W Corridor in the vicinity of I-95 and between I-95 and the FECR Corridor. A total of 19.3 acres of farmland is within the Alternative A corridor and 31.8 acres of unique farmland is located within the Alternatives C and E corridors.

Farmland Characteristics	Alternative A	Alternative C	Alternative E
Total Acres Within Corridor	260.9	434.8	431.6
Total Acres of Prime and Unique Farmland Soils	19.3	31.8	31.8
Percentage of Farmland in County within Corridor	<0.1%	<0.1%	<0.1%

Source: AAF and Natural Resources Conservation Service (NRCS). 2013. *Farmland Conversion Impact Rating for Corridor Type Projects*. June 7, 2013. Report.

North-South Corridor

The N-S Corridor is located entirely within the existing FECR Corridor, which is developed for rail infrastructure and does not contain prime farmland, unique farmland, or farmland of statewide or local importance.

West Palm Beach-Miami Corridor

The WPB-M Corridor is located entirely within the existing FECR Corridor, which is developed for rail infrastructure and does not contain prime farmland, unique farmland, or farmland of statewide or local importance.

4.2.4 Hazardous Materials and Solid Waste Disposal

This section describes potential and confirmed sources of subsurface contamination and/or waste materials within the Project Study Area.

4.2.4.1 Methodology

A contamination screening evaluation was performed in general accordance with Part 2, Chapter 22 of the FDOT *Project Development and Environment (PD&E) Guidelines Manual*, and included a records search and review of historical aerials (FDOT 2008). Field reconnaissance was also conducted for sites rated medium- and high-risk (as defined by the *PD&E Guidelines Manual*) in close proximity to the Project Study Area. The purpose of the survey was to identify areas along the proposed corridor where contamination of soil and/or groundwater by petroleum or hazardous materials has occurred,

where contamination of these same materials may exist, and where the potential for contamination exists due to past and present land use.

Evaluation Rating

Risk ratings were assigned to every contamination site identified in reports prepared by Environmental Data Management, Inc (EDM). Sites were identified as “No,” “Low,” “Medium,” or “High” risk indicating the degree for potential contamination related impacts to the Project. Risk ratings were assigned according to the following criteria as outlined in the FDOT PD&E Guidelines:

- **No** - A review of information in the EDM report finds there is nothing to indicate contamination would be a problem. It is possible that contaminants were handled on the property; however, all information indicates that contamination problems should not be expected. An example of an operation that may receive this rating is a wholesale or retail outlet that handles hazardous materials in sealed containers that are never opened while at this facility, such as cans of spray paint at a “drug store.”
- **Low** - The former or current operation has a hazardous waste generator identification number, or deals with hazardous materials; however, based on information available in the EDM report, there is no reason to believe there would be any involvement with contamination in relation to the Project. This is the lowest possible rating a gasoline station operating within current regulations can receive. This rating could also apply to a retail store that blends paint.
- **Medium** - Indications of, known soil and/or water contamination however available documentation indicates that the problem does not need remediation, is being remediated (air stripping of the groundwater, etc.), or that continued monitoring is required. This rating expresses the degree of concern for potential contamination problems. Known problems may not necessarily present a high cause for concern if corrective actions are either underway or complete. The actions may not have an adverse impact on the Project.
- **High** - Potential for contamination. Properties previously used as gasoline stations and which have not been evaluated or assessed would probably receive this rating.

Records Search

The records search conducted for this evaluation included review of regulatory agencies’ enforcement and permitting records database information for the Project Study Area prepared by EDM, and supplemental records searches for select sites through the FDEP online database Document Management System “OCULUS.” EDM’s search reviewed and summarized numerous databases that are generally consistent with American Society of Testing and Materials (ASTM) 1527-05 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*.

The EDM records search radius was established at a one-quarter-mile width to encompass all alternative alignments under consideration. In addition, the detailed screening area was set at 500 feet from the approximately centerline of the proposed E-W Corridor alternatives and the boundary of the MCO Segment to provide coverage of the alternatives.

For the N-S Corridor, the Project will remain within the existing FECR Corridor and no land acquisition will be required. EDM performed a one-eighth-mile wide records search for this portion of the Project. EDM database search results for all sites included within this search radius were reviewed and rated as part of this evaluation. A buffer of 200 feet on each side of the N-S Corridor centerline defined the detailed screening area.

A historical file and record review through the FDEP online database Document Management System "OCULUS" was also conducted to further assess if environmental consequences have been recorded on select sites. Individual sites were selected for additional research based on risk rating, to supplement information presented in the EDM data report and/or due to the proximity of the site to the Project. All sites ranked "High" and "Medium" (as defined below) and located within the detailed screening areas of 500 feet for the E-W Corridor and the MCO Segment, and 200 feet for the N-S Corridor were further researched on OCULUS.

Historical Aerial Photography Review

Historical aerial images of the Project Study Area and adjacent properties were reviewed to identify potentially contaminated sites that may not be listed in the databases reviewed in the records search. Historical aerials are useful in identifying dump sites, landfills, junk yards, disturbed vegetation, and other uncharacteristic land uses.

East-West Corridor

For each aerial image available along the E-W Corridor, an area within approximately 500 feet of the alternative alignments was examined. The aerial images were reviewed to identify previously existing land uses or conditions that were not identified during the records search and could indicate potentially contaminated sites.

North-South Corridor

The review of environmental documents included the *Final Contamination Screening Evaluation Report, FECR Amtrak Passenger Rail Study* (Amtrak EA) (FRA and FDOT 2010). The Amtrak EA included a review of historical aerials along the FECR Corridor that included the proposed N-S Corridor for the Project. No historical concerns were identified within the report. Therefore, the study for this EIS focused on records research and field reconnaissance.

Field Reconnaissance

From July 8 through 12, 2013, AAF conducted field reconnaissance on properties adjacent to the E-W Corridor and the N-S Corridor. The purpose of the field reconnaissance was to visually assess sites in close proximity to the Project Study Area and identify sites that, based on the records search and field observation, could potentially impact the human environment (if not mitigated during construction) due to the presence of contaminated soil, groundwater, or other materials.

The EDM report for the GOAA property, through which the MCO Segment passes, identified 161 records for potentially contaminated sites. A majority of the records were related to minor releases associated with fueling activities at the airport. Since site location data presented in the EDM data report was not detailed enough to identify the specific locations of the releases on the property, and site access is limited within the active airport, GOAA personnel were contacted to ascertain information regarding potentially contaminated sites within the MCO Segment.

Along the E-W Corridor, five high-risk and one medium-risk rated sites within approximately 500 feet of the corridor were visited.

Along the N-S Corridor, 215 high-risk and 48 medium-risk rated sites adjacent to the corridor were inspected. The site inspections focused primarily on sites within approximately 200 feet of the corridor centerline or 150 feet from the FECR ROW. However, several sites outside the 200-foot detailed survey boundary were visited. Field inspections included a walk-through of each site, looking for indications of possible soil contamination, stressed or dead vegetation, or refuse that may indicate the presence of pollutants, toxic, or hazardous materials.

4.2.4.2 Affected Environment

The following sections provide an overview of the existing conditions and land use within the Project Study Area, as it relates to evaluation of potentially contaminated sites. Land use maps are provided in Appendix 4.1.1.

A total of 1,365 potentially contaminated sites were identified within the evaluation area. Table 4.2.4-1 summarizes the number of sites evaluated and the risk ratings for each site.

Risk Rating	MCO Segment (Number)		E-W Corridor (Number)		N-S Corridor (Number)		WPB-M Corridor (Number)
	Less than 500 ft.	Greater than 500 ft.	Less than 500 ft.	Greater than 500 ft.	Less than 200 ft.	Greater than 200 ft.	Less than 150 ft.
High	1	43	3	3	101	237	14
Medium	1	3	0	2	23	56	13
Low	14	38	4	4	114	314	199
No	11	50	9	6	99	202	0
Total	27	134	16	15	337	809	226

Appendix 4.2.4 includes a summary table of all potentially contaminated sites evaluated and risk ratings, aerial figures illustrating the location of all potentially contaminated sites, detailed site descriptions for sites that were researched through the FDEP OCULUS database and/or included in the field reconnaissance effort and copies of the EDM database reports for the Project Study Area.

MCO Segment

The MCO Segment enters the GOAA property from the north and extends to the south, between the existing terminals. The proposed VMF is planned for an undeveloped portion of land within the southern portion of the MCO property. As shown in Table 4.2.4-1, 27 potentially contaminated sites occur within 500 feet of the MCO Segment.

East-West Corridor

Historical aerial images were reviewed for the entire approximately 35-mile E-W Corridor. However, features of interest were only identified along approximately 26 miles of the SR 528 corridor west of the St. Johns River. Fifteen features of interest from historical aerial images were identified. Of the 15 features of interest identified, only one was noted as warranting further investigation due to potential mining or forestry activities observed in a 1970 image. As shown in Table 4.2.4-1, 16 potentially contaminated sites occur within 500 feet of the E-W Corridor. As discussed in Section 4.4.4, *Public Health and Safety*, The E-W Corridor will bisect the Formerly Used Defense Sites (FUDS) Pinecastle Jeep Range. The former range is a 12,483-acre site located near Orlando International Airport.

North-South Corridor

The N-S Corridor is an approximately 100-foot wide existing active railroad. Freight and/or passenger service has used this alignment throughout its 100-year plus history. The N-S Corridor extends from Cocoa to West Palm Beach, Florida and traverses established and heavily developed areas. Neighborhoods and communities have evolved in conjunction with the rail line. Surrounding land uses include undeveloped, residential, commercial, and light industrial properties. As shown in Table 4.2.4-1, 337 potentially contaminated sites occur within 200 feet of the N-S Corridor.

West Palm Beach-Miami Corridor

The Project Study Area traverses established and heavily developed areas of Palm Beach, Broward, and Miami-Dade Counties, and the potential presence of contaminated sites was previously evaluated in Section 3.3.6 of the 2012 EA. Land uses transition from central business district urban, to medium density residential, to industrial and commercial uses. Little vacant and/or undeveloped land exists along the corridor. Due to the age of the existing corridor, established neighborhoods and communities have evolved in conjunction with the corridor.

4.2.5 Coastal Zone Management

The Coastal Zone Management Act (CZMA), 16 USC § 1451, et seq., was passed in 1972 as guidance for the management of coastal resources. As part of the CZMA, Congress provided coastal states with incentives to encourage the development and implementation of comprehensive coastal management programs to balance resource protection with economic growth and development within the coastal zone.

The CZMA requires states to consider areas within the coastal zone that may warrant special consideration due to their environmental, cultural, economic, or recreational value. In response to this requirement, Florida designated Areas of Special Management (ASM) that consist of four existing state programs: Areas of Critical State Concern (ACSC), Aquatic Preserves System, Surface Water Improvement and Management (SWIM), and Beach and Inlet Management Areas.

Chapter 380.05 of the Florida Statutes (FS) established the ACSC program and authorized the Department of Economic Opportunity, the designated state land planning agency, to recommend specific areas of concern to the Administration Commission, which includes the Governor and the Cabinet, for adoption as ACSC. No ACSCs occur within the Project Study Area. The FDEP Office of Coastal and Aquatic Managed Areas (CAMA) oversees the management of designated aquatic preserves in Florida.

The FDEP Bureau of Beaches and Coastal Systems (BBCS) is responsible for implementing the Beach and Shore Preservation Act. On May 21, 2008, FDEP adopted the Strategic Beach Management Plan to address specific strategies for constructive actions at critically eroded beaches and inlets, known as Beach and Inlet Management Areas. Approximately 108 miles of the Florida Atlantic coastline are actively managed to reduce and minimize beach, shoreline, and inlet erosion, including beach and dune restoration, beach nourishment, feeder beaches or inlet sand bypassing, and other actions to mitigate the erosive effects of inlets.

The Project is located entirely within the designated Florida Coastal Zone. Coastal and Aquatic Managed Areas which are located within or in the vicinity of the Project are shown on Figure 4.2.5-1 and include:

- Banana River Aquatic Preserve;
- Indian River – Malabar to Vero Beach Aquatic Preserve;
- Indian River – Vero Beach to Fort Pierce Aquatic Preserve;
- Jensen Beach to Jupiter Inlet Aquatic Preserve; and
- Loxahatchee River – Lake Worth Creek.

Beach and Inlet Management Areas within and adjacent to the Project Study Area include Brevard County Beach, Indian River County Sector Seven, Fort Pierce Shore Protection Project, St. Lucie Inlet Management, Jupiter Beach Restoration, and Miami Beach Restoration.



- Explanation of Features**
- █ N-S Corridor
 - █ E-W Corridor
 - █ WPB-M Corridor
 - █ MCO Segment
 - █ 1, Banana River Aquatic Preserve
 - █ 2, Indian River - Malabar to Vero Beach Aquatic Preserve
 - █ 3, Indian River - Vero Beach to Ft. Pierce Aquatic Preserve
 - █ 4, Jensen Beach to Jupiter Inlet Aquatic Preserve
 - █ 5, Loxahatchee River - Lake Worth Creek Aquatic Preserve
 - █ 6, Biscayne Bay - Cape Florida to Monroe County Line Aquatic Preserve

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

Coastal and Aquatic Managed Areas		
All Aboard Florida Intercity Passenger Rail Project		
		4.2.5-1

4.3 Natural Environment

This section provides a description of the existing natural resources within the Project Study Area, including water resources, wild and scenic rivers, wetlands, floodplains, biological resources and natural ecological systems, and threatened and endangered species.

As stated in Chapter 1, *Introduction*, the U.S. Army Corps of Engineers (USACE) jurisdiction of authority includes Sections 10 and 14 of the Rivers and Harbors Act (RHA) and Section 404 of the Clean Water Act (CWA). The geographic jurisdiction of the RHA includes all navigable waters of the United States, which are defined in 33 CFR Part 329 as, “those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce.” This jurisdiction extends seaward to include all ocean waters within a zone three nautical miles from the coast line (the “territorial seas”). Limited authorities extend across the outer continental shelf for artificial islands, installations and other devices (see 43 U.S.C. 1333 (e)).

The CWA uses the term “navigable waters,” which is defined in Section 502(7) as “waters of the United States, including the territorial seas.” Thus, Section 404 jurisdiction is defined as encompassing Section 10 waters plus their tributaries and adjacent wetlands and isolated waters where the use, degradation, or destruction of such waters could affect interstate or foreign commerce.

Section 404 of the CWA (33 CFR 320-332) regulates discharges of dredged or fill material into waters of the United States, including jurisdictional wetlands. The CWA requires compliance with the Section 404(b)(1) Guidelines, 40 C.F.R. Part 230, developed jointly by the EPA and USACE. CWA compliance requires a sequential evaluation process which includes verification that all jurisdictional wetland impacts have been avoided to the greatest extent practicable, unavoidable impacts have been minimized to the greatest extent practicable, and unavoidable impacts have been mitigated in the form of wetlands creation, restoration, enhancement or preservation. AAF has not yet submitted a complete application for Section 404 authorization to USACE. USACE will complete its Section 404(b)(1) Guidelines analysis and public interest review in its record of decision following publication of the FEIS.

Section 14 of the RHA states any proposed modification to an existing USACE projects (either federally or locally maintained) that go beyond those modifications required for normal Operation and Maintenance require approval under 33 USC § 408. 33 USC § 408 also states that there shall be no temporary or permanent alteration, occupation, or use of any public works including but not limited to levees, sea walls, bulkheads, jetties, and dikes for any purpose without the permission of the Secretary of the Army. Under the terms of 33 USC § 408, any proposed modification requires a determination by the Secretary of the Army that such proposed alteration or permanent occupation or use of a Federal project is not injurious to the public interest and will not impair the usefulness of such work. The authority to make this determination and to approve modifications to Federal works under 33 USC § 408 has been delegated to the Chief of Engineers. Table 4.3.4-3 provides a full list of federal projects that could be impacted by the proposed action.

4.3.1 Water Resources

Water resources analyzed within the Project Study Area include surface water and groundwater, as well as navigable waters. The quality and availability of surface and groundwater are addressed. Surface water resources comprise lakes, rivers, and streams and are important for ecological, economic, recreational, aesthetic, and human health reasons. Groundwater comprises the subsurface hydrologic resources of the physical environment and is an essential resource in many areas; groundwater is commonly used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition.

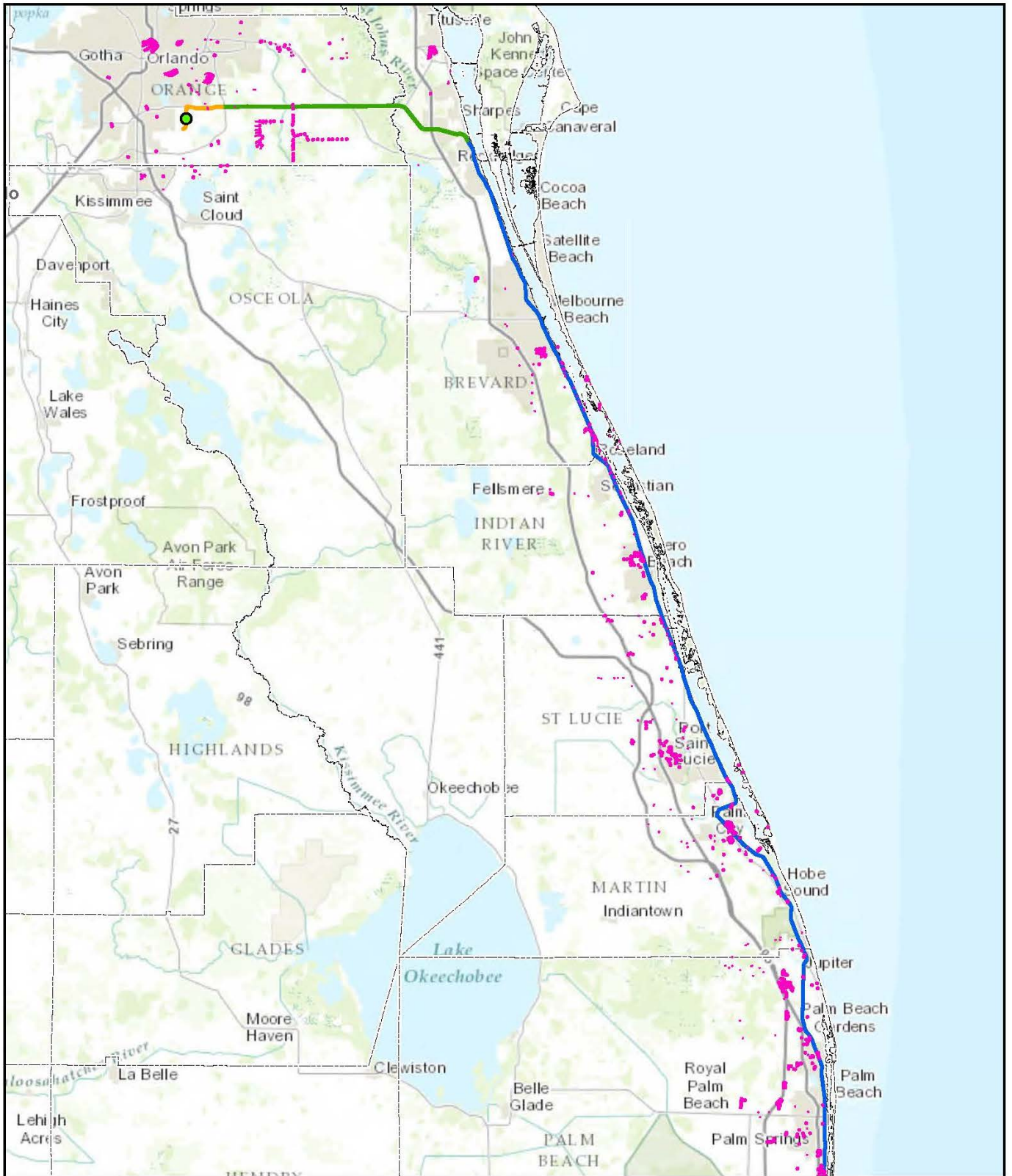
Surface water resources are lakes, rivers, and streams, and are important for ecological, economic, recreational, aesthetic, and human health reasons. Federal and state agencies classify water bodies based upon their characteristics, function, and use. Water quality is also monitored and classifications are assigned to water bodies. Several of these classifications relevant to the Project Study Area are described below.

- **Outstanding Florida Waters** – Chapter 62-302, Florida Administrative Code (FAC), defines Outstanding Florida Waters (OFWs), which include aquatic preserves, state reserves/preserves, and National Wild and Scenic River Systems. OFWs are waters designated worthy of special protection because of their natural attributes. This special designation is applied to certain waters, and is intended to protect and maintain existing acceptable quality standards (FDEP 2012b).
- **Impaired Water Bodies** – Chapter 62-303 of the FAC defines the verified impaired water bodies within Florida (FDEP 2012a and 2012c). Impairments to surface waters may include bacteria (in shellfish), copper, dissolved oxygen, fecal coliforms, mercury (in fish tissue), and nutrients.

4.3.1.1 Methodology

Available GIS information was used to identify and characterize waterways within the Project Study Area. Navigation conditions were determined using existing published information.

The Source Water Assessment and Protection Program (SWAPP) GIS data layer is maintained by FDEP (FDEP 2008). The data layer represents buffered assessment areas around the drinking water supply wells for the following types of wells: non-community wells (500-foot radius buffer of the well); community wells serving populations < 1,000 persons (1,000-foot radius buffer of the well); and community wells serving populations \geq 1,000 persons (1,000-foot radius buffer of the well plus a 5-year groundwater travel time). The SWAPPs within a 10-mile radius of Project Study Area are mapped in Figure 4.3.1-1. The Project would intersect SWAPP zones in all six counties.



Explanation of Features

- E-W Corridor
- N-S Corridor
- MCO Segment
- Proposed Station (By Others)
- 10-mile Radius Source Water Assessment & Protection Program Areas

Data Sources: 2012 ESRI, FDEP SWAPP 2008, FRA Environmental Assessment, AAF 2012

Source Water Assessment and Protection Program Areas	
All Aboard Florida Intercity Passenger Rail Project	
4.3.1-1	

4.3.1.2 Affected Environment

This section describes the existing surface waters, groundwater, and navigation environment within the Project Study Area.

Surface Water

One surface water, Boggy Creek, is within the MCO Segment.

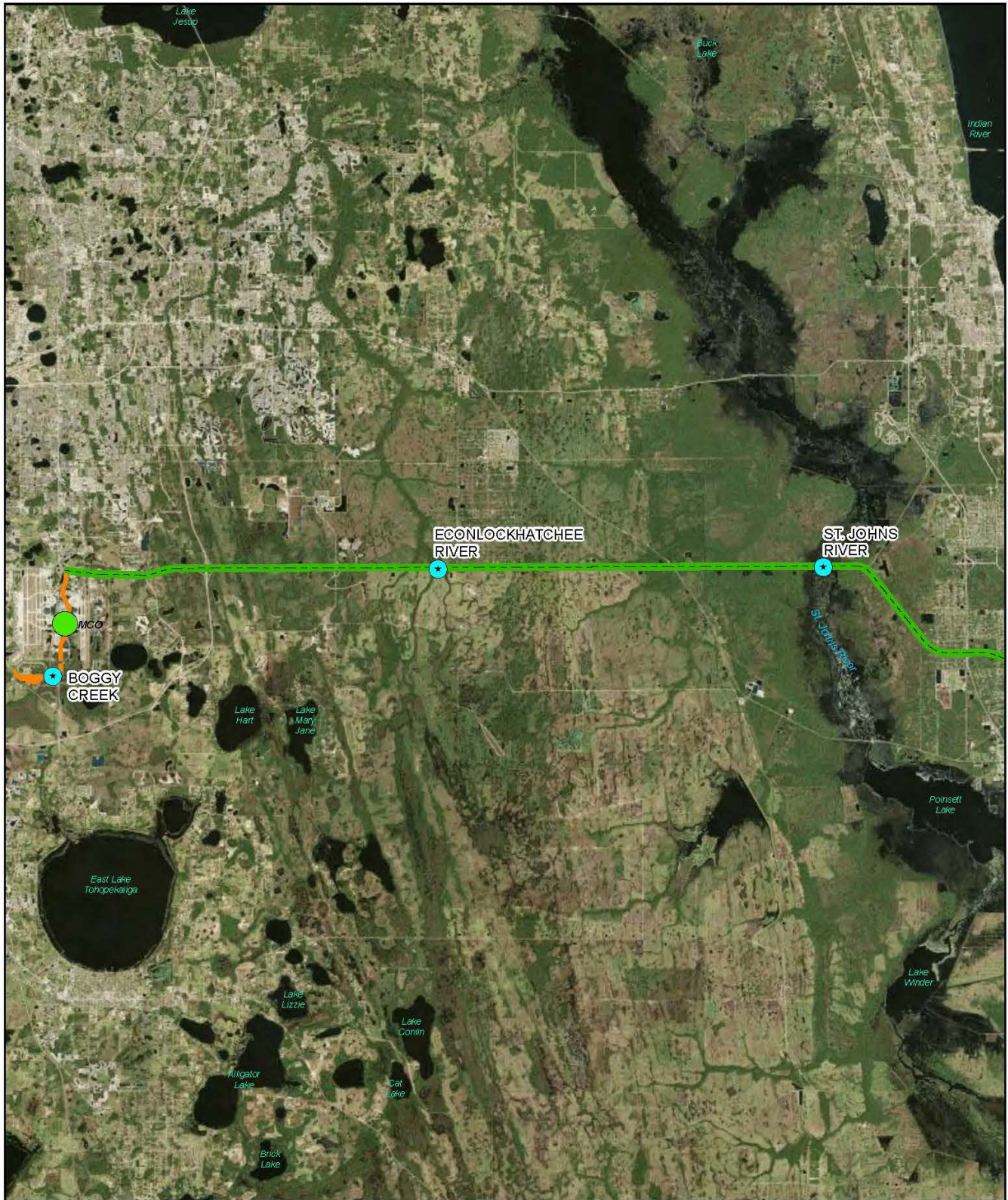
The E-W Corridor crosses five surface waters (Figure 4.3.1-2), one of which is classified as navigable, and two of which are classified as OFW (Table 4.3.1-1). The St. Johns River is considered navigable by USCG.

County	Name of Waterbody	Impaired	Source of Impairment	FDEP Classification ¹
Orange	Boggy Creek	Yes	Fecal Coliform	3F
Orange	Econlockhatchee River	Yes	Mercury (in fish tissue), Fecal Coliform	3F ²
Orange	Second Creek			
Orange	Taylor's Creek			
Orange	Jim Creek	Yes	Fecal Coliform, Dissolved Oxygen, Mercury (in fish tissue)	3F
Orange Brevard	St. Johns River Above Puzzle Lake (South Segment)	Yes	Fecal Coliform, Dissolved Oxygen, Mercury (in fish tissue)	3F ^{2,3}





Source: AMEC 2013b

- 1 Florida's waterbody classifications are defined as:
1 = Potable water supplies; 2 = Shellfish propagation or harvesting; 3F = Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in fresh water; 3M = Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in marine water; 4 = Agricultural water supplies; and 5 = Navigation, utility, and industrial use
- 2 Outstanding Florida Waters
- 3 Navigable Waters

As outlined in Table 4.3.1-2, the N-S Corridor between Cocoa and West Palm Beach crosses 23 surface waters (Figure 4.3.1-3), four of which are classified as navigable, and two of which are classified as OFW. The water bodies north of West Palm Beach that are considered navigable waters are Crane Creek, St. Sebastian River above Indian River, North Coastal-St. Lucie/Loxahatchee, and the St. Lucie Estuary. Impairments to these surface waters includes bacteria (in shellfish), copper, dissolved oxygen, fecal coliforms, mercury (in fish tissue), and nutrients.



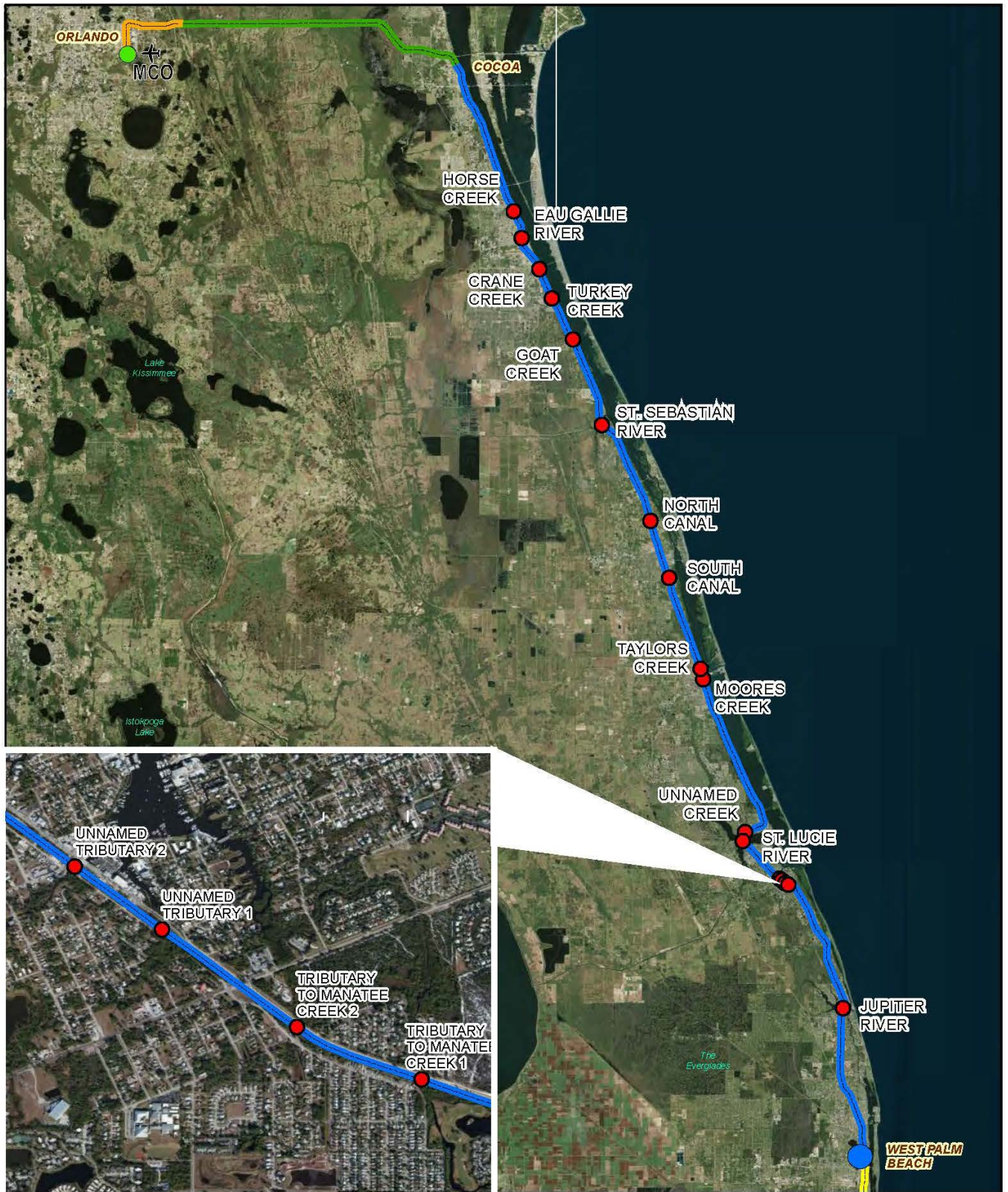
Explanation of Features

-  Water Body Crossings
-  E-W Corridor
-  MCO Segment
-  Proposed Station (by Others)

Data Sources: ESRI Bing Maps 2012 Imagery, FRA 2012, AMEC 2013

MCO Segment and E-W Corridor Waterway Crossings		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.1-2

Path: F:\FECD\FECL_GDBMX\DEA\EW Waterway crossing Map.mxd



Explanation of Features

- Water Body Crossings
- Proposed Stations - WPB-M Corridor
- E-W Corridor
- N-S Corridor
- WPB-M Corridor
- Proposed Station (By Others)
- MCO Segment

Data Sources: ESRI Bing Maps 2012 Imagery, FRA 2012, AMEC 2013

N-S Corridor Waterway Crossings		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.1-3

Path: F:\FCE\FECL_G06\WXD\EAINS\Water body crossing Map2.mxd

County	Name of Waterbody	Impaired	Source of Impairment	FDEP Classification ¹
Brevard	Horse Creek	Yes	Mercury (in fish tissue), Nutrients (historic chlorophyll-A)	3M
Brevard	Eau Gallie River	Yes	Mercury (in fish tissue), Dissolved Oxygen, Nutrients (chlorophyll-A), Copper	3M
Brevard	Indian River Above Melbourne Causeway	Yes	Mercury (in fish tissue)	3M
Brevard	Crane Creek	Yes	Mercury (in fish tissue), Dissolved Oxygen, Nutrients (chlorophyll-A), Copper	3M ⁵
Brevard	Palm Bay And Turkey Creek (Estuarine Segment)	Yes	Mercury (in fish tissue), Nutrients (historic chlorophyll-A)	3M
Brevard	Goat Creek (Marine Segment)	Yes	Mercury (in Fish tissue), Nutrients (historic chlorophyll-A)	2 ⁴
Brevard	St. Sebastian River Above Indian River	Yes	Mercury (in fish tissue), Dissolved Oxygen	3M ⁵
Indian River				
Indian River	South Prong St. Sebastian River (Estuarine Segment)	Yes	Mercury (in fish tissue), Dissolved Oxygen (BOD), Nutrients (Chlorophyll-A)	3M
Indian River	North Canal	Yes	Fecal Coliform, Dissolved Oxygen	3F
Indian River	Main Canal	Yes	Fecal Coliform, Dissolved Oxygen (BOD)	3F
Indian River	South Canal	Yes	Fecal Coliform	3F
St Lucie	North Coastal (St. Lucie/Loxahatchee)	Yes	Nutrients (chlorophyll-A), Dissolved Oxygen, Bacteria (in Shellfish)	3M ⁵
St Lucie	Moore Creek	Yes	Nutrients (chlorophyll-A)	3M
Martin	South Indian River	Yes	Fecal Coliform, Copper, Bacteria (in Shellfish)	2
Martin	Warner Creek ²	Yes	Fecal Coliform, Copper, Bacteria (in shellfish)	2,3M
Martin	Unnamed Creek ²	Yes	Copper, Mercury (in fish tissue)	3M
Martin	St. Lucie Estuary	Yes	Copper, Mercury (in fish tissue)	3M ⁵
Martin	Tributary to Manatee Creek 1 ³	Yes	Nutrients (chlorophyll-A), Copper, Mercury (in fish tissue)	3M
Martin	Tributary to Manatee Creek 2 ³	Yes	Nutrients (chlorophyll-A), Copper, Mercury (in fish tissue)	3M
Martin	Unnamed Tributary 1 ³	Yes	Nutrients (chlorophyll-A), Copper, Mercury (in fish tissue)	3M
Martin	Unnamed Tributary 2 ³	Yes	Nutrients (chlorophyll-A), Copper, Mercury (in fish tissue)	3M
Martin	Loxahatchee River	Yes	Nutrients (historic chlorophyll-A), Mercury (in fish tissue), Bacteria (in shellfish)	3M ^{4,5}
Palm Beach				
Palm Beach	Earman River (Palm Beach Stations / D-Canals)	Yes	Dissolved Oxygen, Nutrients (chlorophyll-A)	3F

Source: AMEC 2013b

1 Florida's waterbody classifications are defined as:

1 = Potable water supplies; 2 = Shellfish propagation or harvesting; 3F = Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in fresh water; 3M = Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in marine water; 4 = Agricultural water supplies; and 5 = Navigation, utility, and industrial use

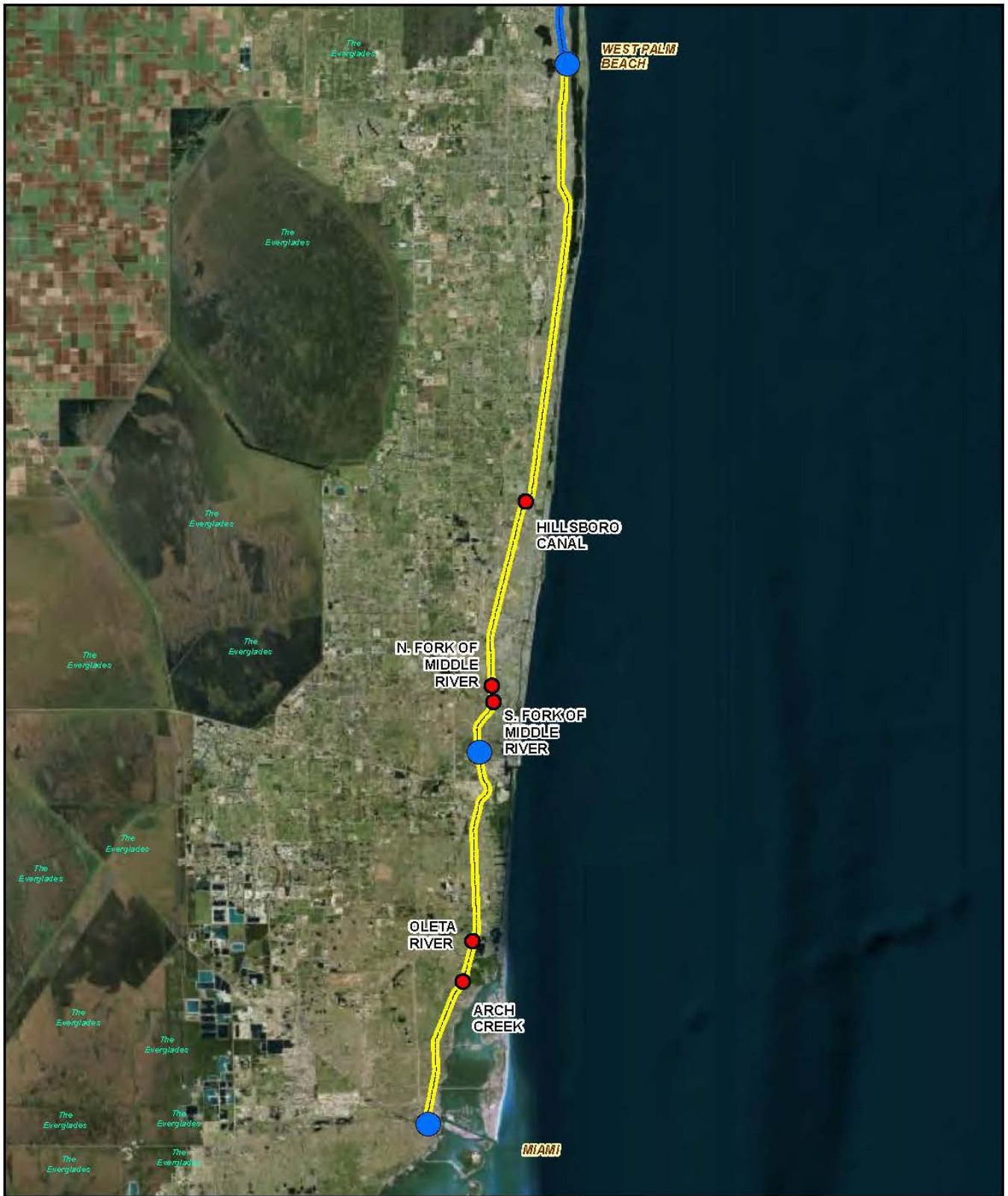
2 Mapped as part of South Indian River in FDEP's Verified Impaired Florida Waters Database

3 Mapped as part of Manatee Pocket in FDEP's Verified Impaired Florida Waters Database

4 Outstanding Florida Waters

5 Navigable Waters

The WPB-M Corridor crosses 15 surface waters (Figure 4.3.1-4), four of which are classified as navigable, and one of which is classified as OFW (Table 4.3.1-3). The water bodies south of West Palm Beach that are considered navigable waters are the Hillsboro Canal (identified by USCG as navigable), North Fork of the Middle River, South Fork of the Middle River, and the Oleta River. The Oleta River is also designated as an OFW. Impairments to these surface waters includes bacteria (in shellfish), copper, dissolved oxygen, fecal coliforms, mercury (in fish tissue), and nutrients.



Explanation of Features

- Water Body Crossings
- N-S Corridor
- WPB-M Corridor
- Proposed Stations - WPB-M Corridor

Data Sources: ESRI Bing Maps 2012 Imagery, FRA 2012, AMEC 2013

WPB-M Corridor Waterway Crossings		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.1-4

Path: F:\FEC\FECL_GDB\MXD\VAWS\Waterbody crossing Map3.mxd

County	Name of Waterbody	Impaired	Source of Impairment	FDEP Classification ¹
Palm Beach	West Palm Beach Canal (C-51)	Yes	Dissolved Oxygen, Nutrients (chlorophyll A)	3F
Palm Beach	Boynton Beach Canal	Yes	Dissolved Oxygen, Nutrients (chlorophyll-A)	3F
Palm Beach	Hillsboro Canal	Yes	Dissolved Oxygen, Nutrients (chlorophyll-A)	3F ³
Palm Beach	Hidden Valley Canal	-		
Broward	Cypress Creek Canal	-		
Broward	North Fork of the Middle River	No	NA	3M
Broward	South Fork of the Middle River	No	NA	3M
Broward	New River	-		
Broward	Tarpon River	-		
Broward	Dania Cutoff Canal	-		
Miami-Dade	Oleta River	Yes	Fecal Coliform, Mercury (in fish tissue)	3M ²
Miami-Dade	Snake Creek/Royal Glades Canal	-		
Miami-Dade	Arch Creek	Yes	Fecal Coliform, Mercury (in fish tissue)	3F
Miami-Dade	Biscayne Park Canal	-		
Miami-Dade	Little River	-		

Source: Environmental Assessment, All Aboard Florida West Palm Beach – Miami (Appendix 1.1-A1)

Note: Section 3.1.2.1 of the 2012 EA did not provide information on impairments or classifications of waters where no construction was proposed.

1 Florida's water body classifications are defined as:

1 = Potable water supplies; 2 = Shellfish propagation or harvesting; 3F = Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in fresh water; 3M = Recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife in marine water; 4 = Agricultural water supplies; and 5 = Navigation, utility, and industrial use

2 Outstanding Florida Waters

3 Navigable Waters

Groundwater

The Florida Safe Drinking Water Act (Fla. Stat. §§ 403.850 – 403.8911) ensures that the existing and potential drinking water resources of the state remain free from harmful quantities of contaminants. Local officials of each county and municipality have been encouraged to handle pollution problems within their respective jurisdictions on a cooperative basis with the state. Brevard, Indian River, St. Lucie, Martin, and Palm Beach Counties have policies and regulations, in the form of wellfield protection ordinances, to protect drinking water supplies from contamination. Wellfield protection criteria are found in Article 14, Chapter B of the Palm Beach County Unified Land Development Code (Palm Beach County, Florida 1992); Martin County Ordinance 428 (Martin County, Florida 2012); Chapter VI, Section 6.03.00 of the St. Lucie Land Development Code (St. Lucie County, Florida 2009); Code of Ordinances County of Indian River Land Development Regulations Chapter 931 (Indian River County, Florida 2012); Chapter 62, Article X, Division 2, and Section 62-3631 of the Brevard County Natural Resource Ordinances (Brevard County, Florida 2012). Orange County does not have a wellfield protection ordinance; however, they follow FDEP regulations (Chapter 62-521, FAC) (Mercado 2013).

The federal Safe Drinking Water Act (42 U.S.C. § 300f) requires protection of sole source aquifers (SSAs). The Project Study Area was overlain on SSA GIS polygon data to determine where there were areas of overlap (EPA 2011a). The results are presented in Table 4.3.1-4. There is no overlap with a SSA in four of the counties. There is overlap in Orange County within the westernmost 20 miles of the Project Study Area and in Palm Beach County for the Biscayne aquifer SSA streamflow and recharge zone.

MCO Segment

Wells in the vicinity of the MCO Segment were identified using the Environmental Data Resources, Inc. (EDR) Radius Map Report. The EDR report indicated nine wells listed on the Florida Wells database within 1 mile of the MCO Segment (EDR 2013). Reportedly, four wells are located within 0.25 mile, two wells within 0.5 mile, and one well within 1 mile. The water use of these wells is City of Orlando public water supply (one), private (seven), and monitoring (one).

County	Sole Source Aquifer(s)	Name of Aquifer(s)/Protection Zone
Orange	Y	Biscayne aquifer SSA streamflow and recharge source zones
Brevard	N	
Indian River	N	
St. Lucie	N	
Martin	N	
Palm Beach (North from the Station in West Palm Beach)	Y	Biscayne aquifer SSA streamflow and recharge source zones

Source: EPA. 2011a. *Office of Water's 2011 SSA Database*. <http://www.fgdl.org/metadataexplorer/explorer.jsp>. Accessed September 27, 2013.

East-West Corridor

There are three hydrostratigraphic units in Orange County. These include the surficial aquifer system, intermediate aquifer system/confining unit, and the Floridan aquifer system. The Biscayne aquifer is protected in Orange County as SSA streamflow and recharge source zones (Lane and Scott 1980; Lichtler et al. 1968; Wilson, W. et al. 1987; Florida Sinkhole Research Institute 1989).

North-South Corridor

Brevard County is underlain by three hydrostratigraphic units. These units include the unconfined surficial aquifer system, intermediate aquifer system/confining unit, and the confined Floridan aquifer system. This is not an area typical of karst terrain. A large percentage of the groundwater used in Brevard County comes from the Floridan aquifer system. The Floridan aquifer system yields large quantities of water due to the high permeability of the carbonates. The Ocala Limestone yields the highest amounts of water in the Brevard County area (Brown, D.W., et al. 1962; Lane and Scott 1980; Mercado 2013).

There are three hydrostratigraphic units in Indian River County. These include: the surficial aquifer system, intermediate confining unit, and the Floridan aquifer system (Crane, Hughes, and Snell 1975;

Schiner, Laughlin, and Toth 1988; Spencer and Lane 1995; Toth and Huang 1998). This area is mostly devoid of karst terrain. In 2006, the Floridan aquifer system supplied more than two-thirds of the water withdrawn by Indian River County, and nearly all of the public drinking water (Indian River County, Planning Division 2010). Commenters on the DEIS noted that this is no longer a major source of potable water due to high chloride levels.

There are three hydrostratigraphic units in St. Lucie County. These include: the surficial aquifer system, intermediate confining unit, and the Floridan aquifer system. This area is essentially devoid of karst terrain. The surficial aquifer system is the primary source of fresh water in St. Lucie County. The water quality of the surficial aquifer system is generally good. Chloride concentrations in surficial aquifer groundwater average less than 100 milligrams per liter (Bearden 1972; Hicks, Marting, and Stodghill 1988). The Floridan aquifer exists under artesian conditions in St. Lucie County. It is not generally a major source of potable water in the area due to high chloride concentrations (Bearden 1972; Hicks 1988; Florida Geological Survey 2012; Bond 1987).

There are three hydrostratigraphic units in Martin County. These include the surficial aquifer system, intermediate aquifer system/confining unit, and the Floridan aquifer system. This is not an area typical of karst terrain. The surficial aquifer system, commonly referred to as the Coastal aquifer or the shallow aquifer, is the primary source of fresh water in Martin County. The surficial aquifer system generally ranges from 150 to 200 feet below mean sea level (msl) in eastern Martin County. The surficial aquifer system is primarily recharged by rainfall. The Floridan aquifer exists under artesian conditions in Martin County. It is highly saline with elevated chloride concentrations.

Palm Beach County contains three hydrostratigraphic units within the Project Study Area. These include the surficial aquifer system, intermediate aquifer system/confining unit, and the Floridan aquifer system. The Biscayne aquifer is protected in Palm Beach County as a SSA streamflow and recharge source zones. The surficial aquifer system is the primary source of fresh water in Palm Beach County. The Floridan aquifer system is not a source of potable water due to salinity.

4.3.2 Wild and Scenic Rivers

Through the National Wild and Scenic Rivers Act of 1968 (16 U.S.C 1271), rivers can be federally designated as wild and scenic if they contain remarkable scenic, recreational, or fish and wildlife related values. Such rivers are granted protection under the Act and must be evaluated as part of the NEPA process.

The Wekiva and Loxahatchee Rivers are the only federally designated Wild and Scenic Rivers in the State of Florida. The Wekiva River is 41.6 miles long and located in Central Florida, north of the City of Orlando. It was designated as Wild and Scenic in 2000 with 31.4 miles of the river designated as Wild, 2.1 miles as Scenic, and 8.1 miles as Recreational (National Wild and Scenic River Systems 2010). The Wekiva River is not proximate to the Project Study Area. The Loxahatchee River is 7.6 miles long and located in southeast Florida in Martin and Palm Beach County. Approximately 1.3 miles of the river is designated as Wild, 5.8 miles as Scenic, and 0.5 miles as Recreational. The Loxahatchee was designated as a Wild and Scenic River in 1985 and stretches from Riverbend Park downstream to Jonathan Dickinson State Park (National Wild and Scenic River Systems 1985). The N-S Corridor crosses the Loxahatchee River in Palm

Beach County; however, it crosses the river approximately 4 river miles downstream of the Wild and Scenic River designated area.

4.3.3 Wetlands

Wetlands within the Project Study Area are regulated and protected under state and federal regulatory programs. Within the State of Florida, activities conducted in wetlands are regulated by the State of Florida under Part IV, Chapter 373, FS. The USACE administers Section 404 of the CWA (33 CFR 320-332) which regulates discharges of fill into wetlands and waters of the United States. Wetlands as defined in Subsection 373.019(17) FS, are “those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils.”

The Clean Water Act, 33 CFR Part 328 defines wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

AAF has not yet submitted a complete application for Section 404 authorization to USACE. USACE will complete its Section 404(b)(1) Guidelines analysis and public interest review in its record of decision following publication of the FEIS.

4.3.3.1 Methodology

Wetlands were identified and characterized for areas in which the Project would require ground disturbing activities. For areas in which ground disturbing activities would occur and for which no land acquisition is required, a buffer of 150 feet from the corridor centerline defines the Project Study Area. For areas in which ground disturbing activities would occur and for which new land acquisition is required, a buffer of 500 feet outside the property boundary of the proposed acquisition defines the Project Study Area.

Wetland vegetation, habitat quality, and biodiversity were characterized using readily available information. Resources reviewed included, but were not limited, to the USFWS National Wetland Inventory (USFWS 2013a), Florida Land Use, Cover and Forms Classification System (FLUCCS) maps (FDOT 1999), USFWS topographic maps (USFWS n.d.), USDA NRCS soil survey maps (USDA 2013), USFWS wood stork rookery data (USFWS 2013b), Florida Natural Areas Inventory (FNAI) natural communities data (FNAI 2013), and water management district (WMD) land use data (SJRWMD 2009; SFWMD 2008).

These wetland systems were identified utilizing WMD land use data that were identified to FLUCCS Level II for generally anthropogenic land uses and to FLUCCS Level III primarily for natural habitats (the FLUCCS is arranged in hierarchical levels with each level containing land information of increasing specificity. Level I data are the most general in nature, while Level IV data are the most specific [FLUCCS 1999]). In addition, field delineations were conducted for the existing SR 528 right-of-way and the FECR Corridor. These delineations provided field confirmation for the occurrence of wetland and surface waters that would be considered jurisdictional pursuant to Chapter 62-340 FAC, and the USACE 1987

Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers 1987 Wetland Delineation *Manual: Atlantic and Gulf Coastal Plain Region* (Version 2.0). Upon completion of the field verifications the USACE will provide a preliminary Jurisdictional Determination to AAF. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, assessments in this EIS will be made on the basis of a preliminary jurisdictional determination. A preliminary jurisdictional determination will treat all waters and wetlands, which would be affected in any way by the proposed activity as if they are jurisdictional waters of the United States.

4.3.3.2 Affected Environment

The Project Study Area includes 16 types of aquatic habitats (wetlands and surface waters), as listed in Table 4.3.3-1. The figures in Appendix 4.1.1 provide depictions of the land use within the Project Study Area. Lists of characteristic plant species of each community are provided in Appendix 4.3.3-A1, Appendix 4.3.3-A2, and Table 4.3.3-2.

Streams and Waterways

Streams and waterways communities include rivers, creeks, canals, and other linear waterways. Freshwater rivers and streams cross the E-W Corridor, the N-S Corridor, and the WPB-M Corridor. Within urbanized areas, these systems typically have been dredged to facilitate stormwater drainage and the banks are often armored to protect from erosion. Rivers and streams in rural areas, particularly along the E-W Corridor, may have been channelized at some point but appear relatively undisturbed. Water levels within these systems vary according to seasonal precipitation with water levels rising in the wet summer months and dropping during the dry winter season. Vegetation within freshwater river and stream systems vary according to intensity of utilization, adjacent land use, water depth and frequency of inundation.

Tidally influenced waterways cross the N-S Corridor and the WPB-M Corridor at several locations. Tidally influenced systems include creeks and canals along the coastline that are subject to salinity and water level fluctuation concomitant with the ebb and flow of the tides. Canals are typically excavated waterways providing boat access to inland areas. Canals undergo regular maintenance in the form of channel dredging and canal banks tend to be steeply sloped or vertical and bolstered with concrete seawalls or rip-rap to prevent bank erosion. Vegetation is often limited to isolated red mangrove and scattered patches of typical saltmarsh vegetation. Tidally influenced river and creeks exhibit banks with less steep slopes although many areas are armored with seawalls and rip-rap to minimize erosion. Within most tidal rivers and creeks, channels have been dredged to allow boat traffic. Variations in salinity and water level generated by tidal flow and freshwater and sediment inputs from their associated watersheds provide a mosaic of habitats and communities within tidal river and creek systems. Habitats associated with tidal river and creeks include saltwater marshes, mangrove swamps, seagrass beds and oyster bars. The specific community composition varies from location to location according to the intensity of waterway utilization and adjacent land uses.

Table 4.3.3-1 Existing wetland communities within the Project Study Area as defined by FLUCCS and the National Wetland Inventory (NWI)

FLUCCS Code	FLUCCS Description	National Wetland Inventory (NWI) Wetland ³
510	Streams and Waterways	Riverine
520	Lakes	Lake
530	Reservoirs	Lake
540	Bays and Embayments	Estuarine and Marine Deepwater
611	Bay Swamps	Freshwater Forested/Shrub (PFO3/1)
612	Mangrove Swamps	Estuarine and Marine Wetland (E2FO3)
617	Mixed Wetland Hardwoods	Freshwater Forested/Shrub (PFO1/3)
618	Willow and Elderberry	Freshwater Forested/Shrub (PSS3)
619	Exotic Wetland Hardwoods	Freshwater Forested/Shrub (PFO3/1)
621	Cypress	Freshwater Forested/Shrub (PFO2)
625	Hydric Pine Flatwoods	Freshwater Forested/Shrub (PFO4)
630	Wetland Forested Mixed	Freshwater Forested/Shrub (PFO6/7)
641	Freshwater Marsh	Freshwater Emergent Wetland (PEM2)
643	Wet Prairie	Freshwater Emergent Wetland (PEM2)
644	Emergent Aquatic Vegetation	Freshwater Emergent Wetland (PEM1)
646	Treeless Hydric Savanna	Freshwater Emergent Wetland (PSS6/7)

Sources: FDOT. 1999. *Florida Land Use, Cover and Forms Classification System (FLUCCS) – Handbook*.

<http://www.dot.state.fl.us/surveyingandmapping/documentsandpubs/fluccmanual1999.pdf>. January 2013. Accessed August 7, 2013; United States Fish and Wildlife Service (USFWS). 2013a. *National Wetlands Inventory*. <http://www.fws.gov/wetlands/>. Accessed September 27, 2013.

Lakes

Lakes communities include lakes, ponds, and stormwater ponds. Within the Project Study Area these consist primarily of stormwater ponds, which are constructed to prevent flooding by retention or detention of water during storm events. Retention ponds are generally “wet” and store stormwater for extended periods of time allowing the water to percolate into the soil and recharge the groundwater or to dissipate through evaporation or evapotranspiration. Detention ponds are generally “dry” and hold water for short periods of time slowly releasing it into the drainage system. In addition to maintaining surface and groundwater levels, stormwater ponds allow suspended sediments and pollutants to settle out of the water column. Vegetation within stormwater ponds varies based on location, hydrology, utilization, and surrounding environment or land uses. Dominant vegetation typically consists of weedy upland and wetland species.

Reservoirs

Reservoirs are artificial impoundments constructed for water supplies, irrigation, flood control, and recreation. Reservoirs are typically dominated by open water although some designs incorporate littoral zones or islands to increase wildlife habitat value or to provide aesthetic enhancement. Vegetation consists of wetland species but the species composition varies considerably depending on the purpose and utilization of the reservoir. Factors such as human activity, maintenance regime, design, and landscaping influence the community structure and habitat value.

Bays and Estuaries

Bays and estuaries consist of inlets of the ocean that occur along coastlines and include subtidal, intertidal, and supratidal zones and occur along the N-S Corridor. Estuaries typically have a river or stream flowing into it and exhibit an open connection to the sea greater than 1 nautical mile (nm) in width (FDOT 1999). Tidal areas less than 1 nm wide are classified as streams and waterways. Estuaries are subject to marine influences, such as tides, waves, and the influx of salt water. In addition to the physical and chemical influences that tides have on estuaries, estuaries also receive inputs of freshwater and sediment from their associated watersheds. As a result estuaries may contain many biological niches within a small area, and are associated with high biodiversity.

Bay Swamps

Bay swamps are freshwater hardwood forested wetlands dominated by bay tree species such as swamp bay, red bay, sweetbay, and loblolly bay (Table 4.3.3-2). These communities typically occur in wetland areas with a strong seepage component to the hydrology and mucky acidic soils. The understory is composed of a moderately dense shrub stratum consisting of Virginia willow, wax myrtle, common buttonbush, possumhaw, and swamp azalea among others. Groundcover species consist of shade tolerant herbaceous species such as lizard's tail and ferns.

Mangrove Swamps

Mangrove swamp is a dense forest occurring along marine and estuarine shorelines that are protected from full wave energy. Mangrove swamps are dominated by four mangrove species (Table 4.3.3-2) that generally occur in distinct monospecific zones that reflect varying degrees of tidal influence and depth of inundation, levels of salinity, and types of substrate. Red mangrove often dominates the lowest zone, followed by black mangrove in the intermediate zone, and white mangrove in the highest zone. Buttonwood usually occupies the transitional zone between the wetland and the adjacent upland community.

The density and height of mangroves and the diversity of associated herbaceous species can vary considerably within a mangrove swamp. Mangroves typically occur in dense stands but may be sparse, allowing salt marsh species predominate. Mangrove swamps often exist with no understory, although shrubs such as seaside oxeye and woody vines may be present. Groundcover is usually sparse, but herbaceous species common to mangrove swamps include saltwort, perennial glasswort, mangrove spiderlily, and giant leather fern.

Mangrove swamps occur adjacent to the N-S Corridor and WPB-M Corridor, and are found in some locations within the FECR right-of-way.

Scientific Name	Common Name
<i>Acer rubrum</i>	Red maple
<i>Cephalanthus occidentalis</i>	Buttonbush
<i>Cladium jamaicense</i>	Sawgrass
<i>Gordonia lasianthus</i>	Loblolly bay
<i>Ilex cassine</i>	Dahoon holly
<i>Itea virginica</i>	Virginia willow
<i>Liquidambar styraciflua</i>	Sweetgum
<i>Magnolia virginiana</i>	Sweetbay
<i>Melaleuca quinquinerva</i>	Melaleuca
<i>Myrica cerifera</i>	Wax myrtle
<i>Nyssa sylvatica</i> var. <i>biflora</i>	Swamp tupelo
<i>Panicum hemitomum</i>	Maidencane
<i>Persea borbonia</i>	Red bay
<i>Persea palustris</i>	Swamp bay
<i>Pinus elliotii</i>	Slash pine
<i>Pinus palustris</i>	Longleaf pine
<i>Pinus serotina</i>	Pond pine
<i>Quercus hemisphaerica</i>	Laurel oak
<i>Quercus nigra</i>	Water oak
<i>Rhododendron viscosum</i>	Swamp azalea
<i>Sabal minor</i>	Dwarf palmetto
<i>Sabal palmetto</i>	Cabbage palm
<i>Salix caroliniana</i>	Carolina willow
<i>Schinus terebinthifolia</i>	Brazilian pepper
<i>Taxodium ascendens</i>	Pond cypress
<i>Taxodium distichum</i>	Bald cypress
<i>Ulmus americana</i>	American elm

Mixed Wetland Hardwoods

Mixed wetland hardwoods are freshwater hardwood forested wetlands exhibiting a large variety of species composing the canopy stratum with no discernible pattern of dominance. Canopy species typically include American elm, sweetbay, red maple, sugarberry, American hornbeam, and water oak. Cabbage palm and slash pine are often components of the canopy or subcanopy. Common shrub and understory species include swamp dogwood, Walter's viburnum, swamp bay, wax myrtle, dwarf palmetto, American beautyberry, and wild coffee. Groundcover species are dominated by ferns.

Willow and Elderberry

Willow and Elderberry is a community in which either Carolina willow or elderberry is predominant. Within the Project Study Area this community is typically found in areas disturbed by human activities. It can also be found in areas experiencing natural fluctuations in environmental conditions. Both Carolina willow and elderberry are early successional species which tend to quickly recruit into and spread

through disturbed systems. They are also tolerant of a wide range of environmental conditions and may be found in areas with fluctuating conditions such as slough systems.

Exotic Wetland Hardwoods

Exotic Wetland Hardwoods are wetlands dominated by non-native hardwood species such as Brazilian pepper and melaleuca. These exotic species present dense stands with little light penetration and sparse groundcover vegetation. This community is usually found in areas disturbed by human activity or natural process such as wildfire.

Cypress

Cypress is a freshwater coniferous wetland forest dominated by pond cypress or bald-cypress. Deep zones of this community typically consist of dense or pure stands of cypress within a transitional zone dominated by red maple, water oak, live oak, or other hardwood tree species tolerant of hydric conditions. Cypress wetlands are often isolated forming “domes” with the older, taller trees in the center. Canopy associate species include red maple, dahoon holly, swamp bay, slash pine, sweetbay, loblolly bay, and, in South Florida, coco plum and pond apple. Shrubs are typically sparse to moderate, and typical shrubs include Virginia willow, shiny lyonia, common buttonbush, and wax myrtle. Typical herbaceous species include ferns, maidencane, sawgrass, and lizard’s tail.

Hydric Pine Flatwoods

Hydric Pine Flatwoods are pine forests with a sparse subcanopy and groundcover consisting of hydrophytic grasses, herbs, and shrubs. The dominant pine canopy typically consists of one or a combination of longleaf pine, slash pine, pond pine, or South Florida slash pine. Longleaf pine and pond pine are more common in the northern portions of the Project Study Area. Associated tree species consist of scattered sweetbay, swamp bay, loblolly bay, pond cypress, dahoon holly, and cabbage palm. Common shrubs include wax myrtle, shiny lyonia, swamp azalea, common buttonbush, and Walter’s viburnum, among others. Herbaceous groundcover species include grasses, Carolina redroot, beaksedges, and rushes.

Wetland Forested Mixed

Wetland forested mixed includes freshwater forested wetland communities in which neither hardwoods nor conifers achieve a 66-percent dominance of the canopy community. Dominant canopy species typically include sweetgum, sweetbay, laurel oak, water oak, American elm, red maple, swamp tupelo, slash pine, and bald cypress. Bay species such as loblolly and swamp bay are often mixed in the canopy in acidic or seepage systems. Common shrubs include swamp dogwood, dahoon holly, dwarf palmetto, Walter’s viburnum, American snowbell, wax myrtle, and highbush blueberry. Characteristic groundcover species include witchgrass, slender woodoats, beaksedges, Virginia chain fern, and beaked panicum.

Freshwater Marsh

Freshwater marshes are regularly inundated wetlands and may occur in a variety of situations. Species composition is heterogeneous both within and between marshes but can generally be divided into emergent and transitional zones from deepest to shallowest portions. Shrub patches may be present

within any of these zones. Species common to the emergent zone include pickerelweed, bulltongue arrowhead, cattail, sawgrass, burr marigold, and softstem bulrush. Maidencane, sand cordgrass, sweetscent, mild waterpepper, and blue waterhyssop are species common to the transitional zone. Carolina willow, common buttonbush, and wax myrtle are common shrubby components.

Wet Prairie

Wet Prairie is characterized as a shallow, usually rounded depression in sand substrate with herbaceous vegetation or shrubs and a relatively short hydroperiod. Wet prairies typically occur in landscapes occupied by fire-maintained communities such as mesic flatwoods, dry prairie, or sandhill. Zonation, seen as concentric bands of vegetation, is related to the length of the hydroperiod and depth of flooding. The outer zone is often occupied by herbaceous vegetation or shrubs consisting of bushy bluestem, beaksedges, yelloweyed grass, blue maidencane, myrtleleaf St. John's wort, sand cordgrass, roundpod, and bogbutton. The deeper zones commonly consist of purple bluestem, peelbark St. John's wort, water toothleaf, Baldwin's spikerush, maidencane, bulltongue arrowhead, or sawgrass.

Emergent Aquatic Vegetation

Emergent aquatic vegetation is a deep marsh dominated by emergent, floating, and submerged herbaceous vegetation. A shallow transitional zone is present at the wetland edge. This type of wetland typically exhibits a longer hydroperiod than the freshwater marsh. Alligator flag, pickerelweed, bulltongue arrowhead, giant cutgrass, softstem bulrush, and Kissimmeegrass are common species where emergent vegetation is present. Deeper areas may contain floating and submerged aquatic plants such as American white waterlily, big floating heart, spatterdock, frog's bit, and bladderworts. Exotic floating species such as water hyacinth and water-lettuce have become common components of the floating vegetation community in Florida.

Treeless Hydric Savanna

Treeless Hydric Savanna is a shrub and grass dominated hydric flatland although this FLUCCS code is often applied to any shrub dominated wetland system. Within the Project Study Area these shrub systems are found in wet areas which have been disturbed by human activities and are typically dominated by Carolina willow, wax myrtle, elderberry, and false-willow.

Wildlife Habitat

Wetlands and waterbodies capable of supporting fish and/or shellfish populations are important in maintaining diversity and abundance within the aquatic community. Other wetland characteristics that contribute to the health of the aquatic species populations include water quality improvement, cover and shelter, forage resources, spawning and nursery areas, and connectivity between water resources.

There are specific habitats within the Project Study Area that are valuable to maintaining viable aquatic species communities. Red mangroves located along the tidal streams and rivers crossing the N-S Corridor are important fish nursery areas, which support many species of fish and shellfish. Much of this area has been designated as Essential Fish Habitat (EFH) by the National Marine Fisheries Service (NMFS).

Seagrass and oyster beds located within these estuarine areas also provide aquatic wildlife habitat as well and nurseries for shellfish.

Large, undisturbed wetlands are generally considered to provide important wildlife habitat functions. Other factors that contribute to the provision of important wildlife habitat include the proximity to undisturbed upland wildlife habitat, vegetation species and structural diversity, and foraging opportunities. Wetlands that are contiguous to other wetland areas may serve as travel corridors for many species of wildlife. A large number of species are dependent on wetlands at some point in their life cycle.

Wetland wildlife habitat within the maintained areas of the SR 528 right-of-way is limited, but many species will forage within stormwater management ponds, swales, and ditches. Outside the maintained areas of the SR 528 right-of-way, wetlands provide higher quality habitat although many of these areas consist of ecotones between the natural wetland ecosystem and the cleared roadway and may exhibit primary or secondary successional vegetation communities reducing their overall value as wildlife habitat. Beyond the ecotones much of the existing wetland habitat consists of virtually undisturbed wetlands with developed communities which provide habitat for a diversity of wildlife species.

Much of the wetland habitat located within the E-W Corridor in Orange County outside of the existing SR 528 right-of-way is undisturbed and provides high quality wildlife habitat. Natural connectivity between and within existing habitats occurs except where restricted by barriers between habitats provided by either fences along the SR 528 right-of-way boundary or created by ecotones between disturbed and undisturbed habitat.

4.3.4 Floodplains

A floodplain is defined as any land area susceptible to being inundated by floodwaters from any water source (44 CFR part 59), whereas the 100-year floodplain is the area of land inundated by a flood event that has a 1 percent chance of being equaled or exceeded in any given year (FEMA 2013a). Floodplains are designated and regulated by the Federal Emergency Management Agency (FEMA) with standards outlined in 44 CFR Part 60.3. Executive Order (EO) 11988, *Floodplain Management*, requires agencies to assess the impacts that their actions may have on floodplains and to consider alternatives to avoid adverse impacts and incompatible development on floodplains. U.S. Department of Transportation (USDOT) Order 5650.2, *Floodplain Management and Protection*, contains the Department's implementing procedures to fulfill the requirements of the EO.

4.3.4.1 Methodology

For this analysis, the areas subject to flooding and protected under EO 11988 were obtained using the base flood elevation published on FEMA's Flood Insurance Rate Maps (FIRMs) through GIS analysis. Special Flood Hazard Areas depicted on the FIRMs include Flood Zones A or V, also referred to as the 100-year floodplain. For the E-W Corridor, a 100-foot buffer was used on each side of the proposed 60-foot-wide right-of-way to identify floodplain locations within the corridor. For the segments that were missing right-of-way data, an average distance of 150 feet from the rail centerline was used in the analysis.

4.3.4.2 Affected Environment

According to the FIRMs and GIS analysis, the Project Study Area contains Zone A (the 100-year floodplain) and Zone X (the 500-year floodplain). As summarized below, portions of the Project Study Area within the MCO Segment, E-W Corridor, and N-S Corridor would be located within the existing 100-year floodplain. Figure 4.3.4-1 depicts the extent of the 100-year floodplain within the MCO Segment and E-W Corridor, and Figure 4.3.4-2 depicts the extent of the 100-year floodplain within the N-S Corridor. Table 4.3.4-1 provides a summary of the total acreage within each segment or corridor within the existing 100-year floodplain.

Element	Area within 100-year Floodplain (acres)
MCO Segment	117
E-W Corridor	332
N-S Corridor	472
WPB-M Corridor	145

The E-W Corridor and N-S Corridor also cross regulated floodways. A regulated floodway “means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height (FEMA 2013b).” The regulated floodways are also depicted on Figures 4.3.4-1 and 4.3.4-2. Table 4.3.4-2 provides a summary of the floodways within these corridors.

Section 205 of the Flood Control Act of 1948, as amended, provides a continuing authority for the USACE to develop and construct small flood control projects without the need of specific congressional authorization. The Jacksonville District began implementation of the Central and South Florida Flood Control Project (CS&F) in the 1950s. Since that time the Jacksonville District and its partners have established flood control, water conservation and control, saltwater intrusion, fish and wildlife, water supply to Everglades National Park, and environmental restoration. Features implemented by the CS&F project include 46 bridges, 10 locks, 670 miles of canals, 809 miles of levees, 130 control and diversion structures, and 16 pump stations.



Explanation of Features

- Floodway Crossing
- Proposed Station (By Others)
- MCO Segment
- E-W Corridor
- N-S Corridor
- 100-Year Floodplain

Floodplains along the MCO Segment and E-W Corridor		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.4-1
Path: F:\FEC\FECL_GDB\MXD\EIS\EW FloodPlain Map.mxd		



- Explanation of Features**
- Floodway Crossings
 - Proposed Station (By Others)
 - Proposed Stations - WPB-M Corridor
 - 100-Year Floodplain
 - MCO Segment
 - E-W Corridor
 - N-S Corridor
 - WPB-M Corridor

Floodplains along the N-S Corridor		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.4-2

Path: F:\FEC\FECL_GDB\MXD\EVANS Corridor FloodPlain Map.mxd

Floodway	Corridor	County	FEMA Flood Zone
Econolockhatchee River	E-W	Orange	AE
St Johns River	E-W	Orange/Brevard	AE
Jim Creek	E-W	Brevard	A
Second Creek	E-W	Brevard	A
Taylor Creek	E-W	Brevard	AE
Turkey Creek	N-S	Brevard	AE
Crane Creek	N-S	Brevard	AE
Eau Gallie	N-S	Brevard	AE
Goat Creek	N-S	Brevard	AE
Horse Creek	N-S	Brevard	AE
St. Sebastian River	N-S	Brevard/Indian River	AE
South Canal	N-S	Indian River	AE
Main Canal	N-S	Indian River	AE
North Canal	N-S	Indian River	AE
Taylor Creek	N-S	St Lucie	VE
Moore's Creek	N-S	St Lucie	AE
St. Lucie River	N-S	Martin	AE
Tributary To Manatee Creek	N-S	Martin	X500
Tributary To Manatee Creek	N-S	Martin	AE
Unnamed Tributary	N-S	Martin	AE
Unnamed Tributary	N-S	Martin	AE
Warner Creek	N-S	Martin	AE
No Name	N-S	Martin	AE
Earman River	N-S	Palm Beach	AE
Jupiter River	N-S	Palm Beach	AE

Source: St. Johns River Water Management District (SJRWMD). 2012. SJRWMD

Waterbodies. <http://www.sjrwmd.com/gisdevelopment/docs/themes.html>. Accessed September 27, 2013; South Florida Water Management District (SFWMD). 2012. Water

Body. http://my.sfwmd.gov/gisapps/sfwmdxwebdc/dataview.asp?query=unq_id=1959. Accessed September 27, 2013.

The Project Study Area will cross eight existing federal projects listed in table 4.3.4-3 below. Six of these are within the WPB-M Corridor. These federal projects are for flood control purposes, which only have a canal feature to convey the flood waters away from the protected areas.

County	Federal Project Name	Local Name	Project Corridor
St. Lucie	C-25	Taylor Creek	N-S
Palm Beach	C-17	Earman River	N-S
Palm Beach	C-51	C-51 Canal	WPB-M
Palm Beach	C-16	Boynton Beach Canal	WPB-M
Palm Beach	C-15	Hidden Valley Canal	WPB-M
Broward	C-14	Un-named	WPB-M
Broward	C-13	Un-named	WPB-M
Miami-Dade	C-9	Un-named	WPB-M

Source: USACE 2013

4.3.5 Biological Resources and Natural Ecological Systems

This section describes biological resources, including fish, wildlife and plants, present within the Project Study Area, in accordance with CEQ guidance *Incorporating Biodiversity Considerations Into Environmental Impact Analysis Under the National Environmental Policy Act* (CEQ 1993). This section includes a description of natural upland habitats, important wildlife habitats, migratory bird habitats, and EFH.

4.3.5.1 Methodology

Habitats were characterized based on a desktop review of readily available information regarding natural and disturbed upland vegetation and habitat. Evaluated resource material included, but was not limited to, the FLUCCS maps (FDOT 1999), USDA NRCS soil survey maps (USDA 2013), FNAI natural communities data (FNAI 2013), and land use data from WMDs (SJRWMD 2009; SFWMD 2008), in addition to high altitude aerial imagery supplemented by satellite imagery. Information regarding upland vegetation land cover types, wildlife corridors, habitat quality, and biodiversity within the Project Study Area was also reviewed.

Upland habitats were identified utilizing WMD land use data that were identified to FLUCCS Level II for generally anthropogenic land uses and to FLUCCS Level III primarily for natural habitats (FDOT 1999). Factors considered in assessing the relative condition of uplands included, but were not limited to:

- Location and use of the upland (whether the upland is currently natural, or has the upland been impacted by non-natural land uses such as residential, commercial, industrial, agriculture, and transportation);
- Size of the upland (whether the upland is located within/adjacent to the Project Study Area part of a large contiguous upland, or is it isolated);
- Uniqueness;
- Presence of known and proposed wildlife corridors, habitat preserves, and wildlife sanctuaries;
- Protected species (whether the upland provides required conditions/habitat for protected plant and animal species); and
- Level of disturbance (whether the upland is disturbed by the existing rail and/or other transportation or land use).

NMFS's *EFH Mapper* database (NOAA 2013), literature review (South Atlantic Fishery Management Council 1998a and 1998b; NMFS 2004 and 2008) and on-site investigation, as well as information provided by NMFS (Howard 2013) were used to generate a list of species groups with designated EFH within the N-S Corridor (including all bridges between Cocoa and West Palm Beach and bridges with proposed in-water construction between West Palm Beach and Miami).

Habitat was evaluated at the bridge sites to identify habitats listed in "Appendix 6: Summary of EFH Requirements for Species Managed by the SAFMC" of *Essential Fish Habitat: A Marine Fish Habitat National Mandate for Federal Agencies* provided as Appendix 4.3.5 (NMFS 2010).

Snorkeling surveys were conducted at each of the potential impact areas to evaluate the type and quality of aquatic habitats and associated substrates (submerged aquatic vegetation [SAV] and oyster beds/shell bottom) for EFH determinations. The purpose of the benthic survey was to characterize the bottom

composition as well as evaluate the presence of rooted seagrass beds, oyster beds (live or dead), sponges, and other benthic colonizing organisms. Benthic surveys were performed at each Bridge Study Area in accordance with the NMFS guidance for assessing small project sites less than or equal to 1 hectare (NOAA 2012). The bottom survey included a center line transect beneath the existing bridge structure as well as transects on both the east and west sides of the existing bridge structures. As part of the in-water seagrass survey protocol, if seagrasses were determined to be rooted within the bridge project area, patch distribution was delineated and quantified. Appendix 4.3.5, *EFH Assessment Report*, provides additional details of the sampling methods and results.

4.3.5.2 Affected Environment

Natural Upland Habitats

Uplands present within the Project Study Area include natural habitats that are relatively undisturbed by human activity and anthropogenic land uses that include commercial and residential developments, industrial, agriculture, mining. Natural upland habitats within the Project Study Area were identified according to the FLUCCS Level III, as appropriate, and are provided in Table 4.3.5-1. Many of these natural habitats are relatively undisturbed by human activity although habitats present within developed areas have experienced varying levels of disturbance.

The natural upland habitats located within the Project Study Area are listed in Table 4.3.5-1. Brief descriptions including vegetation and wildlife information for the upland habitat categories are detailed in the sections below. Lists of common plant species found in these communities are included in Appendix 4.3.3-A1.

FLUCCS Code	FLUCCS Description
310	Herbaceous (Dry Prairie)
320	Shrubs and Brushland
321	Palmetto Prairie
322	Coastal Scrub
330	Mixed Rangeland
411	Pine Flatwoods
413	Sand Pine
420	Hardwood Forests
421	Xeric Oak
422	Brazilian Pepper
424	Melaleuca
427	Live Oak
428	Cabbage Palm
434	Hardwood – Coniferous Mixed
437	Australian Pines

Source: FDOT. 1999. Florida Land Use, Cover and Forms Classification System (FLUCCS) – Handbook. <http://www.dot.state.fl.us/surveyingandmapping/documentsandpubs/fluccmanual1999.pdf>. January 2013. Accessed August 7, 2013.

Scientific Name	Common Name
<i>Andropogon</i> spp.	Bluegrass, Bluestem
<i>Aristida stricta</i> var. <i>beyrichiana</i>	Wiregrass
<i>Celtis laevigata</i>	Sugarberry
<i>Ceratiola ericoides</i>	Florida rosemary
<i>Dichanthelium</i> spp.	Witchgrass
<i>Gaylussacia dumosa</i>	Dwarf huckleberry
<i>Ilex glabra</i>	gallberry
<i>Lyonia</i> spp.	Fetterbush
<i>Myrica cerifera</i>	Wax myrtle
<i>Panicum</i> spp.	Panic grass
<i>Quercus geminate</i>	Sand live oak
<i>Quercus minima</i>	Dwarf live oak
<i>Rhus coppalinum</i>	Winged sumac
<i>Serenoa repens</i>	Saw palmetto
<i>Vaccinium arboretum</i>	Sparkleberry
<i>Vaccinium myrsinites</i>	Shiny blueberry

Herbaceous (Dry Prairie)

Herbaceous (dry prairie) habitat within the E-W Corridor and N-S Corridor is located within the Project Study Area in Orange, Brevard, Martin, Indian River, and St. Lucie Counties. Dry prairie typically lacks trees and displays a variety of herbaceous vegetation including grasses, rushes, sedges, and low shrubs. The dry prairie typically occupies large, level expanses of land. Communities sometimes present with dry prairie include islands of xeric or mesic flatwoods, small depression wetlands, wet prairies, and live oak hammocks. This habitat is typically dominated by grasses and herbs such as wiregrass, bottlebrush threeawn, bluestem, lopsided indiagrass, panicgrass, yellow-eyed grass, milkwort, witchgrass, narrowleaf silkgrass, goldenrod, and slender flattop goldenrod. Scattered shrubs and subshrubs found within dry prairies typically include saw palmetto, dwarf live oak, gallberry, fetterbush, shiny blueberry, pawpaw, Atlantic St. John's wort, wax myrtle, and dwarf huckleberry.

Typical species that inhabit dry prairie include bird species such as wild turkey, eastern meadowlark, red-tailed hawk, and northern bobwhite. Other notable wildlife species include oak toad, box turtle, eastern cottontail rabbit, and hispid cotton rat.

Shrub and Brushland

Shrub and brushland is a Level II category, which includes three shrub dominated communities: palmetto prairie, coastal scrub, and other shrubs and brush. This Level II category is often applied to shrub areas for which the dominant species cannot be identified on aerial photography. The E-W Corridor and N-S Corridor traverse this land cover type in all six counties. Dominant shrubs within these habitats include saw palmetto, wax myrtle, gallberry, sand live oak, sea grape, false-willow, and Brazilian pepper.

This land use category includes both undisturbed natural habitats and habitats undergoing successional ecosystem development subsequent to a historical disturbance.

Typical wildlife species that inhabit shrub and brushland include pygmy rattlesnake, southeastern five-lined skink, northern mockingbird, southern toad, and loggerhead shrike.

Palmetto Prairie

Palmetto prairie is a saw palmetto dominated habitat common to peninsular Florida. Shrub species which may be present in addition to saw palmetto include wax myrtle, gallberry, winged sumac, sand live oak, shiny blueberry, fetterbush, and pawpaw. Groundcover is present in the spaces between palmettos and includes wiregrass, bottlebrush threeawn, bluestem, lopsided indiagrass, yellow-eyed grass, and narrowleaf goldenrod.

Coastal Scrub

Coastal scrub is found within the coastal zone associated with the N-S Corridor. The community composition is strongly influenced by physical factors attributed to proximity with the sea include wind and salt spray. It usually develops as a band between beach dunes along the coast, and maritime hammock or mangrove swamp communities further inland. On barrier islands it also occurs as patches of shrubs within coastal grasslands. Typical components of the shrub stratum of this habitat include saw palmetto, sand live oak, sea grape, Spanish bayonet, myrsine, buttonsage, white indigo berry, Spanish stopper, wild lime, coinvine, and gray nicker. Common groundcover species include sea oats, railroad vine, coral dropseed, and seashore paspalum.

Scrub habitats occurring near the coast is important habitat for many small wildlife species during and after storm events that destroy the fore dunes. Typical species inhabiting coastal scrub include spadefoot toad, cotton mouse, southeastern pocket gopher, eastern coachwhip, scrub lizard, scarlet kingsnake, and chuck-will's-widow.

Mixed Rangeland

Mixed rangeland includes habitat composed of an intermixture (greater than 33 percent composition) of both dry prairie or shrub dominated habitats (FDOT 1999). The Project Study Area includes this habitat type within Orange, Brevard, Indian River, and St. Lucie Counties. The natural community within this land cover type includes grasses, forbs, and shrubs that provide grazing opportunities as well as a mix of the vegetation described for herbaceous (dry prairie) and palmetto prairie.

Pine Flatwoods

Pine flatwoods typically has an open canopy of tall pines and dense groundcover of low shrubs, grasses, and forbs. In northern and central Florida longleaf pine and slash pine are the dominant canopy species. In south Florida the canopy is typically dominated by south Florida slash pine. The shrub stratum consists of saw palmetto, fetterbush, tarflower, and winged sumac. Subshrubs include dwarf live, running oak, shiny blueberry, Darrow's blueberry, and dwarf huckleberry. The herbaceous layer consists primarily of

grasses, including wiregrass, dropseed, witchgrasses, panicgrass, and bluestem among others. Typical forbs include goldenrod, slender flattop goldenrod, chaffhead, and gayfeather.

Wildlife species occurring within pine flatwoods includes white-tailed deer, Florida black bear, coopers hawk, barred owl, common ground dove, eastern diamondback rattlesnake, and pinewoods tree frog.

Sand Pine

Sand Pine occurs in xeric habitats and has an open canopy of widely spaced sand pine with an understory consisting of low grasses and shrubs. Other canopy species may include turkey oak and long leaf pine. The shrub layer consists of saw palmetto, rusty staggerbush, and scrub oak species. Common subshrubs include dwarf live oak, running oak, dwarf huckleberry, gopher apple, Adam's needle, and shiny blueberry. Grasses include wiregrass, bluestem, and little bluestem. Forbs include coastal plain honeycomb head, narrowleaf silkgrass, October flower, and pricklypear.

Upland Hardwood Forests

Upland hardwood forest includes any natural forest stand with a canopy providing greater than 10 percent cover that is dominated (greater than 66 percent) by hardwood tree species (FDOT 1999). The Project Study Area includes upland hardwood forest in Orange, Brevard, Indian River, St. Lucie, Martin, and Palm Beach Counties.

A wide variety of wildlife species utilize upland hardwood forests including Florida black bear, white-tailed deer, bobcat, gray fox, gray squirrel, eastern diamondback rattlesnake, pileated woodpecker, northern cardinal, broad-winged hawk, green tree frog, and cottontail rabbit.

Xeric Oak

Xeric oak, also called scrub, is a community composed of evergreen shrubs and is found on dry, infertile, sandy ridges. This habitat is dominated by three shrub oak species, myrtle oak, sand live oak, and Chapman's oak. Associated shrub species include rusty staggerbush and saw palmetto. Florida rosemary and sand pine may also be present. The overall structure of this habitat consists of a dense shrub layer with patches of open ground with patchy cover of grasses and herbs. Herbaceous species are typically dominated by threeawn, sedges, and subshrubs such as pinweed and jointweed, and ground lichens.

Species endemic to scrub and other xeric habitats are similar to those species utilizing coastal scrub including eastern fence lizard, slender glass lizard, and coral snake.

Brazilian Pepper

Brazilian pepper is dominated by the exotic hardwood species Brazilian pepper. Brazilian pepper creates dense pure stands with little light penetration and sparse groundcover vegetation. This habitat is usually found in areas disturbed by human activity or natural process such as wildfire, although Brazilian pepper has been documented as a highly invasive species and can completely overgrow native habitats. Brazilian pepper has historically been utilized as an ornamental landscape species in Florida.

Melaleuca

Melaleuca is dominated by the exotic hardwood species melaleuca. Like Brazilian pepper, melaleuca creates dense pure stands with little light penetration and sparse groundcover vegetation. This habitat is usually found in areas disturbed by human activity or natural process such as wildfire. Melaleuca has been documented as a highly invasive species and can completely overgrow native habitats. Melaleuca has historically been utilized as an ornamental landscape species in Florida.

Live Oak

Live oak is a mesic upland hammock dominated by live oak. Associated canopy species include laurel oak, water oak, and sand live oak. Cabbage palm, southern magnolia, and pignut hickory may occasionally be present in the subcanopy. The shrubby understory is typically composed of a mix of saw palmetto, American beautyberry, gallberry, sparkleberry, highbush blueberry, and wax myrtle. The herb layer is often sparse or patchy due to a dense canopy and subcanopy, including panicgrass, witchgrasses, woodsgrass, longleaf woodoats, and tailed bracken.

Cabbage Palm

Cabbage palm is a mesic upland hammock dominated by cabbage palm. Associated canopy species include live oak, laurel oak, water oak, southern magnolia, and pignut. The shrubby understory is typically composed of a mix of saw palmetto, American beautyberry, gallberry, sparkleberry, and highbush blueberry. Tropical shrubs such as Simpson's stopper, myrsine, and wild coffee are common in south Florida mesic hammocks. The groundcover is often sparse or patchy due to a dense canopy and subcanopy and includes panicgrass, witchgrass, woodsgrass, longleaf woodoats, and tailed bracken.

Hardwood – Coniferous Mixed

Hardwood – Coniferous Mixed is typically a closed-canopy forest with a diverse mixture of coniferous and hardwood tree species on mesic soils. Characteristic canopy trees include southern magnolia, pignut hickory, sweetgum, live oak, laurel oak, water oak, slash pine, cabbage palm, red maple, American elm, longleaf pine, and sugarberry. Typical shrubs species include saw palmetto, American beautyberry, sparkleberry, and wax myrtle, among others. The groundcover is composed of shade tolerant species such as Virginia creeper, muscadine grape, tailed bracken, and saw greenbriar.

Australian Pines

Australian pines is dominated by the exotic Australian pine species. Like Brazilian pepper and melaleuca, Australian pine creates dense pure stands with little light penetration and sparse groundcover vegetation. This habitat is usually found in areas disturbed by human activity although Australian pine has historically been utilized to stabilize beaches and provide shade in coastal recreational areas in Florida.

Preserves, Wildlife Sanctuaries, and Wildlife Corridors

Although the existing transportation corridors, including SR 528 and the FECR Corridor, do not provide important wildlife habitat and present a barrier to wildlife movement within the Project Study Area,

several preserves, sanctuaries, and wildlife corridors important to upland biodiversity are present adjacent to the corridors. The publically-owned parks described below are also considered as recreational resources in the context of Section 4(f), see Section 4.4.6.

Hal Scott Regional Preserve

The Hal Scott Regional Preserve (HSR Preserve) is located in eastern Orange County, southeast of Orlando and north of SR 528. The preserve was established as part of the mitigation for beltway construction in the southern part of Orange County. County funding provided the partnership to establish this regional preserve, which protects the natural resources of the Econlockhatchee River.

Tosohatchee Wildlife Management Area

The Tosohatchee Wildlife Management Area covers 30,701 acres along 19 miles of the St. Johns River in eastern Orange County. Dominant natural communities include freshwater marsh, hardwood swamp, mesic hammocks, pine flatwoods, cypress, and rivers and streams. These habitats, and those of adjacent public lands, are essential to maintaining water quality and the ecological integrity of the St. Johns River (FWC 2008).

Helen and Allan Cruickshank Sanctuary

The Helen and Allan Cruickshank Sanctuary is part of the Brevard County Environmentally Endangered Lands (EEL) Program. The approximately 140-acre site is located in Rockledge, Florida. Natural communities within the sanctuary include pine flatwoods and sand pine along with other upland and wetland habitats. Approximately 1,000 feet of the eastern boundary of the sanctuary abuts the existing FECR Corridor between Mile Post (MP) 176 and 177. Wildlife species present within the sanctuary include migratory birds, Florida scrub-jay, northern bobwhite, raptors, gopher tortoise, and eastern indigo snake (Brevard County, Florida 2013a).

Malabar to Vero Beach Aquatic Preserve

The Malabar to Vero Beach Aquatic Preserve consists of 28,000 acres of sovereign submerged lands of the Indian River Lagoon and its freshwater tributaries, Turkey Creek and the St. Sebastian River. This preserve protects a diverse estuarine ecosystem, including manatee and dolphin as well as waterfowl.

Savannas Preserve State Park

Savannas Preserve State Park was established in 1977 and is over 6,000 acres in size. The park is located within south St. Lucie County and north Martin County between Fort Pierce and Jensen Beach. The natural communities located within the park include the largest intact freshwater marsh in Southeast Florida, which extends 10 miles along the entire length of the park. East of the marsh is the Atlantic Coastal Ridge, which is dominated by sand pine scrub habitat. Sand pine scrub is one of the rarest, and most imperiled, habitats in Florida. Areas west of the central marsh are dominated by pine flatwoods.

Jonathan Dickinson State Park

The 11,500-acre Jonathan Dickinson State Park was established in 1950 and is located south of Stuart in Martin and Palm Beach Counties along the east end of the Loxahatchee River. Thirteen natural communities are found within the park, including pine flatwoods, sand pine scrub, mangrove swamp, and river swamps. The Loxahatchee River, Florida's first federally designated Wild and Scenic River, runs through the park (Florida State Parks n.d.). The FECR crosses the park.

Hobe Sound National Wildlife Refuge

Hobe Sound National Wildlife Refuge, established in September 1969, is a coastal refuge located in Martin County and bisected by the Indian River Lagoon into two separate tracts of land totaling over 1,000 acres. The 735-acre Jupiter Island tract located on the north half of the island provides some of the most productive sea turtle nesting habitat in the United States. The 300-acre mainland tract located immediately east of Jonathan Dickinson State Park is dominated by the native sand pine scrub habitat much of which has been lost to development in Florida (USFWS 2013c). The FECR Corridor crosses the NWR.

Hypoluxo Scrub Natural Area (Lantana)

The Hypoluxo Scrub Natural Area is a 92-acre site owned and managed by Palm Beach County. This site is mostly scrub and scrubby flatwoods. Most of the site was cleared in the early 1960s and the natural communities are still in the process of regenerating. A small Florida scrub-jay population lives on this site and also uses several nearby smaller scrub sites.

Seacrest Scrub Natural Area (Boynton Beach)

The Seacrest Scrub Natural Area is a 54-acre site owned and managed by Palm Beach County. This site is predominantly scrub and scrubby flatwoods. Most of the area was cleared in the 1920s for pineapple farming and the natural communities are still in the process of regenerating.

Leon M. Weekes Environmental Preserve (Delray Beach)

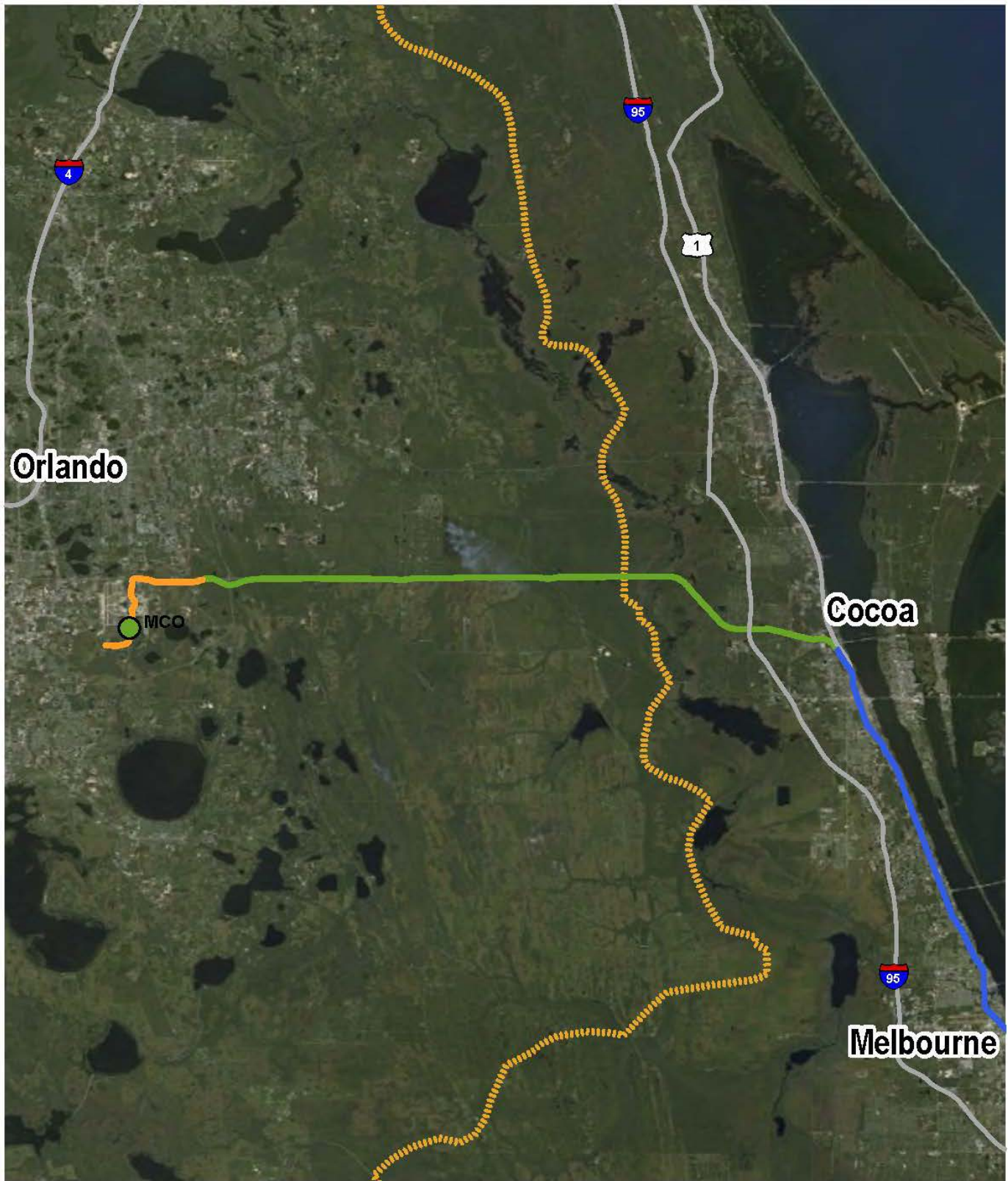
The Leon M. Weekes Environmental Preserve is a 12-acre site co-owned by Palm Beach County and the Town of Delray Beach. The Preserve is managed by the Town of Delray Beach. The site is scrub habitat with paved and natural trails. The old sand pine scrub burned in late 1990s near the railroad and now is mostly occupied by scrub oaks. Gopher tortoise burrows are found on the property.

Rosemary Ridge Preserve (Boca Raton)

The Rosemary Ridge Preserve is a 7-acre site owned and managed by the City of Boca Raton. The site consists of xeric sand pine scrub.

Gopher Tortoise Preserve (Boca Raton)

The Gopher Tortoise Preserve is a 9-acre site owned and managed by the City of Boca Raton. The site consists of xeric sand pine scrub.



Explanation of Features

- E-W Corridor
- MCO Segment
- N-S Corridor
- ⋯ Florida Wildlife Corridor
- Proposed Station (By Others)

Data Sources: 2012 ESRI, Florida Wildlife Corridor 2014

Florida Wildlife Corridor		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.5-1

MapData: Orlando 10/27/00 FPO NEPR, Sugarloafsham, COSE 08/11 (p. 1 of 4)

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Highland Scrub Natural Area (Pompano Beach)

The Highland Scrub Natural Area is a 34-acre site owned and managed by Broward County. The site consists of scrub oak and sand pine and is considered one of Broward County's last substantial remaining sand pine scrub communities. The site is characterized by loose white sand with a canopy of sand pine and scrub oak and a subcanopy of saw palmetto, small scrub oaks, gopher apple, and prickly pear cactus. A gopher tortoise was identified on site during field visits.

Colohatchee Park (Wilton Manors)

Colohatchee Park is a 7-acre site owned and managed by the City of Wilton Manors. The site consists of a mangrove preserve along the Middle River dominated by red and white mangroves.

Greynolds Park (North Miami Beach)

Greynolds Park is a 241-acre site owned and managed by Miami-Dade County. Once the site of a rock quarry, the site consists of a variety of habitats, including 1 acre of pineland, 18 acres of hammock, 26 acres of coastal habitat, and 31 acres of lake. The hammock is one of the last well-protected natural areas of northern Miami-Dade County.

Oleta River State Park (North Miami)

Oleta River State Park is a 1,033-acre site owned by Trustees of the Internal Improvement Trust Fund and managed by FDEP. Florida's largest urban park, Oleta River State Park, borders the north shore of Biscayne Bay and contains the mouth of the Oleta River. Along the Oleta River, at the north end of the park, a large stand of mangrove forest is present. The bulk of the uplands are dredge spoil, and exotic species are a major problem, but natural vegetation has reclaimed 468 acres of tidal swamp.

Arch Creek Park (North Miami Beach)

Arch Creek Park is a 9-acre site owned and managed by the Miami- Dade County. The site consists of 7 acres of hammock and 1 acre of coastal habitat. The park was created around a natural limestone bridge formation that was once part of an important Indian trail and is designated as a Florida State Historical Preserve.

Essential Fish Habitat (EFH)

EFH is defined as those waters and substrates necessary to support fish for spawning, breeding, feeding, or growth to maturity. Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act in 1966 required NMFS to coordinate with federal and state agencies, resource users, and others to protect, conserve, and enhance EFH. The South Atlantic Fishery Management Council (SAFMC) is responsible for the conservation and management of fish stocks within the federal 200-mile limit of the Atlantic Ocean off the coasts of North Carolina, South Carolina, Georgia, and eastern Florida to Key West. SAFMC is also responsible for the development of fishery management plans and amendments to ensure sustainable fisheries. Implementation of the regulations, including federal management of permits for some fisheries, is the responsibility of NMFS. The rule also identifies Habitat Areas of Particular Concern (HAPC). HAPC are

subsets of EFH that are particularly important to the long-term productivity of populations of one or more managed species, or are particularly vulnerable to human induced degradation.

There are no EFHs or HAPCs located within the MCO Segment or the E-W Corridor. EFH and HAPC are located within the N-S Corridor associated with waterways and bridge crossings. EFH for sites along the FECR Corridor from West Palm Beach to Miami were previously identified in Section 3.1.5.1 of the 2012 EA.

NMFS indicated that EFH for the snapper/grouper complex, spiny-lobster, and penaeid shrimp, as well as HAPC for snapper/grouper complex, is present at one or more of the bridge project locations. A figure of the locations of EFH and HAPC located within or adjacent to the Project boundaries is provided in Appendix 4.3.5. The list of the managed species groups that may utilize aquatic habitat along the N-S and WPB-M Corridors is presented in Table 4.3.5-2.

County	Site	EFH¹	HAPC¹
Brevard	Horse Creek	Spiny Lobster Penaeid Shrimp	None
	Eau Gallie River	Spiny Lobster Snapper-Grouper Complex	None
	Crane Creek	Spiny Lobster Snapper-Grouper Complex	None
	Turkey Creek	Spiny Lobster Snapper-Grouper Complex	None
	Goat Creek	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
Brevard Indian River	St. Sebastian River	Spiny Lobster Snapper-Grouper Complex	Snapper-Grouper Complex
Indian River	North Canal	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	None
	Main Canal ²	None	None
	South Canal	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	None
	Warner Creek ²	None	None
	Unnamed Creek	Spiny Lobster Penaeid Shrimp	Snapper-Grouper Complex
St. Lucie	Taylor Creek	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
	Moore's Creek	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex

County	Site	EFH¹	HAPC¹
Martin	St. Lucie River	Bull Shark Blacktip Shark Spiny Lobster Snapper-Grouper Complex	None
	Unnamed Tributary ² (MP 266.58)	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
	Unnamed Tributary ¹ (MP 266.86)	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
	Tributary to Manatee Creek ² (MP 267.34)	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	None
	Tributary to Manatee Creek ¹ (MP 267.70)	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	None
Palm Beach County	Loxahatchee River	Spiny Lobster Snapper-Grouper Complex	None
	Earman River ²	None	None
	Canal C-51 ²	None	None
	Hillsboro Canal	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
	Boynton Beach Canal	Spiny Lobster Penaeid Shrimp	-
Broward County	North Fork of the Middle River	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
	South Fork of the Middle River	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
	Hillsboro Canal	Spiny Lobster Penaeid Shrimp	Snapper-Grouper Complex
	Cypress Creek Canal	Spiny Lobster	-
	New River	Spiny Lobster	-
	Tarpon River	Spiny Lobster	-
	Dania Cut-off Canal	Spiny Lobster	-
Miami-Dade County	Oleta River	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
	Arch Creek	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
	Biscayne Park Canal	Spiny Lobster Penaeid Shrimp	-
	Little River	Penaeid Shrimp	-

Source: NMFS. 2010. *Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies- South Atlantic Region*. National Marine Fisheries Service Habitat Conservation District Southeast Regional Office. http://sero.nmfs.noaa.gov/hcd/pdfs/efhdocs/sa_guide_2010.pdf. September 2010. Accessed March 7, 2013; NOAA. 2013. *EFH Mapper*. <http://www.habitat.noaa.gov/protection/efh/habitatmapper.html>. Accessed March 7, 2013.

1 Identified based on site assessment of habitat and literature review (NMFS 2010; NOAA 2013)

2 Water control structure downstream of these bridge locations

Migratory Bird Habitat

Florida is on the Atlantic flyway, a major migratory route stretching more than 3,000 miles from Baffin Island to northern South America (Ducks Unlimited n.d.). Florida provides important overwintering habitat to many migratory bird species (Rapoza 2007). Common migratory species include many waterfowl (gadwall, American widgeon, blue-winged teal, northern shoveler, northern pintail, green-winged teal, American coot), raptors (northern harrier, American kestrel, sharp-shinned hawk), shorebirds (black-bellied plover, semipalmated plover, greater yellowlegs, ruddy turnstone, red knot, least sandpiper, short-billed dowitcher), and passerine landbirds (eastern phoebe, palm warbler, yellow-rumped warbler, gray catbird, American robin, ruby-crowned kinglet, chipping sparrow, Baltimore oriole). Birds that overwinter on the Caribbean islands also migrate through Atlantic coastal Florida in spring and fall, including shorebirds, flycatchers, warblers, and thrushes and tanagers (Rapoza 2007). Passerine migrants are found in hardwood hammocks and other forested habitats, waterfowl on lakes and impoundments, and shorebirds on beaches and flooded agricultural fields (Rapoza 2007).

4.3.6 Threatened and Endangered Species

The Federal Endangered Species Act of 1973 (ESA) defines an endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range.” The Act also defines a threatened species as “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” The ESA protects species listed as endangered or threatened on a national basis. The current list of federally protected wildlife is provided within the 50 CFR part 17.11 *Endangered and Threatened Wildlife*, published October 1, 2012. The current list of federally protected plants is provided within 50 CFR part 17.12 *Endangered and Threatened Plants*, published October 1, 2012.

State-listed species are protected under Article IV, Section 9 of the Constitution of the State of Florida, and are classified as Endangered, Threatened, or Species of Special Concern. An Endangered species is a species native to Florida that is in danger of extinction throughout all or a significant portion of its range within Florida. A Threatened species is a species native to Florida that is likely to become endangered in Florida in the foreseeable future. Species of Special Concern are those species native to Florida for which biological research has documented a decline in population that could threaten the species if the decline continues unchecked, or those species native to Florida that occur in such small numbers or with such a restricted distribution that they could easily become threatened within the state. Chapter 68A-27.003-005 FAC, updated January 2013, lists protected wildlife species regulated by the State of Florida. Plant species listed in Chapter 5B-40.0055, FAC, adopted April 22, 2004, are regulated by the State of Florida and are classified as Endangered, Threatened, or Commercially Exploited.

4.3.6.1 Methodology

Databases maintained by the regional offices of USFWS (USFWS 2012a) and by the FNAI Biodiversity Matrix (FNAI n.d.) were consulted to identify listed species within each county. These databases provide information on state and/or federally protected species documented or expected to occur in or near the Project Study Area.

In addition, the FWC bald eagle locator (FWC 2012a), red-cockaded woodpecker database (USFWS 2004a), and wading bird colony locator (FWC 2009) were utilized to determine the presence of nests and rookeries of these species in relation to the Project Study Area. The Project Study Area was also examined for appropriate sand skink habitat utilizing elevation and soil GIS data. Low altitude aerial photography was utilized to identify areas that may provide suitable habitat for particular listed species.

The records search provided a list of species with potential to occur within or adjacent to the Project Study Area, their habitat requirements, and life history information. Wildlife within the Project Study Area were observed during pedestrian field surveys (where plant and animals species were identified). Windshield surveys of habitat, benthic seagrass surveys, low altitude aerial surveys to identify eagle nests, and surveys to evaluate Florida scrub-jay habitat were also conducted. Seagrass survey details, field survey methods and details of specific surveys for Audubon's crested caracara, bald eagle, and Florida scrub-jay are provided in Appendix 4.3.6-A.

Species	Assumed Cover Type Use (FLUCCS Codes)
Bald Eagle	None
Wood Stork	510, 520, 530, 610, 620, 630, 640
Sand Skink	None (Habitat based on soils and elevation, not cover or land use)
Eastern Indigo Snake	310, 320, 330, 411, 434, 617, 625, 630, 641, 643
Audubon's Crested Caracara	310, 330, 411, 625, 641, 643
Florida Scrub-Jay	320, 330, 411
Everglades Snail Kite	None
Red-Cockaded Woodpecker	411, 625
Sherman's Fox Squirrel	310, 330, 411, 434, 625, 630
American Alligator	510, 525, 530, 641
Sandhill Crane	310, 330, 510, 530, 641, 643
Southeastern American Kestrel	310, 330, 411, 625, 641, 643
Gopher tortoise	310, 320, 330, 411, 412, 413, 421
Burrowing Owl	310, 320, 330
Florida Mouse	310, 320, 330, 411, 412, 413, 421
Pine Snake	310, 320, 330, 411, 412, 413
Short-Tailed Snake	310, 320, 330, 411, 412, 413, 421
Rim Rock Crowned Snake	None
Gopher Frog	310, 320, 330, 411
Mangrove Rivulus	612
Limpkin	510, 520, 530, 617, 618, 621, 625, 630, 641, 643, 646
Little Blue Heron	510, 520, 530, 617, 618, 621, 625, 630, 641, 643, 646
Roseate Spoonbill	510, 520, 530, 617, 618, 621, 625, 630, 641, 643, 646
Reddish Egret	612
Snowy Egret	510, 520, 530, 617, 618, 621, 625, 630, 641, 643, 646
Tricolored Heron	510, 520, 530, 617, 618, 621, 625, 630, 641, 643, 646
White Ibis	510, 520, 530, 617, 618, 621, 625, 630, 641, 643, 646

Source: SFWMD. Undated. *GIS Data Catalog*. <http://my.sfwmd.gov/gisapps/sfwmdxwebdc/dataview.asp?>. Accessed: August 31, 2013; SJRWMD. 2013a. *GIS Data Download Table*. <http://floridaswater.com/gisdevelopment/docs/themes.html>. Accessed: August 31, 2013.

Several of the species may use habitat types that were not included in assumptions listed in Table 4.3.6-1. For example, gopher tortoises may utilize areas within residential developments and road or railroad rights-of-way if the soil conditions are appropriate.

Detailed scrub-jay surveys were conducted by BioTech Consulting, Inc., along the N-S Corridor from Brevard County to Palm Beach County. Survey stations were located where the existing FECR Corridor bordered Type I, Type II, or Type III habitats as determined by GIS and field confirmation. Scrub-jays are most often found in low oak scrub, but habitat is classified into three different Types. Type I habitat consists of any upland habitat in which scrub oak species provide greater than 15 percent cover. Type II habitat includes any areas not meeting the requirements of Type I habitat in which one or more scrub oak species are present. Type III habitat consists of any other area within ¼ mile of Type I or Type II habitat.

Preliminary surveys to determine the presence of threatened or endangered species and delineate wetland boundaries were conducted within areas of the N-S Corridor where the construction footprint would go beyond the existing and historic railroad tracks and ballast. Surveys for threatened or endangered species consisted of reconnaissance level identification of species within the proposed construction footprint.

4.3.6.2 Affected Environment

The desktop survey identified 39 plant and animal species that are both federally and state listed (Table 4.3.6-2) and 31 plant and animal species listed only by the State of Florida (Table 4.3.6-3) that may occur within or adjacent to the Project Study Area. Table 4.3.6-5 lists protected plant species.

Wildlife Species

The MCO Segment, E-W Corridor, and N-S Corridor intersect USFWS Consultation Areas for: West Indian (Florida) manatee, Florida scrub-jay, red-cockaded woodpecker, Everglade snail kite, Audubon's crested caracara, piping plover, Atlantic salt marsh snake, and Florida sand skink/blue mole skink (USFWS 2003a, 2003b, 2003c, 2003d, 2003e, 2003f, 2004a, and 2011a). Appendix 4.3.6-B provides figures depicting Consultation Areas for these species in relation to the Project Study Area. Figure 4.3.6-1 shows the location of listed bird species habitats in relation to the E-W Corridor. The Project is also within the Consultation Area for the Everglades snail kite, blue-tailed mole skink, and Atlantic salt marsh snake.

Table 4.3.6-2 Federal and State Protected Wildlife Species Known to Occur Within the Phase II Project Study Area Counties

Listed Species	Scientific Name	Federal Status	State Status	Preferred Habitat
West Indian Manatee	<i>Trichechus manatus</i>	E	E	Coastal waters, bays, rivers, lakes
Southeastern Beach Mouse	<i>Peromyscus polionotus niveiventris</i>	E	T	Sand dunes
Florida panther	<i>Puma concolor coryi</i>	E	E	Large blocks of forested upland or wetland
Florida scrub-jay	<i>Aphelocoma coerulescens</i>	T	T	Fire-dominated low-growing oak scrub
Red knot	<i>Calidris canutus rufa</i>	C	Not listed	Beaches
Audubon's crested caracara	<i>Caracara cheriway</i>	T	T	Open country with cabbage palm
Piping plover	<i>Charadrius melodus</i>	T	T	Beaches and tidal mudflats
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E	E	Dense scrub
Wood stork	<i>Myceteria americana</i>	E	E	Freshwater wetlands
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	E	Open mature pine woodland
Everglade snail kite	<i>Rostrhamnus socialibis plumbeus</i>	E	E	Large open freshwater marshes
American alligator	<i>Alligator mississippiensis</i>	SAT	SSC	Permanent bodies of freshwater
Loggerhead sea turtle	<i>Caretta</i>	T	T	Coastal and oceanic waters
Green sea turtle	<i>Chelonia mydas</i>	E	E	Coastal and oceanic waters
Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	E	E	coastal and oceanic waters
Hawksbill sea turtle	<i>Eremochelys imbricata</i>	E	E	Coastal and oceanic waters
Leatherback sea turtle	<i>Demochelys coriacea</i>	E	E	Coastal and oceanic waters
Gopher tortoise	<i>Gopherus polyphemus</i>	C	T	Dry sandy uplands
Florida sand skink	<i>Neoseps reynoldsii</i>	T	T	Sparse dry scrub
Atlantic salt marsh snake	<i>Nerodia clarkia taeniata</i>	T	T	Coastal salt marshes
Eastern indigo snake	<i>Drymarchon corais couperi</i>	T	T	Wide range of upland and wetland habitats
Striped newt	<i>Notophthalmus parstriatus</i>	C	Not listed	Xeric uplands
Smalltooth sawfish	<i>Pristis pectinata</i>	T	T	Estuaries, bays, tidal creeks

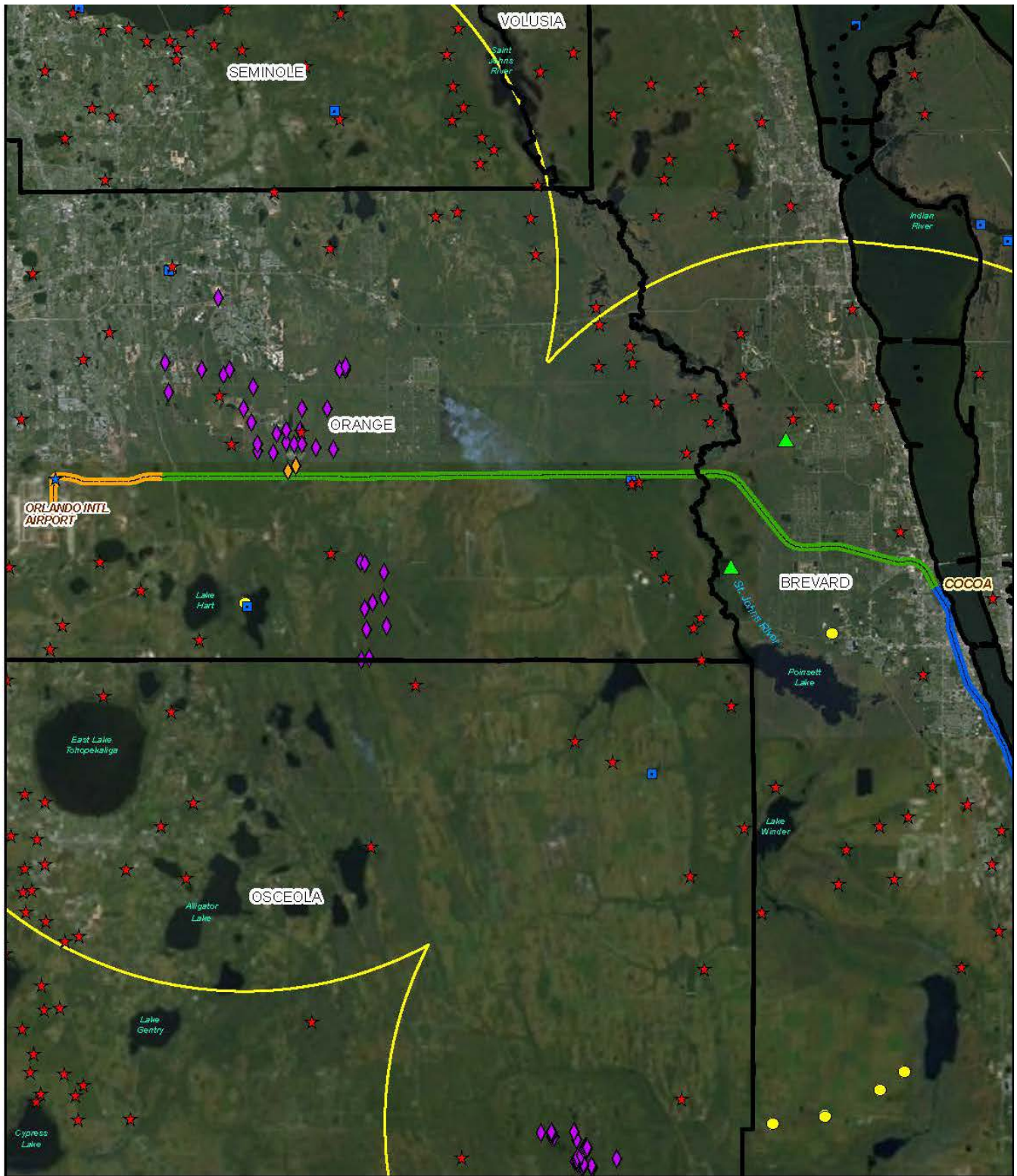
E Endangered; T, Threatened; C, Candidate; SAT, Threatened because of similarity of appearance; SSC, special concern

Table 4.3.6-3 State-only Protected Wildlife Species Known to Occur Within the Phase II Project Study Area Counties

Listed Species	Scientific Name	State Status	Preferred Habitat
Florida mouse	<i>Podomys floridanus</i>	SSC	Xeric sandy uplands
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	SSC	Sandhill, pine flatwoods, pastures
American oystercatcher	<i>Haematopus palliatus</i>	SSC	Beaches, sandbars, mudflats
Black skimmer	<i>Rynchops niger</i>	SSC	Coastal waters
Brown pelican	<i>Pelecanus occidentalis</i>	SSC	Coastal shallow estuarine waters
Burrowing owl	<i>Athene cunicularia</i>	SSC	Sparsely vegetated sandy uplands
Florida sandhill crane	<i>Grus canadensis pratensis</i>	ST	Prairies, pasture, freshwater marshes
Least tern	<i>Sterna antillarum</i>	ST	Beaches
Limpkin	<i>Aramus guarauna</i>	SSC	Mangroves, marshes, wetlands
Little blue heron	<i>Egretta caerulea</i>	SSC	Shallow open wetlands
Reddish egret	<i>Egretta rufescens</i>	SSC	Tidal flats and shores
Roseate spoonbill	<i>Platalea ajaja</i>	SSC	Coastal mangroves, tidal flats
Snowy egret	<i>Egretta thula</i>	SSC	Inland and coastal wetlands
Southeastern american kestrel	<i>Falco sparverius paulus</i>	ST	Open pine habitats, prairies, pastures
Tricolored heron	<i>Egretta tricolor</i>	SSC	Coastal and inland wetlands
White ibis	<i>Eudocimus albus</i>	SSC	Freshwater and brackish marshes
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	SSC	Open upland forests on dry sandy soils
Rim rock crowned snake	<i>Tantilla oolitica</i>	ST	Tropical hardwood hammocks, disturbed habitats
Gopher frog	<i>Lithobates capito</i>	SSC	Dry sandy uplands near water
Mangrove rivulus	<i>Rivulus marmoratus</i>	SSC	Mangrove forests

SSC Species of Special Concern

ST State Threatened



Explanation of Features

- MCO Segment
- E-W Corridor
- N-S Corridor
- ★ Eagle Nests > 660 ft
- ★ Eagle Nests < 660 ft
- ▲ Caracara Nest
- ◆ Red Cockaded Woodpecker Nests < 0.5 miles
- ◆ Red Cockaded Woodpecker Nests > 0.5 miles
- Wood Stork Nest 15 Mile Buffer
- Wood Stork Nesting Colonies
- Wading Bird Active Rookeries, 1999 data

Protected Bird Species along the MCO Segment and E-W Corridor		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.6-1

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Numerous natural areas, parks, refuges and other open spaces are adjacent to the Project Study Area in several locations. Protected species populations utilize some of these open space areas. These natural areas provide primary habitat as well as refugia for a wide variety of plant and animal species. Boundary fences are located adjacent to the FECR Corridor and SR 528 along many of the natural areas typically with a maintained buffer of 10 to 20 feet between the rail line and the natural area fence. The Project Study Area is in close proximity to wood stork nesting colonies, other active wading bird rookeries, red-cockaded woodpecker nesting sites, and a bald eagle nest (Figures 4.3.6-2 and 4.3.6-3).

The federally protected bald eagle was observed during the field surveys, along with suitable nesting habitat. State and federal listed species, Florida scrub-jay, Audubon's crested caracara, wood stork, and gopher tortoise were observed during the field surveys. Suitable habitat for Florida scrub-jay and Audubon's crested caracara were observed within the Project Study Area during the field investigations, along with wood stork foraging and wading bird nesting and foraging.

Several federal species identified as present within the counties through which the Project would pass are not within the Project Study Area because either habitat is lacking or the Project Study Area is outside the accepted range of the species. These species include: Florida panther, southeastern beach mouse, piping plover, Kirtland's warbler.

Scrub-jay field surveys identified occupied habitat in many areas adjacent to the FECR Corridor, and the corridor is classified as Type III habitat where it is located within a ¼ mile of any Type I or Type II habitat. Field surveys indicated scrub-jays occupy areas adjacent to the corridor in the following locations:

Brevard County

- Adjacent to the Helen and Allan Cruikshank Sanctuary
- Adjacent to and north of the Jordan Scrub Sanctuary
- Between Micco Road and Holly Street

Indian River County

- Adjacent to the North Sebastian Conservation Area

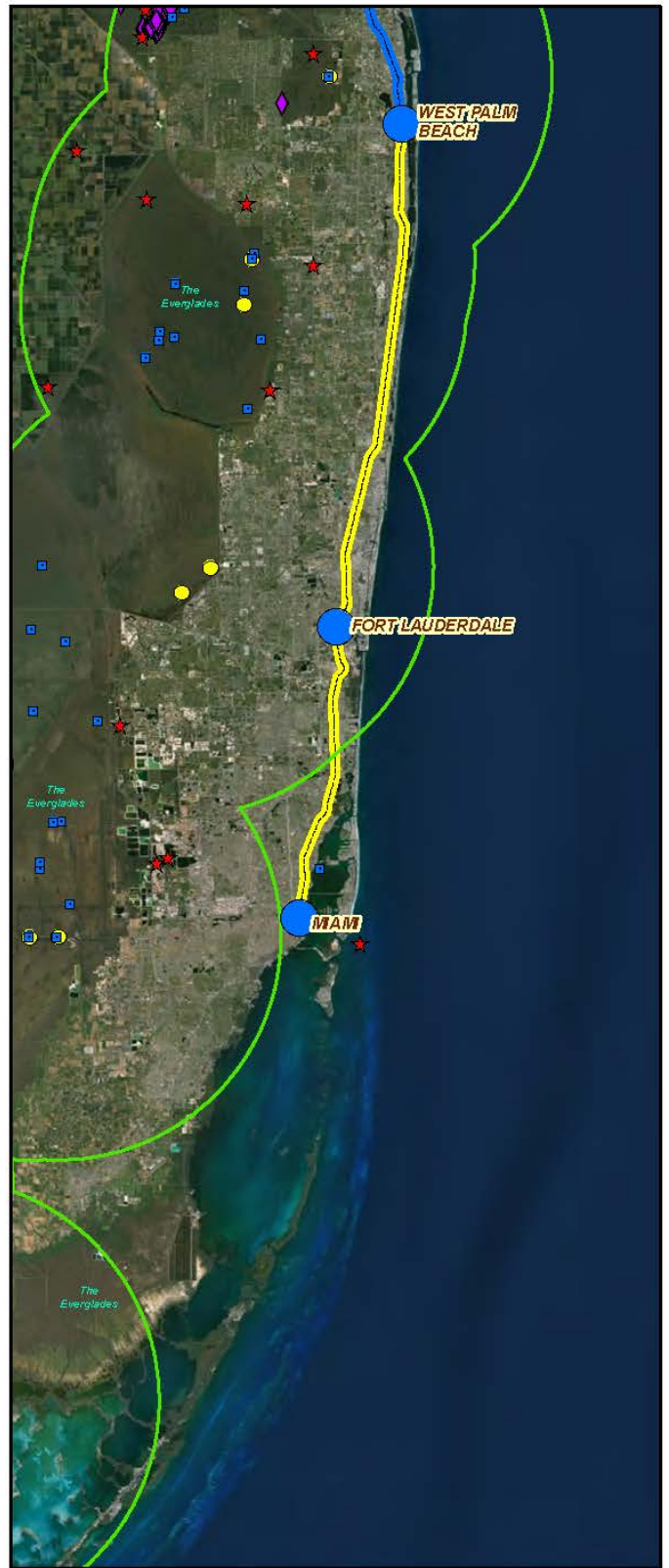
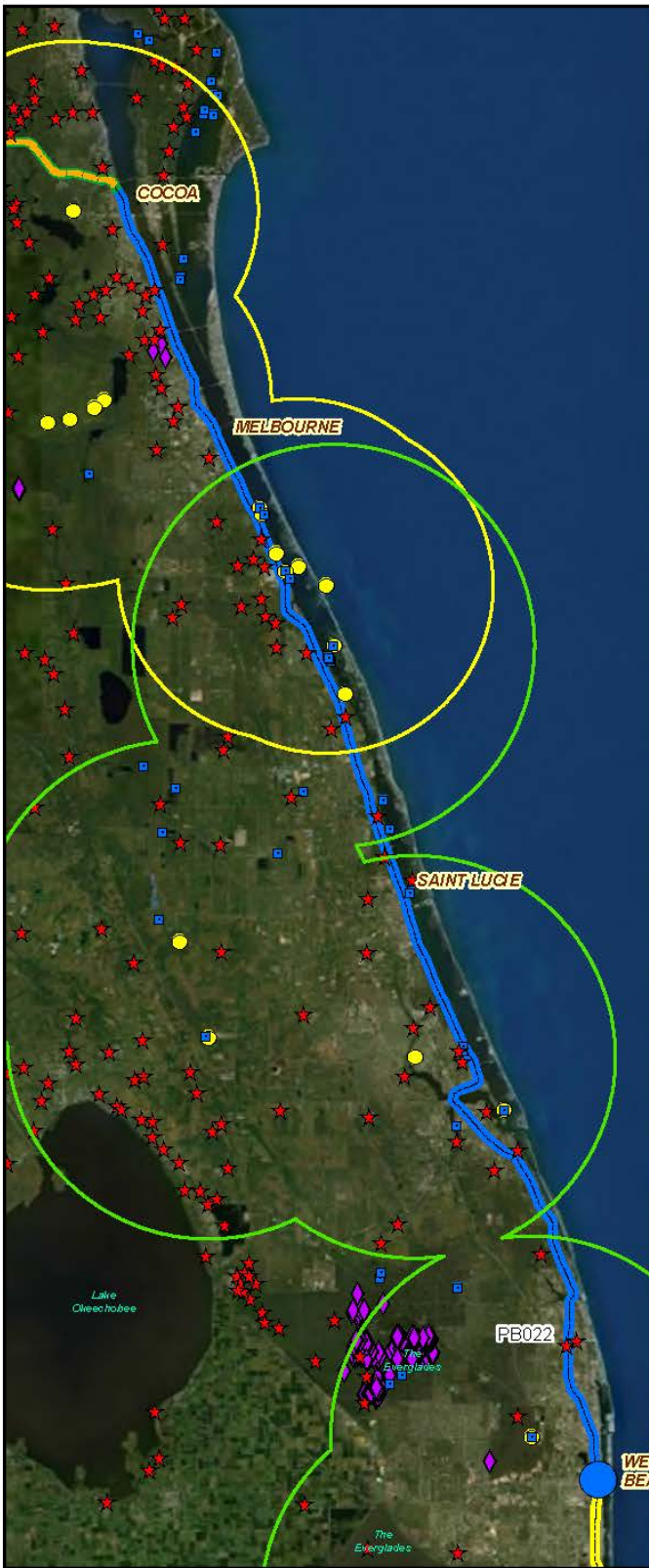
St. Lucie County

- Within and adjacent to a power line easement in Savannas Preserve State Park
- Adjacent to Savannas Preserve State Park, north and south of Walton Road
- Adjacent to Savannas Preserve State Park, north of County Line Road

Martin County

- Adjacent to Jonathan Dickinson State Park

Several commenters, including FDEP and USFWS, also reported scrub-jays in Hobe Sound National Wildlife Refuge (NWR), Savannas Preserve State Park in St. Lucie County, and other locations.







Explanation of Features

- Proposed Stations - WPB-M Corridor
- Core Foraging Area (CFA) = 15 miles for North Florida
- Core Foraging Area (CFA) = 18.6 miles for South Florida
- ◆ Red Cockaded Woodpecker Nests < 0.5 miles
- ◆ Red Cockaded Woodpecker Nests > 0.5 miles
- Wading Bird Active Rookeries, 1999 data
- ★ Eagle Nests
- Wood Stork Nesting Colonies
- E-W Corridor
- N-S Corridor
- WPB-M Corridor

Protected Bird Species along the N-S and WPB-M Corridors		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.6-2
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Explanation of Features

-  Eagle Nest
-  330 Foot Buffer
-  660 Foot Buffer
-  MCO Segment - Extent of Construction

Data Sources: ESRI 2012, BCI 2013, HNTB 2013

Bald Eagle Nest Location		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.6-3

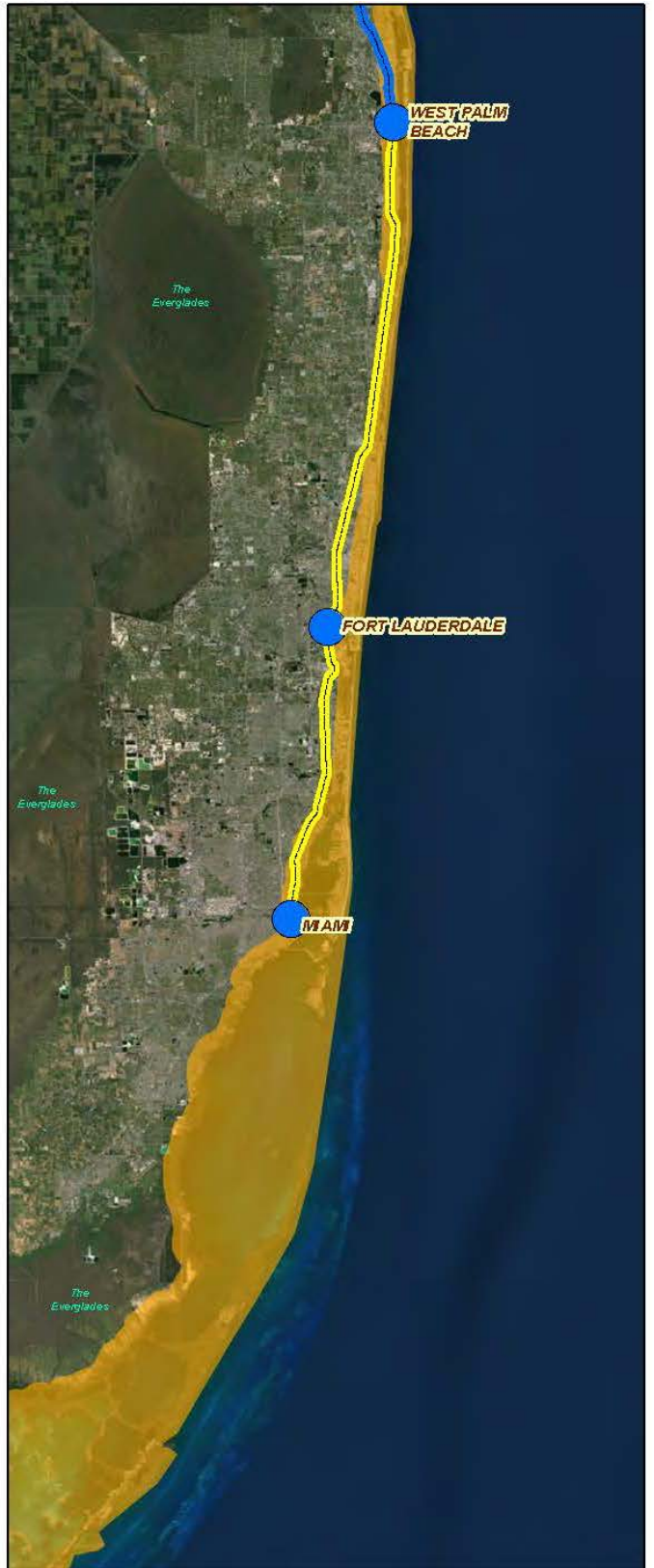
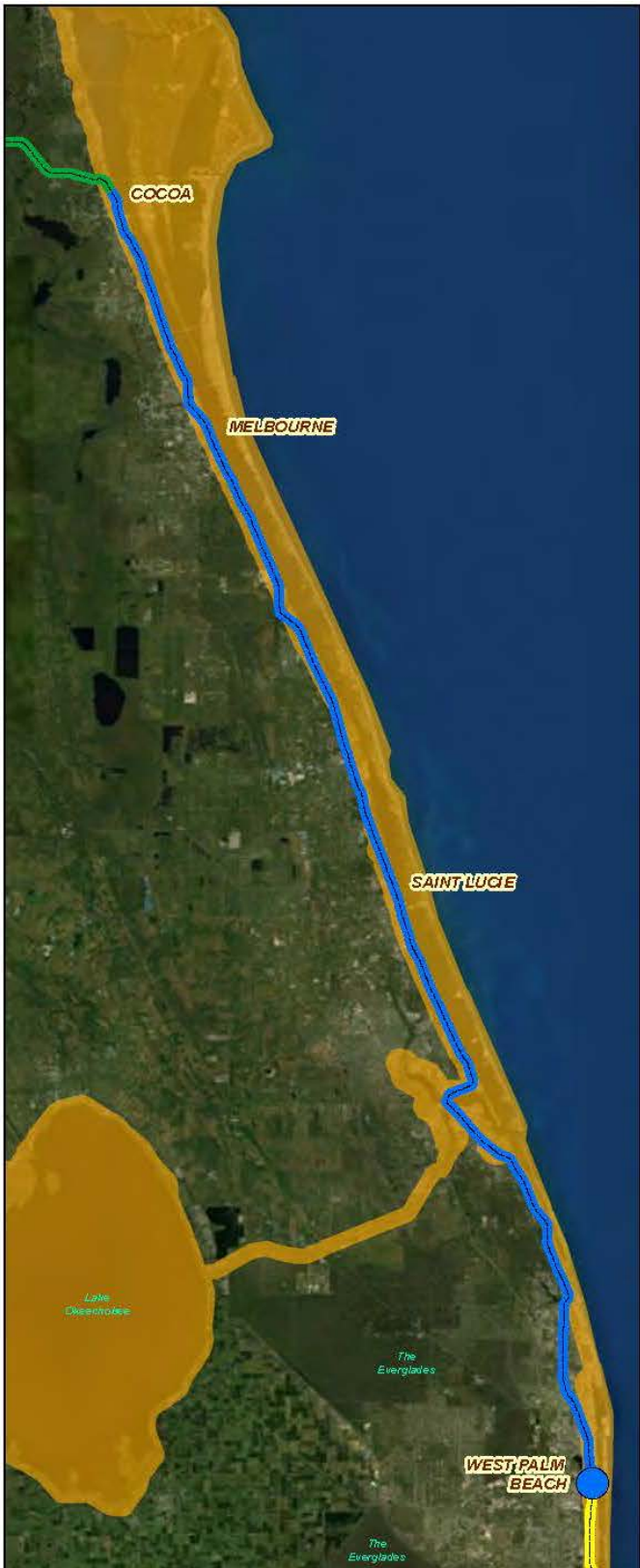
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Project: 06-63-12-0272






Suitable habitat for eastern indigo snake, West Indian (Florida) manatee, smalltooth sawfish, and swimming sea turtles were observed within the Project Study Area during the field investigations. Sand skink habitat is defined as areas within the Consultation Area which are at or above 82 feet elevation above sea level and consist of excessively well drained, well drained, and moderately well drained, sandy soils. Several areas meeting these requirements were identified within the Project Study Area including the west end of the E-W Corridor and the VMF footprint (AMEC 2013g)

Several Important Manatee Areas (IMAs) are located within the Project Study Area (Figure 4.3.6-4). IMAs are “areas within certain counties where increased densities of manatees occur due to the proximity of warm water discharges, freshwater discharges, natural springs and other habitat features that are attractive to manatees” (USFWS 2013d). IMAs located within the Project Study Area include:

- Eau Gallie River (Brevard County)
- Crane Creek (Brevard County)
- Turkey Creek (Brevard County)
- St. Sebastian River (Brevard/Indian River County)
- Taylor Creek (St. Lucie County)
- Manatee Pocket (Martin County)



Explanation of Features

-  Proposed Stations - WPB-M Corridor
-  E-W Corridor
-  N-S Corridor
-  WPB-M Corridor
-  West Indian Manatee Critical Habitat

Data Sources: ESRI Imagery, USFWS 2010, Wildlife Conservation Areas

West Indian Manatee Critical Habitat		
All Aboard Florida Intercity Passenger Rail Project		
		4.3.6-4

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Areas within and adjacent to the WPB-M Corridor also may provide habitat for listed species, as reviewed in the 2012 EA. Table 4.3.6-4 lists the protected species reported for the three counties crossed by the WPB-M Corridor. A total of 17 federal and state-listed species, and ten additional state-listed species, are reported.

Listed Species	Scientific Name	Federal Status	State Status
Mangrove Rivulus	<i>Rivulus marmoratus</i>	N/A	SSC
Smalltooth Sawfish	<i>Pristis pectinata</i>	E	E
American Alligator	<i>Alligator mississippiensis</i>	SAT	SAT
American Crocodile	<i>Crocodylus acutus</i>	T	T
Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	T	T
Green Sea Turtle	<i>Chelonia mydas</i>	E	E
Gopher Frog	<i>Lithobates capito</i>	N/A	SSC
Gopher Tortoise	<i>Gopherus polyphemus</i>	N/A	T
Hawksbill Sea Turtle	<i>Eretmochelys imbricate</i>	E	E
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E	E
Loggerhead Sea Turtle	<i>Caretta</i>	T	T
Rim Rock Crowned Snake	<i>Tantilla oolitica</i>	N/A	T
Bald eagle	<i>Haliaeetus leucocephalus</i>	Delisted	Delisted
Everglades Snail Kite	<i>Rostrhamus sociabilis plumbeus</i>	E	E
Florida Burrowing Owl	<i>Athene cunicularia floridana</i>	N/A	SSC
Florida Scrub-jay	<i>Aphelocoma coerulescens</i>	T	T
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E	E
Piping Plover	<i>Charadrius melodus</i>	T	T
Little blue heron	<i>Egretta caerulea</i>	N/A	SSC
Red Knot	<i>Calidris canutus rufa</i>	C	N/A
Snowy egret	<i>Egretta thula</i>	N/A	SSC
Tricolored heron	<i>Egretta tricolor</i>	N/A	SSC
White ibis	<i>Eudocimus albus</i>	N/A	SSC
Wood stork	<i>Mycteria americana</i>	E	E
Florida Bonneted bat	<i>Eumops floridanus</i>	C	T
Florida mouse	<i>Podomys floridanus</i>	N/A	SSC
Southeastern Beach Mouse	<i>Peromyscus polionotusniveiventris</i>	T	T
West Indian Manatee	<i>Trichechus manatus</i>	E/CH	E/CH

- E Endangered
- T Threatened
- C Candidate
- CH Critical Habitat
- SAT Threatened because of similarity of appearance
- SSC State Special Concern

Plant Species

Federally listed plant species known to occur within the Study Area Counties are listed in Table 4.3.6-5, below.

Surveys conducted within the construction-area limits along the E-W corridor did not identify any listed species.

The waters along the coastline and intra-coastal waterway east of the N-S Corridor contain seagrass populations and habitat. Johnson's seagrass is a federally threatened species. Potential seagrass habitat near the bridge crossings consists of shallow areas less than 7 feet deep, with stable sediments and slow currents. No Johnson's seagrass populations were identified in or adjacent to the Project Study Area during benthic surveys. Seagrass species located in the vicinity of the existing bridges but outside the footprints of the bridges proposed for construction work include manatee grass and shoal grass, which are not listed.

Plant species for which the accepted range does not include the Project Study Area are: Florida bonamia, pygmy fringe tree, Okeechobee gourd, scrub wild buckwheat, scrub lupine, Britton's beargrass, papery whitlow-wort, and Carter's mustard. Plant species for which known populations do not occur within the Project Study Area include: beach jacquemontia, sand lace, scrub plum, and clasping warea.

Listed Species	Scientific Name	Federal Status	State Status	Preferred Habitat
Four-petal pawpaw	<i>Asimina tetramera</i>	E	E	Sand pine scrub
Florida bonamia	<i>Bonamia grandiflora</i>	T	E	Open or disturbed sand scrub
Florida perforated cladonia	<i>Cladonia perforata</i>	E	E	Open sand in scrub habitats
Okeechobee gourd	<i>Cucurbita okeechobeensis</i>	E	E	Swamps along Lake Okeechobee
Beautiful pawpaw	<i>Deeringothamnus pulchellus</i>	E	E	Open longleaf pine woods
Lakela's mint	<i>Dicerandra immaculata</i>	E	E	Atlantic coastal ridge scrub
Savannah mint	<i>Dicerandra immaculata var. savannarum</i>	E	E	Atlantic coastal ridge scrub
Scrub wild buckwheat	<i>Eriogonum longifolium var. gnaphalifolium</i>	T	E	Various scrub upland habitats
Johnson's seagrass	<i>Halophila johnsonii</i>	T	T	Tidal deltas, mouths of canals
Fragrant prickly-apple	<i>Harrisia fragrans</i>	E	E	Scrub flatwoods and xeric hammocks
Beach jacquemontia	<i>Jacquemontia reclinata</i>	E	E	Dunes, coastal strand
Papery whitlow-wort	<i>Paronychia chartacea</i>	T	E	Lake Wales ridge scrub
Tiny polygala	<i>Polygala smallii</i>	E	E	Scrub, sandhill
Sand lace	<i>Polygonella myriophylla</i>	E	E	Open sandy scrub
Scrub plum	<i>Prunus geniculata</i>	E	E	Sandhill and oak scrub
Carter's mustard	<i>Warea carteri</i>	E	E	Sandhill, inland and coastal scrub

E Endangered
T Threatened

Table 4.3.6-6 State-only Protected Plant Species Known to Occur Within Phase II Project Study Area Counties

Listed Species	Scientific Name	State Status	Preferred Habitat
Barbed-wire cactus	<i>Acanthocereus tetragonus</i>	ST	Maritime hammocks, beaches
Curtiss' milkweed	<i>Asclepias curtissii</i>	SE	Dry hammocks, scrub flatwoods
Curtiss' sandgrass	<i>Calamovilfa multiflorus</i>	ST	Wet flatwoods
Many-flowered grass-pink	<i>Calopogon multiflorus</i>	SE	Dry to moist longleaf pine forest
Sand dune spurge	<i>Chamaesyce cumulicola</i>	SE	Beach dunes
Piedmont joint grass	<i>Coelorachis tuberculosa</i>	ST	Freshwater marshes
Large-flowered rosemary	<i>Conardina grandiflora</i>	ST	Coastal scrub
Nodding pinweed	<i>Lechea cernua</i>	ST	Scrub and scrubby flatwoods
Pine pinweed	<i>Lechea divaricata</i>	SE	Scrub and scrubby flatwoods
Celestial lily	<i>Nemastylis floridana</i>	SE	Wet prairies, marshes, cabbage palm hammocks
Simpson's zephyrlily	<i>Zephyranthes simpsonii</i>	ST	Peaty-sandy soil

ST State Threatened
SE State Endangered

Preliminary surveys did not identify any threatened or endangered plant species within the FECR Corridor survey area; however, commenters on the DEIS indicated that several state and federal protected species have been observed near or within the FECR Corridor in areas which were not included within the preliminary survey because these areas are outside of the construction zone. These include:

- Fragrant prickly-apple (*Cereus eriophorus* var. *fragrans*)
- Lakela's mint (*Dicerandra immaculata*): (Federal and State Endangered)
- Fourpetal pawpaw (*Asimina tetramera*): (Federal and State Endangered)
- Perforate reindeer lichen (*Cladonia perforata*): (Federal and State Endangered)
- Curtiss' milkweed (*Asclepias curtissii*): (State Endangered)
- Barbed-wire cactus (*Acanthocereus tetragonus*): (State Threatened)

AAF has initiated coordination with federal and state agencies as well as land managers and biologists within public land to determine the potential presence of protected plant species and identify appropriate areas in which additional surveys will be conducted.

As described in the 2012 EA, Section 3.2.2 and Table 4.3.6-7 below, there are two federal- and state-listed plant species and 26 state-listed plant species within the WPB-M study area.

Listed Species	Scientific Name	Federal Status	State Status
Bahama Brake	<i>Pteris bahamensis</i>	N/A	T
Bahama Sachsia	<i>Sachsia polycephala</i>	N/A	T
Banded Wild-pine	<i>Tillandsia flexuosa</i>	N/A	T
Blodgett's Wild-mercury	<i>Argythamnia blodgettii</i>	N/A	E
Celestial Lily	<i>Nemastylis floridana</i>	N/A	E
Christmas Berry	<i>Crossopetalum ilicifolium</i>	N/A	T
Clamshell Orchid	<i>Encyclia cochleata</i> var. <i>triandra</i>	N/A	E
Coastal Vervain	<i>Glandularia maritima</i>	N/A	E
Cutthroat Grass	<i>Panicum abscissum</i>	N/A	E
Eaton's Spike Moss	<i>Selaginella eatonii</i>	N/A	E
Florida Lantana	<i>Lantana depressa</i> var. <i>depressa</i>	N/A	E
Florida Royal Palm	<i>Roystonea elata</i>	N/A	E
Giant Orchid	<i>Pteroglossaspis ecristata</i>	N/A	T
Golden Leather Fern	<i>Acrostichum aureum</i>	N/A	T
Johnson's Seagrass	<i>Halophila johnsonii</i>	T/CH	T/CH
Large-flowered Rosemary	<i>Conradina grandiflora</i>	N/A	T
Lignum-vitae	<i>Guaiacum sanctum</i>	N/A	E
Nodding Pinweed	<i>Lechea cernua</i>	N/A	T
Pine Pinweed	<i>Lechea divaricata</i>	N/A	E
Pineland Jacquemontia	<i>Jacquemontia curtissii</i>	N/A	T
Porter's Broad-leaved Spurge	<i>Chamaesyce porteriana</i>	N/A	E
Redmargin Zephyrlily	<i>Zephyranthes simpsonii</i>	N/A	T
Rockland Painted-leaf	<i>Euphorbia pinetorum</i>	N/A	E
Sand-dune Spurge	<i>Chamaesyce cumulicola</i>	N/A	E
Small's Flax	<i>Linum carteri</i> var. <i>smallii</i>	N/A	E
Tiny polygala	<i>Polygala smallii</i>	E	E
Two-keeled Helmet Orchid	<i>Galeandra bicarinata</i>	N/A	E
West Indies Mahogany	<i>Swietenia mahagoni</i>	N/A	T

Source: AAF 2012

E Endangered
T Threatened
CH Critical Habitat

4.4 Social and Economic Environment

This Section provides information on the existing human environment, including communities and demographics, environmental justice communities, economics, public health and safety, cultural resources, recreation, and other Section 4(f) resources, visual and scenic resources, utilities, and energy.

4.4.1 Communities and Demographics

This section provides an overview of existing community structure and demographic profiles within the Project Study Area.

4.4.1.1 Methodology

Information collected from the United States Census Bureau (USCB), county websites (Orange, Brevard, Indian River, St. Lucie, Martin, and Palm Beach), and municipal websites (Orlando, Cocoa, Melbourne, Sebastian, Vero Beach, St. Lucie Village, Fort Pierce, Stuart, Jupiter, Palm Beach Gardens, Riviera Beach, and West Palm Beach) was reviewed and incorporated, as appropriate, to describe the community structure and demographic profiles within the Project Study Area.

4.4.1.2 Affected Environment

The MCO Segment is located within MCO, which is in the City of Orlando. MCO is the 13th busiest airport in the United States and the 29th busiest airport in the world (MCO 2012). Orlando is the most visited destination in the United States with over 50 million domestic and international visitors each year (Orange County Office of Economic Development 2013).

According to 2007-2011 American Community Survey (ACS) 5-year Estimates, the City of Orlando has a total population of 236,532 (Table 4.4.1-1) (USCB 2011). Between 2000 and 2011, the total population of the city increased by 27.2 percent (USCB 2000). Orlando has a land area of 102.4 square miles; its population density is 2,327.3 persons per square mile (USCB 2010c).

The E-W Corridor extends from Orlando to Cocoa. Outside of these municipalities, the remaining areas along the E-W Corridor predominantly consist of transportation, cropland and pastureland, and undeveloped areas. Cocoa is located within Florida's Space Coast, the most concentrated high-tech economy in the state (Economic Development Commission of Florida's Space Coast 2011a). According to 2007-2011 ACS 5-year Estimates, the City of Cocoa has a total population of 17,302 (Table 4.4.1-1) (USCB 2011). Between 2000 and 2011, the total population of Cocoa increased by 5.4 percent (Table 4.4.1-1) (USCB 2000). Cocoa has a land area of 13.3 square miles; its population density is 1,287.0 persons per square mile (USCB 2010c).

The N-S Corridor is within the existing FECR Corridor, and passes through numerous incorporated and census designated places (Table 4.4.1-1). Among these communities, the City of Port St. Lucie has the highest total population (159,962), while the Town of Ocean Breeze has the lowest total population (392) (USCB 2011). Between 2000 and 2011, the City of Port St. Lucie experienced the largest population gain on a percentage basis (80.2 percent) (USCB 2000; USCB 2011). Several communities had their total populations decline between 2000 and 2011, including Fort Pierce North CDP (-3.2 percent), Micco CDP (-3.4 percent), St. Lucie Village (-6.0 percent), Lake Park (-6.1 percent), Vero Beach (-11.5 percent), Ocean Breeze (-15.3 percent), Roseland CDP (-18.9 percent), Rio (-20.7 percent) and Wabasso CDP (-26.1 percent) (USCB 2000; USCB 2011).

County	Place¹	Total Population (2000)	Total Population (2011)	Percent Increase in Total Population (2000 to 2011)
Orange	Orlando city	185,951	236,532	27.2
Brevard	Cocoa city	16,412	17,302	5.4
	Rockledge city	20,170	24,707	22.5
	Palm Shores town	794	850	7.1
	Melbourne city	71,382	76,538	7.2
	Palm Bay city	79,413	101,815	28.2
	Malabar town	2,622	2,778	5.9
	Grant-Valkaria town	NA	3,809	--
	Micco CDP	9,498	9,172	-3.4
Indian River	Roseland CDP	1,775	1,439	-18.9
	Sebastian city	16,181	21,603	33.5
	Wabasso CDP	918	678	-26.1
	Winter Beach CDP	965	1,659	71.9
	Gifford CDP	7,599	9,940	30.8
	Vero Beach city	17,705	15,664	-11.5
	Vero Beach South CDP	20,362	22,372	9.9
	Florida Ridge CDP	15,217	17,009	11.8
St. Lucie	St. Lucie Village town	604	568	-6.0
	Fort Pierce North CDP	7,386	7,148	-3.2
	Fort Pierce city	37,516	42,373	12.9
	Indian River Estates CDP	5,793	6,629	14.4
	Port St. Lucie city	88,769	159,962	80.2
Martin	Jensen Beach CDP	11,100	12,668	14.1
	Ocean Breeze town	463	392	-15.3
	Stuart city	14,633	15,644	6.9
	Rio CDP	1,028	815	-20.7
	Port Salerno CDP	10,141	10,174	0.3
	Hobe Sound CDP	11,376	11,747	3.3
Palm Beach	Tequesta village	5,273	5,632	6.8
	Jupiter town	39,328	53,935	37.1
	Palm Beach Gardens city	35,058	47,483	35.4
	Cabana Colony CDP	NA	2,658	--
	Lake Park town	8,721	8,190	-6.1
	Riviera Beach city	29,884	32,508	8.8
	West Palm Beach city	82,103	98,795	20.3

Source: USCB. 2000. Census 2000. <http://factfinder2.census.gov>. Accessed August 13, 2013; USCB. 2011. 2007-2011 American Community Survey 5-Year Estimates: Total Population. <http://factfinder2.census.gov/>. Accessed August 13, 2013. Accessed August 14, 2013; USCB. 2014. 2014 TIGER/Line Shapefiles: Places: Florida. <https://www.census.gov/cgi-bin/geo/shapefiles2014/main>. Accessed February 20, 2015.

¹ CDP = Census Designated Place

Brief descriptions of the major incorporated places (total populations greater than 30,000) traversed by the N-S Corridor are provided below.

- Melbourne is in the southern portion of Brevard County, on Florida's Space Coast (Melbourne, Florida 2012). Melbourne has a land area of 33.9 square miles; its population density is 2,246.4 persons per square mile (USCB 2010c).
- The City of Palm Bay is home to a number of aerospace and related companies, which contributes to the city's high concentration of workers employed in "advanced industries" such as science, technology, engineering, and math (Barth 2015). Palm Bay has a land area of 65.7 square miles; its population density is 1,570.6 persons per square mile (USCB 2010c).
- The City of Fort Pierce is one of the oldest communities on the eastern coast of Florida and has been the hub of St. Lucie County for over 100 years (Fort Pierce, Florida 2010). Fort Pierce has a land area of 20.6 square miles; its population density is 2,021.9 persons per square mile (USCB 2010c).
- The City of Port St. Lucie sits about halfway between Miami and Orlando, and is a regional hub of biotech research and life sciences (Port St. Lucie 2013). Port St. Lucie has a land area of 114.0 square miles; its population density is 1,444.5 persons per square mile (USCB 2010c).
- The Town of Jupiter is a coastal community, and one of the northernmost suburbs of the Miami-Fort Lauderdale-Pompano Beach Metropolitan Statistical Area. Jupiter has a land area of 21.5 square miles; its population density is 2,569.5 persons per square mile (USCB 2010c).
- The City of Palm Beach Gardens is the largest land area in Palm Beach County. Over 50 percent of the city's land mass is either forested or landscaped green space (Palm Beach Gardens, Florida 2008). Palm Beach Gardens has a land area of 55.1 square miles; its population density is 879.5 persons per square mile (USCB 2010c).
- The City of Riviera Beach has a robust waterfront, occupied by shops, restaurants, and other attractions such as the Port of Palm Beach (City of Riviera Beach, Florida 2013). Riviera Beach has a land area of 8.5 square miles; its population density is 3,810.0 persons per square mile (USCB 2010c).
- The City of West Palm Beach includes numerous shopping districts, historic and scenic neighborhoods (Northwood Village, Old Northwood, Flamingo Park, and El Cid), and year-round outdoor festivals. West Palm Beach has a land area of 55.3 square miles; its population density is 1,807.1 persons per square mile (USCB 2010c).

The additional two municipalities served by the Phase I stations are described below.

- The City of Fort Lauderdale has a land area of 34.8 square miles; its population density is 4,761.1 persons per square mile (USCB 2010c).
- The City of Miami has a land area of 35.9 square miles and has a population density of 11,135.9 persons per square mile (USCB 2010c).

The total population of the 117 census tracts within the Project Study Area is 535,868, which represents 15.1 percent of the total population of the six counties and 2.9 percent of the total population of the entire

state. The highest concentrations of population in the Project Study Area are within Brevard County (158,623) and Palm Beach County (115,597). Table 4.4.1-2 provides the total population for each of the six counties crossed by the Project, the census tracts within the Project Study Area (by county), and the State of Florida (USCB 2010a).

Geography (No. of Census Tracts)	Total Population	Total Population of the Census Tracts Transected by the Project
Florida	18,688,787	--
Six County Total	3,541,985	535,868
Orange (8)	1,133,087	78,632
Brevard (32)	542,320	158,623
Indian River (17)	137,004	69,533
St. Lucie (10)	274,693	35,131
Martin (20)	145,480	78,352
Palm Beach (30 - N-S Corridor)	1,309,401	115,597
Palm Beach (46 - WPB-M Corridor)	1,320,134 ¹	170,687 ¹
Broward (52)	1,748,066 ¹	220,308 ¹
Miami-Dade (38)	2,496,435 ¹	157,769 ¹

Source: USCB. 2011. *2007-2011 American Community Survey 5-Year Estimates: Total Population*. <http://factfinder2.census.gov/>. Accessed August 13, 2013; AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013.

1 Population data, as presented in Section 3.3.3 of the 2012 EA, derives from the 2010 U.S. Census

Section 4.4.2, *Environmental Justice*, presents demographic information pertaining to minority and low-income populations identified within the Project Study Area.

4.4.2 Environmental Justice

This section provides an overview of the existing conditions related to minority and low-income populations within the Project Study Area. Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations*, was issued in February 1994 and requires that federal agencies consider whether a proposed project would have a disproportionately high adverse impact on minority or low-income populations.

CEQ has oversight of the federal government's compliance with NEPA, including EO 12898. CEQ, with input from the EPA and other affected agencies, developed a guidance document to assist federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed. CEQ's guidance document indicates that

“minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit

of geographic analysis. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds.” (CEQ 1997b)

4.4.2.1 Methodology

This evaluation uses demographic data collected from the 2010 U.S. Census and 2010 ACS. The Project Study Area includes census tracts within 1,000 feet of the proposed or existing railroad alignments. Because impacts to environmental justice communities are dependent on the potential for significant impacts in other environmental categories, the area of analysis for environmental justice is the area of potential significant impacts for the other environmental impact categories, including cumulative impacts.

Thresholds to determine meaningfully greater high minority and low-income populations include census tracts where minority populations are 10 percent higher than the combined total for the six counties crossed by the Project (37.4 percent) and census tracts where low-income populations are 10 percent higher than the combined total for the six counties crossed by the Project (22.4 percent).

Poverty information was obtained from the USCB American Fact Finder website for poverty status in the past 12 months at the state, county, and census tract levels within the Project Study Area (USCB 2010b). There is a portion of the population whose poverty status cannot be determined. These populations include individuals under the age of 15 that do not live with a family member such as foster children; and people in college dormitories, military barracks, and institutional quarters such as prisons or nursing homes (USCB 2012). The percentage of the population below the poverty level is based on the population for which poverty status has been determined, rather than the total population in a given area.

4.4.2.2 Affected Environment

Race

For this analysis, the minority or ‘non-White’ population refers to persons who reported their ethnicity and race as something other than ‘White alone’ during the 2010 Census (USCB 2010a). The ‘non-White’ population was calculated by subtracting the ‘White’ population from the total population for each area. The ‘non-White’ population includes individuals of American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic racial heritage. Table 4.4.2-1 summarizes the ‘non-White’ populations identified at the state, county and census tract levels within the Project Study Area. Census tracts with a meaningfully greater percentage of minority populations (≥ 37.4 percent of the population, which is 10 percent higher than the percent minority population calculated for the combined six counties crossed by the Project) and minority populations greater than 50 percent are listed by county in Table 4.4.2-2 and shown in Appendix 4.4.2-A.

	Minority/'Non White' Population	Percent 'Non-White'
Florida	4,692,148	25.0
Orange County	417,161	36.4
Brevard County	92,449	17.0
Indian River County	21,682	15.7
St. Lucie County	78,453	28.2
Martin County	18,627	12.7
Palm Beach County	350,013	26.5
Six County Total	978,385	27.4
Project Study Area Census Tracts within:		
Orange County (8)	21,684	27.6
Brevard County (32)	28,557	18.0
Indian River County (17)	14,782	21.3
St. Lucie County (10)	11,812	33.6
Martin County (20)	10,374	13.2
Palm Beach County (30)	48,162	41.7
Project Study Area Total	135,371	25.3

Source: USCB. 2010. *Census 2010*. <http://factfinder2.census.gov/>. Accessed August 13, 2013.

As shown in Table 4.4.2-1, 25.3 percent of the total population within the Project Study Area is 'non-White'. This is lower than the total percentage of the population considered 'non-White' within the six counties crossed by the Project Study Area (27.4 percent), but nearly equal to the total percentage of the population considered 'non-White' within the entire state (25.0 percent). Among the counties within the Project Study Area, Orange County has the highest concentration of minority populations (36.4 percent), while Martin County has the lowest concentration of minority populations (12.7 percent). The highest concentrations of minority populations within the Project Study Area were found to be in Palm Beach County (41.7 percent), St. Lucie County (33.6 percent), and Orange County (27.6 percent). Of the 117 census tracts within the Project Study Area, 24 census tracts (20.5 percent) have minority populations greater than 50 percent and two tracts (1.7 percent) have minority populations greater than 37.4 percent (Table 4.4.2-2).

	Census Tract	Percent Minority Population ≥37.4 %	Percent Minority Population >50 %
Brevard	062301	--	60.2
	062302	38.2	--
	062600	--	78.2
	062900	38.5	--
	064902	--	53.1
	065124	--	70.2
Indian River	050302	--	79.0
St. Lucie	380901	--	57.8
	380100	--	66.7
	380200	--	94.9
	380500	--	51.4
Martin	000800	--	58.5
Palm Beach	001101	--	67.9
	001200	--	72.8
	001301	--	85.6
	001302	--	98.6
	001404	--	97.3
	001403	--	98.5
	001402	--	91.0
	001500	--	85.8
	001600	--	64.1
	001700	--	50.2
	001801	--	83.4
	002200	--	95.1
	002300	--	51.4
	002400	--	93.1

Source: USCB. 2010. *Census 2010*. <http://factfinder2.census.gov/>. Accessed August 13, 2013.

For the WPB-M Corridor evaluated in Section 3.3.3 of the 2012 EA (138 census tracts in Palm Beach, Broward, and Miami-Dade Counties), 39.7 percent of the population was 'non-White' and 25.7 percent Hispanic, which is 10.0 percent greater than the tri-county 'non-White' population and 15.9 percent less than the tri-county Hispanic population. Based on the CEQ guidelines, the 10.0 percent higher 'non-White' population represents a proportion of the impacted area that is deemed "meaningfully greater" when compared to the regional population; therefore, minority populations subject to protection under Executive Order 12898 are present within the WPB-M Corridor.

Low Income

CEQ's guidance for environmental justice indicates that low-income populations in an affected area "should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty (CEQ 1997b)." USCB uses a set of income thresholds that vary by family size and composition to determine poverty status. Official poverty thresholds do not vary geographically, but are updated for inflation (USCB 2012). USCB reports poverty data from several major household surveys and programs, including the ACS, which is an ongoing statistical survey that samples a small percentage of the population every year. Information from the ACS is used to help determine how federal and state funds are distributed each year (USCB 2011). Weighted average poverty thresholds for 2010 ranged from \$10,458 to \$11,344 annual income for individuals, and \$14,218 to \$45,220 for households, depending on age and the number of people in the household.

Table 4.4.2-3 summarizes low-income populations identified at the state, county, and census tract levels within the Project Study Area. Census tracts with a meaningfully greater percentage of the population below the poverty level (≥ 22.4 percent of the population, which is 10 percent higher than the percent of the population below poverty calculated for the combined six counties) and populations below poverty greater than 50 percent are listed by county in Table 4.4.2-4 and figures in Appendix 4.4.2-B.

	Population for which Poverty is determined	Population Below Poverty	Percent Below Poverty	Median Household Income
Florida	18,107,049	2,502,365	13.8	\$47,827
Orange County	1,097,169	147,225	13.4	\$49,731
Brevard County	532,304	55,981	10.5	\$50,068
Indian River County	134,445	16,984	12.6	\$46,363
St. Lucie County	265,682	36,457	13.7	\$44,947
Martin County	141,536	14,724	10.4	\$53,612
Palm Beach County	1,281,333	156,759	12.2	\$52,951
Six County Total	3,452,469	428,130	12.4	
Affected Census Tracts (117) within:				Project Study Area Weighted Average
Orange County (8)	71,324	6,495	9.1	\$66,704
Brevard County (32)	154,662	18,353	11.9	\$51,269
Indian River County (17)	68,002	11,175	16.4	\$42,270
St. Lucie County (10)	35,127	5,977	17.0	\$35,629
Martin County (20)	75,856	7,764	10.2	\$54,002
Palm Beach County (30)	108,645	18,611	17.1	\$55,004
Project Study Area Total	513,616	68,375	13.3	

Source: USCB. 2010b. 2006-2010 American Community Survey 5-Year Estimates. <http://factfinder2.census.gov/>. Accessed September 12, 2013.

As shown in Table 4.4.2-3, 13.3 percent of the total population within the Project Study Area has been below the poverty level within the last 12 months. This is slightly higher than the total percent of the population below poverty within the six counties (12.4 percent), but slightly lower than the percent below poverty within the entire state (13.8 percent). St. Lucie County has the highest percent below the poverty level (13.7 percent), while Martin County has the lowest percent below the poverty level (10.4 percent). Of the 117 census tracts within the Project Study Area, three (2.6 percent) reported poverty greater than 50 percent and 23 (19.7 percent) reported poverty greater than 22.4 percent (Table 4.4.2-4). The three census tracts with poverty greater than 50 percent occur in St. Lucie and Palm Beach Counties, and were also identified as counties with greater than 50 percent minority populations. Palm Beach County has the greatest number of census tracts with poverty levels greater than 22.4 percent (10).

	Census Tract	Percent Low-Income Population ≥22.4 percent	Percent Low-Income Population >50 percent
Brevard	062301	38.5	--
	062302	40.2	--
	062400	23.6	--
	062600	36.2	--
	064700	27.0	--
	064902	40.8	--
	065124	23.4	--
Indian River	050302	29.1	--
	050401	46.9	--
St. Lucie	380100	--	51.6
	380200	42.9	--
	380500	23.2	--
	380901	22.7	--
	381000	26.5	--
Martin	000800	35.6	--
	001200	22.6	--
Palm Beach	001200	24.8	--
	001301	23.7	--
	001302	31.4	--
	001402	24.7	--
	001403	--	51.6
	001500	24.8	--
	001700	35.1	--
	002200	--	56.0
	002300	33.8	--
	002400	46.1	--

Source: USCB. 2010b. 2006-2010 American Community Survey 5-Year Estimates. <http://factfinder2.census.gov/>. Accessed September 12, 2013.

In addition to data pertaining to minority and low-income populations, information on language usage identifies areas within the Project Study Area where mitigation measures, such as the use of translators during public meetings, may be necessary. In Orange and Brevard Counties, 12.8 percent and 3.1 percent of the total population (5 years old and over) speak English less than “very well,” respectively. Among the combined total population (5 years old and over) within the counties crossed by the N-S Corridor, 9.6 percent speak English less than “very well.” The highest concentration of persons that speak English less than “very well” were found to be in Palm Beach County (13.0 percent) (USCB 2010b).

Some commenters noted that the environmental justice evaluation in the FEIS should include Martin County’s Community Redevelopment Areas (CRAs), namely Jensen Beach, Rio, Old Palm City, Golden Gate, Hobe Sound, Port Salerno, and Indiantown. Old Palm City and Indiantown are outside the Project Study Area (within 1,000 feet of the proposed or existing railroad alignments). Jensen Beach, Rio, Golden Gate, and Hobe Sound are within the Project Study Area, but not within census tracts identified as environmental justice communities. Port Salerno is within the Project Study Area and intersects an identified environmental justice community (Census Tract 12). This CRA has been evaluated at the census tract level along with all other identified environmental justice communities in Section 5.4.2, *Environmental Justice*.

For the WPB-M Corridor evaluated in Section 3.3.3 of the 2012 EA, 20.4 percent of the population was below the poverty level. This is 8.9 percent higher than the tri-county average, which represents a proportion of the impacted area that is deemed “meaningfully greater” when compared to the regional population as per the CEQ guidelines. Low-income populations subject to protection under Executive Order 12898 are present within the WPB-M Corridor.

4.4.3 Economic Conditions

This section provides an overview of existing labor force and general employment sector conditions for the six counties within the Project Study Area.

4.4.3.1 Methodology

Data obtained from the 2007-2011 ACS, “Selected Economic Characteristics,” and information collected as part of a literature review were examined and incorporated, as appropriate, to describe the economic characteristics of the Project Area. This section also includes an assessment of the economic value of the marine industry, particularly with respect to the St. Lucie, Loxahatchee and New Rivers.

The State of Florida has performed extensive studies regarding the economic value of the marine industry. These studies include analysis of spending on vessels (e.g., boat sales, storage, repairs) and recreation (e.g., restaurants, fishing, tackle, ski/boating instruction). These studies also provide information about the economic value of marine-related activities by county. The *2014 Navigation Discipline Report* (AMEC 2014) estimated the economic value of the marine industry in 2013 in order to determine a cost per trip for the socioeconomic impact analysis. Growth in the marine industry involved the projection of all retail sales based on estimated gross sales in the marine industry, as recorded by the Florida Department of Revenue. These data contain monthly totals for gross sales and taxable sales by county and by Kind Code up to December 2013. Kind Code 28, which includes motorboats, yachts, marine parts, accessories, and boat dealers, was used to determine growth in the marine industry by calculating

the percentage growth in this industry between the base date of the original study and December 2013. The same level of growth was applied to all retail values that were calculated in the State of Florida's studies. The four counties that are affected by marine activities on the St. Lucie River, Loxahatchee River, and New River include St. Lucie, Martin, Palm Beach, and Broward counties (AMEC 2014a). The *Navigation Discipline Report* did not include economic analysis for marine activities in Indian River or Brevard Counties, such as recreational boating, commercial fishing, scenic tour operators, or fishing guides, for which data are not readily available.

As described in the *2014 Navigation Discipline Report*, the economic benefits of marine-related activities on the inland waterways for each of the counties considered were originally analyzed in the following years: 2007 for Broward County, 2006 for Palm Beach County, and 1999 for both Martin and St. Lucie Counties. The State of Florida updated these studies in December 2011 to reflect the economic value of the marine industry in each county for 2009 values (based on the most recently available data at the time) (Florida Inland Navigation District 2011). The state's studies identify and quantify the total economic benefit of each county's waterways, including direct benefits, indirect benefits, and induced benefits associated with marine-related activity; the analysis includes benefits related to expenditures in the marine industry as well as expenditures outside of the marine industry, but directly related to marine activities (e.g., groceries purchased for a boating trip). These analyses do not include the effect of the marine industry on property values (Florida Inland Navigation District 2011).

This analysis expands on the methodology of the state's studies to estimate growth in direct, indirect, and induced economic activity (see Table 4.4.3-1), including total business volume, personal income, and employment (AMEC 2014a).

Type of Effect	Definition	Illustrative Example
Direct	The initial change in the industry in question (e.g., expenditures in the marine industry)	For example, when a boater pays for repairs to his vessel, this spending is considered a direct effect of the industry.
Indirect	Changes in inter-industry transactions when supplying industries respond to increased demands from the directly affected industries (e.g., impacts from non-wage expenditures)	When repairing the vessel, the mechanic uses a portion of these funds to purchase epoxy; if this expenditure occurs in the same region, it would constitute an indirect economic effect of vessel industry spending.
Induced	Changes in local spending that result from income changes in the directly and indirectly affected industry sectors (e.g., impacts from wage expenditures).	The vessel mechanic would earn income that can then be spent in the local economy, thereby producing induced benefits to the local economy.

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014. Report.

In order to determine the economic value of the specific waterways considered in this analysis, the relative importance of each waterway was determined as a percentage of the marine industry in the county in which it is located. In the case that a particular waterway is located in two counties, its relative importance in each county was considered and then the results for each county were summed to get the total economic value of the waterway.

4.4.3.2 Affected Environment

This section describes general economic conditions within the Study Area, and specifically the economic conditions related to the marine industry in the counties where there are moveable bridges along the FECR Corridor.

General Economic Conditions

Orlando and Orange County are the most visited destinations in the United States with over 50 million domestic and international visitors each year (Orange County Office of Economic Development 2013). The tourism sector alone provides \$27.6 billion in total economic impact to Metro Orlando (Metro Orlando Economic Development Commission 2012). Theme parks such as Walt Disney World Resort, Universal Orlando Resort, and SeaWorld Orlando are some of the area's main attractions. Walt Disney World Resort is the largest amongst these attractions, and includes several theme parks and water parks: Magic Kingdom, Epcot Center, Disney's Hollywood Studios, Disney's Animal Kingdom, Disney's Typhoon Lagoon, and Disney's Blizzard Beach (Disney n.d.). The nation's second largest convention facility is the Orange County Convention Center, which hosts approximately 1 million visitors per year and provides \$1.9 billion in total economic impact to the Central Florida economy (Orange County Convention Center 2013).

The area from Cocoa to Melbourne in Brevard County is within Florida's Space Coast. The Space Coast stretches 72 miles along the state's eastern coastline, and is the most concentrated high-tech economy in the state (Economic Development Commission of Florida's Space Coast 2011a). This high-tech economy includes communications, electronics, aerospace, advanced security, and emerging technologies (Economic Development Commission of Florida's Space Coast 2011a). The National Aeronautics and Space Administration (NASA) Kennedy Space Center and United States Air Force (USAF) Cape Canaveral Air Force Station operate within the Space Coast, and are two of the region's largest employers (Economic Development Commission of Florida's Space Coast 2011b). The Kennedy Space Center Visitor Complex hosts over 1.5 million visitors per year. The Space Coast also includes the Merritt Island National Wildlife Refuge (MINWR) and Canaveral National Seashore, which draw over 550,000 visitors per year. Port Canaveral, one of the busiest ports in the nation, served over 3 million passengers in 2011 and has an estimated economic impact of \$48 million of state and local taxes (Canaveral Port Authority 2009).

According to the ACS, three industry categories typically employed the greatest percentage of the labor forces in the six counties transected by the Project Study Area: educational services, health care, and social assistance; professional, scientific, management, administrative and waste management services; and retail trade (USCB 2011) (Table 4.4.3-2).

County	Population in Labor Force	Industry Type (Percent of Workforce)			Percent Unemployed
		Educational Services, Health Care and Social Assistance	Retail Trade	Professional, Scientific, Management, Administrative and Waste Management Services	
Orange	627,702	17.5	12.5	13.9	7.2
Brevard	263,218	20.8	13.3	12.9	6.2
Indian River	62,322	20.9	13.9	12.7	6.7
St. Lucie	128,691	20.8	16.8	10.0	8.2
Martin	66,999	20.2	14.7	13.1	5.8
Palm Beach	647,885	20.0	13.4	14.0	6.3

Source: USCB. 2011. 2007-2011 American Community Survey 5-Year Estimates: Total Population. <http://factfinder2.census.gov/>. Accessed August 13, 2013.

Agriculture is one of the major industries in Palm Beach County; commercial agriculture provides over \$2 billion in total economic impact to Palm Beach County's economy. Approximately 37 percent of the total land in the county is occupied by agricultural land use (Palm Beach County, Florida 2013). Agriculture, natural resources and related industries are significant economic contributors within the five counties crossed by the N-S Corridor. This industry group generates 189,489 direct jobs and approximately \$15.4 billion in direct revenues; it has an overall economic impact of approximately \$18 billion (Table 4.4.3-3). Among the five counties crossed by the N-S Corridor, the largest economic impact from agriculture, natural resources and related industries is found in Palm Beach County (\$11.6 billion) (Rahmani et al. 2008).

	Direct Employment (Jobs)	Revenue (\$ billions)	Economic Impact (\$ billions)
Brevard	29,493	2.1	2.2
Indian River	14,919	1.1	1.2
St. Lucie	18,612	1.3	1.6
Martin	14,217	1.2	1.4
Palm Beach	112,248	9.7	11.6
Five County Total	189,489	15.4	18.0

Source: Rahmani, Mohammad, Alan W. Hodges, and Rodney L. Clouser. 2008. Economic Contributions of Agriculture, Natural Resources, and Related Industries in Florida Counties, 2008. <http://www.fred.ifas.ufl.edu/economic-impact-analysis/pdf/Florida%20Counties%20Main.pdf>. Accessed August 18, 2013.

Maritime Economic Conditions

This section describes maritime economic conditions in the areas associated with the three movable bridges: St. Lucie River Bridge, Loxahatchee River Bridge, and New River Bridge.

Recreational boating activities bring revenue for local businesses and governments. According to the SFWMD and the Florida Center for Environmental Studies, fishing in the Indian River Lagoon brought in \$82.1 million in Martin and St. Lucie Counties in 1995, with boating adding an additional \$12.4 million (SFWMD and Florida Center for Environmental Studies 1999). According to the Recreational Marine Research Center, which conducted a study commissioned by the Florida Fish and Wildlife Conservation Commission, the total spending on boat trips by boat owners registered in Martin County in 2006 is estimated to be over \$65 million, and nearly \$170 million in Palm Beach County. If the estimated annual spending on recreational boating, not including purchases of boats, is added to that, the economic significance of trip spending and annual boating spending by boats registered in Martin County is estimated to have a value of over \$90 million. In Palm Beach County, these numbers are estimated with a value over \$280 million (Recreational Marine Research Center n.d.). According to recreational boat traffic surveys, recreational boating in Broward County has an economic impact of approximately \$8.8 billion (Mote 2005). These estimates include lodging, marina services, restaurants, groceries, boat fuel, auto fuel, marine supplies, recreation, entertainment, and shopping, and encompass an area much larger than the Project Study Area.

Martin County

As described in the *2014 Navigation Discipline Report*, the direct economic value of the marine industry in Martin County was determined by updating the economic analysis performed by the State of Florida in 2011. The state's study was updated from the base year of 1999, when the original study for Martin County was performed, to reflect the total value of the industry in December 2013. The direct economic value of the marine industry associated with the portion of the St. Lucie River that lies in Martin County includes all direct spending associated with the marine industry that occurred near this portion of the St. Lucie River. In other words, it includes all marine-related spending by the individuals utilizing this portion of the waterway (AMEC 2014a).

The total value of the marine industry in Martin County is \$705.0 million, with \$523.7 million in direct sales, \$86.0 million in indirect benefits, and \$95.3 million in induced benefits (Table 4.1.3-3). Direct spending in the marine industry supports 4,588 jobs and \$138.1 million in personal income. Additionally, the total spending associated with the marine industry, including direct, indirect, and induced effects, supports 7,049 jobs and \$205.5 million in personal income (Table 4.1.3-4) (AMEC 2014a).

	Original 1999 Model Results				Estimated 2013 Figures			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Business Volume (in millions)	\$314.8	\$51.7	\$57.3	\$423.8	\$523.7	\$86.0	\$95.3	\$705.0
Personal Income (in millions)	\$83.0	\$19.0	\$21.5	\$123.5	\$138.1	\$31.6	\$35.8	\$205.5
Employment	2,758	663	816	4,237	4,588	1,103	1,358	7,049

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014. Report.

St. Lucie County

As described in the *2014 Navigation Discipline Report*, the direct economic value of the marine industry in St. Lucie County was determined by updating the economic analysis performed by the State of Florida in 2011. Because the economic studies for the marine industry in Martin and St. Lucie Counties were both performed in 1999, the methodology for updating data to December 2013 values is the same for both counties. The direct economic value of the marine industry associated with the portion of the St. Lucie River that lies in St. Lucie County includes all direct spending associated with the marine industry that occurred near this portion of the St. Lucie River. In other words, it includes all marine-related spending by the individuals utilizing this portion of the waterway (AMEC 2014a).

The total value of the marine industry in St. Lucie County is \$420.9 million, with \$308.4 million in direct sales, \$53.2 million in indirect benefits, and \$59.3 million in induced benefits. Additionally, the total personal income generated by the industry is \$106.6 million and the total associated employment is 3,771 jobs (Table 4.4.3-5) (AMEC 2014a).

	Original 1999 Model Results				Estimated 2013 Figures			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Business Volume (in millions)	\$192.87	\$33.26	\$37.11	\$263.24	\$308.35	\$53.17	\$59.33	\$420.85
Personal Income (in millions)	\$40.34	\$12.46	\$13.88	\$66.68	\$64.49	\$19.92	\$22.19	\$106.60
Employment	1,377	441	541	2,359	2,201	705	865	3,771

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014. Report.

The St. Lucie River represents approximately 82.9 percent of the marine activity in Martin County and 15.3 percent in St. Lucie County. Because the economic activity associated with the St. Lucie River is located in both Martin and St. Lucie Counties, the total economic value of this river is equivalent to 82.9 percent of the economic value of the marine industry in Martin County plus 15.3 percent of the economic value of the marine industry in St. Lucie County, resulting in a total economic value of \$648.8 million. This total value is comprised of \$481.3 million in direct expenditures, \$79.4 million in indirect effects, and \$88.1 million in indirect effects. This activity supports 6,420 jobs and \$186.6 million in personal income (Table 4.4.3-6) (AMEC 2014a).

		Direct	Indirect	Induced	Total
Portion within Martin County	Business Volume (in millions)	\$434.1	\$71.3	\$79.0	\$584.4
	Personal Income (in millions)	\$114.4	\$26.2	\$29.7	\$170.3
	Employment	3,803	914	1,125	5,843
Portion within St. Lucie County	Business Volume (in millions)	\$47.2	\$8.1	\$9.1	\$64.4
	Personal Income (in millions)	\$9.9	\$3.0	\$3.4	\$16.3
	Employment	337	108	132	577
Total	Business Volume (in millions)	\$481.3	\$79.4	\$88.1	\$648.8
	Personal Income (in millions)	\$124.3	\$29.2	\$33.1	\$186.6
	Employment	4,140	1,022	1,258	6,420

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014. Report.

Palm Beach County

As described in the *2014 Navigation Discipline Report*, the direct economic value of the marine industry in Palm Beach County was determined by updating the economic analysis performed by the State of Florida in 2011. The state's study was updated from the base year of 2006, when the original study for Palm Beach County was performed, to reflect the total value of the industry in December 2013. The direct economic value of the marine industry associated with the Loxahatchee River includes all marine-related spending by the individuals and businesses utilizing the waterway (AMEC 2014a).

The total value of the marine industry in Palm Beach County is \$1,716.7 million, with \$943.1 million in direct sales, \$219.4 million in indirect benefits, and \$554.2 million in induced benefits (Table 4.1.3-6). Direct spending in the marine industry supports 4,753 jobs and \$182.7 million in personal income. Additionally, the total spending associated with the marine industry, including direct, indirect, and induced effects, supports 11,865 jobs and \$494.8 million in personal income (Table 4.4.3-7) (AMEC 2014a).

	Original 2006 Model Results				Estimated 2013 Figures			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Business Volume (in millions)	\$1,311.9	\$305.2	\$771.0	\$2,388.2	\$943.1	\$219.4	\$554.2	\$1,716.7
Personal Income (in millions)	\$254.2	\$122.8	\$311.3	\$688.3	\$182.7	\$88.3	\$223.8	\$494.8
Employment	6,612	2,533	7,360	16,505	4,753	1,821	5,291	11,865

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014. Report.

The Loxahatchee River represents approximately 23.2 percent of the marine activity in Palm Beach County, excluding revenue from port activities. Because the economic activity associated with the Loxahatchee River is located in Palm Beach County, the total economic value of this river is equivalent to 23.2 percent of the economic value of the marine industry in Palm Beach County, or \$398.6 million. This total value is comprised of \$219.0 million in direct expenditures, \$50.9 million in indirect effects, and \$128.7 million in induced effects. This activity supports 2,755 jobs and \$114.9 million in personal income (Table 4.4.3-8) (AMEC 2014a).

	Direct	Indirect	Induced	Total
Business Volume (in millions)	\$219.0	\$50.9	\$128.7	\$398.6
Personal Income (in millions)	\$42.4	\$20.5	\$52.0	\$114.9
Employment	1,104	423	1,228	2,755

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014. Report.

Broward County

As noted in Section 3.2.4.1 of the *2014 Navigation Discipline Report*, the direct economic value of the marine industry in Broward County was determined by updating the economic analysis performed by the State of Florida in 2011. The state updated the study from the base year of 2007, the year of the original study for Broward County, to reflect the total value of the industry in December 2013. The direct economic value of the marine industry associated with the New River includes all marine-related spending by the individuals and businesses utilizing the waterway (AMEC 2014a).

The total value of the marine industry in Broward County is \$5,268.0 million, with \$3,748.3 million in direct sales, \$820.2 million in indirect benefits, and \$699.4 million in induced benefits (see Table 4.1.3-8). Direct spending in the marine industry supports 15,185 jobs and \$638.7 million in personal income. Additionally, the total spending associated with the marine industry, including direct, indirect, and induced effects, supports 27,592 jobs and \$1,186.8 million in personal income (Table 4.4.3-9) (AMEC 2014a).

Benefit	Original 2007 Model Results				Estimated 2013 Figures			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Business Volume (in millions)	\$4,325.8	\$946.6	\$807.2	\$6,079.6	\$3,748.3	\$820.2	\$699.4	\$5,268.0
Personal Income (in millions)	\$737.1	\$364.2	\$268.3	\$1,369.6	\$638.7	\$315.6	\$232.5	\$1,186.8
Employment	17,524	7,415	6,904	31,843	15,185	6,425	5,982	27,592

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014. Report.

The New River represents approximately 32.7 percent of the marine activity and economic value in Broward County, excluding port activities. In addition, the total value of this river's marine activities is equivalent to 32.7 percent of the economic value of the marine industry in Broward County, or \$1,723.8 million. This total value is comprised of \$1,226.5 million in direct expenditures, \$268.4 in indirect effects, and \$228.9 million in induced effects. This activity supports 9,028 jobs and \$388.3 million in personal income (see Table 4.4.3-10) (AMEC 2014a).

Benefit	Direct	Indirect	Induced	Total
Business Volume (in millions)	\$1,226.5	\$268.4	\$228.9	\$1,723.8
Personal Income (in millions)	\$209.0	\$103.3	\$76.1	\$388.3
Employment	4,968	2,102	1,957	9,028

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014. Report.

Many commenters noted that yachting is a significant economic contributor to local maritime businesses and communities along the New River. According to the South Florida Comprehensive Economic Development Strategy (2012 – 2017), Greater Fort Lauderdale is known as the “Yachting Capital of the World” (SFRPC 2012). Further, commercial activity associated with mega-yachting supports one of Broward County's largest employment sectors and generates approximately \$400,000 in economic impact each year (SFRPC 2012).

4.4.4 Public Health and Safety

This section describes the existing and proposed conditions within the Project Study Area with respect to the health and safety of the residents and communities that may be affected by the construction and long-term operation of the Project.

FRA has primary regulatory authority over railroad safety. FRA's regulations govern aspects of railroad safety, including rail operations, track, and signaling, as well as rolling stock, such as locomotives and freight cars (49 CFR parts 200-299). The State of Florida also has an important role in freight rail safety, especially at highway/rail at-grade crossings. Other groups that establish standards and practices for the industry include the Association of American Railroads (AAR), the American Short Line and Regional Railroad Association (ASLRRA), and the American Railway Engineering and Maintenance-of-Way Association (AREMA).

Where a roadway, sidewalk or pedestrian trail/bikeway crosses the track at the same elevation, this is called an at-grade crossing. Where a roadway, sidewalk or pedestrian trail/bikeway passes over the tracks via an overpass bridge structure or passes under a railroad track via an underpass bridge structure, these crossings are referred to as grade separated. FHWA and FRA have regulatory jurisdiction over safety at crossings, pursuant to the Highway Safety Act of 1966 (HSA) (23 USC § 401 *et seq.*). The HSA governs the distribution of federal funds to states aimed at eliminating hazards at highway-rail grade crossings. USDOT has issued regulations that address crossing safety and provides federal funding for the installation and improvement of warning devices through state departments of transportation. In

addition to federal oversight and funding, states also monitor crossings and, in many cases designate funding to complement the federal funds. Jurisdiction over highway-rail grade crossings falls primarily to the states. This authority is set forth in the Railroad-Highway Grade Crossing Handbook (FHWA 2007). Each state department of transportation is required to periodically inspect highway-rail grade crossings and to determine the adequacy of warning devices at each location, as well as to order safety improvements. USDOT oversees and approves the state determinations. Within Florida, FDOT's Rail Office maintains responsibility for grade crossings.

4.4.4.1 Methodology

Highway/rail at-grade crossing information was collected from the FRA Grade Crossings database (FRA n.d.). This database provides spatial crossing information that originates from the National Highway-Rail Crossing Inventory Program.

The description of geological hazards, considered as a public safety issue, was developed using existing available information (Institute of Food and Agricultural Service 1998 and 2005) and applicable data obtained from geotechnical surveys (soil borings) conducted for the Project Study Area, including information and data obtained to describe existing conditions and potential consequences associated with sinkholes and seismic hazard zones (Beck, Berry and Sinclair 1986; NOAA n.d.).

Data related to soils were collected using the following GIS analysis techniques:

- Creating a polygon that represents a 100-foot buffer of the N-S Corridor;
- Creating a polygon that represents a 60-foot buffer of the E-W Corridor;
- Dividing the polygons into county segments using the Intersect geoprocessing tool in ArcGIS; and
- Using the Intersect geoprocessing tool to intersect the county buffer polygons with the Soil Survey Geographic database soils feature classes created by the NRCS USDA.

4.4.4.2 Affected Environment

This section describes the existing conditions within the Project Study Area with respect to the health and safety of the residents and communities that may be affected by the construction and long-term operations of the Project.

Public Safety

The N-S Corridor between Cocoa and West Palm Beach is within an existing rail right-of-way known as the FECR Corridor. Freight rail service is currently provided in this corridor as described in Section 4.1.2, *Transportation*. Passenger rail service is not currently provided in the corridor.

FRA's Track Safety Standards are based on classifications of track that determine maximum operating speed limits, inspection frequencies, and standards of maintenance, among other issues (49 CFR part 213). Higher track classes require more stringent maintenance standards to support higher allowable maximum operating speed. The existing track in the N-S Corridor is Class 4, allowing maximum

speeds up to 79 mph. Existing maintenance and inspection requirements, as documented in the existing service plan, meet FRA Class 4 standards.

The N-S Corridor crosses 159 at-grade crossings. Two of these, located in Palm Beach County, do not have signals or safety equipment. The remaining at-grade crossings are protected with various forms of at-grade crossing controls, including actively protected grade crossing predictor technology with gates and flashing light signals. An inventory of accidents at N-S Corridor at-grade crossings was conducted for a 5-year period (2007 through 2012) using the FRA's Office of Safety Analysis database (Table 4.4.4-1). In general, the total number of accidents by county is minimal, and only one crossing (Babcock Street, Brevard County) has had more than one accident in the last 5 years.

	Brevard	Indian River	St. Lucie	Martin	Palm Beach
Total Number of Grade Crossings	52	31	27	26	35
Number of Grade Crossings with Accidents (Year 2012 ¹)	1	1	0	1	1
Number of Grade Crossings with Accidents (2011)	0	0	0	0	1
Number of Grade Crossings with Accidents (2010)	2	0	0	0	1
Number of Grade Crossings with Accidents (2009)	1	0	0	0	0
Number of Grade Crossings with Accidents (2008)	2	0	0	1	2
Total Number of Accidents	6	1	0	2	5
Number of Grade Crossings with Signals	52	31	27	26	33
Number of Grade Crossings without Signals	0	0	0	0	2

Source: FRA. 2013b. *Federal Railroad Administration Office of Safety Analysis*. <http://safetydata.fra.dot.gov/OfficeofSafety/default.aspx>. Accessed September 18, 2013.

1 Palm Beach and Brevard County numbers exclude crossings north of SR 528 and south of the proposed West Palm Beach stations. Numbers for all counties exclude grade crossings on sidings and off of the FECR Main Line.

Accidents occurring along the FECR right-of-way (and not at grade crossings) are listed in Table 4.4.4-2. These may include a range of accident types¹, including derailments, accidents between trains, trains and humans, or between trains and objects on the tracks. Between 2006 and 2014, FEC has had only one accident that resulted in the release of hazardous materials (in 2009).

	Year				
	2011	2010	2009	2008	2007
Total Accidents	14	12	10	11	38
Fatalities	3	3	2	1	1

Source: FRA. 2013b. *Federal Railroad Administration Office of Safety Analysis*. <http://safetydata.fra.dot.gov/OfficeofSafety/default.aspx>. Accessed September 18, 2013.

1 Accident locations are based on counties; data represents Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, Indian River and Brevard counties.

The primary roads in the Project Study Area are I-95 and Florida's Turnpike (SR 91), providing north-south connections, and SR 528, providing the east-west connection. Table 4.4.4-3 provides five years of accident data for the regional roadway system within the Project Study Area.

Accidents	Year				
	2011	2010	2009	2008	2007
I-95 (Cocoa to Miami)					
Total Accidents	7903	8957	8232	8464	9174
Fatalities	65	68	72	91	84
Turnpike (Orlando to Miami)					
Total Accidents	1771	2239	2438	2868	3017
Fatalities	22	22	15	19	32
SR 528 (MCO to Cocoa)					
Total Accidents	213	245	253	322	301
Fatalities	3	3	0	9	7

Source: FDOT. 2013c. Florida Traffic Safety Portal. <http://www2.dot.state.fl.us/trafficsafetywebportal/>. Accessed September 31, 2013.

1 Accident locations are based on counties; data represents Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, Indian River and Brevard counties.

The prevailing train control system on the existing FECR Corridor is commonly known as a cab with wayside type system. It uses wayside color light signals at interlockings that control safe switching of trains from mainline track to mainline track, or mainline track to controlled sidings. These signals are remotely controlled by dispatchers from an operations control center in Jacksonville, Florida. Safe braking distance is maintained through automatic signals (also color lights) used as intermediates between controlled interlocking signals. The control is route-signaling augmented by in-cab signals that display the state of the wayside signals continuously in the locomotive cab through electronic coded track. This electronic coded track also provides information on broken rail detection.

Freight trains traveling along the FECR Corridor are currently equipped to haul hazardous materials. Although there is no set schedule, hazardous materials are hauled on an average of once per week. FECR adheres to a safety program for existing freight service that includes:

- Education and Awareness: All FECR employees receive training throughout the year as required by law and by company policy.
- Test/Audits: FECR management teams conducts unannounced safety and compliance audits to ensure that employees are working in the safest environment possible.
- Compliance/Prevention: FECR ensures that potentially unsafe behaviors or circumstances are addressed immediately and any incidents are investigated in a timely manner.
- Recognition: Employee recognition is a key component of any successful safety program. FECR employees share in the success of the safety program through functions designed to promote safe work habits and recognize safety accomplishments throughout the year.

FECR has consistently been recognized for their safety record through receipt of performance rewards, including five E.H. Harriman Awards since 2005. The E.H. Harriman Award was an annual award presented to American railroad companies in recognition for outstanding safety achievements.

Security

In the current security climate, rail line security continues to be a prominent concern. Access points are of particular concern.

The FECR Corridor from Cocoa to West Palm Beach includes buildings and rail yards (Cocoa-Rockledge Yard, Ft. Pierce Yard, Port of Palm Beach Yard, and West Palm Beach Yard), bridges, right-of-way, and underpasses. The safety and security for this rail infrastructure is identified in FECR's Safety Rules and Company Policies (FECR 2012b). The plan provides for overall right-of-way safety and security objectives and the reporting of safety and security performance and details the arrangements for managing safety and security. Standard FECR security practices are listed in Table 4.4.4-4.

Safety and security in the N-S Corridor is accomplished through the combined facilities and services of FECR and the support from local police departments in each town/city in the corridor, other state and county law enforcement departments and other local emergency service providers. Although there is no formal agreement with FECR, in some locations, such as the Hobe Sound National Wildlife Refuge (NWR), NWR personnel use FECR facilities, including unpaved rail access roads, to carry out enforcement and emergency responses.

Rail Infrastructure	Current Practice
<p>Buildings</p> <ul style="list-style-type: none"> • Abandoned • Instrument Houses • Storage Facilities • Wayside Headquarters 	Secured with locks or made inaccessible by boarding openings. Instrument housing and communication housings generally contain unauthorized entry alarm systems and electronic fire detection devices. Generally, headquarters, towers and storage facilities are not alarm protected. County and city police patrols provide additional security.
<p>Right-of-Way</p> <ul style="list-style-type: none"> • Fencing • Inter-Track Platforms • Inter-Track Fencing • Grade Crossings • Yards 	Fencing is installed in specific areas throughout the FECR Corridor. Where appropriate fencing with locked gates are provided. At some locations security is regulated by inner-track fencing. Switch machines and signal housings are locked. County and city police patrols provide additional security.
<p>Bridges</p> <ul style="list-style-type: none"> • Moveable • Overhead • Signal • Undergrade 	Generally bridges are protected from trespassing to the same extent as any ROW area with fencing provided in specific areas. Certain wooden deck bridges have fire circuits incorporated into the signal circuits. Some areas are secured with locked gates and fencing. Locked anti-climb barriers on ladders protect signal bridges.
<p>Underpasses</p>	Generally underpasses are protected from trespassing to the same extent as any ROW area. Evacuation points to underpasses are provided and maintained.

FECR has the responsibility for rail line safety and security along the existing FECR Corridor. At-grade crossings have warning controls as required by applicable federal law (49 CFR Part 222). Trains sound their horns as they travel through at-grade crossings. Other existing controls range from active warning systems and crossings with passive warning systems.

Formerly Used Defense Sites

The East/West Corridor will bisect the Formerly Used Defense Sites (FUDS) Pinecastle Jeep Range (USACE n.d.). The former range is a 12,483-acre site located near Orlando International Airport. Between 1943 and 1946, the government leased the site for small arms training and military demonstrations of weapons and warfare capabilities. In the late 1940s, when the military no longer needed the property, it was returned to the original property owners. Private citizens and units of government now own much of the land, and it is used for schools, homes, and businesses.

At Pinecastle, the military leased most of the land to accommodate small arms training (bullets 1/2 inch in diameter or less). When fired, these bullets can travel a long distance, so it is likely that expended .50 caliber projectiles are throughout the former range. These bullets present a negligible risk, as they are just pieces of metal with no explosives.

A small portion of the site was used for bombing, rocketry, and gunnery demonstrations. Information from surface clearance efforts after military use indicates that, of the total 12,483-acre site, the demonstration area, which has the highest potential for the presence of explosive munitions hazards, was concentrated on only about 500 acres south of Lee Vista Boulevard. As an added precaution, the USACE expanded its investigation to extend 3,000 feet from the identified target locations, which includes portions of neighborhoods north of Lee Vista Boulevard and west of Highway 417. The proposed segment is outside of the USACE investigation area.

Barriers to the Elderly and Handicapped

The existing rail and highway infrastructure do not provide any barriers to the elderly or handicapped. The Americans with Disabilities Act (ADA) of 1990 is a civil rights law that prohibits discrimination based on disability and includes accessibility requirements for public transit facilities (42 USC § 12101 *et seq.*). This section provides information pertaining to the elderly/senior population that was identified within census tracts that occur along or within 1,000 feet of the Project Study Area (Table 4.4.4-5) and that may be affected by future operations. The elderly/senior population is identified as individuals 65 years or older.

According to the USCB, 20.87 percent of the population within the Project Study Area buffer (117 census tracts within 1,000 feet of the rail corridor) is 65 years or older (Table 4.4.4-5). Of the 117 census tracts within the Project Study Area, eight (6.8 percent) reported poverty greater than 50 percent and 26 (22.2 percent) reported senior populations greater than 30.87 percent. The 20 census tracts identified within the Project Study Area in Martin County have a combined senior population of 28.92 percent.

	Senior (65+) Population	Percent Elderly/Senior
Orange	5,150	6.55
Brevard	36,715	23.15
Indian River	17,108	24.60
St. Lucie	9,569	27.24
Martin	22,661	28.92
Palm Beach	20,623	17.84
Total	111,826	20.87

Source: USCB. 2010a. Census 2010. <http://factfinder2.census.gov/>. Accessed September 13, 2013.

Geological Conditions

Geological conditions were investigated to determine if there were existing geological conditions such as sinkholes or seismic hazard zones that could pose a threat to public safety during passenger rail operations.

Sinkholes are a natural and common geologic feature in areas underlain by limestone and other rock types that are soluble in natural water. The term sinkhole is used for closed depressions in the land surface that are formed by surficial solution or by subsidence or collapse of surficial materials owing to the solution of near-surface limestone or other soluble rocks. This discussion refers to sinkhole occurrence in limestone and dolomite, the most common rock types in Florida.

Sinkholes occur in a variety of shapes from steep-walled “natural wells” to funnel-shaped or bowl-shaped depressions. The movement of groundwater to the limestone layers enhances the development of sinkholes by causing raveling of the overlying soils into limestone solution channels and interconnected caverns over a period of thousands of years. Sinkholes are of interest in Florida because they are one of the most predominant features of the state; their development may be sudden, resulting in possible loss of life and property; they may cause flooding during storms; and they may provide an avenue for pollutants on the land surface to more rapidly seep into the underlying limestone and dolomite.

The Project Study Area is located in a region of incohesive, permeable sand ranging from 20 to 200 feet thick (FDEP 1985). Small cover subsidence sinkholes are the most common type, with less common collapse sinkholes forming in areas with clayey overburden sediments. Table 4.4.4-6 lists sinkholes within a 1- to 4.5-mile radius of the Project alignment (FDEP 2013c).

Sinkhole ID	County	Latitude	Longitude	Approximate Distance from Project
75-594	Orange	28.499722	-81.27722	3.5 miles
75-075	Orange	28.492109	-81.27597	3.2 miles
75-593	Orange	28.488575	-81.070328	2.3 miles
70-001	Brevard	28.463833	-80.791778	1.1 miles
75-049	Orange	28.463822	-81.383767	1.2 miles
75-511	Orange	28.461994	-81.3644	1.1 miles
75-595	Orange	28.46111	-81.36	1 mile
75-047	Orange	28.450833	-81.3575	4.4 miles
93-004	Palm Beach	26.783738	-80.058446	2.3 miles
93-003	Palm Beach	26.690833	-80.0675	0.8 miles

Source: FDEP. 2013c. *Subsidence Incident Report locations in a KMZ file*. http://www.dep.state.fl.us/geology/gisdatamaps/SIRs_database.htm. Accessed March 31, 2013.

Seismic Zones / Hazard Zones

Florida is in a region that is classified as stable with regards to earthquakes; that is, earthquakes in the state of Florida are not probable. The state is on the passive margin of the North American Plate and has a very low incidence of earthquakes. An earthquake (magnitude of 5.8) occurred on September 10, 2006 in the Gulf of Mexico and was not linked to any specific fault. The U.S. Geological Survey (USGS) *Seismicity Map of Florida – 1973 to Present* indicated no seismic activities within the Project Study Area during this period (USGS n.d.). The Seismic Hazard Map of Florida indicated that the Project Study Area is within a 0.02 to 0.04 g seismic zone / hazard zone (USGS n.d.). The seismic design category, which reflects the likelihood of experiencing earthquake shaking of various intensities, indicates that the state of Florida has a very small probability of experiencing damaging earthquake effects.

4.4.5 Historic Properties

The National Historic Preservation Act of 1966 (NHPA), as amended, defines historic properties as “any prehistoric or historic district, site, building, structure, or object included on or eligible for listing on the National Register [of Historic Places (NRHP)] including artifacts, records, and material remains related to the district, site, building, structure, or object” (54 USC § 300308). Historic properties are found both above and below ground. Archaeological sites or archaeological resources represent the locations of prehistoric and historic activities, while above-ground historic properties may include buildings, structures, objects, and sites that are usually at least 50 years old. Historic landscapes consist of lands that have been culturally modified. Historic districts consist of historic buildings and other elements that retain identity and integrity as a group, and linear historic districts can include canals, roads, railroads or other manmade linear features. Sacred sites, cemeteries, and burial places are also

considered historic properties, although they are generally not considered eligible for NRHP listing unless they meet special requirements.

Section 4(f) of the DOT Act of 1966 (recodified at 49 U.S.C. § 303(c)) protects public parks, public recreation areas, wildlife and waterfowl refuges of national, state or local significance, and historic sites of national, state or local significance (including properties listed in or eligible for listing on the NHRP and archaeological sites warranting preservation in place). This section describes historic properties that are subject to Section 4(f). Other Section 4(f) resources are described in Section 4.4.6, *Recreational and Other Section 4(f) Resources*.

Section 106 of the NHPA (Section 106) stipulates that “the head of any federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking.” (54 USC § 306108).

The NHPA establishes specific criteria for eligibility to the NRHP: “The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (d) that have yielded, or may be likely to yield, information important in prehistory or history” (36 CFR § 60.4).

FRA submitted a *Cultural Resources Assessment Report* (CRAR; Janus Research, September 2013; see Appendix 4.4.5-C) documenting the historic properties within the Project’s Area of Potential Effect (APE) that are listed in, or eligible for listing in, the NRHP to Florida’s State Historic Preservation Officer (SHPO), the Florida Division of Historical Resources (FDHR), on October 23, 2013, with a request for concurrence. SHPO concurred with FRA’s Determination of Eligibility in the CRAR on November 20, 2013. A draft addendum to this report was submitted to SHPO in May 2015 (CRAR Addendum, Janus Research, May 2015) and received SHPO concurrence on May 21, 2015 (see Appendix 4.4.5-D).

This section of the FEIS describes the methodology used to identify historic properties, and the historic properties that were identified in the Project’s APE for direct and indirect impacts.

4.4.5.1 Methodology

All historic property investigations and consultations were conducted in accordance with Section 106 and its implementing regulations for Protection of Historic Properties in 36 CFR Part 800. The investigations and consultations also complied with the field methods, data analysis, and reporting

standards embodied in the FDHR *Cultural Resource Management (CRM) Standards and Operational Manual* (Florida Department of State 2002), and Chapter 1A-46 (*Archaeological and Historical Report Standards and Guidelines*), Florida Administrative Code (FAC). All work conformed to professional guidelines set forth in the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716, as amended).

FRA and AAF conducted initial consultation with SHPO on July 13, 2012, prior to the initiation of the cultural resources survey to establish a methodology and APE for the Phase I Project corridor. A follow-up meeting was held on March 28, 2013 to confirm use of the same methodology in the N-S corridor, and use of existing data and previous studies for the archaeology/historic building survey for the E-W corridor. A copy of the meeting minutes is provided in Appendix 4.4.5-A. On July 8, 2013, FRA and SHPO held a conference call to discuss the historic property survey methodology, APE, and Section 106 process timeline.

The methodology has been developed in conjunction with SHPO and is similar to previous SHPO-approved methodologies that have been applied to other large-scale transit projects. This proven methodology provides key information such as identifying existing historic properties, and the potential for additional, previously unrecorded historic properties.

Archival research was conducted to determine the types, chronological placement, and location patterning of known cultural resources within the APE. The research began with a Florida Master Site File (FMSF) search of data and mapping from FMSF forms and survey reports within the APEs. Archival research also identified archaeological sites where the site boundary touched (abutted, was directly adjacent to) the limit of the APE. This included a search of federal, state, county, and local site inventories, published and unpublished CRM reports, county Property Appraiser records, historic maps, and other relevant historical research materials. Background research was supplemented by personal knowledge of the project archaeologists, who have worked extensively in this region. A CRAR, previously prepared for the SR 528 corridor between SR 520 and Cape Canaveral, that identifies NRHP listed and eligible resources was also evaluated as part of the archival research (Janus Research, Inc. 2005).

FRA determined that the MCO Segment and the VMF had been adequately addressed by the GOAA in two previous environmental assessments (FAA and GOAA 1998; FAA 2013), because the APE for the MCO Segment and the VMF is included within the boundaries of the previous studies and an updated desktop survey did not identify additional historic resources within this portion of the APE. The methodology for the N-S Corridor was consistent with that used in Section 3.3.7 of the 2012 EA.

The methodology used was approved by the FRA and the SHPO and was meant to specifically address those resources that might experience potential effects from this Project. Only those historic resources that were NRHP-listed, eligible, or considered eligible within the indirect and direct APEs were identified during the background research and CRAR survey. The identification of archaeological sites within and bordering on the APE was done through the review of data and mapping contained within the site file forms and survey reports on file with the FMSF, and supplemented by the knowledge of the project archaeologist. The sites identified based on this methodology were noted within the CRAR.

Area of Potential Effect



An APE was established for each segment of the Project, taking into account the potential extent of direct and indirect effects to above-ground historic properties and below-ground archaeological resources. The APE includes the geographic area or areas in which the Project may directly or indirectly cause changes in the character or use of archaeological and historic properties, if such properties exist. Where only a portion of a historic property or historic district is within the APE, the APE encompasses the entire property or district. The APE was influenced by the scale and nature of the undertaking as well as its geographical setting. Normally, archaeological and other below-ground resources will be affected by ground disturbing activities. Structural resources and other above ground sites, however, are often impacted by those activities, as well as alterations to setting, access and appearance. Indirect impacts, such as noise, vibration, and visual impacts, may also affect historic resources. Direct effects, such as physical destruction or alteration, to above-ground and below-ground properties would occur only within the construction footprint of each segment. Indirect effects could occur within a defined distance from the limit of the proposed or existing right-of-way. The portion of the APE in which physical disturbance would occur is termed the direct effects APE; the portion of the APE in which changes in noise, vibration, or visual setting could occur is termed the indirect effects APE. For the AAF project, the APE is defined as follows:

- MCO Segment: the APE for direct effects was defined as the construction footprint and the APE for indirect effects extended 150 feet from either edge of the proposed rail easement.
- VMF: the APE for direct and indirect effects was defined as the entire 47-acre site.
- E-W Corridor: the APE for direct effects was defined as the construction footprint of all of the alternatives and the APE for indirect effects extended 150 feet south of the proposed right-of-way, except for areas where the limits of disturbance were limited to the north or south side of the existing State Road 528. In those areas, the APE did not extend across the existing roadway.
- N-S Corridor: the APE for direct effects is the FECR right-of-way and the APE for indirect effects was defined as 150 feet on either side of the right-of-way for the consideration of indirect impacts.



The APE for all segments was confirmed by SHPO, in a meeting on July 8, 2013, as documented in Appendix 4.4.5-A of the FEIS.



Explanation of Features

- N-S Corridor Centerline
-  Direct Area of Potential Effect (APE)
-  Indirect Area of Potential Effect (APE)

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

Example Area of Potential Effect for N-S Corridor		
All Aboard Florida Intercity Passenger Rail Project		
 <p>0 0.0125 0.025 Miles</p>		4.4.5-1

TV FRA Example Area of Potential Effect for North-South Corridor.mxd

Consultation and Public Involvement

FRA formally initiated the Section 106 process as part of the Notice of Intent (NOI) to prepare the DEIS for the Project (FRA 2013c). As part of the NOI, FRA provided information about the Project and identified that FRA is seeking participation and input of interested federal, state, and local agencies, Native American groups, and other private organizations and individuals. FRA is coordinating compliance of Section 106 with the NEPA process pursuant to Section 106 and Advisory Council on Historic Preservation (ACHP) regulations (36 CFR Part 800). Consultation materials are provided in Appendix 4.4.5-A and 4.4.5-B.

Consultation with the tribes and other potential consulting parties was discussed at the March 28, 2013 consultation meeting among FRA, AAF and the SHPO. SHPO and FRA agreed that the public outreach required in NEPA would fulfill the public involvement requirements of the NHPA. This approach is allowed per 36 CFR § 800.2.(4)d.3, which states “The agency official may use the agency’s procedures for public involvement under the National Environmental Policy Act or other program requirements in lieu of public involvement requirements in subpart B of this part, if they provide adequate opportunities for public involvement consistent with this subpart.”

Five public scoping meetings were held in May 2013 (see Chapter 8, *Public Involvement*). At these meetings, information about the Section 106 process was available for the public and other interested parties and a cultural resources specialist was made available as well to address any questions raised. In addition, during the fieldwork for the 2013 CRAR (Phase II) researchers contacted five Certified Local Governments (CLGs) and one local informant regarding the proposed project. The resulting comments were integrated into information presented to the SHPO in the CRAR. An addendum to the CRAR addressing updated information regarding historic properties was submitted to SHPO in May 2015 and received SHPO concurrence on May 21, 2015 (see Appendix 4.4.5-B).

As part of the Phase I CRAR, West Palm Beach, Fort Lauderdale, and Broward County were consulted about station locations. Due to previous Section 106 consultation meetings in these Phase I communities (West Palm Beach, Fort Lauderdale, and Miami), and outreach to the CLGs completed during the fieldwork for the CRAR, FRA and SHPO determined that no additional separate Section 106 meetings were necessary in these communities for the Phase II Project.

FRA sent a letter concerning the Project to USFWS because a known archaeological site located within the Hobe Sound National Wildlife Refuge has been mapped within the FECR ROW and is therefore within the APE (Appendix 4.4.5-B). Although the FWS provided comments on the DEIS, FRA has not received a request by the USFWS to be a consulting party.

On April 23, 2013, FRA contacted five Native American Nations to provide information about the Project. The list of Native American Nations to be consulted used prior contacts with Native American tribes for FRA regulated projects in Florida. A list of Native American Nations contacted is included in Table 4.4.5.1. Copies of correspondence with the Native American Nations are included in Appendix 4.4.5-A2. To date, only the Seminole Tribe of Florida Tribal Historic Preservation Officer (THPO) has responded to FRA. The THPO (June 6, 2013 response letter) provided no scoping comments concerning the Project, but did request Project updates and a copy of the completed DEIS (see Appendix 4.4.5-B), which were provided.

Agency (Native American)	Contact Name	Date of Correspondence	Date of Response
Miccosukee Tribe of Florida	Steve Terry, Land Resource Manager	April 23, 2013	No Response to Date
Muscogee Creek Nation	Emman Spain, THPO	April 23, 2013	No Response to Date
Poarch Band of Creek Indians	Robert Thrower, THPO	April 23, 2013	No Response to Date
Seminole Nation of Oklahoma	Chief Leonard M. Harjo	April 23, 2013	No Response to Date
Seminole Tribe of Florida	Paul Backhouse, THPO	April 23, 2013	June 6, 2013

Five Certified Local Governments (CLG) and one local informant were also contacted regarding information on locally designated historic properties. Four CLGs responded to these inquiries but did not request to be consulting parties. Table 4.4.5-2 summarizes this coordination.

City/Town/County	CLG Contact/ Local Informant	Response	Contact Date	Response Date	County
City of Melbourne	Kelly Delmonico, Planner	No locally designated resources within 150 feet of the rail line. Property list of locally designated resources provided.	June 10, 2013	June 17, 2013	Brevard
Town of Lake Park	Nadia Di Tommaso, Community Development Director	Property list of locally designated resources provided	July 9, 2013	July 10, 2013	Palm Beach
Town of Jupiter	David M. Kemp, AICP Principal Partner	Property list of locally designated resources provided	July 9, 2013	July 10, 2013	Palm Beach
City of Ft. Pierce	Kori Benton, Historic Preservation Officer	No response	July 9, 2013	N/A	St. Lucie
Palm Beach County	Christian Davenport, County Archaeologist	No response	July 10, 2013	N/A	Palm Beach
St. Lucie County	Leslie Olson, Planning Manager	Provided a list of local historic structures and GIS files	June 10, 2013	June 2013	St. Lucie

During the NEPA process, AAF met with numerous public and non-governmental entities to discuss the proposed project, including meetings with county and municipal governments to review the 90 percent design plans for the N-S Corridor. As part of this public outreach, AAF held meetings specifically to discuss concerns related to historic properties with the following entities. Input provided during these meetings included information about the location, significance, and integrity of potential historic properties, which helped inform the assessment of effects to historic properties within the APE.

- Indian River County Commission
- Indian River Historical Society
- St. Lucie County Commission

- St. Lucie Village Commission
- St. Lucie Village Historic District
- U.S. Fish and Wildlife Service
- The Historic Lyric Theater
- The Historic Strachan House
- Flagler Museum

The following entities have accepted FRA's invitation to become consulting parties in the Section 106 process:

- Broward County
- St. Lucie County
- City of Stuart
- City of Vero Beach
- Town of St. Lucie Village
- Martin County
- Indian River County
- Indian River County Historical Society
- Old Vero Ice Age Sites Committee

4.4.5.2 Affected Environment

This section categorizes the existing historic properties within the APE. As previously discussed, the NRHP Criteria of Eligibility describe what makes a property historically significant and eligible for the NRHP (36 CFR § 60.4). These criteria were used to evaluate the eligibility and significance of the surveyed historic resources within the APE. The EIS process evaluates project impacts on resources listed on or eligible for the NRHP. During the public review of the DEIS, Commenters identified a number of other historic properties or potential historic properties that were not considered in the DEIS. FRA has determined that these properties were included in the 2013 CRAR and determined to not be eligible for the NRHP so were not included in the EIS, are not within either the direct or indirect APE for the Project, or have been addressed in the 2015 CRAR Addendum.

MCO Segment

The MCO Segment and VMF are located within Orange County and are depicted on the Pine Castle USGS topographic quadrangle map.

Archival research conducted on the VMF was based on the studies prepared for areas previously surveyed and assessed for historic properties during the development of the GOAA NEPA EA for the South Terminal Complex at MCO (FAA and GOAA 1998; FAA 2013). One previously recorded archaeological site

was identified within the MCO Segment, but it was determined by SHPO to be not eligible. No above-ground historic properties have been identified within the MCO Segment (including the VMF) APE in previous studies or an updated search of the FMSF data. This information is summarized in the 2013 CRAR (Appendix 4.4.5-C) and its addendum (2015, Appendix 4.4.5-D).

East-West Corridor

For identification of historic properties within the E-W Corridor APE, Alignment Alternative E was used to define the APE, as it represents the maximum limit of disturbance. At the time of the 2013 CRAR AAF was unable to obtain access to some privately owned properties. When access is granted, AAF will prepare an addendum to the 2013 CRAR. No comments on the DEIS were received that indicated that historic or archaeological resources were present on these properties.

Historic Properties

The E-W Corridor between Orlando and Cocoa is located within portions of Orange and Brevard Counties, and is depicted on the Courtenay, Lake Poinsett NW, Narcoossee NE, Narcoossee NW, Pine Castle, and Sharpes USGS topographic maps.

The Florida Master Site File (FMSF), county and local site inventories, published and unpublished CRM reports, county Property Appraiser's records, and other relevant historical research materials were reviewed to identify known historic properties within the APE for the E-W Corridor Alternative E, the alternative with the largest footprint on undisturbed land.

Pertinent literature and records of the surrounding region as well as archaeological and historical assessments of other tracts of land within or adjacent to the E-W Corridor with Alternative E were reviewed to determine the locations of any previously recorded archaeological and historic properties. This background research identified 25 previously conducted historic resource surveys that have been performed within or adjacent to the E-W Corridor with Alternative E. Fieldwork was conducted to identify archaeological and above-ground historic properties in these areas.

The fieldwork and literature review resulted in the identification of nine recorded above-ground resources within the E-W Corridor APE, in Brevard and Orange Counties. Six of these resources were previously recorded, while three were newly recorded. FMSF forms were completed for the three newly-identified buildings; these have been determined not eligible by FRA and SHPO via the November 2014 concurrence letter for the 2013 CRAR (DHR no. 2013-4404). Resource types represented were buildings (five), linear resources (three) and a mixed district resource group (one). Of these resources, the NRHP-eligible Florida East Coast Railway (FECR) Historic District was the only identified historic property (see Table 4.4.5-3, Appendix 4.4.5-C, and Appendix 4.4.5-D); it is located in the APE for direct effects at the eastern terminus of the E-W Corridor, where it meets the N-S Corridor. The FECR Historic District is eligible for listing under Criterion A, in the categories of Transportation and Community Planning and Development. It was built primarily in the last quarter of the 19th century and the first decade of the 20th century. The FECR was a project of Henry Morrison Flagler, who originally worked with John D. Rockefeller in building the Standard Oil Trust, and became known for developing resorts, industries, and communities along Florida's eastern coast.

FMSF #	Site Name / Address	Resource Group Type	National Register Status
8BR1870	Florida East Coast Railway	Historic Linear Resource	NRHP–Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (4.4.5-C and 4.4.5-D).

Archaeological Resources

A search of literature and records of the surrounding region and archaeological and historical assessments of other tracts of land within or adjacent to the E-W Corridor APE was conducted to determine the locations of previously recorded archaeological resources. This background research identified 28 previously conducted historic resource surveys that have been performed within or adjacent to the E-W Corridor APE. No known archaeological sites are located within the 100-foot right-of-way of the centerlines of the three alternative alignments considered for the E-W Corridor. A field survey of the E-W Corridor for areas located outside of the boundaries of the 2013 CRAR *Survey of the Proposed Magnolia Ranch Development Site, Orange County, Florida* (FMSF Survey No. 2420) and 2013 CRAR *Survey for the SR528 Study From State Road 520 to the Port Canaveral Terminal B Interchange, Orange and Brevard Counties* (FMSF Survey No. 11594) was completed in summer 2013.

For the approximately 40-mile E-W Corridor, Table 4.4.5-4 identifies estimated mileage and acreage for previously surveyed areas and evaluates the probability for identifying new archaeological sites in the areas that had not been surveyed prior to the cultural resource investigations for the Project. This probability was subsequently used to define the testing methodology along the E-W Corridor. Various factors must be considered when assessing the potential of an area to contain prehistoric and/or historic archaeological sites. Among these are topographic setting; soils; proximity to water; location along major routes of transportation; and the extent of ground disturbances within the area resulting from erosion, construction, maintenance, or agricultural activities. Generally speaking, high site potential areas are defined as those areas of moderately well drained to excessively drained upland locales near a wetland or body of water. These areas were tested at 25-meter (82-foot) intervals. Generally speaking, moderate site potential zones are defined as those poorly to very poorly drained locales near a wetland or body of water. Moderate potential areas were tested at 50-meter (164-foot) intervals. Low potential zones are defined as those areas of very poorly drained to excessively drained upland locales not otherwise designated as high or medium potential. Areas of low potential were tested judgmentally at 100-meter (328-foot) intervals.

Archaeological field testing in the previously unsurveyed portions of the E-W Corridor, generally performed at 25-meter to 100-meter intervals per the assigned classification for site probability, did not identify any cultural material and did not identify any additional environmental features indicative of increased archaeological site potential. The survey team was not able to gain access to a portion of the E-W Corridor located on one private property. Once access is obtained, a supplemental survey will be conducted to complete the pedestrian survey and subsurface testing within the E-W Corridor.

Table 4.4.5-4 E-W Corridor Areas and Estimated Mileage and Acreage of Areas Previously Surveyed and by Probability Classification for Areas Previously Unsurveyed

Testing	Miles	Acreage	Percent of Total
Previously Surveyed	14.0	282.9	35.0
High Archaeological Site Potential (shovel testing, 25m interval)	1.3	26.3	3.3
Moderate Archaeological Site Potential (shovel testing, 50m interval)	0.8	15.7	1.9
Low Archaeological Site Potential (pedestrian survey)	22.9	462.8	57.4
Low Archaeological Site Potential (shovel testing, 100m interval or as appropriate)	1.0	19.4	2.5

Source: AMEC 2013h, Technical Memorandum 8, *Cultural Resources for the All Aboard Florida Passenger Rail Project*.

North-South Corridor

Historic Properties

The N-S Corridor between Cocoa and West Palm Beach is located within portions of Brevard, Indian River, St. Lucie, Martin, and Palm Beach Counties, and is depicted on the Ankona, Cocoa, Courtenay, Eau Gallie, Eden, Fellsmere, Fort Pierce, Gomez, Grant, Hobe Sound, Indrio, Jupiter, Melbourne East, Melbourne West, Oslo, Palm Beach, Palm City, Riviera Beach, Sebastian, Sharpes, St. Lucie Inlet, and Vero Beach USGS topographic maps.

For the N-S Corridor, historic properties included resources located within the APE for direct effects and within the APE for indirect effects, defined as 150 feet from the Project centerline. The historic properties were identified through background research and a reconnaissance survey. Background research identified 128 previously conducted historic resource surveys that have been performed within or adjacent to the N-S Corridor as well as previously recorded historic properties on the FMSF that are listed in the NRHP, or are considered eligible for listing. Appendix 4.4.5-C and 4.4.5-D, the Project CRAR and its addendum, show the locations of known historic properties relative to the N-S Corridor APE.

Within the APE for direct effects for the N-S Corridor, the FECR (8BR1870/8IR1497/ 8IR1518/8SL3014/MT1391/8MT1450/8PB12102) was determined eligible for listing on the NRHP as a linear district (Table 4.4.5-5) under Criterion A, in the categories of Transportation and Community Planning and Development. It is generally contiguous with the N-S Corridor, which would be improved under the proposed Project. The FECR travels through each of the five counties traversed by the N-S Corridor. The FECR Historic District retains significance due to its associations with development and transportation of the east coast of Florida. The reconnaissance survey conducted for the 2013 CRAR identified 13 bridges within the FECR ROW, 12 of which were determined eligible as contributing resources to the FECR Historic District by FRA and SHPO. Of these, four were also determined individually NRHP-eligible (Table 4.4.5-6, see Appendix 4.4.5-C and 4.4.5-D). In addition, a platform associated with the FECR within the N-S Corridor and located within the ROW was considered non-contributing and determined not eligible in the CRAR due to lack of integrity. Additional FECR-related resources, located outside of the ROW, are discussed in the APE for indirect effects.

Table 4.4.5-5 Historic Linear Resources Within the N-S Corridor APE for Direct Effects¹

FMSF #	Site Name / Address	Resource Type	National Register Status
8BR1870/ 8IR1497/ 8IR1518/ 8SL3014/ MT1391/ 8MT1450/ 8PB12102	Florida East Coast Railway	Linear Resource	NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

Table 4.4.5-6 FECR Historic Bridges Within the N-S Corridor APE for Direct Effects

Mile Post	County	FMSF #	Site Name / Address	Date Estimate	National Register Status
190.47	Brevard	8BR3058	Fixed Railway Bridge over the Eau Gallie River – Steel	1925	Eligible as FECR Contributing Resource/ Individually Eligible
194.34	Brevard	8BR3059	Fixed Railway Bridge over the Crane Creek and Melbourne Street – Steel	1925	Eligible as FECR Contributing Resource
197.7	Brevard	8BR3060	Fixed Railway Bridge over the Turkey Creek – Steel	1925	Eligible as FECR Contributing Resource
202.59	Brevard	8BR3061	Fixed Railway Bridge over the Goat Creek – Steel	1959	Eligible as FECR Contributing Resource
212.07	Brevard and Indian River	8BR3062/ 8IR1569	Fixed Railway Bridge over the Sebastian River – Steel	1926	Eligible as FECR Contributing Resource/ Individually Eligible
240.1	St. Lucie	8SL3191	Fixed Bridge over the Taylor Creek - Concrete with Steel Beam Span	1961	Eligible as FECR Contributing Resource
259.95	Martin	8MT1623	Fixed Bridge over the Rio Waterway - Steel and Timber Piles	1958	Eligible as FECR Contributing Resource
260.93	Martin	8MT1382	Movable Bridge over the St. Lucie River – Steel	1938	Eligible as FECR Contributing Resource/ Individually Eligible
266.86	Martin	8MT1624	Fixed Bridge over the Salerno Waterway - Steel and Timber Piles	1958	Eligible as FECR Contributing Resource
267.34	Martin	8MT1625	Fixed Bridge over the Tributary to Manatee Creek 1 - Steel and Timber Piles	1962	Eligible as FECR Contributing Resource
267.70	Martin	8MT1626	Fixed Bridge over the Tributary to Manatee Creek 2 - Steel and Timber Piles	1962	Eligible as FECR Contributing Resource
282.58	Palm Beach	8PB16041	Movable Bridge over the Loxahatchee River – Steel	1935	Eligible as FECR Contributing Resource/ Individually Eligible

Within the N-S Corridor APE for indirect effects, 60 historic individual properties and historic districts were identified in the 2013 CRAR. These historic properties include 12 resources in Brevard County; 12 resources in Indian River County; 23 resources in St. Lucie County; 10 resources in Martin County; and three resources in Palm Beach County. These results are organized by county in the 2013 CRAR and in the discussion below.

The Brevard County portion of the N-S Corridor APE for indirect effects includes one NRHP-eligible historic district, two eligible cemeteries, one eligible FECR station, three NRHP-listed buildings, and five eligible buildings (Table 4.4.5-7).

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8IR859	Union Cypress Saw Mill Historic District	Mixed District			NRHP-Eligible
8BR215	Florida Power & Light Co. Ice Plant / 1604 S, Harbor City Boulevard	Building	1926	Industrial Vernacular	NRHP-Listed
8BR759	Marion S. Whaley Citrus Packing House/ 2275 Rockledge Blvd W.	Building	1930	Frame Vernacular	NRHP-Listed
8BR1163	Mattie Lamar House/ 361 Stone Street	Building	c. 1917	Frame Vernacular	NRHP-Eligible
8BR1710	Jorgensen's General Store/5390 US Hwy 1	Building	1894	Frame Vernacular	NRHP-Listed
8BR1723	Cocoa Cemetery Storage Building/ 101 N. Cocoa Blvd.	Building	c. 1931	Masonry Vernacular	NRHP-Eligible
8BR1739	Ashley's Cafe & Lounge/ 1609 Rockledge Blvd. W.	Building	c. 1932	Tudor Revival	NRHP-Eligible
8BR1741	Rockledge Gardens Nursery & Landscaping/2153 Rockledge Blvd. W.	Building	c. 1930	Industrial Vernacular	NRHP-Eligible
8BR1765	Bohn Equipment Company/ 255 Olive St	Building	c. 1927	Industrial Vernacular	NRHP-Eligible
8BR2779	317 Rosa Jones Drive	FECR Station	c. 1962	International	NRHP-Eligible
8BR1724	Hilltop Cemetery	Cemetery	c. 1887		NRHP-Eligible
8BR1777	Cocoa Cemetery	Cemetery	c. 1890		NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

The N-S Corridor APE for indirect effects within Indian River County includes one NRHP-listed historic resource group, one NRHP-eligible linear resource, one eligible bridge, one listed FECR station, two listed buildings, and six eligible buildings (Table 4.4.5-8).

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8IR859	McKee Jungle Gardens	Resource Group			NRHP-Listed
8IR1519	Dixie Highway	Linear Resource			NRHP-Eligible
8IR1516	FDOT Bridge No. 880001	Bridge			NRHP-Eligible
8IR68	Vero Railroad Station/ 2336 14 th Avenue	FECR Station	1903	Frame Vernacular	NRHP-Listed
8IR99	George Armstrong Braddock House/ 1309 Louisiana Avenue	Building	1908	Georgian Revival	NRHP-Eligible
8IR100	Baughman House/ 1525 North Louisiana Avenue	Building	1900	Neo-Classical Revival	NRHP-Eligible
8IR388	5056 North Old Dixie Highway	Building	c. 1920	Bungalow	NRHP-Eligible
8IR624	Old Vero Beach Community Building/ 2146 14 th Avenue	Building	1935	Frame Vernacular	NRHP-Listed
8IR858	Hall of Giants, McKee Jungle Gardens/ US 1 and 4 th Street	Building	1940	Other	NRHP-Eligible (individually and contributing to district)
8IR975	Vero Beach Diesel Power Plant/ 1133 19 th Place	Building	1926	Masonry Vernacular	NRHP-Listed
8IR1464	Vero Beach Community Center/ 2266 14 th Avenue	Cemetery	1966	Moderne	NRHP-Eligible
8IR1475	1146 21 st Street	Cemetery	1966	Moderne	NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

In St. Lucie County, the N-S Corridor APE for indirect effects includes two NRHP-eligible historic districts, two NRHP-listed buildings, and 22 NRHP-eligible buildings (Table 4.4.5-9).

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8SL2801	Edgar Town Historic District	Historic District			NRHP-Eligible (also local designation)
8SL76	St. Lucie Historic District	Historic District			NRHP-Listed
8SL78	Fairmont Manor/ 5707 South Indian River Drive	Building	1896	Neo-Classical Revival	NRHP-Eligible
8SL220	9015 South Indian River Drive	Building	c. 1890	Frame Vernacular	NRHP-Eligible
8SL227	7901 South Indian River Drive	Building	c. 1910	Craftsman	NRHP-Eligible
8SL229	6109 South Indian River Drive	Building	c. 1915	Colonial Revival	NRHP-Eligible
8SL231	5703 South Indian River Drive	Building	c. 1915	Prairie Style	NRHP-Eligible
8SL234	5309 South Indian River Drive	Building	c. 1935	Colonial Revival	NRHP-Eligible
8SL236	Riverhill/ 4625 South Indian River Drive	Building	1903	Frame Vernacular	NRHP-Eligible
8SL237	Britt House/ 4511 South Indian River Drive	Building	1908	Frame Vernacular	NRHP-Eligible
8SL238	N.E. Card House/ 3915-3917 Indian River Drive	Building	1914	Masonry Vernacular	NRHP-Eligible
8SL247	Hoskins House/ 2929 North Indian River Drive	Building	1910	Frame Vernacular	NRHP-Eligible
8SL289	Old Fort Pierce City Hall/ 315 A Avenue	Building	c. 1925	Italianate	NRHP-Listed
8SL799	Sunrise Theater/ 117 2nd Street South	Building	c. 1923	Mediterranean Revival	NRHP-Listed
8SL825	601 South 2nd Street	Building	c. 1935	Masonry vernacular	NRHP-Eligible
8SL826	Frank Tyler House/ 519 2nd Street South	Building	c. 1924	Mediterranean Revival	NRHP-Eligible
8SL917	Banyon Belle Manor/ 1001 South Indian River Drive	Building	1905	Georgian Revival	NRHP-Eligible
8SL918	1009 South Indian River Drive	Building	1925	Mission	NRHP-Eligible
8SL920	1029 South Indian River Drive	Building	1920	Georgian Revival	NRHP-Eligible
8SL926	O.L. Peacock House/ 2211 South Indian River Drive	Building	1920	Mediterranean Revival	NRHP-Eligible
8SL930	Stephen Leshner House/ 2501 South Indian River Drive	Building	1920	Italian Renaissance Revival	NRHP-Eligible
8SL931	Carlton-Vest House/ 2507 South Indian River Drive	Building	1920	Masonry Vernacular	NRHP-Eligible
8SL932	Casa Del Rio/ 2513 South Indian River Drive	Building	1920	Italian Renaissance Revival	NRHP-Eligible
8SL933	Babe Phelps House/ 2521 South Indian River Drive	Building	1935	Monterey	NRHP-Eligible
8SL1599	Shadetree Studio/ 2900 Old Dixie Highway	Building	1950	Frame Vernacular	NRHP-Eligible
8SL1922	East Coast Packers/ 2130 Old Dixie Highway	Building	1950	Industrial Vernacular	NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

Martin County has one NRHP-eligible historic resource group, one eligible linear resource, one NRHP-listed building, and seven eligible buildings within the N-S Corridor APE for indirect effects (Table 4.4.5-10).

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8MT1573	Witham Field Airport	Mixed District			NRHP-Eligible
8MT1621	Dixie Highway	Linear Resource			NRHP-Eligible
8MT46	George W. Parks Store/ Stuart Feed/ 101 South Flagler Avenue	Building	1901	Frame Vernacular	NRHP-Eligible
8MT84	Fem Building/ 73 West Flagler Avenue	Building	c. 1950	Masonry Vernacular	NRHP-Eligible
8MT86	Lyric Theatre/ 59 Southwest Flagler Avenue	Building	c. 1926	Mediterranean Revival	NRHP-Listed
8MT130	East Coast Lumber and Supply/ 49 Southwest Flagler Avenue	Building	1917	Frame Vernacular	NRHP-Eligible
8MT131	Hobe South Cabinetry/ 500 South Dixie Highway	Building	1917-c. 1926	Masonry Vernacular	NRHP-Eligible
8MT307	Crary House/ 161 Southwest Flagler Avenue	Building	1925	Tudor Revival	NRHP-Eligible
8MT838	12200 Southeast Nassau Street	Building	c. 1941	Frame Vernacular	NRHP-Eligible
8MT1066	250 North Flagler Road	Building	c. 1940	Masonry Vernacular	NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

The N-S Corridor APE for indirect effects within Palm Beach County includes one NRHP-eligible historic district, one eligible cemetery, and one eligible building (Table 4.4.5-11). The 2013 CRAR notes that an additional previously-recorded linear resource was identified in the FMSF forms, but this was determined not eligible for the NRHP due to a lack of integrity.

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8PB13340	Kelsey City Layout	Historic District			NRHP-Eligible
8PB218	Evergreen Cemetery	Cemetery	1916		NRHP-Eligible (also local designation)
8PB6064	St. John's Baptist Church/ 2010 A. E. Isaacs Avenue	Building	1929	Mission	NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

Comments on the DEIS, particularly for Indian River County, identified additional historic resources of concern that fall outside of the APE. The APEs were developed to include all resources that might have potential effects from this project. SHPO concurred in the APE established for the Project. Only those historic resources that were NRHP-listed, eligible, or considered eligible within the indirect and direct APEs were identified during the background research and field survey during development of the CRAR. An updated review of the FMSF did not find evidence of additional known listed, eligible, or potentially eligible historic properties within the APE in Indian River County.

Also in Indian River County are two NRHP-listed historic districts within the City of Sebastian, Old Town Sebastian Historic District East (8IR1048B) and Old Town Sebastian Historic District West (81048A). These two distinct NRHP districts fall just outside of the Project APE. While the FMSF data suggests there are additional sites within the FECR ROW in Indian River County, the review of the site file forms and survey reports found that their actual locations are not within the FECR ROW. Pocahontas Park (not previously recorded), the Vero Beach Community Center (8IR1464), and the Heritage Center (previously recorded in the FMSF as the 'Old Vero Beach Community Building' [8IR624]), are all located within the APE. Field survey and background research subsequent to the CRAR found that Pocahontas Park does not meet the criteria for inclusion in the NRHP. The Heritage Center is NRHP-listed and included within the 2013 CRAR (as the Old Vero Beach Community Building). The Vero Beach Community Center (8IR1464) is considered eligible for inclusion in the NRHP.

The NRHP-listed St. Lucie Village Historic District (8SL76) is located over 500 feet outside of the FECR ROW to the east (more than 350 feet east of the APE). The mapped boundary and contributing buildings of this historic district are located along Indian River Drive adjacent to Indian River Lagoon, and the closest contributing resource is located over 500 feet east of the historic rail line. However, because the property limits of two historic properties included in the district do extend into the APE, the St. Lucie Village Historic District (8SL76) is included within the APE. While the Payne-Jones (recorded in the FMSF as the 'St. Lucie Cemetery' [8SL1579]) and Palms (8SL1269) cemeteries fall within the APE which was approved by the FRA and the SHPO, they were not previously evaluated for NRHP eligibility by the SHPO. SHPO concurred with the CRAR finding that these resources do not meet the criteria for inclusion in the NRHP.

The only NRHP-eligible historic district identified within the APE in Fort Pierce is the Edgartown Historic District (8SL2801), which includes a mix of residential, commercial and industrial land uses. The other two FMSF districts within the APE (Downtown Historic District [8SL2799] and River's Edge Historic District [8SL2802]) were recommended as ineligible by the initial recorder.

Archaeological Resources

Seven previously-recorded archaeological sites were identified within the N-S Corridor APE, five of which were identified in the 2013 CRAR. Two additional sites, originally considered to be outside of the APE based on FMSF mapping, were subsequently evaluated as having the potential to have unmapped features within the APE, and were added to the total number of archaeological sites within the N-S Corridor accordingly (Appendix 4.4.5-D, see below for detailed discussion). One of the previously-recorded sites had been determined not eligible for listing in the NRHP; the remaining six sites, which are

either designated or have the potential to be eligible for listing, are summarized in Table 4.4.5-12 and discussed below.

Of these six sites, two have been evaluated as eligible for listing in the National Register: the Vero Man/Vero Locality site in Indian River County (8IR1/8IR9, eligible) and Fort Pierce in St. Lucie County (8SL31, NRHP-listed). The remaining four sites have not been evaluated by the SHPO, though the preparers of the recordation forms comment on potential eligibility. One of the unevaluated sites is located in Indian River County, one site is location in Martin County, and two sites are located in St. Lucie County (Table 4.4.5-12 and Appendix 4.4.5-A, 4.4.5-C, and 4.4.5-D). The Hobe Sound National Wildlife Refuge #3 (8MT1287) and Fort Capron (8SL41) sites are located within the APE. The Project will not require subsurface excavation at Fort Capron, and therefore there will be no impacts to this resource. Construction activities near the limits of the Hobe Sound National Wildlife Refuge #3 site include excavation and construction of a retaining wall; the excavation has the potential to adversely affect this archaeological site.

Comments on the DEIS identified other archaeological sites of concern. These sites were not identified or evaluated in the 2013 DEIS because FMSF mapping placed them outside of the APE. The identification of archaeological sites within and directly adjacent to the archaeological APE for the 2013 CRAR was done through the review of the data and mapping contained within the site file forms and survey reports on file with the FMSF. As discussed in greater detail below, further evaluation of site locations, performed as a result of DEIS comments, identified two sites (Vero Man/Vero Locality Site (81R1/81/R9) and Fort Pierce (8SL31)) originally mapped outside of the APE, but new information suggests may have features that fall within the APE. These sites were added to the initial list of four NRHP-listed or potentially-eligible archaeological sites noted in the 2013 CRAR, resulting in a total of six NR-listed, NR-eligible, and potentially eligible sites located in the N-S Corridor APE.

Archaeological sites and cemeteries mentioned by commenters that are located outside of the APE for direct effects include: Walton Railroad 1 (8SL292), Savannahs North Dune (8SL3063), Indian River Drive Site #2 (8SL1719), Indian River Drive Site #4 (8SL1720), Payne-Jones Cemetery (8SL1579), and Palms Cemetery (8SL1269).

Two additional sites reported by DEIS commenters in Indian River County, the San Sebastian River Bridge (8IR2) and the North River Canal (8IR8), are listed in the FMSF as having undetermined locations, and thus could not be considered for this study.

The Vero Man/Vero Locality Site (8IR1/8IR9) was initially omitted from the N-S Corridor APE based on FMSF mapping information, but DEIS comments indicated new information that resulted in this site being included in the APE. When the CRAR was completed in 2013, the information available from the FMSF clearly placed this site west of the FECR right-of-way and outside of the APE. Since this time, investigators from Mercyhurst University have conducted excavations in a portion of the site approximately 500 feet west of the right-of-way. In May 2014, an updated FMSF site form was provided to the SHPO. According to this site file, "site boundaries are imprecisely documented due to local development. Portions of the site are under fill below the FEC Railroad; a packing house lot; and other modern construction. Known site areas are protected but under 3 to 10 feet of fill." In September 2014, a Change of Status form was filed by the SHPO for the Vero site. According to this form, the SHPO now considers the site to be eligible for listing in the NRHP. AAF submitted a draft addendum to the CRAR in May 2015 that includes this site within the APE, and the SHPO concurred with the findings of the CRAR Addendum in a letter dated May

21, 2015 (Appendix 4.4.5-D). This site is included in the list of archaeological sites located within the N-S Corridor APE (Table 4.4.5-12).

The NRHP-listed Fort Pierce (8SL31) was initially omitted from the N-S Corridor APE based on known mapping, but inconsistencies in the recorded location of this property suggest that the precise boundaries are not known but may extend into the APE. The National Register nomination form for the property indicates that the boundary of the property is adjacent to the APE to the east. However, as of September 2013, information on file with the FMSF indicated the site is located more than 150 feet east of the APE, and a subsequent update to the plotted location placed the site 115 feet east of the APE and 350 feet north of its previously mapped location in the FMSF. Although none of the mapped locations are within the APE, the apparent incongruity in the location of this site, at one point reported as adjacent to the APE, suggests the boundary may be ambiguous. Therefore, there is a potential for the boundary of the site to extend into the APE. The May 2015 CRAR addendum concurred with by SHPO includes this information, and this site is included in the list of archaeological sites located within the N-S Corridor APE (Table 4.4.5-12). An additional Fort Pierce site mentioned by commenters, the Fort Pierce Mound and Midden (8SL3), is depicted in the FMSF data as being located more than 270 feet east of the FECR ROW and is therefore outside of the APE.

FMSF #	Site Name / Address	Site Type	National Register Status
8IR846	Railroad	Malabar-Period Shell Midden and Artifact Scatter	Not Evaluated by SHPO
8MT1287	Hobe Sound National Wildlife Refuge #3	Prehistoric Campsite and Prehistoric Shell Midden	Previously recommended as Potentially Eligible: Not Evaluated by SHPO
8SL41	Fort Capron	Historic Fort	Previously recommended as Potentially Eligible: Not Evaluated by SHPO
8SL1772	Avenue A-Downtown Fort Pierce	Precolumbian Habitation, Midden, Campsite, and extractive Site; Historic American Building Remains, Refuse, and Artifact Scatter	Not Evaluated by SHPO
8IR1/8IR9	Vero Man/Vero Locality	Pleistocene Faunal assemblage: Redeposited Precolumbian Burial	NRHP-Eligible
8SL31	Fort Pierce	Historic Fort	NRHP-Listed

West Palm Beach-Miami (WPB-M) Corridor

The evaluation of, and impacts to, archaeological sites and historic properties along the WPB-M Corridor Main Line and Stations were discussed in the 2012 EA and the supporting 2012 CRAR and are summarized below. SHPO has concurred with these findings (with the exception of two resources at the West Palm Beach station location) and effects determinations in November 2012 (DHR 2012-4778) and October 2014 (2014-4786), conditional on continued consultation with the SHPO and locally affected parties during the station design process.

However, eight of the bridges located within this corridor and are contributing resources to the NRHP-eligible FECR Historic District will now be impacted by the Project, and these properties are included in the impacts discussion in Chapter 5 of this document. They are listed in Table 4.4.5-13.

County	FMSF #	Site Name / Address	Date Estimate	National Register Status
Palm Beach	8PB15951	Fixed Railway Bridge over the C-15 Canal	1962	Eligible as FECR Contributing Resource
Broward	8BD4860	Fixed Railway Bridge over the Cypress Creek/ C-14 Canal	1960	Eligible as FECR Contributing Resource
Broward	8BD4861	Fixed Railway Bridge over the North Fork of Middle River	1957	Eligible as FECR Contributing Resource
Broward	8BD4862	Fixed Railway Bridge over the South Fork of Middle River	1959	Eligible as FECR Contributing Resource
Broward	8BD4863	Fixed Railway Bridge over the Dania Cut-Off Canal	1927	Eligible as FECR Contributing Resource
Miami-Dade	8DA12596	Fixed Railway Bridge over the Oleta River	1963	Eligible as FECR Contributing Resource
Miami-Dade	8DA12597	Fixed Railway Bridge over the Royal Glades/C-9 Canal	1956	Eligible as FECR Contributing Resource
Miami-Dade	8DA12598	Fixed Railway Bridge over the Arch Creek	1930	Eligible as FECR Contributing Resource

Several NRHP-listed and eligible historic properties were identified in the APE for indirect effects for the WPB-M Corridor, in Palm Beach, Broward, and Miami-Dade Counties. Palm Beach County has two NRHP-listed historic districts, two NRHP-eligible linear resources, four NRHP-listed and 11 NRHP-eligible buildings, and one NRHP-eligible cemetery (Table 4.4.5-14).

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8PB5980	Northwest Neighborhood Historic District	Historic District			NRHP-Listed
8PB9905	Lake Lucerne Commercial Historic District	Historic District			NRHP-Listed
8PB10311	Hillsboro Canal	Linear Resource			NRHP-Eligible
8PB10331	West Palm Beach Canal	Linear Resource			NRHP-Eligible
8PB169	Administration Building/ Dixie Highway & Camino Real	Building	1925	Mediterranean Revival ca. 1880-1940	NRHP-Listed
8PB240	Hoot, Toot & Whistle/ 290 E. Atlantic Avenue	Building	c.1926	Mission	NRHP-Eligible
8PB513	Andrews House/ 306 SE 1 st Avenue	Building	c.1909	Frame Vernacular	NRHP-Eligible
8PB8232	Seaboard Air Line Dining Car 6113/747 S. Dixie Highway	Building	1947	Moderne ca. 1920-1940	NRHP-Listed
8PB8233	Seaboard Air Line Lounge Car 6603/747 S. Dixie Highway	Building	1947	Moderne ca. 1920-1940	NRHP-Listed
8PB14806	470 Fern Street	Building	c. 1930	Mediterranean Revival	NRHP-Eligible
8PB14808	500 Fern Street	Building	c. 1949	Mediterranean Revival	NRHP-Eligible
N/A	Arc Rib Storage/502 Kanuga Drive	Building			NRHP-Eligible
N/A	Delray Beach Antique Mall/ 1350 N. Federal Highway	Building			NRHP-Eligible
N/A	Goodwill/1640 N. Federal Highway	Building			NRHP-Eligible
N/A	Lantana Chamber of Commerce/ 212 Iris Avenue	Building			NRHP-Eligible
N/A	Woodlawn Cemetery Gate/ 1500 S. Dixie Highway	Building			NRHP-Eligible
N/A	3615 Henry Avenue	Building	c.1925	Frame Vernacular	NRHP-Eligible
8PB96	FECR Railway Station/ S. Dixie Highway at SE 8th Street	Building	1929	Mediterranean Revival ca. 1880-1940	NRHP-Listed
N/A	Delray Beach FECR Depot and Water Tower/220 NE 1st Street	Building			NRHP-Eligible
N/A	Woodlawn Cemetery	Cemetery			NRHP-Eligible

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013. SHPO concurrence November 6, 2012.

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. An additional property, the Peninsular Plumbing Company Warehouse at 501-513 Fern Street was recommended as eligible by the West Palm Beach Historic Preservation Planner, but determined ineligible by the SHPO.

In Broward County, the WPB-M Corridor APE for indirect effects includes one NRHP-listed historic district, four NRHP-eligible historic districts, one NRHP-eligible linear resource, one NRHP-listed building, and 14 NRHP-eligible buildings, structures and building complexes (Table 4.4.5-15).

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8BD181	Downtown Fort Lauderdale Historic District	Historic District			NRHP-Eligible
8BD3284	Hollywood Boulevard Historic Business District	Historic District			NRHP-Listed
N/A	Northwest Pompano Historic District	Historic District			NRHP-Eligible
N/A	Old Business District	Historic District			NRHP-Eligible
N/A	Old Pompano Historic District	Historic District			NRHP-Eligible
8BD3229	Hillsboro Canal	Linear Resource			NRHP-Eligible
8BD62	King-Cromartie House/229 SW 2nd Avenue	Building	1907	Frame Vernacular	NRHP-Eligible
8BD63	New River Inn/229 SW 2 nd Avenue	Building	1906	Masonry Vernacular	NRHP-Listed
8BD143	Hotel Poinciana/ 141 NW 1st Avenue	Building	c.1920	Mission	NRHP-Eligible
8BD212	Philemon Bryan House/ 227 SW 2nd Avenue	Building	1906	Neo-Classical Revival ca. 1880-1940	NRHP-Eligible
8BD227	Bryan, Tom M. Building/ 201-213 Himmarshee Street	Building	c.1925	Mediterranean Revival ca. 1880-1940	NRHP-Eligible
8BD376	The Hollywood Publishing Company/219 N 21st Avenue	Building	1924	Masonry Vernacular	NRHP-Eligible
8BD574	Ingram Arcade/ 2033-2051 Hollywood Blvd.	Building	1921	Commercial	NRHP-Eligible
8BD1976	Progresso Plaza/901 Progresso Drive	Building	c.1925	Mediterranean Revival ca. 1880-1940	NRHP-Eligible
8BD2237	Hamilton's Pharmacy/ McClellan Drugs/126 N Flagler Avenue	Building	1925	Art Deco ca. 1920-1940	NRHP-Eligible
8BD2258	Pompano Mercantile Company/ 114 N Flagler Avenue	Building	1924	Mission	NRHP-Eligible
8BD4179	Hollywood Amory/910 N Dixie Highway W	Building	c.1954	Other	NRHP-Eligible
N/A	Antique Car Museum/1527 SW 1st Avenue	Building	N/A	N/A	NRHP-Eligible
N/A	Sears Town/901 N Federal Highway	Building	N/A	N/A	NRHP-Eligible
N/A	Florida East Coast Freight House and Platform Machine Ramp/ 1801 SW 1st Avenue	Structure	1948; 1956	N/A	NRHP-Eligible
N/A	Florida East Coast Rail Yard/ 3125 S. Andrews Avenue	Building Complex	N/A	N/A	NRHP-Eligible

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013. SHPO concurrence November 6, 2012.

The WPB-M Corridor APE for indirect effects within Miami-Dade County includes seven NRHP-eligible historic districts, one NRHP-eligible linear resource, two NRHP-listed and one eligible building, and one NRHP-listed cemetery (Table 4.4.5-16).

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8DA378	Greynolds Park	Designed Historic Landscape			NRHP-Eligible
8DA3536	Miami Shores Golf Course	Designed Historic Landscape			NRHP-Eligible
N/A	Miami Shores Historic District	Historic District			NRHP-Eligible
N/A	Biscayne Park Historic District	Historic District			NRHP-Eligible
N/A	El Portal Historic District	Historic District			NRHP-Eligible
N/A	MiMo/Biscayne Boulevard Historic District	Historic District			NRHP-Eligible
N/A	Palm Grove Neighborhood Historic District	Historic District			NRHP-Eligible
N/A	El Portal – Little River - Seawall	Linear Resource			NRHP-Eligible
8DA165	Reassembled Spanish Monastery AD 1141/16711 W Dixie Highway	Building	1952	Masonry Vernacular	NRHP-Listed
8DA355	Dade County Courthouse/ Miami City Hall/73 W Flagler Street	Building	1925	Neo-Classical Revival ca. 1880-1940	NRHP-Listed
N/A	N. Miami Beach/Peoples Gas Building/ System/15779 W. Dixie Highway	Building	N/A	Not Available	NRHP-Eligible
8DA1090	City of Miami Cemetery	Cemetery	1897		NRHP-Listed

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013. SHPO concurrence November 6, 2012.

The WPB-M Corridor includes several proposed station locations, and the 2012 EA established a separate APE for these station locations. The APE for WPB-M Proposed Stations includes two NRHP-listed and one eligible historic district, with 19 total contributing resources located within the APE. Six of these contributing resources are also individually eligible for the NRHP, and one contributing resource is individually NRHP-listed. In addition, the APE includes two NRHP-listed buildings and seven NRHP-eligible buildings (Table 4.4.5-17).

Table 4.4.5-17 Historic Properties Within the WPB-M Corridor APE for Proposed Stations

Station	FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
West Palm Beach Central	8PB574	513-515 Clematis Street	Building	c. 1921	Masonry Vernacular	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB575	517-519 Clematis Street	Building	c. 1929	Masonry Vernacular	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB576	518-520 Clematis Street	Building	1924	Masonry Vernacular	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB577	521-527 Clematis Street	Building	c. 1920	Masonry Vernacular	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB578	522 Clematis Street	Building	1919	Masonry Vernacular	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB579	526 Clematis Street	Building	1923	Masonry Vernacular	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB580	W. E. Pope Building/529-531 Clematis Street	Building	1921	Masonry Vernacular	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB581	528 Clematis Street	Building	1929	Art Deco	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)/ Individually NRHP-eligible
West Palm Beach Central	8PB582	533 Clematis Street	Building	1925	Neoclassical Revival	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)/ Individually NRHP-eligible
West Palm Beach Central	8PB585	540 Clematis Street	Building	c. 1925	Masonry Vernacular	Contributing resource to NRHP-Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB593	Alma Hotel/ 534 Datura Street	Building	c. 1926	Mediterranean Revival	NRHP- Eligible
West Palm Beach Central	8PB690	Ferdix Building/ 321-325 S. Dixie Highway	Building	1925	Mission	NRHP-Listed
West Palm Beach Central	8PB835	Peninsular Plumbing Company Warehouse/ 501-513 Fern Street	Building	c. 1938	Masonry Vernacular	NRHP- Eligible
West Palm Beach Central	8PB10348	Clematis Street Historic Commercial District	Historic District	Various	Various	NRHP-Listed
West Palm Beach Central	8PB14806	470 Fern Street	Building	c. 1930	Mediterranean Revival	NRHP-Eligible
West Palm Beach Central	8PB14807	West Palm Beach Employee Health Center/464 Fern Street	Building	c. 1930	Mediterranean Revival	NRHP-Eligible

Table 4.4.5-17 Historic Properties within the WPB-M Corridor APE for Proposed Stations (Continued)

Station	FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
West Palm Beach Central	8PB14808	Ballet Florida/ 500 Fern Street	Building	c. 1949	Mediterranean Revival	NRHP-Eligible
Fort Lauderdale North	8BD62	King-Cromartie House/ 229 SW 2nd Avenue	Building	1907	Frame Vernacular	Contributing resource to NRHP-Eligible Ft. Lauderdale Historic District (8BD181)/ individually NRHP-Eligible
Fort Lauderdale North	8BD63	New River Inn/ 231 SW 2nd Avenue	Building	1906	Masonry Vernacular	Individually NRHP-Listed/ Contributing resource to NRHP-Eligible Ft. Lauderdale Historic District (8BD181)
Fort Lauderdale North	8BD181	Ft. Lauderdale Historic District	Historic District	Various	Various	NRHP-Eligible
Fort Lauderdale North	8BD212	Philemon Nathaniel Bryan House/ 227 SW 2nd Avenue	Building	1906	Neoclassical Revival	Contributing resource to NRHP-Eligible Ft. Lauderdale Historic District (8BD181)/ individually NRHP-Eligible
Fort Lauderdale North	8BD213	Davis Acetylene Building/N of 229 SW 2nd Avenue	Building	c. 1905	Masonry Vernacular	Contributing resource to NRHP-Eligible Ft. Lauderdale Historic District (8BD181)/
Fort Lauderdale North	8BD227	Tom Bryan Building/ 201-211 Himmarshee Street	Building	c. 1925	Mediterranean Revival	Contributing resource to NRHP-Eligible Ft. Lauderdale Historic District (8BD181)/ individually NRHP-Eligible
Fort Lauderdale North	8BD237	ROK:BRGR/ 208 Himmarshee Street	Building	c. 1939	Masonry Vernacular	Contributing resource to NRHP-Eligible Ft. Lauderdale Historic District (8BD181)/
Fort Lauderdale North	8BD239	Briny Irish Pub/ 214-220 SW 2nd Street	Building	c. 1937	Masonry Vernacular	Contributing resource to NRHP-Eligible Ft. Lauderdale Historic District (8BD181)/ individually NRHP-Eligible
Miami Central	8DA271	Salvation Army Citadel/ 49 NW 5th Street	Building	c. 1925	Gothic Revival	NRHP-Eligible
Miami Central	8DA1164	212-222 N Miami Avenue	Building	c. 1922	Masonry Vernacular	Contributing resource to NRHP-Listed Downtown Miami Historic District (8DA10001)
Miami Central	8DA2397	Lyric Theater/ 819 NW 2nd Avenue	Building	c. 1914	Masonry Vernacular	NRHP-Listed
Miami Central	8DA10001	Downtown Miami Historic District	Historic District	Various	Various	NRHP-Listed
Miami Central	8DA12603	201 NW 1st Avenue	Building	c. 1914	Masonry Vernacular	NRHP-Eligible

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013. SHPO concurrence November 6, 2012.

4.4.6 Parks and Recreation Areas

This section describes existing or planned publically-owned parks, recreational areas, and wildlife and waterfowl refuges of national, state or local significance (collectively “recreational properties”). These properties are protected by Section 4(f) of the USDOT Act of 1966 (49 USC § 303 et seq.) and may also be protected by Section 6(f) of the Land and Water Conservation Act of 1965 (16 USC § 460L).¹

Recreational properties identified in this EIS are all publically-owned parks, recreation areas, or wildlife and waterfowl refuges of national, state, or local significance that are protected by Section 4(f) and within 300 feet of the Proposed Action. In general, a park or recreation area is afforded federal protection under Section 4(f) if:

- It is publicly owned, meaning the property is owned and operated by a public entity, or the public entity has a proprietary interest in the property, such as an easement;
- It is open to the public for visitation for more than a select group of the public at any time during normal hours of operation;
- The primary purpose of the property is recreation (lands used primarily for non-recreational purposes but that host recreational activities do not have recreation as a primary purpose); and
- It is significant as a park or recreation area, meaning that the resource plays an important role in meeting the park and recreational objectives of the community, as determined by the official with jurisdiction over the property.

Section 6(f) resources are all parks and other recreational facilities that have received Land and Water Conservation Fund Act (LWCF) grants of any type. Section 6(f)(3) contains strong provisions to protect federal investments and the quality resources receiving LWCF Act grants. Section 6(f)(3) states that no Section 6(f) resource shall be converted to other than public outdoor recreation uses without approval of the Secretary of the Interior. The Secretary may approve conversions only if he/she finds it to be in accordance with the existing comprehensive statewide outdoor recreation plan and if substitute property of equal value is provided as mitigation.

4.4.6.1 Methodology

This evaluation used GIS data derived from the Florida Natural Area Inventory and the University of Florida. In addition, EDR provided environmental data to identify facilities that are within the Project Study Area. The EDR database review identified natural areas that included federal wilderness areas, preserves, sanctuaries, refuges and wild and scenic rivers. Property appraiser’s websites for each county within the Project Study Area and aerial photography were also evaluated to identify additional resources not identified in the above referenced data sources. Local land use plans for the six counties within the Project Study Area were reviewed to determine if there are any planned recreational resources within 300 feet of the Project alignment. A list of the sources used in this evaluation is provided in Table 4.4.6-1.

¹ Historic properties subject to Section 4(f), were identified in the previous Section 4.4.5, *Historic Properties*.

Title	Author	Date
Florida Managed Areas (GIS)	Florida Natural Areas Inventory (FNAI)	June 2012
Florida Parks and Recreational Facilities (GIS)	University of Florida	2009
The EDR National Environmental Policy Act (NEPA) check Report Greater Orlando Aviation Authority (GOAA) Site- Johnson Boulevard, Inquiry Number 3532737.8s	Environmental Data Resources	February 2013
Orange County Property Appraiser	Orange County	2013
Brevard County Property Appraiser	Brevard County	2013
Indian River County Property Appraiser	Indian River County	2013
St. Lucie County Property Appraiser	St. Lucie County	2013
Martin County Property Appraiser	Martin County	2013
Palm Beach County Property Appraiser	Palm Beach County	2013
Google Earth Imagery	Google	2011
Comprehensive Plan Future Land Use Map, Orange County	Orange County	2012
Brevard County Comprehensive Plan, Chapter III: Recreation and Open Space Element	Brevard County	2009
Indian River County 2030 Comprehensive Plan, Chapter 10: Recreation and Open Space Element	Indian River County	2010
St. Lucie County Comprehensive Plan: Recreation Element	St. Lucie County	2010
Martin County Comprehensive Growth Management Plan	Martin County	2013
Palm Beach County 1989 Comprehensive Plan	Palm Beach County	2012

4.4.6.2 Affected Environment

Thirty-two recreational properties were identified within 300 feet of the Project alignment (Table 4.4.6-2; Appendix 4.4.6). Although the Section 106 Area of Potential Effect identified an area extending 150 feet from either edge of the existing or proposed right-of-way as the geographic extent of any potential direct or indirect effects to Section 106 or Section 4(f) properties, recreational properties were inventoried within a larger distance to be consistent with the screening distance used in the 2012 EA. Two of the identified recreational properties are along the E-W Corridor, while the remaining 30 are along the N-S Corridor. No recreational properties were identified along the MCO Segment.

Two of the identified recreational properties were also identified as Section 6(f) resources: North Sebastian Conservation Area and Sawfish Bay Park. Both Section 6(f) resources are along the N-S Corridor. The counties' comprehensive planning documents showed that there are no planned recreational properties (parks, recreational areas, or wildlife refuges) within 300 feet of the Project alignment.

Map ID	Recreational Resource	County	Description
E-W Corridor			
1	Tosohatchee Wildlife Management Area (WMA)	Orange	The WMA is managed by the Florida Fish and Wildlife Conservation Commission (FWC). Recreational activities include: hiking, bicycling, camping, horseback riding, fishing, limited hunting and wildlife viewing (FWC 2013a). 30,700 ac.
2	Canaveral Marshes Conservation Area	Brevard	Conservation area managed by SJRWMD. Recreational activities include: fishing, hiking, bicycling, canoeing, boating, and wildlife viewing (SJRWMD 2013b). 12,644 ac.
N-S Corridor			
3	Helen and Allan Cruickshank Sanctuary	Brevard	Wildlife sanctuary managed by Brevard County. Recreational activities include hiking and wildlife viewing (Brevard County, Florida 2013b). 140 ac.
4	Rotary Park at Suntree	Brevard	Community park managed by Brevard County. Recreational facilities include a playground and a pavilion (Brevard County, Florida 2013c). 10 ac.
5	Jordan Scrub Sanctuary	Brevard	Wildlife sanctuary managed by Brevard County. Recreational activities include: hiking, bicycling, horseback riding, and wildlife viewing (Brevard County, Florida 2013b). 354 ac.
6	South Mainland Community Center	Brevard	Community Center managed by Brevard County. Recreational facilities include a gymnasium and playground. A nature trail is in the planning process (Brevard County, Florida 2013b).
	Malabar to Vero Beach Aquatic Preserve	Brevard and Indian River	Sovereign Submerged Lands managed by the State of Florida. Recreational activities include boating, swimming, fishing, and watching manatees, dolphin and birds. 28,000 ac.
7	North Sebastian Conservation Area ¹	Indian River	Conservation area managed by Indian River County. Primary intended use is the protection of scrub habitat for the Florida scrub-jay. A plan for environmental education and passive recreation (hiking) was proposed (Indian River County, Parks Division 2013). 400 ac.
8	Pocahontas Park	Indian River	Community park managed by Indian River County. Facilities include playground, tennis courts, shuffle board, water fountains, and shaded park benches (Indian River County, Parks Division 2013).
9	Harmony Oaks Conservation Area	Indian River	Conservation area managed by Indian River County. Intended use of the park is to maintain a scenic shoreline for boaters. There are no existing trails, but the County has identified this area for future trails (locations unknown) (FWC 2013a). 90 ac.
10	Harbor Branch Natural Area	St. Lucie	Natural Area managed by St. Lucie County. Recreational activities include: hiking, picnicking, disc golf, horseshoes and volleyball (St. Lucie County, Environmental Resources Department n.d.). 250 ac.
11	D.J. Wilcox Preserve	St. Lucie	Preserve managed by St. Lucie County. Recreational activities include: hiking, birding and wildlife viewing (St. Lucie County, Florida 2013a). 100 ac.
12	Indrio Scrub Preserve	St. Lucie	Preserve managed by St. Lucie County. Recreational activities include hiking and wildlife viewing (St. Lucie County, Florida 2013a). 23 ac.
13	St. Lucie Village Heritage Park	St. Lucie	Park managed by St. Lucie County. Recreational activities include: Interpretive hiking trails, birding, picnic, volleyball, disc golf, and grilling (St. Lucie County, Florida 2013a). 120 ac.
14	Central Open Space – SLV	St. Lucie	Park managed by St. Lucie County. Park consists of a vacant lot with no facilities (St. Lucie County, Office of the Property Appraiser 2013).
15	Old Fort Historical Site	St. Lucie	Historical site managed by St. Lucie County. No recreational facilities were identified on the site and no information regarding the park was available on the County website (St. Lucie County, Florida 2013a).
16	Savannas Outdoor Recreation Area	St. Lucie	Recreational area managed by St. Lucie County. Recreational activities include: camping, boating, fishing, hiking, biking, wildlife viewing and picnicking (St. Lucie County, Florida 2013b).
17	Savannas Preserve State Park	St. Lucie	Park managed by the State of Florida. Recreational activities include: hiking, bicycling, horseback riding, canoeing, kayaking, fishing and wildlife viewing (Florida State Parks 2013). 550 ac.
18	Walton Scrub Preserve	St. Lucie	Preserve managed by St. Lucie County. Recreational activities include hiking, bicycling, fishing, and wildlife viewing (St. Lucie County, Florida 2013b). 33 ac.
19	Rio Nature Park	Martin	Nature park managed by Martin County. Recreational activities include picnicking and wildlife viewing (Martin County, Department of Parks and Recreation 2011a). 2.5 ac.

Map ID	Recreational Resource	County	Description
N-S Corridor			
20	Sailfish Ballpark	Martin	Ball Park managed by the City of Stuart. Recreational facilities include baseball fields, racquetball courts, tennis courts and picnicking facilities (City of Stuart, Community Services n.d.).
22	Station 30 Park	Martin	Community park managed by Martin County. Recreational facilities include picnicking facilities and playground (Martin County Property Appraiser 2012).
23	Broward St. Boat Ramp	Martin	Boat ramp managed by Martin County. Primary function is the loading and removing of boats from manatee pocket (Martin County, Department of Parks and Recreation 2011b).
24	Seabranche Preserve State Park	Martin	Park managed by the State of Florida. Recreational activities include: hiking, picnicking, and wildlife viewing (Florida State Parks 2013). 1,000 ac.
25	William G. "Doc" Meyers Park a.k.a. "South County Ball Park"	Martin	Ball Park managed by Martin County. Recreational facilities include softball/baseball fields, basketball courts, tennis courts, multi-purpose football and soccer fields, a batting cage, and concessions (Martin County, Department of Parks and Recreation 2011b). 35 ac.
26	Saturn Ave Addition	Martin	Park managed by Martin County. Park consists of a vacant lot with no facilities (Martin County, Department of Parks and Recreation 2011b).
27	Hobe Sound National Wildlife Refuge	Martin	Wildlife refuge managed by the United States Fish and Wildlife Service (USFWS) bisected by the proposed alignment. Recreational activities include: wildlife viewing, surf fishing, beach use, hiking and environmental education (USFWS 2013c). > 1,000 ac
28	Jonathan Dickinson State Park	Martin	Park managed by the State of Florida bisected by the proposed alignment. Recreational activities include: biking, hiking, boating, camping, swimming, picnicking, horseback riding, and wildlife viewing (Florida State Parks 2013). 10,500 ac.
29	Sawfish Bay Park ¹	Palm Beach	Park managed by the Town of Jupiter. Recreational activities include: picnicking, fishing, canoeing and kayaking (Town of Jupiter, Parks Department 2013). 2.5 ac.
30	Lake Park Scrub Natural Area	Palm Beach	Natural area managed by Palm Beach County. Recreational activities include hiking and wildlife viewing (Palm Beach County, Environmental Resources Management 2013). 55 ac.
31	Northwood Community Center	Palm Beach	Community park managed by the Boy and Girls Club of Palm Beach County. Recreational facilities include: outdoor basketball court, playground and recreational fields (Boys and Girls Clubs of Palm Beach County 2013).
32	Nathaniel Adams Park	Palm Beach	Community park managed by the City of West Palm Beach. Recreation facilities include a playground and basketball courts (City of West Palm Beach n.d.).

Source: FNAI. 2012. *Florida managed Areas-June 2012*. Using: ArcGIS 10.1. Redlands, California: ESRI 2012. Tallahassee, Florida.; University of Florida GeoPlan Center. 2009. *Florida Parks and Recreational Facilities 2009*. Using: ArcGIS 10.1. Redlands, California: ESRI 2012. Gainesville, Florida.

1 Section 6(f) Resources

Section 3.3.8 of the 2012 EA listed an additional 45 recreational properties within 300 feet of the WPB-M Corridor (Table 4.4.6-3).

Table 4.4.6-3 Recreational Resources Within the West Palm Beach – Miami Corridor Study Area

Resource Name	County/Municipality
Flamingo Park	West Palm Beach
Mary Brandon Park	West Palm Beach
City of West Palm Beach Municipal Golf Course	West Palm Beach
City of West Palm Beach Recreational Center	West Palm Beach
Hypoluxo Scrub Natural Area	Palm Beach County
Seacrest Scrub Natural Area	Palm Beach County
Lake Worth Shuffleboard Courts	Lake Worth
Lake Worth Recreation Center	Lake Worth
Veterans Park	Boyton Beach
Bicentennial Park	Boyton Beach
Pence Park	Boyton Beach
Palm Beach County Recreation Center	Boyton Beach
Worthing Park	Delray Beach
Currie Commons Park	Delray Beach
Miller Park	Delray Beach
Leon M. Weekes Environmental Preserve	Delray Beach
Boca Isles Park	Boca Raton
City of Boca Raton Recreation Center	Boca Raton
City of Boca Raton Gopher Tortoise Preserve	Boca Raton
Rosemary Ridge Preserve	Boca Raton
Poinciana Park/Dog Park	Hollywood
Dowdy Baseball Park	Hollywood
Byrd Park	Dania
Jaco Pastorius Park and Community Center	Oakland Park
Tarpon River Park	Fort Lauderdale
Florence C. Hardy Park	Fort Lauderdale
Sistrunk Park	Fort Lauderdale
Oakland Park Boat Ramp	Fort Lauderdale
Midway Park	Fort Lauderdale
City of Fort Lauderdale SW 9th Street Recreation Center	Fort Lauderdale
Florence C. Hardy Park and Southside Cultural Center	Fort Lauderdale
Highlands Scrub Natural Area	Broward County
Broward County Planned Park	Broward County
Colohatchee Park	Winton Manors
Aqua Bowl Park	North Miami Beach
Arthur I. Snyder Tennis Complex	North Miami Beach
Oleta River State Park	Miami-Dade County
Arch Creek Park	Miami-Dade County
Arch Creek Park Addition	Miami-Dade County
Greynolds Park	Miami-Dade County
Dorsey Park	City of Miami
Woodson/Miami Design Park	City of Miami
Ed Abdella Field House and Athletics	City of Miami
El Portal Tot Lot	Village of El Portal

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013.

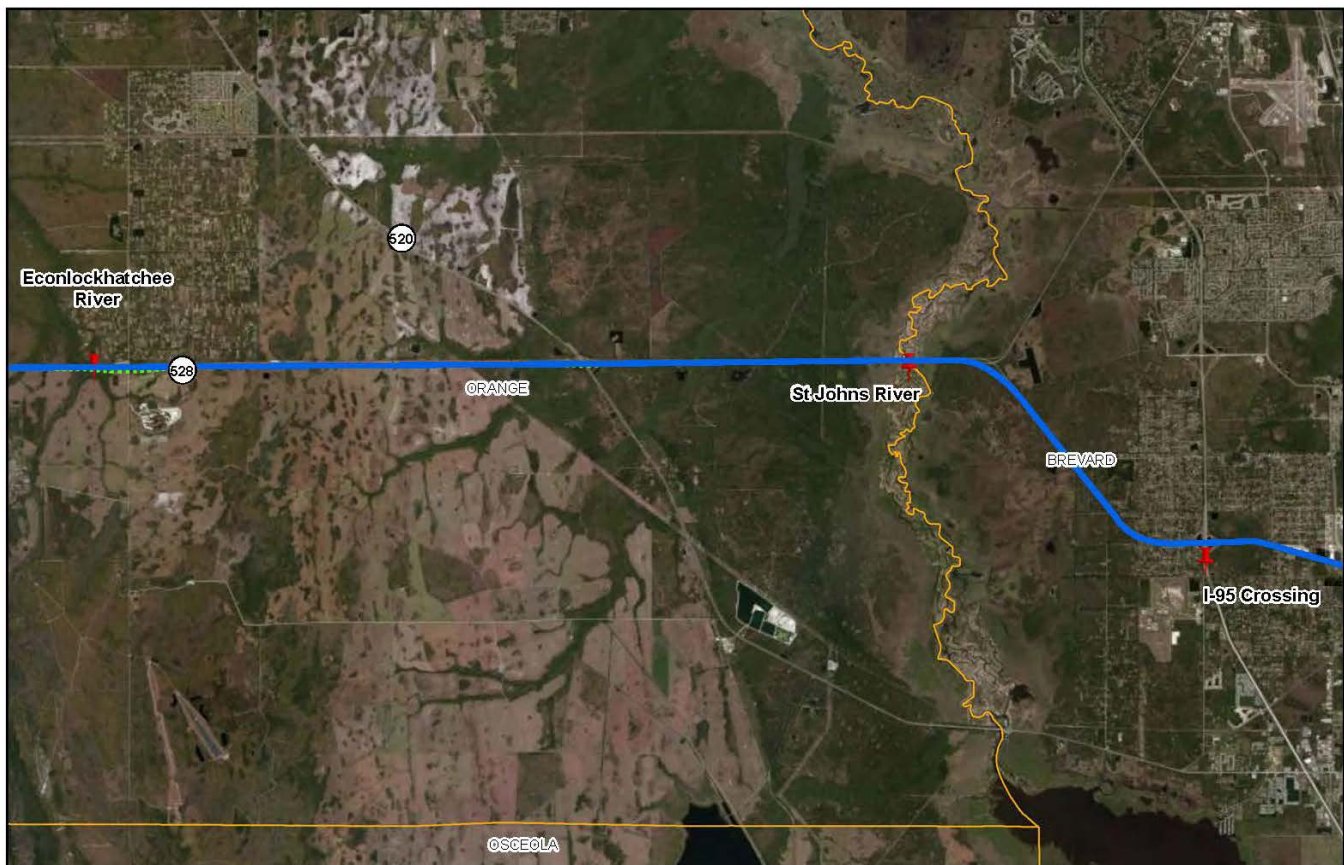
4.4.7 Visual and Scenic Resources

Visual and scenic resources include natural and man-made features that give a particular landscape its aesthetic properties. Visual resources include sites, objects, and landscapes features that contribute to the visual character of the surrounding area and/or are valued for their scenic qualities. They can include designated scenic routes and views within natural areas, parks, and urban areas identified as having historical or cultural significance.

4.4.7.1 Methodology

Three crossing locations along the E-W Corridor (at the Econlockhatchee River, St. Johns River, and I-95) were selected as representative sites that illustrate the potential impact that the new rail line would have on its surroundings (Figure 4.4.7-1). No photo renderings were developed for the N-S Corridor as this is currently a developed rail corridor and restoring the second track is not anticipated to substantially change the visual environment.

A mosaic of hundreds of high-resolution digital pictures was used as a backdrop on which the rendered rail alignment and bridges could be placed. Two points of view were chosen for the St. Johns River Bridge visual analyses to show the viewshed from the point of view of the driver on SR 528 looking toward the proposed railroad bridge and from the St. Johns River looking north toward the bridge. Viewpoints and camera views were arranged in the modeling software, 3D Studio Max, to match the perspective views of the photographs. The bridges, earth retaining walls, trains, guardrails and barriers were all modeled. Each element was assigned a material and color, which was then rendered by the software. Several revisions of the renderings were required to assure that the shade and shadows matched the photographs. The renderings were melded into the existing photographs using Adobe Photoshop. Existing and proposed renderings were developed in order to display potential impacts to visual and scenic resources.



Explanation of Features

- E-W Corridor
- 📌 Photo Rendering Location

E-W Corridor Visual Environment Key Map		
All Aboard Florida Intercity Passenger Rail Project		
		4.4.7-1

Data Sources: ESRI 2012, FGDL 2012, AMEC 2013

Path: F:\FEC\OFF\ECI_008\MXD\ES E-W Corridor Visual Environment Key.mxd

4.4.7.2 Affected Environment

The visual and scenic resources associated with the MCO Segment and VMF generally consist of SR 528, MCO, and associated airport infrastructure such as parking lots.

The E-W Corridor would be located parallel and adjacent to SR 528, where there is currently no rail line. The areas outside of the current transportation right-of-way generally consist of undeveloped wooded areas, agricultural pasture, wetlands, and road crossings. The current E-W Corridor area provides scenic views to motorists on SR 528. The corridor, the existing SR 528 highway, is within the viewshed of recreational users of roads and trails in the Tosohatchee Wildlife Management Area and the St. Johns River. Motorists traveling on SR 528 and crossing the Econlockhatchee River currently see a narrow view of the river and associated dense floodplain vegetation. Figure 4.4.7-2a shows the existing view of the Econlockhatchee River looking south from SR 528. Motorists traveling on SR 528 crossing the St. Johns River see a broad view of the river with an open floodplain and meandering river channel. Views from the St. Johns River looking north towards SR 528 are wide and open with the low SR 528 bridge crossing the river. Figures 4.4.7-3a and 4.4.7-4a provide existing views of the St. Johns River looking southeast from SR 528 and from the St. Johns River looking north. Motorists traveling on I-95 towards the SR 528 overpass currently see sparse vegetation on the right and left sides of the roadway with the overall view

dominated by the SR 528 overpass. Figure 4.4.7-5a shows the existing view of the SR 528 overpass from I-95. The views depicted in Figures 4.4.7-2 through 4.4.7-5 are representative of the viewshed changes along the Project corridor.

The visual and scenic resources associated with the N-S Corridor generally consist of the previously disturbed FECR Corridor. The N-S Corridor is visible from roadways that cross at-grade. Motorists' views at these at-grade roadways are limited to grade crossings, lights, gates, and flashers. In a few locations, especially urban areas, the N-S Corridor is visible from nearby buildings. Views currently consist of one or two tracks, railroad ballast, and infrastructure. In more suburban areas, vegetation generally screens the views of the railroad. Boaters traveling on navigable waterways, such as Crane Creek, the Sebastian River and the St. Lucie River, have a view of the existing FECR Corridor bridges. In most locations, these consist of an active, maintained bridge and a parallel out-of-service, poor condition, structure.

As noted by several DEIS commenters, the Indian River Lagoon is a designated Scenic Byway. The FECR Corridor parallels the west shore of the Lagoon, separated from the waterway by intervening uplands and roads. In a few locations there may be views from the train to the Lagoon, but the railroad corridor is not part of the viewshed of the Lagoon.

Visual and scenic resources associated with the WPB-M Corridor are similar to the N-S Corridor.

4.4.8 Utilities and Energy Resources

This section describes the public utilities and energy facilities and providers within the Project Study Area.

4.4.8.1 Methodology

The affected environment for public utilities and energy resources was determined based upon the following web-based resources:

- Orlando Utilities Commission (OUC) – Service Area Map;
- Orange County – Planning and Development Map;
- USDOT – Pipeline Mapping System;
- Waste Management-Class III Landfills; and
- Florida Department of Agriculture and Consumer Services – Annual Motor Gasoline and Diesel Report.



A - Econlockhatchee River - Existing View of River



B - Econlockhatchee River - Future View of River Alternative E

Existing and Future Views of Econlockhatchee River

All Aboard Florida Intercity Passenger Rail Project

NTS



U.S. Department
of Transportation
**Federal Railroad
Administration**

4.4.7-2

Source: HNTB

Path: F:\ECON\FECL\G08\W\X\0\EA\NS\W\k\body\082616\Map2.mxd



A - St. Johns River - Existing View of River



B - St. Johns River - Future View of River

Existing and Future Views of St. Johns River, Southeast View

All Aboard Florida Intercity Passenger Rail Project

NTS



4.4.7-3

Source: HNTB

Path: F:\FEC\FEC_I_G\DB\X\VIEW\NS Map\body crossing Map2.mxd



A - St. Johns River - Existing View from River



B - St. Johns River - Future View from River

Existing and Future Views of St. Johns River, North View

All Aboard Florida Intercity Passenger Rail Project

NTS



4.4.7-4

Source: HNTB

Path : F:\ECAFEC\1_0_DB\X\DEAMS\table\body\06611g_Map2.mxd



A - I-95 Interchange - Existing view of Interchange



B - I-95 Interchange - Future view of Interchange

Existing and Future Views of SR 528 Overpass from I-95, North View

All Aboard Florida Intercity Passenger Rail Project

NTS



U.S. Department
of Transportation
**Federal Railroad
Administration**

4.4.7-5

Source: HNTB

Path: F:\FEC\FEC\1_0 DEWIX\DEWIX\101616\body\existing Map2.mxd

4.4.8.2 Affected Environment

Existing utilities (water systems, stormwater management systems, energy production/transmission facilities) were identified for each of the three project corridor segments.

Existing utilities within the MCO Segment include power and subsurface utilities associated with MCO. The E-W Corridor contains the following utilities, based on information provided by AAF:

- Stormwater management system for SR 528;
- Overhead transmission lines owned by Florida Power and Light (FPL), OUC, and Progress Energy Florida LLC/TECO Energy Inc.; and
- Two existing pipelines (Pipeline and Hazardous Materials Safety Administration 2007), owned by Florida Gas Transmission Company LLC.

Electrical service providers within the E-W Corridor include FPL, OUC, and Progress Energy. Electrical service providers within the N-S Corridor include FPL and the City of Vero Beach.

The N-S Corridor contains underground fiber-optic duct banks containing FECR communications and signals systems. Several overhead and underground utilities are also present within the FECR right-of-way, under license to FECR.

5 Environmental Consequences

This chapter describes the consequences of the No-Action Alternative and three Action Alternatives (Alternatives A, C, and E) to the environmental resources specified in Federal Railroad Administration's (FRA) *Procedures for Considering Environmental Impacts* (64 FR 28545). The discussion of environmental consequences includes any adverse environmental impacts that cannot be avoided, the relationship between short-term uses of environmental resources and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources that would be involved in the Project should it be implemented. This chapter also includes a summary of the environmental consequences of Phase I, West Palm Beach to Miami Passenger Rail, as presented in the 2012 EA. Mitigation for any unavoidable impacts is discussed in Chapter 7, *Mitigation*

As noted in Chapter 3, *Alternatives*, AAF has identified Alternative E as its preferred alternative because it is the only alternative that is reasonable and feasible to construct. The E-W Corridor segment of the Project requires the CFX to lease land for the rail corridor. The CFX approved only Alignment Alternative E (Appendix 3.2.3). Therefore, Alternatives A and C have been dismissed because it would not be possible to lease the land necessary for construction and operation. Alternative E includes four segments: the MCO Segment, which includes the proposed VMF and new railroad infrastructure between the VMF and the E-W Corridor; the E-W Corridor on new alignment (Option 3E) between MCO and Cocoa, paralleling SR 528; the N-S Corridor within the FECR ROW between Cocoa and West Palm Beach, and the WPB M Segment within the FECR ROW. FRA has evaluated AAF's analysis and concurs that Alternative E is its preferred alternative that would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors.

5.1 Land Use, Transportation, and Navigation

This section provides a description of the potential consequences of the Project with respect to land uses, transportation (regional and local roadways), and navigation (boat traffic and related economics).

5.1.1 Land Use

This section identifies the potential direct, indirect, and secondary effects to land and land uses for each Alternative. As required by the National Environmental Policy Act (NEPA) regulations (40 CFR § 1502.16(c)), this section also includes a discussion of "possible conflicts between the proposed action and the objectives of federal, regional, state, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned."

As documented below, each Action Alternative would convert up at least 245 acres of land to transportation use through All Aboard Florida (AAF)'s acquisition of private property and leasing land from public entities including the Greater Orlando Airport Authority (GOAA), Central Florida Expressway Authority (CFX, formerly the Orlando-Orange County Expressway Authority, OOCEA), and the Florida Department of Transportation (FDOT). The Project would be consistent with all applicable local and regional comprehensive plans.

5.1.1.1 Environmental Consequences

The impacts of the Project on land include areas where property would be acquired through fee or lease and where existing non-transportation land uses would be converted to transportation. This section also includes an evaluation of the consistency of each alternative with local comprehensive plans.

In addition to the evaluation of consistency with local comprehensive plans, a consistency analysis was also performed for the Project relative to the *2060 Florida Transportation Plan*. The Project has been determined to be consistent with this state-level plan, as this plan identifies the development and operation of “a statewide high speed and intercity passenger rail system” as a long-range objective (FDOT 2011d). Further, one of the plan’s implementation strategies includes coordination with the private sector to develop and operate such a system (FDOT 2011d).

No-Action Alternative

Under the No-Action Alternative, construction and operation of the Project would not take place. Existing commuter and intercity railway services would remain unchanged, and no changes to local land use patterns would occur. Land use development would continue consistent with the approved and adopted local comprehensive, master, and/or visioning plans.

Alternative A

MCO Segment

The MCO Segment is entirely within MCO; it would not require acquisition of privately owned property. The Vehicle Maintenance Facility (VMF) portion of the MCO Segment would require the lease of 80 acres from GOAA. Land that is part of this lease agreement would convert from utilities (wastewater treatment plant and infiltration ditch) and undeveloped lands to transportation use.

The MCO Segment would be consistent with comprehensive plans (described below) of Orlando and Orange County.

The City of Orlando’s Growth Management Plan supports higher speed rail; it recognizes rail as an alternative to automobile and airline travel (City of Orlando, Planning Division 2011). The City desires to conduct annual coordination with GOAA to identify transportation alternatives to serve MCO. The City has also expressed an interest in becoming the hub of a statewide intercity railway system, and to work with FDOT to identify appropriate corridors and sites for stations and ancillary components associated with the system. The MCO Segment would be consistent with Orlando’s planning goals and objectives.

Orange County recognizes the need for alternative modes of transportation, and supports the development of high-capacity transit systems. The county also supports the expansion of commuter rail stations to major employment centers such as MCO, International Drive, and the Central Florida Research Park (Orange County Planning Division 2012). The MCO Segment would be consistent with Orange County planning goals and objectives.

East-West Corridor

CFX plans to acquire an additional 538 acres of right-of-way south of the existing State Road 528 (SR 528) right-of-way along an approximate 17-mile stretch in Orange County. This land acquisition will allow for future expansion of SR 528, as well as the Project. SR 528 is owned by FDOT in Brevard County; FDOT's expansion plans for SR 528 do not require the acquisition of additional right-of-way. However, in order for the Project to accommodate FDOT's SR 528 expansion plans, AAF intends to acquire approximately 44 acres east of the Interstate 95 (I-95) interchange.

The E-W Corridor under Alternative A is predominantly within the current SR 528 right-of-way. Direct effects to land use from the E-W Corridor under Alternative A would be limited to the acquisition of nine privately owned parcels of property in Orange County and four in Brevard County, and the subsequent conversion of these properties from undeveloped land use to transportation use. The nine parcels of property in Orange County account for 45.1 acres. These parcels are zoned as residential, but their acquisition and use will not result in residential displacements. Three of the parcels in Brevard County are zoned as commercial and account for 21.2 acres, while the remaining parcel is zoned as industrial and accounts for 0.5 acres. No commercial or industrial operations would be displaced due to property acquisitions or use in Brevard County. AAF is also in the process of acquiring a property interest from the Florida East Coast Railway (FECR) in Brevard County that accounts for 26.9 acres, and is zoned as locally accessed railroad property. In total, acquisition and use of parcels along the E-W Corridor accounts for 93.7 acres.

As described above, CFX plans to acquire property in Orange County adjacent to the existing SR 528 right-of-way that would be converted to a transportation corridor. All of this land is currently undeveloped. For the E-W Corridor under Alternative A, CFX would lease approximately 245 acres of the newly acquired land to AAF.

The E-W Corridor under Alternative A would be consistent with the comprehensive plan (described below) of Brevard County. As explained in the MCO Segment discussion, the Project would be consistent with growth management policies adopted by Orange County.

Although no station is planned in Brevard County as part of the Project, the Project is conceptually consistent with Brevard County's comprehensive plan, which encourages the expansion of transportation, including rail facilities, for the safe, efficient, and timely movement of passengers and goods (Objective 5) (Brevard County, Planning and Development 2011). The County also supports the development and maintenance of a comprehensive railway system to meet current and future needs as well as to further economic growth (Policy 5.2) (Brevard County, Planning and Development 2011). For these reasons, the E-W Corridor under Alternative A would be consistent with Brevard County planning goals and objectives.

North-South Corridor

Many commenters on the Draft Environmental Impact Statement (DEIS) noted that the Project was not consistent with local planning because it would increase train trips without providing transportation benefits in the communities where no stations or transportation improvements are proposed. The N-S Corridor is entirely within the existing Florida East Coast Railway (FECR) Corridor, and would not require acquisition of privately owned property or new development; therefore, there would be no land use

conversions. For this reason, although the Project does not fulfill specific intents of many local comprehensive plans, it is partially consistent with these plans. The discussions below describe the limited consistency between the N-S Corridor and the applicable county comprehensive plans.

The N-S Corridor is partially consistent with the comprehensive plans of Indian River, St. Lucie, Martin, and Palm Beach Counties (described below). Even though no stations are planned within these counties as part of Phase II, the Project advances relevant policies. As explained in the E-W Corridor discussion, the Project would be consistent with growth management policies adopted by Brevard County. Indian River County does not have a passenger rail service, but supports future planning to secure access to the FECR Corridor for future passenger rail. Indian River County also supports future coordination with the FDOT and Florida East Coast Industries (FECI) about a passenger rail service (Policy 6.7) (Indian River County, Planning Division 2010).

According to the St. Lucie Comprehensive Plan, St. Lucie County supports the reestablishment of passenger rail along the eastern coast of Florida (St. Lucie, County Planning Division 2010) and supports the establishment of rail stations in Fort Pierce, Port St. Lucie, and/or within the County's urban service area. One of the goals of St. Lucie County is to provide safe and efficient multi-modal transportation systems that address the movement of people and goods. AAF has no plans in place at this time to provide direct passenger rail service to Brevard, Martin, St. Lucie and Indian River counties by constructing stations and the use of regular, intermittent or skip-stop service. However, AAF does not preclude additional stations as demands warrant in the future. Brevard County is evaluating options for a possible station and locations where such a station, in the future, might be located. Indian River, Martin and St. Lucie counties may also undertake ridership studies to determine if stations are feasible.

One of Martin County's goals, as stated in its Comprehensive Growth Management Plan, is "to develop and implement a transportation network that is coordinated and consistent with municipal, County, state, federal and regional planning programs and planning programs of adjacent jurisdictions" (Martin County Growth Management Department 2013). As noted in Policy 3.1A.5, elected officials representing Martin County "should address regional issues such as air travel, and bypass corridor alternatives to U.S. Route 1, including the St. Lucie Bypass Corridor and high-speed rail (Martin County Growth Management Department 2013). Further, as noted in Policy 5.1A.5, Martin County desires to "plan for comprehensive long range transportation needs" (Martin County Growth Management Department 2013). Policy 5.1A.5 references coordination with the Florida High Speed Rail Authority, an entity that proposed high-speed passenger rail that would have traversed Martin County if constructed.

The Palm Beach County Comprehensive Plan does not include objectives or policies regarding constructing higher speed railway in the county (Palm Beach County, Planning Division 2013); however, it does describe the Tri-Rail, South Florida's existing commuter rail system. The county encourages the use of this railway for commuter transportation through incentive programs. Palm Beach County designs and implements these incentive programs through coordination with Tri-Rail and the Palm Beach Metropolitan Planning Organization.

Phase I – West Palm Beach to Miami Corridor

As stated in Section 3.3.2 of the 2012 EA, the WPB-M Corridor, which includes the Preferred Build System Alternative and the Preferred Build Station Alternatives, would not have a significant effect on land use or property acquisition. Proposed improvements to the mainline are occurring within existing right-of-way

and the existing corridor is identified as a transportation land use in all three counties (Palm Beach, Broward, and Miami-Dade). Property acquisition would be required for the proposed West Palm Beach Station and relocated Fort Lauderdale Station. These property acquisitions would not have significant, adverse impacts on property owners or land use, as documented in the 2012 EA (Section 3.3.2).

Alternative C

The E-W Corridor is the only component under Alternative C that differs from Alternative A. The E-W Corridor under Alternative C straddles the current SR 528 right-of-way and the newly acquired land by CFX in the segment of the corridor owned by CFX. This straddle design would require the same land acquisition and access arrangements with CFX, GOAA, and FDOT as described in the E-W Corridor under Alternative A. Under Alternative C, however, CFX would lease 374 acres of the newly acquired land to AAF, which would result in the use of 467.7 acres of land through either acquisition or leasing (93.7 acquired, 374 leased).

The E-W Corridor under Alternative C would be consistent with local comprehensive plans. As explained under Alternative A, the Project would be consistent with growth management policies adopted by Orange and Brevard Counties.

Alternative E

The E-W Corridor is the only component under Alternative E, the preferred alternative, that differs from Alternatives A and C. The E-W Corridor under Alternative E would be offset approximately 200 feet south of the existing SR 528 right-of-way, and completely within the newly acquired land by CFX in the portion of the E-W Corridor that lies adjacent to the land currently owned by CFX. This offset would require the same land acquisition and access arrangements with CFX, GOAA, and FDOT as described in the E-W Corridor under Alternatives A and C. Under Alternative E, CFX would lease 374 acres of the newly acquired land to AAF, which would result in the use of 467.7 acres of land through either acquisition or leasing (93.7 acquired, 374 leased).

The E-W Corridor under Alternative E would be consistent with local comprehensive plans. As explained under Alternative A, the Project would be consistent with growth management policies adopted by Orange and Brevard Counties.

5.1.1.2 Indirect and Secondary Impacts

The Project would not result in induced growth; no changes to land use due to induced growth would occur. The only potential growth-inducing Project component proposed under the No-Action Alternative is the new intermodal station at MCO to be constructed by GOAA. No transit-oriented development would occur at this station, as it is entirely within MCO property boundaries; it would not be a nucleus for induced growth.

The evaluation of potential indirect effects includes a review of population projections for Orange County, as the only station under Phase II of the Project is at MCO. The MCO Intermodal Station would be developed by GOAA as a separate action from the Project. Rail stations are potential growth inducers due to associated transit-oriented development, which provides increased economic activity and housing options. Transit-

oriented development is not anticipated at this location, as the station will be within MCO and is part of the planned South Terminal complex.

According to projections from the University of Florida, Orange County will add 550,979 residents between 2011 and 2035 (BEBR 2011b). Orange County will need to accommodate this projected growth. According to the county's Infill Master Plan, the county prioritizes infill and redevelopment, activity centers and mixed-use corridors (Orange County, Planning Division 2008). An increasing population, however, will put pressure on Orange County to expand services, such as water and sewer, to undeveloped lands. These conditions are independent of the Project; they represent baseline conditions that would occur under the No-Action Alternative. The MCO Segment and N-S Corridor under the Action Alternatives would not bisect any privately owned properties, no partial acquisition of parcels is required, and no adjacent land uses would change. The E-W Corridor under Alternatives A, C, and E would require the acquisition and use of nine privately owned properties outside the SR 528 right-of-way in Orange County and four privately owned properties plus one property interest belonging to FECR near the "Cocoa Curve" (the section of new right-of-way between the SR 528 alignment and the FECR right-of-way in Brevard County). Land use conversions on parcels adjacent to those associated with the Project are not anticipated. Similar to the Project-related parcels, the adjacent parcels are predominantly undeveloped at present.

Phase I of the Project (see Section 1.6 of the 2012 EA) includes development in the vicinity of each of the proposed stations. At West Palm Beach and Fort Lauderdale, there will be 10,000 square feet of retail space within the station. At Miami, the Project includes 30,000 square feet of retail within the station, and additional 75,000 square feet of transit-oriented retail, 300,000 square feet of office space, 400 residential units, and a 200-room hotel. As described in Section 3.5 of the Environmental Assessment for the All Aboard Florida Passenger Rail Project – West Palm Beach to Miami, Florida, dated October 31, 2012 (2012 EA), these connected actions as well as potential development and redevelopment outside of the station are consistent with the future land use plans for these counties.

5.1.1.3 Temporary Construction-Period Impacts

Constructing the Action Alternatives would not require permanent land acquisition for constructing staging areas or access. Temporary construction impacts to land use would include short-term construction easements on privately owned properties.

The Action Alternatives would not require construction easements for the MCO Segment, N-S Corridor, or WPB-M Corridor; all construction staging areas would be located on vacant lands within MCO or the existing FECR Corridor.

Temporary construction impacts to land use along the E-W Corridor would be limited to areas outside the SR 528 right-of-way. Construction easements would result in temporary land use conversions; however, pre-construction land use patterns would return once the construction period concludes. At this stage in the development of the Project, the number and location of required construction easements for the E-W Corridor alternatives are unknown.

5.1.2 Transportation

This section provides an analysis of the potential impacts of the Project on transportation systems. For the purposes of this transportation evaluation, the Project Study Area includes the MCO Segment, the

E-W Corridor, and the N-S Corridor. The impacts of the Project on transportation systems in the WPB-M Corridor were evaluated in the 2012 EA and the subsequent Finding of No Significant Impact in 2013 (2013 FONSI). This evaluation considers impacts on all transportation modes and infrastructure, including automobile, motorbus, pedestrian, train, and aviation.

Comments on the DEIS included concerns with the analysis of at-grade crossings and traffic delays, effects on other modes of transportation, and inputs to the traffic analyses. This section of the Final Environmental Impact Statement (FEIS) addresses those comments. Section 1.7.3 of this FEIS also provides a general response to comments concerning transportation.

There would be no significant impact to transportation as a result of the Project. The Project would not adversely impact (and will benefit) current freight train service on the FECR Corridor by increasing freight speeds and providing additional passing track, and would improve conditions on regional highways by relieving congestion. Increased train traffic will result in minor degradation of local road traffic conditions at certain at-grade crossings and nearby intersections.

5.1.2.1 Methodology

This analysis focuses on the impacts of increased train frequency on local roads, caused by more frequent trains and at-grade crossing closures. Annual Average Daily Volume (AADT) traffic data are available from FDOT for arterials in the Project Study Area. These were sorted and the largest two arterials by volume for each county were selected for analysis. By evaluating the highest-volume arterials in each county, the analysis presents a conservative “worst-case” analysis of future conditions. Ten major arterials with highway-rail grade crossings on the existing FECR Corridor were analyzed (Table 5.1.2-1).

County	Location	Annual Average Daily Volume (AADT) (2011)
Brevard	Pineda Causeway	40,000
	Palm Bay Road	26,000
Indian River	Oslo Road	12,400
	19 th Place/20 th Place	11,500
St. Lucie	Seaway Drive	6,600
	North Causeway	8,200
Martin	SE Indian Street	16,200
	E Monterey Road	15,900
Palm Beach	Banyan Boulevard	39,500
	Northlake Boulevard	40,000

Highway capacity analysis for the 10 at-grade railroad crossings and intersections were conducted in accordance with the methodology presented in the Highway Capacity Manual utilizing Synchro/Simtraffic software, Version 8 (TRB 2010).

Level of service (LOS) provides a qualitative relationship between operational conditions. Signalized LOS ranges from “A” through “F,” with “A” being the most free operating condition and “F” being the most

restrictive. Generally, LOS “D” or better is considered acceptable. LOS for signalized intersections is measured by control or signal delay per vehicle. Unsignalized LOS ranges from “A” through “H,” with “A” being the most free operating condition and “H” being the most restrictive. Generally, LOS “D” or better is considered acceptable. LOS for unsignalized intersections is calculated using the Intersection Capacity Utilization (ICU) method by taking a sum of critical volume to saturation flow ratios. Table 5.1.2-2 provides the delay ranges for the signalized and unsignalized LOS. No significant adverse impacts would occur if the future LOS is D or better, and if the LOS below “D” does not deteriorate.

Level of Service	Signalized Intersections - Delay (seconds/vehicle)	Unsignalized Intersections – Intersection Capacity Utilization (ICU)
A	<10	<55
B	10.1 to 20.0	>55 <64
C	20.1 to 35.0	>64 <73
D	35.1 to 55.0	>73 <82
E	55.1 to 80.0	>82 <91
F	> 80.0	>91 <100
G		>100 <109
H		>109

For the Project, intersections and railroad crossings were analyzed with conditions similar to the projected evening (PM) Peak Hour, to represent the maximum traffic volume during the day. Each location was analyzed without train crossings, with freight train crossings, and with passenger train crossings.

The operation includes a clearance phase prior to the arrival of the train to clear any queues present on the railway and adjacent approaches. Then the train-crossing event is simulated. During the train-crossing event, the traffic movements not in conflict with the train crossing continue to operate normally.

Since the train crossings occur approximately three times during the peak hour, the closure time for each crossing was calculated without train crossing, with freight train crossing, and with passenger train crossing closures. However, the combined freight train and passenger train schedules could result in more than three trains per hour at various times of day and at various locations.

Queue lengths were obtained for the 95th percentile queue as calculated by the Synchro/Simtraffic software. The 95th percentile queue represents the queue length that is not expected to be reached 95 percent of the time. Results for closure times, LOS, and queue length were calculated for each crossing and adjacent intersections for 2016 (Appendix 3.3.5-D). LOS and queue length with the freight train crossings are considered to be equivalent to the No-Action condition.

5.1.2.2 Environmental Consequences

This section presents the potential impacts of the Project on rail transportation, highways, and local roads, in comparison to the No-Action Alternative in the same analysis year (2016, projected to be the first year of revenue service).

No-Action Alternative

The No-Action Alternative would not cause significant adverse impacts to rail transportation. Under the No-Action Alternative, there would be no passenger train service added from Cocoa to West Palm Beach and the existing freight infrastructure would be maintained. Freight train configurations would be expected to incorporate the anticipated annual cargo growth of approximately 3 percent through increases in train length and/or speed. The No-Action Alternative would not result in any delays or impacts related to construction of stations or other infrastructure required for the Project. The upgrades to the FECR Corridor contemplated as part of the Project would not, however, occur in the near term as part of the No-Action Alternative, and freight speeds would not increase. The demand for freight capacity is expected to grow along the N-S Corridor. Based on anticipated operations data for the 2016 opening year, the number of freight trains per day is expected to increase from 18 (in 2011; 14 in 2013) to 20 in 2016 along with an increase in the average train length to 8,150 feet (AMEC 2014a). The projected annual increase in freight would result in minor increases in local roadway crossing closures, but total impacts relative to existing conditions would be minimal.

Given the projected increase in intercity traffic, the No-Action Alternative has the potential to contribute to future adverse transportation impacts on SR 528, I-95, and Florida's Turnpike by not aiding in the reduction of the projected increase in total automobile volume on these roads. Without the added capacity provided by the proposed passenger service, these roads would be forced to absorb the majority of this increase.

The No-Action Alternative would not have a significant impact on local vehicular traffic. Based on data provided in Table 5.1.2-3, the projected annual increase in freight operations would increase local roadway crossing closure times. Table 5.1.2-3 shows the at-grade closure times for the No-Action Alternative (freight), based on 22 trains per day (2019 conditions). Closure times would range from an average of 2.3 to 4.0 minutes per hour, with the longest closures occurring in Martin County. This is an increase from the existing average of 1.2 minutes per hour (Table 4.1.2-4), but would not have a significant impact on traffic.

Table 5.1.2-3 Summary of No-Action (2019) Freight Operating Characteristics and Average Crossing Closures within the N-S Corridor

County	Time to Activate and Close the Gate (sec) ¹	Avg. Train Length (ft.)	Avg. Train Speed (mph) ³	Time to Clear (sec)	Time to Bring the Gate Back Up (sec)	Total Time to Activate and Clear (sec)	Crossings (Trains per Day)	Closure (min/day)	Maximum Crossings per Hour ²	Maximum Closure Time per Hour (min) ⁴
Brevard	30	8150	28.5	195	15	240	22	88.0	2	4.0
Indian River	30	8150	28.5	195	15	240	22	88.0	2	4.0
St. Lucie	30	8150	28.5	195	15	240	22	88.0	2	4.0
Martin	30	8150	28.5	195	15	240	22	88.0	2	4.0
Palm Beach	30	8150	59.4	94	15	139	22	60.0	2	2.3

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013.

- 1 FRA regulations require 20 seconds to activate and close the gate prior to the train entering the railroad crossing and 10 seconds to bring the gate back up. FDOT uses 30 seconds to activate and close the gate prior to the train entering the railroad crossing and 15 seconds to bring the gate back up. To account for the worst-case scenario, FDOT timings were used in this analysis.
- 2 Maximum crossings per hour includes north-bound and south-bound trains combined
- 3 2011 freight speed for Palm Beach, Martin, St. Lucie, Indian River, and Brevard Counties was obtained from Section 3.3.1.1 of the Environmental Assessment for the All Aboard Florida Passenger Rail Project – West Palm Beach to Miami, Florida, dated October 31, 2012.
- 4 Maximum Closure Time per Hour calculated as the Total Time to Activate and Clear multiplied by the Maximum Crossings per Hour.

Action Alternatives A, C, and E

The Project would have the same impacts as a result of Alternatives A, C, or E. The route alternatives for the E-W Corridor would have the same impact on rail transportation, other modes of transportation, and highway and local traffic, as they would include the same impacts on existing rail and highway infrastructure, have the same ridership and effects on vehicle miles traveled, and would have the same number and locations of at-grade crossings. Table 5.1.2-4 shows the predicted diversion from other modes of transportation in 2019 (when passenger volumes are predicted to reach steady levels).

Mode	Percent of AAF Passengers Diverted from other Modes	Annual Passengers Diverted	Daily Passengers Diverted
Long-Distance Market			
Air	10	152,630	418
Rail	2	30,526	84
Bus	10	152,630	418
Short-Distance Market			
Bus	22	427,790	1,172

Source: Louis Berger Group. 2013. *All Aboard Florida Ridership and Revenue Study: Summary Report*. September 2013. Prepared for Florida East Coast. Report.

Rail Impacts

The Project passenger operations would include 16 round-trip passenger trains per day, which amounts to a maximum frequency of two passenger trains crossings per hour. Maximum operating speeds would range from 79 to 125 mph, depending upon the location along the E-W or N-S Corridors. Operating speeds will be greatest along the E-W Corridor where there are no highway-rail grade crossings. From the station at MCO to the station at West Palm Beach, service would be nonstop, as there are no intermediate stations proposed.

The N-S Corridor has been designed to cause no adverse impact on freight operations, and has an assumed beneficial impact on freight operations. The addition of passenger rail service would require modifying the mostly single-track system to a mostly double track system, which would be used by both passenger and freight operations. This will improve freight efficiency by increasing average operating speeds. As a result, the Project would have beneficial impacts on future freight traffic along the N-S Corridor. There are no existing freight rail operations within the E-W Corridor; therefore, no impacts to freight rail operations would occur in the E-W Corridor with Alternatives A, C, or E.

The Project would also have a beneficial impact on the passenger rail transportation network between Orlando and Miami by providing potential customers with an alternative means of rail transportation. The Project is designed to provide a direct, nonstop rail service from MCO to West Palm Beach, which is a different service geographically and functionally compared to the existing Amtrak service. The Project

would also provide more frequent and regular service, which would result in more flexibility to potential customers.

Riders for AAF are expected to be primarily diverted from automobile modes (69 percent of forecast ridership). However, 2 percent of the AAF ridership is forecast to accrue from competing passenger rail services, which would include the existing Amtrak service. In 2019, this amounts to approximately 30,526 annual trips (Table 5.1.2-4) diverted from Amtrak, which is about 4 percent of Amtrak's FY2012 ridership along the Silver Star (425,794) and Silver Meteor (375,164) corridors (Amtrak 2012). No diversion from Tri-Rail is anticipated. Tri-Rail provides frequent commuter-rail service between West Palm Beach and Miami, with multiple stops and relatively low fares. The infrequent intercity passenger rail service provided by AAF would have fewer stops and higher fares, and would not be expected to divert a significant number of riders.

Inter-City Motorbus Service Impacts

The proposed passenger train service would divert 10 percent of its long-distance riders and 22 percent of its short-distance riders on the WPB-M Corridor from private inter-city motorbus services (Table 5.1.2-4). This totals approximately 152,630 annual bus passenger-trips per year in the long-distance market and 427,790 trips per year in the short-distance market.

Local Transit Service Impacts

The Project is not anticipated to impact local transit services, as intercity passenger rail would not compete with local transit services for long-distance riders due to the stations served and the higher fares. Local transit providers (such as LYNX in Orlando) would be expected to carry more passengers locally as a result of the rail service as these passengers will be seeking connections to their ultimate destinations from the AAF station.

Aviation Impacts

The proposed passenger train service would attract approximately 10 percent of its riders from the air service market (Louis Berger Group 2013). This totals approximately 152,630 annual aviation passenger trips per year (418 per day) who could potentially choose train service based on convenience and cost. This does not represent a significant diversion from the overall air passenger market between central and southeast Florida.

Regional Roadway Impacts

The FDOT "Vision Plan" discussed in the Purpose and Need Statement estimates that the total intercity travel person trips between Miami and Orlando will increase from 9.5M in 2000 to 18.5M by 2020, with further increase to 30.5M by 2040 (FDOT 2006a). This will result in several roadway segments exceeding capacity.

The ridership analysis projected that 335,628 auto vehicle trips per year would be removed from the roads as a result of the Project in 2016 and 1.2M vehicles would be removed per year in 2019 (Louis Berger Group 2013).

The Project would have a beneficial impact on regional roadway transportation networks by providing additional transportation capacity between Orlando and Miami. Construction and operation of the Project would reduce the cumulative traffic volume on I-95, Florida's Turnpike, and SR 528 by removing vehicles and providing an easily accessible and efficient alternative means of transport to residents and visitors between the Orlando, West Palm Beach, Fort Lauderdale, and Miami areas.

Local Traffic Impacts

Many commenters on the DEIS expressed concern that the Project would increase traffic congestion and travel delays, especially in downtown areas, as a result of increased grade crossing closures. Commenters stated that the impact analysis presented in the DEIS underestimated the congestion and delays that would result from the Project, particularly in town centers that already experience high levels of seasonal traffic, and did not take into account the impacts that could occur where there are several closely-spaced at-grade crossings, and did not fully account for delays associated with adjacent traffic signals. Section 1.7.3 of this FEIS provides a general response to these comments. This section of the FEIS has been revised to address comments.

The proposed VMF would have a negligible impact on local vehicular transportation. Assuming facility operations would require 100 employees per day and each employee, in addition to arriving and leaving from work each day, left an average of once during the day for lunch, meetings, and errands. The estimated maximum number of trips that would be generated each day is 400. This traffic would access the station via Boggy Creek Road from either the northwest or southeast. In 2012, the AADT for these portions of Boggy Creek Road were 13,000 and 9,300, respectively. If employee access is distributed evenly between both access directions, the increase in AADT would consume 1.5 percent of current capacity in the northwest direction and 2.2 percent in the southeast direction. This is considered minor, as the threshold for a major impact is a five-percent loss of capacity. In existing conditions, Boggy Creek Road is operating at a LOS E. The Project is not anticipated to change the LOS during peak periods.

The Project would not impact local vehicular traffic along the E-W Corridor, as there would be no at-grade crossings and no public road closures.

Along the N-S Corridor, passenger rail service would result in minor increased traffic delays at existing roadway crossings. The Project would result in some degradation in LOS at the grade crossings and intersections studied, with greater percentages of time within an hour of operation under unacceptable roadway conditions than in the No-Action Alternative. With just three train crossings per hour (two passenger and one freight), the majority of each hour of operation would not be affected by the introduction of passenger train service. However, at some locations, more than three trains per hour are scheduled and greater percentages of those hours would operate under unacceptable levels of service than under the No-Action Alternative.

The increase in number of crossing events due to the addition of 16 passenger rail round trips per day would cause additional closures, but closures from passenger trains would be much shorter than closures from existing freight traffic (Table 5.1.2-5). On average, an at-grade crossing requires 30 seconds to activate and close the gates, and 15 seconds to bring the gate back up. FRA regulations require 20 seconds to activate and close the gate prior to the train entering the railroad crossing and 10 seconds to bring the gate back up. FDOT uses 30 seconds to activate and close the gate prior to the train entering the railroad

crossing and 15 seconds to bring the gate back up. To account for the worst-case scenario, FDOT timings were used in this analysis. For freight trains (average length 8,150 feet and average speed approximately 51 mph), a single train crossing results in an average crossing closure of 155 seconds (ranging from 147 to 170 seconds), which equates to 2.6 minutes. For passenger trains (average length 725 to 900 feet and average speed 93 mph), a single train crossing results in an average crossing closure of 51 seconds.

As shown in Table 5.1.2-5, typical at-grade crossings (intersections of local roads with the FECR Corridor) would be closed an average of 54 times per day (three times per hour), with closure times ranging from 1.7 minutes (passenger) to 2.8 minutes (freight). The total hourly closure would range from 4.2 minutes per hour to 4.5 minutes per hour, an increase of approximately 2 minutes per hour in comparison to the No-Action Alternative.

Detailed traffic impact analyses were done for the ten highest-volume at-grade crossings along the N-S corridor between Cocoa and West Palm Beach (Table 5.1.2-1). Several of the intersections where the N-S Corridor crosses local roads are also adjacent to other intersections. The analyses evaluate the impacts on local traffic for the road crossing the FECR Corridor as well as the adjacent connected intersections, with respect to level of service and the delay for each signal cycle (Table 5.1.2-6).

Average delays for both the No-Action Alternative and the Project alternatives at several of these intersections are much lower than the gate closure times predicted for passenger and freight trains. Although there may be some variability in when automobiles arrive at a closed intersection, some of the automobiles crossing at this location would experience a delay at least as long as the gate closure time.

At several locations described below, the at-grade crossing is adjacent to several other at-grade crossings. The high traffic volumes combined with the potential that numerous adjacent roadways could also have their crossing gates deployed at the same time could have greater impacts on traffic operations.

Table 5.1.2-5 At-grade Crossing Closures (2019)

County	Number of at-grade crossings ¹	Freight			Passenger		Total	
		Number of trains/day	Train speed (mph)	Maximum closure (min/hour) ²	Number of trains/day	Train speed (mph) ³	Maximum closure (min/hr)	Maximum closure (min/hr)
Brevard	55	22	53.8	2.5	32	98.1	1.7	4.2
Indian River	30	22	54.2	2.5	32	106.6	1.7	4.2
St. Lucie	20	22	47.8	2.7	32	92.6	1.7	4.4
Martin	25	22	44.4	2.8	32	79.5	1.7	4.5
Palm Beach	26	22	54.3	2.5	32	89.2	1.7	4.2

Source: AMEC. 2013 e. *Transportation and Railroad Crossing Analysis for the All Aboard Florida Passenger Rail Project from Cocoa to West Palm Beach, Florida*. September 2013. Report.

1 Maximum crossings per hour include northbound and southbound trains combined.

2 Maximum closure per hour calculated as the total time to activate and clear multiplied by the maximum crossings per hour, divided by 60.

2 Train speed is the average speed in all sections of track for the county.

Intersection	Normal Cycle ¹			Freight (2 cycles/hr)		Passenger (2 cycles/hr)		Weighted Average ²	
	Delay ³	LOS	Cycles/Hr	Delay ³	LOS	Delay ³	LOS	Delay ³	LOS
Banyan Blvd @S. Quadrille Blvd	59.4	E	40	186.8	F	184.2	F	70.9	E
Banyan Blvd @ FECR	1.6	A	40	173.6	F	171.9	F	17.2	B
Northlake Blvd @ Old Dixie Hwy	46	D	80	118.7	F	131.1	F	50	D
Northlake Blvd @ FECR	0.4	A	80	25.6	C	29.6	C	1	A
Northlake Blvd @ HW 811/10 th St	55.7	E	64	142	F	147.9	F	61	E
SE Indian Street @ SE Dixie Hwy	9.3	A	79	103	F	103.4	F	13.8	B
SE Indian St. @ FECR	0.2	A	79	64.3	E	63.3	E	3	A
SE Monterey Rd @ SE Dixie Hwy	8.8	A	79	113.1	F	114.5	F	13.9	B
SE Monterey Rd @ FECR	0.1	A	79	61.1	E	58.1	E	10.9	B
Hwy 714/Monterey Rd @ SE Federal Hwy	10.9	B	79	10.6	B	10.6	B	10.9	B
Seaway Dr @ US 1	20.6	C	53	146.6	F	146.6	F	29.4	C
Seaway Dr @ FECR	0	A	79	225.2	F	225.2	F	10.9	B
Seaway Dr @ Indian River Dr	8.6	A	79	8.6	A	8.6	A	8.6	A
North Causeway @ US 1	12.2	B	63	12.3	B	12.3	B	12.2	B
North Causeway @ Old Dixie Hwy	10.3	B	79	88.1	F	86.6	F	14	B
North Causeway @ FECR	0.5	A	79	25.1	C	17.5	B	1.5	A
Oslo Rd @ Old Dixie Hwy	11	B	80	95.1	F	95.1	F	15	B
Oslo Rd @ FECR	0.1	A	80	148.8	F	148.5	F	7	A
Oslo Rd @ US 1	18.8	A	80	143.9	F	143.9	F	24.8	C
19 th Place @ Commerce Ave	8.9	A	80	49.3 ⁴	D	49.6	D	10.8	B
19 th Place @ FECR	0.1	A	80	129.5 ⁴	F	128.4	F	6	A
20 th Place @ Commerce Ave	8.4	A	80	136.8 ⁴	F	136.5	F	14.5	B
20 th Place @ FECR	0	A	80	58.4 ⁴	E	58.0	E	2.8	A
Palm Bay Rd @ FECR	3.5	A	53	68.5 ⁴	E	12.1	B	6.1	A
Pineda Causeway @ Holy Trinity Dr	48.9	D	21	80.3	F	63.6	E	52.6	D
Pineda Causeway @ FECR	0.8	A	21	34.0	C	18.4	B	4.9	A

- 1 Normal Cycle
- 2 Weighted Average
- 3 Delay
- 4 Cycles per hour = 1

The analyses show that the Project would have a minor, but not significant, impact on local traffic by increasing the frequency of at-grade crossing closures. The majority of intersections operate at acceptable levels of service (LOS A to LOS C) under the normal signal cycle under both the No-Action Alternative and with the Project. The level of service degrades to LOS E or LOS F when a train passes, at most intersections. Four intersections (Banyan Boulevard at S. Quadrille Boulevard, Pineda Causeway at Holy Trinity Drive, Northlake Boulevard at Old Dixie Highway, and Northlake Boulevard at HW 811/10th Street) operate at poor levels of service (LOS D to LOS E) for all traffic signal cycles, and degrade to LOS F for short periods due to train passage. The weighted average for all signal cycles shows that most intersections operate at acceptable levels of service except the four intersections listed above, which already operate at poor levels of service. This demonstrates that the Project would not result in the degradation of the average level of

service from acceptable to poor at any intersection. The Project would result in 18 of the 26 intersections operating at LOS D to LOS F on average twice an hour, with delays at these intersections ranging from 49 seconds to 225 seconds (4 minutes) for a passenger train to traverse the signal. The effects of passenger trains would be similar to freight trains. As shown in Table 5.1.2-7, traffic operations forecast out to 2036 show similar results.

Intersection	Normal Cycle ¹			Freight (2 cycles/hr)		Passenger (2 cycles/hr)		Weighted Average ²	
	Delay ³	LOS	Cycles/Hr	Delay ³	LOS	Delay ³	LOS	Delay ³	LOS
Banyan Blvd @S. Quadrille Blvd	115.6	F	40	236.0	F	238.5	F	21.3	C
Banyan Blvd @ FECR	1.5	A	40	222.3	F	216.2	F	21.3	C
Northlake Blvd @ Old Dixie Hwy	78.2	E	80	310.8	F	272.3	F	88	F
Northlake Blvd @ FECR	0.4	A	80	57.4	E	38.7	D	2.7	A
Northlake Blvd @ HW 811/10 th St	101.2	F	64	382.9	F	307.9	F	115.6	F
SE Indian Street @ SE Dixie Hwy	11.2	B	79	108.2	F	112.6	F	16	B
SE Indian St. @ FECR	0	A	79	70	E	69.1	E	3	A
SE Monterey Rd @ SE Dixie Hwy	11	B	79	118.1	F	122.6	F	16.3	B
SE Monterey Rd @ FECR	0.1	A	79	67.8	E	63.9	E	3	A
Hwy 714/Monterey Rd @ SE Federal Hwy	13.7	B	79	13.6	B	13.6	B	13.7	B
Seaway Dr @ US 1	66.7	E	53	189.9	F	189.8	F	75.3	E
Seaway Dr @ FECR	0.1	A	79	236.3	F	236.3	F	11.5	B
Seaway Dr @ Indian River Dr	8.8	A	79	8.8	A	8.8	A	8.8	A
North Causeway @ US 1	22.5	C	63	22.5	C	22.5	C	22.5	C
North Causeway @ Old Dixie Hwy	11.0	B	79	93.8	F	90.5	F	14.9	B
North Causeway @ FECR	0.6	A	79	27.4	C	19.1	C	1.7	A
Oslo Rd @ Old Dixie Hwy	12.1	B	80	101.4	F	101.3	F	16	B
Oslo Rd @ FECR	0.1	A	80	148.2	F	147.8	F	4	A
Oslo Rd @ US 1	33.8	C	80	259.9	F	258.3	F	44.5	D
19 th Place @ Commerce Ave	9.2	A	80	50.3 ⁴	D	50.7	D	11.2	B
19 th Place @ FECR	0.1	A	80	134.0 ⁴	F	132.8	F	6.4	A
20 th Place @ Commerce Ave	8.4	A	80	140.2 ⁴	F	139.9	F	14.7	B
20 th Place @ FECR	0	A	80	58.7 ⁴	E	58.4	E	2.8	A
Palm Bay Rd @ FECR	14.6	B	53	132.2 ⁴	F	44.9	D	19.8	B
Pineda Causeway @ Holy Trinity Dr	157.4	F	21	185.3	F	128.5	F	157.3	F
Pineda Causeway @ FECR	1.6	A	21	79.1	E	36.0	E	10.6	B

- 1 Normal Cycle
- 2 Weighted Average
- 3 Delay
- 4 Cycles per hour = 1

As shown in Table 5.2.1-8, the Diagnostic Team Review recommended that three local streets be closed for safety reasons. An additional three streets were recommended for closure if four-quadrant gates could not be installed. None of these streets are major arterials or provide the sole access to a residential or commercial area. Traffic would shift to adjacent grade crossing.

County	Municipality	Street	Recommendation	Traffic Shifts To
Brevard	Melbourne	Creel Street	Close if four-quadrant gates cannot be installed	Aurora Road, Eau Gallie Boulevard
Brevard	Palm Bay	Hessey Avenue	Close if four-quadrant gates cannot be installed	Palm Bay Road
Indian River	Vero Beach	14th Avenue	Close	26th Street, 23rd Street
Indian River	Vero Beach	21st Street	Close if four-quadrant gates cannot be installed	23rd Street, 20th Street
Martin	Salerno	Seaward Street	Close	Southeast Salerno Road
Palm Beach	West Palm Beach	Hunter Street	Close	Forest Hill Boulevard

Pedestrian and Bicycle Accommodations

Comments on the DEIS indicated that residents along the N-S Corridor had concerns with the effects of increased train trips and at-grade crossing closures on pedestrian and bicycle movements. For pedestrian crossing safety, AAF will add pedestrian crossings wherever sidewalks exist. Others suggested that a shared-use pedestrian/bicycle path should be constructed within the E-W and N-S Corridors to enhance local and regional travel.

Neither FECR nor AAF support the additional use of the FECR ROW for a rail-with-trail use. AAF's ownership interest in the ROW limits its uses to operation of passenger rail service: AAF does not control the land resources. FECR retains its rights to use any remaining property within the ROW for railroad purposes. Similarly, AAF's property interest in the ROW along the E-W Corridor does not include the right to operate a bicycle or mixed-use trail in conjunction with passenger rail operations. In either location, adding a bicycle trail would increase the impacts to natural resources and would present significant safety liabilities.

Phase I - West Palm Beach to Miami

As stated in the 2013 FONSI, Phase I of the Project (which was analyzed to include impacts resulting from existing freight service, as well as projected freight growth and the proposed passenger service) would not have a significant impact on traffic operations at railroad crossings between West Palm Beach and Miami. The impact on delay, queuing, and LOS is limited to signal cycles immediately following a train crossing event and are minimal on a peak-hour basis. The passenger train is proposed to clear a typical crossing in an average of 51 seconds. With only one to two such crossing events during peak hours, the impact on traffic operations on adjacent roadways is expected to be minor. Signal and circuit upgrades performed as part of the track construction, improvement, and rehabilitation would occur within the FECR Corridor, and would not substantially impact traffic on intersecting roadways. There are no permanent road closures

contemplated as a result of the railroad system portion of the Project. There are, however, crossing closures anticipated for the station elements of the Project that are necessary to accommodate the proposed platforms. As documented in the 2012 EA (Section 2.5.1), the contemplated crossing closures would only occur at low-volume, local streets and would not impact local circulation significantly as there are alternate routes located in close proximity to the proposed closures so as to avoid dead-end conditions and result in minimal changes to the existing traffic patterns. Access to existing properties would not be impacted by the proposed crossing closures. There would be one roadway closure at both the West Palm Beach and Fort Lauderdale Stations, and two at the Miami Station. As required by the FONSI, AAF prepared supplemental traffic analyses for the three Phase I stations to evaluate intersection operations. The analysis showed that all intersections would operate under acceptable conditions without mitigation. All three reports can be found at <http://www.fra.dot.gov/Page/P0590>.

5.1.2.3 Indirect and Secondary Impacts

The Project would enhance regional roadway transportation by reducing vehicles on the regional roadway network. The three proposed stations for the WPB-M Corridor (in West Palm Beach, Fort Lauderdale, and Miami) may result in secondary effects such as creating potential for development and redevelopment outside the development directly associated with the stations. This additional development may also create impacts such as induced traffic generated by those developments.

As noted in Section 1.7.7, commenters stated that the DEIS did not adequately evaluate the effects of the Project on businesses located in small downtown areas along the N-S Corridor. They believed that increased grade crossing delays and traffic congestion from the Project would discourage customers, particularly tourists, which would force businesses to close, increase retail vacancies, and reduce sales tax revenue. FRA disagrees with these conclusions, because the FECR Corridor is an active freight rail corridor, with an average of 14 round-trip freight trains per day under current conditions, projected to increase to 20 by 2019. In recent years, the number of freight trains was substantially higher, with 24 daily trains in 2006. The AAF passenger service would not be introducing a new rail element along this corridor, and the incremental effects of adding passenger trains would not significantly degrade the viability of businesses located in town centers along the rail line. The FECR Corridor has supported freight and/or passenger rail service on a continuous basis for more than 100 years, and existing downtowns along with their commercial properties largely developed around these conditions. AAF would not introduce new disruption, noise, traffic, or other effects that could affect businesses.

5.1.2.4 Temporary Construction-Period Impacts

The Project would result in minor, short-term impacts to freight rail transportation, regional highways, and local vehicular traffic during construction. New track construction required for the Project would be performed according to best management practices (BMPs), which are defined as methods designed to minimize adverse impacts to the environment, so that minimal temporary adverse impacts to existing freight operations would be experienced. Any required maintenance or rehabilitation of the existing single track would also be done using planning and construction practices that would minimize impacts to existing freight traffic. Future required maintenance and rehabilitation would also be done more efficiently as track operators would be able to use planning practices that utilize the additional tracks to

mitigate temporary delays. AAF plans to use BMPs and previously successful methods to reduce or eliminate potential impacts such as delays or downtime.

As stated in Section 3.4 of the 2012 EA, existing at-grade crossings along the WPB-M Corridor will be modified to include second tracks and crossing protection devices relocated as required. These improvements will require temporary closures of individual lanes or complete streets. All closure plans involve the coordination and involvement of state and local governments due to the crossing agreements in place, and will only be implemented with the full collaboration of the agencies. Temporary lane or full crossing closures may create temporary construction impacts to traffic during construction from the operation of equipment and potential temporary, short-term closure of local streets. The typical duration of any closures ranges from 2 to 3 days for minor crossings to up to 1 week for major arterial crossings. Proper planning and implementation and maintenance of mitigation measures (such as, maintenance of traffic plans) will be specified and required for construction. During construction, where local roads provide the sole access to a neighborhood, development, or park, AAF will maintain at least one lane open to traffic at all times.

5.1.3 Navigation

This section provides the analysis of proposed navigational conditions for the No-Action Alternative and the Project for the bridges over navigable waters that require replacement or reconstruction, including the New River Bridge (Figure 4.1.3-1). These include:

- The proposed new fixed railroad bridge over the St. Johns River.
- The existing single-track drawbridge over the St. Lucie River. The existing structure is planned to be rehabilitated, and train frequencies would increase.
- The existing double-track drawbridge over the Loxahatchee River (also known as the Jupiter River), which is currently operated as a single-track bridge. For the Project, the out-of-service second track would be reconstructed.
- The five fixed bridges that will be replaced (Eau Gallie River, Crane Creek, Turkey Creek, St. Sebastian River, Hillsboro Canal).

This FEIS evaluates Phase II of the Project, which would extend service from West Palm Beach to Orlando. Phase I of the Project, which was the subject of previous environmental review, includes the segment from West Palm Beach to Miami (see Section 3.1). As shown in Figure 4.1.3-1, the St. Lucie and Loxahatchee River Bridges are within the N-S Corridor (Phase II of the Project) and the New River Bridge is within the WPB-M Corridor (Phase I of the Project, currently under construction). This FEIS includes evaluation of the New River Bridge in response to comments received during the FEIS scoping process. There is currently no construction planned at the existing double track drawbridge over the New River, however train frequencies would increase. The economic effects of increased bridge closures are evaluated in Section 5.4.3, *Economic Conditions*.

Freight traffic is predicted to increase under the No-Action Alternative from an average of 14 trains per day under 2013 existing conditions to a projected 20 trains by 2016, increasing the number of bridge closures and vessel wait times at the moveable bridges. Under Project conditions, 16 round-trip

passenger trains (32 total) would pass over these bridges in addition to the 20 freight trains. The bridge and track infrastructure would be improved, resulting in increased train speeds. The Project would increase the number of bridge closures and vessel wait times at the three moveable bridges, however there would not be a substantial increase in the length of time for any single closure.

All alternatives would alter the existing fixed bridges at other navigable waterways by either replacing the existing track bridge with a new double-track bridge, or adding a second single-track bridge parallel to the existing bridge. Navigation on the waterways with fixed bridges would not be impacted due to the increase in train traffic.

In comments on the DEIS, the U.S. Coast Guard (USCG) has noted that increased rail traffic would result in a significant increase in closure time of the moveable bridges. USCG has not yet made a determination that the proposed increases in waterway closures would meet the reasonable needs of navigation (see Appendix 4.1.3-A).

Many commenters on the DEIS were concerned with the effects of the increased number and duration of bridge closures on maritime traffic. Section 1.7.4 of this FEIS presents a synopsis of the general comments, and a summary response. Other comments included concerns that the existing bridges are in poor condition and, under increased usage, will fail in a closed position; that increased bridge closures will result in unsafe conditions for boaters due to congestion; that the analysis was not extended to years later than 2016; that the modeling analysis did not reflect realistic boater behavior; and that the modeling analysis did not use the best available data. Commenters noted that the modeling analysis appeared to assume that boats could safely hold their positions in a queue, regardless of tides, currents, vessel wake, and other factors, and that the model assumed that two boats could pass through the open bridge at the same time. As described below, the updated modeling analysis, based on field observations, assumes that two small boats can safely pass while the bridge is open. The model does not account for the complex interactions of tides, currents, vessel wake, and boater behavior. It represents the most realistic situation of boat arrivals and bridge operations possible using existing modeling technology. This section of the FEIS provides an updated analysis of effects on navigation in response to these and other comments.

5.1.3.1 Methodology

This section explains how effects to navigation were evaluated for the future No-Action Alternative and Project. Details of the methodology are provided in Appendix 4.1-3-B1 and 4.1.3-B2.

Estimates of rail traffic arrivals are based on the proposed schedule. A model to predict this schedule was generated using Rail Traffic Controller (RTC)¹ modeling. Freight train arrivals were grouped by day-of-week and time-of-day. The RTC model simulation includes variations in departure times and delays in route. The model generates train arrivals at the bridges using arrival times with a variance of ± 10 minutes to maintain some randomness in the forecasted train arrivals. Passenger train arrivals provided by the RTC model are at regular intervals, approximately once per hour in each direction. The RTC data provide no variability in passenger train arrival times because the predictability of the passenger service schedule is critically important to overall performance (AMEC 2014a).

¹ Rail Traffic Controller is a rail traffic simulation tool developed by Berkeley Simulation Software. It is the de facto simulation tool used by all Class I carriers (the seven largest North American railroads) and the majority of rail consulting firms.

Infrastructure changes as a result of the Project include extending the double track of the mainline across the Loxahatchee River Bridge and up to the St. Lucie River Bridge; the St. Lucie River Bridge will remain single tracked. This change will allow a train to be staged closer to the bridge while waiting for a second train to cross the bridge. This action would reduce delays for trains that currently have to slow or stop to yield to oncoming train traffic. The model assumes that trains encountering oncoming traffic are delayed 5 minutes under the 2016 Project conditions. The New River Bridge is currently double tracked, so there are no delays realized in either the 2013 or the 2016 model scenarios (AMEC 2014a). It is also assumed that due to improved infrastructure under Project conditions, future trains would operate at a faster speed than trains under the No-Action Alternative. Table 5.1.3-1 depicts average train speeds under Project conditions, as compared to the No-Action Alternative.

County	No-Action Alternative	Project	
	Freight Train Speed (mph)	Passenger Train Speed (mph)	Freight Train Speed (mph)
Broward	23	61	38
Palm Beach	33	76	39
Martin	32	77	36

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

Note: Speeds shown are the average for the entire track section in the county.

RTC modeling was used to determine the times that trains would occupy the span over the waterway. A secondary process used the RTC model data to determine the times that the water way would be unavailable to vessel passage. The RTC model includes the time that the bridge is in the process of closing before a train's arrival and is therefore unnavigable for passing boat traffic. A bridge must be closed several minutes prior to the train's arrival to allow for safe passage; under existing conditions, this closure time is approximately 12 minutes. Train speeds are expected to increase as a result of the Project and will allow closure times prior to the train's arrival to be reduced to approximately 7 minutes. The waterway remains unavailable as the bridge is raised, although observational data show small vessels crossing as the bridges opens.

Many commenters noted that the winter boat counts presented in the DEIS were too low and were not representative of the peak summer season. In response to public comments, this section has been revised based on an analysis of summer boat count data. Summer boat counts were higher than those in the winter and the model was reconfigured with these data to produce new results. The modeled results use the average wait time for all vessels and the average wait time for those vessels that experience a wait. This section also includes the modeled results for a "typical high volume day" under the Project. The typical high volume day represents 80 percent of the highest peak volume day; this is representative of a busy weekend day and does not represent the highest peak holiday traffic weekend. Data for the St. Lucie River (June 12 to August 31, 2014) and Loxahatchee River (May 14 to August 12, 2014) for the summer boating season were developed by Taylor Engineering and provided to AAF by Martin County and the Jupiter Inlet District, and were sorted by direction of travel. Summer boat count data was not available

for the New River Bridge. To approximate summer traffic at New River, the winter boat counts were escalated based on the increases observed at the other two bridges. Table 5.1.3-2 shows the boat count increase by day-of-week at Loxahatchee and St. Lucie. The increases at Loxahatchee were greater than at St. Lucie. For this reason, the New River winter boat counts were escalated using the figures from Loxahatchee, Weekday counts were increased by 58 percent, Saturdays by 151 percent and Sundays by 84 percent.

Bridge	Weekday	Saturday	Sunday
St. Lucie River	28%	62%	64%
Loxahatchee River	58%	151%	84%

The average counts derived from the data sets for the St. Lucie River and Loxahatchee River, extrapolated for the New River, are provided in Table 5.1.3-3.

Bridge	Weekday	Saturday	Sunday
St. Lucie River	140	454	563
Loxahatchee	182	564	582
New River	248	760	752

The model used all boat data for all days to calculate delays, and used the following assumptions based on video footage taken at New River and St. Lucie crossings:

- Boats take between 1.5 to 7 seconds to cross under the bridge, depending on size and speed.
- Most small boats take approximately 2 seconds to cross.
- Medium boats like the water taxi take about 3.5 seconds to cross.
- Larger boats like the Jungle Queen (commercial ferry) and sun cruises will take on average 5 to 6 seconds to cross.
- Two small boats can cross at the same time in the same or opposite direction.
- Medium and small boats were observed crossing at the same time heading opposite directions
- A small boat will cross the bridge just behind a large boat, reducing the amount of time it to cross by about 1 second.
- When a large boat like the Jungle Queen crosses, no other boat can cross the opposite direction at the same time, so they will queue at the side. Once the Jungle Queen crosses it takes them a couple of seconds to cross.

- Many small boats can cross when the bridge is down.
- Small boats will cross when the bridge is going down and will cross before the bridge goes up completely.

5.1.3.2 Environmental Consequences - Direct Impacts

This section describes the projected impacts to navigation under the No-Action Alternative and Project. Appendices 4.1.3-B1 and 4.1.3-B2 provide a detailed analysis, including modeling results.

Fixed bridges at navigable waterways would not be altered. The waterways include the Eau Gallie River, Crane Creek, Turkey Creek, St. Sebastian River, and the Hillsboro Canal. The projected increase in the number of freight trains in 2016, or the number of future passenger rail trains, would not affect navigation at these bridges.

No-Action Alternative

Under the No-Action Alternative, freight traffic on the FECR Corridor is predicted to increase. FECR operated 24 daily trains in 2006 and had projected growth of 5 to 7 percent between today and 2016. However, due to delays in the expansion of the Panama Canal and other factors, it is now expected that freight operations will increase from the current number of trains to 20 trains per day by 2016, and at a 3 percent annual growth after 2016. Under the No-Action Alternative, the infrastructure would not be improved; train speeds would not increase and, therefore, the amount of overall closure time would increase. Approximately 20 freight trains would pass over the St. Lucie, Loxahatchee, and New River Bridges on any given day (AMEC 2014a). Approximately half of the trains would pass during daytime hours (7 AM to 10 PM). As shown in Table 5.1.3-4, at the St. Lucie River Bridge this would result in 18 closures per day, with an average time of 20 minutes per closure. The average of the total weekday closure time would be 397.4 minutes (6.6 hours). The average of the total weekend closure time at the St. Lucie River Bridge would be 213 minutes (3.6 hours). The Loxahatchee River (Jupiter Inlet) bridge would result in 16 closures per day, with an average time of 20 minutes per closure. The average of the total weekday closure time would be 350.8 minutes (5.8 hours) and the average of the total weekend closure time would be 216 minutes (3.6 hours). The New River Bridge would be closed 16 times per day, with an average time of 19 minutes per closure. The average of the total weekday closure time would be 360 minutes (6.0 hours) and the average of the total weekend closure time would be 197 minutes (3.3 hours).

Table 5.1.3-4 Moveable Bridge Closures						
Year	Number of Closures¹	Average Single Weekly Closure Time (minutes)	Average of Total Weekday Closure time (minutes)	Average of Total Weekday Closure time (hours)	Average of Total Weekend Closure Time (minutes)	Average of Total Weekend Closure Time (hours)
St Lucie River Bridge						
2013	10	21	241	4.0	165	2.7
2016 No-Action	18	20	397	6.6	213	3.6
2016 Project	42	15	588	9.8	458	7.6
Loxahatchee River Bridge (Jupiter Inlet)						
2013	10	19	214	3.6	156	2.6
2016 No-Action	16	20	351	5.8	216	3.6
2016 Project	42	12	515	8.6	434	7.2
New River Bridge						
2013	10	19	147	3.5	147	2.5
2016 No-Action	16	19	360	6.0	197	3.3
2016 Project	30	13	414	6.9	314	5.2

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

St. Lucie River Bridge

Under the No-Action Alternative, approximately 20 freight trains would pass over the St. Lucie River Bridge on any given day. As shown in Table 5.1.3-4, at the St. Lucie River Bridge this would result in 18 closures per day, with an average time of 20 minutes per closure. The average of the total weekday closure time would be 397.4 minutes (6.6 hours). The average of the total weekend closure time at the St. Lucie River Bridge would be 213 minutes (3.6 hours).

The number of vessels that experience a wait time in the peak summer season would increase from 24 percent to 32 percent under the No-Action Alternative, which only includes the operation of freight trains. The average queue time for vessels experiencing a wait will increase by approximately 3.1 minutes. Table 5.1.3-6 presents vessel wait times for the St. Lucie River Bridge under the No-Action Alternative. Figure 5.1.3-1 depicts the percent of boats that wait and their maximum wait time, by percent. Under the No-Action Alternative, 50 percent of boats experience a wait time greater than 3.3 minutes, 20 percent of boats experience a wait time greater than 14.0 minutes, 10 percent of boats experience a wait time greater than 17.6 minutes, and 1 percent of boats experience a wait time greater than 33.1 minutes. The maximum wait time under the No-Action Alternative would be 65.5 minutes.

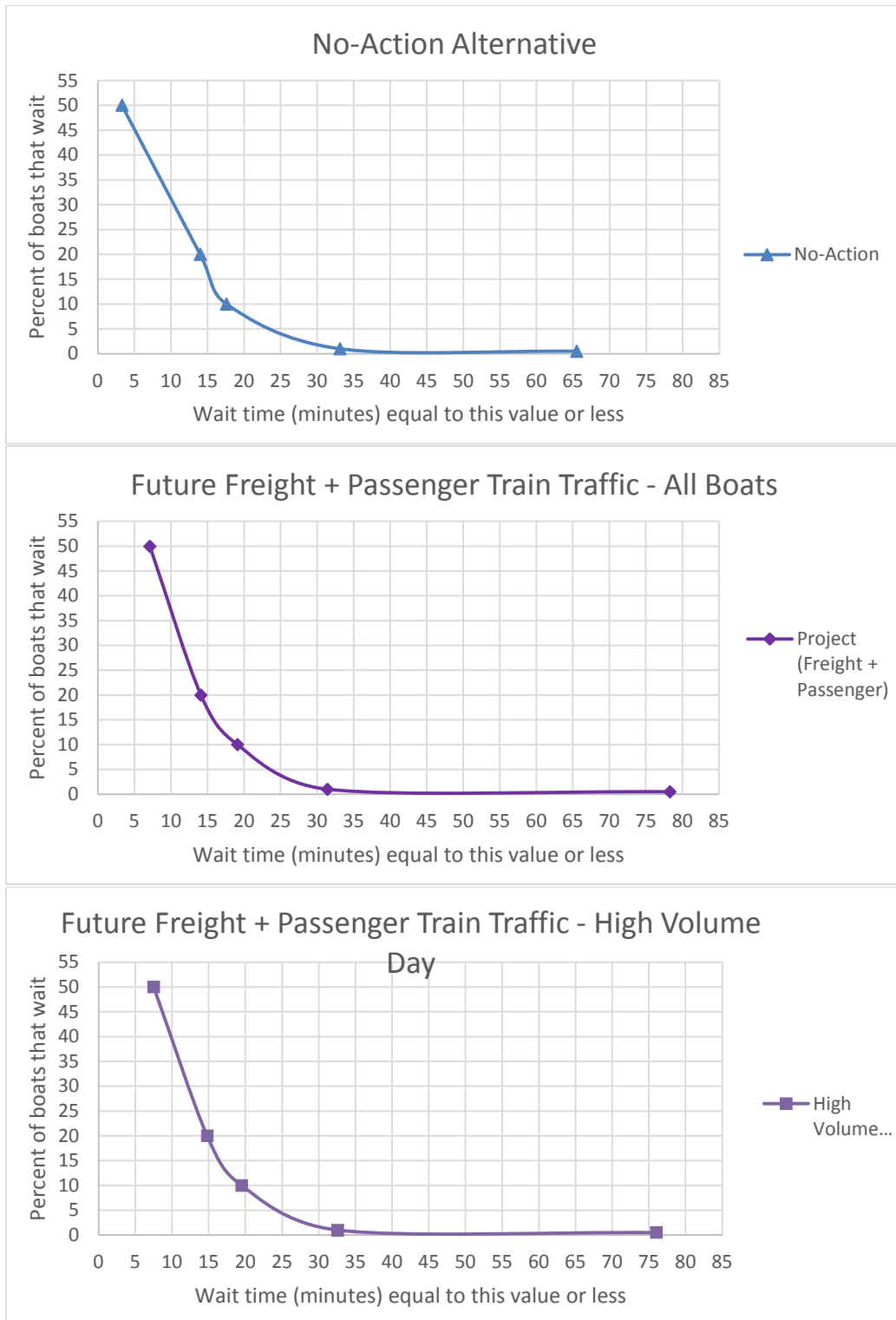


Figure 5.1.3-1 St. Lucie River Bridge – Summer Non-Zero Wait Time Distributions

Loxahatchee River Bridge

Under the No-Action Alternative, approximately 20 freight trains would pass over the Loxahatchee River Bridge on any given day. As shown in Table 5.1.3-4, rail traffic over the Loxahatchee River (Jupiter Inlet) bridge would result in 16 closures per day, with an average time of 20 minutes per closure. The average of the total weekday closure time would be 350.8 minutes (5.8 hours) and the average of the total weekend closure time would be 216 minutes (3.6 hours).

The number of vessels that experience a wait time would increase from 28 percent to 34 percent under the No-Action Alternative, which only includes the operation of freight trains. The average wait time for vessels experiencing a wait will increase by approximately 1.9 minutes. Table 5.1.3-8 presents vessel wait times for the Loxahatchee River Bridge under the No-Action Alternative. Figure 5.1.3-2 depicts the percent of boats that wait and their maximum wait time, by percent. Under the No-Action Alternative, 50 percent of boats experience a wait time greater than 1.4 minutes, 20 percent of boats experience a wait time greater than 12.0 minutes, 10 percent of boats experience a wait time greater than 15.4 minutes, and 1 percent of boats experience a wait time greater than 26.4 minutes. The maximum wait time under the No-Action Alternative would be 48.4 minutes.

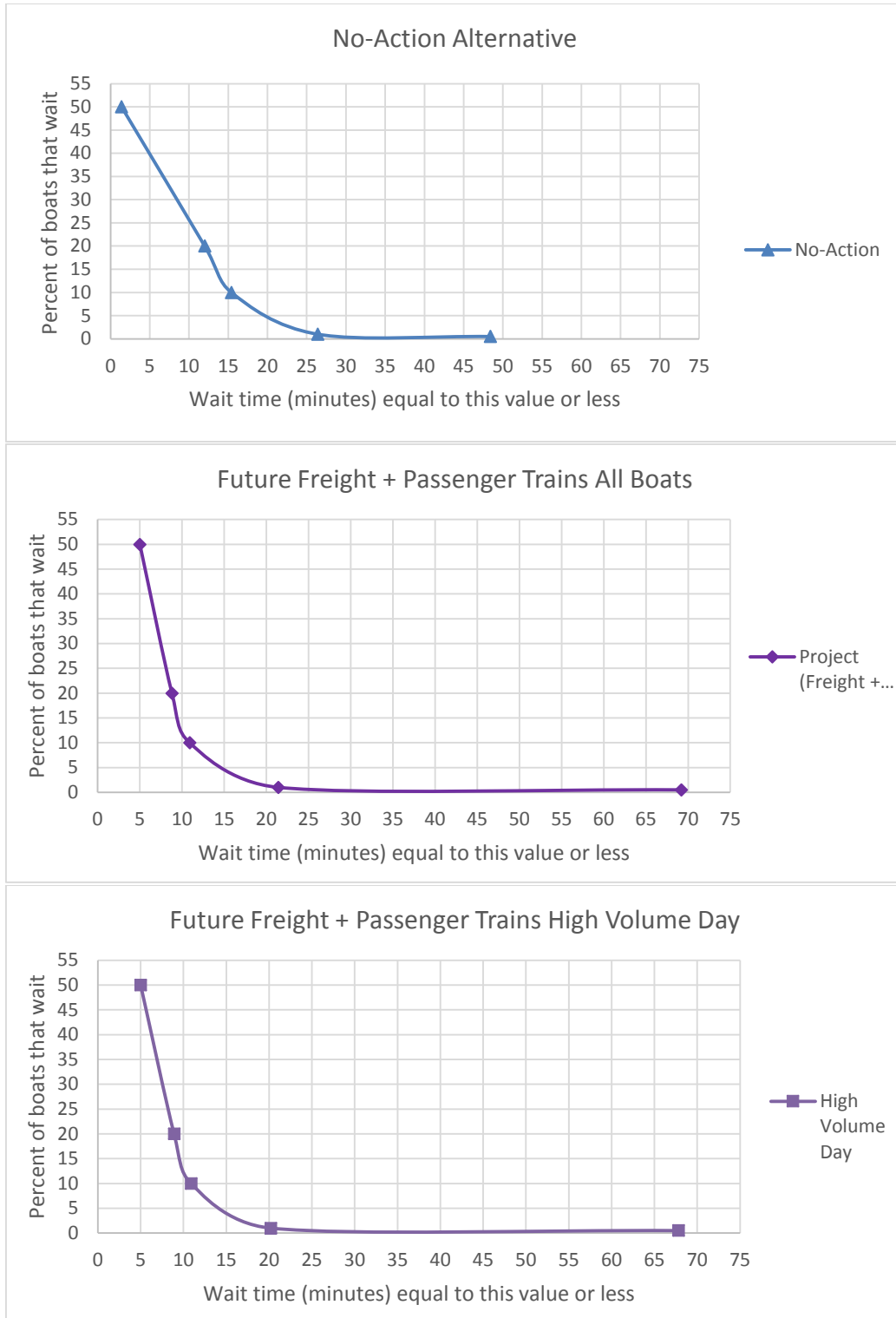


Figure 5.1.3-2 Loxahatchee River Bridge Summer Non-Zero Wait Time Distributions

New River Bridge

Under the No-Action Alternative, approximately 20 freight trains would pass over the New River Bridge on any given day. As shown in Table 5.1.3-4, the New River Bridge would be closed 16 times per day, with an average time of 19 minutes per closure. The average of the total weekday closure time would be 360 minutes (6.0 hours) and the average of the total weekend closure time would be 197 minutes (3.3 hours).

The number of vessels that experience a wait time from 42 percent to 51 percent under the No-Action Alternative, which only includes the operation of freight trains. The average wait time for vessels that wait will increase by approximately 2.7 minutes. Table 5.1.3-10 presents vessel wait times for the New River Bridge under the No-Action Alternative. Figure 5.1.3-3 depicts the percent of boats that wait and their maximum wait time, by percent. Under the No-Action Alternative, 50 percent of boats would experience a wait time greater than 3.8 minutes, 20 percent of boats experience a wait time greater than 14.0 minutes, 10 percent of boats experience a wait time greater than 16.9 minutes, and 1 percent of boats would experience a wait time greater than 28.1 minutes. The maximum wait time under the No-Action Alternative would be 52.4 minutes.

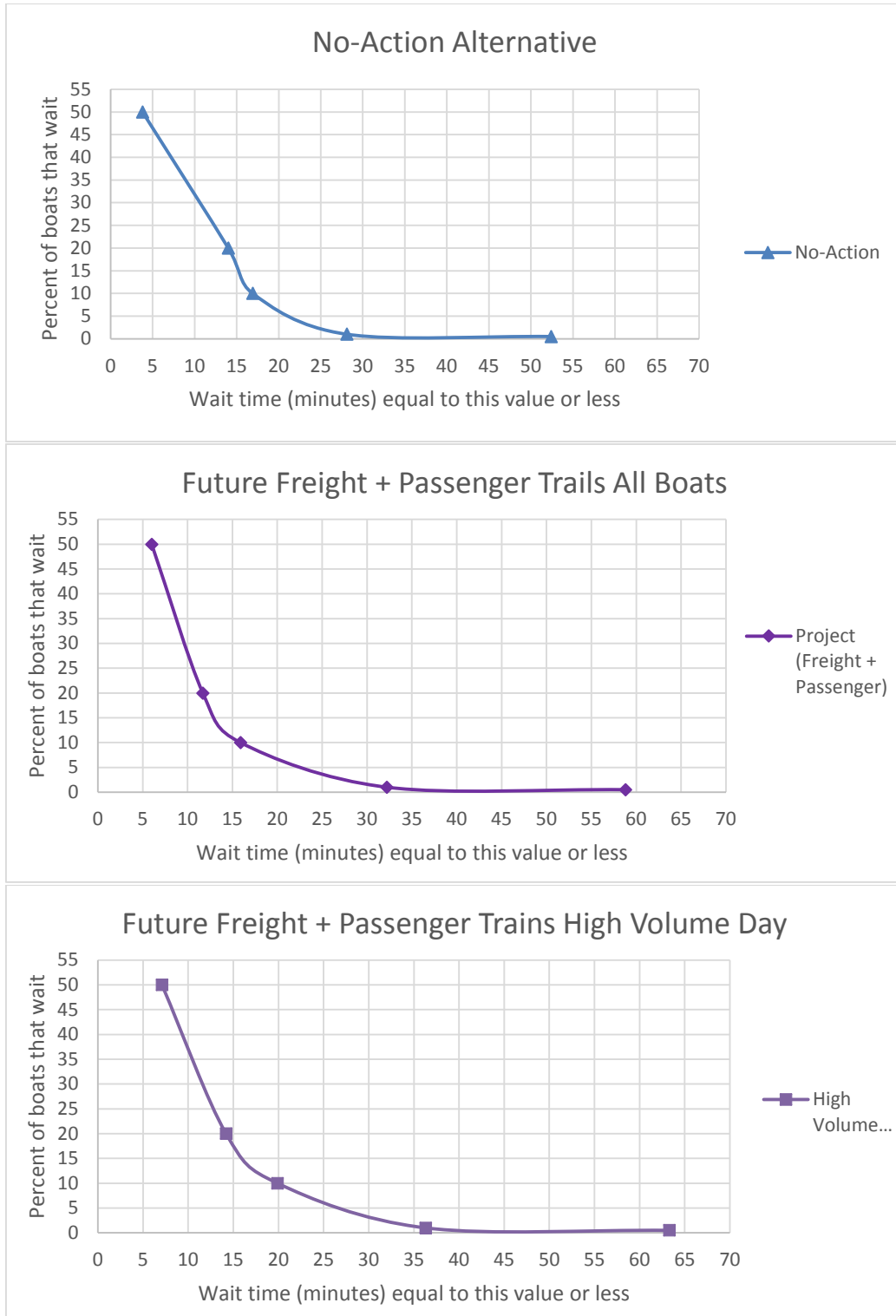


Figure 5.1.3-3 New River Bridge Summer Non-Zero Wait Time Distributions

Action Alternatives A, C, and E

The effects to navigation from the Project would be the same for Alternatives A, C, and E, as each would include the same bridge improvements and the same number of passenger trains at each of the bridges under consideration. Navigation impacts were modeled for 2016 using the number of freight trains projected under the No-Action Alternative. However, with the Project's infrastructure improvements, the freight trains would be operating at higher speeds. The project analysis includes both freight and passenger trains since it is not possible to separate their effects at moveable bridges (a single bridge closure could accommodate both).

St. Johns River

The proposed new rail bridge over the St. Johns River would provide the same clearance that the existing SR 528 bridge provides. The proposed rail bridge would provide 16 feet vertical clearance above the mean high water level of river, resulting in no loss of existing clearance. The Project would not impede or interfere with navigation.

St. Lucie River

As part of the Project, AAF will rehabilitate the mechanical components of, but not replace, the St. Lucie River Bridge (see Chapter 3, *Alternatives*). There would be no change in the structure or the dimensions of the opening. The bridge would continue to operate in accordance with the bridge regulations at 33 CFR 111.317(c). The proposed passenger train operations would increase the amount of time that the bridge would be closed. Table 5.1.3-4 shows the effect of the additional train trips on bridge closure times. Under Project conditions, 16 round-trip (32) passenger trains and 20 freight trains would pass over the St. Lucie River Bridge on any given day. Future train speeds at this location are shown in Table 5.1.3-1. Appendices 4.1.3-B1 and 4.1.3-B2 also provides detailed information on hourly bridge closures.

The Project would result in an additional 24 closures per day of the St. Lucie River Bridge (Table 5.1.3-5). These additional closures result in a higher number of vessels experiencing wait times for all vessels. Additionally, the increased frequency of closures results in vessel queuing that would affect the vessel movement on the St. Lucie River and associated waterways. As shown in Table 5.1.3-6 the number of vessel arrivals would vary depending on the day and time. For the St. Lucie River Bridge on a typical high volume day under Project conditions, arrivals are estimated at 441 vessels.

Based on the current proposed operational plan provided by AAF, with the Project the St. Lucie River Bridge would be closed 42 times per day, with an average time of 15 minutes per closure. The average closure time would decrease, as compared to the No-Action Alternative, due to improvements to the rail infrastructure which are expected to increase the speed of rail traffic (AMEC 2014a). The average of total weekday closure time would be 588 minutes (9.8 hours) per day under Project conditions, an increase of 190.6 minutes (3.2 hours) over the No-Action Alternative. The average of total weekend closure time would be 458 minutes (7.6 hours) per day under Project conditions, which is an increase of 245 minutes (4.0 hours) over the No-Action Alternative. Model results for the No-Action Alternative and Project bridge operations for the St. Lucie River Bridge are presented in Table 5.1.3-5 (AMEC 2014a).

St. Lucie River Bridge	No-Action Alternative¹	Project²
Average Single Closure Time (minutes) ³	20	15
Total Number of Daily Closures	18	42
Average of Total Weekday Closure Time (Minutes)	397.4	588
Average of Total Weekday Closure Time (Hours)	6.6	9.8
Average of Total Weekend Closure Time (Minutes)	213	458
Average of Total Weekend Closure Time (Hours)	3.6	7.6

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

- 1 Results based on RTC modeling data of train and bridge operations with closure times verified with existing field conditions and under the assumption that infrastructure improvements planned under the Proposed Action do not occur.
- 2 Results based on RTC modeling data of train and bridge operations for both freight and passenger rail with the planned infrastructure improvements planned under the Proposed Action.
- 3 Multiple trains (freight and passenger) can cross under a single bridge closure.

	Units	No-Action Alternative	Project	High Volume Day
Boat Arrivals	(#/day)	Varies ²	Varies ²	441
Percent of boats with non-zero wait time	(%)	32%	59%	66%
Average wait time	(min)	2.2	5.1	5.9
Average non-zero wait time	(min)	6.9	8.6	8.9
Maximum non-zero wait time	(min)	65.5	78.3 ²	76

Source: AMEC Foster Wheeler. 2015. *Rail/Marine Traffic Simulation Using Summer Boat Traffic Data for the AAF Passenger Rail Project from Orlando to Miami, Florida*. January 21, 2015.

- 1 This scenario represents a typical high-volume day or 80 percent of the highest peak volume day.
- 2 See Table 5.1.3-3 for average summer weekday and weekend boat counts
- 3 Maximum wait time inclusive of the highest peak volume day.

Table 5.1.3-6 shows the model results for marine traffic wait times for all vessels at the St. Lucie River Bridge. Under Project conditions, the percentage of vessels that experience a wait would increase from 32 percent under the No-Action Alternative to 59 percent under the Project. On a typical high volume day, the percentage of vessels that experience a wait would increase to 66 percent. The average wait time for all vessels (inclusive of those vessels that wait and those that do not wait) would increase from 2.2 minutes under the No-Action Alternative to 5.1 minutes under the Project and 5.9 minutes on a typical high volume day. The average wait time of delayed vessels would increase, from 6.9 minutes to 8.6 minutes under the Project and 8.9 minutes on a typical high volume day. The most likely vessel wait time would increase under Project conditions as compared to the No-Action Alternative (AMEC Foster Wheeler 2015).

Figure 5.1.3-1 depicts the percent of boats that wait and their maximum wait time, by percent. Under the Project, 50 percent of boats experience a wait time greater than 7.1 minutes, 20 percent of boats experience a wait time greater than 14.1 minutes, 10 percent of boats experience a wait time greater than 19.1 minutes, and 1 percent of boats experience a wait time greater than 31.4 minutes. The maximum wait time under the Project is 78.3 minutes. On a typical high volume day, 50 percent of boats experience a wait time greater

than 7.5 minutes, 20 percent of boats experience a wait time greater than 14.8 minutes, 10 percent of boats experience a wait time greater than 19.5 minutes, and 1 percent of boats experience a wait time greater than 32.6 minutes. The maximum wait time on a typical high volume day is 76.0 minutes.

Loxahatchee (Jupiter) River

As part of the Project, AAF will rehabilitate the mechanical components of, but not replace, the Loxahatchee River Bridge. There would be no change in the structure or the dimensions of the opening. The bridge would continue to operate in accordance with the bridge regulations at 33 CFR 111.299. The proposed passenger train operations would increase the amount of time that the bridge would be closed. Table 5.1.3-4 shows the effect of the additional train trips on bridge closure times. A total of 16 round-trip (32) passenger trains and 20 freight trains would pass over the Loxahatchee River Bridge on any given day. Future train speeds at this location are shown in Table 5.1.3-1.

The Project would result in an additional 26 closures per day of the Loxahatchee River Bridge (Table 5.1.3-7). These additional closures result in a higher number of vessels experiencing wait times for both commercial and recreational vessels. Additionally, the increased frequency of closures results in vessel queuing that would affect the vessel movement on the Loxahatchee River and associated waterways.

Based on the current proposed operational plan provided by AAF, with the Project the Loxahatchee (Jupiter Inlet) River Bridge would be closed 42 times per day with an average time of 12 minutes per closure. The average closure time would decrease, as compared to the No-Action Alternative, due to improvements to the rail infrastructure which are expected to increase the speed of rail traffic (AMEC 2014a). The average of the total weekday closure time would be 515 minutes (8.6 hours) per day, an increase of 164.2 minutes (2.8 hours) over the No-Action Alternative. The average of the total weekend closure time would be 434 minutes (7.2 hours) per day, an increase of 218 minutes (3.6 hours) over the No-Action Alternative. There would be no direct effect on navigation of the Intracoastal Waterway, as the Loxahatchee River Bridge does not cross the waterway directly.

Loxahatchee River Bridge	No-Action Alternative¹	Project²
Average Single Closure Time (minutes) ³	20	12
Total Number of Daily Closures	16	42
Average of Total Weekday Closure Time (Minutes)	351	515
Average of Total Weekday Closure Time (Hours)	5.8	8.6
Average of Total Weekend Closure Time (Minutes)	216	434
Average of Total Weekend Closure Time (Hours)	3.6	7.2

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

- 1 Results based on RTC modeling data of train and bridge operations with closure times verified with existing field conditions and under the assumption that infrastructure improvements planned under the Proposed Action do not occur.
- 2 Results based on RTC modeling data of train and bridge operations for both freight and passenger rail with the planned infrastructure improvements planned under the Proposed Action.
- 3 Multiple trains (freight and passenger) can cross under a single bridge closure.

Model results for the bridge operations under the Project and No-Action Alternative for the Loxahatchee River Bridge are presented in Table 5.1.3-7. Appendix 4.1.3-B2 also provides detailed information on hourly bridge closures.

Table 5.1.3-8 shows the model results for marine traffic wait times for all vessels at the Loxahatchee River Bridge. Under Project conditions, the percentage of vessels that experience a wait would increase from 34 percent under the No-Action Alternative to 58 percent under the Project conditions and 66 percent during a typical high volume day. The average wait time for all vessels (inclusive of those vessels that wait and those that do not wait) would increase from 1.9 minutes under the No-Action Alternative to 3.3 minutes under the Project and 3.6 minutes during a typical high volume day. The average wait time of delayed vessels would increase, from 5.5 minutes to 5.6 minutes under the Project conditions and 5.5 minutes during a typical high volume day. The most likely vessel wait time is increased slightly under Project conditions as compared to the No-Action Alternative (AMEC Foster Wheeler 2015).

Figure 5.1.3-2 depicts the percent of boats that wait and their maximum wait time, by percent. Under the Project, 50 percent of boats experience a wait time greater than 5.0 minutes, 20 percent of boats experience a wait time greater than 8.8 minutes, 10 percent of boats experience a wait time greater than 10.9 minutes, and 1 percent of boats experience a wait time greater than 21.4 minutes. The maximum wait time under the Project is 69.2 minutes. On a typical high volume day, 50 percent of boats experience a wait time greater than 5.0 minutes, 20 percent of boats experience a wait time greater than 8.9 minutes, 10 percent of boats experience a wait time greater than 10.9 minutes, and 1 percent of boats experience wait time greater than 20.2 minutes. The maximum wait time on a typical high volume day is 67.8 minutes.

As shown in Table 5.1.3-8, the number of vessel arrivals would vary depending on the day and time. For the Loxahatchee River Bridge, on a typical high volume day under Project conditions, arrivals are estimated at 513 vessels.

	Units	No-Action Alternative	Project	High Volume Day
Boat Arrivals	(#/day)	varies	varies	513
Percent of boats with non-zero wait time	(%)	34%	58%	66%
Average wait time	(min)	1.9	3.3	3.6
Average non-zero wait time	(min)	5.5	5.6	5.5
Maximum non-zero wait time	(min)	48.4	69.2 ²	67.8

Source: AMEC Foster Wheeler. 2015. *Rail/Marine Traffic Simulation Using Summer Boat Traffic Data for the AAF Passenger Rail Project from Orlando to Miami, Florida*. January 21, 2015.

1 This scenario represents a typical high-volume day or 80 percent of the highest peak volume day.

2 See Table 5.1.3-3 for average summer weekday and weekend boat counts

3 Maximum wait time inclusive of the highest peak volume day.

New River

As part of the Project, AAF will rehabilitate the mechanical components of, but not replace, the New River Bridge. There would be no change in the structure or the dimensions of the opening. The bridge would continue to operate in accordance with the bridge regulations at 33 CFR 111.313(b). The proposed passenger train operations would increase the amount of time that the bridge would be closed. Table 5.1.3-4 shows the effect of the additional train trips on bridge closure times. Under Project conditions, 16 round-trip (32) passenger trains and 20 freight trains would pass over the New River Bridge on any given day. Future train speeds at this location are shown in Table 5.1.3-1.

The Project would result in an additional 14 closures per day of the New River Bridge (Table 5.1.3-9). These additional closures would result in a higher number of vessels experiencing wait times for both commercial and recreational vessels. Additionally, the increased frequency of closures results in vessel queueing that would affect the vessel movement on the New River.

Based on the current operational plan provided by AAF, with the Project the New River Bridge would be closed 30 times per day with an average time of 13 minutes per closure (Table 5.1.3-9). The average closure time would decrease, as compared to the No-Action Alternative, due to improvements to the rail infrastructure that are expected to increase the speed of rail traffic (AMEC 2014a). Under Project conditions, the average of the total weekday closure time would be 414 minutes (6.9 hours) per day and the average of the total weekend closure time would be 314 minutes (5.2 hours) per day. The estimated effect of the Project on the New River Bridge on weekdays is approximately 54 minutes (0.9 hours) of additional bridge closure time per day as compared to the No-Action Alternative. The estimated effect of the Project on the New River Bridge on weekends is approximately 117 minutes (1.9 hours) of additional bridge closure time per day as compared to the No-Action Alternative. Model results for the projected bridge operations, under the No-Action Alternative and Project, for the New River Bridge are presented in Table 5.1.3-9 (AMEC 2014a). Appendix 4.1.3-B2 also provides detailed information on hourly bridge closures.

New River Bridge	No-Action Alternative ¹	Project ²
Average Weekly Closure Time (minutes) ³	19	13
Total Number of Daily Closures	16	30
Average of Total Weekday Closure Time (Minutes)	360	414
Average of Total Weekday Closure Time (Hours)	6.0	6.90
Average of Total Weekend Closure Time (Minutes)	197	314
Average of Total Weekend Closure Time (Hours)	3.3	5.23

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

- 1 Results based on RTC modeling data of train and bridge operations with closure times verified with existing field conditions and under the assumption that infrastructure improvements planned under the Proposed Action do not occur.
- 2 Results based on RTC modeling data of train and bridge operations for both freight and passenger rail with the planned infrastructure improvements planned under the Proposed Action.
- 3 Multiple trains (freight and passenger) can cross under a single bridge closure.

The USCG has issued a temporary deviation from the operating schedule at the New River Bridge, effective May 18, 2015 through October 16, 2015.² This deviation is intended to test FECR's proposed installation of an automated system to increase vessel traffic efficiency. The automated system would allow the railroad dispatcher to receive a signal that the bridge must close for approaching trains. The dispatcher is then advised when trains clear the bridge so that it can reopen. During the test period, the bridge will operate under the following conditions:

- The bridge will be constantly tended;
- The bridge tender will utilize a VHF-FM radio to communicate and may be contacted by telephone;
- Signage will be posted displaying radio and telephone contact information;
- A countdown clock for bridge closure time will be posted at the bridge site and will be visible to maritime traffic;
- A bridge log will be maintained and will include bridge opening and closing times;
- When the bridge is fully opened, green lights will be displayed to indicate that vessels may pass;
- When a train approaches:
 - The lights will flash red and a horn will sound four blasts;
 - There will be a pause followed by four additional blasts;
 - The bridge will lower and lock.
- The bridge will open and lights will turn green once a train has cleared; and
- The bridge will not be closed more than 60 minutes combined for any 120 minute time period beginning at 12:01 A.M.

The drawbridge will return to the regular operating schedule immediately following the period of deviation. The USCG will determine whether a permanent change to operations can be approved and has requested public comments for their consideration. If approved, it is likely that this new schedule would be applied to the St. Lucie and Loxahatchee River Bridges.

Table 5.1.3-10 shows the model results for marine traffic wait times for both commercial and recreational vessels at the New River Bridge. Under Project conditions the percentage of vessels that experience a wait would increase from 51 percent under the No-Action Alternative to 63 percent and 75 percent during a typical high volume day. The average wait time for all vessels (inclusive of those vessels that wait and those that do not wait) would increase from 3.5 minutes under the No-Action Alternative to 4.6 minutes under the Project and 6.6 minutes during a typical high volume day. The average wait time of delayed vessels would increase, from 6.8 minutes to 7.3 minutes and 8.8 minutes during a typical high volume day. The most likely vessel wait time is higher under Project conditions as compared to the No-Action Alternative (AMEC 2014a).

² The notice of temporary deviation from regulations can be viewed at: <http://www.regulations.gov/#!documentDetail;D=USCG-2015-0271-0002>

Figure 5.1.3-3 depicts the percent of boats that wait and their maximum wait time, by percent. Under the Project, 50 percent of boats experience a wait time greater than 6.0 minutes, 20 percent of boats experience a wait time greater than 11.7 minutes, 10 percent of boats experience a wait time greater than 15.9 minutes, and 1 percent of boats experience a wait time greater than 32.2 minutes. The maximum wait time under the Project is 58.8 minutes. On a typical high volume day, 50 percent of boats experience a wait time greater than 7.1 minutes, 20 percent of boats experience a wait time greater than 14.2 minutes, 10 percent of boats experience a wait time greater than 19.9 minutes, and 1 percent of boats experience wait time greater than 36.3 minutes. The maximum wait time on a typical high volume day is 63.3 minutes.

As shown in Table 5.1.3-10, the number of vessel arrivals would vary depending on the day and time. For the New River Bridge, on a typical high volume day under Project conditions, arrivals are estimated at 656 vessels.

	Units	No-Action Alternative	Project	High Volume Day
Boat Arrivals	(#/day)	varies	varies	656
Percent of boats with non-zero wait time	(%)	51%	63%	75%
Average wait time	(min)	3.5	4.6	6.6
Average non-zero wait time	(min)	6.8	7.3	8.8
Maximum non-zero wait time	(min)	52.4	58.8 ²	63.3

Source: AMEC Foster Wheeler. 2015. *Rail/Marine Traffic Simulation Using Summer Boat Traffic Data for the AAF Passenger Rail Project from Orlando to Miami, Florida*. January 21, 2015.

1 This scenario represents a typical high-volume day or 80 percent of the highest peak volume day.

2 See Table 5.1.3-3 for average summer weekday and weekend boat counts

3 Maximum wait time inclusive of the highest peak volume day.

Fixed Bridges

All alternatives would alter the existing fixed bridges at other navigable waterways (Eau Gallie River, St. Sebastian River, Crane Creek, Turkey Creek, and the Hillsboro Canal) by either replacing the existing single-track bridge with a new double-track bridge, or adding a second single-track bridge parallel to the existing bridge. At these waterways, the new bridge would have the same horizontal and vertical clearances as the existing bridge and would not affect navigation. Several commenters asked AAF to evaluate raising these bridges, including the bridge at Taylor Creek. Section 3.3.3 of this FEIS provides additional information on bridge alternatives.

The USCG requested that AAF evaluate alternatives that would raise these bridges and increase the vertical clearance below the bridge, as the low clearance under these structures currently limits navigation. AAF has evaluated alternatives that would raise the bridge elevation and concluded that these are not feasible. A primary consideration in the use of elevated structures is track grade or incline. Trains, as opposed to automobiles, are much more restricted in the grades they can navigate safely and efficiently. For the FECR Corridor, freight trains represent the limiting factor for grade, which is a one-percent grade based on AREMA design standards (AREMA 2003). To provide a 1-percent grade, for each foot in

elevation a bridge is raised, an additional 100 linear feet of embankment is needed at each end of the bridge. For example, if the bridge is raised 20 feet, the track work for 2,000 feet on either end of the bridge will require substantial infrastructure improvements to support the grade increase, resulting in a total impact of 4,000 feet (0.75 mile).

Raising the track on the approaches to the bridges would require retaining walls to keep the additional fill within the railroad right-of-way, and may require property acquisition to accommodate the new embankment and structures. At-grade crossings are often close to the bridge, and raising the bridge would require either closing the grade crossing or raising the surface road. For example, major surface roads are located less than 0.2 miles from the Eau Gallie River and St. Sebastian River bridges (SR 505). These infrastructure improvements and supporting activities would have significant additional costs as a result of:

- Building large, costly retaining walls to minimize the footprint of the large embankments and fill required to maintain track grades;
- Abandoning, rebuilding, or relocating the existing grade crossings adjacent to the bridges;
- Mitigating any increased environmental impacts to aquatic resources, including wetlands and surface waters important habitat, etc.;
- Mitigating increased noise impacts to any residences near the elevated structure; and
- Protecting or purchasing buildings or nearby community structures of significance which will be impacted by the larger footprint of the bridge.

The use of elevated bridge structures would result in significant cost increase; preliminary cost estimates indicate at least an increase in costs of two to three times planned activities. Time of overall project execution would also increase, thereby affecting AAF's goal to be operational in 2016. Purchasing additional property, if available, would negatively impact project costs and the project schedule. Moreover, AAF does not have condemnation authority, so there is no guarantee that AAF would be able to purchase the needed land. Community impacts would also result from closing, moving or modification of at-grade crossings and the impacts of construction and operations to structures in the vicinity of the expanded footprint that would be needed.

In summary, FRA has determined that the significant delays, costs, and risks associated with the use of elevated structures make raising any of the corridor bridges not feasible.

5.1.3.3 Indirect and Secondary Impacts

Indirect effects of the Project potentially caused by increased closures of the moveable bridges along the St. Lucie River, Loxahatchee River, and New River on recreational and commercial boat traffic. Commenters also stated that delays, inconvenience to boaters, and safety problems would have significant effects on quality of life, the viability of maritime businesses located upriver of the bridges, and on the value of waterfront property upriver of the bridges.

Commenters on the DEIS stated that the increased queuing would decrease safety due to the need for boats to maintain headways while queuing. The analysis presented in the EIS assumes that each queue developed during a bridge closure would be eliminated before the next closure cycle begins. With an increase in bridge closures, it is possible for one queue to merge with another which could create a

navigation hazard. As noted in the public comments, barges using the St. Lucie Canal (Okeechobee Waterway) are slow to react and cannot stack at the bridge. It can take a barge over 30 minutes to resume navigable speed. In the absence of mitigation, the potentially increased queue lengths and durations could adversely affect boater safety as well as the time required for commercial barges to traverse the St. Lucie Bridge.

Section 5.4.3, Economic Conditions, discusses the potential for the Project to affect the maritime economy or property values. AAF has committed to implementing mitigation measures, as stipulated in Section 7.2.2 that will reduce queuing and associated safety concerns by providing mariners with a fixed schedule of bridge closures and durations.

5.1.3.4 Temporary Construction-Period Impacts

Rehabilitating the three moveable bridges (St. Lucie, Loxahatchee and New River) may require short closures of the bridges in order to rehabilitate the bridge-raising mechanisms. AAF will coordinate with the U.S. Coast Guard in advance of bridge rehabilitation and identify a schedule and notification protocols that minimize temporary impacts on navigation at these structures. Replacing the other fixed bridge along the N-S Corridor and the WPB-M Corridor will require installing new pilings and superstructure, but will maintain navigability on these waterways.

5.2 Physical Environment

This section evaluates the potential impacts of the Project on the physical environment in the Project Study Area, with respect to air quality, noise and vibration, farmland soils, hazardous materials and solid waste, coastal zone management, and climate change. Geology, which is not a resource that FRA requires to be evaluated in an EIS, is considered in Section 5.4.4, *Public Health and Safety*, as it concerns the safety of the Project with respect to sinkholes and other geological threats to public infrastructure.

5.2.1 Air Quality

This section describes the potential impacts to air quality from the Project. The air quality provisions that are applicable to the Project include the 1990 Clean Air Act Amendments (CAAA), and the NEPA requirements as specified in the CEQ's Regulations for Implementing the National Environmental Policy Act (40 CFR parts 1500-1508) (EPA 2008a; CEQ 2005a).

The CAAA require that a Project does not:

- Cause any new violation of the NAAQS;
- Increase the frequency or severity of any existing violations; or
- Delay attainment of any NAAQS.

As demonstrated in this section, for all alternatives the Project would provide a net regional air quality benefit as compared to the No-Action Alternative. The air quality study demonstrates that the Project would decrease emissions of all regulated pollutants. Air quality in the region would be improved through the diversion of vehicles from the roads and highways in central-east Florida.

Some commenters raised concerns that the air quality and greenhouse gas emissions estimates omitted emissions from motor vehicles stopped at grade crossings, as well as from boats stopped at the three

drawbridges. They requested that the FEIS include an analysis of air quality at congested grade crossings, particularly in downtown areas. Section 1.7.5 provides a summary response: additional information is included in the following section.

5.2.1.1 Methodology

The analysis considered emissions of regulated pollutants from passenger trains and other vehicles.

Passenger Train Emissions Methodology

Air pollutant emissions resulting from the operation of passenger trains associated with the Project and switching occurring at the VMF were calculated based upon the number and types of locomotives (two diesel engines per train, with eight trainsets operating concurrently), the horsepower rating of the engines (4,000 horsepower), and the assumption that the locomotives would be compliant with U.S. Environmental Protection Agency (EPA) Tier 4 rail emission standards. Criteria pollutant emission factors for the locomotives were obtained from the EPA.

Vehicular Emissions Methodology

Overall vehicle miles travelled (VMT) reductions were calculated based upon estimates of auto vehicle trips avoided as auto passengers are diverted to the new rail service for long-distance service (travel between central and southeast Florida). Daily vehicle trip reductions were calculated based on values for total annual trips diverted based on the AAF ridership report (Appendix 3.2.1) Air pollutant emission reductions resulting from reduced VMT as a consequence of the Project were determined using a conservative approach. All VMT reductions were assumed to result from motorcycles, cars and light trucks (SUVs, light pickups, etc.). Emission factors for cars, motorcycles, and light trucks for speeds above 40 mph were taken from data generated from the 2007 on-road mobile source inventory developed for the Southeastern States Air Resource Managers, Inc. (AMEC 2013a). For the purposes of this estimation procedure, all vehicles were assumed to be gasoline burning vehicles since that fuel type represents the majority of vehicles in the passenger vehicle categories included in this evaluation.

The emissions related to vehicles stopping at the grade crossings was estimated and included in the overall project emissions estimates. Details of this analysis are presented in Appendix 5.2-1. Average vehicle emissions factors were developed using MOVES 2010A and were applied to the estimated traffic projected at the grade crossings during the time a train crosses the roadway. The total number of vehicles used to calculate emissions were obtained through Synchro 8 reports generated for the Transportation and Rail Road Crossing Analysis.

Based on the information provided from the Transportation and Railroad Crossing Analysis report, the number of hourly cycles was determined, and multiplied by 24 hours to determine the total number of cycles per day. This represents the number of times traffic will be stopped at a grade crossing. Current conditions reflects freight train cycles and normal cycles (where automotive traffic during periods when no freight trains are passing). Passenger train cycles were estimated separately to determine the emissions potentially associated with vehicle queuing for the passenger trains. Two cycles per hour (or 48 cycles per day) was estimated for all passenger trains and freight trains.

Emissions associated with vehicles queuing for 2016 and 2036 were calculated using 2007 emission factors. Table 5.2.1-4 presents the 2016 and 2036 emissions associated with vehicles queuing under

normal traffic cycles and freight train cycles. Total greenhouse gas emissions analysis was not included since emission factors were not available from MOVES 2010A. However, CO₂ emissions, which are a fundamental component of climate change analyses, are calculated in Table 5.2 1-2 below.

5.2.1.2 Environmental Consequences

This section describes the potential impacts to air quality that could result from the Project. Air quality impacts would be the same for each of the Action Alternatives, as each would include the same train miles and automobile diversions; this analysis, therefore, does not differentiate between Alternatives A, C, and E.

The CAAA require that federal agency activities conform to the State Implementation Plan (SIP) with respect to achieving and maintaining attainment of NAAQS and addressing air quality effects (58 FR 62188). The EPA General Conformity Rule requires that a conformity analysis be performed which demonstrates that a proposed action does not:

- 1) Cause or contribute to any new violation of any NAAQS in the area;
- 2) Interfere with provisions in the SIP for maintenance or attainment of any NAAQS;
- 3) Increase the frequency or severity of any existing violation of any NAAQS; or
- 4) Delay timely attainment of any NAAQS, any interim emission reduction, goals, or other milestones included in the SIP (58 FR 63214).

Provisions in the General Conformity Rule allow for exemptions from performing a conformity determination only if total emissions of individual nonattainment area pollutants resulting from the proposed action fall below the significant threshold values.

The Project Study Area (Phase II) is located in Orange, Brevard, Indian River, St. Lucie, Martin, and Palm Beach Counties. All six counties are designated as attainment areas for all criteria pollutants. As the Project is in attainment areas, it is not subject to review under the EPA's General Conformity Rule. Pursuant to this exclusion, a development, or select analysis, of emissions inventories of criteria pollutants of the proposed action would not be necessary and would not be performed for General Conformity evaluation purposes. However, emissions of the criteria pollutants, as related to changes in new passenger trains and freight trains, and reductions in on-road VMT, are reviewed to assess whether the passenger trains emissions would affect regional air quality and to assess the effects of VMT reduction on regional air quality.

The 2013 FONSI for Phase I found that the Project would provide a net regional air quality benefit as compared to current conditions, and would reduce regional criteria pollutants, mobile source air toxics, and greenhouse gas emissions because motor vehicle use would decrease.

No-Action Alternative

Under the No-Action Alternative, VMT within the Orlando to West Palm Beach area would continue to increase as population in southeastern and central-eastern Florida continues to grow. This population increase would result in an ongoing increase in VMT, with few alternative public transportation options that could be utilized by a large number of residents and visitors. VMT reductions that would be realized under the Proposed Action would not occur; therefore, moderate adverse air quality impacts would occur.

Action Alternatives A, C, and E

Air quality impacts of the three Action Alternatives (Alternative A, Alternative C, and Alternative E) would be identical, as each alternative would provide a similar travel time and would have the same ridership and VMT reductions. As shown in Table 5.2.1-1, the Project for the Orlando to West Palm Beach service would remove 344 daily vehicle-trips from area highways in 2016, 1,214 daily trips in 2019, and 1,453 daily trips in 2030. With a 337-mile round-trip distance, this would result in an annual VMT reduction of 42,313,720 miles in the start-up year (2016), and an annual VMT reduction of 149,328,070 miles by 2019, the year that near-full ridership is anticipated. In 2030, VMT reductions of 178,726,265 miles are anticipated.

The entire Project would provide a net regional air quality benefit as compared to the No-Action Alternative. Air quality in the region would be improved through the reduction of vehicles from the roads and highways as riders move instead to the proposed passenger rail service between Orlando and West Palm Beach.

	2016	2019	2030
Daily Vehicle-Trips Removed	344	1,214	1,453
Annual Vehicle-Trips Removed	125,560	443,110	530,345
Annual VMT Reductions ¹ (miles)	42,313,720	149,328,070	178,726,265

Source: Louis Berger Group. 2013. *All Aboard Florida Ridership and Revenue Study: Summary Report*. September 2013. Prepared for Florida East Coast. Report.

- 1 Based on a 337-mile round trip between Orlando and West Palm Beach
- 2 In May 2015, AAF published the *All Aboard Florida Ridership and Revenue Study*, which supersedes the data presented in this table and in the associated 2013 ridership study. However, this EIS maintains use of the 2013 data, as it represents a more conservative approach to estimating ridership.

As shown in Table 5.2.1-2, the difference between reductions in emissions related to VMT and increases related to passenger train emissions, as measured in tons per year, was estimated for CO, NO_x, SO₂, VOCs, PM₁₀, PM_{2.5}, CO₂, CH₄, and N₂O. Emissions for all pollutants, except CO₂ in 2016, show an overall decrease. The lone exception is CO₂ if the Project is considered independently of the cumulative impacts in the Project Study Area. Under that analysis, CO₂ shows an increase of just over 23,000 tons per year, related primarily to the increase in passenger train emissions and the modest decrease in vehicular traffic in 2016. This analysis is based only on a review of the 344 vehicles per day being removed as a result of train ridership for 2016 for the extension of proposed passenger rail service from West Palm Beach to Miami. Under that limited analysis, the modest decrease in vehicular traffic from the Project in 2016 is not sufficient to offset the emissions increase for CO₂ from the trains themselves (which are calculated on the basis of the entire Project).

Table 5.2.1-2 Summary of Emissions (tons/year) for Orlando to West Palm Beach, 2016-2030¹

Pollutant	Year	VMT Reduction	Automobile Total	Passenger Train	Train Switching	Train Total	Net Emissions
CO	2016	42,313,720	-354.0	55.4	1.6	57.0	-296.9
	2019	149,328,070	-1249.1	55.4	1.6	57.0	-1192.1
	2030	178,726,265	-1495.1	55.4	1.6	57.0	-1438.1
NO _x	2016	42,313,720	-51.6	43.4	1.3	44.5	-7.1
	2019	149,328,070	-182.1	43.4	1.3	44.5	-137.6
	2030	178,726,265	-218.0	43.4	1.3	44.5	-173.4
SO ₂	2016	42,313,720	-0.8	0.2	0.0	0.2	-0.6
	2019	149,328,070	-2.8	0.2	0.0	0.2	-2.6
	2030	178,726,265	-3/3	0.2	0.0	0.2	-3.1
VOC	2016	42,313,720	-12.7	1.8	0.1	1.9	-10.8
	2019	149,328,070	-44.9	1.8	0.1	1.9	-43.0
	2030	178,726,265	-53.7	1.8	0.1	1.9	-51.8
PM ₁₀	2016	42,313,720	-1.3	0.6	0.0	0.7	-0.6
	2019	149,328,070	-4.5	0.6	0.0	0.7	-3.8
	2030	178,726,265	-5.4	0.6	0.0	0.7	-4.7
PM _{2.5}	2016	42,313,720	-1.1	0.6	0.0	0.6	-0.4
	2019	149,328,070	-3.8	0.6	0.0	0.6	-3.2
	2030	178,726,265	-4.6	0.6	0.0	0.6	-3.9
CO ₂	2016	42,313,720	-16,978.0	40,234.9	NA	40,234.9	23,256.9
	2019	149,328,070	-59,916.5	40,234.9	NA	40,234.9	-19,618.7
	2030	178,726,265	-71,212.3	40,234.9	NA	40,234.9	-31,477.4
CH ₄	2016	42,313,720	-1.4	0.4	NA	0.4	-1.0
	2019	149,328,070	-5.1	0.4	NA	0.4	-4.7
	2030	178,726,265	-6.1	0.4	NA	0.4	-5.7
N ₂ O	2016	42,313,720	-1.5	0.2	NA	0.2	-1/3
	2019	149,328,070	-5.3	0.2	NA	0.2	-5.0
	2030	178,726,265	-6.3	0.2	NA	0.2	-6.1

Source: AMEC. 2013b. Technical Memorandum No. 10: Environmental Consequences for All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. Report.

1 Emissions reductions are presented as negative numbers (-)

2 Automobile emissions include emissions related to the vehicle delays at the Project grade crossings.

By 2019, the reduction in automobile travel from the Project would offset all CO₂ emissions from the passenger trains and provide an overall reduction in all pollutants including CO₂. The CO₂ reduction would approximate 20,000 tons by 2019, and 31,000 tons by 2030.

Table 5.2.1-3 summarizes the cumulative air quality benefits of the Project in combination with the Phase I - West Palm Beach to Miami service analyzed in Section 3.1.1 of the 2012 EA. The Project for all alternatives would provide a net regional air quality benefit as compared to the No-Action Alternative. The air quality study demonstrates that the Project would decrease emissions of CO, NO_x, SO₂, VOC, PM₁₀, and PM_{2.5}. Air quality in the region would be improved through the diversion of vehicles from the roads and highways in central-east Florida. By 2030, the combined project would reduce CO emissions by 1,654 tons, NO_x by 192 tons, VOCs by 59 tons, and PM₁₀ by 7 tons.

Pollutant	Year	Segment	Estimated VMT Reduction	Estimated Pollutant Reduction (tons/year)
CO	2018/2019	Orlando to West Palm Beach	149,328,070	1,249.1
		West Palm Beach to Miami	44,229,342	273.5
		Net Reduction		1,522.6
	2030	Orlando to West Palm Beach	178,726,265	1,438.1
		West Palm Beach to Miami	51,345,672	215.7
		Net Reduction		1,653.8
NO _x	2018/2019	Orlando to West Palm Beach	149,328,070	182.1
		West Palm Beach to Miami	44,229,342	49.6
		Net Reduction		132.5
	2030	Orlando to West Palm Beach	178,726,265	173.4
		West Palm Beach to Miami	51,345,672	19.0
		Net Reduction		192.4
VOC	2018/2019	Orlando to West Palm Beach	149,328,070	44.9
		West Palm Beach to Miami	44,229,342	14.5
		Net Reduction		59.4
	2030	Orlando to West Palm Beach	178,726,265	51.8
		West Palm Beach to Miami	51,345,672	7.1
		Net Reduction		58.9
PM ₁₀	2018/2019	Orlando to West Palm Beach	149,328,070	4.5
		West Palm Beach to Miami	44,229,342	0.1
		Net Reduction		4.6
	2030	Orlando to West Palm Beach	178,726,265	4.7
		West Palm Beach to Miami	51,345,672	2.2
		Net Reduction		6.9

Source: AMEC. 2013b. Technical Memorandum No. 10: Environmental Consequences for All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida.

The 2013 FONSI for Phase I stated that the selected alternative would provide a net regional air quality benefit as compared to the current conditions, and that operation of the selected alternative would reduce regional criteria pollutants, mobile source air toxics, and greenhouse gas emissions because motor vehicle emissions would decrease in the region based on the reduction of VMTs.

Vehicle Maintenance Facility and Station

The Project includes a dedicated VMF on GOAA property south of MCO. There would be some electrical requirements for the VMF but the emissions related to the minimal electrical requirements are considered negligible. In addition, the additional vehicular trips related to the MCO Intermodal Station are projected to be minimal (less than 100 employees) and are considered negligible in relation to the entire Project's estimated annual VMT reductions of 42,313,720 in 2016 and 149,328,070 in 2019. The Project's VMT and associated pollutant reductions dominate the air quality benefits.

Intersections/At-grade Crossings

Section 3.1.1 of the 2012 EA prepared for the West Palm Beach to Miami section modeled air quality emissions at intersections and grade crossings, where vehicle congestion may occur, using a CO hotspot screening method. Motor vehicles emit CO at high rates when they are operating at low speeds or idling in queues. Section 3.1.1 of the 2012 EA evaluated the most congested intersections (in terms of LOS, delay, and traffic volumes) in the vicinity of the proposed stations and railroad crossings. The modeling showed that traffic did not exceed air quality criteria for CO in either the opening year or the build-out year at any of the intersections.

As documented in Section 4.1.2, *Transportation*, the highest-volume grade crossings for the Project carry 40,000 AADT. The highest-volume grade crossing evaluated in Section 3.1.1 of the 2012 EA had an AADT of 47,200 (Hillsboro Boulevard, Broward County). Traffic volumes and congestion at the Project's grade crossings, and therefore CO emissions, are projected to be lower than those presented in Section 3.1.1 of the 2012 EA and therefore would not exceed air quality criteria. As Section 3.1.1 of the 2012 EA showed that traffic delays at the higher-volume grade crossing did not exceed air quality criteria, a detailed hotspot CO modeling evaluation was not conducted for this FEIS.

Emissions for vehicle queuing at grade crossings under passenger train cycles are presented in Table 5.2.1-4. As shown, the emissions from the passenger trains are significantly less than 1 ton per day, which represents a *de minimis* impact pursuant to EPA standards. Combined with emissions associated with vehicle queuing under normal and freight train cycles, with the exception of Banyan Boulevard Crossing and Northlake Boulevard Crossing, the overall projected emissions from all sources generally amount to less than one ton per day. Emissions at those two crossings are still considered *de minimis* pursuant to EPA standards. The air quality analysis shows that vehicle delays associated with passenger trains are not expected to generate adverse air quality impacts.

Table 5.2.1-4 Emissions Associated with Vehicles Queuing at Grade Crossings							
Intersection	Year	CO	NOX	VOC	SO2	PM10	PM25
		(tons/day)	(tons/day)	(tons/day)	(tons/day)	(tons/day)	(tons/day)
Freight Train Cycles							
19th 20th Place Crossing	2016	0.063	0.159	0.043	0.000	0.003	0.003
19th 20th Place Crossing	2036	0.076	0.191	0.051	0.000	0.003	0.003
Banyan Blvd Crossing	2016	0.428	1.043	0.285	0.001	0.019	0.019
Banyan Blvd Crossing	2036	0.672	1.638	0.447	0.002	0.031	0.030
Monterey Rd Crossing	2016	0.132	0.333	0.089	0.000	0.006	0.006
Monterey Rd Crossing	2036	0.169	0.424	0.114	0.001	0.008	0.007
North Causeway Crossing	2016	0.065	0.164	0.044	0.000	0.003	0.003
North Causeway Crossing	2036	0.083	0.209	0.056	0.000	0.004	0.004
Northlake Blvd Crossing	2016	0.474	1.155	0.316	0.001	0.022	0.021
Northlake Blvd Crossing	2036	0.752	1.835	0.501	0.002	0.034	0.033
Oslo Rd Crossing	2016	0.175	0.441	0.118	0.001	0.008	0.008
Oslo Rd Crossing	2036	0.238	0.600	0.161	0.001	0.011	0.011
Palm Bay Rd Crossing	2016	0.065	0.163	0.044	0.000	0.003	0.003
Palm Bay Rd Crossing	2036	0.123	0.311	0.083	0.000	0.006	0.005
Pineda Causeway Crossing	2016	0.187	0.471	0.127	0.001	0.009	0.008
Pineda Causeway Crossing	2036	0.327	0.824	0.221	0.001	0.015	0.014
SE Indian Street Crossing	2016	0.087	0.218	0.059	0.000	0.004	0.004
SE Indian Street Crossing	2036	0.114	0.286	0.077	0.000	0.005	0.005
Seaway Drive Crossing	2016	0.084	0.211	0.057	0.000	0.004	0.004
Seaway Drive Crossing	2036	0.117	0.294	0.079	0.000	0.005	0.005
Passenger Train Cycles							
19th 20th Place Crossing	2016	0.034	0.087	0.023	0.000	0.002	0.002
19th 20th Place Crossing	2036	0.053	0.132	0.036	0.000	0.002	0.002
Banyan Blvd Crossing	2016	0.162	0.395	0.108	0.000	0.007	0.007
Banyan Blvd Crossing	2036	0.240	0.585	0.160	0.001	0.011	0.011
Monterey Rd Crossing	2016	0.050	0.125	0.034	0.000	0.002	0.002
Monterey Rd Crossing	2036	0.083	0.208	0.056	0.000	0.004	0.004
North Causeway Crossing	2016	0.012	0.029	0.008	0.000	0.001	0.001
North Causeway Crossing	2036	0.011	0.029	0.008	0.000	0.001	0.000
Northlake Blvd Crossing	2016	0.201	0.490	0.134	0.001	0.009	0.009
Northlake Blvd Crossing	2036	0.312	0.761	0.208	0.001	0.014	0.014
Oslo Rd Crossing	2016	0.082	0.207	0.056	0.000	0.004	0.004
Oslo Rd Crossing	2036	0.098	0.248	0.067	0.000	0.004	0.004
Palm Bay Rd Crossing	2016	0.022	0.055	0.015	0.000	0.001	0.001
Palm Bay Rd Crossing	2036	0.072	0.182	0.049	0.000	0.003	0.003
Pineda Causeway Crossing	2016	0.092	0.231	0.062	0.000	0.004	0.004
Pineda Causeway Crossing	2036	0.186	0.469	0.126	0.001	0.008	0.008
SE Indian Street Crossing	2016	0.041	0.103	0.028	0.000	0.002	0.002
SE Indian Street Crossing	2036	0.091	0.224	0.061	0.000	0.004	0.004
Seaway Drive Crossing	2016	0.033	0.083	0.022	0.000	0.002	0.001
Seaway Drive Crossing	2036	0.046	0.117	0.031	0.000	0.002	0.002

5.2.1.3 Indirect and Secondary Impacts

The areas surrounding the proposed stations are already developed; the Project is not anticipated to result in induced growth or development that could generate additional emissions of criteria pollutants, and would not result in indirect or secondary effects to air quality. Section 3.1 of the 2012 EA documented that there would be no indirect or secondary effects to air quality associated with Phase I of the Project.

5.2.1.4 Temporary Construction-Period Impacts

The emissions from construction activities are expected to be minimal, controlled using BMPs, and temporary in nature. Combustion emissions would be associated with construction-related equipment, workers' vehicles, and transportation/delivery of construction materials. Emissions associated with construction equipment would be minimal because most equipment would be driven to and kept at affected sites for the duration of construction activities. In addition, BMPs routinely performed at construction sites would serve to keep emissions of PM (the primary pollutant emitted) to a minimum during the temporary construction activities. Emissions associated with construction workers commuting and the transport of materials would also be minimal given the temporary nature of the activities. Contractors will be required to use BMPs during construction, such as soil watering to reduce fugitive dust emissions, which would be effective in substantially reducing potential emissions during construction. Any potential temporary impacts will be avoided and/or minimized through BMPs and mitigation requirements applied pursuant to all applicable federal, state, and local statutes, regulations and ordinance, if and as applicable, such that any such temporary construction impacts would cease immediately after construction activities are completed.

5.2.2 Noise and Vibration

This section identifies the impacts of the Project on properties and residents within the Project Study Area due to changes in noise and vibration. Section 4.2.2 defines noise and vibration and provides information on existing noise and vibration levels. AAF has committed to installing stationary wayside horns at each of the 117 grade crossings between Cocoa and West Palm Beach where severe, unmitigated impacts would occur using locomotive-mounted horns (see Appendix 3.3.5-D). Therefore, the noise analysis assumes that wayside horns will be implemented as a design feature of the Project. Stationary pole-mounted wayside horns at grade crossings will reduce future noise levels along the N-S Corridor by eliminating train-mounted warning horns for both future freight trains and AAF passenger trains. While a wayside horn generates the same sound as that from an on-board locomotive horn, using wayside horns at the intersection instead of the locomotive horn has been shown to substantially reduce the noise footprint without compromising safety at the grade crossing.

The Project would result in long-term noise and vibration adverse impacts to residents and properties, primarily along the N-S Corridor. The Project would result in noise impacts along some elevated sections of the E-W Corridor. Noise impacts would be the same for the three alignments, Alternatives A, C, and E. The Project will result in minor vibration impacts along the N-S Corridor due to the increase (greater than doubling) of vibration events as a result of adding passenger train service to the existing freight operations. There is no potential vibration impact along the MCO Segment because of low train speeds and the absence of sensitive receptors. Along the E-W Corridor, minor vibration impacts would occur

where residences are close to the proposed tracks. Vibration levels are not projected to exceed structural damage levels (100 VdB) at any location.

Comments on the noise analysis presented in the DEIS included statements that the current freight trains create noise impacts, even at a considerable distance from the tracks. Commenters believed that the DEIS did not take this into account, and underestimated the effects of noise from trains passing-by. Other concerns include the noise effects on historic buildings, which are not insulated to prevent the penetration of sound. Commenters were also concerned that the passenger rail service would cause freight trains to operate at night, increasing nighttime noise effects. There were also comments that the noise analysis omitted consideration of warning horns at the three moveable bridges. Some commenters also requested information on the location of proposed noise barriers. Section 1.7.5 of this FEIS provides general responses to these comments, while other specific comments are addressed in the following sections.

5.2.2.1 Methodology

Noise and vibration have been assessed according to guidelines specified in FRA's *High-Speed Ground Transportation Noise and Vibration Impact Assessment* guidance manual (FRA Manual), the Federal Transit Administration's (FTA) *Noise and Vibration Impact Assessment* guidance manual, and the Federal Highway Administration (FHWA) guidelines as defined for Florida application by FDOT for traffic operations (FRA 2012a; FTA 2006; FDOT 2011c). These guidelines provide the methodology for identifying the affected environment and assessing potential impact from transit projects such as the Project.

The methodology for assessing potential short- and long-term noise and vibration impacts of the Project includes: identifying noise and vibration-sensitive land uses within the area of potential impact; modeling existing noise and vibration conditions at these sensitive receptors based on existing freight operations, highway traffic conditions, and general ambient sources; projecting future noise and vibration conditions from the proposed alternatives; assessing potential long-term noise and vibration impact; and considering noise and vibration mitigation. The distances to potential impact have been used to create noise contours and to identify the number of potential impacts. The noise impacts have been calculated assuming that wayside horns will be implemented as part of the Project. Noise impacts were calculated for 2016, the first year of full revenue service, for all at-grade intersections and along the Project corridor with respect to operational noise and vibration.

Some commenters questioned the areas of noise impact, specifically areas identified as no impact areas that currently experience noise and vibration impacts from existing train operations. Noise impact is determined based on the comparison of existing to future noise conditions. Noise impact only occurs at sensitive receptors where the Project would cause an increase in noise that would result in either a moderate or severe increase as defined by the FRA noise impact criteria (Figure 5.2.2-1).

Noise

Noise generated from the proposed passenger rail operations was calculated based on average operating characteristics for each county and projected service schedules. Table 5.2.2-1 shows the noise calculation inputs for the proposed passenger rail operations. The train schedule assumes an average of two operations per hour between 7:00 AM and 10:00 PM and 0.22 operations per hour between 10:00 PM and 7:00 AM, for a total of 16 roundtrip trains per day during the 2016 build-out year. For this analysis, total passenger train

length was assumed to be 810 feet, consisting of two 65-foot long locomotives and eight 85-foot long passenger cars.

Noise predictions include all noise sources resulting from train operations. The predominant noise sources include the locomotive engine, exhaust and radiator cooling fans, the wheel/rail interaction on locomotives and rail cars as well as audible warning devices at highway-rail grade crossings. There is little research to support that there is any difference in noise emissions from trains operating on wooden or concrete ties and, accordingly, the FRA does not account for any difference in noise emissions for different tie types.

Speeds will vary depending upon the location along the route. Except for Orange County, speeds were averaged by county. For Orange County, operations were split into Orange (East) and Orange (West) of SR 417 because projected operating speeds would be substantially less west of SR 417.

Distances to potential moderate and severe noise impacts have been calculated and impact assessed by comparing the Project noise level with the existing noise level. As both existing and Project noise levels decrease with increasing distance from the source, comparisons were made at 5-foot intervals moving outward from the alignment until the Project noise would no longer exceed the impact criteria. As existing noise is in part a function of population density, which varies on either side of the track, impact contours are not always necessarily symmetrical.

County	Speed (mph)	Average Daily Trains	Trains/ Hour Daily	Trains/ Day (7:00 AM-10:00 PM) ²	Trains/ Hour Day	Trains/ Night (10:00 PM-7:00 AM) ²	Trains/ Hour Night
East-West Corridor							
Orange (West)	34.2	32	1.33	30	2	2	0.22
Orange (East)	103.5	32	1.33	30	2	2	0.22
Brevard	94.6	32	1.33	30	2	2	0.22
North-South Corridor							
Brevard	98.1	32	1.33	30	2	2	0.22
Indian River	106.6	32	1.33	30	2	2	0.22
St. Lucie	92.6	32	1.33	30	2	2	0.22
Martin	79.5	32	1.33	30	2	2	0.22
Palm Beach	89.2	32	1.33	30	2	2	0.22

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013. AAF. 2013a. *Modeling Assumptions*. May 2013.

- 1 Average speeds calculated from CA20 TPC Runtimes
- 2 Relative distribution of day/night activity for Passenger Operations

Noise impacts within the MCO Segment were determined using FRA impact criteria. In the vicinity of the VMF, noise from idling locomotives was added to the noise generated from moving trains. The Ldn from moving and idling trains is 68.8 dBA at a distance of 50 feet (FTA 2006).

Along the E-W Corridor, the Project includes 13 bridges over roads. In these areas, the proposed track will be elevated and noise generated from the passenger trains would therefore propagate farther. To account for this increased noise exposure, a correction of +4 dBA was added to these sections. These areas are indicated as “Elevated” in Table 5.2.2-8, while non-elevated portions of track are indicated as “At Grade.” In order to account for the varying distances between SR 528 and the track alignment for each alternative alignment in the CFX segment, the corridor was divided into nine sections (HW1 through HW9) based on the average distance between SR 528 and the track alignment. Existing and Project noise levels were computed as a function of distance from the respective sources and impacts assessed according to FRA criteria.

A summary of the nine sections is given in Table 5.2.2-2 and illustrated in Appendix 5.2.2-A1. Distance between the alignment centerline and SR 528 was calculated for each section, and is measured from the alternative alignment centerline to the centerline of the near lane. Generally, the alternative alignments are located south of SR 528. However, in Section HW9, the alternative alignment is north of SR 528.

Noise impact criteria for trains are defined by FTA and FRA. The criteria are based on potential future increases in noise exposure and are defined using a sliding scale that incorporates existing noise conditions. For example, introducing new noise sources in relatively quiet areas would have a greater potential for impact than in noisier areas. Future noise levels would include the contributions of existing noise sources and new project noise sources.

SR 528 Section	Rail Noise Section	From	To	Offset Distance (feet) ¹		
				Alt. A	Alt. C	Alt. E
HW1	Orlando (West)	SR 436	GOAA Property Boundary	50	70	130
HW2	Orlando (East)	GOAA Property Boundary	SR 417	100	100	100
HW3		SR 417	Int. Corp Park Blvd	80	140	260
HW4		Int. Corp Park Blvd	Dallas Blvd	80	140	250
HW5		Dallas Blvd	SR 520	80	550	260
HW6		SR 520	Brevard County Line	80	80	70
HW7		Brevard (EW)	Orange County Line	SR 407	50	
HW8	SR 407		East side of I-95 Interchange	70		
HW9	East of I-95 Interchange		SR 524	80		

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013.

¹ Distance measured from alternative alignment centerline to SR 528 near lane centerline. Section H9 located north of SR 528.

The noise criteria include two levels of potential noise impact. The interpretation of these two levels of impact is summarized below and shown in Figure 5.2.2-1:

- **Severe:** FRA strongly encourages noise abatement for projects where severe noise impacts are identified. Severe noise impacts represent the most compelling need for mitigation as they have the greatest potential for adverse impact on the community.
- **Moderate:** In this range of noise impact, several project-specific factors are considered to determine the magnitude of the impact. These factors include where impact falls within the moderate range, what the existing noise levels are and what future noise levels would exist, and the types and number of noise-sensitive land uses impacted.

AAF conducted an analysis in order to determine possible impacts resulting from increased use of warning horns on the three movable bridges along the North-South Corridor: St. Lucie River (Martin County), Loxahatchee River (Palm Beach County), and New River (Broward County).

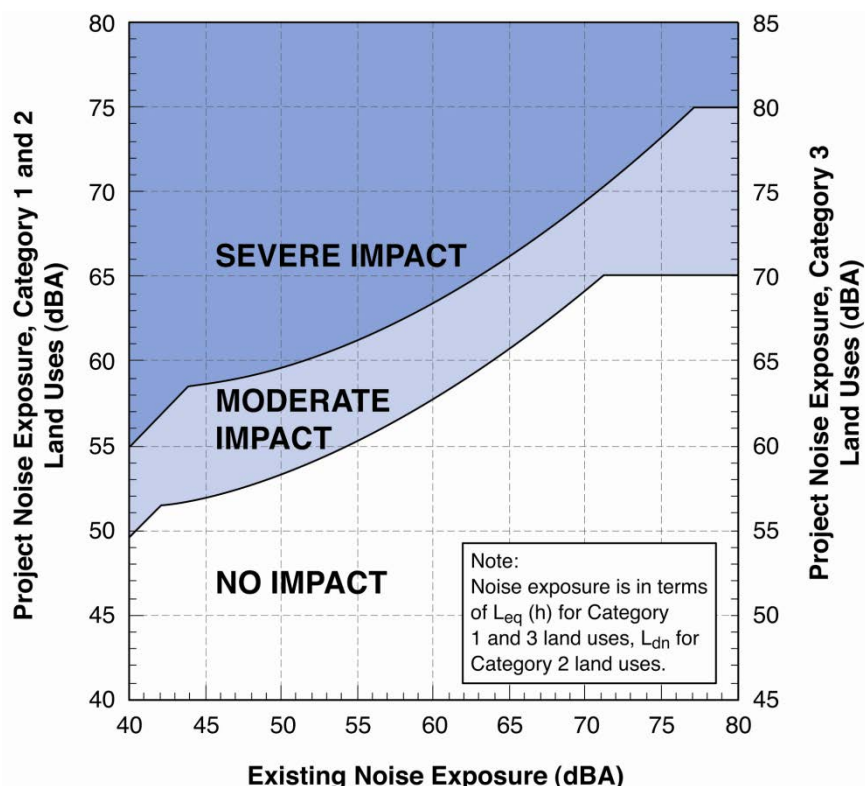


Figure 5.2.2-1 Noise Impact Criteria

Source: Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006.

A noise impact assessment was conducted at each bridge following FTA/FRA guidelines which included comparison of potential future noise levels (passenger trains + bridge siren noise) to existing noise levels (freight trains + bridge sirens). Noise levels from trains at each location were obtained from published noise levels in the DEIS. In order to be conservative, (i.e. use a lower existing noise level) modeling for noise impacts due to the bridge sirens was completed without including any train horns as part of the existing background noise conditions. Also, due to the elevation and open area around each bridge siren, propagation of noise from each bridge would be un-attenuated.

Noise levels from bridge sirens were calculated using equations from Table 6-8 of the FTA Manual along with information obtained from the FECR. Calculation inputs included:

- Sound Exposure Level (SEL) of electronic siren considered is 114 dB.
- For each train pass-by, the siren will sound in cycles of 4 blasts with durations of 2 seconds each, repeated every 2 minutes. The total time from first siren to bridge re-opening is 16 minutes. In this timeframe a total of 64 seconds of siren noise would occur for each train pass-by event. The estimated 16 minute event duration was based on regulatory requirements for bridge signaling provided in 33 CFR 117.

Vibration

Vibration levels are estimated based on the FTA generalized curve that predicts the overall ground-borne vibration level outside buildings as a function of distance from the source. Adjustments were applied to this generalized curve to account for factors such as vehicle speed, building type and propagation characteristics. For this assessment, vibration was projected based on a composite approach that incorporated modeling methods recommended by FRA and measured vibration levels from another project along the existing N-S Corridor (FRA and FDOT 2010). The combined approach establishes existing vibration conditions based on measured data and then extrapolates these data for the proposed track conditions and train speeds.

In a noise and vibration assessment prepared in July 2010 as part of the Amtrak EA (FRA and FDOT 2010) for a separate proposed passenger rail service expansion along the existing FECR Corridor, vibration measurements were conducted at representative locations 70 feet from the track centerline in Jacksonville, Vero Beach, and West Palm Beach. These vibration measurements are representative of the existing freight rail traffic and passenger rail operations.

A baseline curve was established according to the average measured vibration level from the Amtrak study for each type of train: freight and passenger. For freight operations, a total of 11 train events with speeds ranging from 30 to 49 mph (average 39 mph) generated vibration levels ranging from 79 to 86 VdB (average of 82 VdB). For passenger operations, a total of four train events with speeds ranging from 71 to 72 mph (average 72 mph) generated vibration levels ranging from 80 to 83 VdB (average 81 VdB).

The average measured results for passenger and freight operations were adjusted according to the FTA generalized curve for “Locomotive Powered Passenger or Freight” operations incorporate the specific source and soil propagation characteristics associated with FRA and FTA “Adjustment Factors” for these specific source and propagation characteristics. Figure 4.2.2-3 shows the generalized curve for “Locomotive Powered Passenger or Freight” operations at 50 mph and the freight and passenger curves

based on measurements in the Amtrak EA. Vibration estimates for the proposed passenger operations were then adjusted for the average train speed along the project segment.

Ground-borne noise predictions were made using the same curves generated for ground-borne vibration with adjustments for the frequency spectra of the type of train and soil characteristics. Based on the characteristics of freight and passenger trains and that the majority of soils along the N-S and E-W Corridors are sandy, an adjustment of -50 dB was used to calculate ground-borne noise levels (dBA) from ground-borne vibration levels (VdB).

FTA and FRA vibration impact criteria are based on human and structural responses to ground-borne vibration and GBN. The criteria are based on the type of land use and the frequency of vibration-generating events. Just as with noise impacts, more frequent vibration events will cause a greater impact than less frequent events. Table 5.2.2-3 lists the vibration impact criteria for the three major land use categories, according to frequency of vibration events.

According to FRA, historic properties are categorized according to their current use. For example, a historic home is categorized as a Category 2 residential receptor and a historic museum is categorized as a Category 3 institutional receptor (FRA 2012d). Potential vibration impact resulting and structural damage has been assessed at all structures adjacent to the Project including those which are registered or eligible to be registered as historic.

Potential noise and vibration impact has been assessed at all hospital and medical facilities as they apply to Category 2 (hospital locations where people sleep) and Category 3 (institutional facilities) receptors.

Land Use Category	Ground Borne Vibration Impact Levels (VdB)			Ground Borne Noise Impact Levels (dB)		
	Frequent Events ¹	Occasional Events ²	Infrequent Events ³	Frequent Events ¹	Occasional Events ²	Infrequent Events ³
Category 1: Buildings where vibration would interfere with interior operations	65 VdB ⁴	65 VdB ⁴	65 VdB ⁴	N/A ⁵	N/A ⁵	N/A ⁵
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB	35 VdA	38 VdA	43 VdA
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB	40 VdA	43 VdA	48 VdA

Source: Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. USDOT Report Number FTA-VA-90-1003-06, May 2006.

- 1 *Frequent Events* is defined as more than 70 vibration events of the same kind per day.
- 2 *Occasional Events* is defined as between 30 and 70 vibration events of the same kind per day.
- 3 *Infrequent Events* is defined as fewer than 30 vibration events of the same kind per day.
- 4 This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
- 5 Vibration-sensitive equipment is not sensitive to ground-borne noise.

There are some buildings that can be very sensitive to vibration and noise but do not fit into any of the three land use categories listed in Table 5.2.2-3. These buildings can include concert halls, TV and recording studios, auditoriums, and theaters, and warrant special attention when assessing potential vibration impacts. The impact criteria for these special buildings are given in Table 5.2.2-4.

Land Use Category	Ground Borne Vibration Impact Levels (VdB)			Ground Borne Noise Impact Levels (dB)		
	Frequent Events ¹	Occasional Events ²	Infrequent Events ³	Frequent Events ¹	Occasional Events ²	Infrequent Events ³
Concert Halls	65	65	65	25	25	25
TV Studios	65	65	65	25	25	25
Recording Studios	65	65	65	25	25	25
Auditoriums	72	80	80	30	38	38
Theaters	72	80	80	35	43	43

Source: Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006.

- 1 Frequent Events is defined as more than 70 vibration events of the same kind per day.
- 2 Occasional Events is defined as between 30 and 70 vibration events of the same kind per day.
- 3 Infrequent Events is defined as fewer than 30 vibration events of the same kind per day.

Construction

Construction noise impacts were estimated following the general assessment methodologies in the FRA Manual. Based on these guidelines, 1-hour L_{eq} noise levels were projected for the two loudest pieces of equipment used for typical construction activities. For bridge construction, the two loudest pieces of equipment are a pile driver and a bulldozer. For non-bridge construction including track construction, the two loudest pieces of equipment are a rail saw and a bulldozer. The distances to potential construction noise impact are shown in Table 5.2.2-5.

Construction Condition	Land Use	Distance to Impact (feet from corridor centerline)	
		Day (7 AM-10 PM)	Night (10 PM-7 AM)
1 – Bridge	Residential	175	565
	Commercial	55	55
	Industrial	55	55
2 – Non-Bridge	Residential	55	180
	Commercial	0	0
	Industrial	0	0

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013. Report.

Construction vibration was assessed to determine the potential for human annoyance-related impacts as well as potential structural damage to vibration-sensitive buildings. Based on methodologies outlined in the FRA Manual, vibration levels from a pile driver and a large bulldozer were used to predict vibration levels and assess potential impact.

The distances to potential structural damage from pile driving operations are 50 feet for reinforced-concrete, steel or timber structures and up to 135 feet for extremely vibration-sensitive structures. The distance to potential structural damage from a large bulldozer does not extend beyond the typical working clearance of the bulldozer to structures. The tables in Appendix 5.2.2-B summarize the distances to potential vibration impact for structural damage for pile driving and a large bulldozer.

5.2.2.2 Environmental Consequences

This section describes the noise and vibration impact assessment results for the No-Action Alternative and the Action Alternatives for the Project. As documented below, the Project would result in long-term noise and vibration adverse impacts to residents and properties, primarily along the N-S Corridor. The impacts of Alternatives A, C, and E would be similar.

Noise

Noise impacts along the E-W Corridor would primarily be due to the sound created by train passage. Along the N-S Corridor, noise impacts would primarily be due to the increased frequency of warning horn use at at-grade crossings. According to FRA guidelines, minimizing or eliminating horn blowing and other types of audible warning signals can reduce noise impacts, but must be compliant with safety regulations and FRA guidelines. Wayside horns are a commonly used example warning signal, and noise levels resulting from their implementation are well documented. Using wayside horns at the intersection instead of the locomotive horn has been shown to substantially reduce the noise footprint without compromising safety at the grade crossing. A wayside horn does not need to be as loud as a locomotive horn, but the real advantage is the focusing of the warning sound only on the area where it is needed. AAF has committed to installing stationary wayside horns at each of the 117 grade crossings where severe, unmitigated impacts would occur using locomotive-mounted horns. These mitigation measures would eliminate all severe noise impacts for residential and institutional receptors along the N-S Corridor. Where compliant with safety regulations and FRA guidelines, AAF is also working with local communities that would like to create quiet zones as an alternate noise abatement measure to wayside horns.³

In response to comments on the DEIS, AAF conducted an analysis in order to determine possible impacts resulting from increased use of warning horns on the three movable bridges along the North-South Corridor: St. Lucie River (Martin County), Loxahatchee River (Palm Beach County), and New River (Broward County). These impacts are discussed below.

No-Action Alternative

Under the No-Action Alternative, there would be increases in existing freight train operations and highway traffic volumes. Along the E-W Corridor, projected increases in intercity transit between Orlando and Miami

³ Please note that AAF cannot create a quiet zone; the public entity must go through the application process with FRA.

will likely result in increased traffic volumes along SR 528, which will likely result in marginal changes in future noise conditions. Along the N-S Corridor, freight operations are expected to continue with a planned annual growth of 3 percent. This continued growth will likely result in marginal increases in noise levels through possible increases in train speed, frequency, and length. It is important to note that the FTA noise and vibration assessment methodology specifies that noise and vibration impact is assessed based on a comparison of existing to future Proposed Action conditions and not to the No-Action Alternative. Therefore, there would be no noise impact associated with the No-Action Alternative.

Action Alternatives A, C, and E

MCO Segment

The Project would not result in adverse noise impacts within the MCO Segment. Table 5.2.2-6 shows the distance to impact contours for the impact analysis conducted according to FRA methods and impact criteria assuming a background L_{dn} of 65 dBA. There are no noise-sensitive receptors within these distances.

Operating Condition ¹	Category 1		Category 2		Category 3	
	Moderate Impact (feet)	Severe Impact (feet)	Moderate Impact (feet)	Severe Impact (feet)	Moderate Impact (feet)	Severe Impact (feet)
Moving Trains	85	none	90	none	none	None
Idling Trains	165	70	120	50	75	None

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013. Report.

Table 5.2.2-7 shows the total noise at 50 feet from each source, along with the distances to the 65 and 70 Ldn contours. The 65 and 70 Ldn contours are shown in Appendices 5.2.2-A1 along with potentially incompatible land uses. No incompatible land use exists within the 65 Ldn Contour associated with proposed passenger train operations or the VMF.

Project Noise Source	Existing Noise Exposure (L_{dn})	Noise at 50 feet from Source		Distance to 65 Ldn Contour (feet)	Distance to 70 Ldn Contour (feet)
		Project Noise Exposure (L_{dn})	Total Noise Exposure (L_{dn})		
Inbound/Outbound Rail	65	65	68	50	NA
VMF	65	69	70	80	60

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013. Report.

East-West Corridor

For the E-W Corridor, passenger rail operations adjacent to SR 528 would increase future noise levels and potential noise impacts. Table 5.2.2-8 provides a summary of noise impacts within the E-W Corridor. Existing highway noise results in a calculated L_{dn} of 65 dBA. The Project would result in noise levels of 63 dBA on at-grade sections and 67 dBA at elevated sections, for a total future noise level of 67 dBA on at-grade sections and 69 dBA at elevated sections. As a result of the Project, noise levels would increase by 2.0 to 2.3 dBA in at-grade sections and by 4.0 to 4.4 dBA in elevated sections.

West of SR 520, there would be one potential severe Category 2 (residential) noise impact. East of SR 520, in Brevard County, there is the potential for 105 moderate and four severe noise impacts at Category 2 (residential) land use and one moderate impact at Category 3 (institutional) land use.

County	Condition	Existing	Project (Passenger Trains)	Total Future	Change (Total Future vs Existing)
Orange	At-grade	65	63	67	2.3
	Elevated	65	67	69	4.4
Brevard	At-grade	65	63	67	2.0
	Elevated	65	67	69	4.0

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013. Report.

North-South Corridor

Passenger rail operations would be added to existing freight operations within the N-S Corridor, resulting in an increase in future noise levels and the potential for noise impacts. As shown in Table 5.2.2-9, the Project (passenger rail trains only, with wayside horns) would result in daytime noise levels (L_{eq}) ranging from 62.1 to 63.9 dBA close to at-grade crossings (average 62.5 dBA) and ranging from 61.4 to 63.5 dBA along the mainline tracks. The noise levels of passenger trains, measured as L_{dn} (residential receptors) would range from 62.2 to 64.1 dBA at grade crossings, and from 61.6 to 63.6 dBA along the mainline. Table 5.2.2-9 also shows the impact criteria for each land use category, based on existing noise levels.

County	Total Noise at 50 ft. (dBA)					
	Day (Leq)		Night (Leq)		Ldn	
	At-Grade Crossing	Mainline	At-Grade Crossing	Mainline	At-Grade Crossing	Mainline
Brevard	63.4	62.9	53.9	53.3	63.6	63.1
Indian River	63.9	63.5	54.4	53.9	64.1	63.6
St. Lucie	63.1	62.5	53.5	52.9	63.2	62.6
Martin	62.1	61.4	52.6	51.9	62.3	61.6
Palm Beach	62.8	62.2	53.3	52.7	63.0	62.4
Impact Criteria (moderate)						
Cat 1 – Quiet Setting	65	62	-	-	-	-
Cat 2 – Residential	-	-	-	-	65	65
Cat 3 – Institutional and Recreational	70	62	-	-	-	-

Table 5.2.2-10 summarizes the noise analysis results for residential receptors along the N-S Corridor. The table shows the existing noise levels for mainline segments and at-grade crossings (based on freight locomotives with train-mounted horns), noise resulting from the Project (passenger trains with wayside horns) and the total future noise (future passenger trains and freight, all with wayside horns). The Project would reduce noise levels compared to existing noise levels. With the installation of wayside horns, total future noise levels would be comparable to existing levels, generally increasing by 0.2 to 0.3 dBA, along the mainline. Future noise levels would be substantially lower than existing noise levels at grade crossings, generally by 7 to 8 dBA. As shown in Table 5.2.2-10, no receptors along the N-S Corridor would experience noise levels that exceed impact criteria.

County	Location	Existing	Project (Passenger Trains)	Total Future	Change (Total Future vs Existing)
Brevard	Mainline	75	63	75	0.3
	At-grade Crossing	82	64	75	-7.1
Indian River	Mainline	75	64	75	0.3
	At-grade Crossing	82	64	75	-7.0
St, Lucie	Mainline	74	63	74	0.3
	At-grade Crossing	82	63	74	-7.0
Martin	Mainline	74	62	74	0.3
	At-grade Crossing	82	62	74	-8.1
Palm Beach	Mainline	75	62	75	0.2
	At-grade Crossing	82	63	75	-7.1

As noted above, AAF conducted an analysis in order to determine possible impacts resulting from increased use of warning horns on the three movable bridges along the N-S Corridor: St. Lucie River (Martin County), Loxahatchee River (Palm Beach County). The noise analysis results are provided in Table 5.2.2-12. These tables provide noise levels and level of impact for Category 1, 2 and 3 land uses, while resulting impact contour distances are provided in Table 5.2.2-11, for each of the movable bridges. In all cases, impact contours, as measured from the center of each bridge, were not large enough to intersect any noise-sensitive land uses. Therefore, no additional noise impacts were identified by this supplemental bridge noise impact assessment.

Table 5.2.2-11 Impact Contour Distances (feet)

Bridge	County	Category 1		Category 2		Category 3	
		Moderate Impact	Severe Impact	Moderate Impact	Severe Impact	Moderate Impact	Severe Impact
St. Lucie River	Martin	230	none	55	none	none	none
Loxahatchee River	Palm Beach	215	none	60	none	none	none
New River	Broward	225	none	none	none	none	none

Table 5.2.2-12 Noise Levels and Impacts from Warning Horns (dBA, Ldn)

Category	Existing Noise Level	Project Noise Level	Impact Criteria		Impact Category	Total Noise Level	Noise Level Increase	# of Impacts	
			Mod.	Sev.				Mod.	Sev.
St Lucie River Bridge									
1	66	66	62	67	Moderate	69	2.8	0	0
2	74	62	65	72	No Impact	75	1.6	0	0
3	66	66	67	72	No Impact	69	2.8	0	0
Loxahatchee River Bridge									
1	67	66	62	68	No impact	70	2.5	0	0
2	75	62	65	73	No impact	76	1.3	0	0
3	67	66	67	73	No Impact	70	2.5	0	0
New River Bridge									
1	65	65	61	66	No impact	68	3.1	0	0
2	72	60	65	71	No impact	74	2.1	0	0
3	65	65	66	71	No Impact	68	3.1	0	0

Comments on the DEIS questioned whether there would be additional noise impacts at the curve north of the St. Sebastian River Bridge in Brevard County. With respect to operations-based noise impacts, the current analysis presented in this FEIS is sufficient and conservative enough to capture hypothetical impacts that may result from the proposed double-tracking north of the St. Sebastian Bridge. North of the bridge, mainline conditions (i.e. no warning horn) predominate; therefore, no impacts are anticipated based on the comparison of proposed passenger train noise to existing freight train noise. Furthermore, the expected track offset is less than 30 feet from its current location. The properties immediately adjacent to the track on the east side are included in the unmitigated Category 2 impacts documented in the DEIS, and the next closest row of residential parcels is approximately 150 feet from the current severe impact contour (see Figure 5-17, Appendix 5.2.2-A2). Because of this distance, these properties would not experience noise impacts.

Phase I - West Palm Beach – Miami

The 2012 EA for the WPB-M Corridor included an evaluation of operational noise and vibration, noise and vibration associated with stations, and station traffic (2012 EA Section 3.1.7.3). The analysis found that there were no noise-sensitive receptors within 500 feet of the proposed station sites and, therefore, station noise would be negligible. The traffic noise impacts associated with traffic changes around the proposed stations were evaluated for 2012 (existing) and 2035 (future) conditions. The analysis found that no traffic noise impacts would be caused by traffic increases around the proposed stations. Adding passenger trains on the WPB-M Corridor (with the use of wayside horns to reduce noise at grade crossings) would have moderate adverse impacts to 199 residential and six institutional receptors, and severe noise impacts to four residential receptors.

As noted above, AAF conducted an analysis in order to determine possible impacts resulting from increased use of warning horns on the New River Bridge (Broward County). The noise analysis results are provided in Table 5.2.2-12. These tables provide noise levels and level of impact for Category 1, 2 and 3 land uses, while resulting impact contour distances are provided in Table 5.2.2-11. Impact contours, as measured from the center of the bridge, were not large enough to intersect any noise-sensitive land uses. Therefore, no additional noise impacts were identified by this supplemental bridge noise impact assessment.

Summary

The distances to potential impact have been used to create noise contours and to identify the number of potential impacts. Appendix 5.2.2-A1 shows the noise impact contours along the corridor for all alternatives. Table 5.2.2-13 shows a summary of the total number of impacted parcels for each corridor and alternative. There would be no noise impact in the MCO Segment. Along the E-W Corridor, noise impacts would be the same for the three alignments, Alternatives A, C, and E. There would be 105 moderate and four severe noise impacts at residential receptors and one moderate impact at a Category 1 (quiet) receptor. Along the N-S Corridor, the Project would have no permanent noise impacts as a result of the use of wayside horns. Phase I evaluated in the 2012 EA would add 199 moderate and four severe residential impacts, and six moderate institutional impacts. FRA found, in the 2013 FONSI, that this would not constitute a significant adverse impact. The analysis of noise impacts associated with the moveable bridges found no adverse noise impacts associated with the increase in bridge closing horns.

Corridor Segment	Category 1 (Quiet)		Category 2 (Residential)		Category 3 (Institutional)	
	Moderate	Severe	Moderate	Severe	Moderate	Severe
MCO	0	0	0	0	0	0
East-West	1	0	105	4	0	0
North-South	0	0	0	0	0	0
Subtotal	1	0	105	4	0	0
West Palm Beach to Miami	0	0	199	4	6	0
Totals	1	0	304	8	6	0

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013. AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/elib/details/L04278>. Accessed September 12, 2013.

Vibration

Comments on the DEIS included questions about the analysis of several soil vibration phenomena, including Rayleigh waves, Love waves, and soil liquefaction. Rayleigh waves can be slow, low-amplitude soil movements. Love waves are used to describe a particular vibration motion that is generated during earthquakes. Ground-borne vibration generated by high-speed trains are most commonly in the form of Rayleigh waves. Potential ground-borne vibration impacts, which include Rayleigh waves, are assessed in the FEIS.

With regard to soil liquefaction, research has shown that a certain vibration phenomenon can occur with “very high speed” (i.e. 200 mph+) train operations on very soft soil. Under these conditions, the wave speed of the vibration generated by the train can become faster than the soil can withstand, consequently the soil will breakdown. For example, this phenomenon has been found previously for high-speed train operations in Sweden where there is very soft soil. For the typical train speeds up to 125 mph considered for the Project, there is minimal risk of this phenomenon occurring. Regardless, the FTA and FRA do not require that this potential phenomenon be assessed during the environmental phase of the Project, as this is primarily a structural design issue. AAF would identify any associated risk potential during the design phase of the Project when soil conditions in the study area are tested. If the potential for soil liquefaction was identified, then AAF would then design system infrastructure accordingly.

No-Action Alternative

Under the No-Action Alternative, freight train operations would increase along the N-S Corridor, with a planned annual growth of 3 percent. This continued growth will likely result in small increases in the number of vibration events, but there would be no increase in the amplitude of vibration events since the train speeds would not be expected to change. Therefore, there would be no vibration impact associated with the No-Action Alternative.

Action Alternatives A, C, and E

New passenger rail service along the MCO Segment and E-W Corridor, and addition of passenger rail service to the N-S Corridor, has the potential to cause vibration impacts. Along the N-S Corridor, there is a potential for impact due to the increase in the number of train events. The analysis demonstrates that there would be no differences in vibration impacts among Alternatives A, C, and E.

MCO Segment

Along the MCO Segment, ground-borne vibration levels were estimated based on average operating speeds of the trains. There would be no potential vibration impacts along the MCO Segment (Table 5 in Appendix 5.2.2-C).

East-West Corridor

Along the E-W Corridor, ground-borne vibration levels were estimated based on average operating speeds of the trains and whether the track was at-grade or on elevated structure. There are 13 locations along the E-W Corridor where the proposed alignment would be elevated. Vibration levels associated with trains on elevated structures are approximately 10 VdB lower than for at-grade trains.

As shown in Table 5.2.2-13, the Project would result in vibration impacts to 118 residential properties and 12 institutional properties (Tables 6 through 8 in Appendix 5.2.2-C).

Land Use Category	Corridor				Total
	MCO Segment	East-West	North-South	WPB-M	
Category 1 (highly sensitive)	0	0	0	0	0
Category 2 (residential)	0	118	3,317	0	3,435
Category 3 (institutional)	0	12	513	0	525
Concert Halls	0	0	0	0	0
TV Studios	0	0	3	0	3
Recording Studios	0	0	3	0	3
Auditoriums	0	0	9	0	9
Theaters	0	0	3	0	3
Total	0	130	3,848	0	3,978

Source: AMEC. 2013c. *Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida*. July 2013. Report.

North-South Corridor

Ground-borne vibration levels already exceed the FRA criteria along the N-S Corridor due to the frequency and nature of current freight operations. FRA guidance for assessing project impacts along such “heavily used rail corridors” (more than 12 trains per day) states that additional impact would occur if the project approximately doubled the number of trains (FRA 2012a). For the Project, although vibration levels would not increase from the passenger trains, the frequency of events will approximately double. Appendix 5.2.2-C summarizes distances to vibration impact and the number of impacts by county for the N-S Corridor. Impact contours are also illustrated in Appendix 5.2.2-A2.

As shown in Table 5.2.2-13, the Project would result in minor vibration impacts to 3,317 residential receptors and 513 institutional receptors, as well as 18 other vibration-sensitive land uses (TV studios, recording studios, auditoriums, and theaters). Vibration levels at all receptors will be less than 100 VdB, the threshold for minor structural damage to fragile buildings, and therefore vibration is not anticipated to cause structural damage to buildings.

Phase I - West Palm Beach – Miami Corridor

The 2012 EA included an evaluation of operational vibration along the WPB-M Corridor, and vibration associated with stations (2012 EA Section 3.1.7.3). The analysis concluded that none of the residential or institutional buildings in the Project Study Area would experience levels exceeding the FTA limits for ground borne vibration or ground borne noise.

Summary

The greatest potential for vibration impact is along the N-S Corridor due to the increase (approximately doubling) of vibration events as a result of adding passenger train service to the existing freight operations. There is no potential vibration impact along the MCO Segment. Along the E-W Corridor, vibration impacts would be the same for each of the three alignments, Alternatives A, C, and E. There is the potential for vibration impact at 118 Category 2 and 12 Category 3 receptors. Along the N-S Corridor, there would be potential vibration impact at a total of 3,317 Category 2 receptors, 513 Category 3 receptors, three TV studios, three recording studios, nine auditoriums, and three theatres. Vibration levels at all receptors will be less than 100 VdB, the threshold for minor structural damage to fragile buildings, and therefore vibration is not anticipated to cause structural damage to buildings.

5.2.2.3 Indirect and Secondary Impacts

The Project is not anticipated to cause any specific growth or development that could increase noise or vibration conditions in the Project Study Area. There would be no indirect or secondary impacts associated with Phase II of the Project. The Phase I, 2012 EA considered the indirect and secondary effects associated with the three new stations and station-area development, and found that there were no traffic noise impacts associated with this development (Section 3.1.7.3).

5.2.2.4 Temporary Construction-Period Impacts

Construction Noise

Constructing the Project could cause short-term noise and vibration impacts from construction activities. Potential impact from construction noise has been assessed according to FTA guidelines to screen for potential construction noise impacts. Table 5.2.2-14 presents the FTA criteria based on 1-hour L_{eq} limits at residential, commercial and industrial land uses.

Land Use	One-Hour L_{eq}	
	Day (7:00 AM-10:00 PM)	Night (10:00 PM -7:00 AM)
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. USDOT Report Number FTA-VA-90-1003-06, May 2006.

In addition to FRA construction noise impact criteria, various local noise ordinances apply to the Project construction. In general, each county enforces noise limits that are based on time of day and surrounding land use. Each county prohibits general nighttime construction. However, provisions are in place within the local ordinances to allow for temporary exemptions to these limitations, provided that proper permits are obtained prior to construction. In all cases, it will be the responsibility of AAF to apply for all applicable local permits prior to construction. Applicable county noise ordinances include:

- Orange County – Code of Ordinances. Part II – Orange County Code. Chapter 15 – Environmental Control. Article V. Noise Pollution Control (Orange County, Florida 2013).
- Brevard County – Code of Ordinances. Chapter 62 Land Development Regulations. Sec. 62-2271 (Brevard County, Florida 2012).
- Indian River County – Code of Ordinances. Chapter 974. Section 974.04(2) (Indian River County, Florida 2012).
- St. Lucie County – Code of Ordinances. Chapter 1-13.8 Noise Control. Sec. 1-13.8-19(n) (St. Lucie County, Florida 2009).
- Martin County – County Code and Ordinances. Ordinance No. 531. Section 5B: Specific Noise Prohibitions (Martin County, Florida 2012).
- Palm Beach County – Unified Land Development Code. Article 5 – Supplementary Standards. Supplement No. 14 (Palm Beach County, Florida 1992).

Two main categories of construction activity were assumed for the construction noise impact assessment: bridge construction and non-bridge construction (that is, track construction). The primary difference between the categories is the presence or absence of pile drivers, one of the noisiest pieces of construction equipment commonly used for rail projects. Table 5.2.2-15 presents a summary of the construction noise impacts within the distances to potential impact. The construction impacts in Palm Beach, Broward and Miami-Dade counties would result from bridge construction, particularly from pile-driving activities.

County	Category 1		Category 2		Category 3	
	Bridge	Non-Bridge	Bridge	Non-Bridge	Bridge	Non-Bridge
Day Construction						
E-W Corridor						
Orange - Alternative A	0	0	1	0	0	3
Orange - Alternative C	0	0	1	0	0	3
Orange - Alternative E	0	0	1	0	0	4
Brevard	0	0	34	0	0	0
N-S Corridor						
Brevard	0	0	17	618	0	0
Indian River	0	0	0	86	0	0
St. Lucie	0	0	4	523	0	0
Martin	0	0	25	194	0	0
WPB-M Corridor						
Palm Beach	0	0	34	0	3	0
Broward	0	NA	60	NA	3	NA
Miami-Dade	0	NA	18	NA	6	NA
Totals	0	0	195	1,421	12	10
Night Construction						
E-W Corridor						
Orange - Alternative A	0	0	43	0	0	3
Orange - Alternative C	0	0	19	0	0	3
Orange - Alternative E	0	0	3	0	0	4
Brevard	0	0	128	111	0	0
N-S Corridor						
Brevard	0	0	135	1149	0	0
Indian River	0	0	0	223	0	0
St. Lucie	0	0	24	830	0	0
Martin	0	0	236	646	0	0
WPB-M Corridor						
Palm Beach	0	0	153	608	0	0
Broward	0	NA	231	NA	3	NA
Miami-Dade	0	NA	23	NA	6	NA
Totals	0	0	995	3,567	9	10

Source: AMEC. 2013c. Technical Memorandum No. 5, Noise and Vibration for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. July 2013. Report.

For Phase I, the analysis presented in Section 3.1.7.3 of the 2012 EA established that the Project would result in construction noise impacts as shown in Table 5.2.2-15. Table 5.2.2-14 shows that nighttime construction of the seven bridges over waterways in the WPB-M Corridor would result in daytime and nighttime noise impacts to residential and institutional properties in proximity to the bridges.

Table 5.2.2.16 Summary of Construction Noise Impacts –West Palm Beach to Miami Corridor (Excluding Bridges)			
Day Construction			
County	Category 1	Category 2	Category 3
Palm Beach	0	1	0
Broward	0	0	0
Miami-Dade	0	0	0
Night Construction			
Palm Beach	0	373	0
Broward	0	94	0
Miami-Dade	0	133	0
Total			
Palm Beach	0	374	0
Broward	0	94	0
Miami-Dade	0	133	0

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013.

Construction Vibration

The distances to potential structural damage from pile driving operations are 50 feet for reinforced concrete, steel or timber structures and up to 135 feet for extremely vibration-sensitive structures. The distance to potential structural damage from a large bulldozer does not extend beyond the typical working clearance of the bulldozer to structures. No structures are present within 50 feet of the Project; therefore there would be no potential construction vibration impacts for structural damage.

On the E-W Corridor, pile driving would potentially result in 143 residential and 41 institutional vibration impacts for human annoyance. Large bulldozer construction would potentially result in 83 residential and 12 institutional impacts. On the N-S Corridor, pile driving would potentially result in 693 residential and 61 institutional vibration impacts for human annoyance. The use of large bulldozers would potentially impact four highly sensitive land uses, 1,551 residential land uses, and 217 institutional properties, as well as one auditorium. Tables 14-17 in Appendix 5.2.2-C summarize the distances to potential vibration impact for human annoyance for pile driving and a large bulldozer, and the number of structures that would be impacted in the E-W Corridor and N-S Corridor.

For Phase I, Section 3.1.7.4 of the 2012 EA stated that neither impacts nor damage from construction vibration are anticipated as a result of the Project.

5.2.2.5 Summary

The Project (Phase II) is anticipated to result in four severe and 105 moderate noise impacts to residential and institutional receptors in the absence of mitigation. The Project includes the use of stationary wayside horns at certain grade crossings, replacing locomotive-mounted horns, to minimize noise impacts. The Project would also result in vibration impacts to 3,978 receptors. In total, noise from the Project would affect 304 receptors at a moderate level and 11 receptors at a severe level, in the absence of mitigation.

5.2.3 Farmland Soils

The Farmland Protection Policy Act (FPPA) (7 USC Chapter 73) limits the conversion of significant agricultural lands to non-agricultural uses as a result of federal actions. The determination of whether or not farmlands are subject to FPPA requirements is based on soil type; the land does not have to be actively used for agriculture.

The Project would result in a loss of prime and unique farmlands within the E-W Corridor. The total disturbed area would comprise a negligible percent of the farmland in Orange and Brevard Counties (AAF and NRCS 2013). The locations of the E-W Corridor alternative alignments within or proximate to the existing SR 528 corridor ensure that losses of prime or unique farmland soils and farm operations would be limited to the margins of active or potential agricultural areas. Farmland impacts would be the same for Alternatives C and E, and slightly less for Alternative A. Implementing any of the alternatives would not result in significant adverse impacts to farmlands.

5.2.3.1 Methodology

Part I of the *Farmland Conversion Impact Rating for Corridor Type Projects* and *Farmland Conversion Impact Rating* forms were completed and submitted to NRCS on June 10, 2013 for the MCO Segment, E-W Corridor, and the N-S Corridor. Farmlands with any level of designation by the NRCS were identified and mapped relative to the Project (Figure 4.2.3-1).

5.2.3.2 Environmental Consequences

Impacts to prime farmland and unique farmland areas were defined and quantified based on a construction footprint of 60 or 100 feet in width, depending upon the Action Alternative alignment. This section describes the direct effects to soils, prime farmlands, and unique farmlands anticipated from constructing and operating the Project.

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed. The Project Study Area as it exists today would remain the same with no development or construction changes relevant to the Project. In the No-Action Alternative, there would be no impacts, adverse or otherwise, to soils or farmlands.

Alternative A

Alternative A consists of the MCO Segment (including the VMF), E-W Corridor Alternative A, and the N-S Corridor. Direct effects to each of these areas are discussed below.

MCO Segment

The MCO Segment, including the VMF, does not contain any prime or unique farmland areas so there will be no impacts to this resource.

East-West Corridor

Constructing E-W Corridor Alternative A would result in the loss of 19.3 acres of prime farmland and unique farmland soils.

North-South Corridor

The N-S Corridor is not subject to the FPPA because, according to the NRCS, the corridor's existing right-of-way was purchased before August 4, 1984 and no farmland is being converted to non-agricultural use. The N-S Corridor does not contain any prime or unique farmlands, so there would be no impacts to these resources.

Phase I - West Palm Beach – Miami Corridor

The southern section of the passenger rail service, from West Palm Beach to Miami, would not impact mapped farmland soils. As stated in Section 3.0 of the 2012 EA, the WPB-M Corridor is not subject to the FPPA because, according to the NRCS, the corridor's existing right-of-way was purchased before August 4, 1984 and no farmland is being converted to non-agricultural use. The WPB-M Corridor does not contain any prime or unique farmlands, so there would be no impacts to these resources.

Alternative C

Alternative C consists of the MCO Segment (including the VMF), E-W Corridor Alternative C, and the N-S Corridor. Direct effects to farmland soils within the MCO Segment and the N-S Corridor would be identical to Alternative A. Within the E-W Corridor, Alternative C would result in direct conversion of 31.8 acres of mapped prime and unique farmland soils.

Alternative E

Alternative E, the preferred alternative, consists of the MCO Segment (including the VMF), E-W Corridor Alternative E, and the N-S Corridor. Direct effects to farmland soils within the MCO Segment and the N-S Corridor would be identical to Alternative A. Within the E-W Corridor, Alternative E would result in the conversion of 31.8 acres of mapped prime and unique farmland soils.

Summary of Direct Impacts

Impacts to prime and unique farmland soils from constructing the Project are limited to the E-W Corridor for all three alternatives. The direct effects to soils from the No-Action and three Action Alternatives are summarized in Table 5.2.3-1. The relative value for agricultural production of the farmland to be converted (as determined by NRCS and described below) by the Project compared to the relative value of other farmland in the area (for example, the average relative value for the proposed site) is also provided in Table 5.2.3-1.

Soil/Farmland Characteristic	No-Action	Alternative A	Alternative C	Alternative E
Total acres of prime and unique farmland converted	0	19.3	31.8	31.8
Relative value of farmland (out of 100) ¹	0	46.9	46.9	46.7
Percentage of farmland in county with same or higher relative value	0	18.7	18.7	18.7
Total points	0	77.9	81.9	81.7

Source: AAF and Natural Resources Conservation Service (NRCS). 2013. *Farmland Conversion Impact Rating for Corridor Type Projects*. June 7, 2013.

AAF, in accordance with the FPPA, has completed USDA's NRCS Farmland Conversion Impact Rating (NRCS Form AD 1006). These Forms (provided in Appendix 5.2.3) were submitted to NRCS and were completed by NRCS and returned on June 12, 2013. In completing the AD 1006 Form, NRCS conducted a two-part evaluation of each alignment alternative, consisting of an assessment of the relative value of the potentially impacted farmland and an overall site assessment. An overall score is calculated (out of 260 points) of the relative value of farmland to be converted. Sites most suitable for protection under these criteria receive the highest total scores, and sites least suitable receive the lowest scores. Sites where the total points equal or exceed 160 must consider alternative actions, such as alternative sites, modifications, or mitigation. According to the results of the NRCS evaluation and as shown in Table 5.2.3-1, none of the alignment alternatives exceeded the 160-point threshold: Alternative A received a total of 77.9 points, Alternative C 81.9 points and Alternative E 81.7 points. These low scores indicate no significant adverse impact to farmland soils.

5.2.3.3 Temporary Construction-period Impacts

Temporary impacts are those that occur in association with construction related activities and cease following the completion of construction. Temporary impacts to farmland soils would occur where areas of farmland soils would be used for construction staging, construction access, or other temporary occupancy of farmland. The impacts on farmland soils could include soil compaction in staging and traffic areas, dust generation, and erosion. Vehicle and heavy equipment use, as well as storing heavy materials, can compact the soils. Compaction reduces the transmission of air and water into the soil, increases runoff, and makes vegetation establishment more difficult. Construction activities remove the vegetation coverage and root structure that helps to maintain the soil. These exposed soils are more susceptible to

loss from wind as dust or being eroded by rain and stormwater runoff. The Project is not anticipated to have a temporary adverse impact on farmland soils as there are no construction staging or access areas proposed within areas of mapped farmland soils.

5.2.4 Hazardous Materials and Solid Waste Disposal

This section describes the potential impacts that may occur as the result of existing or potential releases and regulated materials in the Project Study Area. Constructing the Project has the potential to encounter contaminated soils or groundwater, or to require the removal of waste material such as railroad ties, creosote-treated bridge timbers, or demolition material, as described below. The potential impacts of Alternatives A, C, and E would be the same. The Project would not generate hazardous materials or solid waste. Implementing the Action Alternatives would not change the potential for indirect effects along the N-S Corridor, as there is no anticipated change in frequency or quantity of hazardous materials transported by freight.

5.2.4.1 Methodology

Risk ratings were assigned to every contamination site identified within the Environmental Data Management Inc. (EDM) reports. Sites were identified as “No,” “Low,” “Medium” or “High” risk indicating the degree for potential contamination related impacts to the Project. Risk ratings were assigned according to the criteria outlined in the FDOT PD&E Guidelines summarized in Section 4.2.4.

5.2.4.2 Environmental Consequences

This section identifies the potential impacts that may occur as the result of existing or potential releases and regulated materials in the Project Study Area. Direct, indirect, and secondary effects were characterized by comparing each alternative with the locations and nature of the areas of concern (potential and confirmed sources of subsurface contamination and/or waste materials).

Direct effects are defined as immediate consequences to the environment as a result of the implementation of the alternatives. As used in this section, a direct effect would occur if construction of an alternative encountered contaminated soils or groundwater. In comparison to the Action Alternatives, the No-Action Alternative is expected to encounter relatively inconsequential amounts of contaminated soils or groundwater or generate relatively inconsequential amounts of solid waste during routine subsurface maintenance activities, if conducted in the vicinity of a release

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed. The Project Study Area as it exists today would remain the same with no development or construction changes relevant to the Project. Existing contaminated sites within the Project Study Area would continue to be addressed in accordance with the regulatory framework. Potentially contaminated sites not previously identified would not be assessed or mitigated without the implementation of the Project.

Action Alternatives A, C, and E

The Action Alternatives have the potential to encounter contaminated soils or groundwater, or to require the removal of waste material such as railroad ties, creosote-treated bridge timbers, or demolition material, as described below. The potential impacts of Alternatives A, C, and E would be similar.

MCO Segment

A total of 27 potentially contaminated sites were reported by EDM within the 500-foot detailed evaluation area for the MCO Segment (including the VMF) on the GOAA property. However, the site location information provided by EDM did not appear to accurately represent specific site locations. GOAA maintains environmental records for known contaminated areas within the airport property and reviewed the EDM data. GOAA reported that no contaminated sites were located within 500 feet of the Project. All EDM-mapped sites are included in the database summary included as Appendix 5.2.4.

East-West Corridor

Sixteen potentially contaminated sites were within the 500-foot detailed evaluation area for the E-W Corridor. Construction activities along the E-W Corridor are anticipated to involve subsurface work and may include underground utility installations and stormwater pond construction. However, potentially contaminated sites identified for the E-W Corridor were outside the planned construction areas and impacts from the existing contaminated areas are not anticipated. The E-W Corridor may also require limited property acquisition of undeveloped properties adjacent to the SR 528 right-of-way. Prior to property acquisition, further assessment may be conducted to determine if contamination is present and to identify any regulatory obligations and associated cost premiums as a result of contamination that could be present on these properties.

North-South Corridor

A total of 337 potentially contaminated sites were identified within the 200-foot detailed evaluation area along the 128.5-mile N-S Corridor. However, the proposed work for this portion of the Project is anticipated to be completely within the existing FECR Corridor and would result in minimal subsurface disturbance. Impacts from existing contaminated areas are not anticipated. Any contamination that is discovered in the existing FECR Corridor and associated structures as a result of current or historical usage will be managed in accordance with applicable federal, state and local law or regulations.

Phase I - West Palm Beach – Miami Corridor

According to information provided in Section 3.3.6 of the 2012 EA, there are 199 Low Risk sites; 13 Medium Risk sites; and 14 High Risk sites along the WPB-M Corridor. Preliminary subsurface investigations to establish the presence of soil or groundwater contamination will be conducted prior to construction activities for sites receiving a High or Medium risk ranking that may be impacted by acquisition, drainage features, underground utilities, or dewatering activities.

5.2.4.3 Indirect and Secondary Impacts

An indirect effect related to subsurface contamination or waste materials management would exist if an alternative has the potential to impact ongoing remediation of known releases, would produce additional sources of subsurface contamination or waste materials following construction, or would transport waste to another site. The scope and magnitude of the indirect effects for each Action Alternative would be generally the same, as described below. No indirect effects were identified for the No-Action Alternative. A secondary effect related to subsurface contamination or waste materials management would exist if an alternative has the potential to cause an impact in another time or place. Some commenters on the DEIS asked about the potential for derailments or accidents to result in spills or fuel or other contaminants. Spills from derailments and accidents are rare events, and any spills would be handled through existing safety, containment, and clean-up procedures.

No-Action Alternative

The No-Action Alternative could potentially result in indirect impacts associated with spills from freight trains. Freight trains traveling along the N-S Corridor are currently equipped to haul hazardous materials and will continue to do so. Although there is no set schedule, hazardous materials are transported on an average of once per week. Table 5.2.4-1 contains a list of hazardous materials hauled by freight trains along the FECR Corridor.

Liquid Propane Gas	Rocket Motors	Chemicals not elsewhere classified
Ethanol	Potassium Chloride	Phosphoric Acid
Sodium Hydroxide/Caustic Soda	Carbon Dioxide	Explosives
Alcohol in Bond	Ammonium Polyphosphate	Methanol
Hydrogen Chloride	Sulfur Dioxide	Pesticide/Chemicals not elsewhere classified
Bleach-Sodium Hypochlorite	Fuel Oil	Tail Oil Pitch
Ammonium Nitrate		

Source: AMEC. 2013f. Technical Memorandum No. 6: Contaminated Sites Evaluation for the All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida. Report.

Action Alternatives A, C, and E

Implementing the Action Alternatives would not change the potential for indirect effects along the N-S Corridor, as there is no anticipated change in frequency or quantity of hazardous materials transported by freight. The proposed VMF has the potential for spills and soils or groundwater contamination. Planned operations at the VMF, such as vehicle fueling, maintenance and repair, and washing, would include use of hazardous materials (primarily petroleum products, lubricants, and degreasers). The Project would not include use or storage of hazardous materials outside the VMF. The typical materials that would be stored and used at the VMF include diesel fuel, motor oils, lubricants, and degreasers. Table 5.2.4-2 provides an inventory of the typical materials stored at existing VMF facilities and is considered representative of the types and quantities of hazardous materials that are anticipated at the Project VMF.

Table 5.2.4-2 Anticipated Hazardous Products Storage at the VMF – Above-ground Storage Tanks (ASTs)

Capacity	Quantity	Contents
10,000-gallon AST ¹	2	Diesel Fuel
500-gallon AST	1	Gasoline
250-gallon AST	1	Conventional Oil
250-gallon AST	1	Hydraulic Oil
250-gallon AST	1	Waste Oil

Source: AAF

1 AST = aboveground storage tank

All hazardous products would be stored at the VMF in double-walled storage containers or double-walled above-ground storage tanks (ASTs). Hazardous materials would be used and stored according to accepted industry BMPs. Planned operations at the VMF are similar to operations currently ongoing at MCO and are considered minor in respect to the overall operations and land use at the airport.

The Project could result in off-site disposal of construction materials. During construction, contaminated materials and regulated waste would require disposal at off-site facilities including landfills, recycling centers, and treatment/asphalt batch plants. If not handled properly, the disposal of these materials could potentially cause soil, groundwater, or air contamination at these facilities or during transport to them. Regional facilities for disposing of construction debris, contaminated materials and regulated waste have sufficient capacity to dispose of the anticipated volume of material.

The Project would include only passenger trains along the E-W Corridor. Freight trains would not operate over the E-W Corridor. With the exception of on-board fuel, lubricants, and relatively small quantities of materials required for operation of the passenger trains, there would be no hazardous material transportation associated with passenger trains, or along the E-W Corridor, associated with the Project.

5.2.4.4 Temporary Construction-Period Impacts

Construction requirements and methodology for the proposed system upgrades within the FECR Corridor will result in minimal subsurface disturbance; consequences to existing contaminated areas are not anticipated. Construction impacts will be minimized through the avoidance of areas of known or suspected contamination during the design of the drainage, lighting, and foundations. Contamination areas will be verified prior to construction and remedial actions will be developed and implemented to further minimize consequences if necessary. Any contaminated or hazardous wastes encountered through ground-disturbing activities during construction for any of the alternatives will be handled and disposed of in accordance with applicable regulatory requirements. If potentially contaminated sites cannot be avoided through project engineering all applicable state and federal laws will be followed to minimize impacts.

In the event that construction activities occur in or near contaminated areas, a Phase II investigation may need to be conducted. If subsurface activities impact contaminated sites and cannot be avoided, technical special provisions such as Remedial Action Plans would be developed as part of the Phase II investigation. If contamination is identified prior to construction, remedial actions can be implemented to minimize

impacts. Any contaminated or hazardous wastes encountered through ground-disturbing activities during construction would be handled and disposed in accordance with regulatory requirements.

For dewatering activities, potentially contaminated sites within a 500-foot radius of the construction site will need to be re-evaluated and addressed before applying for a dewatering permit to avoid potentially exacerbating a contaminant plume, and to determine proper groundwater management for such sites.

Construction activities have the potential to generate new releases/spills as a result of the storage and use of hazardous materials such as diesel fuel, gasoline, hydraulic oil, and lubricating oils associated with the construction equipment, storage tank removal, and pipeline relocation activities. New underground storage tanks (UST) and ASTs would be installed as part of the construction of any of the Action Alternatives, including an expanded tank farm at the airport. AAF would construct new facilities in accordance with all applicable regulations, and a new Spill Prevention, Control, and Countermeasure Plan would be implemented to reduce the risk of accidental releases.

The Project would generate construction and demolition debris such as used railroad ties, creosote-treated bridge timbers, steel rail, excess soil, rock, organic material, asphalt, concrete, or wood. All construction and demolition debris would be handled according to federal, state, and local regulations and industry BMPs. To the extent practical, materials would be recycled. Debris that requires disposal would be transported under applicable transportation manifests and disposed of at licensed disposal facilities.

The recommendations for mitigation measures during construction may include special waste handling, dust control, and management and disposal of contaminated soil and ground water in order to prevent construction delays and to provide adequate protection to workers and any nearby sensitive receptors. All Remedial Action Plans actions must ensure that any nearby or adjacent receptors are adequately protected and the assessment and management of contaminated media encountered during the Project would be handled in accordance with applicable federal, state, and local laws and regulations. Contaminated sites have been identified within 150 feet of the FECR right-of-way in the WPB-M Corridor and in the vicinity of the Preferred Build Station Alternatives identified in Section 3.3.6 of the 2012 EA. None of the Project elements described in the 2012 EA are anticipated to impact known contaminated or hazardous waste sites within the Project Study Area; avoidance techniques will be maximized during the design phase.

5.2.5 Coastal Zone Management

Under provisions of Section 307 of the Coastal Zone Management Act (CZMA), the State of Florida has authority to review any federal activity that impacts the coastal resources of Florida for consistency with the Florida Coastal Management Plan (FCMP). Federal activities subject to review include:

- Activities conducted by or on behalf of a federal government agency;
- Federal licenses or permits;
- Permits issued under the Outer Continental Shelf Lands Act for offshore minerals exploration or development; and
- Federal assistance to state and local governments (FDEP 1981).

The Florida State Clearinghouse coordinates the review of proposed federal activities, requests for federal funds, and applications for federal permits other than permits issued under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Consistency reviews of federal permits issued under those Acts are conducted in conjunction with Environmental Resource Permit (ERP) applications by the FDEP or the Water Management Districts (WMDs). The FCMP provides each partner agency an opportunity to comment on the merits of the proposed action, address concerns, make recommendations and state whether the Project is consistent with its statutory authorities under the FCMP. Regional planning councils and local governments also may participate in the federal consistency review process by advising the Florida Department of Economic Opportunity (DEO) on the local and regional effect of proposed federal actions. In the event a state agency determines a proposed federal activity is inconsistent, the agency must identify the statute with which the activity conflicts and provide alternatives for the project to maintain consistency with the FCMP.

As the designated lead coastal agency for the state, FDEP communicates the agency comments and the final consistency decision of the state to federal agencies and applicants for all actions other than permits issued under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The consistency decisions on those permits are made through the approval or denial of the ERP issued under Chapter 373, Part IV, FS. Federal consistency is the requirement that federal actions that impact any land or water use or natural resource of a state's coastal zone must be consistent with the enforceable policies of the state. The FCMP federal consistency process consists of a network of 24 Florida Statutes (that is, enforceable policies) administered by FDEP and a group of partner agencies responsible for implementing the statutes. Consistency is based on effects rather than geographic boundaries; consequently, there are no categorical exclusions from the consistency requirement. Any federal activity that would have an impact on a state's coastal zone is subject to a consistency review, unless specifically exempted by federal law. Impacts are determined by assessing reasonably foreseeable direct and indirect effects on any coastal use or resource.

As documented in this section, the Project is consistent with Florida's Coastal Zone Management Act. The Florida State Clearinghouse concurs with this finding, as detailed in a letter to FRA dated March 3, 2015 (FDEP, 2015).

5.2.5.1 Environmental Consequences

This section evaluates the direct effects to coastal resources, including coastal barrier beaches, Coastal and Aquatic Managed Areas, and natural resources within the coastal zone.

Direct effects to the "natural resources of the coastal zone" (both aquatic and marine resources) will result from all elements of the Project, including construction of the VMF, bridge and rail construction along the E-W Corridor, and bridge construction along the N-S Corridor. A full discussion of the impacts on these resources is provided in the appropriate sections of this EIS. Portions of the N-S Corridor are within or adjacent to Coastal and Aquatic Managed Areas identified in Section 4.2.5. Bridge construction/reconstruction would impact small areas of aquatic resources within the Indian River and the Jensen Beach-Juniper Inlet Aquatic Reserve. Coastal barrier resources are associated with unconsolidated shorelines and are on the east side of the Intracoastal Waterway; therefore, none of the WPB-M Corridor Project elements (which are west of the Intracoastal Waterway) considered in the 2012 EA would impact any coastal barrier resources.

5.2.5.2 Indirect and Secondary Impacts

The Project is not anticipated to result in direct impacts to coastal resources, and would not result in development or induced growth in coastal natural resources. The Project therefore would not have indirect or secondary effects to coastal natural resources or designated Coastal and Aquatic Managed Areas.

5.2.5.3 Draft Consistency Determination

This section provides a draft Consistency Determination under CZMA Section 307, 15 CFR part 930 Sub-part C, Chapter 380 FS, Part II, Coastal Planning and Management. This federal consistency determination addresses the proposed extension of passenger rail service from Orlando to West Palm Beach, which would include the MCO Segment, the E-W Corridor, and the N-S Corridor. Additionally, this federal consistency determination includes all in-water bridge work for the seven bridges along the 66.5-mile WPB-M Corridor (AAF 2012).⁴ The FDEP, as the designated coastal agency for the state, will participate in consistency decisions on permits issued under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act through the state's ERP process. Both of these permitting processes are applicable to the Project. As documented in this section, the Project is consistent with Florida's Coastal Zone Management Act. The Florida State Clearinghouse concurs with this finding, as detailed in a letter to FRA dated March 3, 2015 (FDEP, 2015).

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed. Therefore, there would be no adverse impact on land or water use or natural resources of the coastal zone.

Action Alternatives A, C, and E

Table 5.2.5-1 documents the consistency of the Project with the FCMP. There would be no difference in consistency between the three Action Alternatives evaluated in this FEIS. The scope of each relevant statute and the Project's consistency with the provisions of the statute is provided.

As stated in the 2013 FONSI for the WPB-M Corridor, the Florida State Clearinghouse has reviewed the *South Florida East Coast Corridor Transit Analysis*, a similar project to Phase I of the WPB-M Corridor described in the 2012 EA. The South Florida project was determined to be consistent with the FCMP, and the State Clearinghouse determined that this consistency determination would be valid for the AAF project because the AAF Project Area is fully encompassed within the *South Florida East Coast Corridor Transit Analysis* area which was found to be consistent in 2006 and there have been no relevant changes in the CZMA or FCMP criteria that would affect that determination.

As documented in the following Table 5.2.5-1, the Project (all alternatives) is consistent with each of the relevant CZM statutes and standards.

⁴ This 66.5-mile rail segment was analyzed in the Environmental Assessment (EA) and Section 4(f) Evaluation for the All Aboard Florida (AAF) Passenger Rail Project West Palm Beach to Miami, Florida (2012). However, the 2012 EA did not include analysis of in-water bridge work that is contemplated as part of this Proposed Action. Therefore, that work is included as the subject of the Build Alternatives being considered herein.

Table 5.2.5-1 Florida Coastal Management Program Consistency Review		
Statute	Scope	Consistency
Chapter 161 <i>Beach and Shore Preservation</i>	This statute provides policies for the regulation of construction, reconstruction, and other physical activities related to the beaches and shores of the state. Additionally, this statute requires the restoration and maintenance of critically eroding beaches.	<p>The Project would not impact beach and shore management along Florida’s East Coast, specifically as it pertains to:</p> <ul style="list-style-type: none"> • The Coastal Construction Permit Program. • The Coastal Construction Control Line Permit Program. • The Coastal Zone Protection Program. <p>All construction activities associated with the N-S Corridor would occur within the existing FECR Corridor. Additionally, the E-W Corridor would not be sited on beach or dune habitat.</p>
Chapter 163, Part II <i>Growth Policy; County and Municipal Planning; Land Development Regulation</i>	Requires local governments to prepare, adopt, and implement comprehensive plans that encourage the most appropriate use of land and natural resources in a manner consistent with the public interest.	<p>The Project would be conceptually consistent with local, regional, and state comprehensive plans. No new development would occur in the towns and counties where no stations are planned. For this reason, planning consistency within these communities is irrelevant.</p> <p>Consistency with local, regional, and state comprehensive plans has been included in the purpose and need criteria matrix used to develop the Action Alternatives.</p>
Chapter 186 <i>State and Regional Planning</i>	Details state-level planning efforts. Requires the development of special statewide plans governing water use, land development, and transportation.	<p>The Project, including the proposed mitigation measures aimed at reducing the severity of impacts to physical and biological resources, is generally consistent with the State Comprehensive Plan as adopted under Florida Statute Title 8 Planning and Development Section 187.101.</p> <p>Specifically, the Project meets the adopted air quality, energy, urban and downtown revitalization, and transportation policies, including the following listed below:</p> <ul style="list-style-type: none"> • Ensure that developments and transportation systems are consistent with the maintenance of optimum air quality. • Ensure emergency efficiency in transportation design and planning and increase the availability of more efficient modes of transportation. • Enhance the linkages between land use, water use, and transportation planning in state, regional, and local plans for current and future designated areas. • Encourage the development of mass transit systems for urban centers, including multimodal transportation feeder systems, as a priority of local metropolitan, regional, and state transportation planning. <p>The proposed rail system is also consistent with the adopted transportation goal that Florida shall direct future transportation improvements to aid in the management of growth and shall have a state transportation system that integrates highway, air, mass transit, and transportation modes.</p> <p>Additionally, mitigation measures included as part of the Project meet the intent of Natural Systems and Recreation Lands goal that Florida shall protect and acquire unique natural habitats and ecological systems, such as wetlands, and restore degraded natural systems to a functional condition. Further, soil and water quality mitigation measures meet the intent of water resources policies directing the protection of surface and groundwater quality in the state.</p>

Statute	Scope	Consistency
Chapter 186 <i>State and Regional Planning (contd.)</i>	Details state-level planning efforts. Requires the development of special statewide plans governing water use, land development, and transportation.	The Project is located within the East Central Florida and Treasure Coast regional planning council districts. The proposed rail system meets the transportation goals in the Strategic Regional Policy Plans (SRPPs) for each of these districts. This includes Policy 5.12 of the East Central Florida SRPP, which encourages that multi-modal design options should take precedence over the expansion of existing roads or the construction of new roads where feasible. It also includes Policy 7.1.3.4 of the Treasure Coast SRPP, which encourages the reduction of vehicle miles traveled per capita by private automobile within the region through a combination of means, including the expansion of commuter rail and intermodal connections.
Chapter 252 <i>Emergency Management</i>	Provides for planning and implementation of the state's response to, efforts to recover from, and the mitigation of natural and manmade disasters.	<p>The Project would include the development of a passenger rail system within an existing rail corridor and along an existing highway ROW. The E-W Corridor would be located outside of the defined storm surge zones and hurricane evacuation areas for Brevard and Orange counties. Within the N-S Corridor the rail line would be located within Florida Division of Emergency Management-defined storm surge zones; however the development would occur entirely within the FECR Corridor and would be consistent with the existing transportation uses. While the proposed rail system would encourage regional connection as well as growth in the vicinity of the supporting stations, growth would be focused in previously developed areas and would be consistent with existing commercial and industrial land uses.</p> <p>Consequently, the Project would not affect the state's vulnerability to natural disasters and would not affect emergency response and evacuation procedures. Further the Project would be consistent with the emergency preparedness policies within the East Central Florida and Treasure Coast SRPPs.</p>
Chapter 253 <i>State Lands</i>	Addresses the state's administration of public lands and property of this state and provides direction regarding the acquisition, disposal, and management of all state lands.	The proposed rail line would be located within the privately owned FECR Corridor as well as along the SR 528 ROW. CFX is pursuing the acquisition of additional ROW along SR 528, which would affect the viability of certain E-W Corridor alternatives. E-W Corridor Alternative A would occur entirely within the SR 528 ROW; consequently, this alternative would not adversely impact state lands. Under E-W Corridor Alternative C and Alternative E would require acquisition of additional ROW easement along 14 miles of the alignments between SR 417 and SR 520. However, any impacts to public lands and property of the state outside of the existing SR 528 ROW would be mitigated by permit requirements and the implementation of standard construction BMPs. Additionally, the E-W Corridor would include bridges where necessary to avoid significant impacts to aquatic resources (wetlands, streams, and rivers) including the St. Johns River and Econlockhatchee River; some of which may include State-owned Sovereign Submerged Lands. Proposed bridges would meet U.S. Coast Guard navigational requirements and would therefore not interfere with public use of sovereign submerged lands.

Table 5.2.5-1 Florida Coastal Management Program Consistency Review (Continued)		
Statute	Scope	Consistency
Chapter 258 <i>State Parks and Preserves</i>	Addresses administration and management of state parks and preserves.	The N-S Corridor is entirely within the existing FECR Corridor. Therefore, there would be no adverse impacts to state parks and preserves. E-W Corridor Alternative A would be sited within the SR 528 ROW. Although this alignment would traverse the Tosohatchee Wildlife Management Area and Canaveral Marsh Conservation Area, the proposed rail line would be located within the SR 528 ROW, which is owned by FDOT in this segment and includes wetlands that have been delineated (with the exception of the portion of the alignment identified as the Cocoa Curve). Many of the wetland boundaries have been inspected and confirmed by the USACE; however, a binding Jurisdictional Determination has not been completed at this time. The St. Johns River WMD has also inspected and confirmed these delineated wetlands. The E-W Corridor Alternatives C and E would require additional ROW acquisition along the 14-mile segment between SR 417 and SR 520. While impacts to the Tosohatchee Wildlife Management Area and Canaveral Marsh Conservation Area, located east of SR 520, would remain the same as those described for E-W Corridor Alternative A, additional area within the Hal Scott Preserve would not be affected by the development of a rail corridor to the north (outside) of the SR 528 ROW. Impacts to these state lands would be mitigated through the implementation of standard construction BMPs (e.g., erosion controls) as well as the acquisition and/or restoration of wetland habitats as required by State and Federal permit requirements. Wetland delineations have not been completed for the portions of the E-W Corridor Alternatives C and E that lie beyond the SR 528 ROW.
Chapter 259 <i>Land Acquisition for Conservation or Recreation</i>	Authorizes acquisition of environmentally endangered lands and outdoor recreation lands.	The Project would likely result in land acquisition for conservation purposes; compensatory mitigation would be required including the potential acquisition of environmentally endangered lands. Impacts to jurisdictional wetlands would require mitigation as required by State and Federal permits. Consequently, while the implementation of the Project would remove wetlands from the N-S and E-W Corridors, compensatory mitigation would include the potential acquisition of environmentally sensitive habitat types.
Chapter 260 <i>Florida Greenways and Trails Act</i>	Established in order to conserve, develop, and use the natural resources of Florida for healthful and recreational purposes.	The N-S Corridor would not impact any of the greenways and trails as defined in the Florida Greenways and Trails System Plan. The E-W Corridor would cross the St. Johns River, which is designated as a Priority Land Trail and as an Existing Trail in Priority Network to the north of the SR 528. SR 528 crosses this area via a bridge approximately 550 feet long. For the Project, this Priority Land Trail would be bypassed via a railroad bridge, which would pass over the Priority Land Trail providing for continued trail linkage. The Project would not significantly adversely impact the trail and would generally be consistent with the strategies and goals outlined in the Greenways and Trails System Plan. Additionally, the E-W Corridor would cross the proposed Florida Wildlife Corridor, which is envisioned to secure a connected landscape from the Everglades to Georgia. The proximity of the E-W Corridor alignment to existing SR 528 infrastructure would limit the Project's contribution to fragmentation of natural landscapes and watersheds.

Table 5.2.5-1 Florida Coastal Management Program Consistency Review (Continued)		
Statute	Scope	Consistency
Chapter 267 <i>Historical Resources</i>	Addresses management and preservation of the state's archaeological and historical resources.	FRA has formally initiated the National Historic Preservation Act Section 106 consultation process with the Florida State Historic Preservation Office (SHPO) as a part of the Notice of Intent (NOI) to prepare this EIS. Additionally, FRA has separately initiated consultation with five Native American Nations. Coordination between FRA, SHPO, and Section 106 consulting parties will continue through the Project.
Chapter 267 <i>Historical Resources</i> (<i>contd.</i>)	Addresses management and preservation of the state's archaeological and historical resources.	<p>During a 2009 SHPO meeting regarding the South Florida East Coast Corridor Study, there was agreement that the use of the historic rail line within the FECR Railway District and restoration of passenger rail on the line would not constitute an adverse effect. Consequently, the National Register of Historic Places (NRHP)-eligible FECR Railway District would not be adversely affected by the N-S Corridor.</p> <p>Within the FECR Corridor, four bridges have been identified as individually eligible for listing on the NRHP under Criterion A and Criterion C. These four bridges are also considered contributing elements to the FECR Railway Historic District. An additional eight bridges are not considered individually eligible for listing on the NRHP but are still considered contributing elements to the FECR Railway Historic District. For the AAF FONSI, a no adverse effect determination was conditioned on the reconstruction or rehabilitation work to the bridges being developed in consultation with the SHPO to avoid and/or minimize effects. For the Project, a similar no adverse effect finding is anticipated based on the condition that consultation with the SHPO would continue through the design process in order to ensure compatibility and appropriate sensitivity to the bridge resources and FECR Railway Historic District.</p> <p>Based on the information available, the Project would have no adverse effect on archaeological sites along the N-S Corridor. The no adverse effect finding is based on the condition that consultation with the SHPO would continue through the design process, as needed, in order to ensure appropriate sensitivity to the previously recorded archaeological sites located within the area of potential effect (APE).</p> <p>Similarly, the E-W Corridor is anticipated to have no adverse effect on the FECR Railway Historic District. Field surveys have determined that no archaeological resources occur in the E-W Corridor. The Project would be consistent with Florida's statutes and regulations regarding the state's archaeological and historical resources.</p>
Chapter 288 <i>Commercial Development and Capital Improvements</i>	Promotes and develops general business, trade, and tourism components of the state economy.	The Project would provide linkages between regional and statewide multi-modal transportation networks and promote commercial development within the vicinity of the transit stations consistent with the East Central Florida and Treasure Coast SRPPs. The Project would be consistent with Smart Growth and Sustainability Policies 4.1 and 4.3 in the East Central Florida SRPP as well as Policy 4.13, which encourages efforts that connect regional airports, rail systems, and seaports to gain a competitive advantage in the global marketplace. Further, the Project would be consistent with Regional Goal 3.5 in the Treasure Coast SRPP, which encourages multimodal linkages

Table 5.2.5-1 Florida Coastal Management Program Consistency Review (Continued)		
Statute	Scope	Consistency
		<p>throughout the region, including the provision of commuter and long distance passenger service on the FECR corridor.</p> <p>The Project would have an indirect beneficial effect on future business opportunities and would likely promote tourism in the region.</p>
Chapter 334 <i>Transportation Administration</i>	Addresses the state's policy concerning transportation administration.	The Project would be consistent with the transportation code as well as the mission, goals, and object of FDOT. Specifically the Project would be consistent with Section 334.30 regarding public-private transportation facilities.
Chapter 339 <i>Transportation Finance and Planning</i>	Addresses the finance and planning needs of the state's transportation system.	AAF has applied for federal funds through the Railroad Rehabilitation and Improvement Financing Program, which is a loan and loan guarantee program administered by FRA. The Project would be consistent with the 2060 Florida Transportation Plan, which includes new measures encouraging a greater reliance on public transportation systems for moving people, including a statewide passenger rail network and enhanced transit systems in Florida's major urban areas. The Project would support the long-range objective of the plan to develop and operate a statewide intercity passenger rail system connecting all regions of the state and linking to public transportation systems in rural and urban areas. The Project would not have an adverse impact on transportation finance and would result in beneficial impacts with regard to transportation planning.
Chapter 373 <i>Water Resources</i>	Addresses sustainable water management; the conservation of surface and ground waters for full beneficial use; the preservation of natural resources, fish, and wildlife; protecting public land; and promoting the health and general welfare of Floridians.	<p>The Project would impact aquatic resources (wetlands and surface waters) within the N-S and E-W Corridors. However, these corridors are currently impacted by the existing FECR Corridor as well as the SR 528 ROW. To the extent feasible, direct effects to surface water bodies would be avoided through the construction of bridges. Additionally, standard construction BMPs would be employed to limit offsite construction-related impacts.</p> <p>Federal and state permits would be required for the N-S and E-W Corridors, and compensatory mitigation measures would be implemented as a part of the Project.</p>
Chapter 373 <i>Water Resources (contd.)</i>	Addresses sustainable water management; the conservation of surface and ground waters for full beneficial use; the preservation of natural resources, fish, and wildlife; protecting public land; and promoting the health and general welfare of Floridians.	<p>Additionally, applicable permitting requirements would be satisfied in accordance with Florida Administrative Code (FAC) 62-25 and the National Pollutant Discharge Elimination System (NPDES). AAF would submit a Notice of Intent (NOI) to use the generic permit for stormwater discharge under the NPDES program prior to project initiation according to Florida Statute Section 403.0885. The Project would also require coverage under the generic permit for stormwater discharge from construction activities that disturb one or more acres of land (FAC 62-621).</p> <p>The Project would be consistent with Florida's statutes and regulations regarding the water resources of the state.</p>

Statute	Scope	Consistency
Chapter 375 <i>Outdoor Recreation and Conservation Lands</i>	Develops comprehensive multipurpose outdoor recreation plan to document recreational supply and demand, describe current recreational opportunities, estimate need for additional recreational opportunities, and propose means to meet the identified needs.	The Project would be consistent with Florida's Statewide Comprehensive Outdoor Recreation Plan. The passenger rail service would provide additional transportation linkages between recreational areas throughout the state. Additionally, as the Project is within existing transportation corridors, the rail line would not substantially directly impact recreational areas or recreational opportunities in the immediate vicinity.
Chapter 376 <i>Pollutant Discharge Prevention and Removal</i>	Regulates transfer, storage, and transportation of pollutants, and cleanup of pollutant discharges.	Construction activities associated with the Project may require the use of hazardous materials, and hazardous waste may be generated. However, the Project would not substantially increase operational hazardous material or hazardous waste. The Project would include proper handling, use and disposal of hazardous materials and waste and would be compliant within all appropriate tracking and reporting requirements. The Project would not impact the transfer, storage, or transportation of pollutants.
Chapter 377 <i>Energy Resources</i>	Addresses regulation, planning, and development of oil and gas resources of state.	The Project would not impact energy resource production, including oil and gas, and/or the transportation of oil and gas.
Chapter 379 <i>Fish and Wildlife Conservation</i>	Addresses the management and protection of the state of Florida's wide diversity of fish and wildlife resources.	Pursuant to the NEPA Section 2, 102(H), avoidance and minimization of potential impacts to federally and state-protected species have been considered for the Project. Protected species habitat was avoided to the extent possible when developing the alternatives for the Project. Further, consultation with NOAA – NMFS, FWS, and FWC has been conducted to ensure full compliance with the federal and state Endangered Species Act (ESA); Marine Mammal Protection Act (MMPA); and Fish and Wildlife Coordination Act. A Biological Assessment (BA) is under preparation for U.S. Army Corps of Engineers in accordance with the Final ESA Section 7 Consultation Handbook (USFWS 1998). The BA is intended to provide documentation necessary for informal consultation with the USFWS and NMFS in order to comply with Section 7 of the ESA (7 USC §136; 16 USC §1531 et seq.).
Chapter 379 <i>Fish and Wildlife Conservation (contd.)</i>	Addresses the management and protection of the state of Florida's wide diversity of fish and wildlife resources.	While no significant impacts to sensitive species are anticipated, USFWS- and FWC-recommended species-specific mitigation measures would be implemented for each potentially affected federally or state-listed species. Therefore the Project would be consistent with the state's policies concerning the protection of wildlife.
Chapter 380 <i>Land and Water Management</i>	Establishes land and water management policies to guide and coordinate local decisions relating to growth and development.	The Project would occur within existing transportation corridors, which span six counties in eastern Florida. Changes to coastal infrastructure would include the repair or construction of railroad track as well as the construction of 18 bridges within the FECR Corridor. The Project would result in impacts to upland habitats as well as surface water resources, including wetland habitats. However, these degraded habitats occur within the existing ROWs. Management of state lands outside of the existing transportation corridors would remain unchanged. Additionally, surface waters and storm water runoff would be consistent with all applicable policies including

Table 5.2.5-1 Florida Coastal Management Program Consistency Review (Continued)		
Statute	Scope	Consistency
		FS Section 380.06, which outlines policies for developments of region impact that may have effects on the health, safety or welfare of citizens of more than one county.
Chapter 381 <i>Public Health, General Provisions</i>	Establishes public policy concerning the state's public health system.	The Project would not affect the state's policies concerning the public health system.
Chapter 388 <i>Mosquito Control</i>	Addresses mosquito control effort in the state.	The Project would not affect mosquito control efforts.
Chapter 403 <i>Environmental Control</i>	Establishes public policy concerning environmental control in the state.	<p>AAF would coordinate all applicable permits in accordance with the FAC.</p> <p>The Project would adversely impact aquatic resources (surface water bodies, including wetlands) along the N-S and E-W Corridors. However, standard BMPs would be implemented during construction activities and the need for compensatory mitigation measures for impacts to regulated resources will be evaluated during federal and state permitting.</p> <p>During construction activities, AAF would take all reasonable precautions to minimize fugitive particulate (i.e., dust) emissions during any construction activities in accordance with FAC 62-296.</p> <p>Net increases to operational emissions, both from stationary and mobile sources would be less than significant as a result of the Project. Total emissions would remain below <i>de minimis</i> levels and any adverse impacts to air quality would also be less than significant. Additionally, beneficial impacts to air quality would occur as a result of the potential reduction in vehicle miles traveled.</p> <p>The Project would not significantly increase hazardous material or hazardous waste generated within the existing transportation corridors.</p> <p>Therefore, the Project would not impact water quality, air quality, pollution control, solid waste management, or other environmental control efforts.</p>
Chapter 582 <i>Soil and Water Conservation</i>	Addresses means to conserve soil and water.	<p>All applicable standard construction BMPs, such as erosion and sediment controls and stormwater management measures would be implemented to minimize erosion and storm water run-off, and to regulate sediment control during construction.</p> <p>Therefore, the Project would be consistent with the Florida's statutes and regulations regarding soil and water conservation efforts.</p>

Source: AMEC. 2013b. *Technical Memorandum No. 10: Environmental Consequences for All Aboard Florida Passenger Rail Project from Orlando to Miami, Florida*. Report.

5.2.6 Climate Change

This section describes climate change effects related to the Project. Transportation systems are vulnerable to extreme weather and climate change effects such as increased temperatures, sea level rise, and more intense storm events; these effects increase the vulnerability of transportation systems (FHWA 2013). Climate change adaptation is critical to protecting transportation systems. Reducing greenhouse gas (GHG) emissions is important for long-term climate change effects, but the reduction of GHGs will likely have little impact on the expected climate change effects over the next 20 or 30 years (FHWA 2012).

The climate change provisions that are applicable to the Project include:

- EO 13514: Federal Leadership in Environmental, Energy, and Economic Performance;
- USACE Circular 1165-2-212: Sea-Level Change Considerations for Civil Works Programs; and
- CEQ Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (CEQ Draft NEPA Guidance).

Executive Order 13514 calls for federal leadership in environmental, energy, and economic performance. The CEQ Draft NEPA Guidance outlines climate change considerations for federal agencies. Federal agencies should consider the effects of GHG emissions and climate change in their evaluation of proposals. The relationship of climate change effects to a proposed action should be considered; this includes proposal design, environmental impacts, mitigation, and adaptation measures. If a proposed action is anticipated to cause direct emissions of 25,000 metric tons or more of CO₂-equivalent GHG emissions on an annual basis, a quantitative and qualitative assessment may be meaningful to decision makers and the public. Environmental documents should reflect the global context of climate change and be realistic in focusing on information that will be useful to decision makers. GHG emissions and mitigation opportunities should be evaluated and compared between alternatives. According to the CEQ Draft NEPA Guidance, climate change effects should be considered in the analysis of projects that are designed for long-term utility and located in areas that are considered vulnerable to specific climate change effects (CEQ 2010).

As documented in this section, the Project would reduce emissions of greenhouse gases that contribute to climate change. The N-S and WPB-M Corridors of the Project are vulnerable to climate change effects in the near future. Both of these corridors are along the Florida coast and cross several coastal water bodies. Bridge structures, particularly those with lower elevation, will have increased vulnerability over time, and potential infrastructure damage may result from flooding, tidal damage, and/or storms. Some commenters on the DEIS expressed concerns about the risks posed by climate change to Project infrastructure, particularly bridges. As this section of the FEIS shows, existing structures are potentially at risk in future storm events. The location and types of structures (bridges and tracks) limit the opportunities for AAF or FECR to implement resiliency measures and AAF has not currently proposed any such measures.

5.2.6.1 Methodology

The analysis of climate change effects considers local climate change scenarios. Major concerns for Florida in the coming decades include sea level rise and more intense storm events. Two main planning horizons for climate change are considered in this FEIS: 2030 and 2060. The 2030 horizon represents near-term impacts and the 2060 horizon represents longer-term impacts. These representative years are also frequently referenced in climate change literature for the region. By 2030, a sea level rise of 3 to 7 inches is anticipated, and by 2060 a rise of 9 to 24 inches is anticipated (Southeast Florida Regional Climate Change Compact 2011). The region will also be vulnerable to an increasing number of intense storm events.

USACE Circular 1165-2-212 (Circular) provides guidance for incorporating the direct and indirect physical impacts of projected future sea-level change across a project's life cycle. Potential relative sea-level change must be considered in every USACE Civil Works coastal activity as far inland as the extent of estimated tidal influence. Planning and design must consider how sensitive and adaptable natural and human systems are to climate change. Planning and design for both existing conditions and Project alternatives should consider and evaluate alternatives for the entire range of possible future rates of sea-level change over the project life cycle. The Circular recommends that alternatives should be evaluated using "low," "intermediate," and "high" rates of future sea-level change for both "with" and "without" project conditions. The historic rate of sea-level change should be used as the "low" rate; "intermediate" and "high" rates should be estimated using equations described in the Circular. Alternative plans and designs should be formulated and evaluated for the three sea-level change scenarios. Sensitivity to the rates of future sea-level change should be determined for plan alternatives; how this sensitivity affects calculated risk and design measures to minimize adverse impacts and maximize benefits should also be addressed.

GHG emissions factors were obtained from the EPA (EPA 2008b). GHG emission factors for intercity rail travel were used for this estimation process. The GHG emissions from switch engines are anticipated to be negligible. Passenger miles for GHG emission estimates were based on estimates of total ridership in 2019 and 2030. Section 5.2.1 of this FEIS provides a detailed description of air quality analysis methods.

5.2.6.2 Local Context: Florida Climate Scenarios

Florida faces direct, immediate, and severe impacts from climate change through rising sea level and the possibility of more intense storms. There is also increased likelihood of more severe droughts and periods of torrential rain. Due to these predictions, Florida's commitment to address climate change is increasing. *Florida's Resilient Coasts: A State Policy Framework for Adaptation to Climate Change* provides a framework for state actions (FAU 2007).

Southeast Florida is particularly vulnerable to the effects of climate change, especially sea level rise. As mentioned above, two important planning horizons, referencing the year 2010 as the start date, are 2030 and 2060. These representative years are also frequently referenced in climate change literature for the region. Sea level is predicted to rise an additional foot from the 2010 level between 2040 and 2070, but a 2-foot rise is possible by 2060. By 2060 sea level is projected to be rising by 2 to 6 inches per decade. It will be important to review projections as scientific understanding improves. Sea levels will continue to rise even if mitigation efforts to reduce GHG emissions are successful at stabilizing or reducing atmospheric CO₂ (Southeast Florida Regional Climate Change Compact 2011).

Florida will also be susceptible to more intense storm events. It is likely that in the future there will be fewer total storms but a higher number of intense storms according to *Climate Scenarios: A Florida-Centric View* (Misra et al. 2011). The damage caused by future storms is expected to increase by about 30 percent despite the decrease in the total number of storms. Potential impacts of climate change and variability for Florida include the displacement of communities, damage to infrastructure, and damage to natural systems (Misra et al. 2011).

5.2.6.3 Greenhouse Gas Emissions

GHGs include water vapor, CO₂, CH₄, N₂O, ground-level O₃, and fluorinated gases such as chlorofluorocarbons and hydrochlorofluorocarbons. These gases trap heat in the atmosphere and regulate the Earth's temperature. Global climate change is a transformation in the average weather of the Earth, which is measured by changes in temperature, wind patterns, and precipitation. Scientific consensus has identified human-related emission of GHGs above natural levels as a significant contributor to global climate change (NCADAC 2013).

GHG emissions for carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) were calculated for this project. As shown in Table 5.2.1-2, the Project would decrease emissions as a result of decreased automobile VMT. CO₂ emissions are calculated to decrease by 19,617 tons/year in 2019 and 31,477 tons/year in 2030. CH₄ emissions would decrease by 4.7 and 5.7 tons/year, respectively, and N₂O emissions by 5 and 6.1 tons/year in 2019 and 2030.

5.2.6.4 Climate Change Vulnerabilities and Adaptation

Tables 5.2.6-1 and 5.2.6-2 display sea level rise projections for Southeast Florida, with the year 2010 as a baseline. Using the USACE methodology and as described above, by 2030 an additional rise of three to seven inches is anticipated and by 2060 a rise of nine to 24 inches is anticipated. A rise of one foot is predicted between 2040 and 2070 and 2 feet between 2060 and 2115. The rate of sea level rise is expected to increase each decade. Sea level rise projections should be reviewed as the scientific understanding of climate change grows.

The N-S Corridor and WPB-M Corridor were assessed for vulnerability, as these corridors are along the coast and cross several coastal water bodies. Climate change effects for the MCO Segment and E-W Corridor are anticipated to be minimal for the 2030 and 2060 planning horizons as these segments of the Project are at higher elevations and further from the coast. Track and bridge heights are assessed given current sea level and projected sea level.

Track and bridge elevations average from 15 to 18 feet (NAVD88). The current 100-year flood elevation averages 5.0 to 5.6 feet (NAVD88) and the mean high water level averages 0.0 feet (\pm 0.3 feet). Two bridges were chosen as a representative sample to assess vulnerability: Horse Creek in the N-S Corridor and Arch Creek in the WPB-M Corridor. Both of these bridges would be reconstructed as part of the Project.

Time Range ¹	Decadal Rate of Rise		
	Projected Rise (inches)	Historic (inches/decade)	Projected Rate of Sea Level Rise (inches/decade)
1913-1999		0.82-0.94	
2010-2020	1.5-3.0		1.4-3.2
2020-2030	3.0-7.0		1.6-4.0
2030-2040	5.0-12.0		1.8-4.8
2040-2050	7.0-17.5		2.0-5.6
2050-2060	9.0-24.0		2.2-6.3

Source: Southeast Florida Regional Climate Change Compact. 2011. *A Unified Sea Level Rise Projection for Southeast Florida*. <https://www.broward.org/NaturalResources/ClimateChange/Documents/SE%20FL%20Sea%20Level%20Rise%20White%20Paper%20April%202011%20ADA%20FINAL.pdf>. Accessed January 7, 2014

- 1 Projected total sea level rise and acceleration was determined using the USACE July 2009 Guidance Document using Key West tidal data between 1913 and 1999; 2010 was referenced as the starting date for sea level rise projections.

Projected Sea Level Rise	Estimated Time Occurrence
1 foot	2040-2070
2 feet	2060-2115
3 feet	2078-2150

Source: Southeast Florida Regional Climate Change Compact. 2011. *A Unified Sea Level Rise Projection for Southeast Florida*. <https://www.broward.org/NaturalResources/ClimateChange/Documents/SE%20FL%20Sea%20Level%20Rise%20White%20Paper%20April%202011%20ADA%20FINAL.pdf>. Accessed January 7, 2014

Table 5.2.6-3 shows current and projected bridge conditions at Horse Creek and Arch Creek under the highest sea level rise projection for 2030 and 2060, respectively.

	2013	2030 (7-inch sea level rise)	2060 (24 inch sea level rise)
Horse Creek Bridge			
Top-of-bridge elevation	16.8	16.8	16.8
Bottom cord	12.2	12.2	12.2
100-year flood level	8.1	8.8	10.1
Mean high water level	-0.58	0	2.0
Arch Creek Bridge			
Top-of-bridge elevation	12.75	12.75	12.75
Bottom cord	6.0	6.0	6.0
100-year flood level	5.4	6.0	7.4
Mean high water level	0.28	1.7	2.28

Source: AAF. 2013d. General Plans and Elevations for the Horse Creek and Arch Creek Bridges. Transystems Corporation.

Bridge structures will have increased vulnerability over time; potential infrastructure damage may result from flooding, tidal damage, and/or storms. More frequent and severe flooding is predicted and it is possible that the 100-year floodplain could increase in lateral extent. Bridges with a lower elevation, such as Arch Creek, will have increased vulnerability by the 2030 time frame during storm and flood events. Based on the 2030 projection, the 100-year flood level will rise to meet the bottom chord of the bridge; at high tide the water level may surpass the bottom chord (Table 5.2.6-3). This vulnerability will increase as sea level rises. As a result, there may be increasing periods of time where the train is out of service during storm events.

5.3 Natural Environment

This section describes the potential impacts of the Project on the natural resources within the Project Study Area, including water resources, wild and scenic rivers, wetlands, floodplains, biological resources and natural ecological systems, and threatened and endangered species. For each alternative, the analysis includes the impacts of the Project in the WPB-M Corridor, based on information provided in Section 3.0 of the 2012 EA and the impacts of new Project elements in that corridor that were not evaluated in the 2012 EA.

5.3.1 Water Resources

Water resources analyzed for the Project include surface water and groundwater. This section also provides the analysis of proposed navigational conditions. The Project would have negligible impacts on surface or groundwater resources.

5.3.1.1 Methodology

Impacts to surface and groundwater resources were evaluated by overlaying the Project footprint on GIS mapping of water resources, and assessing the potential impacts to water quality based on changes to the quality and quantity of stormwater runoff.

5.3.1.2 Environmental Consequences

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed or operated. The Project Area would remain the same as it exists today with no development or construction changes relevant to the Project, and no adverse impacts to water resources would occur.

Alternative A

Direct effects to water resources within each segment of Alternative A are discussed below with respect to impacts on surface waters and water quality, outstanding Florida waters (OFWs), groundwater, sole source aquifers (SSAs), wellfield protection, and drinking water safety. Alternative A would result in minor impacts to surface and groundwater resources through construction of 21 new and 10 replacement bridges over waterways, of which six would cross OFWs. This alternative would convert 161 acres of vegetated pervious areas to railroad, and 139 acres of new impervious surfaces (buildings,

parking lot, roads) would be constructed. These facilities would be designed with appropriate BMPs so as to not substantially increase the volume of runoff. BMPs would also mitigate for potential impacts to water quality and water quantity. Alternative A, in the western section, would cross the Biscayne Bay SSA streamflow and recharge source zones. AAF will implement BMPs to protect discharge water quality and ensure that freshwater recharge to the SSA was maintained.

Table 5.3.1-1 summarizes the surface waters impacted by Alternative A as described in the following paragraphs.

Segment	New Bridges	Replaced or Reconstructed Bridges	Outstanding Florida Waters
MCO Segment	1	0	0
E-W Corridor	5	0	2 (Econolockhatchee River, St. Johns River)
N-S Corridor	0	18	3 (Goat Creek, Loxahatchee River, St. Lucie River)
WPB-M Corridor	0	7	1 (Oleta River)
Total	6	25	6

MCO Segment

The MCO Segment, including the VMF, would increase impervious area and one new bridge would be required over a surface water body. No construction would occur within or in the vicinity of designated OFWs or navigable waters.

Direct permanent impacts to surface waters would be limited to installing concrete pilings and abutments within surface waters during bridge construction at Boggy Creek. This alternative would change approximately 20 acres of pervious surface area and 30 acres of impervious surfaces to railroad ballasted railbed along the MCO Segment. The VMF would convert approximately 75 acres of pervious surface area to impervious surface area (buildings, parking lots, and roads) and ballasted railbed. Converting 75 acres of pervious surface area to impervious would alter groundwater recharge and change surface drainage patterns.

Portions of the MCO Segment traverse areas of the airport facilities with a constructed stormwater management system consisting primarily of wet detention ponds. A new wet detention pond is proposed to treat stormwater runoff from the VMF. A required road would require filling an existing detention pond and another pond would be expanded to accommodate the displaced treatment volume. Drainage swales would be used to treat runoff from the rail areas. All stormwater facilities on airport property will comply with FAA regulations (40 CFR part 60).

The MCO Segment and VMF would increase impervious surfaces; however, this would not result in a substantial impact to groundwater recharge over the length of the corridor or within localized areas of increased impervious surfaces. Therefore, only minor impacts to groundwater would occur.

The MCO Segment and VMF would overlap a SSA protection zone in Orange County. Proposed construction would increase impervious surfaces in the Biscayne Aquifer SSA streamflow and recharge source zones. Water quality and quantity BMPs for the additional impervious surface area in the form of stormwater treatment would be required as part of the ERP process and would provide a form of recharge. Therefore, impacts to SSAs would be minor.

The MCO Segment and VMF are not located within a wellfield protection zone or source water assessment and protection program (SWAPP) zone. Orange County does not have a wellfield protection ordinance; however, they follow FDEP regulations (Mercado 2013). The Project would comply with all FDEP and local ordinances; therefore, no adverse impact to drinking water resources would occur.

East-West Corridor

Direct permanent impacts associated with the E-W Corridor would include installing concrete pilings and abutments within surface waters during bridge construction and converting approximately 72 acres of vegetated pervious surface area to ballasted railbed.

Stormwater runoff would be designed primarily to flow to the SR 528 drainage ditch. This may require expanding the capacity of the ditch/swale to accommodate the additional runoff volume from the Project. West of SR 417 the Project would require realigning a drainage canal and constructing a wet detention pond at the south-west corner of Narcoossee Road. A new wet detention pond would also be constructed to treat stormwater runoff at the SR 528/SR 407 interchange, with three new ponds constructed at the I-95/SR 528 interchange.

Alternative A would cross two OFWs, the Econlockhatchee River and the St. Johns River, on new bridges. Stormwater treatment BMPs would be installed to accommodate any increases in runoff associated with the Project.

Orange County has designated a portion of the Econlockhatchee River and its tributaries as the Econlockhatchee River Corridor Protection Zone. According to Chapter 15, Article VIII, Section 15-825 of the Orange County Code of Ordinance, in processing development applications, there shall be no additional crossing by road, rail or utility corridors of the Econlockhatchee River Corridor Protection Zone unless the following conditions are met:

- 1) There is no feasible and prudent alternative to the crossing;
- 2) All possible measures to minimize harm to the resources of the basin will be implemented;
- 3) The crossing supports an activity that is clearly in the public interest as determined by the board;
and
- 4) The wildlife crossing is adequately sized to maintain wildlife movement.

Orange County development permits would be required as part of the permitting process. Orange County review of the Project would ensure impacts to the Econlockhatchee River Corridor Protection Zone are kept to a minimum and meet the code.

Converting vegetated areas to ballasted railbed would not result in a substantial impact to groundwater recharge over the length of the corridor or within localized areas. Therefore, only minor impacts to groundwater recharge or quality would occur.

The westernmost 20 miles of the E-W Corridor would overlap a SSA protection zone in Orange County. The proposed construction would not result in an increase in impervious surfaces in the Biscayne Aquifer SSA streamflow and recharge source zones. Water quality mitigation would be addressed as part of the ERP process. FDEP would oversee the ERP permitting process with the St. Johns River Water Management District (SJRWMD) and the South Florida Water Management District (SFWMD); the ERP requirements protect the discharge water quality, which in turn avoids and minimizes potential effects to the SSA. Therefore, impacts to SSAs would be minor.

Alternative A crosses several wellfield protection zones or SWAPP zones in Brevard County, which have wellfield protection ordinances to protect drinking water supplies from contamination. Wellfield protection criteria are found in Chapter 62, Article X, Division 2, and Section 62-3631 of the Brevard County Natural Resource Ordinances. Orange County does not have a wellfield protection ordinance; however, they follow FDEP regulations. In these counties, the transportation of any regulated substances through the wellfield protection zones is exempt from the provisions of the county/state ordinances, provided that the transporting vehicle is in continuous transit. No adverse impact to wellfield resources would occur.

North-South Corridor

The N-S Corridor follows the FECR Corridor. The Project would include improvements to the existing mainline and reconstruction of the second tracks on the existing track beds. Constructing the Project in the N-S Corridor would not create new impervious surface. As described for the WPB-M Corridor in Section 3.1.2 of the 2012 EA, the proposed mainline improvements will not increase the existing impervious surface area or alter the existing drainage system because the Project will utilize an existing rail corridor. The original construction of the corridor included two rail lines. The majority of the original second line was previously removed, but the track bed remains. The Project would include reconstruction of the second line on the existing track bed. Reconstructing the second rail line within the existing roadbed would not create new impervious area. Adjacent surface drainage would also not be impacted with the reconstruction of the second line. Existing cross drainage facilities on the adjacent roadways span the entire right-of-way width and would not require modification to account for the installation of the rail line on existing roadbed.

Water quality and quantity concerns associated with reconstructing the railbed to add a second track will be addressed as part of the Florida Environmental Resource Permit process. Drainage would be accommodated using an existing channel along the north or south side of the right-of-way. In some cases, this would require relocating existing drainage channels. With the implementation of BMP measures determined by and in compliance with permit requirements, the Project would result in negligible impacts to water quality within and in the vicinity of the N-S Corridor. No construction would occur that would

potentially contact or impact groundwater supply. Constructing the rail in this corridor would not result in a substantial impact to groundwater recharge and only minor impacts to groundwater would occur.

Surface water resources would experience minor direct effects as a result of reconstructing or replacing 18 bridges (Table 5.3.1-1). Figures depicting the bridge crossing locations are provided in Appendix 5.3.1. Direct permanent impacts would include installing concrete pilings and abutments within surface waters. No permanent adverse impacts to surface water quality would be caused by the bridges.

The N-S Corridor would pass over two OFWs: Goat Creek and the Loxahatchee River (Table 5.3.1-1). The Loxahatchee River Bridge would be rehabilitated as part of the Project. The existing FECR rail bridge over Goat Creek would be removed and replaced with a double-track railroad bridge. These actions would have no adverse impact on the OFWs.

The N-S Corridor would overlap an SSA protection area within Palm Beach County along the eastern border of the aquifer protection area. The proposed improvements would not increase impervious surfaces in the Biscayne Aquifer SSA streamflow and recharge source zones. Stormwater treatment would be required as part of the ERP process. No adverse impacts to SSAs would occur.

The N-S Corridor passes through several wellfield protection zones or SWAPP zones in the following counties: Brevard, Indian River, St. Lucie, Martin, and Palm Beach. Each of these counties has policies and regulations, in the form of wellfield protection ordinances, to protect drinking water supplies from contamination, as described above. The Project would comply with all local ordinances for protection of the wellfields, therefore, no impact to wellfield resources would occur.

Phase I - West Palm Beach – Miami Corridor

According to Section 3.1.2 of the 2012 EA, the proposed mainline improvements will not increase the existing impervious surface area or alter the existing drainage system because the project will utilize an existing rail corridor. The original construction of the corridor included two rail lines. The majority of the original second line was previously removed, but the track bed remains. The Project would include reconstruction of the second line on the existing track bed. Reconstructing the second rail line within the existing roadbed would not create new impervious area. Adjacent surface drainage would also not be impacted with the reconstruction of the second line. Existing cross drainage facilities on the adjacent roadways span the entire right-of-way width and would not require modification to account for the installation of the rail line on existing roadbed.

Improvements associated with the proposed stations in Miami and West Palm Beach would include minor changes to impervious surface areas for the station buildings, parking facilities, and platforms. No, or minimal, upgrades to existing off-site municipal drainage systems (conveyance structures) would result from the proposed stations; there will be little change in the pre- versus post-runoff condition in these cases.

The WPB-M Corridor and stations are over the sole source Biscayne Aquifer. Minor mainline modifications are required to accommodate the increase in train speeds and the replacement of the second rail on existing base material. The proposed improvements would not change the existing runoff points of discharge; they would also not significantly increase the existing amount of impervious area or the pollutant loading of the runoff. SFWMD ERP requirements protect the discharge water quality, which

in turn avoids impacts. None of the project elements considered in the 2012 EA would impact sole source aquifers (Section 3.1.2.2).

The FECR Corridor within Broward and Palm Beach Counties travels through several wellfield protection zones; however, none of the proposed stations are within any wellfield protection zones. The Project would comply with all local ordinances for protection of the wellfields, including those noted above. None of the project elements considered in the 2012 EA would impact wellfield resources (Section 3.1.2.3).

As part of Phase II, new construction is proposed at four bridges within the WPB-M Corridor, and an additional three bridges would be reconstructed. This would consist of replacing the existing bridges with two new single-track rail bridges, or adding a new single-track bridge parallel to the existing bridge. The impacts of these bridge replacements were not evaluated in the 2012 EA because they are part of Phase II. Direct permanent impacts to surface waters would be limited to installing concrete pilings and abutments within surface waters during bridge construction.

Alternative C

Impacts to surface and groundwater resources associated with Alternative C would be identical to Alternative A, except within the E-W Corridor. The direct effects to surface waters for Alternative C are the same acreage as Alternative A, but will occur slightly to the south. Constructing the rail in the E-W Corridor for Alternative C would change approximately 93 acres of vegetated pervious surface area to ballasted railroad bed. Stormwater from the proposed rail line would drain to its own, new stormwater management system and would not comingle with SR 528 drainage.

Alternative E

Impacts to surface and groundwater resources associated with Alternative E, the preferred alternative, would be identical to Alternative A, except within the E-W Corridor. The direct effects to surface waters in the E-W Corridor for Alternative E are the same acreage (3 acres) as Alternative A, but will occur farther to the south. Constructing the rail in the E-W Corridor for Alternative E would change approximately 93 acres of vegetated pervious surface area to ballasted railroad bed. Stormwater from the proposed rail line would drain to its own, new stormwater management system (it would not comingle with SR 528 drainage) and some existing stormwater ponds would need to be relocated.

5.3.1.3 Indirect and Secondary Impacts

As discussed in Section 5.1.1, *Land Use*, the Project is not anticipated to result in induced growth or development other than as described in the 2012 EA in the vicinity of stations, and therefore would not have indirect effects on water quality.

5.3.1.4 Temporary Construction-Period Impacts

Construction could potentially have localized site-specific temporary impacts on hydrology and water quality on surface waters that would be crossed by bridges or that are adjacent to the railroad. Substantial quantities of suspended solids can be released as a result of construction activities, when large areas of exposed soil may be present. AAF will develop a Storm Water Pollution Prevention Plan (SWPPP) during

final design that will identify BMPs that would be used to protect receiving waters from sediment discharges or spills during the construction period. AAF would use all appropriate BMPs to construct new bridge pilings in surface waters, including sediment control structures, turbidity curtains, silt booms, and silt fence.

5.3.2 Wild and Scenic Rivers

The closest Wild and Scenic River designated segment is on the Loxahatchee River approximately four river miles upstream from the N-S Corridor in Palm Beach County. The Project would not impact Wild and Scenic Rivers. The railroad would not be located in or visible from a Wild and Scenic River segment.

5.3.3 Wetlands

The Project would result in impacts to the aquatic environment. The CWA defines “aquatic environment” and “aquatic ecosystem” as waters of the United States, including wetlands that serve as habitat for interrelated and interacting communities and populations of plants and animals. Alternative A would result in approximately 128 acres of direct impacts to aquatic resources (wetlands and surface waters). Alternative C would directly affect approximately 165 acres of aquatic resources (wetlands and surface waters), and Alternative E, the preferred alternative, would directly affect approximately 160 acres of aquatic resources (wetlands and surface waters) using the same level of analysis as for Alternatives A and C. Subsequent to the DEIS, the aquatic resource impacts of Alternative E were re-assessed using delineated wetlands and include indirect impacts, and were calculated as approximately 263 acres.

Wetlands within the Project Study Area are protected under state and federal regulatory programs. Within the State of Florida, activities conducted in wetlands are regulated by Part IV, Chapter 373, FS. Impacts to waters of the United States within the jurisdiction of the USACE are regulated under its authority granted by the Clean Water Act, Section 404 (33 U.S.C § 1344, as amended), and navigable water of the United States within the jurisdiction of the USACE are regulated under its authorities granted by Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 U.S.C. § 401). Executive Order 11990 also protects wetlands by directing federal agencies to avoid new construction in wetlands where there is a practicable alternative.

Section 404 of the Clean Water Act (CWA) (33 U.S.C. § 1344) regulates discharges of dredged or fill material into waters of the United States, including jurisdictional wetlands. The CWA requires compliance with the Section 404(b)(1) Guidelines, 40 C.F.R. Part 230, developed jointly by the EPA and USACE. CWA compliance requires a sequential evaluation process that includes avoidance of all impacts to aquatic resources to the greatest extent practicable, minimization of impacts to aquatic resources to the greatest extent practicable, and then compensatory mitigation for unavoidable impacts in the form of wetlands creation, restoration, enhancement or preservation. AAF's Department of the Army (DA) application for Section 404 authorization is currently incomplete. Once determined completed, the USACE will complete its Section 404(b)(1) Guidelines analysis and public interest review in its record of decision following publication of the FEIS.

Section 10 of the RHA of 1899 regulates the installation of structures (e.g., piers, wharfs, breakwaters, bulkheads, jetties, weirs, transmission lines) and work such as dredging or disposal of dredged material,

or excavation, filling, or other modifications to the navigable waters of the United States defined by 33 CFR Part 329.

Various components of the proposed work could be verified through the USACE's Nationwide Permit (NWP). General conditions of the NWPs are in the Federal Register notice announcing the issuance. Pre-construction notification requirements, additional conditions, limitations and restriction are in 33 C.F.R, part 330. NWPs are a type of general permit designed to authorize certain activities that have minimal adverse effects on the aquatic environment and generally comply with the related laws cited in 33 C.F.R 320.3.

This section discusses wetland impacts relative to the alternatives for the Project. These direct and indirect impacts are discussed along with potential mitigation efforts and how they relate to the state and federal regulatory process.

The types of direct impacts and the indirect impacts to wetlands that may result from the Project include:

- Discharging fill material into wetlands (loss of) – reduction in wetland size, fragmentation and edge effects, introduction of human activity (noise, disturbance) to wetland, change in hydrology, vegetation, or habitat;
- Excavation – conversion to storm water management, reduction in wetland size, fragmentation and edge effects, introduction of human activity (noise, disturbance) to wetland, change in hydrology, vegetation, or habitat
- Change in hydrology, fragmentation, introduction of disturbed non-wetland conditions, creation of new “edge” conditions, interruption of migratory routes, alteration of water levels or flow patterns;
- Installing a new culvert or changing existing culvert – alteration water levels or flow patterns;
- Removing canopy or other vegetation – change of light regimes, water temperature, or plan community structure; and
- New discharges of stormwater – alteration of water levels or flow patterns, or introduction of sediments or nutrients.

Comments on the DEIS were largely technical in nature, and concerned the characterization of wetland cover types as well as quantification of impacts. This section has been revised to respond to those comments.

5.3.3.1 Methodology

Direct wetland impacts were estimated using different methodologies for each segment, based on the availability of previously-approved wetland delineations and the level of design developed for each segment and alternative.

- Aquatic resource (wetland and surface water) impacts within the VMF were calculated based on previously approved wetland delineations. All wetlands within the proposed footprint of the VMF were assumed to be impacted (eliminated/removed), including wetlands to be lost as a result of excavation activities.

- Wetland impacts within the MCO and GOAA Segment were calculated based on previously-approved wetland delineations. All wetlands within a 100-foot wide corridor were presumed to be impacted.
- Wetland impacts within the E-W Corridor were calculated based on a combination of previously-approved wetland delineations, project-specific wetland delineation, and GIS wetland mapping (Florida water management district provided land use data). Impacts were calculated based on a 60-foot ROW where the alternative is within the SR 528 ROW and a 100-foot ROW where the alternative was outside of the state highway ROW.
- Direct wetland impacts for the N-S Corridor were calculated based on the proposed limit of work overlain on the field delineation of wetlands in areas where the footprint of the existing railroad corridor would change due to third track addition, curve reduction, or bridge improvement.

Indirect effects to wetlands and other waters include the following impacts that could be caused by the placement of fill or excavation within the wetlands, but occur at a different location or time:

- Changes in wetland functions; or
- Changes in wetland physical/biological characteristics as a result of the direct effects (loss of wetland).

Indirect effects to wetlands were assessed for wetlands within 100 feet of the assumed 100-foot wide railroad corridor and within 500 feet of the proposed VMF footprint. Wetlands were identified utilizing land use data categorized according to FLUCCS (FDOT 1999). The assessment was based on the functions and values each wetland provides and the type and extent of the direct wetland impacts and work adjacent to the wetland that is the cause of the secondary effect.

5.3.3.2 Environmental Consequences

Direct effects are defined as those “which are caused by the action and occur at the same time and place” (CEQ 2005a). Direct effects to wetlands (aquatic resources) may include the discharge of dredge or fill material into aquatic resources, removal of vegetation, alteration of hydrology, and pollutant discharge.

No-Action Alternative

In the No-Action Alternative, the Project would not be constructed or operated. As a result no wetland or aquatic resource loss would occur.

Alternative A

Alternative A would result in the loss of approximately 130 acres of aquatic resources, including 17 acres of surface waters and 113 acres of wetlands of which 68 acres are forested and 45 acres are non-forested. Table 5.3.3-1 provides acreages of direct effects to wetlands and surface waters for the MCO Segment, E-W Corridor, N-S Corridor, and WPB-M Corridor under Alternative A, as described in detail in the following paragraphs. Effects of the Project on wildlife and important wildlife habitats are described in Section 5.3.5.

Table 5.3.3-1 Alternative A - Direct Aquatic Resource Effects (loss resulting from filling or excavation) (acres)

FLUCCS	Description	MCO Segment	E-W Corridor	N-S Corridor	WPB-M Corridor	Total
510	Streams and Waterways	0	3.2	6.2	<0.1	9.5
530	Reservoirs	0	7.3	0	0	7.3
610-612	Wetland Hardwood Forest	6.7	0	0.3	<0.1	7.0
617	Mixed Wetland Hardwoods	0	10.1	0.6	0	10.7
618	Willow and Elderberry	0	1.2	0	0	1.2
621	Cypress	4.4	3.9	0	0	8.3
625	Hydric Pine Flatwoods	0	2.4	0	0	2.4
630	Wetland Forested Mixed	19.7	18.7	0	0	38.4
641	Freshwater Marsh	8.0	7.0	1.5	0	16.5
643	Wet Prairie	0	4.8	0.3	0	5.1
646	Treeless Hydric Savannah	<0.1	23.5	0	0	23.5
	Total Direct Effects (loss)	38.7	82.1	9.0	0.1	129.9

Source: SFWMD. Undated. *SFWMD – GIS Data Distribution: GIS Data*

Catalog. <http://my.sfwmd.gov/gisapps/sfwmdxwebdc/dataview.asp?> Accessed September 27, 2013; SJRWMD. 2013a.

SJRWMD - GIS Data Download Table. <http://www.sjrwmd.com/gisdevelopment/docs/themes.html>. Accessed August 31, 2013.

MCO Segment

The MCO Segment would directly affect approximately 39 acres of aquatic resources including bay swamp, mixed wetland hardwoods, cypress, wetland forested mixed, freshwater marsh, and treeless hydric savannah.

The wetlands located within the footprint of the VMF provide moderate quality wetland wildlife habitat. Wetlands within the MCO Segment have sustained limited disturbance and provide moderate quality wildlife habitat for those species tolerant of the airplane noise. Much of the wetland habitat present along the MCO Segment has been affected by either airport development activities or tree harvesting that has occurred near the south end of the GOAA property. Wetlands from which trees have been harvested provide some low to moderate wildlife habitat while the wetland remnants provide minimal resources for wildlife utilization.

Impacts to jurisdictional wetlands associated with the MCO Segment and VMF have been partially approved by the USACE under a prior permit issued to GOAA (USACE 1996).

East-West Corridor

Alternative A would directly affect approximately 82 acres of wetlands, including streams and waterways, reservoirs, mixed wetland hardwoods, willow and elderberry, cypress, hydric pine flatwoods, wetland forested mixed, freshwater marsh, wet prairie, and treeless hydric savannah. Table 5.3.3-1 provides acreages of direct effects to wetlands and aquatic habitats based upon the assumed 100-foot wide railroad corridor.

Direct impacts would include wetlands within the St. Johns River 100-year floodplain and the floodplain of the Econlockhatchee River, an OFW. The FNAI and FWC prioritized wetland habitats throughout the state for conservation. Geographical Information System (GIS) data indicate several wetlands within the E-W Corridor that the FNAI and FWC ranked as the highest priority for conservation. These wetlands include several large, contiguous cypress strands east of SR 417 and the contiguous system of hydric pine flatwoods and mixed forested wetlands associated with the St. Johns River floodplain (FNAI 2011). Wet prairies and hydric pine flatwoods are often considered valuable wetlands due to the high degree of wildlife utilization of these habitats. Due to their narrow hydroperiods, it is also somewhat difficult to establish the required hydrologic regimes for these wetlands in mitigation sites.

The proposed communications towers would be sited in uplands, and would not increase impacts to wetlands.

North-South Corridor

Direct wetland and aquatic habitat losses within the N-S Corridor would total approximately 9.0 acres due to bridge construction. These include streams and waterways, mangrove swamps, mixed wetland hardwoods, freshwater marsh, and wet prairie. Table 5.3.3-1 provides acreages of direct effects to wetlands based upon the anticipated construction activities. Wetland wildlife habitat would experience minor impacts due to bridge reconstruction.

Phase I - West Palm Beach – Miami Corridor

Bridge construction and reconstruction in the WPB-M Corridor would impact surface waters as a result of installing new concrete pilings, and would impact mangrove wetlands within the footprint of the new or widened bridge. The total wetland loss would be approximately 0.1 acres, as shown in Table 5.3.3-1.

Phase I (West Palm Beach – Miami Corridor) as evaluated in the 2012 EA would not affect surface waters.

Alternative C

Alternative C would result in the loss of approximately 167 acres of aquatic resources, including 9 acres of surface waters/aquatic habitat and 158 acres of wetlands, of which 93 acres are forested and 65 acres are non-forested. Table 5.3.3-2 provides acreages of direct effects to wetlands and surface waters for the MCO Segment, E-W Corridor, N-S Corridor, and WPB-M Corridor under Alternative C.

Alternative C would have the same effects as Alternative A within the MCO Segment and the N-S Corridor. Within the E-W Corridor, Alternative C would result in the loss of approximately 119 acres of streams and waterways, reservoirs, mixed wetland hardwoods, willow and elderberry, cypress, hydric pine flatwoods, wetland forested mixed, freshwater marsh, wet prairie, and treeless hydric savannah.

Direct effects to aquatic resources would include larger portions of undisturbed area within the St. Johns River 100-year floodplain and the floodplain of the Econlockhatchee River. Alternative C would impact a higher acreage of wet prairies, hydric pine flatwoods, and areas ranked by FNAI and FWC as the highest priority for conservation, than would Alternative A.

Table 5.3.3-2 Alternative C - Direct Aquatic Resource Effects loss resulting from filling or excavation) (acres)

FLUCCS	Description	MCO Segment	E-W Corridor	N-S Corridor	WPB-M Corridor	Total
510	Streams and Waterways	0	1.4	6.2	<0.1	7.7
530	Reservoirs	0	1.0	0	0	1.0
610-612	Wetland Hardwood Forest	6.7	0	0.3	<0.1	7.0
617	Mixed Wetland Hardwoods	0	15.1	0.6	0	15.7
618	Willow and Elderberry	0	1.8	0	0	1.8
621	Cypress	4.4	20.3	0	0	24.7
625	Hydric Pine Flatwoods	0	2.8	0	0	2.8
630	Wetland Forested Mixed	19.7	21.3	0	0	41.0
641	Freshwater Marsh	8.0	11.6	1.5	0	21.1
643	Wet Prairie	0	11.0	0.3	0	11.3
646	Treeless Hydric Savannah	<0.1	33.1	0	0	33.2
	Total Direct Effects	38.7	119.4	9.0	0.1	167.2

Source: SFWMD. Undated. SFWMD – GIS Data Distribution: GIS Data

Catalog. <http://my.sfwmd.gov/gisapps/sfwmdxwebdc/dataview.asp?> Accessed September 27, 2013; SJRWMD. 2013a. SJRWMD - GIS Data Download Table. <http://www.sjrwmd.com/gisdevelopment/docs/themes.html>. Accessed August 31, 2013.

Alternative E

Table 5.3.3-3 provides acreages of direct effects to aquatic resources for the MCO Segment, E-W Corridor, N-S Corridor, and WPB-M Corridor under Alternative E, the preferred alternative, using the same methodology as the analysis for Alternatives A and C (Florida Water Management District Data used for the E-W Corridor). As estimated in the DEIS, based on available GIS wetland mapping, Alternative E would result in the loss of approximately 160 acres of aquatic resources, including 8 acres of surface waters/aquatic habitat and 152 acres of wetlands, of which 94 acres are forested and 58 acres are non-forested. Subsequent to the DEIS, AAF identified Alternative E as the preferred alternative and completed field delineations of wetlands that are currently under review by federal and state agencies. FRA has evaluated AAF's analysis and concurs that Alternative E is its preferred alternative that would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors.

Alternative E would have the same effects as Alternative A within the MCO Segment and the N-S Corridor. Within the E-W Corridor, wetlands impacted by Alternative E would include larger portions of undisturbed area within the St. Johns River 100-year floodplain and the floodplain of the Econlockhatchee River although the total acreage of aquatic resource effects would be comparable to those which would occur with Alternative C. Alternative E would result in the loss of less area of wet prairies and greater acreage of hydric pine flatwoods, and a larger acreage of wetlands ranked by FNAI and FWC as highest priority for conservation, than would Alternatives A or C.

Table 5.3.3-4 provides field delineated acreages of direct effects to aquatic resources for the MCO Segment, E-W Corridor, N-S Corridor, and WPB-M Corridor under the preferred alternative. Alternative E, based on updated wetland delineation data, would result in the loss of approximately

263 acres of aquatic resources, including 21 acres of surface waters/aquatic habitat and 167 acres of wetlands, of which 104 acres are forested and 63.5 acres are non-forested.

FLUCCS	Description	MCO Segment	E-W Corridor	N-S Corridor	WPB-M Corridor	Total
510	Streams and Waterways	0	1.4	6.2	<0.1	7.7
530	Reservoirs	0	0.3	0	0	0.3
610-612	Wetland Hardwood Forest	6.7	0	0.3	<0.1	7.0
617	Mixed Wetland Hardwoods	0	13.4	0.6	0	14.0
618	Willow and Elderberry	0	1.5	0	0	1.5
621	Cypress	4.4	18.0	0	0	22.4
625	Hydric Pine Flatwoods	0	6.7	0	0	6.7
630	Wetland Forested Mixed	19.7	22.6	0	0	42.3
641	Freshwater Marsh	8.0	9.4	1.5	0	18.9
643	Wet Prairie	0	7.7	0.3	0	8.0
646	Treeless Hydric Savannah	<0.1	30.9	0	0	30.9
	Total Direct Effects	38.7	111.9	9.0	0.1	159.7

Source: SFWMD. Undated. *SFWMD – GIS Data Distribution: GIS Data Catalog*. <http://my.sfwmd.gov/gisapps/sfwmdxwebdc/dataview.asp?> Accessed September 27, 2013; SJRWMD. 2013a. *SJRWMD - GIS Data Download Table*. <http://www.sjrwmd.com/gisdevelopment/docs/themes.html>. Accessed August 31, 2013.

Description	MCO Segment	E-W Corridor	N-S Corridor	WPB-M Corridor	Total
Streams and Waterways	0	27.1	6.2	<0.1	33.3
Vegetated Wetlands	38.7	188.7	2.8	0	230.2
Total Direct Effects	38.7	215.8	9.0	0.1	263.6

Source: USACE

1 Direct Effects include both physical loss of aquatic resources through filling/excavating and loss of wetland function as a result of changes in wetland size, connectivity or hydrology.

Summary of Direct Impacts

Table 5.3.3-5 provides a comparison of acreages of direct effects to aquatic resources for all alternatives, based on a comparable level of information. No loss of aquatic resources would occur with the No-Action Alternative. Based on a comparable level of wetland delineation and design, Alternative A would result in 130 acres of direct loss, of which 113 acres would be forested and herbaceous wetlands. Alternative C would directly affect 167 acres (158 acres of wetlands), and Alternative E would directly affect 160 acres (152 acres of wetlands). For each alternative, the greatest loss of wetlands would be to the mixed wetland hardwoods category, followed by treeless hydric savannah and wetland forested mixed wetlands. Losses of forested wetlands would be the least with Alternative A (70 acres) and Alternative C and Alternative E would result in an equivalent loss of approximately 100 acres of forested wetland.

Description	No-Action	A	C	E
Surface Waters/Aquatic Habitat	0	16.8	8.7	8.0
Forested Wetland	0	68.0	93.0	93.9
Non-forested Wetland	0	45.1	65.6	57.8
Total Direct Effects to Aquatic Resources	0	129.9	167.2	159.7

¹ E-W corridor wetland losses based on Florida Water Management District Data.

Based on this comparable level of analysis, Alternative A would result in the lowest acreage of loss of aquatic resources while Alternative C would result in the highest loss. Alternative E, the preferred alternative, would have higher wetland losses (188 acres) based on updated wetland delineation data along the E-W Corridor segment. Direct effects would consist of removing all wetland area through filling with ballast for the railroad bed, constructing bridges, and installing culverts. Placing ballast within wetland areas would eliminate most wetland functions and values. New culverts and bridges would have minimal effects on water storage, flow volume, and wildlife habitat but would result in less adverse impacts than removing aquatic resources. Updated wetland impact calculations for Alternative E, the preferred alternative, show that this alternative would result in direct and indirect impacts of 263 acres to aquatic resources.

5.3.3.3 Indirect and Secondary Impacts

The Section 404(b)(1) Guidelines state that “secondary effects are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.” (40 CFR part 230.11). Although not specifically addressing impacts to aquatic resources, the CEQ regulations define indirect effects as “effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include ... related effects on air and water and other natural systems, including ecosystems (40 CFR part 1508.8).”

Indirect effects are therefore the consequences of the direct effects of a proposed action. For example, while the direct effect of filling a wetland would be the loss of the filled wetland area and the functions and values provided by that specific area, the indirect effects of that wetland fill would result from the associated changes to the overall size of the wetland, hydrology, cover type, species assemblage, or degree of habitat fragmentation. These types of effects could adversely impact the ability of the wetland to provide functions and values, or could diminish the functions and values to a degree greater than would be attributed simply due to the loss of area. Isolated fragments of wetlands or waterways may have reduced habitat value, no longer provide viable fish or wildlife habitat, or be so isolated that the wetland or waterway fragments are rendered inaccessible to many fish or other aquatic species.

Secondary and/or indirect effects are changes in the ability of an aquatic resource to provide functions, and do not affect an aquatic resource uniformly (except for some small resources). These functional effects occur as gradients with the highest intensity occurring closest to the disturbance and decreasing with distance. Each resource affected may also experience the effects differently (for example, the effects of a canopy gap

do not affect all wildlife species in the same way, or at the same distance). While some researchers have considered an indirect effect to alter the entire wetland, others have documented that the impacts of highways, or railways, are not uniformly distributed across a wetland (Forman and Deblinger 2000; Eigenbrod, Hecnor, and Fahrig 2009). For example, impacts on the ability of a wetland to support production export are different in type and location than impacts on the ability of a wetland to provide sediment/toxicant retention or nutrient transformation.

There are numerous published studies that document that road construction may adversely impact the hydrology of wetlands upstream and downstream of a new road, and may adversely impact the movement of nutrients, sediment, or wildlife between wetlands (Biglin and Dupigny-Giroux 2006; Fahrig and Rytwinski 2009; Forman and Deblinger 2000; Van der Ree et al. 2011). For newly constructed roads, these effects have been documented to extend 200 to 300 meters from the road. Other studies have focused on the impacts of roads, particularly highways, on wetland-dependent wildlife and have shown that roads have adverse impacts on aquatic wildlife populations as a result of loss of habitat, either directly or indirectly, or as a result of noise, particularly for multi-lane major highways (Eigenbrod, Hecnor, and Fahrig 2009). Forman and Deblinger (2000) coined the phrase “Road-Effect Zone” for the combined area of highway-related secondary and/or indirect effects to natural ecosystems, and considered (based on research by others) that 300 meters was the maximum distance that ecological effects would occur from a highway. Subsequent studies have shown that highway effects are highly species-specific and are correlated with the width of the highway, the volume of traffic, and the night/day traffic distribution (Eigenbrod, Hecnor, and Fahrig 2009).

Eigenbrod et al. (2009) have shown that the ability of a wetland to provide wildlife habitat functions is multivariate, and includes size, edge: interior ratio, cover type, connectivity, microhabitat diversity, soil moisture, and other factors. Their work has shown that the most important variable is wetland size, and that changes in wetland size in small wetlands has a much greater impact on wildlife species richness than changes in size in larger wetlands.

Loss of part of a wetland would create a new ecotone at the wetland/fill boundary causing an “edge effect.” An ecotone is a zone which lies at the boundary between two biomes, or habitats and typically contain species characteristic of both habitats. Community composition varies due to interspecific competition which opens these areas to generalist species tolerant of fluctuating conditions and typically consisting of weedy and invasive exotic species. The introduction of a new edge also reduces biodiversity, which is a function of the length of the edge of the habitat versus the area of the habitat, within a habitat. A change in the light regime may cause a shift in the understory community from species requiring shade to species more tolerant of direct sunlight.

Placing fill within a wetland would result in alterations in hydrology. Because fill reduces the volume of available storage, water levels within adjacent wetland areas that were not directly affected would increase. The water level increase is a function of the volume of fill placed in the wetland and the size of the remaining wetland. Increased water levels may impact wetlands by: shifting the composition of the vegetation community to species tolerant of deeper water, causing hydrologic stress to trees which are less tolerant of fluctuations in water level, and providing the opportunity for invasive exotic wetland vegetation to recruit into areas where the vegetation is reduced by hydrologic stress. The introduction of fill into a wetland would also cause an alteration in the flow regime/drainage patterns of adjacent wetlands although ballast utilized for railroad corridors allows some reduced hydrologic connectivity between wetlands. The upstream

impoundment of water caused by reduced flow rates through the ballast may further increase water levels within remaining wetland fragments.

Minimal alteration of the existing hydrologic regime would occur due to the proposed construction activities for several reasons. The railroad corridor was constructed over 100 years ago and the hydrology within adjacent areas has adjusted to the presence of a hydrologic barrier formed by the railroad. Proposed wetland impacts are small in number and size in all areas of the corridor, and effects would occur in separate wetland systems in different watersheds thus minimizing the collective impact of the Project. The proposed bridge construction would not require dredging of the associated stream and canal channels and would not alter the existing flow regimes at any of the bridge locations.

In Florida, the Wetland Rapid Assessment Procedure (WRAP) and the Uniform Mitigation Assessment Method (UMAM) Functional Assessment method are typically used to assess direct and indirect wetland impacts, losses of wetland function, and to determine the amount of required compensatory mitigation. AAF is working with the USACE and other agencies, as part of the permitting process, to develop these WRAP and UMAM assessments.

No-Action Alternative

In the No-Action Alternative, the Project would not be constructed or operated. As a result no new indirect wetland impacts would occur. Continued maintenance of wetland vegetation within the SR 528 and FECR Corridor would alter wetland vegetation and wildlife habitat characteristics, and stormwater runoff from SR 528 could continue to impact wetland functions.

Alternative A

Alternative A would result in minor secondary and indirect effects to wetlands along the E-W Corridor, although these impacts would be minimal due to the proximity to SR 528.

MCO Segment

Constructing the railroad and VMF in the MCO Segment would result in minor impacts to wildlife. Although the new rail corridor within the MCO Segment, and the new VMF, would introduce barriers to wildlife movement, fragment habitat, and increase human activity on the site, these activities would be in areas that have already been developed and are in close proximity to roads, the Orlando wastewater treatment plant, airport facilities, and parking lots.

East-West Corridor

The E-W Corridor is characterized by a mixture of disturbed and undisturbed wetland habitats. Many of the previously disturbed wetland areas are wetland fragments along SR 528 that have previously experienced indirect effects from the roadway. Alternative A would remove wetland area and stormwater management ponds and increase the width of the wildlife barrier created by SR 528. Indirect effects to remaining wetland areas include alterations in wetland hydrology, reduction in habitat size, creation of a new "edge," introduction of additional human activity and noise, and alteration of the light regime associated with removal of canopy.

Indirect effects to wetland functions of groundwater recharge, floodflow alteration, sediment and pollutant retention, and nutrient removal would also occur due to reduction of wetland size and water storage capacity. The value of wetlands as wildlife habitat varies widely within the SR 528 right-of-way. The Project would reduce the amount of forested wetland habitat, particularly of several cypress wetlands with the appropriate characteristics to support wood stork and other wading bird rookeries.

North-South Corridor

The N-S Corridor would have negligible impacts on wetland functions. The existing developed (ballasted) railroad bed and tracks has a maintained canopy gap and forms a partial barrier to wildlife movement. No indirect wetland effects are anticipated in areas in which the ballast footprint and right-of-way width would remain the same.

The existing railroad corridor and adjacent development activities previously affected many of the wetlands that would be impacted by the Project, although several wetlands provide moderate quality wildlife habitat. Direct effects to forested wetlands would total 2.58 acres and this canopy removal would alter the light regimes within the forest interior. Bridge construction activities would require trimming mangroves adjacent to bridges, which would reduce the quality of the existing habitat as well as altering the light regime within these wetland areas.

Phase I - West Palm Beach – Miami Corridor

Track, signal, and related infrastructure improvements for Phase I of the Project, according to Section 3.1.5 of the 2012 EA, would not have a significant impact on aquatic resources. The wetlands adjacent to or abutting the FECR Corridor are limited to sporadic fringe mangrove wetlands, associated in most cases, with larger wetland systems (waterways). The fringe mangrove wetlands are along the perimeter edge of the right-of-way and no work is proposed in the immediate vicinity of these wetlands. Any intrusion into these edge wetlands will be avoided or minimized through project design, such as using cross-sections of minimum practicable width to fully avoid intrusion.

Mainline modifications to accommodate the increase in train speeds or additional capacity (proposed areas of double tracking) will occur within the FECR Corridor, predominately on already established trackbed. There are no planned modifications to wetlands as a result of the bridge rehabilitation as described in Section 3.1.5 of the 2012 EA. BMPs would be employed during construction to avoid temporary impacts to the wetland systems. Bridge construction activities would require trimming mangroves adjacent to bridges, which would reduce the quality of the existing habitat as well as altering the light regime within these wetland areas. No wetland alteration is required for the three stations or the WPB Rail Yard.

Phase II construction of new or replacement bridges at seven waterways (West Palm Beach Canal, Boynton Canal, Hillsboro Canal, North Fork Middle River, South Fork Middle River, Oleta River, Arch Creek) would result in the cumulative loss of approximately 0.1 acre of aquatic resources on the WPB-M Corridor (Table 5.3.3-1) from new pilings and abutments, and would require removing some vegetation beneath the new structures.

Alternative C

Indirect wetland effects of Alternative C would be the same as for Alternative A within the MCO Segment, the N-S Corridor, and the WPB-M Corridor. Within the E-W Corridor, Alternative C would increase the width of the wildlife barrier formed by SR 528. Indirect effects to remaining wetland areas would alter wetland hydrology, reduce habitat size, create new “edge” conditions, introduce additional human activity and noise, and alter the light regime associated with removal of canopy.

Indirect effects to wetland systems from Alternative C would be similar to indirect effects under Alternative A although the intensity of the effects would be greater. Alternative C would also bisect a number of wetlands, creating small wetland fragments between the rail and highway. Hydrologic effects to wetland fragments remaining between SR 528 and the railroad corridor would occur because hydrologic connectivity to both the north and the south would be reduced whereas Alternative A would reduce connectivity to the north only. Alternative C would further reduce the size of cypress wetlands with the potential to be used as wood stork or wading bird rookeries.

Alternative E

Indirect wetland effects of Alternative E, the preferred alternative, would be the same as for Alternative A within the MCO Segment, the N-S Corridor, and the WPB-M Corridor. Alternative E would fill wetlands within the E-W Corridor and create a new barrier to wildlife movement within wetlands and along riparian corridors. Indirect effects to remaining wetland areas would include altering wetland hydrology, reducing habitat size, creating a new “edge” condition, introducing additional human activity and noise, and altering the light regime associated with removal of canopy.

Indirect effects to wetland systems from Alternative E would be similar to indirect effects from Alternative A and Alternative C, although the intensity of the effects would be greater. Alternative E would also bisect a number of wetlands, fragmenting wetlands and wildlife habitat. Hydrologic effects to wetland fragments remaining between SR 528 and the railroad from reduced hydrologic connectivity would be somewhat less than Alternative C due to the additional wetland area and increased water storage capacity. Alternative E would further reduce the size of cypress wetlands with the potential for utilization as wood stork or wading bird rookeries.

5.3.3.4 Temporary Construction-Period Impacts

Temporary impacts are those that occur in association with construction related activities and cease following construction. Constructing the railroad track and associated structures requires excavating unsuitable material (muck), placing fill or retaining walls, and use of materials such as limerock and concrete. Demucking is anticipated at most of the wetland sites and would be controlled by Section 120 of the FDOT’s *Standard Specifications for Road and Bridge Construction*. Unsuitable materials would be disposed of on- or off-site. Debris would be removed in accordance with local and state regulatory agencies permitting this operation. AAF has committed to employing temporary erosion control features, as specified in the FDOT’s *Standard Specifications for Road and Bridge Construction*, Section 104, which consist of temporary grassing, sodding, mulching, sandbagging, slope drains, sediment basins, sediment checks, silt fences, and berms.

5.3.4 Floodplains

The Project would result in impacts to floodplains but would not result in a significant adverse impact on the beneficial values of floodplains, and would not adversely impact any federal flood control project. All three of the action alternatives under consideration would require construction within the mapped 100-year floodplain, with effects ranging from approximately 138 to 195 acres. These impacts are not avoidable due to the extent of floodplains throughout the Project Study Area. The E-W Corridor parallels SR 528 to maximize the use of existing transportation corridors, and crosses several floodplains, primarily those associated with the Econolockhatchee River and the St. Johns River. The N-S Corridor would use the existing FECR Corridor to maximize the use of existing infrastructure. The FECR Corridor crosses numerous floodplains, primarily associated with coastal waters and estuaries. The construction design would minimize potential harm to the floodplain by retaining existing elevations where feasible, constructing stormwater mitigation measures and retention ponds and minimizing fill in sensitive areas.

This section summarizes the impacts of the Project on floodplains. EO 11988 (*Floodplain Management*) requires agencies to assess the impacts that their actions may have on floodplains and to consider alternatives to avoid adverse impacts and incompatible development on floodplains. U.S. Department of Transportation (USDOT) Order 5650.2, *Floodplain Management and Protection*, contains the USDOT's implementing procedures to fulfill the requirements of EO 11988.

5.3.4.1 Methodology

For this analysis, the areas subject to flooding and protected under EO 11988 were obtained using the base flood elevation published on FEMA's Flood Insurance Rate Maps (FIRMs) through GIS analysis. Special Flood Hazard Areas depicted on the FIRMs include Flood Zones A or V, also referred to as the 100-year floodplain. The proposed right-of-way width was used to calculate floodplain effects along the E-W Corridor. The Project construction footprint was used to calculate effects for the MCO Segment and the N-S Corridor. Floodplain impacts for the WPB-M Corridor, provided in Section 3.1.4 of the 2012 EA, are included here for a comprehensive evaluation of the cumulative impacts of the entire Project.

5.3.4.2 Environmental Consequences

This section describes the direct floodplain effects anticipated as part of the Project. Appendix 5.3.4 shows the areas within floodplains along the Project Study Area that fall within the proposed alignment. As described below, the Project would impact 138 acres (Alternative A) to 195 acres of floodplains (Alternatives C and E) from Orlando to West Palm Beach. Reconstructing the existing railroad infrastructure from West Palm Beach to Miami would require construction within an additional 145 acres of floodplains, but with no loss of flood storage. This section also considers the effects to federal flood projects. Section 14 of the Rivers and Harbors Act states any proposed modification to an existing USACE project (either federally or locally maintained) that go beyond those modifications required for normal Operation and Maintenance require approval under 33 U.S.C. § 408. 33 U.S.C. § 408 also states that there shall be no temporary or permanent alteration, occupation or use of any public works including but not limited to levees, sea walls, bulkheads, jetties and dikes for any purpose without the permission of the Secretary of the Army. Under the terms of 33 U.S.C. § 408, any proposed modification requires a determination by the Secretary of the Army that such proposed alteration or permanent occupation or use of a Federal project is

not injurious to the public interest and will not impair the usefulness of such work. The authority to make this determination and to approve modifications to Federal works under 33 U.S.C. § 408 has been delegated to the Chief of Engineers.

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed or operated. The Project Study Area as it exists today would remain the same with no development or construction changes relevant to the Project.

Alternative A

Alternative A would impact a total of 138.3 acres within the mapped 100-year floodplain, as shown in Table 5.3.4-1.

Table 5.3.4-1 Floodplain Impacts (acres)			
County	Alternative A	Alternative C	Alternative E
MCO Segment			
Orange County	11	11	11
E-W Corridor			
Orange County	28.8	65.9	75.2
Brevard County	29.9	49.8	39.8
N-S Corridor			
Brevard County	31.6	31.6	31.6
Indian River County	5.3	5.3	5.3
St Lucie County	5.2	5.2	5.2
Martin County	13.8	13.8	13.8
Palm Beach County	12.7	12.7	12.7
Subtotal	138.3	195.3	194.6
WPB-M Corridor			
Palm Beach County	1.3	1.3	1.3
Broward County	121.7	121.7	121.7
Miami-Dade County	22.2	22.2	22.2
Subtotal	145.2	145.2	145.2
Totals	284.0	340.5	339.8

MCO Segment

The MCO Segment and VMF footprint would affect 11.0 acres of 100-year floodplain. According to AAF, GOAA has stated that a large portion of the VMF footprint within the floodplain was previously permitted. Other encroached floodplain areas, primarily those associated with the rail corridor of the MCO Segment,

would be permitted through the SFWMD. AAF would optimize the use of the existing MCO stormwater management system, and incorporate BMPs to minimize and compensate for floodplain encroachment.

East-West Corridor

Alignment Alternative A would affect 58.7 acres of 100-year floodplains. This alternative would impact the least amount of floodplain area, as it is primarily within the SR 528 right-of-way boundaries. Displaced flood storage would have minor impacts due to the length of the corridor, the small amount of fill in any single location, and the large lateral extent of the floodplains. No Federal projects are located within the East-West Corridor.

North-South Corridor

The impacted area of 100-year floodplain within the N-S Corridor would total 68.6 acres, ranging from 5.2 acres in St. Lucie County to 31.6 acres in Brevard County. Floodplain management for the N-S Corridor is not a concern, as the Project would be limited to the existing FECR Corridor, minimizing any new land fill required. Flood-prone areas occurring within the FECR Corridor were filled during the historic construction of the rail line between Cocoa and West Palm Beach. AAF proposes to improve or replace existing crossings of eight CS&F projects located in Table 4.3.4-3. The USACE has turned over all of the CS&F identified in Table 4.3.4-2 to the SFWMD for operation and maintenance. Each modified CS&F project will be independently evaluated by the USACE.

Filling would be essentially limited to third track and curve reduction areas. Reductions in flood storage volume resulting from any nominal amount of placement of fill would be insignificant. The N-S Corridor is not anticipated to promote future incompatible floodplain development or increase potential for flood-related property damage or human life. Work within the 100-year floodplain has been minimized to comply with EO 11988 and the Project would conform to applicable state and local floodplain standards (the Project would be required to meet local floodplain standards). Therefore, moderate impacts to floodplains would be anticipated.

The N-S Corridor crosses several federal flood control watersheds and waterways, including the Earman River and Taylor Creek. No construction is proposed at Taylor Creek. Adding a new single-track bridge parallel to the existing Earman River bridge, with the same hydraulic opening, would not affect flooding.

Phase I - West Palm Beach – Miami Corridor

Section 3.1.4 of the 2012 EA stated that the reconstruction of railroad infrastructure along this portion of the Project would require work in 145.2 acres of the mapped 100-year floodplain in Palm Beach (1.3 acres), Broward (121.7 acres), and Miami-Dade (22.2 acres) Counties, but that no work would be performed below the 100-year floodplain elevation and that there would be no permanent impact to the 100-year floodplain.

The Phase I WPB-M Corridor crosses six federal flood control watersheds and waterways, including the C1 Canal, the Boynton Beach Canal, and three un-named waterways. The Miami Canal is south of the terminus of the Project. New single-track parallel bridges are proposed at the C1 Canal and Boynton Beach Canal. These would be built with the same hydraulic opening as the existing bridges and would not affect flooding.

Alternative C

Alternative C would impact a total of 195.3 acres within the 100-year floodplain. Floodplain impacts for Alternative C would be identical to Alternative A for the MCO Segment, the N-S Corridor, and the WPB-M Corridor. Within the E-W Corridor, alignment Alternative C would impact 115.7 acres of 100-year floodplain (Table 5.3.4-1). Displaced flood storage would have minor impacts due to the length of the corridor, the small amount of fill in any single location, and the large lateral extent of the floodplains.

Alternative E

Alternative E, the preferred alternative, would impact a total of 194.6 acres within the 100-year floodplain. Floodplain impacts for Alternative E would be identical to Alternative A for the MCO Segment, the N-S Corridor, and the WPB-M Corridor. Within the E-W Corridor, alignment Alternative E would impact 115.0 acres of 100-year floodplain (Table 5.3.4-1). Displaced flood storage would have minor impacts due to the length of the corridor, the small amount of fill in any single location, and the large lateral extent of the floodplains.

5.3.4.3 Indirect and Secondary Impacts

Secondary effects, such as groundwater contamination of post-development flood-prone areas from the operation of the railway, are expected to be minor as BMPs would be put in place to prevent degradation of water quality in downstream waters and flood-prone areas.

5.3.4.4 Temporary Construction-Period Impacts

Temporary impacts to floodplains would occur where areas of floodplains would be used for construction staging, construction access, or other temporary occupancy of floodplains. The Project is not anticipated to have a temporary adverse impact on floodplains as there are no construction staging or access areas proposed within areas of mapped floodplains.

5.3.5 Biological Resources and Natural Ecological Systems

This section describes effects of the Project on natural upland habitats; wildlife and wildlife habitats; preserves, wildlife sanctuaries, and wildlife corridors; essential fish habitat (EFH); and migratory bird habitats in accordance with the CEQ guidance *Incorporating Biodiversity Considerations Into Environmental Impact Analysis Under the National Environmental Policy Act* (CEQ 1993). The Project would have minor impacts on biological resources and natural ecological systems as a result of the loss of natural vegetation along the E-W Corridor, south of SR 528. The Project would not contribute to habitat fragmentation or loss of important natural systems, and would not have a substantial adverse impact on EFH or migratory bird habitat. The Project would not impact any wildlife preserves, sanctuaries, or corridors.

Comments on the DEIS largely concerned the indirect effects of the Project on wildlife habitat and habitat continuity. As summarized in Section 1.7.6, commenters stated that there have not been adequate field investigations or analysis of the impacts of a second track and increased higher-speed train traffic on wildlife.

5.3.5.1 Methodology

The analysis of direct effects to natural upland habitat was based on the calculation of upland habitat area within a 100-foot wide corridor, 50 feet on each side of the railroad center line, which approximates the footprint of the constructed railroad corridor including the tracks, access road, and stormwater management system. Upland habitat was identified from land use data categorized according to the FLUCCS (SFWMD n.d.; SJRWMD 2013a; FDOT 1999). This analysis also included uplands identified within the footprint of the VMF. Upland habitats identified within the 100-foot corridor and footprint of the VMF would be removed when constructing the Project.

The assessment of indirect effects to upland resources and habitats involved identifying potential impacts of construction of the railroad corridor and operation of the passenger service. Potential impacts are described qualitatively in terms of the potential source and magnitude of impact on the wildlife population and biodiversity of the upland habitats adjacent to the proposed railroad corridor.

5.3.5.2 Natural Upland Habitats

This section addresses the environmental impacts of each alternative of the Project with respect to upland ecological systems and plant communities. Alternative A would cause 93 acres of direct loss of upland vegetation. Alternative C would directly affect approximately 122 acres of uplands, and Alternative E, the preferred alternative, would directly affect approximately 109 acres of uplands. For each alternative, the greatest loss of upland habitat would be to forested plant communities, primarily pine flatwoods and hardwood-coniferous mixed forest.

No-Action Alternative

In the No-Action Alternative, the Project would not be constructed or operated. As a result no impacts to biological resources would occur except for the loss of cleared and graded land for construction of the MCO Intermodal Station.

Alternative A

As shown in Table 5.3.5-1, Alternative A would result in a loss of 93 acres of natural upland habitats, of which the largest is pine flatwoods (49 acres); there would be no loss of natural upland habitats in the N-S Corridor or the WPB-M Corridor.

FLUCCS	Description	MCO Segment	E-W Corridor	Total
190	Open Land	0.5	0	0.5
310	Dry Prairie	0	3.9	3.9
320	Shrub and Brushland	0	4.5	4.5
330	Mixed Rangeland	6.1	3.0	9.1
411	Pine Flatwoods	28.0	20.7	48.7
420	Upland Hardwood Forest	2.9	0.1	3
434	Hardwood-Coniferous Mixed	21.0	2.3	23.3
	Total Direct Effects	58.5	34.5	93.0

Source: SFWMD. Undated. *SFWMD – GIS Data Distribution: GIS Data*

Catalog. <http://my.sfwmd.gov/gisapps/sfwmdxwebdc/dataview.asp?>. Accessed September 27, 2013; SJRWMD. 2013a.

SJRWMD - GIS Data Download Table. <http://www.sjrwmd.com/gisdevelopment/docs/themes.html>. Accessed August 31, 2013.

MCO Segment

The MCO Segment would result in the loss of 58.5 acres of upland habitats, including open land, mixed rangeland, pine flatwoods, upland hardwood forest, and hardwood-coniferous forest. Table 5.3.5-1 provides acreages of direct effects to upland habitats based upon the assumed 100-foot wide railroad corridor and the footprint of the VMF.

FNAI and FWC identified natural habitats that they consider “underrepresented” and of greater conservation concern in Florida (FNAI 2011). These underrepresented habitats include pine flatwoods, which are present within the MCO Segment at the south end of the Project Study Area.

The natural ecological systems within the footprint of the VMF have sustained limited disturbance and provide moderate to high quality wildlife habitat for those species. Much of the upland habitat present along the proposed railroad corridor has been impacted by either airport development activities or pine trees harvesting that occurred near the south end of the line. Upland ecosystems from which trees have been harvested provide some low to moderate wildlife habitat while remnant upland systems within the airport itself provide minimal resources for wildlife utilization.

East-West Corridor

The E-W Corridor would result in the loss of 34.5 acres of natural upland communities that include: dry prairie, shrub and brushland, mixed rangeland, pine flatwoods, upland hardwood forest, and hardwood-coniferous mixed. Table 5.3.5-1 provides acreages of direct effects to uplands based upon the assumed 100-foot wide railroad corridor.

Habitats identified by FNAI and FWC as being of greater conservation concern include pine flatwoods and scrub, or scrubby flatwoods. Pine flatwoods occurs throughout the length of the corridor, and scrubby flatwoods occur between MCO and the Econlockhatchee River.

Wildlife habitat within the maintained areas of the SR 528 right-of-way is limited although some species will forage within areas that are regularly mowed due to the ease of spotting prey and the high productivity of maintained grasses.

North-South Corridor

All construction activities involving infrastructure upgrades, track addition, and curve reduction within the N-S Corridor would occur within previously disturbed areas in the FECR Corridor and would not impact natural upland communities except in limited areas such as curve reductions, where natural vegetation has become established within the right-of-way. These areas are regularly maintained of vegetation to provide access for railroad maintenance activities. Limited wildlife habitat exists within the N-S Corridor although field surveys indicated some utilization of disturbed habitats.

Some slope disturbance will also occur within the corridor, and at one location retaining walls are proposed to protect the maintenance road and ensure the safety of railroad workers. None of these activities will be conducted outside the FECR Corridor or impact native upland habitats.

Phase I - West Palm Beach – Miami Corridor

As described in Section 3.2.1 of the 2012 EA, there are no sensitive ecological areas in the vicinity of the proposed stations in the WPB-M Corridor; therefore, the proposed stations will not impact terrestrial ecological systems. Terrestrial ecological systems will not be impacted because this alternative only involves the removal of open maintained areas within the FECR Corridor or adjacent disturbed urban areas. There is a 10- to 20-foot roadway buffer maintained between the inside of the property fence and the natural area, where the public lands run parallel to the FECR right-of-way. None of the project elements considered in the 2012 EA would result in significant impacts to existing ecological systems along the WPB-M Corridor, including the area in the vicinity of the proposed stations and the area to be modified within the existing FECR Corridor or facilities.

Alternative C

Under Alternative C wildlife habitat availability and quality within the MCO Segment, the N-S Corridor, and the WPB-M Corridor would be the same as under Alternative A. As shown in Table 5.3.5-2, Alternative C would result in the loss of 121.8 acres of natural upland habitat along the E-W Corridor.

Direct effects to habitats identified by FNAI and FWC as being of greater conservation concern include a larger area of pine flatwoods and scrubby flatwoods. Pine flatwoods losses (61 acres) would occur throughout the length of the E-W Corridor, and scrubby flatwoods losses between the Econlockhatchee River and MCO.

Natural upland ecosystems affected by Alternative C provide higher quality wildlife habitat than the areas affected by Alternative A because these are in more undisturbed areas outside the SR 528 right-of-way. Maintained areas of the right-of-way represent a smaller proportion of the area affected by Alternative C.

FLUCCS	Description	MCO Segment	E-W Corridor	Total
190	Open Land	0.5	0	0.5
310	Dry Prairie	0	10.5	10.5
320	Shrub and Brushland	0	10.8	10.8
330	Mixed Rangeland	6.1	4.9	11
411	Pine Flatwoods	28.0	32.7	60.7
420	Upland Hardwood Forest	2.9	0.2	3.1
434	Hardwood-Coniferous Mixed	21.0	4.2	25.2
	Total Direct Effects	58.5	63.3	121.8

Source: SJRWMD. 2013a. *SJRWMD - GIS Data Download Table*. <http://www.sjrwmd.com/gisdevelopment/docs/themes.html>. Accessed August 31, 2013.

Alternative E

As shown in Table 5.3.5-3, Alternative E, the preferred alternative, would result in the loss of approximately 109 acres of natural upland habitat along the E-W Corridor.

Direct effects to habitats identified by FNAI and FWC as being of greater conservation concern include a lower acreage of pine flatwoods and scrubby flatwoods. Pine flatwoods losses (54 acres) would occur throughout the length of the E-W Corridor, and scrubby flatwoods between the MCO and the Econlockhatchee River.

FLUCCS	Description	MCO Segment	E-W Corridor	Total
190	Open Land	0.5	0	0.5
310	Dry Prairie	0	9.7	9.7
320	Shrub and Brushland	0	7.9	7.9
330	Mixed Rangeland	6.1	3.5	9.6
411	Pine Flatwoods	28.0	26.4	54.4
420	Upland Hardwood Forest	2.9	0.1	3
434	Hardwood-Coniferous Mixed	21.0	3.3	24.3
	Total Direct Effects	58.5	50.9	109.4

Source: SJRWMD. 2013a. *SJRWMD - GIS Data Download Table*. <http://www.sjrwmd.com/gisdevelopment/docs/themes.html>. Accessed August 31, 2013.

Summary of Direct Impacts

Table 5.3.5-4 provides acreages of direct effects to natural upland ecosystems for all alternatives. No direct upland effects would occur with the No-Action Alternative. Alternative A would cause 93 acres of direct loss of upland communities. Alternative C would directly impact approximately 122 acres of uplands, and Alternative E would directly impact approximately 109 acres of uplands. For each alternative, the greatest loss of upland habitat would be to forested plant communities, primarily pine flatwoods and hardwood-coniferous mixed forest.

FLUCCS	Description	No-Action	A	C	E
190	Open Land	0	0.5	0.5	0.5
310	Dry Prairie	0	3.9	10.5	9.7
320	Shrub and Brushland	0	4.5	10.8	7.9
330	Mixed Rangeland	0	9.1	11.0	9.6
411	Pine Flatwoods	0	48.7	60.7	54.4
420	Upland Hardwood Forest	0	3.0	3.1	3.0
434	Hardwood-Coniferous Mixed	0	23.3	25.2	24.3
	Total Direct Effects	0	93.0	121.8	109.4

Source: SFWMD. Undated. *SFWMD – GIS Data Distribution: GIS Data*

Catalog. <http://my.sfwmd.gov/gisapps/sfwmdxwebdc/dataview.asp?> Accessed September 27, 2013; SJRWMD. 2013a.

SJRWMD - GIS Data Download Table. <http://www.sjrwmd.com/gisdevelopment/docs/themes.html>. Accessed August 31, 2013.

Indirect and Secondary Impacts

Indirect effects to upland systems may include habitat fragmentation and associated “edge” effects, the loss of genetic diversity of plant and animal populations, increased competition for resources, and physical or psychological restrictions on movements caused by some feature within a corridor that wildlife are unwilling or unable to cross. A railroad may act as a barrier that interferes with the movement of some mammals, amphibians, birds, and reptiles from one habitat to another. The width of a railroad corridor can influence the frequency of wildlife crossings, as well as the mortality associated with potential collisions with rail or vehicular traffic. The rail itself can create a barrier to smaller species such as amphibians, reptiles, and smaller mammals. Another potential indirect effect is the introduction of non-native invasive plant species along the linear corridors of disturbed land.

Curve reduction and railroad corridor improvement activities proposed for the N-S Corridor will use a small amount of fill, ballast, and at one location retaining walls. Due to the presence of the existing railroad and associated structures, it is anticipated widening or reconstructing of the railroad bed will not significantly affect the hydrologic regimes of nearby natural areas. Because of its permeability, track ballast allows water to flow through the railbed. Although additional railbed is proposed for some areas within the N-S Corridor and some filling within the FECR Corridor will occur to form a level surface for the placement of ballast in areas proposed for curve reduction or track expansion, this will not affect groundwater recharge due to the permeable ballast.

Under Alternative C and Alternative E, a greater degree of impacts to upland habitats would occur for areas remaining between SR 528 and the railroad. The two alignments would create hydrologic barriers to the north and south, potentially impounding water between them. The impounded water could cause more frequent flooding of the adjacent uplands and may lead to community-wide shifts from upland to wetland vegetation, most likely consisting of invasive exotic species, and loss of canopy in this strip of land.

Some commenters on the DEIS questioned whether the Project would fragment habitat for pollinating insects such as bees. Along the N-S corridor, the existing FECR tracks and train movements currently act as a barrier to pollinating bees and it is not anticipated that additional train traffic will significantly affect the movement of pollinating bees. A study by Bhattacharya et.al (2001) found that, while bumble bees have the ability to cross a road or railroad, the infrastructure can act as a barrier to plant populations utilized by bumble bees, and the bumble bees generally do not cross gaps 12-24 feet separating two foraging sectors. In addition, a white paper by the California High Speed Rail Authority (2012) concluded that, depending on the strength of the wind displaced by trains, pollinators may be blown off a blossom, but after the train has passed, they would right themselves. Therefore, since the existing FECR corridor and SR 528 are already separating the foraging plant populations on the E-W and N-S corridors, the additional effect on the bumble bees and associated plant populations would be minimal.

Alteration of Light Regime in Forested Systems

Removal of the forest canopy on the proposed railbed could potentially alter the physical conditions (light, wind, temperature) in adjacent forested areas. No adverse impacts are anticipated to herbaceous or shrub-dominated communities, since there would be no change in the light, wind, or temperature regimes. The canopy gap for the rail alternatives would vary with the width of the limit of work and adjacent land uses. In locations along the N-S Corridor where curve reduction or third track installation activities would occur, or for the E-W Corridor alternatives where the proposed railroad corridor will share the SR 528 right-of-way, the canopy gap may only increase slightly. For the E-W Corridor Alternatives C and E in locations where the railroad would be located south of the SR 528 right-of-way, the canopy gap would vary from 60 to 100 feet wide. However, since this would be within or adjacent to SR 528, impacts would be minimal.

Along the E-W Corridor, new forest edges would predominantly face north, and would result in minor changes to interior forest microclimate or habitat. Indirect effects caused by removal of forest canopy would occur in a limited number of areas along the N-S Corridor. Within the majority of the corridor, the footprint of the railroad corridor would not change and the “closed edges” defined above have formed along the edge of the existing alignment.

Introduction of Invasive Species

Construction along any active or inactive rail corridor, or constructing a new rail line, may increase the width of the canopy gap over the railbed and would likely require removing existing vegetation on the elevated railbed. This linear gap, extending through natural communities, may allow invasive exotic plant species to colonize the railbed or adjacent areas.

As per EO 13112, invasive species may be defined as “alien species whose introduction does or is likely to cause economic or environmental harm.” The Florida Exotic Pest Plant Council (FLEPPC) defines invasive exotic plants as “an exotic that not only has naturalized, but is expanding on its own in Florida native plant communities” (FLEPPC 2011). The FLEPPC distinguishes between two classes of invasive exotic plant species:

- Category I species that are characterized as “invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives;” and
- Category II species that are characterized as “invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species” (FLEPPC 2011).

The FLEPPC does not categorize invasive exotic species based upon the economic severity or geographic range of the problem, but on the documented ecological damage caused by a species.

There is a wide range of invasive exotic species known to occur in Florida, occurring in many habitats from ponds and lakes to xeric scrub and sandhills. The primary Category I potential invasive species that could affect the upland and wetland habitats within and adjacent to the railroad corridor include:

- *Casuarina* spp., Australian pine;
- *Dioscorea alata*, winged yam;
- *Dioscorea bulbifera*, air potato;
- *Eichhornia crassipes*, Common water-hyacinth;
- *Imperata cylindrica*, cogongrass;
- *Ludwigia peruviana*, Peruvian primrosewillow;
- *Lygodium japonicum*, Japanese climbing fern;
- *Lygodium microphyllum*, Old World climbing fern;
- *Melaleuca quinquenervia*, punktree;
- *Melinis repens*, rose natalgrass;
- *Paederia foetida*, skunkvine;
- *Panicum repens*, torpedograss;
- *Pistia stratiotes*, water lettuce; and
- *Schinus terebinthifolius*, Brazilian pepper.

Vine species such as winged yam, air potato, Japanese climbing fern, Old World climbing fern, and skunkvine recruit into areas where the forest canopy has been disturbed by either natural or artificial processes. These vines quickly establish themselves and create a monospecific community covering everything and climbing the healthy trees at the edge of the clearing. These species have very high growth rates and will begin to topple trees with the added weight. In some cases the rachis created by the vines conducts ground fire into the canopy where it spreads from tree to tree destroying large tracts of forest.

Forest edges and openings, whether upland or wetland, may be colonized by invasive species dispersed by birds that perch in trees at the edge of the boundary. This creates the potential for establishment of Australian pine, punktree, and Brazilian pepper on or along the edges of the right-of-way. The potential for these species to recruit into disturbed areas is particularly high. These species tend to create an

impenetrable monospecific understory layer within upland and wetland forests which prevent normal canopy species regeneration eventually leading to complete loss of the forest as the mature trees die. Australian pine becomes large enough to directly compete, and then outcompete, with the established forest canopy. Australian pine leaves, which are analogous to pine needles, often form a thick layer on the forest floor smothering understory species.

Seeds of cogongrass could be carried by wind or wildlife to disturbed areas within the Project Area. Cogongrass is particularly invasive in disturbed upland soils and is tolerant of the low nutrient and undeveloped microbial conditions within clean sands utilized as fill in construction projects. Cogongrass spreads quickly by rhizomes and seeds, may potentially be allelopathic, and is tolerant of mesic to wet conditions.

Peruvian primrosewillow and torpedograss typically occur in wetlands, although they may survive in mesic uplands. Torpedograss seeds can be carried by seed eating birds or will float from upstream wetland areas. Peruvian primrose willow has very small sticky seeds which will float or stick to birds and other wildlife. Water lettuce and common water-hyacinth typically float on the water surface in aquatic environments. Seeds are usually spread by water fowl, and aquatic environments with a recently cleared canopy providing access to water birds and increased direct sunlight are particularly subject to infestation by these species.

The Project has the potential to increase invasive species occurrences in natural habitats, particularly along the E-W Corridor, where new disturbance would occur adjacent to natural communities. However, this does not represent a significant change, as the existing SR 528 corridor provides opportunities for the spread of invasive species.

Temporary Construction-Period Impacts

Temporary impacts to biological resources and natural ecological systems would occur where undeveloped areas would be utilized for construction staging or construction access. The impacts on ecological resources could include clearing vegetation, soil compaction in staging and traffic areas, dust generation, erosion, and incidental mortality of wildlife entering the construction zone. In addition to the temporary loss of wildlife habitat, construction activities may lead to soil compaction which reduces the permeability of the soil to water absorption and gas exchange increasing surface water run-off and erosion. The effects of soil compaction and the removal of vegetation subsequently affect the soil's microbial community which requires a commensal relationship with plant species to maintain a balanced ecosystem. The Project is not likely to impact natural habitats adjacent to the N-S Corridor because staging areas are anticipated to be located in existing developed areas such as parking lots and the majority of supplies and equipment will be brought to the construction site by rail. Temporary impacts may occur along the E-W Corridor although the location and extent of those impacts cannot be determined until the locations of staging areas and access roads are determined.

5.3.5.3 Wildlife and Wildlife Habitats

Direct impacts of the project on wildlife and wildlife habitat include the loss of habitat and increased mortality due to collisions with trains. Numerous North American and European studies have demonstrated many wildlife species are impacted by collisions with trains (van der Grift 2001). Data collected by several studies indicate mammals and birds are most commonly struck by trains. (SCV 1996;

Kušta et al. 2011). Higher mortality rates generally occur at the intersection of railroad routes and important wildlife habitat or migratory routes, and wide ranging species with large territories are often the most susceptible. Railroad corridors may also provide attractive habitat for some species including open sunny areas for reptiles, and railroad kills attract carrion eaters (SCV 1996; Stone et al. 2001). Although FECR has operated trains along the N-S Corridor for over 100 years, the increased frequency and speed of the proposed passenger train service would potentially increase wildlife mortality along the existing corridor. Construction and operation of a new railroad along the E-W Corridor would result in some wildlife mortality due to the open habitat present along much of this corridor. Although some wildlife mortality is expected as a result of the Project, wildlife collisions with trains would not jeopardize existing wildlife populations.

AAF has coordinated with Florida Fish and Wildlife Conservation Commission (FWC) at the Tosohatchee Wildlife Management Area and the Econlockhatchee River and Little Creek tributary to create wildlife crossings specifically for the following target species: Florida black bear (*Ursus americanus floridanus*), Florida panther (*Puma concolor coryi*), and whitetailed deer (*Odocoileus virginianus*). Design elements of these crossings include elevated shelves under the bridges to allow dry passage and placing security fence or funnel fencing to encourage wildlife to move through the crossing structures.

At the Tosohatchee Wildlife Management Area, AAF has proposed a 50-foot by 8-foot wildlife crossing under SR 528 at the former Mud Lake Canal. This crossing was coordinated with FDOT to be consistent with commitments made in the PD&E Study for future SR 528 expansion. FWC records indicate two (2) Florida black bear kills in the past 8 years within the park near the vicinity of SR528/the corridor (FWC, 2013). There are not any FWC-recorded Florida panther kills within the Tosohatchee Wildlife Management Area (FWC, 2014).

In addition, AAF has coordinated with FWC for the crossings at the Econlockhatchee River and Little Creek tributary to modify bridge designs to facilitate wildlife crossing. All proposed designs have been evaluated by FWC and they have provided concurrence that the proposed design will ensure adequate passage opportunities for wildlife (FWC Concurrence letter, 2014). There are not any FWC-recorded Florida black bear or Florida panther kills near the vicinity of the Econlockhatchee River Bridge and Little Creek tributary crossing (FWC, 2013; FWC, 2014).

The installation of fencing at wildlife crossing locations provides both benefits and shortcomings. While fencing may prevent certain species from entering the corridor, fencing can also trap those species that have otherwise accessed the area. However, fencing may be appropriately used to guide wildlife into the underpass rather than to serve as a barrier. Therefore, fenced locations within crossings are handled on a case-by-case basis through coordination with land managers and to determine the most appropriate action.

The Project would result in the loss of wetland and upland wildlife habitat, as described in Sections 5.3.2 and 5.3.5.2. These habitat losses would largely occur at the proposed VMF and along the 17-mile section of the E-W Corridor west of SR 520, where the proposed railroad is outside of the existing SR 528 right-of-way. The loss of habitat would not eliminate any habitat patches, but would reduce the size of available habitat areas slightly although this is not likely to displace wildlife populations. The Project would not result in the loss of habitat within any of the important wildlife conservation areas listed in Section 4.3.5.2, nor would it interrupt any existing wildlife corridors. The proposed communications towers described in Section 3.3.3.6 along the E-W Corridor would be monopole or lattice-type poles, less than 100 feet in

height, and would not require guy wires. These towers would be consistent with USFWS guidance on communications towers (USFWS 2012c), and would not have an adverse effect on wildlife or birds.

Other potential indirect effects on wildlife and wildlife habitats would result from habitat fragmentation and operational noise, as described below.

Habitat Fragmentation

Fragmentation is defined as the subdivision of once large and continuous tracts of habitat into smaller patches. It results from agriculture, urbanization, and transportation (or other rights-of-way) (Rosenfield et al. 1992). Habitat fragmentation is associated with 'edge effects' when there is a disturbed or developed area created adjacent to a natural and/or forested area. Edge effects may include the spread of invasive species, increase in the canopy gap, and a decrease in species dependent on undisturbed habitat. In general, fragmentation of habitat is viewed as detrimental when considering original native, climax species composition and abundance, natural history, and relative ecological stability of unmanaged plant and animal populations. In particular, habitat fragmentation increases the amount of edge relative to the amount of interior habitat (Primack 2008). Scientific experts agree that preservation of continuous forest blocks is essential to the long-term protection of biodiversity. Fragmentation of forested tracts has been cited as a major cause in the decline of bird communities. Fragmentation occurs at several spatial scales, from local, which includes edge effects, to landscape, which encompasses differences in size and shape of forest tracts, to regional, where differences in canopy cover are studied to determine the effects on breeding birds (Robinson 1998). The majority of the available literature has focused on large-scale fragmentation that breaks existing forest blocks into disconnected remnants across a landscape by major roadways, residential subdivisions, and clear cuts.

A railroad corridor may act as a barrier that interferes with the movement of amphibians and reptiles from one habitat to another. The width of a railroad corridor can influence the frequency of wildlife crossings, as well as the mortality associated with potential collisions with rail traffic. The railbed on which the tracks are laid can itself create a barrier to smaller species such as amphibians, reptiles, and smaller mammals. Traffic density and traffic speed may also influence wildlife avoidance of transportation corridors (Reijnen et al. 1995; Forman and Alexander 1998).

Indirect effects to reptile and amphibian populations could include lowered reproductive success of existing amphibian populations if rail collisions affect amphibian mortality rates. If the rail is experienced as a barrier by migrating amphibians, existing populations may be divided into subpopulations. This, in turn, may result in a reduced gene pool in the remaining subpopulations, which could result in loss of the population if the remaining genetic variation is not diverse enough to offset the joint action of natural selection and genetic drift. Preserving genetic diversity is important because it allows populations the potential to adapt by "saving" genes that may be useful during future environmental changes. However, the rail would not create a complete barrier to movement between the eastern and western sides of the right-of-way, which would limit the fragmentation effect.

Indirect effects to mammals from fragmentation include potentially lowered reproductive success rates from interruption of migration routes to breeding areas (restricted gene flow), increased predation on small mammals due to lack of cover on the ballasted railroad embankment, and general disturbance of mammalian communities immediately adjacent to the right-of-way. These disturbances include alterations to foraging, denning, and overwintering habitat due to changes in vegetative cover, light, and temperature regimes. There may be minor indirect effects to small mammals but this is not expected to

affect population stability because of their small home ranges. Deer and other large mammals are expected to continue to cross the tracks with minimal impedance.

Fragmentation effects are expected to be minimal from any of the alternatives, since the existing SR 528 alignment, immediately to the north of Alternatives A, C, or E, has already caused fragmentation of large blocks of existing natural habitat. Widening the gap is not anticipated to significantly change the effects of the existing transportation corridor on habitat quality or continuity. The Project along the N-S Corridor and the WPB-M Corridor would not create or exacerbate fragmentation effects and the FECR Corridor would not be widened.

Noise Impacts on Wildlife

Noise from train operations and horns at grade crossings may have indirect effects on wildlife. Scientific literature and other relevant publications concerning the impacts of train pass-by noise on wildlife were reviewed. Many of the available studies are from western states; far less is known about the effects in the eastern United States, presumably because highway and rail infrastructure was largely already in place well in advance of the advent of modern wildlife ecology and conservation biology, and also because of the proportionately larger numbers of endangered mammals long displaced in the east and now confined to the less-developed west. As documented in the National Park Service's (2011) *Annotated Bibliography – Impacts of Noise on Wildlife*, the effects of noise on wildlife have been studied for roads (where noise is continuous), aircraft, boats, and off-road vehicles and snowmobiles. No specific studies on the effects of the episodic noise from trains are listed in this bibliography.

It is possible that the Project would displace some individuals of wildlife populations that are sensitive to noise and vibration, causing increased competition for nearby suitable habitat. Most of the scientific studies conducted on noise and wildlife involve assessing effects from roads, and there is limited scientific data for impacts to wildlife from rail. Most studies show that noise associated with high-density roads affects avian communities by interfering with communication during courtship and brood-rearing. However, the continuous noise resulting from highways is substantially different from the infrequent noise produced by trains. Noise impacts are expected to be minor because of the moderate numbers of trains.

Although limited data exist to relate noise exposure levels to effects on wildlife, criteria to identify possible impacts are available. Table 5.3.5-5 provides wildlife impact criteria based on a summary of recent literature that can be found in Appendix A of the FRA *High Speed Ground Transportation Noise and Vibration Impact Assessment* (FRA 2012a). The criteria are based on the assumption that impacts occur when a noise event is sufficiently loud enough to generate an observable effect in domestic livestock or wildlife.

Based on the impact criteria listed in Table 5.3.5-5, effects to wildlife could occur at sound levels exceeding 100 dBA. Along the E-W Corridor, noise and vibration disturbance from the operation of the railroad would disturb wildlife for very short, discrete periods of time, but would not affect wildlife as much as the constant noise from the highway. As documented in Section 5.1. 2, train pass-by will not exceed 70 dBA, and therefore will not affect wildlife. There would be no new crossings along the MCO Segment or the E-W Corridor and consequently no noise impacts on wildlife from wayside horns.

Animal Category	Class	Noise Metric	Noise Level (dBA)
Domestic	Mammals (Livestock)	Sound exposure level (SEL)	100
	Birds (Poultry)	SEL	100
Wild	Mammals	SEL	100
	Birds	SEL	100

Source: FRA. 2012a. *High-Speed Ground Transportation Noise and Vibration Impact Assessment*, USDOT Report Number DOT/FRA/ORD-12/15. <http://trid.trb.org/view.aspx?id=1238511>. Accessed September 27, 2013.

Temporary Construction-Period Impacts

Temporary impacts are those that occur in association with construction related activities and cease following the completion of construction. Short-term temporary indirect effects can be caused by the increased noise and visual disturbance from land-clearing, earth-moving, and construction machinery during construction.

Temporary impacts to biological resources and natural ecological systems could also occur where undeveloped areas would be utilized for construction staging or construction access. The effects on ecological resources could include clearing vegetation, soil compaction in staging and traffic areas, dust generation, erosion, and incidental mortality of wildlife entering the construction zone. The Project is not likely to impact natural habitats adjacent to the N-S Corridor because staging areas are anticipated to be located in existing developed areas such as parking lots and the majority of supplies and equipment will be brought to the construction site by rail. Temporary effects may occur along the E-W Corridor although the location and extent of those effects cannot be determined until the locations of staging areas and access roads are determined.

5.3.5.4 Preserves, Wildlife Sanctuaries and Wildlife Corridors

The Project would not incorporate land from any of the preserves or wildlife sanctuaries described in Section 4.3.5, and would not affect the ability of these properties to protect wildlife or manage wildlife habitat. The Project would not change existing conditions or exacerbate existing barriers to wildlife movement along the N-S Corridor, however wildlife within these areas may experience the indirect effects described above in Section 5.2.5.2. As described in Section 7.2.9, all alternatives would include wildlife crossings along the E-W Corridor to maintain or improve wildlife passage.

5.3.5.5 Essential Fish Habitat

EFHs and Habitat Areas of Particular Concern (HAPCs) that potentially could be impacted by the Project are Estuarine Intertidal Scrub-shrub (Mangroves), Estuarine Subtidal Open Water/Water Column (Estuarine Planktonic), and Tidal Creeks (Mud/Sand and Sand/Shell Bottom). Within each of the bridge project areas, EFH is equivalent to wetland and/or surface water habitats. Constructing the Project could affect EFH and HAPC as a result of placing rip-rap/fill for the bridge approaches, placing bridge pilings, and excavating where existing timber pilings will be replaced.

Enhancement/replacement is proposed for 34 bridges between Cocoa and Miami; however, only 21 of these bridges will require in-water work or a change in the footprint of the bridges. Four of the bridges were determined to be upstream of salinity barriers. Bridges over water bodies with downstream salinity barriers are not included in this assessment, as these sites are not accessible to marine species and do not include EFH. This assessment focuses on the bridges along the N-S Corridor and the WPB-M Corridor that require construction within EFH (Figure 5.3.5-1). Each bridge project area is defined as the footprint of that bridge, as well as the area upstream and downstream within the limits of construction.

The USACE determined that the Project would not have a substantial adverse impact on EFH or federally managed fishery species based on the proposed mitigation. On October 14, 2014 the NMFS agreed with this determination and did not offer any conservation recommendations pursuant to the EFH provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Appendix 5.3-6).

No-Action Alternative

Under the No-Action Alternative the Project would not be constructed or operated; there would be no impacts to EFH.

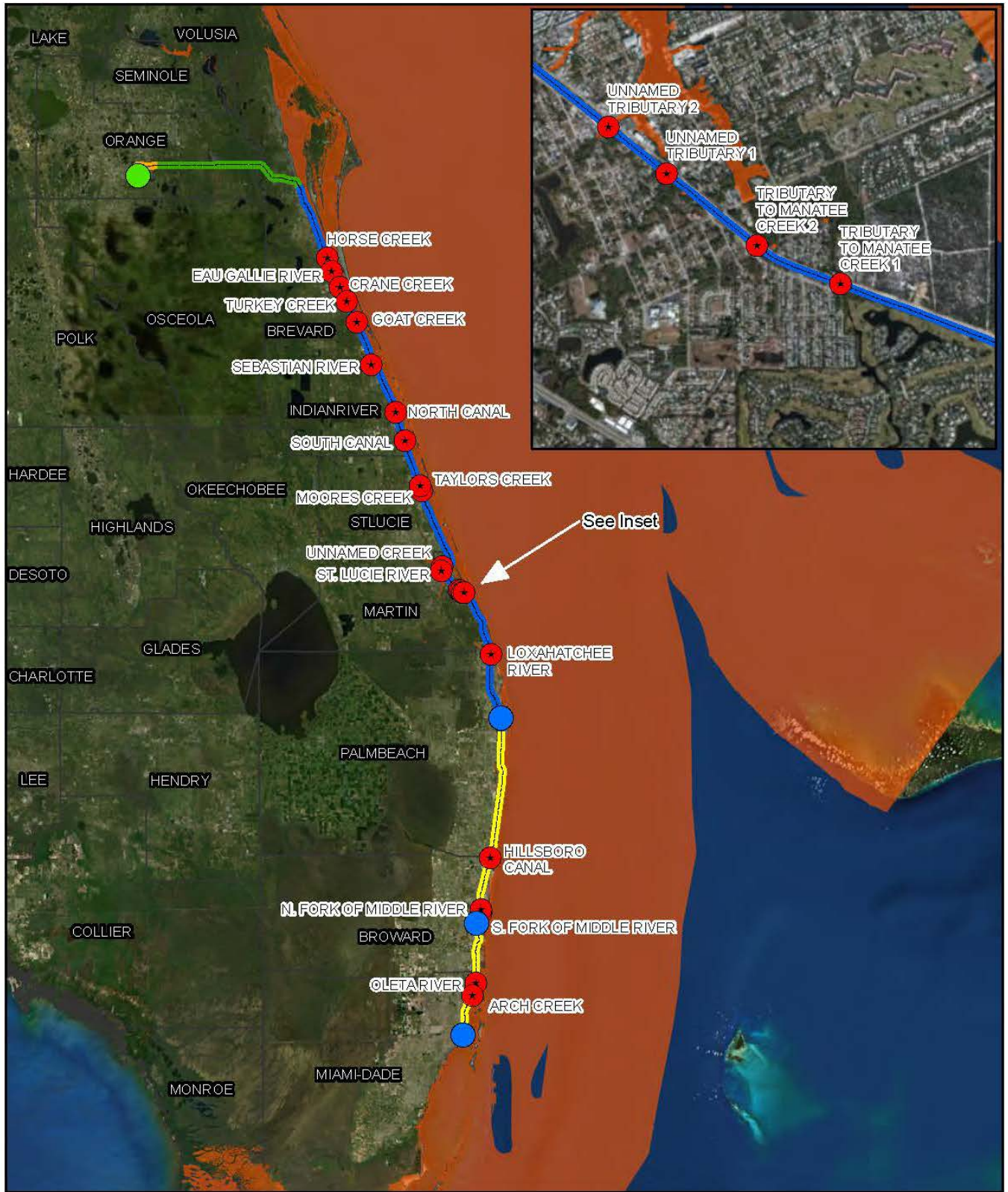
Action Alternatives A, C, and E

This section discusses the direct, indirect, and temporary impacts to EFH and HAPC associated with the 21 bridge project areas and potential implications to their associated fisheries communities. Direct, indirect, and temporary impacts are expected to be generally similar for all fisheries; therefore, the presentation of impacts is for all species. The potential impacts to EFH and HAPC would be the same for each of the Action Alternatives, as the impacts would only occur along the common N-S and WPB-M Corridors.

Habitats within the bridge project areas have been identified as EFH and HAPC. As shown in Table 4.3.6-1, these areas provide EFH for at least seven fishery species managed by the SAFMC during some portion of their life cycle: goliath grouper, gray snapper, mutton snapper, spiny lobster, pink shrimp, white shrimp, and brown shrimp.

At each bridge project area (with the exception of Arch Creek), piles would be driven to load bearing capacity for E80 live loads plus the dead load. Piles would be driven with a steel pile driving template placed to prevent movement of the pile group. Multiple piles will be connected by a cast-in-place pile bent cap or end bent at the abutments. The piling driver equipment would be placed on the abutment or on a barge in larger systems (Eau Gallie River, St. Sebastian River, Hillsboro River, North Fork of the Middle River, and South Fork of the Middle River). Silt fences and floating turbidity barriers would be installed and maintained during construction in accordance with performance standards for erosion and sediment control and stormwater treatment set forth in Section 62-40.432, FAC.

The effect of pilings would be limited to the total footprint of pilings placed in EFH, totaling approximately 760 square feet (<0.1 acre). The effects of the rip-rap/fill at the location of the abutments has been calculated as the total area of rip-rap/fill placed in surface waters, which totals approximately 5,000 square feet (0.1 acre). Approximately 0.73 acre of the substrate would be shaded. Shading effects were calculated as the footprint of the new bridges at each bridge project area. No seagrasses were observed within the bridge project areas. Approximately 940 square feet (0.02 acre) of wetland (primarily mangroves) would be permanently removed, and approximately 4,000 square feet (0.09 acre)



Explanation of Features

- Proposed Station (By Others)
- Proposed Stations - WPB-M Corridor
- ★ Bridges
- MCO Segment
- E-W Corridor
- N-S Corridor
- WPB-M Corridor
- Essential Fish Habitat

Data Sources: ESRI Bing Maps 2012 Imagery, FRA 2012, AMEC 2013

Bridge Project Areas within Essential Fish Habitat		
All Aboard Florida Intercity Passenger Rail Project		
		5.3.5-1

Path: F:\FBI\WPB\G08\00\EA\Figure 1- EPH Project Location Map_RJH_Rout.mxd

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of mangroves would be trimmed in accordance with FDEP Mangrove Trimming Guidelines, which are designed to avoid defoliation, removal, or destruction of the mangrove tree itself.

The new pilings would have a variable impact on the managed fish species. Pilings could ultimately result in a beneficial impact to species/life stages that prefer such structures as habitat, such as adult goliath grouper, gray snapper, and mutton snapper. Permanent effect of the removal of mangrove wetlands could adversely impact species/life stages that prefer mangrove habitat, such as juvenile goliath grouper, post larval/juvenile grey snapper, and juvenile mutton snapper. Impacts to wetlands (mangroves), calculated as the aerial extent of mangroves to be permanently removed by the Project, would be minor.

Indirect and Secondary Impacts

Indirect effects to EFH from ongoing operations and maintenance would be minimal, as active railroad bridges are currently located at all of the bridge project areas.

Temporary Construction-Period Impacts

Temporary construction-related impacts would be limited to the area immediately adjacent to and under each of the bridge project areas. Most of the species of concern are mobile and can actively avoid construction activities, although some benthic fauna could potentially be affected at the site of the piles. Due to the small footprint of in-water work at each bridge, mortality levels would be negligible.

Temporary impacts resulting from construction activities could occur from temporary disturbance, increased sediment loads, and increased turbidity in the water column. These effects will be minimized by implementing BMPs including silt fencing and turbidity curtains during construction. Additional temporary effect would potentially occur through the disruption/burial of aquatic habitats at the location of the bridge abutments and piles.

Pile driving (percussive or vibratory) can result in temporary effects on fish and other aquatic organisms during construction of a bridge (Popper 2005). Potential impacts to eggs, larvae, and adults of invertebrates and fishes associated with pile driving are noise and vibration, sediment deposition, and crushing. Factors that affect the physical interaction of sound with fish include the size of the fish relative to the wavelength of sound, the mass of the fish, its anatomical variation, and the location of the fish in the water column relative to the sound source (Kent and McCauley 2006). Fish may be divided into two broad groups based on hearing sensitivity, 'hearing specialists' and 'hearing generalists'. 'Hearing specialists' show high sensitivity to sound with levels as low as 60 dBA re 1 microPascal at 1 meter across a broad frequency range. The hearing sensitivity of 'hearing generalists' is lower than that of 'hearing specialists'. 'Hearing generalists' rely on the detection of particle displacement for sensing sound. The highly variable auditory sensitivity of fish means that it is impossible to generalize on the effect of impulse signals from one species to another (Kent and McCauley 2006).

Invertebrates also vary in their sensitivity to sound. Sand shrimp exhibited a significant reduction in growth and reproduction rates, and an increase in aggression and mortality when exposed to noise levels of 30 dBA in the 25- to 400-hertz bandwidth in aquaria (Kent and McCauley 2006). Noise from pile driving during construction could affect federally managed species; however, the use of bubble curtains during pile driving would help to dampen noise by about 5 to 22 dBA depending on the pile type and other conditions (Howard 2013). NMFS has recommended that bubble curtains be used when effects could occur. AAF has

committed to using air bubble curtains during pile driving to minimize the potential impacts on federally managed species. It is anticipated temporary construction noise and vibration will elicit an intense avoidance response from most species but will not permanently affect or jeopardize existing populations of aquatic wildlife.

5.3.5.6 Migratory Bird Habitat

The Migratory Bird Treaty Act of 1918 states that, unless permitted by regulations, it is illegal to

“pursue, hunt, take, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer for purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time or in any manner, any migratory bird, included in the terms of this Convention ... or any part, nest, or egg of such bird (16 USC 703(a).”

As the U.S. Fish and Wildlife Service (USFWS) states, “we regulate most aspects of the taking, possession, transportation, sale, purchase, barter, exportation, and importation of migratory birds (50 CFR parts 10 and 21).” The USFWS does not, through the Migratory Bird Treaty Act, explicitly prohibit or regulate the incidental take of birds, bird nests, or bird eggs caused by land clearing.

EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, requires each federal agency taking actions that are likely to have a measurable negative impact on migratory bird populations to develop a Memorandum of Understanding with the USFWS, to promote conservation of migratory bird populations. The EO also requires all NEPA analyses to evaluate the effects of actions on migratory birds and minimize “incidental takes” of migratory birds.

The Project would not adversely impact the majority of habitats important to migratory birds (see Section 4.3.5), such as flooded agricultural fields, open water bodies or deep marshes, or intertidal beaches or mudflats. Each of the three action alternatives under consideration would result in the loss of forested uplands and wetlands, such as wetland and upland hardwood forest, which may provide important migratory habitat. These habitat losses would occur in small areas, at the periphery of larger forested stands, and would have a minor overall impact on the availability of habitat for migratory birds.

As previously mentioned, the proposed communications towers along the E-W Corridor would be monopole or lattice-type poles, less than 100 feet in height, and would not require guy wires. These towers would be consistent with USFWS guidance on communications towers (USFWS 2012c), and would not have an adverse impact on wildlife or birds.

5.3.6 Threatened and Endangered Species

The USACE, a cooperating agency with respect to this FEIS, is the lead federal agency for completion of ESA Section 7 consultation for this Project. As described below, the USACE has evaluated the effects of the Project on federally listed species and determined that the Project would not jeopardize any listed species or modify any designated critical habitat. The USACE has made determinations of “no effect” or “may affect but not likely to adversely affect” for each of the listed species within the Project Area. The USACE has also determined the proposed work would not result in the adverse modification of Designated Critical Habitat. Section 5.3.6.5 of this FEIS provides a detailed determination for each species considered. The agencies charged with administering the ESA, the North Florida office of the US Fish & Wildlife Service (USFWS),

which covers the Brevard and Orange County portions of the Project, and the NOAA-NMFS, have concurred with these determinations (Appendix 5.3.6-A).

The USFWS, Vero Beach Field Office, stated the Project will result in adverse effects and potential “incidental take” of the threatened Florida scrub-jay and recommended initiating formal consultation. Formal Section 7 consultation was requested by USACE on behalf of FRA, the lead agency for AAF. As part of the official consultation, USFWS is preparing a Biological Opinion.

The ESA authorizes the determination and listing of species as Endangered or Threatened and prohibits unauthorized taking, possession, sale, and transport of endangered species. Section 7 of the Act requires federal agencies to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or to modify their critical habitat. USFWS administers the Act, but NMFS is the lead federal agency responsible for the stewardship of the offshore living marine resources of the nation and their habitat.

FWC regulates wildlife species protected by the State of Florida. Chapter 68A-27.003(1)(a), FAC provides “no person shall take, possess, or sell any of the endangered or threatened species...or parts thereof or their nests or eggs except as allowed by specific federal or state permit authorization.” Chapter 68A-27.005(1)(a), FAC additionally stipulates “no person shall take, possess, transport, or sell any species of species concern...or parts thereof or their nests or eggs except as authorized by permit from the executive director, permits being issued upon reasonable conclusion that the permitted activity will not be detrimental to the survival potential of the species.” The Florida Department of Agriculture and Consumer Services (FDACS) regulates protected plant species and limits the harvest, transport and sale of plant species listed as Endangered, Threatened, or Commercially Exploited in Chapter 5B-40, FAC.

The Bald and Golden Eagle Protection Act (BGEPA) serves to protect bald and golden eagles by prohibiting anyone from taking eagles, their nests, or their eggs, without a permit issued by the Secretary of the Interior. The Act specifically defines a taking as pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing the species (USFWS 1972). Violating the Act could result in fines, imprisonment, or both for first offenses.

Some commenters on the DEIS questioned why the USACE was the lead federal agency with respect to ESA Section 7 compliance. The USACE, Jacksonville District, has special expertise related to listed species and consultation with FWS and NMFS in Florida. As prescribed under Section 7(a)(2) of the Endangered Species Act (ESA) and its implementing regulations at 50 CFR § 402, for every activity in which a federal action is involved, each federal agency carrying out the action, in this case the Corps, is required to evaluate the effects (make an effects determination) of each proposed action on any federally listed threatened or endangered species or its designated critical habitat.

The ESA is administered by the Secretary of the Interior, and the USFWS and NOAA-Fisheries share responsibilities for administering the ESA. Section 7 requires all federal agencies (in this case, the USACE, which is a Cooperating Agency with respect to this FEIS and has special expertise related to the ESA) to consult with the Secretary on any prospective agency action if an endangered species is present in the area and project implementation may affect that species. The Final Endangered Species Consultation Handbook for Procedures for Conducting Consultation Activities under Section 7 of the ESA (64 FR 31285, June 10 1999) establishes the procedures by which federal agencies, such as the FRA, must consult with the USFWS and USACE.

Several commenters were concerned with impacts to Florida Scrub-jay, and provided additional detailed information on the location of populations. Others were concerned with potential impacts to listed plant species that may occur within the FECR right-of-way, as well as gopher tortoise protection and mitigation. This section addresses these comments.

5.3.6.1 Methodology

Direct effects were calculated through the use of GIS models. This model quantified effects by intersecting the proposed work areas with land use polygons of habitat that may be utilized by protected species. The model quantified all loss of habitat along the Project based on the limit of permanent alteration. Areas within permanent alteration limits that are already disturbed, such as ballasted railbed and roads, were not counted as habitat loss. Impacts to wetland habitats along the N-S Corridor were calculated based on the wetland delineations conducted for the project. The land use data was acquired from SFWMD (n.d.) and SJRWMD (2013a).

The USACE assessed the effects of the Project on federally listed species using the appropriate species-specific Effects Determination Keys developed by the USACE and USFWS (USFWS 2008 and 2010a through d).

5.3.6.2 Environmental Consequences

Direct effects to protected species may include effects from construction, grading, vegetation management, and mortality associated with potential collisions with rail traffic. These activities may result in degradation of ecological function and loss of habitat, as well as loss of rare plant and animal species. Permanent impacts may include losses or changes in habitat and rare plant and wildlife species through clearing, grading, construction, and the potential introduction of undesirable, invasive species.

Habitat loss is a direct effect of transportation projects. Habitat loss occurs if an area that previously provided food, cover, water, and/or breeding resources to a rare species is cleared, paved, filled, or altered in such a way that it no longer provides one or more of these resources.

No-Action Alternative

Under the No-Action Alternative the Project would not be constructed or operated. Consequently, adverse impacts to threatened and endangered species and their habitats would not occur under the No-Action Alternative.

Alternative A

Alternative A would impact habitats potentially used by federally and state listed wildlife species as indicated in Table 5.3.6-1. The discussion of the effects of Alternative A includes Phase I, the West Palm Beach to Miami corridor.

Federal Species

This section describes the potential project effects on Federally-protected species including wildlife (aquatic vertebrates, birds, reptiles), and plants.

Table 5.3.6-1 Alternative A - Direct Effects to Potential Protected Wildlife Species Habitat (acres)				
Common Name	MCO Segment	E-W Corridor	N-S Corridor	Total
Federally Listed Wildlife Species				
Florida Scrub-Jay	34.1	28.2	0	62.3
Audubon's Crested Caracara	38.7	39.3	0	78
Wood Stork	43.3	81.9	9.0	134.2
Red-Cockaded Woodpecker	28.0	23.0	0	51
American Alligator	6.2	17.5	6.8	30.5
Eastern Indigo Snake	99.0	81.2	2.8	183
Wildlife Species Listed Only by the State of Florida				
Florida Mouse	37.0	32.2	0	69.2
Sherman's Fox Squirrel	60.6	50.9	0	111.5
Burrowing Owl	6.1	11.4	0	17.5
Florida Sandhill Crane	12.5	22.3	6.2	41
Limpkin	43.3	81.9	9.0	134.2
Little Blue Heron	43.3	81.9	9.0	134.2
Roseate Spoonbill	43.3	81.9	9.0	134.2
Snowy Egret	43.3	81.9	9.0	134.2
Southeastern American Kestrel	38.7	41.6	0	80.3
Reddish Egret	0	0	0.1	0.1
Tricolored Heron	43.3	81.9	9.0	134.2
White Ibis	43.3	81.9	9.0	134.2
Gopher Tortoise	37.0	32.2	0	69.2
Florida Pine Snake	37.0	32.2	0	69.2
Short-Tailed Snake	37.0	32.2	0	69.2
Gopher Frog	37.0	32.2	0	69.2
Mangrove Rivulus	0	0	0.1	0.1

Wildlife

Bridge construction activities would occur within West Indian manatee critical habitat and important manatee areas, and potential habitat for sea turtles and smalltooth sawfish, but construction activities would not disturb seagrass beds or require dredging. There would be a negligible loss of habitat due to new bridge pilings.

Field surveys for Audubon's crested caracara nests will be completed prior to construction of the E-W Corridor. Construction activities proposed along the N-S Corridor would not impact suitable caracara habitat or existing nest trees. Direct effects to potential caracara habitat which would occur with the Project total approximately 78 acres. Caracara may also utilize pasture, but pasture was not included in the analysis.

Bald eagle nest OR-065, in Orange County, may be affected by the Project within the MCO Segment (Figure 4.3.6-3). The proposed railroad alignment is less than 200 feet from the nest, placing it within the primary and secondary nest buffer zones. Eagle nest OR-079, also in Orange County (Figure 4.3.6-1), is

approximately 600 feet from the proposed alignment, which is potentially within the nest buffer zone (FWC 2012a).

Two wood stork rookeries are within 2,500 feet of the N-S Corridor in Brevard County (USFWS 2010a). All activities for the Project except construction of the bridges over the Oleta River and Arch Creek would take place within at least one Core Foraging Area (CFA) (USFWS 2010b). Alternative A would affect a total of 134.2 acres of Suitable Foraging Habitat (SFH).

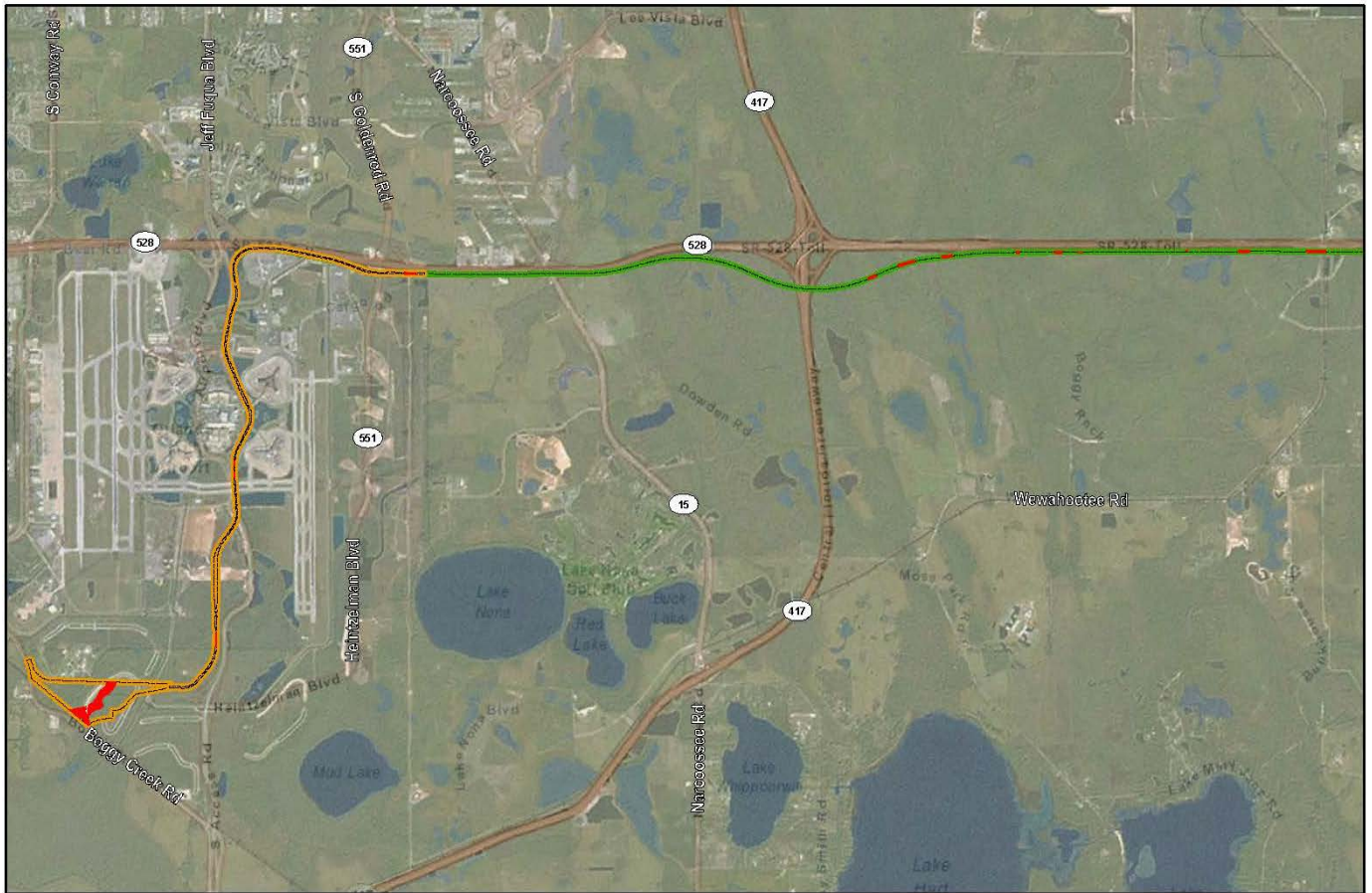
Florida scrub-jay metapopulations are within the vicinity of the N-S Corridor throughout Brevard, Indian River, St. Lucie, and Marin Counties, with a few located in Palm Beach County. Although the presence of scrub-jays along the E-W Corridor has not been fully evaluated, the Florida Scrub-Jay Umbrella Habitat Conservation Plan and Environmental Assessment indicates the presence of documented breeding populations within the vicinity of the Project in Orange County (USFWS 2012b). Potential scrub-jay habitat occurs within the Project Study Area outside the maintained areas of the SR 528 right-of-way, and direct effects would total approximately 62.3 acres under Alternative A.

The scrub-jay field surveys conducted along the N-S Corridor, the documented presence of scrub-jays at Savannas Preserve State Park, and observations of scrub-jays crossing the tracks all indicate it is likely scrub-jays will occur within the rail corridor at times. The action alternatives will result in passenger trains passing through these areas at maximum speeds ranging from 79 mph to 110 mph at a frequency of 32 trips per day. The increase in train frequency as well as the higher operational speeds in comparison to the existing freight rail service increase the likelihood scrub-jays will collide with a train resulting in an "incidental take." Scrub-jays are cooperative breeders, meaning a breeding pair which defends a territory is usually assisted by helpers. This breeding strategy provides for the replacement of a lost member of the breeding population from a large pool of these helpers, a behavior which buffers the population from losses of individuals by providing a quick replacement for a lost breeder (Woolfenden and Fitzpatrick 1984). Therefore, the USACE found that the anticipated "incidental take" will not jeopardize the continued existence of the species or significantly affect local populations.

A review of GIS data of documented red-cockaded woodpecker nest cavities indicated no nests occur within the Project Study Area. Direct effects to red-cockaded woodpecker habitat which would occur with Alternative A total approximately 51 acres within the E-W Corridor.

Potential habitat for the American alligator occurs throughout the Project Study Area for Alternative A. Direct effects to potential alligator habitat would total approximately 30.5 acres. Although the American alligator is no longer listed by the USFWS as a threatened species, it retains federal protection because of its similarity of appearance to the American crocodile, which is a listed species. No American crocodile are known to occur within the project area.

Alternative A would impact undeveloped (unpaved) sand skink soils within the footprint of the VMF and along the MCO Segment (Figure 5.3.6-1). Surveys to confirm the presence of sand skinks have not been completed. Areas providing potential habitat for the Eastern indigo snake include many habitats located within the Project Study Area. The maintained areas within MCO Segment, the SR 528 right-of-way along the E-W Corridor, and the FECR Corridor are generally not considered suitable habitat for the indigo snake. However, indigo snakes are known to enter developed and maintained areas adjacent to large undeveloped tracts of land. Direct effects to potential eastern indigo snake habitat would total approximately 183 acres. AAF will implement the Standard Protection Measures for the Eastern Indigo Snake (USFWS August 12 2013) during construction to reduce potential impacts to indigo snakes.



- Explanation of Features**
- Sand Skink Soils within Project Footprint
 - MCO Segment and VMF
 - E-W Corridor (Alternative E)

Data Sources: ESRI Imagery, 2010; AMEC, 2013; SSURGO, 2012

Sand Skink Soils along the MCO Segment and E-W Corridor		
All Aboard Florida Intercity Passenger Rail Project		
		5.3.6-1
Path: F:\FEIS\FEIS_GDBMX\DEIS\Location of Sand Skink Soils.mxd		

Plants

Comments regarding plant surveys were received from multiple sources following publication of the DEIS, including potential occurrences of Lakela’s mint, Prickly pear (*Cereus eriocephala*), Four-petal paw paw (*Asimina tetrandra*), Small’s milkwort, and Curtiss Milkweed (*Dicerandra immaculata* var. *savannarum*). A known population of beautiful pawpaw occurs in southeast Orange County in pine flatwoods adjacent to the St. Johns River in the E-W Corridor. Johnson’s seagrass may occur in a number of the waterways that intersect with the existing N-S Corridor. Based on input from Savannas Preserve State Park biologists, FRA has determined that fragrant prickly-apple is located within the FECR Corridor and could be affected by the proposed construction activities. USFWS has also indicated that other protected species may occur within construction areas adjacent to the Hobe Sound NW.

AAF’s initial surveys for listed plant species focused on the areas of disturbance, and did not survey the entire FECR corridor. AAF is coordinating and will continue to coordinate with federal and state agencies as well as land managers and biologists within public lands to conduct appropriate pre-construction surveys and develop a transplanting plan for affected individual plants. Seagrass surveys conducted at all bridge crossings within the N-S Corridor did not reveal the presence of Johnson’s seagrass within the Project Study Area. This species would not be affected by the Project.

With respect to Phase I of the Project (WPB-M Corridor), USFWS confirmed FRA's finding that no adverse effect would result from Phase I of the Project, as documented in the 2013 FONSI (FRA 2013a).

State Species

Alternative A would potentially have negligible impacts on state-listed species. The Florida Fish and Wildlife Conservation Commission sent a letter to the Florida Department of Environmental Protection on November 26, 2012 in support of the Project and to confirm its finding that no significant adverse impact would result from Phase I of the Project.

Habitat for Sherman's fox squirrel, a state-listed species, is located throughout the MCO Segment and along the E-W Corridor. Direct effects to potential fox squirrel habitat would total approximately 111.5 acres.

Potential sandhill crane habitat consists of upland and shallow wetland areas with little or no canopy. Direct effects to potential sandhill crane habitat would total approximately 41 acres. No nests were identified within the Project Study Area during the wetland delineation field work.

The southeastern American kestrel utilizes similar habitat to the Audubon's crested caracara. Appropriate habitats consist of open areas with low vegetation and scattered or adjacent trees for perching. Direct effects to potential kestrel habitat would total approximately 80 acres. Habitat for the burrowing owl occurs within the Project Study Area in dry upland areas. Direct effects to potential burrowing owl habitat would total approximately 66 acres. Field reconnaissance did not identify any owl burrows within the Project Study Area.

Gopher tortoise habitat occurs within the xeric uplands of the Project Study Area including the E-W Corridor and the N-S Corridor, which were not included in the habitat analysis. Field reconnaissance indicated Alternative A would directly impact gopher tortoise burrows. Effects to burrows would potentially impact eastern indigo snake, Florida mouse, Florida pine snake, and gopher frog populations by removing potential refuges and nesting locations from the area. Direct effects to potential gopher tortoise, Florida mouse, Florida pine snake, short-tailed snake, and gopher frog habitat would total approximately 69.2 acres.

Gopher tortoise burrows were observed within the existing FECR Corridor and the proposed E-W Corridor boundaries during preliminary wildlife surveys and wetland delineations. AAF is coordinating with the FWC to determine areas appropriate for gopher tortoise surveys and will conduct 15 percent surveys to characterize the gopher tortoise population within the project study area.

The results of the gopher tortoise surveys would be used to characterize the potential populations of state and federal listed burrow commensal species including the Florida mouse, gopher frog, Florida pine snake, and eastern indigo snake. A gopher tortoise relocation permit would provide authorization to move all commensal species other than the eastern indigo snake to an adjacent habitat outside the construction limits. AAF is committed to addressing wildlife species that might be identified within the Project limits, and is coordinating with federal, state and local agencies. AAF anticipates that mitigation for, or relocation of Gopher Tortoises may be necessary as part of project construction. Gopher Tortoise conservation measures and permitting are covered under Florida law (Chapter 68A-27.003 Florida Administrative Code). AAF will coordinate with FFWCC during completion of preconstruction site surveys and permitting, as required. If Gopher Tortoise burrows are identified within the Project limits

of disturbance, AAF anticipates permitting and conservation measures (which may include on-site and/or off-site relocation) would be required.

Two wading bird rookeries within 1,500 feet of the Project Study Area at distances of approximately 550 feet and 1,400 feet, respectively, may also be affected by the Project. Both are visually blocked from the alignment by screens of thick vegetation, placing the Project outside of the buffer zones for both rookeries.

Potential habitat for the American oyster catcher occurs at several bridge locations along the N-S Corridor and the WPB-M Corridor. Although oyster beds are not mapped in the GIS land use data acquired from SFWMD and SJRWMD, they were identified within the Hillsboro Canal, North Fork of the Middle River, South Fork of the Middle River, and the Oleta River.

Habitat for the reddish egret and mangrove rivulus is also present in mangroves at bridge locations along the N-S and WPB-M Corridors and direct effects to mangrove habitat would total 0.1 acre. Because Mangrove rivulus are amphibious and may be found out of water in wet logs or leaf matter within mangrove swamps, construction may result in an incidental take of the rivulus.

Field surveys have not been completed for the MCO Segment or the E-W Corridor, but potential habitat for state listed plant species occurs throughout the Project Study Area. Field surveys will be prior to construction. State listed plant species potentially occurring within the N-S Corridor include Curtiss' milkweed and barbed-wire cactus.

Alternative C

Alternative C would result in the loss of natural habitats potentially used by federally and state listed wildlife species as shown in Table 5.3.6-2. Alternative C would have the same impacts on the habitat of protected species as Alternative A within the MCO Segment and the N-S Corridor. The difference in impacts between Alternative A and Alternative C would occur within the 17-mile stretch of the E-W Corridor between SR 520 and SR 417 where the proposed route for Alternative C would be south of the proposed route for Alternative A and includes some habitat located south of the SR 528 right-of-way.

The route for Alternative C would place the railroad alignment farther from the highway than the route for Alternative A. Although the presence of scrub-jays along the E-W Corridor has not been fully evaluated, documented breeding populations occur within the vicinity of the Project Study Area in Orange County (USFWS 2012b). Alternative C would impact approximately 83 acres of potential scrub-jay habitat.

Alternative C would have more effects to potential caracara habitat than would occur under Alternative A and a greater likelihood of a caracara nest located within the railroad footprint. Direct effects to caracara habitat with Alternative C would total approximately 108.8 acres.

The Project areas close to the bald eagle nests, wood stork nesting colonies, and wading bird rookeries described for Alternative A are no different under Alternative C, therefore effects to nesting areas would remain the same. All activities for the Project except constructing bridges over the Oleta River and Arch Creek would take place within at least one wood stork CFA (USFWS 2010b). Direct effects to a total of approximately 169 acres of SFH would occur with the implementation of Alternative C.

Common Name	MCO Segment	E-W Corridor	N-S Corridor	Total
Federally Listed Wildlife Species				
Florida Scrub-Jay	34.1	48.4	0	82.5
Audubon's Crested Caracara	38.7	70.1	0	108.8
Wood Stork	43.3	116.9	9.0	169.2
Red-Cockaded Woodpecker	28.0	32.9	0	60.9
American Alligator	6.2	14.0	6.8	27
Eastern Indigo Snake	99.0	122.5	2.8	224.3
Wildlife Species Listed Only by the State of Florida				
Florida Mouse	37.0	59.0	0	96.0
Sherman's Fox Squirrel	60.6	73.8	0	134.4
Burrowing Owl	6.1	26.1	0	32.2
Florida Sandhill Crane	12.5	116.9	6.2	135.6
Limpkin	43.3	116.9	9.0	169.2
Little Blue Heron	43.3	116.9	9.0	169.2
Roseate Spoonbill	43.3	116.9	9.0	169.2
Snowy Egret	43.3	116.9	9.0	169.2
Southeastern American Kestrel	38.7	70.9	0	109.6
Reddish Egret	0	0	0.1	0.1
Tricolored Heron	43.3	116.9	9.0	169.2
White Ibis	43.3	116.9	9.0	169.2
Gopher Tortoise	37.0	59.0	0	96.0
Florida Pine Snake	37.0	59.0	0	96.0
Short-Tailed Snake	37.0	59.0	0	96.0
Gopher Frog	37.0	59.0	0	96.0
Mangrove Rivulus	0	0	0.1	0.1

Although implementing Alternative C would not result in the removal of any documented red-cockaded woodpecker nest cavities, it would affect approximately 60.9 acres of potential habitat and effects would be negligible.

Direct effects to wetlands would be greater with Alternative C than with Alternative A due entirely to the difference in alignments between SR 520 and SR 417 in Orange County. The difference in wetland effects would impact habitat for American alligator, Florida sandhill crane, and the state listed wading birds, and may potentially impact foraging habitat for Audubon's crested caracara, southeastern American kestrel, and eastern indigo snake (Table 5.3.6-2).

Alternative C would also impact undeveloped sand skink soils within the footprint of the VMF. Surveys to confirm the presence of sand skinks have not been completed. Field surveys indicate direct effects under Alternative C would most likely occur to gopher tortoise burrows.

Alternative E

Alternative E, the preferred alternative, would result in the loss of natural habitats potentially used by federally and state listed wildlife species as shown in Table 5.3.6-3. Alternative E would have the same impacts on the habitat of protected species as Alternative A within the MCO Segment and the N-S Corridor. The difference in impacts between Alternative A and Alternative E would occur within the 17-mile stretch of the E-W Corridor between SR 520 and SR 417 where the proposed route for Alternative E would be south of the proposed route for Alternative A and include some habitat located south of the SR 528 right-of-way.

Although the presence of scrub-jays along the E-W Corridor has not been fully evaluated, documented breeding populations occur in Orange County (USFWS 2012b). Alternative E would impact approximately 72 acres of potential scrub-jay habitat.

Table 5.3.6-3 Alternative E - Direct Effects to Potential Protected Wildlife Species Habitat (acres)				
Common Name	MCO Segment	E-W Corridor	N-S Corridor	Total
Federally Listed Wildlife Species				
Florida Scrub-Jay	34.1	37.8	0	71.9
Audubon's Crested Caracara	38.7	63.4	0	102.1
Wood Stork	43.3	111.9	9.0	164.2
Red-Cockaded Woodpecker	28.0	33.1	0	61.1
American Alligator	6.2	11.1	6.8	24.1
Eastern Indigo Snake	99.0	110.7	2.8	212.5
Wildlife Species Listed Only by the State of Florida				
Florida Mouse	37.0	47.6	0	84.6
Sherman's Fox Squirrel	60.6	72.1	0	132.7
Burrowing Owl	6.1	21.1	0	27.2
Florida Sandhill Crane	12.5	32.0	6.2	50.7
Limpkin	43.3	111.9	9.0	164.2
Little Blue Heron	43.3	111.9	9.0	164.2
Roseate Spoonbill	43.3	111.9	9.0	164.2
Reddish Egret	0	0	0.1	0.1
Snowy Egret	43.3	111.9	9.0	164.2
Southeastern American Kestrel	38.7	63.4	0	102.1
Tricolored Heron	43.3	111.9	9.0	164.2
White Ibis	43.3	111.9	9.0	164.2
Gopher Tortoise	37.0	47.6	0	84.6
Florida Pine Snake	37.0	47.6	0	84.6
Short-Tailed Snake	37.0	47.6	0	84.6
Gopher Frog	37.0	47.6	0	84.6
Mangrove Rivulus	0	0	0.1	0.1

A survey for Audubon's crested caracara was conducted by AAF. No caracara nests were located within 1,000 feet of the E-W Corridor, although individual birds were observed and potential feeding habitat exists along SR 528. Alternative E would impact approximately 102 acres of potential caracara feeding habitat. There would also be a greater potential for caracara nest trees located within the Project Study Area. The Project areas close to the bald eagle nests, wood stork nesting colonies, and wading bird rookeries described above for Alternative A would not be different under Alternative E. All activities except construction of the bridges over the Oleta River and Arch Creek would take place within at least one wood stork CFA (USFWS 2010b). Alternative E would affect a total of approximately 164 acres of SFH.

Field surveys for the presence of red-cockaded woodpecker nest cavities would be conducted subsequent to the selection of the final alternative for the Project. Although implementing Alternative E would not result in the removal of any documented red-cockaded woodpecker nest cavities, it would affect 61 acres of potential habitat and effects would be negligible.

Wetland losses would impact habitat for wood stork, American alligator, Florida sandhill crane, and the state listed wading birds, and may potentially impact foraging habitat for Audubon's crested caracara, southeastern American kestrel, and eastern indigo snake (Table 5.3.6-3).

Alternative E, the preferred alternative, would also impact undeveloped sand skink soils within the footprint of the VMF. Surveys to confirm the presence of sand skinks have not been completed. Field surveys indicate direct effects from Alternative E would most likely occur to gopher tortoise burrows the effects of which would potentially impact eastern indigo snake, Florida mouse, Florida pine snake, and gopher frog populations by removing potential refuges and nesting locations from the area.

5.3.6.3 Indirect and Secondary Impacts

Indirect effects to threatened or endangered species may include habitat fragmentation and associated edge effects; the loss of genetic diversity of rare plant and animal populations, increased competition for resources, and physical or psychological restrictions on movements caused by some feature within a corridor that wildlife are unable or unwilling to cross. Indirect effects can be caused by the increased noise and visual disturbance from land-clearing, earth-moving, and construction machinery during construction. Noise and vibration associated with the active rail line may cause indirect effects if wildlife avoid habitat near the embankment.

Section 5.3.5, *Biological Resources and Natural Ecological Systems*, provides a broader analysis of the indirect effects to natural habitats and communities.

Few studies on wildlife responses to noise resulting from rail operations have been conducted in the United States, but there is a well-documented negative correlation between transportation corridors and wildlife health/diversity (Rosenfield et al. 1992). Summers et al. (2011) found that distance away from roads was the most important determinant of songbird species richness but were not able to demonstrate that this was due to traffic noise. A study conducted in central Florida on the federally threatened Florida scrub-jay found mortality was significantly higher in roadside territories and reproductive success was higher in non-roadside territories (Mumme et al. 2000). Noise does not always indicate lower reproductive success in birds. A study on the impact of percussive and military aircraft (helicopter) noise

on nesting success and behavior of the federally endangered red-cockaded woodpecker found (Delaney et al. 2000) that:

- Experimental noise (maximum level = 104 dB) did not impact red-cockaded woodpecker reproductive success;
- Flush response increased closer to the noise source;
- Red-cockaded woodpeckers returned to their nests relatively quickly after being flushed; and
- Noise levels within the nest cavities were substantially louder than noise levels at the base of the nest tree.

Based on these analyses, the Project would not have an adverse indirect effect on federal or state-listed species.

5.3.6.4 Temporary Construction-Period Impacts

Proposed construction activities (for example, using construction equipment, operating barges or boats, and placing and securing piling structures) associated with in-water bridge work may temporarily disturb manatees, swimming sea turtles, and smalltooth sawfish in the vicinity of the Project Study Area through temporary effects to water quality (for example, increased turbidity), noise, boat collisions, and unintentional “harassment” of individuals within or adjacent to the Project Study Area. AAF has agreed to implement the Manatee Construction Conditions, Smalltooth Sawfish and Swimming Sea Turtle Conditions and Eastern Indigo Snake Protection Measures which will reduce construction period impacts.

As described above in Section 5.3.5.5 for EFH, pile driving (percussive or vibratory) has the potential to have temporary impacts on threatened or endangered fish and other aquatic organisms during construction of a bridge. Single strike sound levels causing injuries to wildlife are expressed as dB sSEL, or decibels single sound effect level. The sSEL source level caused by a single strike to a 24-inch by 24-inch concrete pile using an impact hammer is 170 dB sSEL, which does not exceed the noise threshold of 187 dB sSEL for causing injury to fish, including the smalltooth sawfish. Sea turtles have a higher single strike noise threshold. The risk of cumulative injury from construction noise is unlikely because West Indian manatees, smalltooth sawfish, and swimming sea turtles will be allowed to leave the project areas, construction activities will be limited to daylight hours, and pile driving will be limited to three piles per day. Bubble curtains will be used to reduce noise impacts. It is anticipated temporary construction noise and vibration from pile driving will elicit an intense avoidance response from most species, including smalltooth sawfish, sea turtles, and manatees, but will not permanently affect or jeopardize existing populations of aquatic wildlife.

In terrestrial habitats, noise and human activity from construction could temporarily cause bird and other vertebrate species to avoid areas near construction sites.

5.3.6.5 Section 7 Consultation and Draft Findings

The USACE has facilitated several discussions with USFWS and NMFS regarding ESA consultation for this Project. These discussions have aided in clarification of the details required in the Biological Assessment (BA), which is being prepared in accordance with the *Final ESA Section 7 Consultation Handbook*

(USFWS 1998). Meeting minutes are provided in Appendix 5.3.6-A. The consultation has been performed in coordination with the following agencies: USFWS (Jacksonville and Vero Beach offices), NMFS, Protected Resources Division (PRD), and FWC. The BA is intended to provide documentation necessary for informal consultation with the USFWS and NMFS in order to comply with Section 7 of the federal ESA (50 CFR 402).

Protected species coordination was initiated on September 6, 2012, with a meeting at the USACE office in Cocoa, which included representatives from the USFWS offices for North Florida and South Florida, and NMFS. USFWS recommended the use of construction conditions to protecting manatees, and indigo snakes. As adjacency to Florida scrub-jay habitat was a concern, scrub-jay surveys were required to determine how the operation of the rail would affect the species. NMFS recommended the use of construction conditions to protecting smalltooth sawfish and swimming sea. NMFS required effects to Johnson seagrass and smalltooth sawfish be determined and provided an ESA checklist for the bridge locations and the EFH federal mandate.

On October 12, 2012, AAF requested that the USFWS confirm listed species occurrence and requirements for the Project Study Area. A response from the South Florida Office of the USFWS was provided on October 30, 2012 confirming the species of concern included: wood stork, Florida scrub-jay, Audubon's crested caracara, bald eagle, eastern indigo snake, and red-cockaded woodpecker. The North Florida Office of the USFWS confirmed the list of species of concern at a meeting at the USFWS Office in Jacksonville. The species list was confirmed to include: West Indian manatee, wood stork, red-cockaded woodpecker, eastern indigo snake, Audubon's crested caracara, Florida scrub-jay, and bald eagle.

BAs were completed and submitted in September 2013 for species under USFWS and NMFS jurisdiction. Based upon the BA submitted to the USFWS, the USACE issued an effects determination letter on September 19, 2013, for the South Florida portion of the Project extending from Miami north through Indian River County, and on September 24, 2013 for the northern section of the Project extending from Indian River County to Orlando. Within these areas USACE determined that the Project would have "no effect" to the Florida panther, Everglade snail kite, red-cockaded woodpecker, and piping plover based on the lack of suitable habitat, known species range within the Project Study Area, and/or lack of visual confirmation during surveys. USACE has made the specific findings listed below (Appendix 5.3.6-A). According to USACE, the Project is:

- Not likely to adversely impact the wood stork. This determination is based on the Project not being located within 2,500 feet of an active colony site. Although the Project includes construction within SFH and within the CFA of a colony site, prior to construction AAF would provide SFH compensation in accordance with the Habitat Management Guidelines to replace lost foraging value.
- Not likely to adversely impact the eastern indigo snake. This determination is based on the Project not being located in open water, and the commitment by AAF to follow the USFWS's *Standard Protection Measures for the Eastern Indigo Snake* during construction.
- May affect, but is not likely to adversely impact the West Indian manatee. This determination is based on the fact that the Project is not located in an Important Manatee Area; does not include dredging; will have minimal adverse effects on aquatic vegetation or mangroves; and the commitment by AAF to follow standard manatee conditions for in-water work.

- May affect, but is not likely to adversely impact the Florida scrub-jay. Habitat documented to be used by this species is outside of the proposed work area.
- May affect, but is not likely to adversely impact the blue-tailed mole skink or the Florida sand skink. AAF has identified areas of suitable habitat for these species and is completing surveys.
- Will have no effect to the Atlantic sturgeon or shortnose sturgeon based on the proposed work occurring outside of their known range.
- Will have no effect to Johnson's seagrass based on the absence of the species within the proposed work area.
- May affect, but is not likely to adversely impact swimming sea turtles based on AAF's agreement to follow the *Sea Turtle and Smalltooth Sawfish Construction Conditions* during construction.
- May affect, but is not likely to adversely impact smalltooth sawfish based on AAF's proposed compensatory mitigation for the loss of red mangrove habitat, absence of seagrass beds within the in-water work areas, and AAF's agreement to follow the *Smalltooth Sawfish Construction Conditions* during construction.

USFWS, Jacksonville Field Office, and NMFS, Protected Resources Division, have provided letters of concurrence with USACE's findings, as documented in Appendix 5.3.6-A. USACE is continuing consultation with USFWS, Vero Beach Field Office.

In an electronic letter dated November 6, 2014, the USFWS, Vero Beach Field Office stated the Project will result in adverse effects to and potential "incidental take" of the Florida scrub-jay, and recommended the USACE initiate formal consultation pursuant to Section 7 of the ESA. The USACE responded on November 21, 2014, in a letter in which it revised the effects determination for the scrub-jay to "may affect" and requested formal consultation. As a result the USFWS prepared a Biological Opinion to determine if the Project would jeopardize the continued existence of the species. The completed analysis of the Project's impacts to the Florida scrub-jay indicated it would not jeopardize the continuation species. According to regulations pursuant to the ESA, the applicant and the action agency, in this case AAF and FRA, are required to minimize the "take" resulting from a Federal action. Minimization of "take" may be accomplished by several methods including protection and conservation of currently unprotected scrub-jay habitat. AAF has acquired two credits from a USFWS approved scrub-jay conservation bank in Florida (Appendix 5.3.6-B). This measure would benefit the Florida scrub-jay by protecting occupied habitat for the species within its range that was previously not protected and managing this habitat in perpetuity.

USFWS Vero Beach staff and Savannas Preserve State Park staff indicated fragrant prickly-apple is present within the FECR Corridor and would be affected by the Project. AMEC, on behalf of AAF, is coordinating with federal and state agency officials as well as land managers and biologists to develop a relocation plan for affected individual plants. USFWS is revising the Biological Opinion, which will be finalized before FRA issues a Record of Decision, to include the fragrant prickly-apple and the finalized transplanting plan.

5.4 Social and Economic Environment

This section evaluates the effects of the Project on the human environment, including communities and demographics, environmental justice communities, economics, public health and safety, cultural resources, recreation and other Section 4(f) resources, visual and scenic resources, and utilities and energy.

5.4.1 Communities and Demographics

This section describes the potential impacts to existing community structure and demographic profiles within the Project Study Area. The Project under all Action Alternatives would not result in residential displacement, neighborhood fragmentation, or the loss of continuity between neighborhoods. Many comments on the DEIS concerned effects of increased train traffic on the quality of life in small towns along the coast of Florida, as summarized in Section 1.7.7 of this FEIS.

5.4.1.1 Environmental Consequences

This section evaluates potential direct effects of the Project to communities and demographics under the No-Action Alternative and the Action Alternatives. Potential direct effects would include long-term residential displacement and neighborhood fragmentation or the loss of continuity between neighborhoods.

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed or operated. Existing commuter railway services would remain unchanged, and no changes to communities and demographics would occur.

Action Alternatives A, C, and E

Potential direct effects of the Project on communities and demographics would be the same under all Action Alternatives.

MCO Segment

The MCO Segment is entirely within GOAA property boundaries; it would not result in residential displacement, neighborhood fragmentation or the loss of continuity between neighborhoods.

East-West Corridor

The E-W Corridor would be predominantly within the SR 528 right-of-way between Orlando and Cocoa. The right-of-way already bisects these municipalities; therefore, the E-W Corridor would not result in new neighborhood fragmentation or loss of continuity among these neighborhoods.

The E-W Corridor would not cross any residential neighborhoods outside Orlando and Cocoa; no neighborhood fragmentation would occur. The E-W Corridor would pass just south of the unincorporated

community of Wedgefield, which is north of SR 528 and west of the SR 520 interchange. Wedgefield is already isolated from other neighborhoods; there are no adjoining neighborhoods.

The E-W Corridor would not require acquisition of residential properties; no residential displacements would occur.

North-South Corridor

The N-S Corridor is within the existing FECR Corridor, which has supported freight and/or passenger service on a continuous basis for more than 100 years. Existing neighborhoods have largely developed around these conditions, and any fragmentation that currently exists would not be the result of the Project. Grade crossings will be closed more often than with the No-Action Alternative, but for very short time periods. Therefore, the N-S Corridor would not result in residential displacement, neighborhood fragmentation, or the loss of continuity between neighborhoods.

Phase I - West Palm Beach-Miami Corridor

Similar to the N-S Corridor, infrastructure improvements along the FECR Corridor for the WPB-M Corridor would not result in residential displacement, neighborhood fragmentation, or the loss of continuity between neighborhoods. Property acquisition will be required for the proposed stations at West Palm Beach and Fort Lauderdale; however, no significant adverse impacts would result to existing local community structure or demographic profiles.

5.4.1.2 Indirect and Secondary Impacts

The Project would have an indirect beneficial effect to communities; it would improve accessibility and mobility between Orlando and Miami, as well as other communities in southeast Florida. Despite accessibility and mobility improvements, the Project would not result in measurable population shifts.

According to projections from the University of Florida, Orange County will add 550,979 residents between 2011 and 2035 (BEBR 2011b). This forecast is independent of the Project and it represents baseline conditions that would occur under the No-Action Alternative.

As noted in Section 4.1.1, *Land Use*, the only potential growth-inducing component of the Project is use of the MCO Intermodal Station. Since this station is located within MCO property boundaries, there would be no associated transit-oriented development. The station at MCO would not be a nucleus for growth or promote population shifts.

According to the 2006 South Florida East Coast Corridor Transit Analysis (SFECCTA), Southeast Florida has been growing rapidly due to immigration and high birth rates and is expected to continue to grow in the foreseeable future (FDOT 2006b). By 2030, the number of households along the WPB-M Corridor is projected to increase by 36 percent compared to 28 percent for Palm Beach, Broward, and Miami-Dade counties combined. Population will increase even more with 34 percent growth in the region and 46 percent along the WPB-M Corridor, bringing the total population within 1 mile of the FECR Corridor to over 1 million by 2030. Automobile ownership and vehicle miles traveled (VMT) are expected to increase even more dramatically than population.

As stated in Section 3.5 of the 2012 EA, transportation improvement projects, such as the proposed stations, have been shown to induce new residential and new commercial development. However, changes in population density and growth rate are projected to occur along the WPB-M Corridor, where AAF stations will be located, regardless of the Project. The WPB-M Corridor would provide an efficient transportation alternative that addresses highway congestion and current and future travel demand between major South Florida cities. The WPB-M Corridor would increase the ability of nearby populations to travel to jobs, education, health care, and leisure activities.

5.4.1.3 Temporary Construction-Period Impacts

Constructing the Project may temporarily disrupt automobile traffic. Upgrades at grade crossings and bridge rehabilitations would adversely impact travel between adjacent neighborhoods and could potentially impede emergency responders, particularly along the N-S Corridor. As discussed in Section 5.1.2, AAF will work with local communities to minimize disruption to traffic and to maintain emergency access.

5.4.2 Environmental Justice

This section describes the potential effects to minority and low-income populations within the Project Study Area that could result from the Project. EO 12898 *Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations* was issued in February 1994 and requires that federal agencies consider whether a Project would have a disproportionately high adverse impact on minority or low-income populations.

CEQ's guidance also indicates that the analysis should identify if a disproportionately high adverse human health or environmental impact occurs on minority or low-income populations. Furthermore, USDOT Order 5610.2(a) establishes USDOT policy to consider environmental justice principles in all USDOT programs, policies, and activities. USDOT Order 5610.2(a) also sets forth the steps to prevent disproportionately high and adverse impacts to minority or low-income populations.

The Project would not result in disproportionately high and adverse impacts to minority or low-income populations. There would be no adverse impacts to environmental justice communities resulting from residential displacement, job loss, or neighborhood fragmentation due to the use of property. Increased train traffic would result in the degradation of local road traffic conditions at certain at-grade crossings and nearby intersections; however, these impacts are expected to be minor. Grade crossings will be closed more often than with the No-Action Alternative, but for very short time periods. Although changes in noise would affect residents along the E-W Corridor, none of the affected parcels are within environmental justice communities. There would be no adverse noise or vibration impacts to environmental justice communities along the E-W Corridor under any of the Action Alternatives, and mitigation would limit any changes in vibration along the N-S Corridor such that there would be no resulting vibration impacts. The Project would comply with all relevant health and safety regulations and would not result in adverse impacts to the public's health or safety, including persons living in environmental justice communities.

Many comments on Environmental Justice issues were received following circulation of the DEIS. Commenters suggested that FRA should have included local Community Redevelopment Areas in the list

of EJ communities; should have considered the effects of increased train traffic on the ability of EJ community residents to cross the active tracks; and that noise impacts would disproportionately impact real estate values and the economic viability of businesses within low-income and minority communities. Section 1.7.7 and the following sections provide responses to these comments.

5.4.2.1 Methodology

A high-level quantitative analysis was conducted for Phase I pursuant to Executive Order 12898, to determine the potential for disproportionately high or adverse impacts to sensitive communities. Based on the result of the demographic assessment, minority populations subject to protection under Executive Order 12898 are present within the West Palm Beach to Miami Corridor Area.

This evaluation used demographic data collected from U.S. Census Bureau (USCB) 2010 U.S. Census and 2010 American Community Survey (ACS). Because impacts to environmental justice communities are dependent on the potential for significant impacts in other environmental categories, the area of analysis for environmental justice is the area of potential significant impacts for the other environmental impact categories, including cumulative impacts. The Project Study Area for this evaluation includes census tracts within 1,000 feet of the proposed or existing railroad alignments.

Thresholds to determine meaningfully greater high minority and low-income populations include census tracts where minority populations are 10 percent higher than the combined total for the six counties crossed by the Project (37.4 percent) and census tracts where low-income populations are 10 percent higher than the combined total for the six counties crossed by the Project (22.4 percent).

5.4.2.2 Environmental Consequences

This section includes an evaluation of potential direct effects of the Project to environmental justice communities under the No-Action Alternative and the Action Alternatives. Potential direct effects to environmental justice communities would include residential or job displacement due to property acquisition, neighborhood fragmentation, degradation of local traffic conditions, increases in noise and vibration levels, and impacts to the public's health and safety. This evaluation includes a comparison between the potential direct effects to environmental justice communities with those same impacts to non-environmental justice communities to determine if adverse impacts would be predominantly borne by minority and/or low-income populations.

Many commenters raised concerns regarding the economic impact to minority business owners along the N-S Corridor. As noted in Chapter 1, *Introduction*, the Project would not be introducing a new rail element along this corridor, and the incremental effects of adding passenger trains would not significantly degrade the viability of businesses along the rail line. The FECR Corridor is an active freight rail corridor, with approximately 14 round-trip freight trains per day under current conditions, projected to increase to 20 by 2019. In recent years, the number of freight trains was substantially higher, with 24 daily trains in 2006. The FECR Corridor has supported freight and/or passenger rail service on a continuous basis for more than 100 years, and businesses proximate to this rail line largely developed around these conditions. The Project would not introduce a significant new disruption, noise, traffic, or other effects that could affect businesses, including those that are minority-owned.

Many commenters also raised concerns regarding Title I Schools⁵, particularly noise and vibration affects to related playing fields. Although Title I Schools exist within the Project Study Area, notably within East Stuart, Golden Gate, and Port Salerno in Martin County, they are not specifically addressed in this environmental justice analysis. This environmental justice analysis does not address individual properties; rather it broadly assesses the impacts of the Project on minority and low-income populations at their places of residence; this includes children and families associated with schools.

Comments also referred to Gifford, a census-designated place in Indian River County that has a non-White population of 50.3 percent, 43.7 percent of which is comprised of persons with a race of Black or African American (USCB 2010a). Gifford is located within Census Tract 503.02, which this environmental justice analysis has identified as an EJ community for having high minority and low-income populations. As such, Gifford has been evaluated for potential disproportionate adverse impacts from the Project as part of this environmental justice analysis at the census tract level.

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed or operated. Existing commuter railway services and opportunities would remain unchanged, and there would be no disproportionate adverse impacts to minority or low-income populations. However, minority populations in Orlando, Miami, and other communities would not have access to efficient intercity rail service.

Action Alternatives A, C, and E

Potential direct effects of the Project to environmental justice communities would be the same under all Action Alternatives. Alternatives A, C, and E would have identical impacts to environmental justice communities because they would cross the same census tracts.

MCO Segment

The MCO Segment is entirely within Census Tract 168.02. According to 2010 USCB data, this census tract does not meet the established environmental justice thresholds. No environmental justice communities exist along the MCO Segment; therefore, there would be no disproportionate adverse impacts to minority or low-income populations.

East-West Corridor

As noted in Sections 5.4.1, *Communities and Demographics*, and 5.4.3, *Economic Conditions*, the Project would not result in residential displacement, job loss, or neighborhood fragmentation due to required property acquisitions along the E-W Corridor. Therefore, there would be no disproportionate impacts to environmental justice communities from changes in land use under any of the Action Alternatives.

As noted in Section 5.1.2, *Transportation*, the Project would not impact local vehicular traffic along the E-W Corridor, as there would be no at-grade crossings and no public road closures. For the same reasons, the Project would not affect the ability of persons commuting to work by bike or by walking. Therefore,

⁵ Title 1 of the Elementary and Secondary Education Act of 1965 provides funding to schools to improve academic achievement by disadvantaged children in core academic subjects.

there would be no disproportionate impacts to environmental justice communities from changes in local vehicular traffic conditions.

The E-W Corridor passes through two census tracts that meet the established environmental justice thresholds, Census Tracts 623.02 and 624.00. The current sound environment along these portions of the E-W Corridor predominantly includes roadway traffic along SR 528. As described in Section 5.2.2, *Noise and Vibration*, changes to noise along the E-W Corridor would affect 109 (105 moderate and four severe impacts) residential parcels. None of the affected residential parcels are within environmental justice communities; therefore, there would be no disproportionate adverse impacts from noise in environmental justice communities along the E-W Corridor.

The Project would result in vibration impacts to 118 residential parcels along the E-W Corridor, none of which are within environmental justice communities. There would be no disproportionate adverse impacts from vibration in environmental justice communities along the E-W Corridor.

The E-W Corridor would not require use of land within a Section 4(f) resource. There would be no disproportionate adverse impacts to parks and recreation resources within environmental justice communities along the E-W Corridor.

North-South Corridor

As noted in Sections 5.4.1, *Communities and Demographics*, and 5.4.3, *Economic Conditions*, the Project would not result in residential displacement, job loss, or neighborhood fragmentation due to required property acquisitions along the N-S Corridor. Therefore, there would be no adverse impacts to environmental justice communities from changes in land use.

No disproportionate impacts to environmental justice communities would occur from changes in local vehicular traffic conditions. As noted in Section 5.1.2, *Transportation*, some roadway crossings would experience increased traffic delays due to the increased frequency of at-grade crossing closures. However, traffic analyses show that these impacts would not rise to a level of significance. Although some commenters requested pedestrian and bicycle crossings at at-grade crossings, the lack of a significant impact to local vehicular traffic conditions is an indicator of no effect to the ability of persons commuting by these means. Despite the lack of a significant impact, as part of the Project, AAF will construct pedestrian crossings where sidewalks exist on either side of the tracks.

The N-S Corridor passes through 29 census tracts that meet the established environmental justice thresholds (Tables 4.4.2-2 and 4.4.2-4). The future No-Action sound environment along these portions of the N-S Corridor predominantly includes freight traffic along the existing FECR Corridor and noise from surrounding population density. As described in Section 5.2.2, *Noise and Vibration*, adding passenger trains along the N-S Corridor would not result in adverse noise impacts due to the use of wayside horns at 117 crossing identified in Appendix 3.3.5-D. Potential impacts resulting from changes to noise in environmental justice communities would not be appreciably more severe or greater in magnitude than the impacts experienced by non-environmental justice communities along the N-S Corridor.

The Project would result in vibration impacts to 3,383 residential parcels along the N-S Corridor, 834 (24.7 percent) of which are within environmental justice communities. However, all vibration impacts (including those within environmental justice communities) would be mitigated to the point where there

would be no disproportionate adverse impacts from vibration in environmental justice communities along the N-S Corridor (see Chapter 7, *Mitigation*).

The N-S Corridor would not require use of land within a park, recreational area or wildlife Section 4(f) resource. There would be no disproportionate adverse impacts within environmental justice communities along the N-S Corridor as a result of the loss of recreational or park resources.

Phase I - West Palm Beach - Miami Corridor

As stated in Section 3.3.3 of the 2012 EA, the Project would not impact minority or low-income populations in a disproportionate manner. The relocated Fort Lauderdale Station (as compared to the Fort Lauderdale Station North Site) would also not disproportionately impact minority or low-income populations. Implementation of crossing-mounted horns would offset all severe impacts in Broward and Miami-Dade Counties and more than 99 percent of all severe impacts in Palm Beach County. As required by the 2013 FONSI, AAF conducted a supplemental study of the Phase I Project's effects on environmental justice communities (AMEC 2014b) and found no disproportionate adverse effect.

Summary

Direct effects to environmental justice communities along the MCO Segment, E-W Corridor, N-S Corridor, and WPB-M Corridor would be the same for all Action Alternatives. There would be no impacts to environmental justice communities along the MCO Segment, as there are no minority or low-income populations within the census tract encompassing this segment. Neither the E-W Corridor nor the N-S Corridor would result in residential displacement, job loss, or neighborhood fragmentation due to the use of property; therefore, there would be no disproportionate impacts to environmental justice communities from changes in land use. Although changes in noise would affect 109 (105 moderate and four severe) residential parcels along the E-W Corridor, none of these parcels are within environmental justice communities. Changes in train frequency along the N-S Corridor would not result in adverse noise impacts to environmental justice communities. There would be no adverse vibration impacts to environmental justice communities along the E-W Corridor under any Action Alternative, and mitigation would limit any changes in vibration along the N-S Corridor, such that there would be no resulting vibration impacts. Finally, there would be no acquisition of land within a Section 4(f) resource along the E-W Corridor or N-S Corridor, and no disproportionate adverse impacts to environmental justice communities.

Although there are Environmental Justice communities of concern present along the FECR Corridor, the implementation of directional, wayside, or crossing mounted horns would dramatically reduce the existing footprint of warning horn noise and would minimize the number of existing and potential noise impacts in the Project Area. As stated in the FONSI, Phase I would not displace any businesses or residences and would not adversely impact the demographics of the Project Area. The Project would further benefit residents by providing additional transportation options to residents and tourists within walking distance of the CBDs in the three cities where stations are proposed. The 2013 FONSI (FRA 2013) found that the Selected Alternative will not result in a disproportionately high or adverse effect on those sensitive populations and Environmental Justice communities of concern considered under Executive Order 12898 after noise mitigation measures have been implemented, such as directional, wayside or crossing mounted horns.

5.4.2.3 Indirect and Secondary Impacts

By offering an alternative transportation option, the Project would improve access and mobility between Orlando, West Palm Beach, Fort Lauderdale, and Miami and would have a beneficial effect on minority and low income populations in these communities. Potential effects on businesses and economics are addressed in the following sections.

5.4.2.4 Temporary Construction-Period Impacts

The Project would benefit environmental justice communities by providing job opportunities during the construction period. AAF would hire local workers to the greatest extent practicable. Section 5.4.3, *Economic Conditions*, discusses these benefits in detail.

5.4.3 Economic Conditions

This section describes the potential effects to local economic conditions that could result from the Project. The Project would not reduce municipal property tax revenues along the MCO Segment or N-S Corridor due to properties being removed from the municipal tax rolls, as the Project does not require the acquisition of private properties along these segments. Acquisition of nine privately owned parcels outside the SR 528 right-of-way in Orange County and four privately owned properties near the Cocoa Curve in Brevard County would be required along the E-W Corridor, and would result in a negligible loss of property tax revenues. The relocated Fort Lauderdale Station within the WPB-M Corridor requires acquisition of three parcels adjoining the FECR Corridor. Some businesses would be displaced, but are expected to relocate elsewhere in Fort Lauderdale. The Project would not displace any other existing businesses or result in the loss of jobs. Impacts to the economic conditions of the marine industries along the St. Lucie, Loxahatchee, and New Rivers are expected to be negligible. The Project would have beneficial regional economic impacts from increased economic activity, tax revenues, construction jobs, and associated spending. Local economic effects would be temporary construction-period effects except in the vicinity of the Phase I stations.

The Project would have a minor economic impact to the maritime industry. Increased wait times and queue lengths anticipated under the No-Action Alternative would result in increased costs, which are estimated to be \$76,285 annually at the St. Lucie River Bridge, \$45,625 annually at the Loxahatchee River Bridge, and \$136,145 annually at the New River Bridge (AMEC 2014a). Under Project conditions, no adverse economic impacts to marine jobs, economic growth, or development are anticipated. Increases in vessel wait times would result in minor increases in costs of less than 0.1 percent when compared to the marine industry values at the St. Lucie River, Loxahatchee River, and New River Bridges. Increased vessel wait times and queue lengths would have minor economic impacts to commercial destinations (e.g., boat/yacht repair and support facilities) along the New River; however, these types of establishments would not incur any decline in business along the St. Lucie and Loxahatchee Rivers. Cruise ships, commercial freighters, and other large oceangoing vessels (other than barges on the Okeechobee Waterway) do not access the St. Lucie, Loxahatchee, or New River Bridges; therefore, the Project would not impact the existing or future operations of these types of vessels.

Many comments were received concerning the Project's potential impacts to the marine industry, pointing out additional information on the economic value of the industry in each of the counties within the Project area, and expressing the belief that increased bridge closures would result in boaters choosing marinas and other services that were not located upriver of the St. Lucie, Loxahatchee, or New River Bridges. Commenters also noted that the economic analysis did not take into account the cost of wages for professional boat crews. Also, commenters were concerned that increased wait times could result in decreased property values for upriver waterfront properties. Section 1.7.4 provides a general response to these comments. The following sections have been revised to further respond to comments.

Other comments on the DEIS were concerned with the effects of increased train noise on property values, and the indirect effects of noise and congestion in downtown areas crossed by the FECR corridor on local businesses. Many commenters indicated that the economic benefits of the Project would occur only in the municipalities with stations (Orlando, West Palm Beach, Fort Lauderdale and Miami) and not in the communities along the N-S Corridor. Section 1.7.7 of this FEIS provides general responses to these comments, and additional information is provided in the following sections.

5.4.3.1 Methodology

This section explains how effects to marine-related economics were evaluated for the future No-Action Alternative and Project. Details of the methodology are provided in Appendix 4.1-3-B1. This analysis considers the potential effects of the Project as compared to the No-Action Alternative to obtain the average economic effect that bridge closure delays would have on the local economy. The bridge operations model included in the 2014 *Navigation Discipline Report* (Appendix 4.1-3-B1) and was used to determine the total number of minutes of waiting time resulting from the Project to both recreational and commercial boaters by multiplying the daily number of vessels by the average amount of wait time per vessel. The waiting time was then multiplied by the cost per hour of operating recreational and commercial vessels on each of the rivers included in this analysis. The sum of these costs constitutes the total value to the marine industry and recreational boaters associated with increased bridge closures on account of the Project (AMEC 2014a).

The data used for the evaluation of economic impacts to marine industries differs from the data presented in Section 5.1.3.2, *Navigation Impacts*. Data on marine traffic associated with the 2014 *Navigation Discipline Report* were derived from video camera footage obtained at the three bridge crossings during winter 2014, while the updated *Rail/Marine Traffic Simulation Using Summer Boat Traffic for the AAF Passenger Rail Project from Orlando to Miami, Florida* predominantly used marine traffic data from summer 2014 (AMEC 2014a and 2015). Summer boat counts were higher than those in winter. Boat count volume increases at the St. Lucie River and Loxahatchee River Bridges ranged from 28 percent to 151 percent depending on the day of the week. Boat count data for the New River Bridge were unavailable at the time of the updated study; however, applicable winter data were escalated using figures from the Loxahatchee River Bridge, as these increases were greater than at the St. Lucie River Bridge. Despite the availability of summer boat counts, these new data do not make the distinction between commercial and recreational vessels, an important data input for determining economic impact. For this reason, this evaluation of economic impacts maintains its use of the winter 2014 data.

This evaluation of economic impacts provides an estimation of the economic value of the marine industry to each of the counties in which the three affected waterways are located. Many commenters noted that these estimated values in the DEIS are lower than what other entities such as the Marine Industry Association of South Florida have reported, leading to an underestimation of the economic impacts to these industries. This evaluation maintains the use of data sourced from the Florida Inland Navigation District (FIND) for consistency purposes, as FIND applied the same methodology across all three counties and updated each report in 2011.

This evaluation does not consider potential boater behavior, as there is no standard method for modeling the economic impacts associated with boater choice (e.g., whether a boater chooses to use a particular waterway). For this reason, this evaluation does not address the Project's economic impacts to yachting, water taxi activity, or individual events held along the affected waterways. There is no standard method for quantifying costs associated with boater time, recreational or otherwise. Therefore, the Project's potential to result in this form of cost is acknowledged but not evaluated.

5.4.3.2 Environmental Consequences

Potential long-term direct and adverse effects to local economic conditions would include the loss of municipal property tax revenue from the acquisition of privately owned properties, costs associated with grade crossing maintenance to be paid by the municipalities in which they are located, permanent displacement of existing businesses and associated revenues, and employment displacement. It also includes the potential loss of economic value within the maritime industries along the St. Lucie, Loxahatchee, and New Rivers. Potential long-term direct and beneficial effects to local economic conditions would include expenditures associated with Project operations such as labor, fuel costs, equipment maintenance, insurance, maintenance of right-of-way, and lease payments (existing lease fees will not change).

Ticket prices associated with the Project have not yet been determined, and as such, were not a consideration in the determination of economic impact or any other area of evaluation of the FEIS.

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed or operated. Existing commuter railway services would remain unchanged, and no anticipated changes to local economic conditions would occur.

Under the No-Action Alternative, bridge infrastructure would not be improved and train speeds would not increase; therefore, the amount of overall closure time would increase due to the increased number of freight trains. Details of the economic impacts to local maritime industries along the St. Lucie, Loxahatchee, and New Rivers are presented below.

St. Lucie River

The anticipated increase in average vessel wait times associated with additional bridge closures and unimproved infrastructure would result in an increase in the time that vessels wait. These increased vessel wait times were considered when evaluating economic impacts to commercial developments

along the St Lucie River. The increase in average vessel wait times is estimated to result in an economic impact under the No-Action Alternative (Table 5.4.3-3) of \$209 per day or \$76,285 annually, based on summer estimates. This represents less than a 0.1 percent increase in the total cost of vessel delays per day on the marine industry under the No-Action Alternative (AMEC 2014a).

There are no cruise ships, commercial freighters, or other large oceangoing vessels that access the St. Lucie River; therefore, the No-Action Alternative is not expected to impact the existing or future operations of these types of vessels (AMEC 2014a).

Individual commercial vessels could potentially experience an increase in vessel queue times at the St. Lucie River Bridge. However, there are very few commercial destinations on the St. Lucie River, and they would not be anticipated to incur any decline in business as a result of the moderate impacts to navigation under the No-Action Alternative. Barge traffic using the Okeechobee Waterway, which can only traverse the bridge under slack tides, would have fewer opportunities to pass the bridge and would likely experience greater delays.

Loxahatchee River

The anticipated increase in average vessel wait times associated with additional bridge closures and unimproved infrastructure would result in an increase in vessel queues of seven vessels per day. These increased vessel wait times were considered when evaluating economic impacts to commercial developments along the Loxahatchee River. The increase in average vessel wait times is estimated to result in an economic impact under the No-Action Alternative (Table 5.4.3-4) of \$125 per day or \$45,625 annually. This represents less than a 0.1 percent increase in the total cost of vessel delays per day on the marine industry under the No-Action Alternative (AMEC 2014a).

There are no cruise ships, commercial freighters, or other large oceangoing vessels that access the Loxahatchee River; therefore, the No-Action Alternative is not expected to have an impact on operations of these types of vessels (AMEC 2014a).

Individual commercial vessels could potentially experience an increase in vessel queue times at the Loxahatchee River Bridge. However, there are very few commercial destinations on the Loxahatchee River, and they would not be anticipated to incur any decline in business as a result of the bridge closures. Therefore, there is no impact under the No-Action Alternative.

New River

The anticipated increase in average vessel wait times associated with additional bridge closures and unimproved infrastructure would result in an increase in vessel queues of 18 vessels per day. These increased vessel wait times were considered when evaluating economic impacts to commercial developments along the New River. The increase in average vessel wait times for commercial and recreational vessels is estimated to result in an economic impact under the No-Action Alternative (Table 5.4.3-5) of \$373.00 per day or \$136,145 annually. This represents less than a 0.1 percent increase in the total cost of vessel delays per day on the marine industry under the No-Action Alternative (AMEC 2014a).

Port Everglades is located east of the New River Bridge; however, cruise ships, commercial freighters, and other large oceangoing vessels do not access the New River. Therefore, the No-Action Alternative would have no impact to existing or future commercial freighter or cruise ship operations at Port Everglades.

Commercial destinations on the New River are primarily boat/yacht repair and support facilities, which would not be anticipated to incur any decline in business because of impacts to navigation, as the services they offer are primarily need-based. Therefore, the No-Action Alternative is not expected to have impacts to such businesses.

Action Alternatives A, C, and E

Potential direct effects of the Project on local economic conditions would be the same under all Action Alternatives.

Economic Benefits and Impacts

The Project would increase federal, state, and local government revenues and have other direct economic benefits to local populations. The Washington Economics Group, Inc. (WEG) performed an economic benefits analysis for the Project (WEG 2014), which followed professionally accepted and widely utilized methodologies using the IMPLAN methodology (developed by the Minnesota IMPLAN Group, Inc.). Construction of the Project would have a direct total economic impact of \$915.6 million, with the largest benefit to be had in Orange County at \$302.2 million (WEG 2014).

Project operations would have a direct total economic impact of \$507.2 million between 2016 and 2021, with an average direct economic impact of \$84.5 million per year (WEG 2014). Table 5.4.3-1 summarizes the direct economic benefits of Project operations between 2016 and 2021. The economic benefits analysis performed for the Project did not breakdown operational economic benefits by county.

Increases in tax revenue, including growth in real estate taxes, corporate income taxes, and sales taxes, as well as benefits to be realized from reemployment insurance could reduce local tax burdens and/or be utilized to address community-specific needs (such as parks, public works, police, and fire protection). Any growth of real estate taxes would also benefit local school districts in communities with stations.

	Average Annual¹	Cumulative (2016-2021)¹
Jobs ²	1,113	1,113
Labor Income (\$ Mil.)	\$48.9	\$293.7
Gross Domestic Product (\$ Mil.)	\$62.9	\$377.3
Total Economic Impact (\$ Mil.)	\$84.5	\$507.2
Federal, State, and Local Revenue (\$ Mil.) ³	\$20.9	\$125.5

Source: WEG 2014

1 Includes Miami-Dade and Broward Counties

2 To avoid double counting net new jobs, the average of all years was used to estimate the number of jobs created per year.

3 Includes indirect and induced economic benefits

As part of its infrastructure program, AAF has voluntarily assumed the cost of grade crossing safety improvements related to the introduction of passenger rail service. However, the State of Florida requires municipalities to fund the maintenance of grade crossing equipment within their jurisdictions. The Project will result in minor increases in the annual cost of maintaining grade crossing equipment due to the addition of a second track, as set forth in the Florida Department of Transportation Schedule of Annual Cost of Automatic Highway Grade Crossing Traffic Control Devices (725-090-41). Municipalities will also experience a small increase in the periodic cost of roadway resurfacing at the grade crossings, which typically occurs every 5 to 10 years based on the volume of highway traffic.

If proposed by municipalities and approved by FRA, municipalities are typically responsible for funding all improvements and equipment maintenance associated with Quiet Zones within their jurisdictions. However, AAF's investments in grade crossing safety improvements, in conjunction with amendments to existing crossing license agreements, include several components that are necessary in the establishment of Quiet Zones. As a consequence, the cost of Quiet Zones will be greatly reduced. Further, the State of Florida has made monies available to counties and municipalities for quiet zone improvements.

Private crossing owners typically bear the cost of improvements at private grade crossings, as this is a function of the right to have a private crossing. The allocation of costs will generally be based on the terms of existing private crossing agreements.

Potential adverse effects to other elements of the transportation industry include passenger diversions. The Project would divert an estimated 10 percent of the proposed long-distance passenger rail ridership from airplane passengers to passenger rail service. This equates to approximately 400 air passengers per day. Based on 2014 airline flight schedules (Orlando Airports 2014) and load factors (DOT 2014) as well as industry average revenue per passenger mile and the annual operating revenues of the airlines currently providing direct service between Orlando and South Florida (American Airlines, Spirit Airlines, and Silver Airways), the lost revenue from diversion of air passengers would account for less than 0.01 percent of the airlines' combined annual operating revenue. Therefore, the forecast diversion of air travelers to the AAF service would not have a significant economic impact to the airlines currently serving the two markets. The potential diversion from other intercity rail services and bus services is also not anticipated to result in a significant economic impact from lost revenue.

Property Acquisition

Potential economic effects due to property acquisitions associated with each segment of the Project are described below:

MCO Segment

The MCO Segment would not require acquisition of privately owned property as it is entirely within MCO property boundaries. Since no land acquisition is necessary, the MCO Segment would not result in the reduction of municipal tax revenue, commercial displacements, or job loss.

East-West Corridor

As noted in Section 5.1.1.1, the E-W Corridor would require the acquisition and use of nine privately owned properties outside the SR 528 right-of-way in Orange County and four privately owned properties near the Cocoa Curve in Brevard County. Acquisition and use of these parcels of property would reduce municipal

tax rolls by approximately 45.1 acres in Orange County and 21.7 acres in Brevard County. Due to the relatively low acreage required within each county, the loss of associated municipal property tax revenues attributable to the E-W Corridor would be negligible, and would not be significant enough to affect government services. The E-W Corridor would also require AAF to acquire a property interest of 26.9 acres belonging to FECR near the Cocoa Curve in Brevard County; however, this acquisition would not affect municipal tax revenues, as this property is not currently included in the municipal tax roll of Brevard County. Property acquisitions associated with the E-W Corridor would not result in job losses or the displacement of any commercial or industrial operations, nor would they induce changes to adjacent land uses that could result in these impacts.

North-South Corridor

The Project would not require acquisition of privately owned property along the N-S Corridor, as the N-S Corridor is entirely within the existing FECR Corridor. Since no land acquisition is necessary, the Project would not result in the reduction of municipal tax revenue, commercial displacements, or job loss along the N-S Corridor.

Phase I - West Palm Beach-Miami Corridor

The WPB-M Corridor would require acquisition of private property for the proposed stations at West Palm Beach and Fort Lauderdale. Any direct loss in real estate taxes, however, would be offset by revenues from increased property values in areas adjacent to these stations. The relocated Fort Lauderdale Station requires acquisition of three parcels, one of which is occupied by an office building that would be demolished to make way for the station lobby building. Tenants within the office building would be displaced by the Project, but are expected to relocate within Fort Lauderdale with no loss of jobs or income tax revenue.

Maritime Economy

The economic effects of extended bridge closures to the local maritime economy would be the same for Alternatives A, C, and E, as each would include the same bridge improvements and the same number of passenger trains. Even when accounting for the seasonal differential in boat counts, the Project would result in negligible cost increases for recreational and commercial vessels; therefore, the Project is not anticipated to have an adverse economic impact to the maritime industries along the affected waterways.

St. Lucie River

As noted in Section 6.6 of the 2014 *Navigation Discipline Report*, the Project would potentially result in minor economic impacts to jobs, economic growth, and development. The estimated economic impact under the Project Alternatives (Table 5.4.3-2) is \$520 per day or \$189,800 annually (an increase of \$311 per day or \$113,515 annually when compared to the No-Action Alternative). This is the impact of the increased total vessel delay per day on the marine industry under the Project Alternatives and represents less than a 0.1 percent increase in the percent cost of waiting compared to the marine industry value at the St. Lucie River (AMEC 2014a).

	Units	No-Action Alternative	Project Alternatives	Difference
Average Wait Time for All Vessels	min	223	239	16
Commercial Industry				
Vessels Experiencing a Wait	#/day	9	4	-5
Cost of Vessel Wait to Marine Industry	\$/day	26	55	29
Percent Cost Compared to Marine Industry Value	%	0.0011	0.0023	0.0012
Recreational Industry				
Vessels Experiencing a Wait	#/day	148	165	17
Cost of Vessel Wait to Marine Industry	\$/day	341	832	491
Percent Cost Compared to Marine Industry Value	%	0.0156	0.0381	.0225

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

Loxahatchee River

As noted in Section 6.5 of the 2014 *Navigation Discipline Report*, the Project would potentially result in minor economic impacts to jobs, economic growth, and development. The estimated economic impact under the Project Alternatives (Table 5.4.3-3) is \$208 per day or \$75,920 annually (an increase of \$83 per day or \$30,295 annually when compared to the No-Action Alternative). This is the impact of the increased total vessel delay per day on the marine industry under the Project Alternatives and represents less than a 0.1 percent increase (AMEC 2014a).

	Units	No-Action Alternative	Project Alternatives	Difference
Average Wait Time for All Vessels	min	147	269	122
Commercial Industry				
Vessels Experiencing a Wait	#/day	1	2	1
Cost of Vessel Wait to Marine Industry	\$/day	9	18	9
Percent Cost Compared to Marine Industry Value	%	0.0006	0.0012	0.0006
Recreational Industry				
Vessels Experiencing a Wait	#/day	15	45	30
Cost of Vessel Wait to Marine Industry	\$/day	241	440	199
Percent Cost Compared to Marine Industry Value	%	0.0182	0.0331	0.0149

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

New River

As noted in Section 6.4 of the 2014 *Navigation Discipline Report* (Appendix 4.1-3-B1), the Project is not anticipated to result in adverse economic impacts to jobs, economic growth, and development. The increase in average vessel wait times results in minor economic impact under the Project Alternatives (Table 5.4.3-4), which is estimated at \$161 per day or \$58,765 annually (a decrease in loss of \$212 per day or \$77,380 annually when compared to the No-Action Alternative). This is the cost of the total vessel delay per day on the marine industry under the Project Alternatives, and creates a minimal impact as there is a less than 0.1 percent increase in the cost of waiting compared to the marine industry value at the New River, when compared to the No-Action Alternative (AMEC 2014a).

	Units	No-Action Alternative	Project Alternatives	Difference
Average Wait Time for All Vessels	min	390	481	91
Commercial Industry				
Vessels Experiencing a Wait	#/day	14	20	6
Cost of Vessel Wait to Marine Industry	\$/day	196	239	43
Percent Cost Compared to Marine Industry Value	%	0.0031	0.0038	0.0007
Recreational Industry				
Vessels Experiencing a Wait	#/day	35	56	21
Cost of Vessel Wait to Marine Industry	\$/day	493	611	118
Percent Cost Compared to Marine Industry Value	%	0.0092	0.0114	0.0022

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

5.4.3.3 Indirect and Secondary Impacts

This section includes an evaluation of potential indirect and secondary effects of the Project to local economic conditions, which would include job creation and economic development stemming from increased goods and services and re-spending patterns as well as the effects of the construction and operation of transit-oriented development (TOD) that will be created by AAF at and around the stations in Miami, Fort Lauderdale, and West Palm Beach. This section also includes a discussion of the relationship between railroads and neighboring property values.

Table 5.4.3-5 summarizes the potential indirect and secondary effects of the Project on local economic conditions, including job creation, labor income, GDP, total economic impact, and tax revenue. Table 5.4.3-6 summarizes the direct, indirect, and secondary economic benefits associated with TOD construction and operations within Miami-Dade, Broward, and Palm Beach Counties.

	Construction	Operations ¹	
		Average Annual	Cumulative (2016-2021)
Jobs ²	2,793	491	491
Labor Income (\$ Mil.)	\$303.2	\$24.8	\$148.6
Gross Domestic Product (\$ Mil.)	\$484.6	\$40.4	\$242.6
Total Economic Impact (\$ Mil.)	\$788.4	\$63.3	\$379.7
Federal, State, and Local Revenue (\$ Mil.) ³	\$173.2	\$20.9	\$125.5

Source: WEG 2014

1 Includes Miami-Dade and Broward Counties

2 To avoid double counting net new jobs, the average of all years was used to estimate the number of jobs created per year.

3 Includes direct economic benefits

	Construction	Operations	
		Average Annual	Cumulative (2017-2021)
Jobs ¹	1,695	389	389
Labor Income (\$ Mil.)	\$658.8	\$11.0	\$66.1
Gross Domestic Product (\$ Mil.)	\$980.5	\$34.1	\$204.4
Total Economic Impact (\$ Mil.)	\$1,800.5	\$56.8	\$284.1
Federal, State, and Local Revenue (\$ Mil.)	\$187.4	\$9.6	\$48.2

Source: WEG 2014

1 To avoid double counting net new jobs, the average of all years was used to estimate the number of jobs created per year.

Additional indirect economic benefits of the Project could be realized through savings associated with reduced highway maintenance costs. The operation of passenger rail service would relieve road congestion, which would prolong the lifespan of highway infrastructure more than if the passenger rail service were not operating.

Property Values

Commenters stated that the DEIS did not adequately evaluate the effects of the Project on residential property values. They indicated that train traffic associated with the Project would increase noise levels, worsen roadway congestion, reduce safety, and limit waterfront access. In the opinion of these commenters, these impacts would lower property values along the rail line, which would cause undue economic hardship for local governments and property owners. Lower property values would reduce municipal property tax revenues, thereby limiting local governments' ability to provide community benefits. Lower property values would also reduce personal wealth. Impacts to noise, traffic, safety, and waterfront access resulting from the Project would make it difficult for property owners to sell their real estate holdings. The combination of lower property values and a deteriorating real estate market would be particularly harmful to Environmental Justice communities.

The FECR Corridor is an active freight rail corridor, with approximately 14 round-trip freight trains per day under current conditions, projected to increase to 20 by 2019. In recent years, the number of freight trains was substantially higher, with 24 daily trains in 2006. The AAF passenger service would not be introducing a new rail element along this corridor, and the incremental effects of adding passenger trains would not significantly degrade the quality of life in municipalities and communities along the rail line. AAF would not introduce significant new disruption, noise, traffic, or other effects that could affect property value. Properties along the railroad are already valued according to their proximity to the rail line. An FRA study “neither established nor excluded the possibility of adverse effects on property values.” It did, however, generally conclude, “other things equal, being within 1,000 feet of an operating rail line depresses the sale price of a property from 5 percent to 13 percent on average.” Because the FECR was established over 120 years ago and has been in continuous operation since the late 1800s, any impact of the railroad on the valuation of nearby properties, up or down, would have already occurred long ago and would not be substantially changed by the added passenger trains.

With respect to waterfront property along the New River, Loxahatchee River or St. Lucie River, the Project would result in increased closings of the moveable bridges. However, the moveable bridges would remain in operation and these rivers would continue to be open to navigation as required by the Coast Guard. Properties along these rivers with docks would continue to have boat access both upriver and downriver. Therefore, the Project is not expected to affect the value of these properties.

Limited research exists on the relationship between trains and property values, and the research that does exist present inconsistent findings. Relevant studies that were readily accessible at the time of this writing are summarized below. *Regulatory Evaluation and Regulatory Flexibility Assessment for Use of Locomotive Horns at Highway-Rail Grade Crossings Final Rule*, prepared by FRA in 2003, included an evaluation of the effects of locomotive horns on property values (FRA 2003). The study “neither established nor excluded the possibility of adverse effects on property values” (FRA 2003). It did, however, generally conclude, “other things equal, being within 1,000 feet of an operating rail line depresses the sale price of a property from 5 percent to 13 percent on average” (FRA 2003).

Examining the Spatial Distribution of Externalities: Freight Rail Traffic and Home Values in Los Angeles, prepared by Michael Futch in 2011, concluded, “an increase in rail traffic by 10 million gross ton miles per mile (MGTM/mi) causes a 0.7 percentage point lower growth in home values within a 1/3 mile band around the tracks” (Futch 2011). *The Effect of Rail Transit on Property Values: A Summary of Studies*, prepared by Parsons Brinckerhoff in 2001, compiled the key findings of the major studies on the subject since 1991. This summary paper concluded, “there is little support for the suggestion that proximity to rail actually decreases property values” (Parsons Brinckerhoff 2001). Prepared by a consortium of authors in 2007, *The Impact of Transit Corridors on Residential Property Values* evaluated the effect of transit corridors on property values with and without the benefit of access. This study, which reviewed various types of transit corridors including freight and transit lines, concluded, “proximity to the transit corridor alone without direct access conveys a negative impact on nearby housing values” (Kilpatrick et al. 2007).

As demonstrated, there is limited research on the relationship between trains and neighboring property values, and the research that does exist present inconsistent findings. As such, the potential for the Project to impact residential property values is inconclusive.

Maritime Industry

Commercial destinations on the St. Lucie River are primarily vessel/yacht repair and support facilities, which would not be anticipated to incur any decline in business as a result of the impacts of the Project on navigation and, therefore, the Project would have minimal impact to such businesses. There are no cruise ships, commercial freighters, or other large oceangoing vessels that access the St. Lucie River; therefore, implementation of the Project would have no impact to existing or future operations of these types of vessels. However, increased bridge closures could affect the time required for barges transiting the Okeechobee Waterway to pass the St. Lucie River Bridge. Barges can only transit the bridge at slack tides, and require a substantial length of time to achieve headway after stopping.

There are very few commercial destinations on the Loxahatchee River, as most of the waterfront development is residential. The few commercial destinations are not expected to incur any decline in business as a result of the impacts of the Project on navigation. There are no cruise ships, commercial freighters, or other large oceangoing vessels that access the Loxahatchee River; therefore, the Project would have no impact to existing or future operations of these types of vessels.

Commercial destinations on the New River are primarily boat/yacht repair and support facilities. These facilities are anticipated to incur minor impacts to their business as a result of the moderate impacts of the Project on vessel wait times and queue lengths. Port Everglades is located east of the New River Bridge. Cruise ships, commercial freighters, and other large oceangoing vessels do not access the New River; therefore, the Project would have no impact to existing or future operations at Port Everglades.

Local Businesses

Commenters stated that the DEIS did not adequately evaluate the effects of the Project on businesses located in small downtown areas along the N-S Corridor. They believed that increased noise and congestion from the Project would discourage customers, particularly tourists, which would force businesses to close, increase retail vacancies, and reduce sales tax revenue. These impacts would also limit future development along the rail line.

The FECR Corridor is an active freight rail corridor, currently with approximately 14 round-trip freight trains per day under current conditions, projected to increase to 20 by 2019. In recent years, the number of freight trains was substantially higher, with 24 daily trains in 2006. The AAF passenger service would not be introducing a new rail element along this corridor, and the incremental effects of adding passenger trains would not significantly degrade the viability of businesses located in town centers along the rail line. The FECR Corridor has supported freight and/or passenger rail service on a continuous basis for more than 100 years, and existing downtowns along with their commercial properties largely developed around these conditions. AAF would not introduce significant new disruption, noise, traffic, or other effects that could affect businesses.

As noted in Section 5.2.2.2, the Project would have no permanent noise impacts along the N-S Corridor due to the use of wayside horns. Future noise levels along the N-S Corridor would be comparable to existing noise levels for mainline segments and substantially lower than existing noise levels at grade crossings. If municipalities believe further noise reduction is necessary, there is the option of seeking Quiet Zone designation under 49 CFR part 222. A Quiet Zone is “a section of a rail line at least on-half mile in length

that contains one or more public crossings at which locomotive horns are not routinely sounded.” Quiet Zones are proposed by municipalities, designed in accordance with FRA standards, and approved by FRA. Municipalities are responsible for funding all improvements and equipment maintenance associated with Quiet Zones within their jurisdictions. AAF has committed to working with local municipalities to develop Quiet Zones as an alternative to the use of wayside horns.

As noted in Section 5.1.2.2, typical grade crossings would be closed an average of three times per hour, which would leave the majority of each hour of operation unaffected by the introduction of passenger train service. An increase in the number of crossing events would cause additional closures; however, the closures due to the passing of passenger trains would be much shorter than closures from existing freight traffic.

Given the minimum impact to noise and local traffic conditions, the additional 16 passenger rail round trips per day is not expected to result in an adverse impact to businesses within small downtowns along the N-S Corridor. There are many locations across the United States, particularly in the Northeast, where intercity passenger rail or commuter rail has been re-instated on out-of-service rail lines or on active freight lines that pass through town centers. There have been no demonstrated downturns in local businesses following the re-introduction of rail service. Downtown businesses are, however, affected by factors such as regional economics, jobs, tourism, parking, and the development of malls and big-box retail stores in areas outside of the downtown.

5.4.3.4 Temporary Construction-Period Impacts

This section includes an evaluation of the potential direct, indirect, and secondary effects of the Project during the anticipated construction period (mid-2014 to mid-2016), which would include job creation and investments associated with the design, engineering, and construction of rail, bridges, communications infrastructure, support facilities, and train stations as well as equipment purchases. As shown in Table 5.4.3-7, constructing the Project is expected to generate nearly 5,500 jobs, with a total economic benefit of approximately \$1.7 Billion. Table 5.4.3-8 summarizes the cumulative economic benefits during construction of the project by county.

	Palm Beach	Martin	St. Lucie	Indian River	Brevard	Orange	Total
Job Creation ¹	464	226	194	191	704	877	2,656
Labor Income (\$ Mil.)	\$54.0	\$26.2	\$22.4	\$22.2	\$81.6	\$101.6	\$308.0
Gross Domestic Product (\$ Mil.)	\$72.0	\$35.0	\$30.2	\$30.0	\$109.2	\$136.2	\$412.6
Total Economic Impact (\$ Mil.)	\$160.0	\$78.0	\$66.8	\$66.0	\$242.6	\$302.2	\$915.6
Federal, State, and Local Tax Revenue (\$ Mil.) ²	\$30.2	\$14.6	\$12.6	\$12.4	\$46.0	\$57.4	\$173.2

Source: WEG 2014

1 To avoid double counting net new jobs, the average of all years was used to estimate the number of jobs created per year.

2 Includes indirect and induced economic benefits

Table 5.4.3-8 Summary of Cumulative Economic Benefits of AAF Construction

	Palm Beach	Martin	St. Lucie	Indian River	Brevard	Orange	Total
Job Creation ¹	952	464	398	392	1,444	1,799	5,449
Labor Income (\$ Mil.)	\$107.0	\$52.0	\$44.6	\$44.2	\$161.8	\$201.6	\$611.2
Gross Domestic Product (\$ Mil.)	\$156.8	\$76.2	\$65.6	\$64.8	\$237.6	\$296.2	\$897.2
Total Economic Impact (\$ Mil.)	\$297.6	\$145.2	\$124.2	\$123.0	\$451.6	\$562.4	\$1,704.0
Federal, State, and Local Tax Revenue (\$ Mil.)	\$30.2	\$14.6	\$12.6	\$12.4	\$46.0	\$57.4	\$173.2

Source: WEG 2014

1 To avoid double counting net new jobs, the average of all years was used to estimate the number of jobs created per year.

5.4.4 Public Health and Safety

This section describes the proposed conditions within the Project Study Area with respect to the health and safety of the residents and communities that may be affected by the construction and long-term operation of the Project. The Project would comply with all relevant health and safety regulations and would not adversely impact the public's health or safety. Further, the Project would provide a public safety benefit by potentially contributing to the reduction of roadway crashes, as passenger train trips have a lower crash risk than passenger vehicles (i.e., car or light truck) (Litman 2014). Measures would be in place to protect the security of the railroad infrastructure and the traveling public.

The 2013 FONSI for Phase I (FRA 2013) found that the addition of passenger trains to the FECR Corridor and the development of the corresponding stations will not negatively impact public health or safety. The Project would result in enhancing public safety with improvements to grade crossing signal equipment for vehicular and pedestrian traffic. Also, the benefits resulting from decreased congestion and the potential for fewer vehicular crashes and fewer air emissions indicate that there will be no significant negative impacts on public health and safety. According to the 2013 FONSI, Phase I of the Project will not result in significant adverse impacts on public health and safety. The same conclusion applies to Phase II.

Many comments on the DEIS concerned the effects of increased train traffic on public health and safety, particularly with the increased number of at-grade crossing closures to allow train passage and the effect on emergency vehicle response times. Other commenters asked about AAF's safety plan. Section 1.7.7 of this FEIS provides a general response to these comments, and other information is provided in the following sections.

5.4.4.1 Regulatory Framework

The following publications and resource materials from FRA and other USDOT agencies were reviewed for general safety information. The Project would be constructed and operated in compliance with these regulations:

- **Rail Safety Improvement Act of 2008 (Public Law 110-432).** The Rail Safety Improvement Act reauthorized funding to enable FRA to oversee the nation's rail safety program between 2009 and 2013. One aim of the statute is to improve conditions of rail bridges and tunnels. The Rail Safety Improvement Act also requires that railroads implement Positive Train Control (PTC) systems to prevent train-to-train collisions on certain rail lines by the end of 2015.

- **Federal Railroad Administration (49 CFR Volume 4, Chapter II, part 200 to 299).** FRA regulations for railroad transportation safety, including standards, rules, and practices, are listed in 49 CFR parts 200-299.
- **U.S. Code on Railroad Safety (49 U.S.C. §§ 20101 et seq.).** Part A of Subtitle V of Title 49 of the United States Code contains a series of statutory provisions affecting the safety of railroad operations.
- **Department of Homeland Security/Transportation Security Administration (49 CFR part 1580).** Part 1580, Rail Transportation Security, codifies the Transportation Security Administration inspection program. It includes security requirements for freight railroad carriers; intercity, commuter, and short-haul passenger train service providers; rail transit systems; and rail operations at certain fixed-site facilities that ship or receive specified hazardous materials by rail.
- **Transportation Security Administration - Security Directives for Passenger Rail Security.** Directives RAILPAX-04-01 require rail transportation operators to implement 15 protective security measures, which include reporting potential threats and security concerns to the Transportation Security Administration, and designate a primary and alternate security coordinator.
- **Emergency Planning and Community Right-to-Know Act.** The objectives of the Emergency Planning and Community Right-to-Know Act are to allow state and local planning for chemical emergencies, provide for notification of emergency releases of chemicals, and address a community's right-to-know about toxic and hazardous chemicals(42 USC 116).
- **Guide to Developing a Passenger Train Emergency Preparedness Plan.** FRA's *Guide to Developing a Passenger Train Emergency Preparedness Plan* assigns railroad operators the responsibility for developing and implementing an emergency preparedness plan that complies with applicable laws and regulations, based on the specific circumstances of the proposed railroad's operations (FRA 2010a).
- **FDOT Rail Handbook.** The Rail Handbook identifies rail processes, guidelines, and responsibilities for the development and implementation of programs which include Highway-Rail Grade Crossing Inventory, Highway-Rail Grade Crossing Safety Improvement Program, Construction and Maintenance Project Management Program, Public Highway-Rail Grade Crossing Opening – Closure Program, Railroad Safety Inspection Program, Florida Rail System Plan, Rail Emergency Management Plan, and the Use of Locomotive Horns at Highway-Rail Grade Crossings and Quiet Zone Application Process (FDOT 2012a).

FDOT provides railroad Safety Inspectors to ensure each railroad is in compliance with 49 CFR part 200 *et seq.*, which includes but is not limited to, inspections of:

- Railroad operating and safety rules;
- Federal regulations concerning training and testing of operating personnel;
- Protection of employees working on track and equipment;
- Drug and alcohol prohibitions;
- Railroad communications; and
- Train identification.

FECR has established operational rules based on FRA guidelines under which they operate. These guidelines are included as Section 6, Method of Operation, in FECR's Operating Rules (FECR 2012a). FECR's Method of Operation includes the following major operational rules and supporting information:

- General Signal Rules (Signals Imperfectly Displayed Governing Signal, Manual Block Territory);
- Interlocking Rules (Automatic Block and Interlocking Signals);
- Automatic Block Signal (ABS) Rules;
- Centralized Traffic Control (CTC) Signal System Rules (Automatic Train Control System);
- Control Station Rules; and
- Rules for Railroad Communications.

5.4.4.2 Environmental Consequences

The No-Action Alternative would continue to be operated consistent with the regulations applicable to the existing FECR freight operations. The Project infrastructure and equipment would be constructed, maintained and operated consistent with FRA safety regulations.

Design elements of the Project include: enhancing signal and train control systems; reducing the potential for accidents at highway-rail at-grade crossings; and limiting access to rail infrastructure by trespassers and other unauthorized persons. These design elements support safe railroad operations for passengers, employees, pedestrians, and motorists. Consolidated control of both freight and passenger train movements, plus the added rail infrastructure, will allow freight operations to continue to operate reliably without adverse impact from the restoration of intercity passenger rail services within the N-S Corridor.

The Project would not appreciably affect public health, safety, and security in the rail corridor. While greater frequency of trains may increase the frequency of opportunities for conflict between trains and vehicles or people, safety improvements at crossings, an upgraded PTC system, enhanced security, and improved communications among emergency responders would be a beneficial effect, serving to minimize potential conflicts and their consequences. AAF will develop a comprehensive safety program for the Project including guidelines and plans including: a passenger train emergency preparation plan, a safety and security certification plan, track safety standards, an operations system safety program plan, a right-of-way safety and security plan, and several FECR safety procedures, including, for example, FECR's Emergency Preparedness Plan (FECR 2012c).

Public Safety

Public safety concerns include at-grade crossings, train control systems, and transport of hazardous materials. Operations within the E-W Corridor and adding passenger trains to the N-S Corridor are not expected to adversely impact public health or safety. Any of the Project Alternatives under consideration would elevate public safety by improving grade-crossing signal equipment for vehicular and pedestrian traffic and upgrading current crossing equipment with signals interconnected with highway traffic signals, constant warning time activation through the railroad signal system, and other devices and measures as required by pertinent laws, regulations, and local safety plans. Upgrades to road crossings will be coordinated with and/or communicated to local emergency responders, as activations at the road crossings

are expected to be more frequent with the increased frequency of train traffic. However, the delays are also expected to be minimal, as the passenger trains should clear a typical crossing in less than one minute.

No-Action Alternative

In the No-Action Alternative, the existing signal system along the N-S Corridor would remain in place, and all at-grade crossings would be protected as they currently are. There would be no change to public safety. There are no anticipated changes in frequency or quantity of hazardous materials to be transported along the N-S Corridor; however, given the number of ports along the corridor, growth could occur. Hazardous materials would continue to be transported consistent with applicable statutes, rules and regulations, and there would be no effect to health and safety due to the transportation of these materials.

The No-Action Alternative is not expected to have a positive effect on public health and safety in the Project Study Area, as vehicular, bicycle, and pedestrian traffic safety would not be enhanced with upgraded at-grade crossings. The number of freight trains is projected to increase from an average of 14 per day (2013) to 20 (2016).

Action Alternatives A, C, and E

Alternatives A, C, and E are anticipated to have the same effects on public safety.

At-Grade Crossings

As is described in Chapter 3, Alternatives, the E-W Corridor would be entirely grade separated at roadways. Existing roads would either be crossed using bridges or would be closed, eliminating any potential safety concerns. As part of the Project, existing crossings along the N-S Corridor would be upgraded in accordance with applicable laws regarding safety requirements, with the need for improvements being determined by a crossing-by-crossing diagnostic approach. During the winter of 2013-2014, AAF contacted FRA and FDOT requesting both agencies' assistance in conducting a diagnostic safety review of the existing grade crossings along the FECR corridor to make objective judgments about the physical and operational characteristics at roadway rail crossings, and to recommend modifications to the crossings based on a consensus determination concerning crossing safety needs. The Diagnostic Team consisted of representatives from FDOT, FRA, FECR and AAF, as well as local officials. The Diagnostic Team concluded the on-site review in Cocoa having looked at 349 total grade crossings in all. FRA has published recommendations for those respective grade crossings based on FRA's Highway-Rail Grade Crossing Guidelines for High-Speed Passenger Rail (<http://www.fra.dot.gov/eLib/Details/L03536>) (Appendix 5.4.4), which are listed in Tables 3.3-8 through 3.3-12 in this FEIS.

Upgrades to road crossings would be coordinated with and/or communicated to local emergency responders, as activations at the road crossings are expected to be more frequent with the increased frequency of train traffic (32 additional passenger train crossings per day). Recommendations for crossings include flashing lights and gates, pedestrian lights and gates, advance warning signs, additional signage, motion sensors, raised medians or barriers, improved crossing geometry, improved sight distances, or other modifications.

While the increased number of train crossings would increase the delay to local traffic at grade crossings as compared to the No-Action Alternative, the local area traffic would not be affected for the majority of

the day. The trains should clear a typical crossing in less than 1 minute and the grade crossing would reopen for traffic in approximately 50 seconds for a passenger train and between 147 and 170 seconds for a freight train. Although not quantifiable, some additional public health and safety benefits will be realized from the anticipated decrease in roadway congestion and the potential for fewer vehicular accidents on existing parallel roadways such as U.S. 1 and I-95, as well as a decrease in air emissions.

Traffic signal pre-emption exists at many intersections on the corridor. FDOT determines the necessary signalization requirements at each intersection. Consistent with FRA regulations, AAF will complete an analysis of collision hazards, including those from motor vehicles, as part of the overall hazard analysis prior to start of revenue service.

Train Operations

According to the operating plan, some trains are scheduled to pass or “meet” at or in the immediate vicinity of grade crossings. As part of the diagnostic review, “Next Train Coming” notification signs or Operation Lifesaver Education forums will be considered to notify the public of a change in grade crossing operations.

The new signal system to be implemented along both the N-S and E-W Corridors as part of the Project would retain the same system currently in use (route-signaling augmented by in-cab signals⁶), as well as provide a PTC overlay system with a back office server in the operations control center to achieve compliance with 49 CFR part 229, *Positive Train Control Systems; Final Rule*.

Some commenters requested that AAF include a safety analysis and plan in the FEIS. Consistent with FRA safety requirements which are not part of the NEPA process, AAF will develop a Hazard Analysis and System Safety Program Plan prior to the start of operations. These documents will identify potential system risks based on an evaluation of potential risk severity and frequency.

As stated in Section 3.3.5 of the 2012 EA, along the WPB-M Corridor AAF will enhance public safety with improvements to existing grade-crossing signal equipment for vehicular and pedestrian traffic. This would include upgrading current crossing equipment with signals interconnected with highway traffic signals, constant warning time activation through the railroad signal system, reballasting track at the crossings to improve drainage, and other devices and measures as required. No adverse impacts to public safety for residential and recreational land uses adjacent to the proposed improvements along the WPB-M Corridor will occur. The WPB-M Corridor includes stops in the central business districts of West Palm Beach, Fort Lauderdale, and Miami. Each station will be ADA compliant and include safety features such as cameras in stations and parking lots, and regular police patrols.

Security

Security considers the effects of the Project on the security of the rail system.

6 The current train control system on the FEC North-South Corridor is “Route-signaling” augmented by in cab signals that display the state of the wayside signals continuously in the locomotive cab via electronic coded track. This electronic coded track also provides for broken rail detection.

No-Action Alternative

Under the No-Action Alternative, the existing fencing and other protection systems along the N-S Corridor would remain in place with no upgrades.

Action Alternatives A, C, and E

Alternatives A, C, and E are anticipated to have the same effects on security. For the E-W Corridor standard FDOT highway fencing, or its equivalent, will be added throughout the length of the corridor where the track is at-grade that will restrict and seal the railroad right-of-way from public access. Fencing in downtown areas should be compatible with the character and aesthetics of the community, particularly within historic districts. Based on coordination with the natural resource agencies, the standard fencing may be modified or substituted with fencing appropriate to discourage wildlife crossings. Fencing on the N-S Corridor would be upgraded based on existing public access locations and the potential for conflicts with the increased train frequency.

AAF will conduct ROW Field Surveys to observe, document, and provide recommendations to minimize trespassing by employing fencing, warning signage, public outreach/information, and other appropriate measures as required.

Barriers to the Elderly and Handicapped

The Project would benefit elderly and handicapped individuals by providing a transportation option that will enhance mobility and livability in their communities. During the design phase, federal, state, and local provisions related to the Americans with Disabilities Act (ADA) of 1990 compliance would be followed. The ADA provides for equal opportunity for individuals with disabilities to access public and private facilities.

No-Action Alternative

Under the No-Action Alternative, there would be no change to access by the elderly and handicapped. The new passenger rail stations proposed as part of Phase I would be fully accessible.

Action Alternatives A, C, and E

Alternatives A, C, and E are anticipated to have the same effects on accessibility. The passenger trains would comply with ADA requirements. AAF trains will be single level, fully accessible coaches, with no stairs or other obstacles to impede movement on board trains. Every coach car would have ADA-compliant restrooms.

As stated in Section 3.3.4 of the 2012 EA, the WPB-M Corridor would not result in significant adverse impacts in terms of barriers to the elderly and handicapped populations. Designated ADA-compliant parking spaces at the three stations would be provided to ensure availability of parking and decrease the distance for elderly and disabled passengers to travel to the train platform. In addition, all station facilities and platforms would have elevator access and level boarding, and individuals with disabilities would not encounter stairs in boarding or departing from trains.

Geological Conditions

Geological conditions may be a safety concern if subsurface conditions are favorable to sinkhole formation or geological faulting. No geological faults are known within the Project Study Area.

No-Action Alternative

Under the No-Action Alternative, risks posed by sinkholes would be unchanged.

Action Alternatives A, C, and E

Alternatives A, C, and E are anticipated to have the same risks to public safety posed by sinkholes. The potential for collapse of sinkholes along any segment of the Project is anticipated to be low. However, if sinkholes were to occur in the railway alignment or any public areas, the sinkholes would be immediately reported to local law enforcement and cordoned-off for public safety.

As stated in Section 3.0 of the 2012 EA, the WPB-M Corridor would not require tunneling or subterranean construction activities. Thus, no potential impact to geology or geologic resources exists.

Hazardous Materials

Planned operations at the VMF, such as vehicle fueling, maintenance, repair, and washing will include use of hazardous materials (primarily petroleum products, lubricants and degreasers). The Project does not include use or storage of hazardous materials outside the VMF. The typical materials that would be stored and used at the VMF include diesel fuel, motor oils, lubricants, and degreasers. All hazardous products would be stored in double-walled storage containers or double-walled ASTs. Hazardous materials would be used and stored at the VMF according to accepted industry BMPs. Planned operations at the VMF are similar to operations currently ongoing at MCO, and are considered minor in the respect to the overall operations and land use at the airport, as explained in Section 5.2.4.

There are no anticipated changes in frequency or quantity of hazardous materials to be transported along the N-S Corridor; however, given the number of ports along the Florida coast, growth could occur. Hazardous materials would continue to be transported consistent with applicable statutes, rules and regulations and there would be no anticipated effect to health and safety due to the transportation of these materials.

Formally Used Defense Sites (FUDS)

The USACE completed a Remedial Investigation/Feasibility Study (RI/FS) of the entire former Pincastle Jeep Range (PJR) property in 2010, which is located along the E-W Corridor, north of SR 528 between Narcoossee Road and SR 417. The PJR property was formerly used as an Army weapons demonstration range and training facility. The purpose was to determine where and what type of contamination was present. During the RI/FS, crews searched for munitions and collected soil and water samples. They dug over 51,000 objects and collected almost 200 samples. Over 800 of the metallic items were debris related to munitions (such as casings and fragments), but only 24 were actual munitions. The remaining objects were nails, fencing and the like. The munitions and munitions debris were found primarily on undeveloped land and none were found in residential lots. No munitions, pieces of munitions, or soil or

water contamination were found north of Lee Vista Boulevard. No environmental contamination was identified in any of the residential areas.

The site was divided into four Munitions Response Sites (MRS) based on what was found during the RI/FS. The MRSs are: Demonstration Range North, Demonstration Range South, Demonstration Range East, and Remaining Area. The demonstration ranges are south of Lee Vista Boulevard, north of Beachline Expressway, and from the western boundary of the property east to the Orange County landfill. Demonstration Range South is a portion of the undeveloped property known as Mockingbird. Demonstration Range East includes Beltway Commerce Center and a portion of the landfill property. Demonstration Range North is south of Lee Vista Boulevard and includes Odyssey Middle School, Tivoli Gardens, and Lee Vista Square. All the residential neighborhoods except those in Demonstration Range North are in the Remaining Area MRS.

No-Action Alternative

Under the No-Action Alternative, the PJR would not be traversed.

Action Alternatives A, C, and E

Alternatives A, C, and E traverse the Remaining Area MRS, within the SR 528 ROW. The USACE has determined no munitions were located in these areas and no further action is required.

5.4.5 Historic Properties

The National Historic Preservation Act of 1966 (NHPA), as amended, defines historic properties as “any prehistoric or historic district, site, building, structure, or object included on or eligible for listing on the National Register [of Historic Places (NRHP)], including artifacts, records, and material remains related to the district, site, building, structure, or object” (54 USC § 300308).

Section 106 of the NHPA (Section 106) requires all federal agencies to take into account, prior to authorizing an undertaking, the effect of that undertaking on historic properties listed in or eligible for listing in the NRHP. Under Section 106,

“An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Consideration shall also be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property’s eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative” (36 CFR § 800.5(a)(1)).

This section of the FEIS contains FRA’s Findings of Effect under Section 106. The portion of the APE in which physical disturbance would occur is termed the direct effects APE; the portion of the APE in which changes in noise, vibration, or visual setting could occur that would alter the characteristics which make a property eligible for inclusion in the NRHP is termed the indirect effects APE. As discussed in Section 4.4.5, *Historic Resources*, no NRHP-listed or eligible properties were identified within the APEs for

the MCO Segment and the VMF. For the E-W Corridor, the NRHP-eligible Florida East Coast Railway (FECR) Historic District was the only historic property identified within the APE for direct effects. The NRHP-eligible FECR was also identified as a historic resource within the N-S Corridor APE for direct effects, and includes 12 contributing historic bridges, four of which have also been determined individually eligible, as described in Section 4.4.5 of this FEIS. The N-S Corridor also contains six recorded archaeology sites within the APE for direct effects, including one site that is NR-listed, one site that is NR-eligible, and four sites that have not been evaluated by SHPO. Within the APE for indirect effects, 63 historic properties and districts have been identified.

In the 2012 EA prepared for Phase I, the FRA determined that Phase I of the Project would have no adverse effect on the FECR Historic District, and SHPO concurred that the use of the historic rail line and restoration of passenger rail service for the Phase I Project would not constitute an adverse effect. None of the bridges within the WPB-M Corridor are individually eligible for the NRHP.

For Phase II, FRA has determined that the Project would have an adverse effect on the two bridges (the Eau Gallie River and St. Sebastian River Bridges) in the N-S Corridor that are individually eligible for the NRHP, due to the demolition of those properties. The Project would have no adverse effect on the NRHP-eligible FECR Historic District as a result of replacing or reconstructing the bridges that are contributing elements to the FECR District, because AAF will continue to consult with SHPO through the bridge design process to ensure that the new bridge design and appearance will be compatible with, and sensitive to, the characteristics of this historic district. The Project would have no adverse effects (noise, vibration, change in setting) to the historic properties located in the N-S Corridor APE for indirect effects.

5.4.5.1 Methodology

All cultural resource investigations and consultations were conducted in accordance with Section 106 of the NHPA and its implementing regulations for Protection of Historic Properties (36 CFR Part 800). Under Section 106, an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the property's integrity. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. Treatment measures to be implemented to avoid, minimize, and mitigate adverse effects identified during the Section 106 process will be memorialized in a Memorandum of Agreement (MOA) among FRA, AAF, and SHPO. A draft MOA is included with this FEIS in Appendix 5.4.5.

Effects were evaluated at each historic property within the APE to determine if there would be any physical alteration or modification of the property as a result of the project, or if the Project would change the setting of the property. Indirect effects were evaluated for all historic properties within the defined indirect impacts APE to determine if the Project would change their setting, if vibration would result in damage to a structure, or if changes in noise levels would have the potential to alter its character-defining features. None of the historic properties include a quiet setting as a character-defining feature. However, this EIS presents noise information in the interest of disclosure. Effects of proposed noise mitigation measures (pole-mounted horns and noise walls) were also evaluated.

5.4.5.2 Consultation and Public Involvement

FRA has prepared a Determination of Effect (DOE) report that contains its assessment of effects to historic properties and archaeological sites located within the APE and its adverse effect finding. This report was circulated, in draft form, to all local governments along the project corridor. Local governments were provided an opportunity to comment on the report, and to become consulting parties under Section 106. The following entities accepted FRA's invitation to become consulting parties:

- Broward County
- St. Lucie County
- City of Stuart
- City of Vero Beach
- Town of St. Lucie Village
- Martin County
- Indian River County Historical Society
- Indian River County
- Old Vero Ice Age Sites Committee

FRA incorporated comments, as appropriate, into the report and provided the document to the SHPO. On July 24, 2015, the SHPO concurred with the FRA's Determination of Effect (Appendix 4.4.5-A).

5.4.5.3 Environmental Consequences

This section identifies the potential beneficial and adverse effects to historic properties from the Project. Under Section 106, an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the property's integrity. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. As described in section 3.3 of the DEIS, FRA has conducted a detailed analysis of the environmental impacts of a No-Action Alternative and three Action Alternatives (Alternative A, Alternative C, and Alternative E). Each of the three Action Alternatives incorporates the same proposed action for these components: the MCO Segment and VMF, the E-W Corridor parallel to SR 528, and the N-S Corridor within the FECR Corridor. The three alternatives differ with respect to the alignment within the 17.4-mile segment of the E-W Corridor between the MCO Segment and SR 520 (within the Central Florida Expressway Authority (CFX) -controlled portion of SR 528 between SR 417 and SR 520).

No-Action Alternative

The No-Action Alternative is not anticipated to have any effect on historic properties.

Action Alternatives A, C, and E

The effects of Alternatives A, C, and E would be identical with respect to historic properties. This section provides a summary of impacts to historic properties and FRA's recommendations of effects.

MCO Segment

No NRHP-listed or eligible historic properties were identified within the MCO Segment and VMF APE. FRA has therefore determined that constructing and operating the MCO Segment and VMF would have no effect on historic properties.

East-West Corridor

Large portions of the East-West (E-W) Corridor APE were surveyed in 1990 and 2005 (Piper Archaeology 1990; Janus Research, Inc. 2005). The remaining portions, with the exception of one area where access was not allowed, were surveyed in 2013, as part of the 2013 CRAR. One NRHP-eligible resource has been identified in the direct effects APE for the E-W Corridor—the FECR Historic District, which is located at the east end of the E-W Corridor in Cocoa at the intersection with the N-S Corridor. FRA determined that constructing the E-W Corridor would have no adverse effect on the FECR Historic District because the restoration of passenger service along the rail line would not affect the characteristics that make the district eligible for the NRHP.

New communications towers are proposed along the E-W Corridor to support the Positive Train Control system and other communications systems. Although the locations of these towers have not yet been identified, AAF would site new towers in locations that have been determined not to affect above- or below-ground historic properties.

One property along the E-W corridor has not been evaluated for the presence of above-ground historic properties or archaeological resources, because evaluators have not been able to access the property. AAF has committed to conducting field investigations once access is granted.

North-South Corridor

The North-South (N-S) Corridor APE contains several above-ground historic properties in the APE for direct effects. The APE for direct effects includes the FECR Historic District; four of the bridges in the APE for the N-S Corridor have also been determined individually eligible, and an additional 8 bridges are eligible as contributing elements. The APE for indirect effects includes 63 historic properties, including districts, buildings, structures, and sites that are already listed in the NRHP or have been found eligible. There are also six archaeological sites that have been NR-listed, are determined NR-eligible, or that not been evaluated for eligibility. All proposed work will occur within the existing FECR ROW.

FECR Historic District (APE for direct effects)

The N-S Corridor was originally built as a double-track railroad, but today it is mostly a single-track railroad with several long sidings. The railbed for the second track still exists and would be used for the additional track improvements. The Project would return the N-S Corridor to a dual-track system. Infrastructure improvements, such as bridge replacements and curve improvements, are planned to be completed within the existing right-of-way (no additional right-of-way acquisition is anticipated). The addition of the second track will return the corridor to its historic configuration and historic use as a passenger rail line.

The NRHP-eligible FECR Historic District, which is the central resource of the N-S Corridor, would not be adversely affected by the Project. This decision is predicated on the previous FRA determination and SHPO concurrence regarding this resource during Phase I of this project. During a 2009 SHPO meeting regarding the South Florida East Coast Corridor Study (SFECC), there was agreement that the use of the historic rail line and restoration of passenger rail on the line would not constitute an adverse effect to the NRHP-eligible FECR Historic District, as this would not alter or adversely affect the character-defining features of this district. This was formalized in a determination from FRA that Phase I would not have an adverse effect on the FECR Historic District, and in a letter dated November 6, 2012, and appended to the 2013 FONSI (see Appendix 1.1-A2 of the DEIS), SHPO concurred with this determination. The Project would include similar improvements for the N-S Corridor in Phase II, and therefore these improvements would not result in adverse effects to this district in the N-S Corridor.

NRHP-Eligible Bridges and Contributing Element Bridges (APE for Direct Effects)

Within the N-S Corridor, four bridges (Eau Gallie River, St. Sebastian River, St. Lucie River, and Loxahatchee River) have been identified as individually eligible for listing on the NRHP under Criterion A and Criterion C. These four bridges are also contributing elements to the FECR Historic District. Eight additional bridges (see Table 5.4.5-1) are not considered individually eligible for listing on the NRHP but are contributing elements to the FECR Historic District.

As described in Section 3.3, *Alternatives Studied in Detail in the EIS*, AAF proposes to demolish the Eau Gallie River and St. Sebastian River Bridges and construct two new single-track bridges within the same footprint. Demolishing these two bridges is an adverse effect. When an adverse effect to a historic property is identified during the Section 106 process, attempts should be made to avoid, minimize, or mitigate these effects. FRA concluded that the effects could not be avoided or minimized, as the AAF cannot operate passenger trains over the existing Eau Gallie River and St. Sebastian River Bridges. The rate of speed of passenger trains is 110 mph, which is much higher and requires a higher bridge loading factor than the 28 mph operation of the current freight trains along the corridor. Even if the existing substructure and superstructure of each bridge were upgraded as part of a rehabilitation effort, the present bridges would not meet the required loading rating for the rate of speed of the passenger trains. The higher rate of speed would cause increased vibration, resulting in fatigue to the steel members of the open-deck superstructure; adding a concrete deck to the superstructure that is less susceptible to vibration would result in a dead load that the existing pile substructure cannot support. Attempts to avoid or minimize the adverse effects to these individually-eligible bridges by retaining the current bridges for freight use while constructing additional adjacent bridges for use by passenger trains would introduce operational challenges that extend well beyond the immediate areas of the bridges. Additionally, the two adversely affected bridges, which cross over rivers, could not be abandoned in favor of new construction, as the USCG has determined that abandoned bridges must be removed to allow for safe navigation (USCG 2014).

As it is not possible to avoid or minimize the adverse effects to the Eau Gallie River and St. Sebastian River Bridges still meet the purpose and need of the Project, FRA and AAF have endeavored to mitigate these impacts by committing to consult with SHPO through the design process to ensure that the new bridge construction is compatible with the character of the FECR Historic District. Consultation with SHPO on the design of reconstructed and rehabilitated bridges is proposed as a key component to mitigate any adverse effects. FRA determined, and SHPO concurred that the Project will have an adverse effect on the

Eau Gallie River and St. Sebastian River bridges. Therefore, FRA, AAF, and SHPO, and potentially the ACHP, are developing a MOA describing the treatment measures that AAF will undertake to mitigate the adverse effects to the bridges. The draft MOA is included in Appendix 5.4.5 of this FEIS.

The St. Lucie River and Loxahatchee River Bridges are similar to the Eau Gallie River and St. Sebastian River Bridges in that they are both contributing resources to the NR-eligible FECR Historic District, as well as being determined individually eligible for listing in the National Register. However, the Project proposes that these bridges would be rehabilitated, as described in Section 3.3.3, but would not be substantially altered. FRA will consult with SHPO to develop rehabilitation designs that both meet the requirements of the Project and are compatible with the surrounding historic character; therefore, there will be no adverse effects to these bridges. This is consistent with the findings in Phase I of the Project, in which SHPO concurred with FRA's no adverse effect determination for bridges within the FECR Historic District in the WPB-M Corridor, conditioned on the reconstruction or rehabilitation work to the bridges being developed in consultation with SHPO to avoid and/or minimize effects.

As shown in Table 5.4.5-1, seven bridges along the N-S Corridor that are not individually eligible, but that are eligible as contributing elements to the FECR Historic District, would be demolished and replaced with new 2-track structures. An additional eighth bridge that is also eligible as a contributing resource to the FECR Historic District (the fixed bridge over Taylor Creek, 8SL3191), would be rehabilitated. For Phase II, AAF will continue to consult with SHPO through the design process to ensure that all of the new or rehabilitated bridge structure designs for the contributing resource bridges within the FECR Historic District, including those for the St. Lucie River, Loxahatchee River, and Taylor Creek bridges, are compatible with the historic character of the district, in order to avoid an adverse effect to the district. Based upon AAF's commitment to continued consultation, FRA has concluded that rehabilitating the St. Lucie River, the Loxahatchee River and the Taylor Creek Bridges and replacing the seven bridges that are not individually eligible for listing on the NPHP but are eligible as contributing elements to the FECR Historic District would not have an adverse effect on the historic district. AAF in consultation with the SHPO will develop bridge designs that are in keeping with the Secretary of the Interior's Standards for Rehabilitation.

The adverse effect resulting from the replacement of two of the four individually-eligible bridges (the Eau Gallie River Bridge and the St. Sebastian River Bridge) would also constitute a "use" under Section 4(f). A Section 4(f) evaluation is provided in Chapter 6, *Section 4(f) Evaluation*.

Archaeological Resources (APE for Direct Effects)

The Project would return the existing FECR Corridor to a dual-track system. Infrastructure improvements are planned to be completed within the existing right-of-way (AAF anticipates no additional right-of-way acquisition). The Project could possibly affect six archaeological sites that have been NR-listed, determined NR-eligible, or that have the potential to be determined NR-eligible. These sites have been mapped within the direct effects APE, or are mapped adjacent to the APE but current information about the sites suggest that intact deposits may extend into the APE. The sites identified in the APE for direct effects are: Hobe Sound National Wildlife Refuge #3 Site (8MT1287); the Fort Capron Site (8SL41); Vero Man/Vero Locality Site (8IRI/8IR9); Fort Pierce (8SL31); Railroad (8IR846); and Avenue A-Downtown Fort Pierce (8SL1772).

County	FMSF #	Site Name / Address	National Register Status	Project Effect
Brevard	8BR3058	Fixed Railway Bridge over the Eau Gallie River – Steel	Eligible as FECR Contributing Resource/ Individually Eligible	Demolish and replace with 2-track structure
Brevard	8BR3059	Fixed Railway Bridge over the Crane Creek and Melbourne Street – Steel	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Brevard	8BR3060	Fixed Railway Bridge over the Turkey Creek – Steel	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Brevard	8BR3061	Fixed Railway Bridge over the Goat Creek – Steel	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Brevard and Indian River	8BR3062/ 8IR1569	Fixed Railway Bridge over the Sebastian River – Steel	Eligible as FECR Contributing Resource/ Individually Eligible	Demolish and replace with 2-track structure
St. Lucie	8SL3191	Fixed Bridge over the Taylor Creek - Concrete with Steel Beam Span	Eligible as FECR Contributing Resource	Rehabilitate
Martin	8MT1623	Fixed Bridge over the Rio Waterway - Steel and Timber Piles	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Martin	8MT1382	Movable Bridge over the St. Lucie River – Steel	Eligible as FECR Contributing Resource/ Individually Eligible	Rehabilitate
Martin	8MT1624	Fixed Bridge over the Salerno Waterway - Steel and Timber Piles	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Martin	8MT1625	Fixed Bridge over the Tributary to Manatee Creek 1 - Steel and Timber Piles	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Martin	8MT1626	Fixed Bridge over the Tributary to Manatee Creek 2 - Steel and Timber Piles	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Palm Beach	8PB16041	Movable Bridge over the Loxahatchee River – Steel	Eligible as FECR Contributing Resource/ Individually Eligible	Rehabilitate

Hobe Sound National Wildlife Refuge #3 (8MT1287): The Hobe Sound National Wildlife Refuge #3 Site (8MT1287) consists of a shell midden consisting of a thin scatter of shell and a few aboriginal ceramic potsherd fragments situated on a dune bluff in the Hobe Sound National Wildlife Refuge that was bisected during the construction of the railroad in the early part of the last century. The bluff is adjacent to the FECR right-of-way, located in an area where the rail line curves to the west. The Hobe Sound National Wildlife Refuge #3 Site is located outside of the right-of-way. However, because the limits of the site are within the APE, and because AAF’s construction activities at this location include excavation and construction of a retaining wall, the excavation has the potential to adversely affect this archaeological site. Preliminary engineering specified a curve modification at this location and this action would have caused disturbance of potentially intact portions of the archaeological site. As an avoidance and protection measure, this curve modification was eliminated from the Project and instead construction in this area will consist of installing rail tracks in their historic locations. Preliminary discussions with SHPO indicated that this design change would avoid adverse effects to the Hobe Sound National Wildlife Refuge #3 Site.

Fort Capron (8SL41): The Fort Capron Site consists of the archaeological remains of a 1850s military fort located east of the FECR right-of-way. The only visible remnants of Fort Capron are several ditches that extend to the east down towards the Indian River. Although the limits of the site are not well-defined, the FECR right-of-way appears to form the western boundary of the site. Because construction in this area will consist of installing rail tracks in their historic locations, no subsurface excavation will be required

and no additional right-of-way will be needed, the Project will not disturb any subsurface resources remaining within the right-of-way. There would be no temporary or permanent effects to the archaeological site caused by the Project.

Vero Man/Vero Locality (8IRI/8IR9): the Vero Man Site consists of a deeply buried fossil bed in the vicinity of the Main Relief Canal in Vero Beach, west of the FECR right-of-way. The site is currently being investigated by researchers from Mercyhurst University. Based on a 2014 Change of Status Form, the SHPO, in 2014, found this site eligible for listing in the National Register. The limits of the site are not well-defined and may extend under the railroad right-of-way. Because construction in this area will consist of installing rail tracks in their historic location and adding a second single-track railroad bridge in its historic location, there will be no construction outside of the right-of-way. The proposed construction will not require subsurface excavation other than shallow excavation (approximately five feet deep) required for new bridge approach slabs. The bridge will not require abutments. The new bridge will have five pile bents, two on each bank of the canal and one in the water. These will consist of 24-inch square concrete pilings, driven to approximately 50-feet in depth. Geotechnical borings at this location show sand layers extending to below the 50-foot depth, with no firm or confining layers. Any potential archaeological resource associated with the site would be located too far beneath the surface to be affected by the shallow excavation association with the approach slabs. There would be no temporary or permanent effects to the archaeological site caused by the Project. .

Fort Pierce (8SL31): the NR-listed Fort Pierce Site is east of the FECR right-of-way and is mapped outside of the APE. However, FMSF GIS data show several locations for this site, and mapped site boundaries for one location directly border on the APE. The disparity regarding the locations of this site on file with the FMSF suggest there is a potential for the boundaries of this site to extend within the APE. Because construction in this area will consist of installing rail tracks in their historic locations, no subsurface excavation will be required and no additional right-of-way will be needed, the Project will not disturb any subsurface resources remaining within the right-of-way. There would be no temporary or permanent effects to the archaeological site caused by the Project.

Railroad Site (8IR846) and Avenue A – Downtown Fort Pierce (8SL1772): Neither the Railroad Site, a Malabar shell midden and artifact scatter of variable density, nor the Avenue A – Downtown Fort Pierce habitation site has been subject to a SHPO eligibility evaluation. Because construction in this area will consist of installing rail tracks in their historic locations, no subsurface excavation will be required and no additional right-of-way will be needed; therefore, the Project will not disturb any subsurface resources remaining within the right-of-way. There would be no temporary or permanent effects to these potentially-eligible archaeological sites caused by the Project.

AAF will follow an Archaeological Monitoring Plan for each of these sites, which will be stipulated in the MOA. The implementation of the Archaeological Monitoring Plan, which includes construction crew training and procedures in the unlikely event that archaeological features or artifacts are discovered during excavation, will avoid or minimize the potential adverse effect of excavation by identifying and protecting any unmarked human remains or significant archaeological resources that may be encountered during construction.

Based on the information available, FRA has determined that the Project would have no adverse effect on archaeological sites within the APE for direct impacts for the N-S Corridor. The no adverse effect finding is based on the condition that AAF will continue to consult with SHPO through the design process, as

needed, and will adhere to the stipulations of the MOA to ensure appropriate sensitivity to the previously recorded archaeological sites located within the APE.

Phase I - West Palm Beach - Miami Corridor

As stated in the 2013 FONSI for Phase I, FRA consulted with the Florida SHPO pursuant to NHPA Section 106, and SHPO concurred on November 6, 2012 with FRA's finding that the Project would have no adverse effect on any of historic resources within the WPB-M APE. The concurrence is conditional, and requires continued consultation with the SHPO and locally affected parties, including the Cities of West Palm Beach, Fort Lauderdale, and Miami, through the station design process to avoid and/or minimize effects. The SHPO also concurred with FRA's finding that the relocated Ft. Lauderdale Station would have no adverse effect on historic properties (Appendix 3.3.1-A2).

County	FMSF #	Site Name / Address	National Register Status	Project Effects
Palm Beach	8PB15951	Fixed Railway Bridge over the C-15 Canal	Eligible as FECR Contributing Resource	None
Broward	8BD4860	Fixed Railway Bridge over the Cypress Creek/ C-14 Canal	Eligible as FECR Contributing Resource	None
Broward	8BD4861	Fixed Railway Bridge over the North Fork of Middle River	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Broward	8BD4862	Fixed Railway Bridge over the South Fork of Middle River	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Broward	8BD4863	Fixed Railway Bridge over the Dania Cut-Off Canal	Eligible as FECR Contributing Resource	Rehabilitate
Miami-Dade	8DA12596	Fixed Railway Bridge over the Oleta River	Eligible as FECR Contributing Resource	Demolish and replace with 2-track structure
Miami-Dade	8DA12597	Fixed Railway Bridge over the Royal Glades/C-9 Canal	Eligible as FECR Contributing Resource	None
Miami-Dade	8DA12598	Fixed Railway Bridge over the Arch Creek	Eligible as FECR Contributing Resource	None

5.4.5.4 Indirect and Secondary Effects

Indirect and secondary effects can include visual changes, increased noise and vibration, and increased development associated with the Project.

No-Action Alternative

There would be no indirect or secondary effects from the No-Action alternative.

Action Alternatives A, C, and E

MCO Segment

As reported in the 2013 CRAR, no historic properties have been identified within the APE for indirect effects for the MCO Segment.

East-West Corridor

According to the 2013 CRAR, there are no historic properties within the APE for indirect effects in the East-West Corridor.

North-South Corridor

As improvements within the N-S Corridor would remain within the existing right-of-way, and would not require right-of-way acquisition from any adjacent historic properties, any potential effects to these properties would be indirect.

The noise analysis conducted for the project and documented in the EIS shows that, with the use of pole-mounted horns and improved rail infrastructure, the project will reduce noise levels along the N-S Corridor in comparison to existing conditions, and that noise levels 50 feet from the right-of-way would not result in noise impacts. While the proposed passenger trains are lighter and faster than the existing freight train traffic, overall there will be more train traffic/operations occurring each day. Secondary and cumulative noise effects are anticipated to be minimal to moderate. Tables 5.4.5-3 and 5.4.5-4 show the noise effects on historic properties and identifies the land use category associated with each property. As discussed in Section 5.2.2 of the EIS, the analysis used FTA impact criteria because of the mix of freight and passenger trains, and the average train speeds of 90 mph or less. As shown, noise mitigation (wayside horns in lieu of using individual locomotive mounted horns) would eliminate all adverse effects. No additional noise mitigation measures that could affect the integrity of historic properties (soundproofing or noise barriers) would be required.

There are no historic properties within the APE that have a quiet setting as a character-defining feature, and therefore noise would not affect any historic properties or their settings. At historic properties where there is public use and that are categorized as Category 1 land use (the McKee Jungle Gardens, Riverhill, the Sunrise Theater and the Lyric Theater), there will be no noise impacts with the required wayside horns.

The analysis of vibration showed that vibration levels would not increase, although the frequency of vibration events would increase. Table 5.4.5-4 shows the vibration effects on historic properties. As shown, and documented in Section 5.2.2 of the EIS, vibration from operation of the passenger rail system would not result in vibration that exceeded damage thresholds (100 VdB at 70 feet), although some properties would experience vibration at “annoyance” levels (perceptible vibration) based on the FTA and FRA impact criteria for existing land uses. Therefore, FRA anticipates that there will be no indirect adverse effects due to changes in noise or vibration to either the integrity of setting or physical structure of any historic property. Construction vibration also was evaluated. The analysis showed that pile-driving at bridges could exceed this damage threshold at distances up to 135 feet, however there are no above-ground historic properties within 135 feet of these bridges.

Returning the FECR Corridor to its historic configuration and historic use as a passenger rail line will not change the visual setting of any historic property within the indirect effects APE. The project will not introduce any new visual elements. Replacing and upgrading the existing crossing gates at at-grade crossings within historic districts or in proximity to a historic property will be designed and constructed in consultation with the SHPO, so as not to adversely change the visual characteristics of the streetscape.

Archaeological Resources

Noise from trains has no effect on subsurface archaeological sites, as there are no noise receptors within these buried strata.

A prior project along portions of the FEC corridor (Ambrosino et al. 2010) reported that noise and vibration testing for the FEC Mainline found that “the analysis of predicted vibration levels showing the proposed project will increase the frequency of vibration levels; however, the predicted vibration levels associated with the passenger trains is less than the existing vibration levels associated with the freights.” They concluded that the APE for cultural resources should be restricted to the direct disturbance areas as “there are no noise or vibration effects to land uses adjacent” to the project area.

The vibration analysis for the Project found that freight trains have greater weight and axle loads, and that the duration of freight train passage was 120 seconds. The freight trains cause greater vibration than passenger trains, which are lighter and have a passing duration of 10 seconds. The analysis calculated the average ground vibration levels for freight and passenger trains along the FEC corridor, at a distance of 70 feet from the track. In all cases, freight (the no-action alternative) was the same or greater than the proposed action, with average vibration levels ranging from 83.2 Vdb to 84.9 Vdb. Passenger train-generated vibration levels ranged from 82.3 to 84.9 VdB. This is approximately the level of “residential annoyance” but does not reach the level of damage. Based on this analysis, the vibration levels from operations of the AAF passenger service would be less than the no-action alternative, and would not result in vibration impacts to physical objects.

Because FEC has operated passenger and freight rail along this corridor for more than 100 years, any vibration effects to subsurface stratigraphy or artifacts would likely have already occurred. However, as there are no data on the stratigraphy beneath the FECR right-of-way and no studies of the effects of vibration on stratigraphy or artifacts in this geomorphological context, this assumption is speculative.

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Three at-grade crossings are located adjacent to one NRHP-eligible historic district in Brevard County (Union Cypress Saw Mill Historic District [8BR2173]); four at-grade crossings are located within a National Register-eligible historic district in St. Lucie County (Edgar Town Historic District [8SL2801]); and two at-grade crossings are located within and adjacent to a National Register-eligible Kelsey City Layout (8PB13340) in Palm Beach County. As determined by FRA and confirmed by SHPO for Phase 1, the proposed Project will not have an indirect effect on these resources because grade crossing improvements will not change the setting of the district and will not introduce new modern elements.

5.4.5.5 Temporary Construction-Period Effects

Temporary construction period effects generally consist of noise, dust, vibration, and traffic related to construction. Temporary construction period effects can also include direct effects, such as staging or material storage that impacts a historic property.

Indirect Effects

As shown in Tables 5.4.5-3 and 5.4.5-4, construction activity will temporarily increase noise and vibration levels at several historic properties. However, construction-period noise effects will not adversely affect any historic properties because any temporary noise-related impacts will not affect the character-defining features that qualify these properties for listing in the NRHP. Construction-period vibration levels will not exceed structural damage thresholds at any historic property. These construction effects are temporary and would occur during and immediately following construction.

Construction-period vibration levels will not exceed structural damage thresholds at any historic property and so are not expected to have an adverse effect. The vibration analysis, summarized in the EIS (Section 5.2.2.4), showed that pile-driving at bridges could exceed the damage threshold at distances up to 135 feet, however there are no historic properties within 135 feet of the bridges where pile-driving is expected to occur.

Construction-period noise levels are not expected to adversely affect any historic properties, because, as noted above, none of the historic properties include a quiet setting as a character-defining feature.

Construction activities, particularly ground-disturbing activities such as excavation and pile-driving, may affect subsurface archaeological sites. As stipulated in the MOA, AAF has committed to construction monitoring at archaeological properties to minimize harm from construction, and will use appropriate construction techniques to minimize vibration from pile-driving.

Site ID	Site Name	Land Use Category	Pre-Mitigation	With Mitigation	Construction
8BR215	Florida Power & Light Co. Ice Plant	0	No	No	No
8BR759	Whaley Citrus Packing House	2	Moderate ¹	No	Yes
8BR1163	Mattie Lamar House	2	Moderate	No	Night
8BR1710	Jorgensen's General Store	2	Moderate	No	Night
8BR1723	Cocoa Cemetery Storage Building	3	Moderate	No	No
8BR1739	Ashley's Café and Lounge	0	No	No	No
8BR1741	Rockledge Gardens Nursery	0	No	No	No
8BR1765	Bohn Equipment Company	0	No	No	No
8RI859	McKee Jungle Gardens	1	Severe	No	No
8IR99	George Armstrong Braddock House	2	Severe	No	Yes
8IR100	Baughman House	2	Severe ¹	No	Yes
8IR388	5056 North Old Dixie Highway	2	Moderate	No	Night
8IR624	Hall O'Giants, McKee Jungle Gardens	1	Severe	No	No

Table 5.4.5-3 Noise Effects on Historic Properties in Indirect Effects APE Based on Land Use Criteria

Site ID	Site Name	Land Use Category	Pre-Mitigation	With Mitigation	Construction
8IR975	Vero Beach Diesel Power Plant	3	Moderate	No	No
8IR1464	Vero Beach Community Center	3	Moderate	No	No
8IR1475	1146 21st Street	2	Moderate	No	No
8SL78	Fairmont Manor	2	No	No	Yes
8SL220	9015 South Indian River Drive	2	No	No	Yes
8SL229	6109 South Indian River Drive	2	No	No	Yes
8SL234	5309 South Indian River Drive	2	Moderate ¹	No	Yes
8SL236	Riverhill	1	Moderate	No	Yes
8SL237	Britt House	2	No	No	Yes
8SK238	N.E. Card House	2	No	No	Yes
8SL247	Hoskins House	2	Severe ¹	No	Yes
8SL289	Old Fort Pierce City Hall	3	Severe	No	Yes
8SL799	Sunrise Theater	1	Severe	No	No
8SL825	601 South 2nd St	2	Severe	No	No
8SL826	Frank Tyler House	2	Moderate ¹	No	Yes
8SL917	Banyon Belle Manor	2	No	No	Yes
8SL918	1009 South Indian River Drive	2	No	No	Yes
8SI920	1029 South Indian River Drive	2	No	No	Yes
8SL926	O.L. Peacock House	2	No	No	Yes
8SL930	Stephen Leshner House	2	No	No	Yes
8SL931	Carlton-Vest House	2	No	No	Yes
8SL932	Casa Del Rio	2	No	No	Yes
8SL933	Babe Phelps House	2	No	No	Yes
8SL1599	Shadetree Studio	3	Severe	No	No
8SL1922	East Coast Packers	0	No	No	No
8MT46	George W. Parks Store	3	Moderate	No	No
8MT84	Fern Building	0	No	No	No
8MT86	Lyric Theater	1	Severe	No	No
8MT130	East Coast Lumber	0	No	No	No
8MT131	Hobe Sound Cabinetry	0	No	No	No
8MT307	Crary House	3	Moderate	No	No
8MT838	12200 Southeast Nassau St.	2	Severe ¹	No	Yes
8MT1066	240 North Flagler Rd	0	No	No	No
8PB6064	St John Baptist Church	3	Moderate	No	No

Source: AMEC 2013c

- 1 Impact based on parcel boundary, not location of structure Impact analysis is based on FRA Land Use Categories, which categorize structures based on existing use: 0 = not noise-sensitive, 1=highly sensitive, quiet is an essential element. 2 = residential, sensitive to night-time noise. 3 = institutional, sensitive to day-time noise. These categories were used to determine whether further mitigation, such as soundproofing or noise walls, were needed to reduce operational impacts to residents or users of the properties.

Table 5.4.5-4 Vibration Effects on Historic Properties in Indirect Effects APE Based on Land Use Criteria

Site ID	Site Name	Land Use Category	Operations (exceeds annoyance level)	Construction (exceeds annoyance level)	Construction (exceeds damage level)
8BR215	Florida Power & Light Co. Ice Plant	0	No	No	No
8BR759	Whaley Citrus Packing House	2	Yes	Yes	No
8BR1163	Mattie Lamar House	2	Yes	Yes	No
8BR1710	Jorgensen's General Store	2	Yes	Yes	No
8BR1723	Cocoa Cemetery Storage Building	3	Yes	No	No
8BR1739	Ashley's Café and Lounge	0	No	No	No
8BR1741	Rockledge Gardens Nursery	0	No	No	No
8BR1765	Bohn Equipment Company	0	No	No	No
8RI859	McKee Jungle Gardens	1	Yes	Yes	No
8IR99	George Armstrong Braddock House	2	Yes	Yes	No
8IR100	Baughman House	2	Yes	Yes	No
8IR388	5056 North Old Dixie Highway	2	Yes	No	No
8IR624	Hall O'Giants, McKee Jungle Gardens	1	Yes	Yes	No
8IR975	Vero Beach Diesel Power Plant	3	Yes	Yes	No
8IR1464	Vero Beach Community Center	3	Yes	Yes	No
8IR1475	1146 21st Street	2	Yes	No	No
8SL78	Fairmont Manor	2	Yes ¹	Yes	No
8SL220	9015 South Indian River Drive	2	Yes ¹	Yes	No
8SL229	6109 South Indian River Drive	2	Yes ¹	Yes	No
8SL234	5309 South Indian River Drive	2	Yes ¹	Yes	No
8SL236	Riverhill	1	Yes ¹	Yes	No
8SL237	Britt House	2	Yes	Yes	No
8SK238	N.E. Card House	2	Yes ¹	Yes	No
8SL247	Hoskins House	2	Yes ¹	Yes	No
8SL289	Old Fort Pierce City Hall	3	Yes	Yes	No
8SL799	Sunrise Theater	1	Yes	Yes	No
8SL825	601 South 2nd St	2	Yes	Yes	No
8SL826	Frank Tyler House	2	Yes	Yes	No
8SL917	Banyon Belle Manor	2	Yes ¹	Yes	No
8SL918	1009 South Indian River Drive	2	Yes ¹	Yes	No
8SI920	1029 South Indian River Drive	2	Yes	Yes	No
8SL926	O.L. Peacock House	2	Yes ¹	Yes	No
8SL930	Stephen Leshner House	2	Yes ¹	Yes	No
8SL931	Carlton-Vest House	2	Yes ¹	Yes	No
8SL932	Casa Del Rio	2	Yes ¹	Yes	No
8SL933	Babe Phelps House	2	Yes ¹	Yes	No

Site ID	Site Name	Land Use Category	Operations (exceeds annoyance level)	Construction (exceeds annoyance level)	Construction (exceeds damage level)
8SL1599	Shadetree Studio	3	Yes	Yes	No
8SL1922	East Coast Packers	0	No	No	No
8MT46	George W. Parks Store	3	No	Yes	No
8MT84	Fern Building	0	No	No	No
8MT86	Lyric Theater	1	Yes	Yes	No
8MT130	East Coast Lumber	0	No	No	No
8MT131	Hobe Sound Cabinetry	0	No	No	No
8MT307	Crary House	3	No	No	No
8MT838	12200 Southeast Nassau St.	2	Yes	Yes	No
8MT1066	240 North Flagler Rd	0	No	No	No
8PB6064	St John Baptist Church	3	No	No	No

Source: AMEC 2013c

1 Impact based on parcel boundary, not location of structure

Impact analysis is based on FRA Land Use Categories, which categorize structures based on existing use: These categories were used to determine whether further mitigation is needed to reduce operational impacts to residents or users of the properties. Land Use Categories: 0 = not vibration-sensitive, 1=highly sensitive, vibration may interfere with operations within the building. 2 = residential, sensitive to night-time vibration. 3 = institutional, sensitive to day-time vibration that could interfere with activities.

Direct Effects

For the E-W Corridor, access to work areas would be primarily from public areas or the highway right-of-way (SR 528). Material staging areas would be located within the proposed railroad right-of-way. Within the N-S Corridor, access to work areas will be primarily from public access points. However, some specific construction effects cannot be estimated at this time because they depend on several factors yet to be determined, such as: final design, location of material staging, access to work areas, materials to be used, specific construction methodologies, and identification of borrow areas or excess material placement areas, if necessary. Construction site access locations have not yet been identified and therefore, potential construction effects that would result from access have not been assessed. Some private access may be required.

If any access, construction staging, borrow, or excess material placement areas are not located within the APE, and therefore were not included in the initial study area, AAF will survey these areas prior to conducting any ground disturbing activities, and will consult with SHPO to assess the potential impacts of these activities on archaeological and historic resources effects of any work in those areas. AAF will locate such activities in such a manner to avoid effects to known historic properties listed or eligible for listing on the NRHP, as stipulated in the MOA. AAF will conduct construction activities in a manner to avoid effects to known historic properties listed or eligible for listing on the NRHP, as stipulated in the MOA.

As stated in Section 3.4 of the 2012 EA, the WPB-M Corridor will include construction primarily on existing exclusive right-of-way (which defines the APE for direct effects), and, therefore, would have no temporary effects on historic or archaeological resources.

5.4.5.6 Findings of Effect

FRA has evaluated the proposed Project pursuant to the regulations adopted by the Advisory Council on Historic Preservation (36 CFR 800) and finds that the proposed Project would have an adverse effect on two historic properties, the Eau Gallie River Bridge and the St. Sebastian River Bridge, both of which must be demolished and replaced with a new 2-track bridge structure. The proposed Project would have an effect, but not an adverse effect, on the FECR Historic District as a whole. Although the project includes reconstructing the double-track railroad system and demolishing and replacing ten bridges that are eligible as contributing elements to the FECR Historic District, these activities would be conditioned on AAF's commitment to continued consultation with SHPO and adherence to the MOA, to ensure that the new and rehabilitated structures are compatible with the historic character of the District. AAF will consult with the SHPO to develop bridge designs that are in keeping with the Secretary of the Interior's Standards for Rehabilitation. On July 24, 2015 the State Historic Preservation Officer concurred with this Finding.

5.4.5.7 Regulatory Compliance

This section outlines a selection of the relevant statutory and regulatory compliance requirements for historic properties. Section 106 of the NHPA (54 USC § 300308) requires that federal agencies to take into account, the effect of their undertakings on historic properties listed or eligible for listing in the NRHP, and provide the ACHP an opportunity to comment prior to authorizing an undertaking. The ACHP has promulgated regulations (36 CFR Part 800) that provide the regulatory framework for the identification and evaluation of historic properties, involvement of consulting parties and the public, and assessment and resolution of adverse effects. Other relevant regulations and procedures include the National Park Service regulations concerning eligibility for inclusion in the National Register of Historic Places (36 CFR Part 63); the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 68); Executive Order 11593, *Protection and Enhancement of Cultural Environment*; FRA's Procedures for Considering Environmental Impacts (64 Fed. Reg. 28545 May 26, 1999); and Appendix C of the *Procedures for the Protection of Historic Properties* at 33 CFR part 325, Processing of Department of the Army Permits.

Mitigation measures for adverse effects to historic properties may include data recovery, and photographic recordation. The documentation for these mitigation measures must provide evidence that consultation has been completed with the SHPO, concerned Indian Tribes, and any other identified consulting parties. As noted above, actions that the parties agree upon to resolve adverse effects are detailed in a MOA among the FRA, the SHPO, AAF, and the ACHP. A draft MOA, prepared in coordination with the SHPO, other participating federal agencies, AAF, the ACHP, and any consulting parties is included in Appendix 5.4.5. Implementing the Project in accordance with the stipulations if the MOA that has been signed by all appropriate parties and filed with the ACHP evidences FRA's compliance with Section 106.

5.4.6 Parks and Recreation Areas

This section describes the potential effects to existing and planned publically-owned parks and recreational properties. As described in Section 4.4.6, in general, these properties are protected under Section 4(f) of the DOT Department of Transportation Act of 1966 (publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State or local significance). In some instances they are also protected under Section 6(f) of the Land and Water Conservation Act of 1965. Section 6(f) resources are all parks and other recreational facilities that have received a Land and Water Conservation Fund Act grants of any type. Section 6(f)(3) contains strong provisions to protect federal investments and the quality of assisted resources. Section 6(f)(3) states that no Section 6(f) resource shall be converted to other than public outdoor recreation uses without approval of the Secretary of the Interior. The Secretary may approve conversions only if he/she finds it to be in accordance with the existing comprehensive statewide outdoor recreation plan and if substitute property is provided.

As documented below the Project would not adversely affect any parks, recreation areas and wildlife or waterfowl refuges protected by Section 4(f). No Section 6(f) properties would be converted to a non-recreation use by the Project.

5.4.6.1 Methodology

Direct impacts to recreational properties were characterized based on physical impacts to the properties. The impacts include:

- When a portion of the recreational properties is permanently incorporated into a transportation facility; and
- When there is a temporary occupancy of a portion of the recreational property that is adverse in terms of Section 4(f)'s preservation purpose; that is, when one of the following criteria for temporary occupancy are not met:
 - The duration of the occupancy must be less than the time needed for the construction of the project, and no change of ownership occurs.
 - Both the nature and magnitude of the changes to the recreational property are minimal.
 - No permanent adverse physical changes, nor interference with activities or purposes of the resources on a temporary or permanent basis, are anticipated.
 - The land must be returned to a condition that is at least as good as existed prior to the project.
 - There is documented agreement with the appropriate federal, state, or local officials having jurisdiction over the land that the above conditions have been met.

Indirect impacts were also evaluated. Because these resources are protected by Section 4(f), this EIS uses the term "constructive use" to identify potentially significant adverse impacts to these recreational properties. A constructive use can occur when the transportation project does not incorporate land from a Section 4(f) resource, but the project's proximity effects are so severe that the protected activities,

features, or attributes that qualify the resource for protection under Section 4(f) are substantially impaired.

5.4.6.2 Environmental Consequences - Direct

Direct effects to parks or recreation areas would include the conversion of land to a railroad use or loss of public access to a property.

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed or operated. Existing commuter and intercity railway services would remain unchanged, and there would be no direct adverse effects to parks or recreation areas.

Action Alternatives A, C, and E

Potential direct effects of the Project to parks and recreation areas would be the same under all Action Alternatives. The Project would not incorporate any park land or recreational lands, or any wildlife refuge.

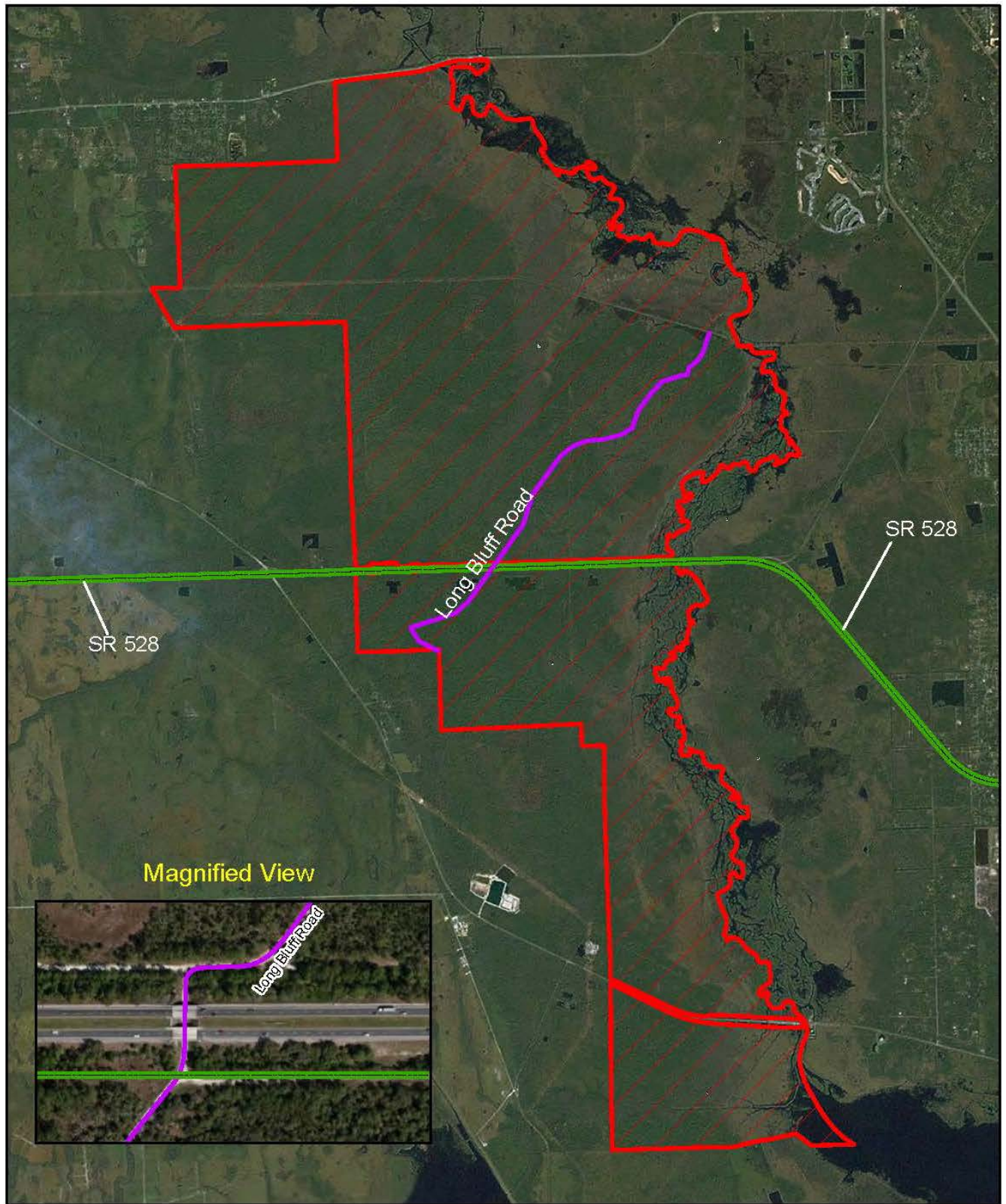
MCO Segment

The MCO Segment would not affect any parks or recreation lands. There are no parks or recreation resources Section 6(f) resources within MCO, which is entirely within the property of the Orlando International Airport.

East-West Corridor

Constructing the E-W Corridor would not require acquisition of any portion of the Section 4(f) recreation resources because the new rail infrastructure would be built entirely within the SR 528 right-of-way owned by FDOT. Additionally, no new communications towers would be placed in a Section 4(f) resource. However, the E-W Corridor is adjacent to two recreation resources east of the SR 528 and SR 520 interchange: the Tosohatchee WMA and Canaveral Marshes Conservation Area.

The E-W Corridor would cross Long Bluff Road in the Tosohatchee WMA (Figure 5.4.6-1). Long Bluff Road is a designated multi-use path that provides access from the north to parking and fishing areas in the southern portion of the Tosohatchee WMA; it is the only road providing access across SR 528 within the Tosohatchee WMA. The Project would cross Long Bluff Road on a new overpass but no WMA property would be acquired as the overpass would be built within the existing FDOT-owned right-of-way. The DEIS described a potential use of land within the Tosohatchee WMA to provide fill material for construction as a *de minimis* use: AAF no longer proposes to acquire fill material from the WMA.



Explanation of Features

-  Long Bluff Road
-  E-W Corridor
-  Tosohatchee Wildlife Management Area

Data Sources: ESRI 2012, FRA 2012, FODL 2012, AMEC 2013

Tosohatchee Wildlife Management Area		
All Aboard Florida Intercity Passenger Rail Project		
		5.4.6-1

North-South Corridor

Thirty parks and recreation resources are along the N-S Corridor. The existing FECR Corridor bisects two of these resources: the Hobe Sound National Wildlife Refuge and Jonathan Dickinson State Park. All construction activities would take place within the existing FECR-owned right of way, and would not require acquisition any portion of the recreational properties.

The N-S Corridor also crosses Southeast Jonathan Dickinson Way within Jonathan Dickinson State Park (Figure 5.4.6-2). Southeast Jonathan Dickinson Way is an at-grade access road that connects Jonathan Dickinson State Park to US 1. To ensure the safety of the users of Jonathan Dickinson State Park, AAF would implement at-grade crossing improvements where the N-S Corridor crosses Southeast Jonathan Dickinson Way. Safety improvements would include upgraded warning devices such as flashing lights, signage and pavement markings; median barriers; and a four-quadrant gate, which blocks both sides of each traffic lane. Electronic warning systems would be implemented, which would monitor and communicate train locations and speeds, and would stop the train if the crossing is not clear. Current safety measures at the existing at-grade crossing of the freight railway and Southeast Jonathan Dickinson Way include passive signage, flashing lights, and a two-quadrant gate. All construction activities, including the new safety improvements, would take place within the existing FECR-owned right-of-way, and no acquisition of park property would occur. At the Hobe Sound NWR, AAF will use retaining walls to limit construction to the FECR right-of-way.

Two of the 30 identified parks and recreation resources along the N-S Corridor are also Section 6(f) resources: North Sebastian Conservation Area and Sawfish Bay Park. The Project would not convert or acquire any portion of the protected resources.

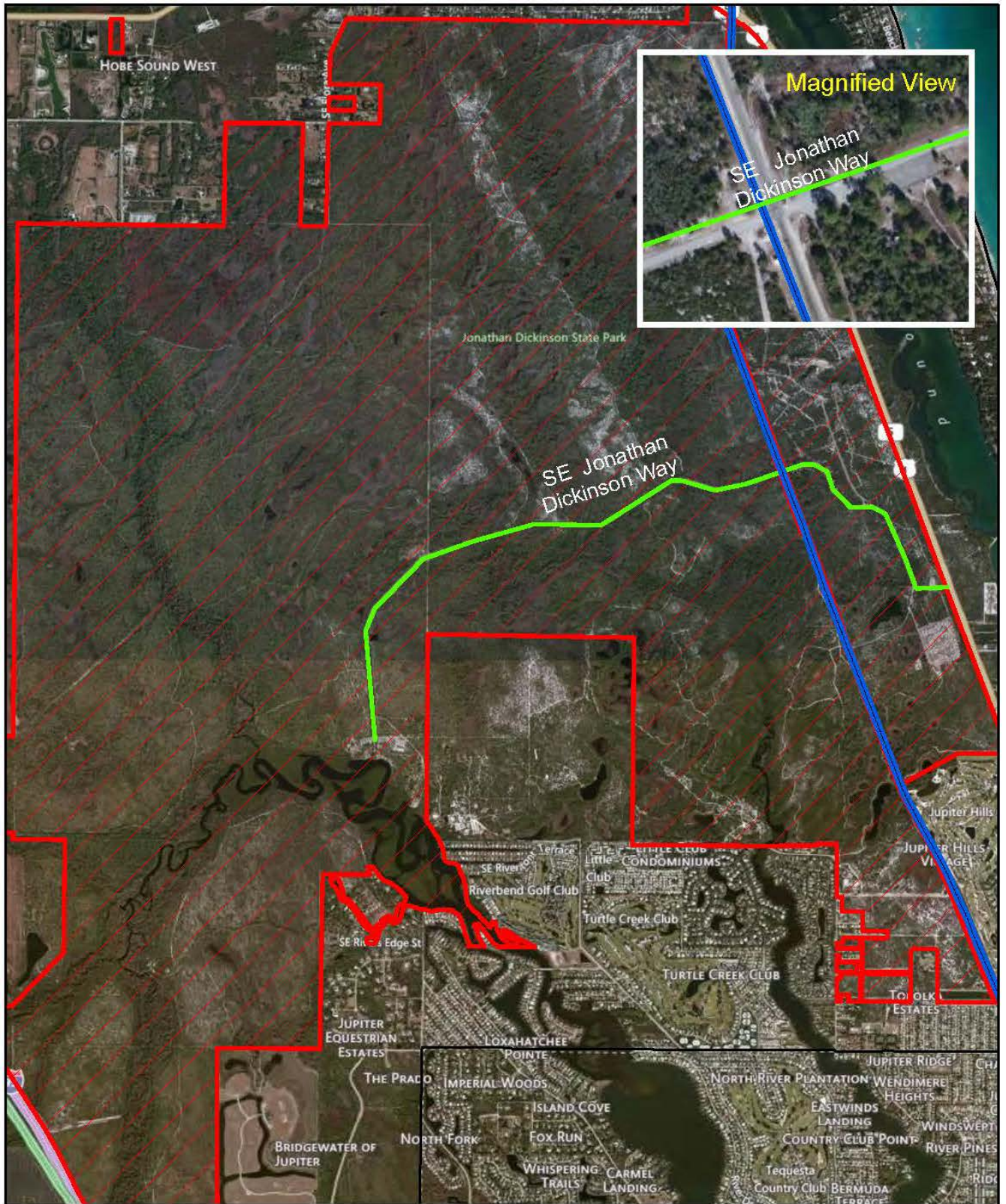
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As stated in Section 3.3.8 of the 2012 EA, the WPB-M Corridor would not require direct property acquisition or additional right-of-way within any of the parks or recreation areas that are adjacent to the right-of-way.

5.4.6.3 Indirect Effects

Indirect effects can occur when a transportation project does not incorporate land from a park or recreation property, but the project's effects on the surrounding area are so severe that the activities, features, or attributes are substantially impaired. This evaluation focuses on the potential proximity impacts to parks and recreation resources from the Project's potential noise, vibration, aesthetics and access effects.

Comments on the DEIS included concerns that noise from the increased train passage would affect adjacent Section 4(f) resources, or that increased train activity within the FECR right-of-way could impact public access to some Section 4(f) Parks, particularly in Indrio. One specific comment was that the increased noise and vibration could affect use of the observation tower in the Walton Scrub Preserve. These issues are addressed in the analysis below.



- Explanation of Features**
- N-S Corridor
 - SE Jonathan Dickinson Way
 - Jonathan Dickinson State Park

Jonathan Dickinson State Park		
All Aboard Florida Intercity Passenger Rail Project		
		5.4.6-2

Data Sources: ESRI 2012, FRA 2012, FGDL 2012, AMEC 2013

Path: F:\FEC\FECL_GDB\MXD\EIS\Jonathan Dickinson State Park_AW.mxd

Noise

The noise analysis conducted for the project and documented in the FEIS shows that, with the use of pole-mounted horns and improved rail infrastructure, the project will reduce noise levels along the N-S Corridor in comparison to existing conditions, and that noise levels 50 feet from the right-of-way would not result in noise impacts. While the proposed passenger trains are lighter and faster than the existing freight train traffic, overall there will be more train traffic/operations occurring each day. This increase in operations results in a higher overall noise exposure, although individual train-pass events will not exceed the no-action alternative. Secondary and cumulative noise effects are anticipated to be minimal to moderate.

Section 5.2.2, Noise and Vibration discusses changes in noise associated with the Project. In general, the Project would be compatible with the intended uses of parks and recreation resources, as parklands are compatible with these noise levels (FAA 2004). While Project operation might result in minor increases in noise, these increases would not adversely affect the recreational use of any park or recreation area along the N-S Corridor for the following reasons:

- These resources currently experience vehicular traffic noise disturbance (automobile and truck traffic within the SR 528 corridor) at higher levels than would be produced by passenger trains, and/or rail noise disturbance (freight traffic within the existing FECR Corridor). As a result, it is unlikely that the increased passenger operations would be perceptible to the recreational uses of the resources.
- Noise disturbance from additional train traffic would be intermittent, and limited to only a few minutes per hour under the highest levels of rail traffic.
- Train noise from individual passenger trains along the N-S Corridor would likely be lower and occur for shorter periods of times, even though more frequently, than with current freight rail operations.

As stated in Section 3.3.8 of the 2012 EA (Appendix 1.1-A1), one Section 4(f) resource appears to have a potential effect from noise along the WPB-M Corridor: the El Portal Tot Lot – Miami-Dade County. However, based on committed mitigation measures (for example, stationary grade crossing horns), all severe and moderate effects related to recreational land uses are eliminated, including noise impact to the El Portal Tot Lot. As a result, there would be no substantial impairment of the recreational uses of the El Portal Tot Lot and, the FONSI included the determination that there would be no use of this property under Section 4(f).

Vibration

The analysis of vibration showed that vibration levels would not increase, although the frequency of vibration events would increase. As shown, and documented in Section 5.2.2 of the FEIS, vibration from operation of the passenger rail system would not result in vibration that exceeded damage thresholds (100 VdB at 70 feet), although some properties would experience vibration at “annoyance” levels (perceptible vibration). As documented in Section 5.2.2.2, the vibration caused by the Project (passenger rail) will be less than from the existing and future freight trains, because the passenger trains are lighter and pass any given location in approximately 10 seconds, compared to 120 seconds for freight. The Project will not increase the magnitude of vibration from a train passing in comparison with the No-

Action Alternative, and will not change the setting of any park or recreation area and will not impair their use.

Vibration, even at a severe level, would not interfere with the intended use of parks or recreation resources within the Project Study Area. Any increase in vibration resulting from the Project would not create adverse effects, and would be scarcely noticeable to the surroundings. The Project would cross Long Bluff Road in the Tosohatchee WMA by means of an overpass. Vibration effects at this crossing would be less than those projected for the at-grade portions of the E-W Corridor, as the trains would be elevated and disconnected from the ground. Vibration associated with existing freight traffic along the N-S Corridor, including the crossing of Southeast Jonathan Dickinson Way in Jonathan Dickinson State Park, is greater than vibration associated with the proposed passenger train traffic and therefore the Project would not increase the vibration impacts as compared to the existing conditions in the No-Action alternative.

This finding is also true for the Walton Scrub Preserve, where an observation tower (to provide views of the Indian River Lagoon) was recently constructed in close proximity to the existing FECR right-of-way. The Project will not increase vibration above the existing conditions and would not adversely impact the observation tower at Walton Scrub Preserve. Changes in vibration from the Project would not result in constructive use to Section 4(f) recreation resources within or adjacent to the Project Study Area, as the intended use of these resources is compatible with any increases in vibration. Section 5.2.2, *Noise and Vibration* discusses changes in vibration associated with the Project.

Aesthetic

The Project along the E-W Corridor would be constructed primarily within or adjacent to the SR 528 right-of-way. SR 528 dominates the existing viewshed along the majority of the E-W Corridor and therefore modifications proposed for this corridor would not substantially change existing aesthetic conditions for the two parks and recreation properties present along this segment. Within the section of the SR 528 Corridor adjacent to the Tosohatchee WMA, the AAF railroad would cross an existing unpaved road (Long Bluff Road) on a bridge immediately adjacent to the SR 528 bridge, and would not change existing aesthetic conditions. The Canaveral Marshes area is not within the viewshed of the Project.

The N-S Corridor is within the existing FECR Corridor, and modifications proposed for this corridor would maintain the general aesthetics of this active rail line. Changes to aesthetics/viewshed associated with the Project would not result in constructive use to recreation resources within or adjacent to the Project Study Area. Section 5.4.7, *Visual and Scenic Resources*, discusses changes to aesthetics associated with the Project.

Access Alteration

The Project would not affect access to any public park, recreation area or wildlife refuge. The Project crosses Long Bluff Road and Southeast Jonathan Dickinson Way in the Tosohatchee WMA and Jonathan Dickinson State Park, respectively. The Project would cross Long Bluff Road on an elevated track structure next to the existing SR 528 bridge, and would maintain existing accessibility. The N-S Corridor would be entirely within the existing FECR Corridor, which currently crosses Southeast Jonathan Dickinson Way, and would require that the existing at-grade crossing be reconstructed. However, access to the park

resources will not be affected and AAF will be required to ensure that all park roads remain open, and in impeded during Project construction.

All of the other Section 4(f) resources along the N-S Corridor have existing access from public roads. Increasing train traffic will not change public access points to these parks, nature preserves or recreation areas. Although park visitors may illegally cross the existing railroad, this is trespass and is unsafe under current conditions and is not allowed by the FECR.

5.4.6.4 Temporary Construction-Period Effects

The Project is not anticipated to result in any temporary construction-period effects to adjacent parks or recreational properties. AAF will develop a construction management plan to reduce and minimize the effects of grade crossing reconstruction on park users. AAF, in association with FRA, will coordinate with the land managing agency.

5.4.7 Visual and Scenic Resources

This section addresses the potential effects of the Project on visual and scenic resources, the natural and man-made features that give a particular landscape its aesthetic properties. Visual resources include sites, objects and landscapes features that contribute to the visual character of the surrounding area and/or are valued for their scenic qualities.

The Project is anticipated to have only minor effects on visual and scenic resources, primarily associated with new bridges over waterways and new communications towers along the E-W Corridor.

5.4.7.1 Methodology

As described in Section 4.4.7, *Visual and Scenic Resources*, three crossing locations along the E-W Corridor, at the Econlockhatchee River, at the St. Johns River, and at I-95, were selected as representative sites that illustrate the potential effect the new rail line would have on its surroundings. No photo renderings were developed for the N-S Corridor as this is currently a developed rail corridor and restoring the second track is not anticipated to substantially change the visual environment.

5.4.7.2 Environmental Consequences

This section describes the visual and scenic resource effects resulting from the Project. Potential historic landscapes, wildlife refuges, parks, and other visual and scenic resources proximate to the MCO Segment, E-W Corridor, and N-S Corridor including potential viewshed effects, are also evaluated within other sections (Section 5.4.5, *Cultural Resources*, and Section 5.4.6, *Recreation and Other Section 4(f) Resources*) of this FEIS.

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed or operated. The Project Study Area, including viewsheds, would remain the same with no passenger rail related development or construction changes. In the No-Action Alternative, there would be no effects, adverse or otherwise, to visual and scenic resources.

Action Alternatives A, C, and E

The visual effects of Alternatives A, C, and E are expected to be similar.

MCO Segment

The existing viewshed of the MCO Segment would remain primarily unchanged as the existing area includes mainly the developed MCO. Development of the MCO Segment would not significantly affect visual and scenic resources in this area as the existing transportation land use would not change because of the Project. Airport visitors would see a new rail line parallel to an existing roadway, which would have minimal effect on the visual conditions. AAF passengers traveling along the MCO Segment would see the existing SR 528, MCO terminals, roadways, parking lots, and undeveloped land.

East-West Corridor

The E-W Corridor primarily crosses undeveloped wooded areas, wetlands, and agricultural pasture, parallel to SR 528. The design and construction of the railroad through the E-W Corridor would comply with FDOT and FRA guidelines, and would include aesthetic features such as standard mechanically stabilized earth walls pursuant to FDOT's *Standard Specifications for Road and Bridge Construction*, and the FDOT's standard Design-Build Guidelines (FDOT 2012b and 2013a). Motorists traveling along SR 528 would generally be able to see the new railroad to the south. For Alternatives A and C, vegetation within the south side of the highway right-of-way would be removed, opening up views to the south and increasing motorists' views of the railroad and adjacent undeveloped lands. For Alternative E, the preferred alternative, motorists would be less likely to see the passenger rail line as the vegetation near the highway would be retained and the rail line would be farther from the highway.

Three locations along the E-W Corridor were selected as representation sites to illustrate potential impacts of new rail line on surrounding viewsheds: the Econlockhatchee River, the St. Johns River, and I-95. If the E-W Corridor were to be developed, the viewshed of motorists traveling east on SR 528 crossing the Econlockhatchee River would change minimally. For Alternatives A and C, the rail line would be relatively close to SR 528 and visible to motorists traveling on SR 528. Motorists would be able to see the rail bridge's long retaining walls parallel to SR 528. For Alternative E, the rail line would be farther away from SR 528 and therefore less visible. Motorists would be able to see a small portion of the new passenger rail line through existing vegetated areas. A narrow, restricted view of the rail bridge settled within the existing views of the Econlockhatchee River's natural features would be visible at this location. Figure 4.4.7-2b shows a photo rendering of the Econlockhatchee River viewshed looking south from SR 528 for Alternative E.

The viewshed of motorists traveling east on SR 528 crossing the St. Johns River would be somewhat obstructed because the top of the rail bridge would be slightly higher than the SR 528 bridge. Those motorists traveling in small passenger vehicles would no longer have an extensive view of the St. Johns River from SR 528. Motorists in larger vehicles such as sport utility vehicles or trucks would likely be able to view the St. Johns River over the railroad bridge and embankment as drivers in these vehicles sit at greater heights. The views for boaters on the St. Johns River looking north towards SR 528 would not change substantially as the rail bridge would be parallel to SR 528 and would be similar to the size and structure of SR 528 over the river. Figures 4.4.7-3b and 4.4.7-4b are photo renderings of St. Johns River

views looking southeast from SR 528 and from the St. Johns River looking north. Views would be the same for Alternatives A, C and E as all three alternatives would be on the same alignment at this location.

The viewshed of motorists traveling on I-95 towards the SR 528 overpass would change minimally. The new rail overpass would be constructed parallel to SR 528 and would be similar to the size and structure of the SR 528 bridge over I-95. Motorists traveling on I-95 would see another overpass similar to SR 528. Figure 4.4.7-5b shows a photo rendering of the I-95 approach to the SR 528 overpass. Views would be the same for Alternatives A, C and E as all three alternatives would be on the same alignment at this location.

Motorists traveling northbound on other intersecting highways, such as Narcoossee Road, SR 417 and SR 520, approaching SR 528 would see a similar view as the I-95 approach to SR 528. Motorists on these highways would see a new overpass in front of and similar to the existing SR 528 overpass. The only minor change in appearance of the new overpass would be instead of seeing grass side slopes, such as the ones associated with SR 528 overpasses, motorists would see concrete retaining walls similar to those shown in Figure 4.4.7-5b.

New communications towers would be required along the E-W Corridor to support the communications systems. These towers would be either monopole or lattice-type towers, and would be less than 100 feet in height. While these towers would be visible to motorists on SR 528, they would not substantially change views along this corridor.

North-South Corridor

The existing viewshed along the N-S Corridor would remain largely unchanged. Modifications proposed for this corridor are expected to maintain the general aesthetics of this active rail line. Project improvements, including restoring the double-track system along the N-S Corridor, would occur within the existing right-of-way. Construction within the N-S Corridor is not expected to affect visual and scenic resources in this area as the existing transportation land use would not be changed because of the Project. The existing rail corridor would continue to be used with minimal removal of vegetation and no changes to at-grade crossings except for upgrades to signals in some locations. In some locations, vegetation removal within the right-of-way may increase views of passing trains.

The N-S Corridor would be visible from roadways that cross at-grade. Motorists' views at these at-grade roadways would be limited to grade crossings, lights, gates, and flashers. In a few locations, especially urban areas, the N-S Corridor would be visible from nearby buildings. Views currently consist of one or two tracks, railroad ballast, and infrastructure. In more suburban areas, vegetation would generally screen the views of the railroad. These visual conditions are not anticipated to change because of the Project. Boaters traveling underneath existing FECR Corridor bridges on navigable waterways would not see a substantial change because of the Project, although some dilapidated bridges on timber pilings would be replaced with new structures supported on concrete pilings. Boaters' views would continue to consist of the railroad bridges, as proposed improvements would restore the tracks or reconstruct the bridges within the same location as the existing structures.

AAF passengers would see a variety of undeveloped and developed land use types, such as residential areas, highways, commercial and industrial developments, golf courses, wetlands, forested areas, parks, agriculture, and water bodies while traveling the N-S Corridor. The trains would travel through areas of high density associated with urban and town centers and areas of low density associated with natural areas.

Phase I - West Palm Beach - Miami Corridor

As stated in Section 3.3.11 of the 2012 EA, the existing viewshed of the FECR Corridor from the surrounding land uses would be maintained. The proposed station concepts include aesthetic features such as architectural components, landscaping, and ADA-compliant parking and pedestrian features. These improvements are anticipated to result in an enhancement to the existing communities. It is also anticipated that the proposed station construction would be compatible with surrounding land uses. During the design phase of the WPB-M Corridor, complete engineering and architectural details for station facilities (including canopy columns and railings), platforms, signing, lighting, and landscaping plans would be developed in accordance with all applicable codes and laws and pursuant to all required permitting reviews.

The stations located adjacent to NRHP-eligible historic districts will incorporate aesthetic features consistent with the historic architecture of the surrounding community and will be developed in coordination with local historic preservation groups and organizations and subject to review by SHPO.

Boaters traveling underneath existing FECR Corridor bridges on navigable waterways would not see a substantial change because of the Project, although some dilapidated bridges on timber pilings would be replaced with new structures supported on concrete pilings. Boaters' views would continue to consist of the railroad bridges, as proposed improvements would restore the tracks or reconstruct the bridges within the same location as the existing structures.

5.4.8 Utilities and Energy Resources

This section describes the potential effects of the Project on public utilities and energy supplies. The Project would have no, or negligible, effects on utilities and energy resources.

5.4.8.1 Environmental Consequences – Utilities

The Project may require that some of the existing utilities be relocated outside of the track footprint. Where the proposed track crosses underground utilities, relocation may be necessary to provide an adequate depth below the tracks. Where the proposed track crosses under overhead utilities, relocation or reconstruction may be necessary to provide the required vertical clearance over the tracks to accommodate utilities lines and equipment. During final design, AAF will coordinate with all of the affected utilities.

No-Action Alternative

The No-Action Alternative would not affect existing public utilities.

Action Alternatives A, C, and E

The effects to utilities from Alternatives A, C, and E are expected to be similar, with some slight variations in the alternative alignments through the CFX section of the E-W Corridor.

MCO Segment

Some buried utilities may be present in the MCO Segment. Coordination with the affected utilities is required and planned; coordination and final relocation plans will be established during the detailed design stage of the Project. The proposed VMF, on GOAA property near the MCO, is currently served by all necessary utilities (OUC 2013). Constructing the VMF would affect a large infiltration ditch originally constructed to serve the City of Orlando wastewater treatment facility but which is no longer functioning. Constructing the VMF, therefore, would not affect any utilities.

East-West Corridor

The E-W Corridor crosses several stormwater management features associated with SR 528. The Project has been designed to provide replacement stormwater management ponds and infrastructure, and would not have a long-term adverse effect on stormwater management.

The E-W Corridor crosses several overhead electrical transmission lines. Vertical relocation (raising) the aerial electrical transmission lines crossing the E-W Corridor right-of-way may also be required, although preliminary analyses by AAF suggest that raising lines to maintain adequate vertical clearances is not likely necessary. The Project would require that an existing access road between Farm Access Road #2 and the major Florida Power and Light (FPL) overhead transmission line west of SR 520 be relocated, for a distance of approximately 1 mile. For Alternative A, the access road would be accommodated within the existing SR 528 right-of-way using retaining walls for the railroad. For Alternatives C and E, a new maintenance access road would be constructed south of the railroad, and would be a shared maintenance road with AAF. AAF would coordinate with the affected utilities during final design.

According to the National Pipeline Mapping Service, the Project may intersect two existing pipelines (PHMSA 2007) that are within the SR 528 right-of-way, parallel to the existing road. Alternative A may require that portions of these pipelines be relocated. Measures that would be used to ensure that natural gas pipelines or any other pipelines crossing beneath the proposed new rail may include the use of casing and maintaining at least 4.5 feet of cover between the top of the casing and the rail bed. AAF will coordinate with the pipeline owners and operators during final design. Any relocation would require approval from the Federal Energy Regulatory Commission (FERC). Coordination with the affected utilities is required and planned; coordination and final relocation plans will be established during the detailed design stage of the Project.

North-South Corridor

Electrical transmission/distribution lines, above and below ground, are located along and within the FECR Corridor. In some locations, poles will require relocation in order to accommodate the new mainline track and upgraded crossings. AAF would coordinate with the affected utilities, which include AT&T, Florida Power and Light, Sprint, Orlando Utilities Commission, Duke Energy, Florida Gas Transmission, and Orange County, during final design and prior to construction. Pole relocation is expected to be minimal, and associated with grade crossings and limited sections of the rail corridor where new track is required.

Electrical service providers within the N-S Corridor include FPL and the City of Vero Beach. Improving the railroad crossings could impose temporary and minor disturbances on electrical service and could result in a slight increase in electricity to operate the new crossings and switch stations.

Phase I - West Palm Beach - Miami Corridor

Phase I of the Project is also served by FPL. An existing FPL substation, located between Datura and North Clematis Streets at the intersection of the FECR rail line, would serve the Project. The main service for the site is routed through aboveground distribution lines adjacent to the WPB-M Corridor. No utility relocations would be required for Phase I.

5.4.8.2 Environmental Consequences - Energy Use

This section evaluates the changes in energy use associated with the Project. The No-Action Alternative would be expected to result in increasing energy consumption for private automobiles, commensurate with the increase in annual vehicle-miles traveled.

The evaluation of energy consumption took into account energy requirements for locomotives (train operations), facility operations, and the off-setting decrease in energy usage by personal automobiles. Alternatives A, C, and E would have negligible effects on energy consumption. Negligible energy effects are those that would result in a slight measurable increased use of energy but are very close to the existing conditions.

Operational, safety improvements and upgrades are necessary due to the increased passenger train speeds and frequency. These improvements and upgrades require minimal electrical demand. Electrical consumption would increase with the addition of a second mainline track along the N-S Corridor from Cocoa to Miami, along with the increase in maximum authorized speed. This minor increase is a result of additional interlockings, which provide the operational flexibility for mixed freight and passenger service. In addition to the increase of interlockings, PTC adds electrical loads not currently seen. These PTC loads are derived from associated equipment, including wayside interface units and radio towers for transmission of information between wayside locations and each train. Another area of increase is at highway-rail grade crossings. Additional equipment is required due to adding a second mainline track, increasing track speed, and the proposed PTC system. To help offset any increases in energy demand at crossings, AAF will replace existing incandescent lamps with LED flashers. Additional minor increases in energy usage would occur with new surveillance cameras at locations where high vandalism occurs, and where potential storage of track maintenance equipment is likely to take place.

Additional electrical service would be required to operate new rail crossings or switch stations. Electrical service providers within the corridor include FPL, Orlando Utilities Commission (OUC), and Progress Energy. The increase in electrical service/demand is minimal and would require no major changes or construction of electrical or other utility infrastructure. No other electrical utilities would be affected by the construction or operation of Project elements within the N-S Corridor.

As stated in Section 3.3.10 of the 2012 EA, electrical energy requirements directly related to the operation of the stations and ancillary activities along the WPB-M Corridor are anticipated to average 81,600,000 kilowatt hours (kWh) annually.

Locomotives

AAF will operate each train with two locomotives. Each locomotive will be designed in accordance with New Generation DE Locomotive PRIIA 305-005 technical specification and all FRA standards and regulations. The dual set will provide maximum reliability, improved acceleration, and a high level of safety from the locomotive's incorporated crash energy management system.

Each locomotive will be equipped with a state-of-the-art, 4,000-horsepower diesel engine that will provide sufficient traction power for up to nine single-level cars for a sustained maximum operating speed of 125 mph. Emission limits are according to EPA Tier 4 (Rail) (EPA 2011b). Fuel consumption and exhaust will be reduced significantly by using a highly efficient diesel-electric traction system with rheostatic braking which will enable significant fuel savings with significant reduction of exhaust. The electrical brake will provide electrical energy to feed auxiliaries.

According to Section 3.3.10 of the 2012 EA, approximately 1.3 million gallons of diesel fuel would be consumed by the Project (in total) on an annual basis. In 2011, the State of Florida consumed approximately 1.4 billion gallons of diesel fuel (Florida Department of Agriculture and Consumer Services 2012). The Project fuel needs represent approximately 0.09 percent of existing diesel fuel use. Based on the estimated annual quantities of diesel consumption, the effect on energy resources would be negligible.

Facility Operations

Operating the VMF at the northern terminus would require additional energy through existing electrical services. Electrical requirements related directly to the operation of the stations and ancillary activities are anticipated to average 81.6 million kWh annually, which is compared with 8.5 trillion kWh produced by the OUC annually (OUC 2013). Adequate energy supplies are available to support the operation of the VMF. As stated in the EA (Section 3.3.10), electrical energy would be required for Phase I stations. Electrical requirements related directly to the operation of the stations and ancillary activities are anticipated to average 81,600,000 kWh annually.

Personal Vehicle Use

Based on the Florida Standard Urban Transportation Model Structure Regional Transportation Model Highway Evaluation output and the investment-grade ridership study (Louis Berger Group 2013), AAF estimates that roadway VMT would be reduced by the proposed Orlando to West Palm Beach service by 149,328,070 miles in 2019 and by 178,726,265 miles in 2030 (see Table 5.2.1-1), respectively. Using the U.S. average of 22.1 miles per gallon (mpg) for 2011, this represents a saving of 6,756,926 gallons per year (gpy) in 2019 and 8,087,161 gpy in 2030. The analysis indicates that the Project would result in a net reduction in petroleum-based fuels consumed and VMTs within the State of Florida and, therefore, would have a beneficial or enhanced effect on energy use.

As stated in Section 3.1.1 of the 2012 EA, the Phase I Project would reduce roadway VMT by 44,229,342 in 2018 and by 51,345,672 in 2030, respectively. Using the average 22.1 mpg, this represents a saving of 2,001,327.6 and 2,323,333.5 gpy, respectively, in gasoline (energy) consumption. This reduction in VMT would generate a corresponding reduction in regional highway congestion levels.

5.4.8.3 Temporary Construction-Period Effects

The Project would require the use of various types of fossil fuels, electrical energy, and other resources during construction. These resources are considered to be irretrievably committed to the Project. At this time, these resources are not in short supply and are considered readily available. As a result, the use of these resources is not expected to result in an adverse effect upon their continued availability.

The Project would consume energy, primarily as diesel fuel, during construction. According to the current design plans for the N-S Corridor, the materials and equipment required to reconstruct the railroad bridges and the additional rail lines would be transported via the existing railway. Due to the reduced energy demands associated with rail travel, the energy needed to construct the Project in the N-S Corridor is substantially less than compared to an infrastructure project that requires a roadway mobilization (FRA 2010b). Construction phasing could greatly reduce energy consumption associated with construction in the E-W Corridor and VMF by allowing materials to be transported by rail.

The Project would require the commitment of various types of construction materials, including steel, aggregate, cement, asphalt (bituminous materials), electrical supplies, piping, and other raw materials such as metal, stone, sand and fill material. Large amounts of labor and other natural resources would be committed to the fabrication and preparation of these construction materials. This commitment of resources is irretrievable but the resources are not in short supply and their use would not result in any adverse effect upon their continued availability.

The initial operation of the Project may result in a slight increase in energy consumption when compared to the No-Action Alternative. The Project would be expected to result in a long-term decrease in energy consumption through increased travel efficiency along new transit routes during operation.

Contractors would use phasing and hire professional utility locators to identify any potential conflicts in order to prevent or limit any interruptions in utility service. Potential outages could occur depending upon the utilities network, which may have the ability to reroute those circuits in order to minimize any temporary disruption of service. The relocation of poles is expected to be minimal, and associated with grade crossings and limited sections of the rail corridor where new track is required. Contractors will be required to follow standard safety practices when working below power lines, including signage, restrictions on equipment height, and protecting wires.

5.5 Cumulative Impacts

The Project would result in direct or indirect, adverse and/or beneficial effects to a range of resources, as described in the prior sections of Chapter 5. Some of the Project's impacts, whether minor or major, when combined with the effects of other past, present, or reasonably foreseeable future actions may result in substantive effects to environmental or social (human) resources. These combined impacts are referred to as cumulative impacts.

The analysis provided in this section evaluates direct and indirect changes to the environment resulting from the Project and because of past and reasonably foreseeable future actions, consistent with CEQ and other agency guidance documents:

- Considering Cumulative Effects Under the National Environmental Policy Act (CEQ 1997a);

- Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ 2005b);
- Secondary and Cumulative Impact Assessment in the Highway Project Development Process (FHWA 1992);
- Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process (FHWA 2003); and
- Cumulative Effects Evaluation Handbook (FDOT 2012c).

The CEQ regulations define a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7).”

As documented in this section, the Project is not anticipated to result in cumulative impacts which would be collectively significant and adverse. With respect to transportation, air quality, and economic resources, the Project would have beneficial cumulative impacts.

5.5.1 Methodology

The purpose of a cumulative impacts analysis is to identify effects that may be minimal and therefore neither significant nor adverse when examined within the context of the proposed action, but that may accumulate and become both significant and adverse over a large number of actions. This section describes the methodology used to evaluate the cumulative impacts of the Project alternatives.

The cumulative effects of the Project were analyzed for each of the alternatives, as compared to the baseline condition (the No-Action Alternative). The evaluation was conducted for a selected set of resources within certain temporal and spatial boundaries, in reference to historical trends or effects from specific other projects, and that are (for the most part) regulated by various governmental agencies.

5.5.1.1 Resources Evaluated

Sections 5.1.1 through 5.4.8 cover the potential direct and indirect effects of the Project for a broad range of resources, including environmental media (air, water), ecosystems (biodiversity, wetlands, protected species), and human communities (historical and archaeological resources, the economy). Some resources are expected to be little affected by any of the Project alternatives; others may be substantively affected positively or negatively, either directly or indirectly, or through induced growth. Some resources have experienced substantial historical impact from other projects or human activity, may experience substantial future impact from other projects or activities, or are of specific interest to decision-makers, regulators, and the residents of the Central and South Florida region. The cumulative impacts evaluation focuses on those resources affected by the Project:

- Land Use;
- Transportation;
- Air quality;

- Noise;
- Water resources;
- Floodplains;
- Wetlands;
- Protected species; and
- Social and economic environment.

The other resources evaluated in Chapter 5 of this FEIS are expected to be little affected or not affected by any of the Project alternatives and/or would not be adversely impacted by past or reasonably foreseeable actions in the Project Study Area.

Although not a “reasonably foreseeable future action” in the traditional sense of cumulative impacts analysis, the possible effects of climate change on resources such as wetlands and threatened and endangered species has been taken into consideration to the extent possible.

Federal, state, or local governmental agencies regulate most of the resources selected for the cumulative impacts evaluation. The regulatory programs drive many of the trends for improving resource values (such as air quality, water quality, and wetlands area) and are thus an important factor in the resource effects of the Project and other regional projects. The regulatory programs typically control effects to the resources by prohibiting impacts except for as authorized by a permit. Regulatory agencies are charged with reviewing permit applications and, generally, only authorize activities that provide the least impact to the resource while still meeting the Project’s purpose and need. For this cumulative impacts evaluation, the existing permitted facilities and proposed actions provide an indication of the current and likely future impacts to the resources.

The agencies responsible for administering these programs are typically charged with managing the resources on a project-by-project basis, but in the context of the common good. For example, the federal government has a “no net loss” policy regarding wetlands: project proponents seeking permits to fill wetland areas are commonly required to offset losses by replacing filled wetlands at a negotiated ratio. These replacement ratios, in part, make up for historical wetland loss in addition to the project-specific loss. Thus, certain regulated resources are experiencing improvements, rather than degradations, over time.

5.5.1.2 Temporal and Spatial Boundaries

The cumulative impacts analysis defines a time frame and geographic range for the evaluation, and takes into account changes from other projects within this time frame that contribute to cumulative effects on the resources listed above. Historical impacts have been evaluated for two time periods.

For most resources, prior changes have been evaluated for the period 2000 to 2012. The year 2000 was selected as the starting date because this is a prior census year, it was in the midst of a period of economic downturn, and it establishes a reasonable baseline condition. The baseline reflects conditions in 2012/2013, taking into consideration publication delays for the availability of the most recent data. Future impacts have been evaluated to the year 2019, the planning year for the Project at which time full ridership is anticipated to be reached. Spatial boundaries for the analysis varied by resource, according to the specific characteristics of the resource, regulatory jurisdictions, and the availability of meaningful data.

The analysis used readily available data sources for past and future changes. For each resource, the analysis took into consideration past changes to the selected resources that resulted from development trends or major projects within the Project Study Area. Future changes to the selected resources are based on historic or recent trends, or specific projects, including all reasonably foreseeable projects (those projects that are undergoing or have completed major environmental permitting actions or NEPA reviews) and that are programmed for construction. Each of these projects is briefly described below. Because the majority of these projects are in early planning stages and are at the conceptual design stage, effects to environmental resources have largely not been quantified. The cumulative impacts of these projects are therefore assessed qualitatively based on the assumed level of impact.

5.5.1.3 Projects Considered in this Analysis

The analysis of cumulative impacts includes projects within the Central-Southeast Florida study area that are reasonably foreseeable – that are planned and programmed for construction within the time frame of this analysis, or which are likely to occur outside of the public planning process. Projects that have been proposed and evaluated, but which are not likely to proceed in this time frame, are not included in the analysis.

MCO Intermodal Station

Multimodal improvements proposed at MCO include two new Intermodal Centers for passengers and the associated passenger rail and light rail (LRT) alignments within MCO. These improvements provide connections to intercity passenger rail and regional light rail. The Intermodal Centers provide interconnectivity to multi-modes of transportation within the region's current and future transportation system and increase capacity through additional passenger processing, ground operations and parking immediately adjacent to the terminals to the south (FTA, FDOT, and GOAA 2005). Construction of the Intermodal Centers would occur with or without the Project, as they would potentially accommodate other rail projects (that is, commuter rail [SunRail] and light rail [North-South Light Rail Alignment]), along with an expanded LYNX bus service, large-scale garage parking, rental car facilities, taxi accommodations, and other ground transportation options (MCO 2010).

Work on this facility has already begun, and construction is expected to be completed in 2018 (GOAA 2015). The Intermodal Terminal Complex, at the site of the future South Terminal, would consist of a terminal building housing the airport's Automated People Mover, a bus terminal, passenger rail tracks, platforms and lobby, and future commuter rail tracks and platforms. A 3,500-car parking garage would be constructed as part of this complex. This terminal complex would be constructed by GOAA even if the AAF project were not advanced, and is therefore not part of the Project.

In accordance with NEPA, the FTA and the FDOT, in cooperation with GOAA, prepared an EA that evaluated the potential environmental impacts of the proposed intermodal improvements at MCO (FTA, FDOT, and GOAA 2005). In December 2005, the FTA issued a FONSI based on the information in the Final EA (FTA 2005). The FAA issued a re-evaluation of the EA for the South Terminal Complex and Intermodal Center, and concluded that the proposed intermodal improvements at MCO do not require a new or supplemental EA (FAA 2013).

Orlando International Airport East Airfield Development Area

GOAA is proposing to develop an approximately 1,325-acre area on the east side of the airport property, south of SR 528 and west of Narcoossee Road. The proposed development would require FAA approval of a modified Airport Layout Plan and is therefore subject to NEPA. The Project was described in a draft EA issued for public comment in November 2009, and in an unpublished revised draft (November 2010) available on the GOAA website (GOAA 2009). The Project includes a flexible conceptual development master plan to provide large-scale aviation uses with efficient airfield access, potentially including a fuel farm; airport support uses such as maintenance, manufacturing, hangars or cargo facilities, and flight training centers; stormwater management areas; roadways and open space; and buffers to the adjacent communities.

Development along the SR 417 Corridor

Development along SR 417 southeast of the MCO has been occurring since the early 2000s, and has included large private institutional developments (including the Veterans Affairs Medical Center, the Sanford-Burnham Medical Research Institute, and Nemours Children's Hospital, all located at the Lake Nona Medical City area) and residential communities (Randal Park, North Lake Park). Comparison of 2003 and 2013 aerial photographs illustrates the increased development in this area. Other private developments are planned (such as International Corporate Park and Magnolia Ranch) and growth is anticipated to continue as Central Florida recovers from the recession.

The Wewahootee property (formerly known as Innovation Place) is a 1,284-acre mixed use master planned community located at the southeast quadrant of the SR 528 and SR 417 interchange. The project area was recently annexed into the City of Orlando from unincorporated Orange County and is entitled for over 2,000 residential units and 1.3 million square feet of non-residential use (retail, office). A construction phasing schedule has not yet been established or approved by the City of Orlando.

State Road 528 Corridor Improvements

FDOT, in consultation with FHWA, is proposing to widen the existing SR 528 corridor from four lanes to six lanes. Additionally, the CFX evaluated proposed improvements in the 2008 SR 528 corridor study, which included expanding existing corridors and/or constructing new multi-use corridor(s) that may include, but not be limited to, a limited-access toll roadway, a multi-use utility corridor for pipelines, power, communication, and/or water facilities; transit features and/or freight rail service. The project study limits for FDOT's SR 528 PD&E Study extend from the SR 520 interchange in unincorporated Orange County to the Port Canaveral Terminal B interchange (George King Boulevard) in unincorporated Brevard County, approximately 24 miles in length. This area includes portions of unincorporated areas of eastern Orange County, the City of Cocoa, and unincorporated areas of Brevard County. Generally, the purpose of the project is to enhance the integrity of the highway while accommodating future traffic demands, improving overall safety, and meeting current design standards. In addition to providing improved emergency evacuation and response/recovery time, the proposed improvements are intended to serve existing and approved land uses along the SR 528 corridor.

The PD&E study completed in 2006 by FDOT provides the documented information necessary for FDOT to reach a decision on the type, design, and location of improvements to SR 528, and this project has been

identified in FDOT's Five Year Work Program. No funding for design, right-of-way, or construction has been allocated.

The SR 528 Multi-Use/Multi-Modal Corridor Study was completed in 2008 by CFX. Next steps include a PD&E study for multi-use/multi-modal improvements. No funding for design, right-of-way, or construction has been allocated (OOCEA 2008).

In July 2013, CFX agreed to purchase approximately 500 acres of undeveloped land from Deseret Ranches (OOCEA 2013). The purchase agreement includes a 200-foot wide strip south of the existing SR 528 right-of-way for future highway improvements and to accommodate the multi-use/multi-modal corridor identified in the authority's 2030 Master Plan.

Interstate 95 Widening

The portion of I-95 under study by FDOT and FHWA stretches for 222 miles, from the Indian River County/Brevard County border at the southern limit to the Georgia border at the northern limit, and includes six counties and 12 municipalities. Roadway widening projects along the I-95 corridor involve increasing lane counts from between four and eight lanes to between six and 12 lanes. The I-95 corridor serves and connects several key facilities including major airports, intermodal freight-rail terminals, passenger terminals, seaports, and a spaceport. The primary purpose of the I-95 Sketch Interstate Plan is to outline a course of action to improve users/travelers mobility within the I-95 corridor by identifying mainline concepts to provide the mobility that will adequately serve high volume travel, facilitating interstate and regional commerce and long distance trips (FDOT, Systems Planning Office 2010).

Some portions of I-95 expansion near Cocoa in Brevard County have been funded or identified for funding by FDOT. Design-build proposals for the 12.4 miles from SR 528 south to SR 519 were received in September 2006. Construction of the 10 miles from SR 528 north to SR 50 was funded in Fiscal Year 2009/2010. The FDOT PD&E to improve the I-95 corridor from north of Oakland Park Boulevard (SR 816) near Fort Lauderdale in Broward County to south of Glades Road (SR 808) near Boca Raton in Palm Beach County is anticipated in July 2013, followed by implementation phases (FDOT 2013b).

5.5.1.4 Potential Future Projects Not Considered in this Analysis

Several transportation projects within the Project Study Area have been proposed or are currently in preliminary planning stages. The Tri-Rail Coastal Link Study is being undertaken by FDOT, and is evaluating the use of the FECR Corridor for the Tri-Rail service, which currently operates on the CSX-controlled railroad right-of-way west of the FECR Corridor (FDOT 2014). The NEPA process for that study is anticipated to begin in 2015. Tri-Rail Coastal Link has been a project sponsored by Florida DOT and the South Florida Regional Transportation Authority (SFRTA) for over a decade. SFRTA's initial preference when the project was conceived in the mid-1980s was to have its existing service on the FEC corridor. AAF is coordinating and discussing possibilities with the South Florida Regional Transportation Authority regarding its ability to operate commuter rail service in conjunction with AAF operations, as required by the commitments established in the Finding of No Significant Impact for the Miami to West Palm Beach Phase. However, until access and operating agreements can be negotiated and the necessary local, state and federal funding has been secured, the operation of Tri-Rail commuter service is not reasonably foreseeable. The project's current estimated cost is \$800 million. Initial capital costs would be provided

by the FTA New Starts program, local communities and the state. Further, there has been no publication of a Notice of Intent by the Federal Transit Administration indicating that NEPA analysis has or will be initiated on this potential project and no capital funds have been committed to the project from local, state or federal agencies.

To fulfill the commitments established by the January 2013 FONSI, AAF has been coordinating and discussing the expansion of the existing Tri-Rail service from the planned and funded Iris connection in Hialeah, Florida to downtown Miami. This approximately 8-mile route would allow Tri-Rail to split its trains, with half continuing to Miami International Airport's Miami Intermodal Center and half continuing to All Aboard Florida's Miami Central station. These discussions are ongoing given that AAF's downtown Miami station must be planned today for Tri-Rail service since the necessary platforms for commuter rail could not be built after the station is completed and the viaduct into downtown Miami could not be widened.

In 2010, a draft Environmental Assessment was completed for a project that contemplated Amtrak service on the FECR Corridor between Jacksonville and Miami (FRA and FDOT 2010). That project has not advanced due to lack of funding, and no funding is reasonably foreseeable.

5.5.2 Cumulative Impacts

This section describes the past, reasonably foreseeable future, and cumulative impacts to those environmental resources within the Project Study Area that would be affected by the Project. Cumulative impacts are described for the Project as a whole, and identify any differences among the three alternatives evaluated in this FEIS.

5.5.2.1 Land Use

Past Effects

Within the analysis period, land use within and adjacent to the Project Study Area has not changed substantially, with the exception of the area east and southeast of MCO along SR 417. Development of the Lake Nona area and other residential/commercial projects have resulted in the conversion of undeveloped land and agricultural land to residential, commercial and institutional land uses.

Reasonably Foreseeable Future Effects (without the Project)

Development of the area east and southeast of MCO, along SR 417 and further east along Innovation Way is expected to continue, with additional conversion of undeveloped land. The East End Development Area at MCO would convert approximately 115 acres of undeveloped land to airport support facilities, with an additional 204 acres of stormwater management areas, and approximately 346 acres to other land uses (transportation and open space). Full build-out, however, may not occur within the planning horizon of the Project.

The MCO Intermodal Facility, SR 528 corridor improvements, and I-95 expansion would be located within existing transportation facilities or corridors and would not affect land use. Although the conceptual plans (see Appendices 3.3.1-A2 and 3.3.1-A3) for the SR 528 corridor show potential future interchanges, these

would only be constructed as needed to support future development along SR 528. This development is speculative and would not occur within the time frame of this analysis.

Cumulative Impacts of the Project

The Project would result in minor changes to land use within GOAA property (for the VMF), within the SR 528 corridor, and to land acquired to facilitate construction of the Cocoa Curve connection between the E-W and N-S Corridors. The Project, considered in combination with past and reasonably foreseeable future effects to land, would not result in a substantially greater change in land use or loss of undeveloped land within the Project Study Area.

The passenger rail and multi-modal stations proposed for the WPB-M Corridor project would affect land at the proposed station sites. However, station construction would have only a minor change to surrounding land uses and would not effectuate change in land use and planning for adjacent areas, though regionally additional infill development is expected as governed by local land use and zoning regulations and ongoing adjustments

5.5.2.2 Transportation

Past Impacts

Regional increases in population and recent developments within and adjacent to the Project Study Area have increased traffic demand on local and regional roadways, increasing congestion and delays, as documented in Chapter 2, *Purpose and Need*.

Reasonably Foreseeable Future Impacts (without the Project)

The projects included in this analysis would provide transportation benefits resulting from capacity increases on SR 528 and I-95, and may benefit communities located along the east coast and the State of Florida as a whole by improving flow of traffic and increasing mobility. Construction of the MCO Intermodal Facility would improve transportation connectivity for airport passengers and employees. Further development of the East Airfield Area and the area southeast of MCO would increase traffic demand on SR 417 and SR 528, as well as other local roads; however, traffic mitigation measures would be incorporated into development permits for these projects. The proposed SR 528 Master Plan development would improve capacity and traffic flow.

Based on FECR's projections of increases in the demand for freight rail transportation of goods, freight train configurations would be expected to incorporate the anticipated cargo growth of approximately 3 percent per year after 2016. Although FECR is projecting that the number of freight trains will increase, FECR also anticipates that most of the increase in freight haulage would be met by increasing train length, rather than be increasing the number of trains, since the number of trains is ultimately limited by the need to accommodate both freight and passenger trains on a two-track system. As the length and number of freight trains increases, the number and duration of at-grade crossing closures and moveable bridge closures is also anticipated to increase. However, the moveable bridge closures would be regulated by the USCG and may change if the USCG implements a new rule-making procedure.

Cumulative Impacts of the Project

The cumulative impact would be beneficial to the regional transportation system because of capacity increases. Any adverse impacts would be limited to temporary delays and detours during construction phasing. The improvements to regional transportation would further benefit communities located along the east coast and the State of Florida as a whole with improved flow of traffic and increased mobility.

5.5.2.3 Air Quality

Past Impacts

Current air quality conditions within the Project Study Area, as described in Section 4.2.1, reflect the contributions of air pollutants from a range of sources, and the effects of state and federal air pollution regulations that have improved regional air quality.

Reasonably Foreseeable Future Impacts (without the Project)

The I-95 widening project, the SR 528 improvements, and the WPB-M Corridor project involve improvements to existing highway and rail corridors. Cumulative air quality effects are associated with increased vehicle capacity of the expanded roadway, and take into account the beneficial effects of regulatory programs.

Cumulative Impacts of the Project

The Project is anticipated to have a beneficial effect on air quality due to the offsetting effect of increased rail ridership to reduce vehicular travel. Increased ridership through expanded rail service is expected to alleviate to a minor extent the demand for vehicular travel and offset related emissions. No cumulative adverse effect is therefore anticipated. The Project is anticipated to be constructed at a different time than the other future projects included in this analysis, and therefore would not contribute to cumulative air quality effects from construction.

Increased development associated with increased economic activity in the vicinity of the WPB-M Corridor transit nodes would potentially result in increased emissions indirectly associated with building operation or commercial activity. Air quality effects from construction will be temporary and will primarily be in the form of exhaust emissions from trucks and construction equipment as well as fugitive dust from construction sites.

5.5.2.4 Noise

Past Impacts

Many areas in the vicinity of MCO, along SR 528, and along the FECR Corridor experience noise because of vehicular and freight train traffic, as well as aviation noise and general urban noise levels.

Reasonably Foreseeable Future Impacts (without the Project)

The projects included in the analysis primarily involve improvements to existing highway and rail corridors, or within an existing airport. Increased vehicle capacity of the expanded roadway system would likely increase vehicular noise and, to a lesser extent, vibration. The FECR Corridor currently operates with freight rail, which generates noise and vibration. Any noise impacts to adjacent residences or sensitive land uses along the SR 528 or I-95 corridors resulting from shifting vehicle traffic closer to residences would be mitigated as required by FHWA guidelines. Temporary noise and vibration impacts may be generated by heavy equipment and construction activities such as pile driving and vibratory compaction of embankments.

Cumulative Impacts of the Project

The Project is not anticipated to result in noise impacts within the MCO Segment or the E-W Corridor due to the lack of receptors, and would not result in cumulative noise impacts in these areas. The N-S Corridor is approximately 1 to 15 miles east of I-95. Due to this physical separation, the construction and operation of the rail facilities are not likely to cumulatively generate noise or vibration impacts for adjacent communities. The addition of new structures or uses associated with the I-95 widening in proximity to the existing N-S Corridor would result in minimal cumulative effects from the introduction of noise and vibration-sensitive uses in adjacent developed areas or areas of potential future urban development. The Project would reduce noise within the N-S and WPB-M Corridors by using pole-mounted horns at certain grade crossings.

The N-S Corridor and the WPB-M Corridor are within the existing FECR Corridor. Noise and vibration impacts may be generated by heavy equipment and construction activities such as pile driving and vibratory compaction of embankments during construction phases only, but would not cumulatively increase noise and vibration when considered with the Project.

5.5.2.5 Water Resources***Past Impacts***

As documented in Section 4.3.1, *Water Resources*, Affected Environment discussion, the surface waters throughout the Project Study Area have been adversely affected by past human activities (agriculture, wastewater discharge, urban development) and are considered impaired for fecal coliform, dissolved oxygen, mercury, copper, and high nutrient levels (eutrophication).

Reasonably Foreseeable Future Impacts (without the Project)

Each of the reasonably foreseeable future projects considered in this analysis would impact water resources due to the effects of increased surface runoff from impermeable surfaces and redirection of natural water bodies. However, impacts are expected to be minor, as all projects are expected to include BMPs put in place to prevent degradation of water quality in downstream waters and flood-prone areas. Impacts to water resources are anticipated to be minimal on a regional scale. Proposed development would not be anticipated to result in potential effects to water bodies, creeks, streams, and rivers in the vicinity as regulatory agencies require appropriate BMPs prior to issuing permits. The FAA EA/FONSI for the MCO

Intermodal Facility determined that there is no significant pollution discharge associated with the surface waters within MCO, and that the existing stormwater management system could accommodate the proposed rail extensions within the MCO property with little if any modification. Stormwater Pollution Prevention Plans (SWPPPs) would be required for all phases of projects to cumulatively avoid effects to water resources. The MCO East End Development has committed to more than 200 acres of stormwater management to mitigate for potential effects to water resources. On a regional basis, groundwater aquifers are predicted to be affected by climate change and sea level rise (Koch-Rose, Mitsova-Boneva, and Root 2011).

Cumulative Impacts of the Project

The Project is expected to have minor impacts on surface and groundwater, as all surface water effects would be mitigated in accordance with applicable state and local laws regarding appropriate compensation and permitting. The Project would result in minimal amounts of impervious surfaces, with new impervious surface proposed only at the VMF. Improvements associated with the proposed station alternatives in Miami and Fort Lauderdale will include minor changes to impervious surface areas for the proposed stations, parking facilities, and platforms as outlined in Table 3-1.9 of the 2012 EA. Because there will be little change in the pre- versus post-runoff condition in these cases, no, or minimal, upgrades to existing off-site municipal drainage systems (conveyance structures) are anticipated as a result of the proposed stations and facilities.

The remainder of the Project would be constructed as railroad bed and ballast and would not affect surface or groundwater. The Project would not contribute to cumulative impacts on groundwater. The cumulative impacts of the Project and other reasonably foreseeable future effects would be minor and would be mitigated as required by regulatory agencies. Cumulative impacts of construction (release of silt or sediment) are not likely because the Project would not be constructed at the same time as the other future projects.

5.5.2.6 Floodplains

Past Impacts

It is likely that past development actions have encroached on the 100-year floodplain at locations within the Project Study Area; however, the effects of these actions have not been documented.

Reasonably Foreseeable Future Impacts (without the Project)

Each of the reasonably foreseeable future projects considered in this analysis would require construction in 100-year flood prone areas, however, the existing master stormwater system in place is expected to compensate for flood storage volumes and prevent cumulative increases in onsite or offsite flooding. Proposed SR 528 widening would be likely to affect areas within the 100-year floodplain, and would require improvements to the stormwater system to compensate for flood storage volumes and prevent cumulative increases in onsite or offsite flooding. With predicted sea level rise and climate change, future 100-year flood elevations are expected to increase, and future improvements to SR 528 or I-95 may require design features to improve resiliency in extreme flood events.

Cumulative Impacts of the Project

The Project would require construction within the 100-year floodplain in several locations. Cumulative impacts are expected to be minor, as all floodplain effects would be mitigated in accordance with applicable state and local laws regarding appropriate compensation and permitting.

5.5.2.7 Wetlands

Past Impacts

Wetlands throughout the Project Study Area have been altered by previous human activities, including road construction, urban and suburban development, construction of MCO, and agricultural activities. These impacts have included wetland loss, fragmentation of wetlands and riparian habitats, and a decreased ability for wetlands to provide important functions such as flood storage, groundwater recharge/discharge, pollutant attenuation, and wildlife habitat. In recent years, wetland effects have been compensated by constructing new wetlands in wetland mitigation banks, and some large-scale wetland restoration projects have been advanced. For example, over the last decade, large-scale wetland restoration and enhancement projects have been undertaken at Indian River Lagoon, St. Lucie River, Hobe Sound, and Loxahatchee River. Much of the restoration conducted within these areas was completed or supported as part of the Indian River Lagoon National Estuary Program, which includes dozens of small and large-scale wetland enhancement and restoration projects. Projects range in size from less than 1 acre to over 500 acres and include activities such as hydrology restoration, exotic species removal, native plant installation, and trash removal (SJRWMD 2013c).

Reasonably Foreseeable Future Impacts (without the Project)

Under the reasonably foreseeable future conditions, existing wetlands would likely be filled or experience impaired functions and values because of constructing the East End Development. Approximately 260 acres of wetlands would be converted to uplands and stormwater management system for this development. The SR 528 improvements, the I-95 widening, and future private development projects would also result in wetland losses, which have not been quantified. Discharges of dredged or fill material into jurisdictional wetlands are required to be mitigated pursuant to the CWA Section 404(b)(1) Guidelines, either by the purchase of wetland mitigation credits at approved mitigation banks or in lieu fees or by permittee-responsible compensatory mitigation, in accordance with applicable permit conditions.

Cumulative Impacts of the Project

The Project is anticipated to result in minor losses of wetlands in all of the project segments, and would affect wetland functions and values. Potential adverse impacts to future populations of wetland-dependent wildlife and/or aquatic species from loss of habitat through Project construction and cumulative projects in the vicinity of the Project are also expected to be minor. Cumulative impacts to wetland resources are anticipated to be minimal on a regional scale, and are proposed to be fully mitigated through the purchase of mitigation bank credits.

5.5.2.8 Protected Species

Past Impacts

Numerous plant and wildlife species within the Project Study Area are currently protected by the federal and state endangered species acts. Although some of these are rare due to species-specific restricted habitat distributions, population dynamics, or other natural causes, many are threatened or endangered due to historic effects of human activity (habitat loss, hunting, pesticides), which have been most severe on species which have highly restricted habitat requirements or existed in small populations. However, several previously-listed species (including the bald eagle and American alligator) have recovered and populations expanded due to federal protection and are no longer considered imperiled. Other species continue to be at low or declining population sizes due to a variety of factors, including development and habitat change.

Reasonably Foreseeable Future Impacts (without the Project)

Some of the Projects within the Project Study Area may have a direct or indirect effect on protected species. Although the SR 528 and the I-95 improvements are planned for existing transportation corridors that provide low quality habitat, wildlife species are at risk for fatal or injurious encounters with vehicles, and the proposed improvements may result in the loss of habitat for reptiles such as gopher tortoise or indigo snake. Potential adverse effects to future populations of wildlife or plants from loss of habitat through project construction and cumulative projects in the vicinity of the Project are expected to be minor. All Projects would require review by USFWS and NMFS to ensure that effects to listed species were avoided to the extent feasible, and mitigated as needed, in conformance with the ESA.

Cumulative Impacts of the Project

Cumulative impacts to protected species are anticipated to be minimal on a regional scale and limited to incidental takes from transportation uses and minor losses of habitat. As the proposed passenger trains would pass through the E-W and the N-S Corridors relatively infrequently, introduction of the trains along these transportation corridors would not be anticipated to result in a measurable increase in takings of special status species such as gopher tortoise or Florida scrub-jay. The USFWS and NMFS are anticipated to concur with the USACE's finding of "effect but not adverse effect" for all listed species. The WPB-M Corridor project would have no adverse impact on federal listed species and no significant adverse impact to state listed species.

5.5.2.9 Social and Economic

Past Impacts

Between 2003 and 2006, Florida experienced substantial increases in total population, averaging yearly expansions of about 426,000 persons per year (Office of Economic and Demographic Research 2011). Significant economic growth accompanied population increases, as Florida's gross state product rose 27.4 percent from \$574.4 million in 2003 to \$731.5 million in 2006 (BEA 2013). Economic expansion turned to decline following one of the worst national financial disasters since the 1930s, the Great Recession. From the onset of the Great Recession in December 2007 to its end in June 2009, the unemployment rate in the State of Florida increased from 4.7 percent to 10.5 percent (NBER 2010; BLS 2013). During the same 18-

month period, the unemployment rates in the Metropolitan Statistical Areas (MSAs) within the Project Study Area collectively increased from 4.5 percent to 11.0 percent (BLS 2013).⁷

While the Great Recession officially ended at the national level in June 2009, the Florida economy continued to decline until the statewide unemployment rate peaked at 11.4 percent in February 2010 (NBER 2010; BLS 2013). The statewide economy (as evidenced by unemployment) has slowly improved, but has not fully recovered to pre-recession levels. As of June 2013, the statewide unemployment rate was 7.1 percent (BLS 2013). Although this represents the state's lowest unemployment level since September 2008, it is 2.4 percent above the state's unemployment level at the onset of the Great Recession. Similar to the statewide economy, the economies of the MSAs within the Project Study Area have improved, and have not fully recovered to pre-recession levels. As of June 2013, the combined unemployment rate in the MSAs within the Project Study Area was 7.6 percent (BLS 2013). According to IHS Global Insight Inc., the economy of the State of Florida will not return to pre-recession employment levels until 2016 (BusinessWire 2013).

Land development activity peaked in 2007, followed by several years of low activity corresponding with the economic recession. The land development market began to recover in 2012 as master developers and homebuilders cleared existing inventory. In September 2013, the Orlando metropolitan area was identified as Number 5 in the U.S. among the top 10 "booming" real estate markets (Orlando Business Journal 2013).

Reasonably Foreseeable Future Impacts (without the Project)

Construction and operation of these projects would not substantially extend into surrounding land uses or change land use and planning for adjacent areas. At MCO, new construction of intermodal improvements would be limited to existing MCO property and would not extend into or partition existing neighborhoods or populations. CFX's property acquisition would change land use but would not affect the economic viability of Deseret Ranch (a 300,000-acre property). Removing these 500 acres from the tax rolls would have a negligible effect on the tax revenues of Orange County. None of the reasonably foreseeable future actions would result in splitting, relocating, or isolating neighborhoods and would not isolate a portion of an ethnic group or neighborhood, separate residences from community facilities, or substantially change local traffic travel patterns. The construction and operation of these facilities would likely introduce new jobs and revenue into local communities over the life of both projects and would have a beneficial effect to the adjacent communities, where additional jobs, community reinvestment/redevelopment, and improved tourism to local business and attractions may occur.

Cumulative Impacts of the Project

The cumulative impacts of the Project in combination with other reasonably foreseeable projects would be beneficial to communities since these projects would result in additional jobs, community reinvestment/redevelopment, and improved tourism to local business and attractions. The WPB-M Corridor would also have slight beneficial contributions to cumulative impacts. The addition of passenger rail service would also encourage transit-oriented development adjacent to the proposed stations and would promote local economic growth in these areas.

⁷ The MSAs along the Project Corridor include Miami-Fort Lauderdale-Pompano Beach, Orlando-Kissimmee-Sanford, Palm Bay-Melbourne-Titusville, Port St. Lucie and Sebastian-Vero Beach.

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6 Section 4(f) Determination

6.1 Introduction

Section 4(f) of the U.S. Department of Transportation Act of 1966 requires Department of Transportation (DOT) agencies to protect certain resources when making transportation improvements. These resources, collectively referred to as Section 4(f) resources, include publicly owned parks, recreation areas, wildlife or waterfowl refuges, and historical properties of national, state, or local significance. This chapter summarizes FRA's identification of protected properties and potential impacts to those properties, describes Section 4(f) resources that would be used by the alternatives under consideration for the Proposed Action (see explanation of "use" in Section 6.2), contains an analysis of potential feasible and prudent alternatives to the use of Section 4(f) resources, and identifies mitigation measures that would be employed to minimize harm to Section 4(f) resources resulting from use.

Since the publication of the DEIS, AAF no longer proposes any temporary construction activities within the Tosohatchee Wildlife Management Area. As a result, the potential temporary occupancy and de minimis impact to this property would not occur and has therefore been removed from this Section 4(f) Determination.

6.2 Section 4(f) Applicability

Section 4(f) of the U.S. DOT Act (49 USC § 303(c)) provides protection for publicly owned parks, recreation areas, wildlife and waterfowl refuges, and historic properties or archaeological sites on or eligible for listing on the National Register of Historic Places (the National Register). Specifically, Section 4(f) provides that:

"The Secretary of Transportation shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the States, in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of lands crossed by transportation activities or facilities... The Secretary may approve a transportation program or project...requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significant, or land of an historic site of national, State, or local significance (as determined by Federal, State, or local officials having jurisdiction over the park, area, refuge or site) only if:

- There is no prudent and feasible alternative to using that land; and
- The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."

A “use” of a protected property can occur in one of three ways:

- When land is permanently incorporated into a transportation facility;
- When there is a temporary occupancy of land that is adverse in terms of the statute’s preservationist purposes; or
- When there is a constructive use of a Section 4(f) property.¹

While not binding on FRA, FRA uses FHWA regulations (23 CFR part 774) to guide its interpretation and implementation of Section 4(f).

Where a DOT agency determines that a project would result in a use of a protected resource, it can only approve the project if there are no prudent and feasible alternatives avoiding the use and if the project incorporates all possible planning to minimize harm. If a prudent and feasible alternative exists that avoids Section 4(f) resources and meets the Project purpose and need, the DOT agencies may not select the alternative that uses a Section 4(f) resource. An alternative is not feasible if it cannot be built as a matter of sound engineering judgment. In determining whether an alternative is prudent, the FRA may consider if the alternative will result in any of the following: (1) compromise the project to a degree that is unreasonable for proceeding with the project in light of its stated purpose and need, (2) unacceptable safety or operational problems, (3) after reasonable mitigation the project results in severe social, economic, or environmental impacts; severe disruption to established communities; severe disproportionate impacts on minority or low-income populations; or severe impacts on environmental resources protected under other federal statutes, (4) additional construction, maintenance, or operational costs of an extraordinary magnitude, (5) other unique problems or unusual factors, (6) multiple factors that, while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

FRA has developed this Section 4(f) Determination because the All Aboard Florida Project would use (due to a Section 106 adverse effect) two properties that are individually eligible for listing on the National Register of Historic Places: the Eau Gallie River Bridge and the St. Sebastian River Bridge. The project will also have a *de minimis* impact on the Florida East Coast Railroad (FECR) Historic District because of the demolition of nine bridges that are contributing elements.

6.3 Project Purpose and Description

The purpose of the Project is to provide reliable and convenient intercity passenger rail transportation between Orlando and Miami, Florida (the Project Corridor), by extending (in Phase II) the previously reviewed Phase I AAF passenger rail service between Miami and West Palm Beach and by maximizing the use of existing transportation corridors. This transportation service would offer a safe and efficient alternative to automobile travel on Interstate 95 (I-95), the primary highway connecting Orlando and Miami; add transportation capacity to communities within the I-95 corridor; and encourage connectivity with other modes of transportation such as light rail, commuter rail, and air transportation.

¹ A Constructive use occurs when the transportation project does not incorporate land from a Section 4(f) resource but the project’s proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the resource are substantially diminished.

The additional purpose of Phase I of the Project, as stated in the 2013 Finding of No Significant Impact (FONSI), is to “provide intercity passenger rail service that addresses South Florida’s current and future needs to enhance the transportation system by providing a transportation alternative for Floridians and tourists, supporting economic development, creating jobs, and improving air quality” (Appendix 1.1-A2).

The Project includes four segments: the MCO Segment, which includes the proposed vehicle maintenance facility (VMF) and new railroad infrastructure between the VMF and the E-W Corridor; the E-W Corridor on new alignment between MCO and Cocoa, paralleling State Road (SR) 528; the N-S Corridor within the Florida East Coast Railroad (FECR) right-of-way between Cocoa and West Palm Beach (WPB), and the WPB-M Corridor within the FECR right-of-way. Since the publication of the 2012 EA and FONSI, AAF has determined that additional construction is necessary within the Phase I area, including reconstructing seven bridges over waterways, and modifying the turnout at the Miami Viaduct. Other changes to the Phase I segment include relocating the Fort Lauderdale Station and moving the Vehicle Maintenance Facility (from Fort Lauderdale to West Palm Beach). FRA analyzed the Fort Lauderdale Station in a Re-Evaluation, and FRA issued a separate Supplemental EA and FONSI for the West Palm Beach VMF (See Appendices 3.3.1-A1-A3). Neither of these changes would require the use of Section 4(f) properties. Generally, the Project includes additional rail infrastructure improvements from Orlando to West Palm Beach, including new track, new bridges, drainage systems, and the development of all communications, signaling, safety, and security systems. A new signal system would be implemented as part of the Project that will provide a Positive Train Control overlay system with a back office server in the operations control center to achieve compliance with 49 CFR part 229.

AAF submitted two separate loan applications to the Federal Railroad Administration (FRA) seeking financial assistance to support the phased implementation. This action triggered the need for review under the National Environmental Policy Act (NEPA).

6.4 Section 4(f) Protected Properties

Section 4(f) protects publically-owned land associated with public parks, recreation areas, or wildlife and waterfowl refuge of national, State, or local significance; and land of an historic site of national, State, or local significance. This section describes the Section 4(f) properties within the Project study area. Additional information is provided in Sections 4.4.5 and 4.4.6 of this FEIS.

6.4.1 Public Parks, Recreation Areas and Wildlife Refuges

Section 4.4.6 of this FEIS, *Recreation and Other Section 4(f) Resources*, identified 32 publically-owned parks, recreation areas, or wildlife refuges within 300 feet of the proposed Phase II project area (Orlando to West Palm Beach), and 45 Section 4(f) resources within 300 feet of the Phase I project area (West Palm Beach to Miami). These properties were identified using available public sources, as documented in Table 4.4.6-1. The lists of these properties are provided below in Tables 6.4.1-1 and 6.4.1-2.

Table 6.4.1-1 Section 4(f) and Section 6(f) Parks, Wildlife Refuges, Conservation, and Recreation Areas within the Orlando-West Palm Beach Project Study Area

Recreational Resource	County	Description
E-W Corridor		
Tosohatchee Wildlife Management Area (WMA)	Orange	The WMA is managed by the Florida Fish and Wildlife Conservation Commission (FWC). Recreational activities include: hiking, bicycling, camping, horseback riding, fishing, limited hunting and wildlife viewing (FWC 2013a). 30,700 ac.
Canaveral Marshes Conservation Area	Brevard	Conservation area managed by SJRWMD. Recreational activities include: fishing, hiking, bicycling, canoeing, boating, and wildlife viewing (SJRWMD 2013b). 12,644 ac.
N-S Corridor		
Helen and Allan Cruickshank Sanctuary	Brevard	Wildlife sanctuary managed by Brevard County. Recreational activities include hiking and wildlife viewing (Brevard County, Florida 2013b). 140 ac.
Rotary Park at Suntree	Brevard	Community park managed by Brevard County. Recreational facilities include a playground and a pavilion (Brevard County, Florida 2013c). 10 ac.
Jordan Scrub Sanctuary	Brevard	Wildlife sanctuary managed by Brevard County. Recreational activities include: hiking, bicycling, horseback riding, and wildlife viewing (Brevard County, Florida 2013b). 354 ac.
South Mainland Community Center	Brevard	Community Center managed by Brevard County. Recreational facilities include a gymnasium and playground. A nature trail is in the planning process (Brevard County, Florida 2013b).
Malabar to Vero Beach Aquatic Preserve	Brevard and Indian River	Sovereign Submerged Lands managed by the State of Florida. Recreational activities include boating, swimming, fishing, and watching manatees, dolphin and birds. 28,000 ac.
North Sebastian Conservation Area	Indian River	Conservation area managed by Indian River County. Primary intended use is the protection of scrub habitat for the Florida scrub-jay. A plan for environmental education and passive recreation (hiking) was proposed (Indian River County, Parks Division 2013). 400 ac.
Pocahontas Park	Indian River	Community park managed by Indian River County. Facilities include playground, tennis courts, shuffle board, water fountains, and shaded park benches (Indian River County, Parks Division 2013).
Harmony Oaks Conservation Area	Indian River	Conservation area managed by Indian River County. Intended use of the park is to maintain a scenic shoreline for boaters. There are no existing trails, but the County has identified this area for future trails (locations unknown) (FWC 2013a). 90 ac.
Harbor Branch Natural Area	St. Lucie	Natural Area managed by St. Lucie County. Recreational activities include: hiking, picnicking, disc golf, horseshoes and volleyball (St. Lucie County, Environmental Resources Department n.d.). 250 ac.
D.J. Wilcox Preserve	St. Lucie	Preserve managed by St. Lucie County. Recreational activities include: hiking, birding and wildlife viewing (St. Lucie County, Florida 2013a). 100 ac.
Indrio Scrub Preserve	St. Lucie	Preserve managed by St. Lucie County. Recreational activities include hiking and wildlife viewing (St. Lucie County, Florida 2013a). 23 ac.
St. Lucie Village Heritage Park	St. Lucie	Park managed by St. Lucie County. Recreational activities include: Interpretive hiking trails, birding, picnic, volleyball, disc golf, and grilling (St. Lucie County, Florida 2013a). 120 ac.
Central Open Space – SLV	St. Lucie	Park managed by St. Lucie County. Park consists of a vacant lot with no facilities (St. Lucie County, Office of the Property Appraiser 2013).
Old Fort Historical Site	St. Lucie	Historical site managed by St. Lucie County. No recreational facilities were identified on the site and no information regarding the park was available on the County website (St. Lucie County, Florida 2013a).
Savannas Outdoor Recreation Area	St. Lucie	Recreational area managed by St. Lucie County. Recreational activities include: camping, boating, fishing, hiking, biking, wildlife viewing and picnicking (St. Lucie County, Florida 2013b).

Table 6.4.1-1 Section 4(f) and Section 6(f) Parks, Wildlife Refuges, Conservation, and Recreation Areas within the Orlando-West Palm Beach Project Study Area (Continued)		
Recreational Resource	County	Description
N-S Corridor		
Savannas Preserve State Park	St. Lucie	Park managed by the State of Florida. Recreational activities include: hiking, bicycling, horseback riding, canoeing, kayaking, fishing and wildlife viewing (Florida State Parks 2013). 550 ac.
Walton Scrub Preserve	St. Lucie	Preserve managed by St. Lucie County. Recreational activities include hiking, bicycling, fishing, and wildlife viewing (St. Lucie County, Florida 2013b).33 ac.
Rio Nature Park	Martin	Nature park managed by Martin County. Recreational activities include picnicking and wildlife viewing (Martin County, Department of Parks and Recreation 2011a). 2.5 ac.
Sailfish Ballpark	Martin	Ball Park managed by the City of Stuart. Recreational facilities include baseball fields, racquetball courts, tennis courts and picnicking facilities (City of Stuart, Community Services n.d.).
Station 30 Park	Martin	Community park managed by Martin County. Recreational facilities include picnicking facilities and playground (Martin County Property Appraiser 2012).
Broward St. Boat Ramp	Martin	Boat ramp managed by Martin County. Primary function is the loading and removing of boats from manatee pocket (Martin County, Department of Parks and Recreation 2011b).
Seabranche Preserve State Park	Martin	Park managed by the State of Florida. Recreational activities include: hiking, picnicking, and wildlife viewing (Florida State Parks 2013). 1,000 ac.
William G. "Doc" Meyers Park a.k.a. "South County Ball Park"	Martin	Ball Park managed by Martin County. Recreational facilities include softball/baseball fields, basketball courts, tennis courts, multi-purpose football and soccer fields, a batting cage, and concessions (Martin County, Department of Parks and Recreation 2011b). 35 ac.
Saturn Ave Addition	Martin	Park managed by Martin County. Park consists of a vacant lot with no facilities (Martin County, Department of Parks and Recreation 2011b).
Hobe Sound National Wildlife Refuge	Martin	Wildlife refuge managed by the United States Fish and Wildlife Service (USFWS) bisected by the proposed alignment. Recreational activities include: wildlife viewing, surf fishing, beach use, hiking and environmental education (USFWS 2013c). > 1,000 ac
Jonathan Dickinson State Park	Martin	Park managed by the State of Florida bisected by the proposed alignment. Recreational activities include: biking, hiking, boating, camping, swimming, picnicking, horseback riding, and wildlife viewing (Florida State Parks 2013). 10,500 ac.
Sawfish Bay Park ¹	Palm Beach	Park managed by the Town of Jupiter. Recreational activities include: picnicking, fishing, canoeing and kayaking (Town of Jupiter, Parks Department 2013). 2.5 ac.
Lake Park Scrub Natural Area	Palm Beach	Natural area managed by Palm Beach County. Recreational activities include hiking and wildlife viewing (Palm Beach County, Environmental Resources Management 2013). 55 ac.
Northwood Community Center	Palm Beach	Community park managed by the Boy and Girls Club of Palm Beach County. Recreational facilities include: outdoor basketball court, playground and recreational fields (Boys and Girls Clubs of Palm Beach County 2013).
Nathaniel Adams Park	Palm Beach	Community park managed by the City of West Palm Beach. Recreation facilities include a playground and basketball courts (City of West Palm Beach n.d.).

Source: FNAI. 2012. *Florida managed Areas-June 2012*. Using: ArcGIS 10.1. Redlands, California: ESRI 2012. Tallahassee, Florida.; University of Florida GeoPlan Center. 2009. *Florida Parks and Recreational Facilities 2009*. Using: ArcGIS 10.1. Redlands, California: ESRI 2012. Gainesville, Florida.

Table 6.4.1-2 Recreational Resources within the West Palm Beach – Miami Study Area

Resource Name	County/Municipality
Flamingo Park	West Palm Beach
Mary Brandon Park	West Palm Beach
City of West Palm Beach Municipal Golf Course	West Palm Beach
City of West Palm Beach Recreational Center	West Palm Beach
Hypoluxo Scrub Natural Area	Palm Beach County
Seacrest Scrub Natural Area	Palm Beach County
Lake Worth Shuffleboard Courts	Lake Worth
Lake Worth Recreation Center	Lake Worth
Veterans Park	Boynton Beach
Bicentennial Park	Boynton Beach
Pence Park	Boynton Beach
Palm Beach County Recreation Center	Boynton Beach
Worthing Park	Delray Beach
Currie Commons Park	Delray Beach
Miller Park	Delray Beach
Leon M. Weekes Environmental Preserve	Delray Beach
Boca Isles Park	Boca Raton
City of Boca Raton Recreation Center	Boca Raton
City of Boca Raton Gopher Tortoise Preserve	Boca Raton
Rosemary Ridge Preserve	Boca Raton
Poinciana Park/Dog Park	Hollywood
Dowdy Baseball Park	Hollywood
Byrd Park	Dania
Jaco Pastorius Park and Community Center	Oakland Park
Tarpon River Park	Fort Lauderdale
Florence C. Hardy Park	Fort Lauderdale
Sistrunk Park	Fort Lauderdale
Oakland Park Boat Ramp	Fort Lauderdale
Midway Park	Fort Lauderdale
City of Fort Lauderdale SW 9th Street Recreation Center	Fort Lauderdale
Florence C. Hardy Park and Southside Cultural Center	Fort Lauderdale
Highlands Scrub Natural Area	Broward County
Broward County Planned Park	Broward County
Colohatchee Park	Winton Manors
Aqua Bowl Park	North Miami Beach
Arthur I. Snyder Tennis Complex	North Miami Beach
Oleta River State Park	Miami-Dade County
Arch Creek Park	Miami-Dade County
Arch Creek Park Addition	Miami-Dade County
Greynolds Park	Miami-Dade County
Dorsey Park	City of Miami
Woodson/Miami Design Park	City of Miami
Ed Abdella Field House and Athletics	City of Miami
El Portal Tot Lot	Village of El Portal

Source: AAF. 2012. Environmental Assessment and Section 4(f) Evaluation for the All Aboard Florida Passenger Rail Project West Palm Beach to Miami, Florida. <http://www.fra.dot.gov/eLib/details/L04278>. Accessed September 12, 2013.

6.4.2 Historic Properties

Historic properties within the Area of Potential Effect that are listed in, or eligible for, the National Register of Historic Places, are identified and documented in Section 4.4.5, *Historic Properties*, of this FEIS. The SHPO has concurred with FRA's findings of eligibility.

The NRHP-eligible Florida East Coast Railway (FECR) Historic District is the only identified historic property within the APE for direct effects. The FECR Historic District is eligible for listing under Criterion A, in the categories of Transportation and Community Planning and Development. It was built primarily in the last quarter of the 19th century and the first decade of the 20th century. The FECR was a project of Henry Morrison Flagler, who originally worked with John D. Rockefeller in building the Standard Oil Trust, and became known for developing resorts, industries, and communities along Florida's eastern coast.

Within the FECR Historic District in the Phase II N-S Corridor there are 12 bridges that are either individually eligible for the National Register, or are contributing elements to the District (Table 6.4.2-1).

Mile Post	County	FMSF #	Site Name / Address	Date Estimate	National Register Status
190.47	Brevard	8BR3058	Fixed Railway Bridge over the Eau Gallie River – Steel	1925	Eligible as FECR Contributing Resource/ Individually Eligible
194.34	Brevard	8BR3059	Fixed Railway Bridge over the Crane Creek and Melbourne Street – Steel	1925	Eligible as FECR Contributing Resource
197.7	Brevard	8BR3060	Fixed Railway Bridge over the Turkey Creek – Steel	1925	Eligible as FECR Contributing Resource
202.59	Brevard	8BR3061	Fixed Railway Bridge over the Goat Creek – Steel	1959	Eligible as FECR Contributing Resource
212.07	Brevard and Indian River	8BR3062/ 8IR1569	Fixed Railway Bridge over the Sebastian River – Steel	1926	Eligible as FECR Contributing Resource/ Individually Eligible
240.1	St. Lucie	8SL3191	Fixed Bridge over the Taylor Creek - Concrete with Steel Beam Span	1961	Eligible as FECR Contributing Resource
259.95	Martin	8MT1623	Fixed Bridge over the Rio Waterway - Steel and Timber Piles	1958	Eligible as FECR Contributing Resource
260.93	Martin	8MT1382	Movable Bridge over the St. Lucie River – Steel	1938	Eligible as FECR Contributing Resource/ Individually Eligible
266.86	Martin	8MT1624	Fixed Bridge over the Salerno Waterway - Steel and Timber Piles	1958	Eligible as FECR Contributing Resource
267.34	Martin	8MT1625	Fixed Bridge over the Tributary to Manatee Creek 1 - Steel and Timber Piles	1962	Eligible as FECR Contributing Resource
267.70	Martin	8MT1626	Fixed Bridge over the Tributary to Manatee Creek 2 - Steel and Timber Piles	1962	Eligible as FECR Contributing Resource
282.58	Palm Beach	8PB16041	Movable Bridge over the Loxahatchee River – Steel	1935	Eligible as FECR Contributing Resource/ Individually Eligible

Six archaeological sites are located within the direct effects APE, or have uncertain boundaries that may potentially extend into the APE (Table 6.4.2-2).

FMSF #	Site Name / Address	Site Type	National Register Status
8IR846	Railroad	Malabar-Period Shell Midden and Artifact Scatter	Not Evaluated by SHPO
8MT1287	Hobe Sound National Wildlife Refuge #3	Prehistoric Campsite and Prehistoric Shell Midden	Previously recommended as Potentially Eligible: Not Evaluated by SHPO
8SL41	Fort Capron	Historic Fort	Previously recommended as Potentially Eligible: Not Evaluated by SHPO
8SL1772	Avenue A-Downtown Fort Pierce	Precolumbian Habitation, Midden, Campsite, and extractive Site; Historic American Building Remains, Refuse, and Artifact Scatter	Not Evaluated by SHPO
8IR1/8IR9	Vero Man/Vero Locality	Pleistocene Faunal deposits; Redeposited Precolumbian Burial	NRHP-Eligible
8SL31	Fort Pierce	Historic Fort	NRHP-Listed

Within the N-S Corridor APE for indirect effects, 63 historic individual properties and historic districts were identified in the 2013 CRAR (Appendix 4.4.5-A3) and Addendum to the CRAF (Appendix 4.4.5-A4). These historic properties include 12 resources in Brevard County; 12 resources in Indian River County; 26 resources in St. Lucie County; 10 resources in Martin County; and 3 resources in Palm Beach County.

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8IR859	Union Cypress Saw Mill Historic District	Mixed District			NRHP-Eligible
8BR215	Florida Power & Light Co. Ice Plant / 1604 S, Harbor City Boulevard	Building	1926	Industrial Vernacular	NRHP-Listed
8BR759	Marion S. Whaley Citrus Packing House/ 2275 Rockledge Blvd W.	Building	1930	Frame Vernacular	NRHP-Listed
8BR1163	Mattie Lamar House/ 361 Stone Street	Building	c. 1917	Frame Vernacular	NRHP-Eligible
8BR1710	Jorgensen's General Store/5390 US Hwy 1	Building	1894	Frame Vernacular	NRHP-Listed
8BR1723	Cocoa Cemetery Storage Building/ 101 N. Cocoa Blvd.	Building	c. 1931	Masonry Vernacular	NRHP-Eligible
8BR1739	Ashley's Cafe & Lounge/ 1609 Rockledge Blvd. W.	Building	c. 1932	Tudor Revival	NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

Table 6.4.2-3 Historic Properties within the N-S Corridor APE for Indirect Effects¹ (Continued)

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8BR1741	Rockledge Gardens Nursery & Landscaping/2153 Rockledge Blvd. W.	Building	c. 1930	Industrial Vernacular	NRHP-Eligible
8BR1765	Bohn Equipment Company/ 255 Olive St	Building	c. 1927	Industrial Vernacular	NRHP-Eligible
8BR2779	317 Rosa Jones Drive	FECR Station	c. 1962	International	NRHP-Eligible
8BR1724	Hilltop Cemetery	Cemetery	c. 1887		NRHP-Eligible
8BR1777	Cocoa Cemetery	Cemetery	c. 1890		NRHP-Eligible
8IR859	McKee Jungle Gardens	Resource Group			NRHP-Listed
8IR1519	Dixie Highway	Linear Resource			NRHP-Eligible
8IR1516	FDOT Bridge No. 880001	Bridge			NRHP-Eligible
8IR68	Vero Railroad Station/ 2336 14 th Avenue	FECR Station	1903	Frame Vernacular	NRHP-Listed
8IR99	George Armstrong Braddock House/ 1309 Louisiana Avenue	Building	1908	Georgian Revival	NRHP-Eligible
8IR100	Baughman House/ 1525 North Louisiana Avenue	Building	1900	Neo-Classical Revival	NRHP-Eligible
8IR388	5056 North Old Dixie Highway	Building	c. 1920	Bungalow	NRHP-Eligible
8IR624	Old Vero Beach Community Building/ 2146 14 th Avenue	Building	1935	Frame Vernacular	NRHP-Listed
8IR858	Hall of Giants, McKee Jungle Gardens/ US 1 and 4 th Street	Building	1940	Other	NRHP-Eligible (individually and contributing to district)
8IR975	Vero Beach Diesel Power Plant/ 1133 19 th Place	Building	1926	Masonry Vernacular	NRHP-Listed
8IR1464	Vero Beach Community Center/ 2266 14 th Avenue	Cemetery	1966	Moderne	NRHP-Eligible
8IR1475	1146 21 st Street	Cemetery	1966	Moderne	NRHP-Eligible
8SL2801	Edgar Town Historic District	Historic District			NRHP-Eligible (also local designation)
8SL76	St. Lucie Historic District	Historic District			NRHP-Listed
8SL78	Fairmont Manor/ 5707 South Indian River Drive	Building	1896	Neo-Classical Revival	NRHP-Eligible
8SL220	9015 South Indian River Drive	Building	c. 1890	Frame Vernacular	NRHP-Eligible
8SL227	7901 South Indian River Drive	Building	c. 1910	Craftsman	NRHP-Eligible
8SL229	6109 South Indian River Drive	Building	c. 1915	Colonial Revival	NRHP-Eligible
8SL231	5703 South Indian River Drive	Building	c. 1915	Prairie Style	NRHP-Eligible
8SL234	5309 South Indian River Drive	Building	c. 1935	Colonial Revival	NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

Table 6.4.2-3 Historic Properties within the N-S Corridor APE for Indirect Effects¹ (Continued)

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8SL236	Riverhill/ 4625 South Indian River Drive	Building	1903	Frame Vernacular	NRHP-Eligible
8SL237	Britt House/ 4511 South Indian River Drive	Building	1908	Frame Vernacular	NRHP-Eligible
8SL238	N.E. Card House/ 3915-3917 Indian River Drive	Building	1914	Masonry Vernacular	NRHP-Eligible
8SL247	Hoskins House/ 2929 North Indian River Drive	Building	1910	Frame Vernacular	NRHP-Eligible
8SL289	Old Fort Pierce City Hall/ 315 A Avenue	Building	c. 1925	Italianate	NRHP-Listed
8SL799	Sunrise Theater/ 117 2nd Street South	Building	c. 1923	Mediterranean Revival	NRHP-Listed
8SL825	601 South 2nd Street	Building	c. 1935	Masonry vernacular	NRHP-Eligible
8SL826	Frank Tyler House/ 519 2nd Street South	Building	c. 1924	Mediterranean Revival	NRHP-Eligible
8SL917	Banyon Belle Manor/ 1001 South Indian River Drive	Building	1905	Georgian Revival	NRHP-Eligible
8SL918	1009 South Indian River Drive	Building	1925	Mission	NRHP-Eligible
8SL920	1029 South Indian River Drive	Building	1920	Georgian Revival	NRHP-Eligible
8SL926	O.L. Peacock House/ 2211 South Indian River Drive	Building	1920	Mediterranean Revival	NRHP-Eligible
8SL930	Stephen Leshner House/ 2501 South Indian River Drive	Building	1920	Italian Renaissance Revival	NRHP-Eligible
8SL931	Carlton-Vest House/ 2507 South Indian River Drive	Building	1920	Masonry Vernacular	NRHP-Eligible
8SL932	Casa Del Rio/ 2513 South Indian River Drive	Building	1920	Italian Renaissance Revival	NRHP-Eligible
8SL933	Babe Phelps House/ 2521 South Indian River Drive	Building	1935	Monterey	NRHP-Eligible
8SL1599	Shadetree Studio/ 2900 Old Dixie Highway	Building	1950	Frame Vernacular	NRHP-Eligible
8SL1922	East Coast Packers/ 2130 Old Dixie Highway	Building	1950	Industrial Vernacular	NRHP-Eligible
8MT1573	Witham Field Airport	Mixed District			NRHP-Eligible
8MT1621	Dixie Highway	Linear Resource			NRHP-Eligible
8MT46	George W. Parks Store/ Stuart Feed/ 101 South Flagler Avenue	Building	1901	Frame Vernacular	NRHP-Eligible
8MT84	Fem Building/ 73 West Flagler Avenue	Building	c. 1950	Masonry Vernacular	NRHP-Eligible
8MT86	Lyric Theatre/ 59 Southwest Flagler Avenue	Building	c. 1926	Mediterranean Revival	NRHP-Listed
8MT130	East Coast Lumber and Supply/ 49 Southwest Flagler Avenue	Building	1917	Frame Vernacular	NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

Table 6.4.2-3 Historic Properties within the N-S Corridor APE for Indirect Effects¹ (Continued)

FMSF #	Site Name / Address	Resource Type	Construction Date	Style	National Register Status
8MT131	Hobe South Cabinetry/ 500 South Dixie Highway	Building	1917-c. 1926	Masonry Vernacular	NRHP-Eligible
8MT307	Crary House/ 161 Southwest Flagler Avenue	Building	1925	Tudor Revival	NRHP-Eligible
8MT838	12200 Southeast Nassau Street	Building	c. 1941	Frame Vernacular	NRHP-Eligible
8MT1066	250 North Flagler Road	Building	c. 1940	Masonry Vernacular	NRHP-Eligible
8PB13340	Kelsey City Layout	Historic District			NRHP-Eligible
8PB218	Evergreen Cemetery	Cemetery	1916		NRHP-Eligible (also local designation)
8PB6064	St. John's Baptist Church/ 2010 A. E. Isaacs Avenue	Building	1929	Mission	NRHP-Eligible

¹ Includes properties listed in, or eligible for listing in, the National Register of Historic Places. For a full list of surveyed properties, please see the 2013 CRAR and 2015 CRAR Addendum Appendices (online).

The Phase I Project APE (West Palm Beach to Miami) also includes the FECR Historic District, with eight historic bridges identified as contributing resources (Table 6.4.2-4). Section 4(f) uses of these bridges were not evaluated in the 2013 EA or Section 4(f) Determination because modifications to the bridges were not necessary for Phase I rail operations, therefore, there would be no use of these resources due to Phase I. Section 4.4.5, *Historic Properties*, provides a list of all historic properties within the APE for the Phase I (WPB-M) Corridor.

Table 6.4.2-4 Historic Railway Bridges Identified within the WPB-M Corridor APE for Direct Effects

County	FMSF #	Site Name / Address	Date Estimate	National Register Status
Palm Beach	8PB15951	Fixed Railway Bridge over the C-15 Canal	1962	Eligible as FECR Contributing Resource
Broward	8BD4860	Fixed Railway Bridge over the Cypress Creek/ C-14 Canal	1960	Eligible as FECR Contributing Resource
Broward	8BD4861	Fixed Railway Bridge over the North Fork of Middle River	1957	Eligible as FECR Contributing Resource
Broward	8BD4862	Fixed Railway Bridge over the South Fork of Middle River	1959	Eligible as FECR Contributing Resource
Broward	8BD4863	Fixed Railway Bridge over the Dania Cut-Off Canal	1927	Eligible as FECR Contributing Resource
Miami-Dade	8DA12596	Fixed Railway Bridge over the Oleta River	1963	Eligible as FECR Contributing Resource
Miami-Dade	8DA12597	Fixed Railway Bridge over the Royal Glades/C-9 Canal	1956	Eligible as FECR Contributing Resource
Miami-Dade	8DA12598	Fixed Railway Bridge over the Arch Creek	1930	Eligible as FECR Contributing Resource

6.5 Use of Section 4(f) Properties

This section identifies the uses of Section 4(f) properties that would result from the proposed Project, either as direct uses (incorporation of property or adverse effects to a Section 106 historic property) or indirect (constructive) uses.

6.5.1 Uses (Direct Impacts)

Thirty-three recreational properties were identified within the Orlando-WPM Study Area, including two in the E-W Corridor and thirty-one in the N-S Corridor. These resources comprise several different property types, including conservation areas, community parks, wildlife sanctuaries, historic sites, and sports and boating facilities. A majority of these properties are county-owned and/or managed, with additional properties operated by the State of Florida, the United State Fish and Wildlife Service, and individual municipalities. As described in Section 4.4, the Project will not result in any direct impacts to any publically-owned park, recreation area, wildlife or wildlife and waterfowl refuge of national, State, or local significance.

The Project will construct railroad infrastructure within the FECR right-of-way, which is designated as the FECR Historic District. This includes the demolition of nine bridges that are contributing elements of the Historic District. However, after consultation with SHPO, and with its concurrence, FRA has determined that the Project will not result in an adverse effect to the FECR Historic District and therefore will result in a *de minimis* impacts to the District for purpose of Section 4(f). However, as described below, the Project will require the demolition and reconstruction of two bridges, individually eligible for listing on the National Register of Historic Places and therefore protected under Section 4(f).

6.5.1.1 Orlando to West Palm Beach (Phase II)

The FECR Corridor was originally built as a double-track railroad, but today it is mostly a single-track railroad with several long sidings. The railbed for the second track still exists and would be used for the additional track improvements. Infrastructure improvements, such as bridge replacements and curve improvements, are planned to be completed within the existing right-of-way and no additional right-of-way acquisition is anticipated. The addition of the second track would return the N-S corridor to its historic, dual-track configuration and historic use as a passenger rail line.

The NRHP-eligible FECR Historic District, which is the central resource of the N-S Corridor, would not be adversely affected by the Project. Previous studies and coordination with SHPO have identified the rail infrastructure within the FECR Corridor as eligible for listing on the NRHP as a linear district. The FECR Corridor retains historical importance due to its associations with development and transportation of the east coast of Florida. Built primarily in the last quarter of the 19th century and the first decade of the 20th century, the FECR Corridor was a project of Henry Morrison Flagler. Flagler, who originally worked with John D. Rockefeller in building the Standard Oil Trust, became known for developing resorts, industries, and communities along Florida's eastern coast. The FECR Corridor is considered eligible for listing in the NRHP as a linear historic district under Criterion A in the categories of Transportation, and Community Planning and Development.

FRA determined that the use of this historic rail line and restoration of passenger rail on the line as part of Phase I (The AAF Passenger Rail Project – West Palm Beach to Miami) would not have an adverse effect on the NRHP-eligible FECR Railway Historic District in that segment of the corridor. In a letter dated November 6, 2012, and appended to the 2013 FONSI (see Appendix 1.1-A2), the SHPO concurred with this determination. The Project would include similar improvements for the N-S Corridor in Phase II and would have the same potential to affect the FECR Historic District.

FRA has made a recommendation of “no adverse effect” for direct impacts to the FECR Historic District in the N-S Corridor because the use of the historic rail line and restoration of passenger rail service would not adversely affect the setting or alter the character-defining features, and therefore there would be no Section 4(f) use. On July 24, 2015, SHPO concurred with this finding.

As part of this reconstruction, in Phase II the Project will alter twelve bridges within the N-S Corridor that are either individually eligible for the National Register or are contributing elements to the FECR Historic District (Tables 6.5-1, 6.5-2). Two of these bridges that are individually eligible for the National Register will be demolished and replaced with modern structures; seven bridges that are contributing elements will be demolished and replaced with modern structures; two bridges that are individually eligible for the NRHP and one bridge that is contributing elements will be rehabilitated. Demolishing and replacing the contributing bridges has been determined as “no adverse effect” under Section 106 and therefore this replacement is a *de minimis* impact under Section 4(f).

Within the N-S Corridor, four bridges (Eau Gallie River, St. Sebastian River, St. Lucie River, and Loxahatchee River) have been identified as individually eligible for listing on the NRHP under Criterion A² and Criterion C.³ These four bridges are also contributing elements to the FECR Historic District. Eight additional bridges (see Table 6.4.2-1) are not considered individually eligible for listing on the NRHP, but are contributing elements to the FECR Historic District.

As described in Section 3.3, *Alternatives Studied in Detail in the EIS*, AAF proposes to demolish the Eau Gallie River and St. Sebastian River bridges and construct two new single-track bridges within the same footprint at each location. Demolishing these two bridges is an adverse effect that cannot be avoided and therefore a use of a Section 4(f) property. The St. Lucie River and Loxahatchee River bridges would be rehabilitated, as described in Section 3.3.3 of the FEIS, but FRA has determined, with SHPO concurrence, that the rehabilitation would not result in an adverse effect to the bridges.

² See 36 CFR 60.4(a) (Associated with events that have made a significant contribution to the broad patterns of our history.)

³ See 36 CFR 60.4(c) (Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.)

Table 6.5-1 Proposed Bridge Construction, N-S Corridor

Bridge	NR Status	Proposed Project	Number of New Single-Track Bridges	Length (ft)	Width (ft)	Number of Spans
Eau Gallie River	Individual	Demolish	2	580	16	(15) ¹
Crane Creek	Contributing	Demolish	2	660	16	(17)
Turkey Creek	Contributing	Demolish	2	180	16	3
Goat Creek	Contributing	Demolish	2	120	16	5
St. Sebastian River	Individual	Demolish	2	1625	16	(43)
Taylor Creek	Contributing	Rehabilitate	0	210	16	8
Rio Waterway	Contributing	Demolish	2	95	16	4
St. Lucie River	Individual	Rehabilitate	0	1270	24	49
Salerno Waterway	Contributing	Demolish	1	40	16	2
Manatee Tributary 1	Contributing	Demolish	2	34	16	1
Manatee Tributary 2	Contributing	Demolish	2	34	16	1
Loxahatchee River	Individual	Rehabilitate	0	585	28	9

¹ Number of spans has not been determined for the new structure. (X) is number of existing spans.

AAF will continue to consult with SHPO through the design process to ensure that all of the new or rehabilitated bridge structure designs for the contributing element bridges within the FECR Historic District, including those for the St. Lucie River, Loxahatchee River, and Taylor Creek bridges, are compatible with the historic character of the FECR Historic District. Based upon AAF's commitment to continued consultation, FRA has determined, and received SHPO concurrence, that rehabilitating the St. Lucie River, the Loxahatchee River and the Taylor Creek Bridges and replacing the seven bridges that are not individually eligible for listing on the NPHP but are eligible as contributing elements to the FECR Historic District would not have an adverse effect on the historic district and therefore result in a *de minimis* impact to the resource under Section 4(f). AAF in consultation with the SHPO will work to develop bridge designs that are in keeping with the Secretary of the Interior's Standards for Rehabilitation. This process is incorporated in the Memorandum of Agreement (MOA) prepared in accordance with Section 106 of the National Historic Preservation Act and addressing mitigation for the adverse effects to the two bridges.⁴

Based on the information available, FRA has determined that the Project would have no adverse effect on archaeological sites within the APE for direct impacts for the N-S Corridor. The no adverse effect finding is based on the condition that AAF will continue to consult with SHPO through the design process, as needed, and will adhere to the stipulations of the MOA to ensure appropriate sensitivity to the previously recorded archaeological sites located within the APE (the draft MOA is appended to this FEIS as Appendix 5.4.5). There would be no adverse effect and no Section 4(f) use of an archaeological resource.

AAF has prepared and will follow an Archaeological Monitoring Plan for archaeological sites in close proximity to the N-S Corridor, which will be stipulated in the MOA. The implementation of the

⁴ See chapter 5, section 5.4.5.1 for a further explanation of the MOA.

Archaeological Monitoring Plan, which includes construction crew training and procedures in the unlikely event that archaeological features or artifacts are discovered during excavation, will avoid or minimize the potential adverse effect of excavation by identifying and protecting any unmarked human remains or significant archaeological resources that may be encountered during construction.

6.5.1.2 West Palm Beach to Miami Corridor (Phase I)

As stated in the 2013 FONSI, FRA consulted with the SHPO pursuant to NHPA Section 106, and received concurrence on November 6, 2012 with FRA's finding that the Project would have no adverse effect on any of historic resources within the WPB-M APE. The concurrence is conditional, and requires AAF to continue consultation with the SHPO and locally affected parties, including the Cities of West Palm Beach, Fort Lauderdale, and Miami, through the station design process. In a subsequent re-evaluation, in a letter dated March 24, 2014, the SHPO also concurred with FRA's finding that the relocated Ft. Lauderdale Station would have no adverse effect on historic properties (Appendix 3.3.1-A1-A3). In a letter dated October 30, 2014 the SHPO also concurred with FRA's finding that the relocated West Palm Beach Vehicle Maintenance Facility would have no adverse effect on historic properties. The 2013 FONSI also made the determination that Phase 1 would not use any property subject to Section 4(f).

For Phase I, SHPO concurred with FRA's determination of "no adverse effect" conditioned on the reconstruction or rehabilitation work to the bridges in the West Palm Beach – Miami Corridor being developed in consultation with SHPO to avoid and/or minimize effects. For Phase II, AAF will continue to consult with SHPO through the design process to ensure compatibility and appropriate sensitivity to the bridge resources in the N-S Corridor and the FECR Historic District. As shown in Table 6.5-2, three bridges that were determined eligible in Phase I as contributing elements would be demolished and replaced with new 2-track structures. Two of the bridges that are eligible as a contributing element, but not eligible for listing individually (the fixed bridges over Dania Creek and Snake Creek), would be rehabilitated.

Bridge	NR Status	Proposed Project	Number of New Single-Track Bridges	Length (ft)	Width (ft)	Number of Spans
West Palm Beach Canal	Contributing	Retain	1	200	16	9
Cypress Creek Canal	Contributing	Retain	-			
North Fork Middle River	Contributing	Demolish	2	192	16	8
South Fork Middle River	Contributing	Demolish	2	192	16	8
Dania Canal	Contributing	Rehabilitate	-	79	30	1
Oleta River	Contributing	Demolish	2	82	16	3
Snake Creek Canal	Contributing	Rehabilitate	-	160	27	7
Arch Creek	Contributing	Retain	1	75	16	1

As part of Phase II of the Project, AAF proposes to rehabilitate one bridge and demolish and replace three other bridges within the WPB-M Corridor that have been determined to be eligible as contributing elements to the FECR Historic District (Table 6.5-2). As described above in section 3.2.3.2, AAF has evaluated alternatives to demolishing these bridges and found that it is not feasible to preserve these bridges.

For Phase I, the SHPO concurred in FRA's "no adverse effect" determination conditioned on the reconstruction or rehabilitation work to the bridges being developed in consultation with SHPO to avoid and/or minimize effects. Having secured SHPO's concurrence in its "no adverse effect" determination, FRA finds that the demolition of the contributing elements will result in a *de minimis* impacts to the resource under Section 4(f). Additionally, pursuant to the MOA Stipulations for Phase II, AAF will continue to consult with SHPO through the design process to ensure compatibility and appropriate sensitivity to the bridge resources and the FECR Historic District.

6.5.2 Indirect Effects

FRA's analysis found that the Project will not result in any constructive uses (indirect impacts) to Section 4(f) properties resulting from adverse proximity impacts from the Project. A constructive use can occur when a transportation project does not incorporate land from a Section 4(f) resource, but the project's effects on the surrounding area are so severe that the protected activities, features, or attributes that qualify the resources for protection under Section 4(f) are substantially impaired. Substantial impairment is determined to occur when there is a substantial diminishment of the activities, features, and attributes of the Section 4(f) recreation resources. This evaluation focuses on the potential proximity impacts to Section 4(f) resources from the Project's potential noise, vibration, aesthetics and access effects.

6.5.2.1 Noise

The noise analysis conducted for the Project and documented in the FEIS shows that, with the use of pole-mounted wayside horns and improved rail infrastructure, the Project will reduce noise levels along the N-S Corridor in comparison to existing conditions, and that noise levels 50 feet from the right-of-way would not result in noise impacts. While the proposed passenger trains are lighter and faster than the existing freight train traffic, overall there will be more train traffic/operations occurring each day. Secondary and cumulative noise effects are anticipated to be minimal to moderate. Tables 5.4.5-3 and 5.4.5-4 show the noise effects on historic properties and identifies the land use category associated with each property. As discussed in Section 5.2.2 of the FEIS, the analysis used FTA impact criteria because of the mix of freight and passenger trains, and the average train speeds of 90 mph or less. As shown, noise mitigation (wayside horns in lieu of using individual locomotive mounted horns) would eliminate all severe impacts. No additional noise mitigation measures (soundproofing or noise barriers) would be required.

As documented in Chapter 5, there are no historic properties where a quiet setting is a character-defining feature, and therefore no historic properties where changes in sound levels would result in an impact to historic features.

As documented in Section 5.2.2, *Noise and Vibration*, changes in noise from the operation of the Project would not result in a constructive use to Section 4(f) recreation resources within or adjacent to the Project Study Area, for the following reasons:

- The Section 4(f) recreation resources currently experience vehicular traffic noise disturbance (automobile and truck traffic within the SR 528 corridor) at higher levels than would be produced by passenger trains, and/or rail noise disturbance (freight traffic within the existing FECR Corridor).
- Noise disturbance from additional train traffic would be intermittent, and limited to only a few minutes per hour under the highest levels of rail traffic.
- Train noise from individual passenger trains along the N-S Corridor would likely be lower and occur for shorter periods of times, even though more frequently, than with current freight rail operations.

Section 5.2.2, *Noise and Vibration* discusses changes in noise associated with the Project. The Project would be compatible with the intended uses of Section 4(f) recreation resources, as parklands are compatible with these noise levels (FAA 2004). Minor increases in noise would not be a constructive use of any park or recreation area along the N-S Corridor.

As stated in Section 3.3.8 of the 2012 EA (Appendix 1.1-A1), one Section 4(f) resource appears to have a potential effect from noise along the WPB-M Corridor: the El Portal Tot Lot – Miami-Dade County. However, based on committed mitigation measures (for example, stationary grade crossing horns), all severe and moderate effects related to recreational land uses are eliminated, including noise impact to the El Portal Tot Lot. The FONSI made the determination that there would be no use of this property under Section 4(f).

6.5.2.2 Vibration

The analysis of vibration showed that although the frequency of event would increase, the overall vibration levels would not increase. Table 5.4.5-4 shows the vibration effects on historic properties and identifies the land use category associated with each property. As shown, and documented in Section 5.2.2 of the FEIS, vibration from operation of the passenger rail system would not result in vibration that exceeded damage thresholds (100 VdB at 70 feet), although some properties would experience vibration at “annoyance” levels (perceptible vibration). Therefore, FRA anticipates that there will be no indirect adverse effects due to changes in noise or vibration to either the integrity of setting or physical structure of any historic property. Because the proposed passenger trains will create vibration at lower levels and shorter durations than the existing freight trains that currently utilize the corridor and will continue to use the corridor in the future condition, adding passenger trains will not result in any increased operational vibration impacts on historic sites or subsurface archaeological sites. Construction vibration also was evaluated. The analysis showed that pile-driving at bridges could exceed this damage threshold at distances up to 135 feet, however there are no historic properties within 135 feet of these bridges.

The low level of vibration from the proposed passenger trains, which is less than that associated with freight trains that currently utilize the corridor, will not result in any additional impacts on recreational sites, parks or wildlife refuges. The predicted levels of vibration would not interfere with the intended use of Section 4(f) recreation resources within the Project Study Area. Any increase in vibration resulting from the Project would not create adverse effects, and would be scarcely noticeable to the surroundings.

As stated in the FTA Noise and Vibration Manual, “ground-borne vibration is almost never annoying to people who are outdoors...The rumble noise that usually accompanies the building vibration is perceptible only inside buildings.” Vibration therefore has no effect on persons using outdoor recreational areas or parks. The Project would cross Long Bluff Road in the Tosohatchee WMA by means of an overpass. Vibration effects at this crossing would be less than those projected for the at-grade portions of the E-W Corridor, as the trains would be elevated and disconnected from the ground. Vibration associated with existing freight traffic along the N-S Corridor, including the crossing of Southeast Jonathan Dickinson Way in Jonathan Dickinson State Park, is greater than vibration associated with the proposed passenger train traffic. This finding is also true for the Walton Scrub Preserve, where an observation tower (to provide views of the Indian River Lagoon) was recently constructed in close proximity to the existing FECR right-of-way. Changes in vibration from the Project would not result in constructive use to Section 4(f) recreation resources within or adjacent to the Project Study Area, as the intended use of these resources is compatible with any increases in vibration. Section 5.2.2, *Noise and Vibration* discusses changes in vibration associated with the Project.

6.5.2.3 Aesthetic

Returning the FECR Corridor to its historic configuration and historic use as a passenger rail line will not change the visual setting of any historic property within the indirect effects APE. The Project will not introduce any new visual elements. Replacing and upgrading the existing crossing gates at at-grade crossings within historic districts or in proximity to a historic property will be designed and constructed in consultation with the SHPO, so as not to adversely change the visual characteristics of the streetscape. The analysis considered the potential that replacing existing grade crossing signals and equipment adjacent to historic districts could alter the visual setting. Three at-grade crossings are located adjacent to one NRHP-eligible historic district in Brevard County (Union Cypress Saw Mill Historic District [8BR2173]); four at-grade crossings are located within a National Register-eligible historic district in St. Lucie County (Edgar Town Historic District [8SL2801]); and two at-grade crossings are located within and adjacent to a National Register-eligible Kelsey City Layout (8PB13340) in Palm Beach County. As determined by FRA and confirmed by SHPO for Phase 1, the proposed Project will not have an indirect effect on these resources because grade crossing improvements will not change the setting of the district and, because there are already modern grade crossing equipment at these locations, will not introduce new modern elements.

The Project along the E-W Corridor would be constructed primarily within or adjacent to the SR 528 right-of-way. SR 528 dominates the existing viewshed along the majority of the E-W Corridor; modifications proposed for this corridor would not substantially change existing aesthetic conditions for the two Section 4(f) properties present along this segment. Within the section of the SR 528 Corridor adjacent to the Tosohatchee WMA, the AAF railroad would cross an existing unpaved road (Long Bluff Road) on a bridge immediately adjacent to the SR 528 bridge, and would not change existing aesthetic conditions. The Canaveral Marshes area is not within the viewshed of the proposed rail line. The N-S Corridor is within the existing FECR Corridor, and modifications proposed for this corridor would maintain the general aesthetics of this active rail line. Changes to aesthetics/viewshed associated with the Project would not result in constructive use to Section 4(f) recreation resources within or adjacent to the Project Study Area. Section 5.4.7, *Visual and Scenic Resources*, discusses changes to aesthetics associated with the Project.

6.5.2.4 Access Alteration

None of the Section 4(f) recreation resources within the Project Study Area would require alteration to existing access. The Project crosses Long Bluff Road and Southeast Jonathan Dickinson Way in the Tosohatchee WMA and Jonathan Dickinson State Park, respectively. The Project would cross Long Bluff Road on an elevated track structure next to the existing SR 528 bridge, and would maintain existing accessibility. The N-S Corridor would be entirely within the existing FECR Corridor, which currently crosses Southeast Jonathan Dickinson Way, and would require that the existing at-grade crossing be reconstructed. AAF will maintain access on these roads throughout construction and would not affect the public's use of the properties.

All of the other Section 4(f) resources along the N-S Corridor have existing access from public roads. Increasing train traffic will not change public access points to these parks, nature preserves or recreation areas. Although park visitors may illegally cross the existing railroad, this trespassing is unsafe under current conditions and is not allowed by the FECR.

6.6 Alternatives Analysis

FRA NEPA Procedures requires that the Section 4(f) Determination include "A similarly detailed description of every reasonable alternative location, routing, or design to the one proposed, including the alternative of "no action." Each description should analyze, as appropriate, the technical feasibility, cost estimates (with figures showing percentage differences in-total project costs), the possibility of community or ecosystem disruption, and other significant environmental impacts of each alternative, so as to evidence that the financial, social, or ecological costs or adverse environmental impacts of each alternative other than that proposed would present unique problems or reach extraordinary magnitudes."

Chapter 3, *Alternatives*, of this FEIS provides a complete analysis of alternatives that were developed and evaluated for the entire project. In Level 1 of that analysis, AAF evaluated three alternatives that would avoid using the FECR corridor and would therefore avoid the demolition and resulting Section 4(f) use of the Eau Gallie River and St. Sebastian River bridges. The three route alternatives (the I-95 Route, the Florida's Turnpike Route, and the CXS Route) were dismissed as not feasible to construct or operate because they did not meet the purpose and need of the Project. Specifically, the alternatives resulted in excessive construction costs, long trip times (which would reduce ridership and financial feasibility), and higher impacts to the natural and built environment. FRA concurred with AAF's analysis and decided not to carry the alternatives forward for further review in the EIS.

This section provides the analysis of reasonable and prudent alternatives that avoid the use of the Eau Gallie River and St. Sebastian River bridges. These two individually eligible bridges (the Eau Gallie River and St. Sebastian River) must be replaced because they are currently single-track bridges and because AAF assessed the condition of each existing bridge and determined it was not feasible to rehabilitate the bridge superstructure due to its condition and the condition of the substructure. The proposed passenger trains will operate at 110 mph in this segment, and require a higher bridge loading factor than the existing freight trains, which operate at 28 mph. The existing substructure and superstructure, even if rehabilitated, would not meet the required loading rating. Without replacing these bridges, AAF could not

operate passenger trains over the bridges. For each of the bridges that would be demolished and replaced, FRA evaluated several alternatives which are discussed in detail for each bridge in the following sections.

This evaluation showed that it is necessary to demolish each of the bridges and replace it with a new 2-track structure. The SHPO and FRA have concurred that the proposed Project will have an adverse effect on these two bridges; therefore, a draft Memorandum of Agreement (MOA) between the FRA, the SHPO, and AAF has been developed that addresses construction of the Eau Gallie River and St. Sebastian River Bridges. As part of the draft MOA, FRA, AAF and the SHPO agree that the undertaking will be implemented in accordance with specific stipulations to minimize, and to the extent practical avoid effects to known historic properties listed or eligible for listing on the NRHP (see Appendix 5.4.5).

6.6.1 Eau Gallie Bridge

In order to implement the Project, the Eau Gallie Bridge, a structure located within the FECR right-of-way, would be demolished and a new bridge would be constructed in its place to accommodate the future passenger and freight rail traffic. Figure 6.2-1 shows the location and representative view of the Eau Gallie Bridge.

6.6.1.1 Description of Bridge and Status of Historical Designation

The original railroad crossing of the Eau Gallie River in Melbourne, Brevard County, was constructed in 1925 as a fixed viaduct bridge with two tracks on an open deck. The bridge has 15 spans and is approximately 600 feet long. The substructure consists of steel bents on concrete piles, with cross-ties between bents. At some point during its operating history, the railroad was reduced to a single active track on the eastern side of the deck. The western tracks were not maintained and are in a state of dilapidation and disrepair.

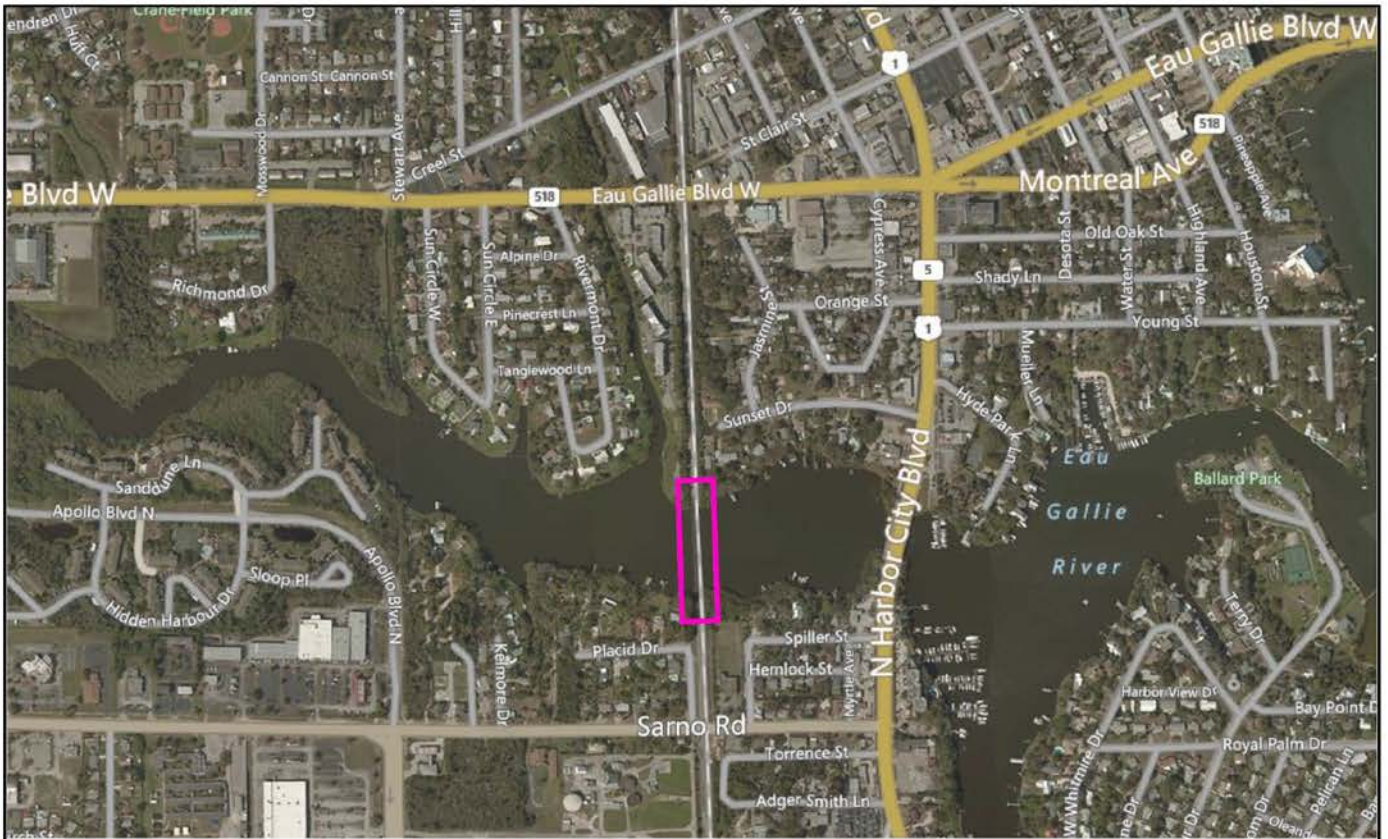
FRA has determined that the existing bridge is eligible for listing in the National Register both as an individual resource and as a contributing resource to the FECR District (see Section 4.4.5 in Chapter 4 for additional information and determinations of eligibility for both the Eau Gallie Bridge and the FECR District).

6.6.1.2 Proposed Use

The Project includes constructing new twin 575-foot independent ballast deck bridges east of the existing railroad bridge and demolishing the existing bridge. Demolishing and removing the existing bridge is necessary to safely implement the Project, allow for high-speed passenger operations, and protect navigation uses on the waterway, as determined by the U.S. Coast Guard (USCG). The USCG has determined bridges must be removed to allow for safe navigation of vessels.⁵ Bridges that are not used for the convenience of land transportation are considered unreasonable obstructions to navigation. There is a condition in all USCG bridge permits for removal of bridges no longer used for transportation purposes.

The demolition of the bridge is an adverse effect under Section 106 (see Section 5.4.5 in Chapter 5 for the finding of adverse effect) and constitutes a use under Section 4(f).

⁵ Letter from Evelyn Smart, Environmental Protection Specialist with the United States Coast Guard to Lisa A. Standley, Chief Environmental Scientist with Vanasse, Hangen, Brustlin, Inc. April 4, 2014.



Eau Gallie Bridge		
All Aboard Florida Intercity Passenger Rail Project		
		6.2-1

Data Sources: USGS Earthstar Geographics SIO 2015, Microsoft Corporation 2015, Nokia

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6.6.1.3 Design Alternatives Considered

FRA considered a comprehensive set of avoidance alternatives to avoid demolishing the bridge. The potential avoidance alternatives included the maintaining the existing bridge, , rehabilitating and reusing the existing bridge, adding a second single-track bridge alongside the existing bridge, constructing a new two track passenger rail bridge (retaining the existing) and constructing a new two track passenger rail bridge and abandoning the existing. These alternatives are described below.

Maintain the Existing Bridge

Under the Maintain the Existing Bridge Alternative, the bridge would be retained in its current condition, and no new bridge would be constructed. The Project would operate with a single track crossing at this location, on the existing bridge.

This alternative is not feasible and prudent. The proposed passenger trains will operate at 110 mph in this segment, and require a higher bridge loading factor than the existing freight trains, which operate at 28 mph. The existing substructure and superstructure, would not meet the required loading rating and therefore the current bridge cannot safely support 110-mph passenger train speeds.

The existing structure is an open-deck bridge, meaning the timber railroad ties are bolted to the tops of the steel plate girders, and the girder top flanges are otherwise open to the air above them. This structure is adequate for trains travelling at the current slower freight speeds. However, for the higher speeds of the AAF trains traveling at 110 mph along these stretches of the corridor, an open deck presents numerous operational and safety problems. First, the lack of ballast means there is no energy-absorbing buffer between the trains and the stiff steel structure beneath. This prevents the energy from the moving train from being dissipated and therefore leads to magnified vibrations, rocking and bouncing of the AAF trains, resulting in significant passenger discomfort. Further, the additional un-absorbed vibrations add wear-and-tear on the trains and will impact steel girders, cross-frames, and other miscellaneous components because the vibrations induced by high-speed trains. Lastly, higher speed trains generate a different dynamic frequency (harmonic wave energy and vibration) and an increase in fatigue cycling than slower trains. This may lead to premature failure of steel connection and other fatigue-sensitive steel components.

Rehabilitate and Reuse the Existing Bridge

This alternative would rehabilitate and reuse the existing bridge superstructure, and restore the second track on the west side of the deck. Based on AAF's assessment showing that because of the condition of the existing bridge, FRA concurred it was not feasible to rehabilitate the bridge superstructure due to its condition and the condition of the substructure. The proposed passenger trains will operate at 110 mph in this segment, and require a higher bridge loading factor than the existing freight trains, which operate at 28 mph. The existing substructure and superstructure, even if rehabilitated, would not meet the required loading rating.

The optimum design for safe and efficient passenger rail service is to use railroad ballast contained on a concrete deck that is cast onto the steel girders, known as a ballasted concrete deck. This design absorbs the majority of the energy in the ballast and allows the concrete to distribute the loads to a greater number of steel components, reducing the fatigue and vibration loading. However, retrofitting the existing bridges

with a 12-inch thick concrete deck and an 18-inch layer of ballast would add approximately 100 tons of dead load to each 50-ft long span of the existing bridge (33 percent more loading). That additional 100 tons of dead load could ordinarily be accommodated in the superstructure (girders, deck, etc.) by replacing some or all of the structural steel in the bridge. However, it was determined during design that the additional 100 tons cannot be supported by the existing foundations of the bridge. The existing foundations consist of small-diameter timber piles, driven below the mudline and capped with a large, unreinforced concrete seal. These piles only have a design capacity of 20 tons.

The existing foundations could be strengthened by driving new pilings adjacent to the existing foundations and tie the new piles into the existing footings to add more load capacity. Pile driving operations could damage the old timber piles and further reduce the bridge's capacity. Furthermore, the required number of additional piling and the complicated connection of new reinforced concrete into the unreinforced concrete, all below the mudline, would be cost-prohibitive and difficult to ensure that the existing footings are not overloaded by transferring the increased loads into the new piles. Therefore, the recommendation of the professional engineers that analyzed the operation and structural integrity of the bridge is to fully replace it.

For the above stated reasons, this alternative would not meet the project purpose and is neither feasible nor prudent.

Add a Second Single-track Bridge Beside the Existing Bridge

This alternative would build a new single-track bridge adjacent to the existing structure for passenger rail service and still maintain freight rail traffic on the existing bridge.

Because the Eau Gallie River and St. Sebastian River Bridges are only 7 miles apart, this alternative would require an approximately 10-mile single-track segment for passenger rail connecting both bridges, as it would not be feasible to construct turnouts and a second track within this short segment that would support the proposed operating speed. Passenger trains would be unable to pass on this segment. Modeled train performance based on this infrastructure change demonstrates that on-time performance of passenger trains would be reduced from 95 percent to 69 percent as a result of the single-track section. This does not meet the minimum requirements for viable passenger train service, and would therefore not meet the Project's purpose and need.

Construct 2-Track New Passenger Rail Bridge and Retain Existing Bridge

This alternative would construct a new two track bridge east of the existing bridge, for passenger rail service. The existing bridge would be retained for freight use only. This alternative would have three active tracks at the Eau Gallie and St. Sebastian River Bridges, and would likely require either a three-track infrastructure for the entire 10-mile segment (and adding a third track to the bridges over Crane Creek and Turkey Creek, both navigable waterways), or new switches and crossovers north and south of each bridge. Because of the track curvature and switches, passenger trains would have to reduce speed, which would increase trip times and reduce on-time performance to the point where it would not meet the project purpose. In addition, installing a third track is not feasible because there is not sufficient right-of-way and numerous property acquisitions would likely be required. As demonstrated in Chapter 3, Alternatives, property acquisition has a significant effect on the financial feasibility of the Project. This

alternative is not prudent because it would present unique operational problems affecting the Project's ability to meet the purpose and need and would also likely result in additional environmental and socioeconomic impacts including additional property acquisition and increased impacts to navigable waters.

Construct 2-Track New Bridge and Retain (Abandon) Existing Bridge

This alternative would construct a new two track bridge east of the existing bridge. The existing bridge would be retained but abandoned. This alternative is not prudent, as the USCG has determined the bridge must be removed to allow for safe navigation of vessels on the Eau Gallie River at this location if new bridges are constructed (USCG 2014). Bridges that are not used for the convenience of land transportation are considered unreasonable obstructions to navigation. There is a condition in all USCG bridge permits for removal of bridges no longer used for transportation purposes.

6.6.2 St. Sebastian River Bridge

In order to implement the Project, the St. Sebastian River Bridge, a structure located within the FECR right-of-way, would be demolished and a new bridge would be constructed in its place to accommodate the future passenger and freight traffic. For analysis of alternatives, see information provided above on the Eau Gallie River Bridge. Figure 6.2-2 shows the location and representative view of the St. Sebastian River Bridge.

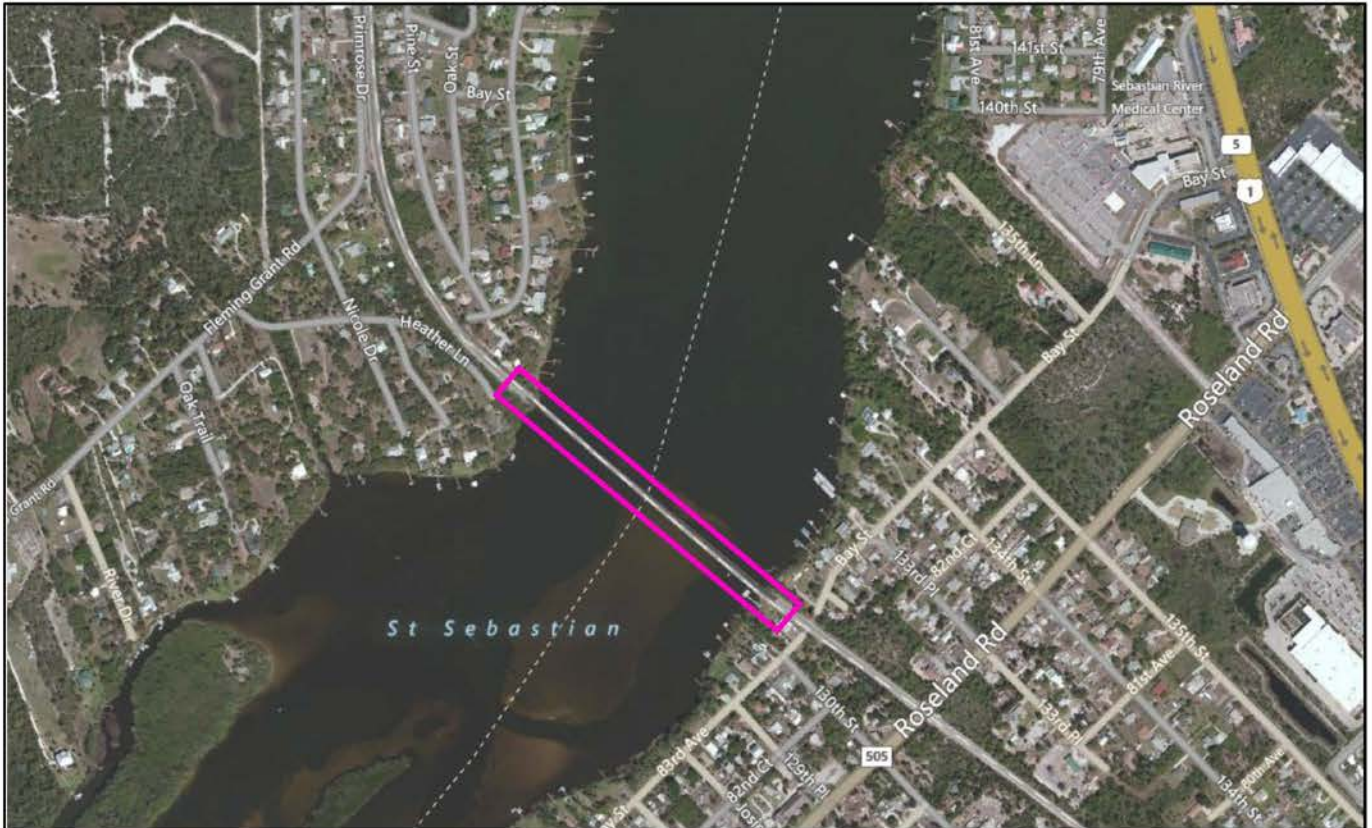
6.6.2.1 Description of Bridge and Status of Historical Designation

The original railroad crossing of the St. Sebastian River in Brevard and Indian River counties was constructed in 1926 as two, deck plate girder bridges supported by a common substructure. Each bridge superstructure has an open deck and single track. The substructures consist of steel towers on concrete foundations with steel ties. The bridges span an approximately 1,635-foot crossing. At some point during its operating history, the railroad was reduced to a single active track on the easternmost bridge. The westernmost bridge has not been maintained. The rails were removed and the deck and substructure have fallen into disrepair.

The existing bridges are eligible for listing in the National Register both as individual resources and as contributing resources to the FECR Corridor linear historic district (see Section 4.4.5 in Chapter 4 for additional information and determinations of eligibility for both the St. Sebastian Bridge and the FECR Corridor linear historic district).

6.6.2.2 Proposed Use

The Project includes the construction of a new twin independent ballast deck structure with concrete piers, to the east of the existing railroad bridges and the demolition and removal of both of the existing bridges. Demolishing and removing the bridges is necessary to protect navigation uses on the waterway, as determined by the USCG. The demolition of the bridge is an adverse effect under Section 106 (see Section 5.4.5 in Chapter 5 for the finding of adverse effect) and constitutes a use under Section 4(f). The bridge is within the FECR right-of-way and no property acquisition is required.



St. Sebastian River Bridge		
All Aboard Florida Intercity Passenger Rail Project		
		6.2-2

Data Sources: USGS Earthstar Geographics SIO 2015, Microsoft Corporation 2015, Nokia

\\Ntl\proj\06\mxd\41107_001\FINAL\03A_Support\graphics\FIGURE\06\bridge_location.mxd

Project # 61653-122072

6.6.2.3 Design Alternatives Considered

A comprehensive set of avoidance alternatives was considered to avoid demolishing the bridge, including maintaining the existing bridge, rehabilitating and reusing the existing bridge, constructing a new passenger rail bridge and retaining the existing freight bridge, constructing a new two track passenger rail bridge and retaining the existing freight bridge, and constructing a new two track passenger rail bridge and abandoning the existing bridge. Because the St. Sebastian River Bridge has a single substructure that supports two single-track superstructures, the alternatives evaluated are slightly different than for the Eau Gallie River Bridge, which has two entirely separate substructures and superstructures. These alternatives are described below.

Maintaining the Existing Bridge

Under the No-Action Alternative, the bridge would be retained in its current dilapidated and unused condition, and no new bridge would be constructed. The Project would operate with a single crossing at this location, on the existing single track bridge superstructure.

As described for the Eau Gallie River Bridge, this alternative is not prudent because 110-mph passenger trains cannot safely operate over the existing bridge.

Rehabilitate and Reuse the Existing Bridge

This alternative would rehabilitate and reuse the existing bridge, and restore it to use as two-track bridge capable of supporting 110-mph passenger rail service. AAF assessed the condition of the existing bridge and determined it was not feasible to rehabilitate the bridge due to its condition. In addition, the proposed passenger trains will operate at 110 mph in this segment, and require a higher bridge loading factor than the existing freight trains, which operate at 28 mph. The existing substructure and superstructure, even if rehabilitated, would not meet the required loading rating. For the same reasons described above for the Eau Gallie River Bridge, this alternative would not meet the project purpose and is neither feasible nor prudent.

Construct a New Passenger Rail Bridge and Retain Existing Freight Bridge

This alternative would construct a new two track bridge east of the existing bridge, for passenger rail service. The existing bridge would be retained for freight use only. Because the Eau Gallie River and St. Sebastian River Bridges are only 7 miles apart, this would require an approximately 10-mile single-track segment for passenger rail that connected both bridges. Passenger trains would be unable to pass on this segment. AAF has modeled train performance based on this infrastructure change and determine that on-time performance of passenger trains would be reduced from 95 percent to 69 percent as a result of the single-track section. For the same reasons described above for the Eau Gallie River Bridge, this alternative would not meet the project purpose.

Add a Second Single-track Bridge beside the Existing Bridge

This alternative would build a new single-track bridge adjacent to the existing structure for passenger rail service and still maintain freight rail traffic on the existing bridge. The discussion of this alternative presented for the Eau Gallie River Bridge is applicable. As for the Eau Gallie River Bridge, this alternative

is not prudent because it would not meet the project purpose, and would result in greater environmental impacts.

Construct New Bridge and Retain (Abandon) Existing Bridge

This alternative would construct a new two track bridge to the east of the existing bridge. The existing bridge would be retained in its current state. This alternative is not prudent, as the USCG has determined the bridge must be removed to allow for safe navigation of vessels on the St. Sebastian River at this location (USCG 2014). Bridges that are not used for the convenience of land transportation are considered unreasonable obstructions to navigation. There is a condition in all USCG Bridge Permits for removal of bridges no longer used for transportation purposes.

6.7 Planning Undertaken to Minimize Harm

As part of the Section 106 process, FRA has consulted with SHPO and other appropriate parties to resolve the adverse effects to the Eau Gallie and St. Sebastian River bridges. The resolution of these effects has been memorialized in a draft Memorandum of Agreement (MOA, Appendix 5.4.5). The draft MOA requires FRA and AAF to document the existing Eau Gallie and St. Sebastian River bridges in accordance with Historic American Engineering Record (HAER) standards, and to consult with SHPO regarding the replacement bridge design. FRA has determined that the measures to resolve the adverse effects developed through the Section 106 consultation process are appropriate measures to minimize harm under Section 4(f).

6.8 Consultation

FRA NEPA Procedures require that FRA consult with the Department of the Interior (DOI) concerning Section 4(f) compliance and, where applicable, with public officials having jurisdiction over the Section 4(f) properties regarding the proposed action and the planning to minimize its harm.

The DOI reviewed the DEIS and provided comments on the Section 4(f) evaluation (letter provided in Appendix 8.1-D1). DOI recommended that the FRA continue working with SHPO to develop a MOA to document the measures to avoid, minimize and mitigation impacts to Section 4(f) resources.

While the Eau Gallie Bridge or St. Sebastian River Bridge are within the FECR right-of-way and owned by the FECR, because they are individually eligible for the National Register, and therefore protected by Section 106, SHPO is the applicable official with jurisdiction. FRA has worked extensively with SHPO throughout the NEPA and Section 106 process, as detailed in Chapters 4 and 5 of the FEIS, in Sections 4.4.5.1 and 5.4.5.2. As described in the DEIS, the officials with jurisdiction over the Tosohatchee WMA and the Jonathan Dickinson State Park were consulted because of potential impacts to those resources that have since been avoided. However, outside of the NEPA process, no additional 4(f)-specific consultation occurred because the remaining resources would not be used by the Project.

6.9 Findings

As described in the analysis above, FRA has determined that there is no feasible and prudent alternative to the demolition of the Eau Gallie River and St. Sebastian River bridges and the project includes all possible planning to minimize harm. New bridges are required at these locations to upgrade these crossings to double track crossings, and retaining the bridges presents an unacceptable safety risk to navigation of vessels on the waterways below. To mitigate the loss of these historic resources, consistent with the Section 106 process to resolve adverse effects to these resources, AAF will document the existing Eau Gallie and St. Sebastian River bridges in accordance with Historic American Engineering Record (HAER) standards, and consult with SHPO regarding the replacement bridge design. These mitigation measures are documented in the draft MOA appended to the FEIS (Appendix 5.4.5).

7 Mitigation Measures and Project Commitments

7.1 Introduction

According to the Council on Environmental Quality (CEQ) *Regulations for Implementing the National Environmental Policy Act (NEPA)*, project proponents shall, to the fullest extent possible:

“Use all practicable means consistent with the requirements of the Act and other essential considerations of nation policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions on the quality of the human environment.”
(40 CFR § 1500.2(f))

In accordance with the NEPA regulations, this chapter identifies and evaluates measures that would avoid, minimize, or mitigate impacts that would result from the Project. Measures to minimize impacts by limiting the degree or magnitude of impacts associated with the proposed All Aboard Florida (AAF) passenger rail service and its implementation are described. As documented in this chapter, effects to various environmental resources are unavoidable due to the proposed location of the new MCO Segment and East-West Corridor (E-W Corridor) connecting with the existing Florida East Coast Railway (FECR) (the North-South Corridor [N-S Corridor]); therefore, measures that minimize adverse effects have been identified. A detailed analysis of proposed compensatory mitigation measures is included for areas in which replacing lost resources is necessary.

This chapter provides a description of mitigation for short-term construction-period effects, permanent loss of protected resources, and long-term effects of Project operations, and responds to public comments on the Draft Environmental Impact Statement (DEIS) concerning mitigation of potential environmental impacts of the Project. This chapter also describes consultation with federal and state agencies pertaining to mitigation. In addition, this chapter summarizes the mitigation commitments for Phase I, the West Palm Beach to Miami Corridor, as set out in the 2013 Finding of No Significant Impact (FONSI) (FRA 2013).

7.2 Project Commitments

This section describes the proposed Best Management Practices (BMPs) incorporated in the Project and mitigation measures for unavoidable impacts. Mitigation measures are proposed for traffic and at-grade crossings, noise and vibration, water, navigation, wetlands, biological resources and natural ecological systems, essential fish habitat (EFH), threatened and endangered species, and historic properties. For each resource, the analysis describes efforts to avoid consequences, minimize impacts, and provide compensatory mitigation. Table 7.2-1 provides a summary of construction-period BMPs and mitigation measures proposed for environmental resources that would be affected by the Project. These construction-period BMPs were also required by the FONSI for the WPB-M Corridor.

Table 7.2-1 Project BMPs and Mitigation Measures – Construction Period	
Environmental Resource	BMPs and Mitigation Measures
Transportation	<ul style="list-style-type: none"> • Implement traffic management BMPs during construction activities
Air Quality	<ul style="list-style-type: none"> • Implement BMPs (such as soil watering to reduce fugitive dust emissions) to keep emissions to a minimum • Keep construction equipment on site for duration of construction
Noise and Vibration	<ul style="list-style-type: none"> • Avoid nighttime construction in residential neighborhoods • Locate stationary construction equipment as far as possible from noise sensitive sites • Re-route construction-related truck traffic along roadways that will cause the least disturbance to residents • Monitor and maintain equipment to meet noise limits • Minimize the use of generators to power equipment • Limit use of public address systems • Limit or avoid certain noisy activities, such as aboveground jackhammering and impact pile driving, during nighttime hours • Use augers (as opposed to pile drivers) where practicable • Operate earthmoving equipment on the construction lot as far away from vibration-sensitive sites as practicable. • Phase demolition, earthmoving, and ground-impacting operations so as not to occur in the same time period. • Select low-impact demolition methods where possible. • Avoid vibratory rollers and packers near sensitive areas.
Hazardous Materials and Solid Waste Disposal	<ul style="list-style-type: none"> • Use appropriate special waste handling techniques • Implement dust control measures • Use proper technique for management/disposal of contaminated soil/groundwater
Water	<ul style="list-style-type: none"> • Implement sediment control BMPs (turbidity curtains and silt fences)
Essential Fish Habitat	<ul style="list-style-type: none"> • Use silt fences and turbidity curtains • Develop and implement an Erosion and Sedimentation Control Plan • In-kind compensatory mitigation at a federally approved mitigation bank
Biological Resources and Natural Ecological Systems	<ul style="list-style-type: none"> • Revegetate cleared areas when required by standard BMPs and applicable laws. • Reduce the potential for invasive species spread by using imported soil for fill material that has been certified free of invasive species seeds and rhizomes.
Threatened and Endangered Species and Other Protected Species	<ul style="list-style-type: none"> • Adhere to the Reasonable and Prudent Measures, Terms and Conditions, and Conservation Recommendations of the Biological Opinion issued by USFWS. • Make siltation/turbidity barriers of material to not entrap/entangle species, and not impede species movement. • Operate water vessels at no wake/idle speeds at all times and in water depths where the draft of the vessel provides less than a 4-foot clearance from the sediment. Vessels to follow routes of deep water. • Instruct personnel in the potential presence of threatened and endangered species in the vicinity. Personnel to be advised of the civil and criminal penalties for harming species. • Cease activities if a manatee comes within 50 feet of the construction area or barrier, including vessels being shutdown, until the animal has moved on its own volition beyond the 50-foot radius of the construction operation.

Table 7.2-1 Project BMPs and Mitigation Measures – Construction Period (Continued)	
Environmental Resource	BMPs and Mitigation Measures
Threatened and Endangered Species and Other Protected Species (Continued)	<ul style="list-style-type: none"> • Post signs regarding species before and during in-water construction activities. • Do not subject feeding sites to water management practices. • Comply with the Bald Eagle Management Plan with respect to all construction activities. • Obtain a Bald Eagle Disturbance Permit. • Submit an eastern indigo snake monitoring report to the appropriate federal and local field offices. • Conduct construction activities during daylight hours in areas that might be visible from any sea turtle nesting beaches. • Complete construction from the water utilizing floating barges and turbidity barriers. • Use bubble curtains during pile driving to reduce noise impacts to swimming sea turtles and smalltooth sawfish. • Complete Florida Fish and Wildlife Conservation Commission-compliant gopher tortoise surveys by a qualified gopher tortoise agent prior to ground disturbing activities. • Conduct pre-construction surveys for listed plant species in coordination with USFWS and relocate individuals if necessary. • Implement eastern indigo snake protection measures • Implement STANDARD MANATEE CONDITIONS FOR IN-WATER WORK – 2011 • Implement SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS March 2006
Historic Properties	<ul style="list-style-type: none"> • Implement Archaeological Monitoring Plan for all project work in the area of six identified archaeological sites (Hobe Sound National Wildlife Refuge #3 Site (8MT1287); the Fort Capron Site (8SL41); Vero Man/Vero Locality Site (8IRI/8IR9); Fort Pierce (8SL31); Railroad (8IR846); and Avenue A-Downtown Fort Pierce (8SL1772) and in any other areas designated by SHPO • Consult with SHPO for design for rehabilitation and construction of all bridges that are contributing resources to the Florida East Coast Railroad Historic District to avoid adverse effect to the district • Consult with SHPO in the design and construction of replacement and updated crossing gates at grade crossings within historic districts abutting the Florida East Coast Railroad Historic District or in proximity to historic properties • Consult with SHPO to assess and avoid potential adverse effects of construction activities identified outside of the existing APE for direct effects on historic properties or archaeological sites listed or eligible for listing in the National Register of Historic Places • Place communications towers in locations that have been determined to contain no above or below ground historic properties • Implement alternative construction methods such as vibratory or sonic pile driving to reduce vibration impacts from pile driving at archaeological sites located within 135 feet of locations where pile driving occurs
Section 4(f) Parks and Recreation Properties	<ul style="list-style-type: none"> • AAF will develop a construction management plan to reduce and minimize the effects of grade crossing reconstruction in Jonathan Dickinson State Park on park uses. AAF, in association with FRA, will coordinate with the land management agency.

Table 7.2-2 provides a summary of project-level mitigation measures proposed for unavoidable impacts as a result of the Project.

Environmental Resource	Mitigation Measure
Traffic and Grade Crossings	<ul style="list-style-type: none"> • Work with State and local traffic officials to adjust traffic signal timing as needed in Project Area • Implement and fund initial grade crossing safety enhancements identified in the Diagnostic Team Report (see Section 5.4.4.2)
Noise and Vibration	<ul style="list-style-type: none"> • Install noise barriers along the E-W Corridor (see Section 7.2.4) where effective in reducing noise impacts near elevated structures (Narcoossee Road and I-95) • Maintain train wheels and rails to minimize vibration • Install pole-mounted horns at 117 grade crossings where severe noise impacts would occur in the absence of mitigation (Appendix 3.3.5-D)
Water	<ul style="list-style-type: none"> • Implement stormwater treatment BMPs (surface infiltration through swales, ditches, and over-land flow; installation of underground French drain systems; deep injection wells to drain water via gravity or pumping; and/or wet detention and retention ponds)
Navigation	<ul style="list-style-type: none"> • Manage train schedules to minimize bridge closures • Provide marine industry with bridge closure schedules to facilitate planning by boaters • Develop a set schedule for the down times of each bridge location. This schedule will include both freight and passenger rail service. • Provide that schedule of bridge closures in an internet-accessible format to offer the public with access to that information, including the boating community and marinas. This will be posted on the AAF website and/or the US Coast Guard website. • Implement a notification sign/signal at each bridge location with warning count downs to indicate the times at which the bridge will begin to close and open and how long before a train will arrive. • Develop formal contact with first responders and emergency personnel. • Develop coordination plans between AAF and local authorities during peak vessel travel times on holidays and major public events • Install a bridge tender at the New River Bridge
Wetlands	<ul style="list-style-type: none"> • To compensate for impacts to waters of the United States (wetlands and surface waters) AAF proposes the purchase of in-kind mitigation bank credits from a federally approved mitigation bank whose service area covers the project. • To compensate for impacts to wetlands under the jurisdiction of State of Florida AA proposes:
Biological Resources and Natural Ecological Systems	<ul style="list-style-type: none"> • Develop designs to provide wildlife passage under bridges and through culverts in critical areas (Econolockhatchee River and Little Creek). • Install wildlife crossing within the Tosohatchee Wildlife Management Area
Threatened and Endangered Species and Other Protected Species	<ul style="list-style-type: none"> • Purchase two scrub-jay credits with a USFWS-approved scrub-jay mitigation bank in accordance with Florida Statute Title XXVIII, Chapter 373.4135, Mitigation banks and offsite regional mitigation
Essential Fish Habitat	<ul style="list-style-type: none"> • Obtain Section 404 permit and follow wetland mitigation conditions • In-kind compensatory mitigation at a federally approved mitigation bank in accordance with Florida Statute Title XXVIII, Chapter 373.4135, Mitigation banks and offsite regional mitigation
Historic Properties	<ul style="list-style-type: none"> • Prepare HAER documentation for the Eau Gallie River Bridge and the St. Sebastian River Bridge • Develop website focusing on and highlighting the contributions of Henry Morrison Flagler as well as the history of the Florida East Coast Railway and its passenger rail service along the corridor. • Continue to consult with the SHPO regarding appropriate design elements for the replacement of NRHP eligible bridges and those bridges that are contributing elements to the FECR Historic District.

7.2.1 Transportation

AAF does not propose any new road crossings in the Project. The increase in number of crossing events along the N-S Corridor and WPB-M Corridor due to the addition of 32 passenger trains each day would cause additional closure events at each at-grade crossing, but closures from passenger trains will be much shorter than closures from existing freight traffic. AAF will work with state and local traffic officials to adjust traffic signal timing along the N-S Corridor and WPB-M Corridor to reduce potential traffic impacts.

AAF will perform new track construction required for the Project according to BMPs so that minimal temporary adverse impacts to existing freight operations will be experienced. Any required maintenance or rehabilitation of the existing single track will also be done using planning and construction practices that will minimize impact to existing freight traffic. Future required maintenance and rehabilitation will also be done more efficiently as track operators will be able to use planning practices that utilize the additional tracks to mitigate temporary delays.

The Phase I 2013 FONSI required AAF to coordinate with the Florida Department of Transportation (FDOT) and Southern Florida Rail Transportation Agency (SFRTA) to develop a plan for integrated passenger rail services in the South Florida region. However, until access and operating agreements can be negotiated and the necessary local, state and federal funding has been secured, the operation of Tri-Rail commuter service is not reasonably foreseeable.

7.2.2 Navigation

AAF will implement a series of mitigation measures to reduce vessel delay and queuing at the three operable bridges (St. Lucie River, Loxahatchee River, and New River). These include:

- Develop a set schedule for the down times of each bridge for passenger rail service. Passenger rail service is anticipated to operate on consistent daily schedules that are both predictable and reliable with minimal deviations. Local mariners should be able to predict approximate crossing times once they are familiar with the passenger rail schedule, which will be consistent and unchanging from week to week. Mariners will be able to plan travel times and avoid unnecessary wait times according to the posted schedule.
- Provide public access to the bridge closure schedules in an internet accessible format updated daily with anticipated crossing times for each bridge. Schedules for each bridge will be posted on the AAF website and/or the United States Coast Guard (USCG) website. Internet sites will provide estimated bridge crossing times so mariners may access real-time data from the water and plan appropriately. Schedules and/or information may also be made available at local marinas and tackle shops. This will allow the boating community to plan their trips to avoid wait times.
- Implement a notification sign/signal/horn at each bridge location with countdowns to indicate the times at which the bridge will begin to close and open. Similar to a road crossing, the notification system will alert mariners within the vicinity of a bridge that a train is approaching. The signal will also provide a countdown for bridge closings and openings. This system can help mariners within the vicinity of the bridge plan trips accordingly and will also help to ease boater frustration for those that wait.

- Develop formal contact with first responders and emergency personnel. A point of contact will be established to ensure that emergency personnel can coordinate with the dispatch center when access is necessary to respond to waterway emergencies.
- Develop coordination plans between AAF and local authorities during peak vessel travel times on holidays and major public events. Local authorities will have the ability to contact AAF in order to coordinate plans for certain special events and occasions in an effort to establish adjustments to train schedules that will allow a bridge to be open for specified periods of time.
- Develop a coordination plan between AAF and the USCG to communicate bridge operating schedules to the commercial and recreational boating communities. Such a plan will allow updates to the bridge operating schedule to be disseminated throughout these communities. Communication will be through the USCG, local marinas, and on the official scheduling website.
- Install a bridge tender at the New River Bridge. The New River Bridge has the greatest amount of commercial traffic (as compared to the Loxahatchee River Bridge and the St. Lucie River Bridge). The addition of a bridge tender at this location will allow better communication with commercial vessels. The tender could be contacted directly by mariners with a need for information so that they could plan accordingly and minimize wait times. As described in Section 5.1.3.2 of this FEIS, the USCG has issued a temporary deviation from the operating schedule at the New River Bridge, through the use of a bridge tender. The intent of the deviation is to test FEIS's proposed installation of an automated system to increase vessel traffic efficiency.

Some commenters noted that the FEIS should consider greater vertical and horizontal clearance for the Loxahatchee River Bridge to enable bi-directional traffic as well as mechanical improvements to assure structural integrity of the bridge. AAF will be adding a second track and making mechanical improvements to the Loxahatchee River Bridge, but these changes will not affect the horizontal or vertical clearance of the bridge. Section 3.3.3 of this FEIS evaluates bridge alternatives including raising bridge elevations, and concludes that this approach is not feasible due to limitations on grade steepness and associated safety, cost, land impact, and operational barriers. AAF has developed an operating schedule that minimizes bridge closures and agreed to several additional mitigation measures including improved signage and information accessibility on bridge operations (see above).

The USCG has stated that the Coast Guard is responsible for setting bridge closure schedules as part of the rule making process. Until the USCG implements a new rule making process, the existing bridge opening regulations would still apply (Section 4.1.3.2, Existing Navigation Conditions).

7.2.3 Air Quality

The Project will have a beneficial effect on air quality as the daily vehicle trips will be reduced on roadways and annual vehicle miles traveled will decrease. Section 5.2.1 of this FEIS provides an analysis of air quality, noting that increased emissions from traffic queuing at grade crossings represents a *de minimis* impact. This minimal adverse impact, coupled with the benefits of reducing vehicle-miles travelled due to increased passenger rail service, will result in an overall net benefit to regional emissions. Therefore, the Project will provide an overall net benefit for regional air quality.

Potential emissions associated with construction equipment will be kept to a minimum as most equipment will be driven to and kept at affected sites for the duration of construction activities. In

addition, routine BMPs will be performed at construction sites to keep emissions of particulates (the primary pollutant emitted) to a minimum during the temporary construction activities. Emissions associated with construction workers commuting and the transport of materials will also be minimal given the temporary nature of the activities. The use of BMPs during construction, such as soil watering to reduce fugitive dust emissions, will be effective in substantially reducing potential emissions during construction.

7.2.4 Noise and Vibration

AAF will implement mitigation measures as part of the Project design to reduce noise and vibration impacts from passenger train operations as well as construction.

Some maintenance measures can help to mitigate noise and vibration. The roughness of the wheels and rails is the most important maintenance factor in controlling noise and vibration from freight and passenger trains. AAF will maintain their equipment to minimize noise and vibration emissions, including repairing wheel flats, truing wheels to optimize the wheel/rail interface, and periodic rail grinding.

Some commenters questioned whether the FRA would conduct inspections of the wheels as a way to reduce noise and vibration. The FRA has a detailed program outlined in the Motive Power and Equipment Compliance Manual that provides guidance to inspectors to ensure railroad equipment complies with Federal requirements. Specific conditions of the train wheels such as dimensions of the wheel flange and rim, presence of cracks, or wheel flats, are regulated by the FRA and are a critical part of FRA's oversight to safety. It should be noted that while these wheel conditions may relate to the level of vibration generated by the equipment, the FRA is not responsible for the direct inspection or measurement of train vibration.

Some commenters requested mitigation in response to increased visual, noise, or vibration impacts as a result of the bridge crossing over Innovation Way (SR 528). The noise and vibration analysis conducted as part of the DEIS took into account increased noise exposure and decreased vibration exposure due to the elevated portion of track over International Corporate Park (ICP) Boulevard and the adjacent existing railroad corridor (see Appendix 5.2.2-A2, Figure 5-30). Because there is no portion of Innovation Way that currently exists within the proposed E-W corridor, the noise and vibration analysis immediately west of ICP Blvd (i.e. Innovation Way area) is based on the current design that includes at-grade operations. Additionally, because there are currently no residential parcels in the area referenced, the noise and vibration analysis conducted in the DEIS, in accordance with FRA guidelines, identified no residential impacts in the area.

7.2.4.1 Noise Mitigation

Along the E-W Corridor, noise impacts will be primarily due to the increased noise propagation from elevated portions of track. Proposed noise mitigation in these areas includes sound barriers on the edge of the elevated structures to mitigate potential severe effects. Sound barriers are effective in mitigating noise when they break the line-of-sight between source and receiver. The necessary height of a barrier depends on such factors as the source height and the distance from the source to the barrier. For example, if a barrier is located very close to a train noise source, it typically only needs to be 3 to 4 feet

above the top of rail to provide noise reductions of 6 to 10 dBA. The Project will include constructing two noise barriers (at Narcoossee Road and I-95) which will effectively eliminate all severe noise impacts anticipated along the E-W Corridor and reduce the number of moderate noise impacts to only 33 residential receptors.

Noise along the N-S Corridor and the WPB-M Corridor will be reduced by the use of pole-mounted horns at 117 grade crossings where severe noise impacts would occur in the absence of the pole-mounted horns, as described in Section 5.2, listed in Appendix 3.3.5-D, and required by the FONSI (FRA 2013). With this mitigation, there will be no significant noise impacts along the rail corridor. However, stakeholders in the affected communities along the N-S Corridor are considering the institution of quiet zones (which prohibit horns to be sounded in specified areas) at certain at-grade crossings. This involves instituting alternate safety measures such as four-quadrant gates and non-mountable median dividers. In addition, supplementary safety measures must be installed and a risk analysis must be prepared to demonstrate that safety would not be compromised by eliminating train horns in the area receiving “quiet zone” designation. The governmental entities or other authorities pursuing these quiet zones will act as the sponsors of such efforts and will be responsible for the application process and the associated costs, including the costs of any improvements.

Based on the recommendations of the Grade Crossing Diagnostic Team, AAF will pay the cost of the recommended grade crossing safety improvements related to the introduction of passenger rail service, in conjunction with county and municipal execution of amendments to existing crossing license agreements. AAF will, after execution of amendments to existing crossing license agreements, ensure that, where defined sidewalks exist, pedestrian crossing gates will be installed to ensure pedestrian safety. This will allow local governments to focus on finding the additional funding needed for the quiet zone improvements.

7.2.4.2 Vibration Mitigation

The purpose of vibration mitigation is to minimize the adverse effects that the Project’s ground-borne vibration will have on sensitive receptors, such as annoyance and rattling. Vibration impacts are not as common a problem as environmental noise, and the mitigation approaches have not been as well defined. In some cases, it is necessary to develop project-specific approaches to mitigate for unacceptable vibration impacts. This is partly due to the fact that vibration characteristics are difficult to calculate, and depend on numerous project and environmental factors.

Vibration impacts will be minimized by wheel and rail maintenance that will control unacceptably high vibration levels. According to FRA guidelines, problems with rough wheels or rails can increase vibration levels by as much as 20 dB, negating the effects of even the most effective vibration control measures. AAF will conduct soil characterization and pre-construction soil analysis to determine if additional mitigation measures are warranted, such as in areas that may be subject to liquefaction or are otherwise vulnerable to vibration.

7.2.4.3 Construction Noise Mitigation

AAF will monitor construction noise to verify compliance with the relevant noise limits. The contractor will have the flexibility to meet the Federal Transit Administration construction noise limits in the most

efficient and cost-effective manner. In that regard, the contractor may either prohibit certain noise-generating activities during nighttime hours or provide additional noise control measures to meet the noise limits. To meet required noise limits, AAF will implement the following noise control mitigation measures:

- Avoid nighttime construction in residential neighborhoods;
- Locate stationary construction equipment as far as possible from noise sensitive sites;
- Re-route construction-related truck traffic along roadways that will cause the least disturbance to residents;
- Monitor and maintain equipment to meet noise limits;
- Minimize the use of generators to power equipment;
- Limit use of public address systems; and
- Limit or avoid certain noisy activities during nighttime hours such as aboveground jackhammering and impact pile driving.

To avoid noise impacts related to pile driving (if needed), AAF's constructor would use an auger to install the piles instead of a pile driver which would reduce noise levels substantially. If pile driving is necessary for station construction, the time of day that the activity can occur will be limited to daytime hours.

Some commenters questioned whether AAF has included sufficient detail regarding noise abatement measures to be taken during construction. Construction noise and the mitigation measures that will be needed to adequately reduce noise are dependent on the specific equipment and construction methods of the contractor. AAF will incorporate the noted noise control mitigation measures into construction plans as the Project design advances and further details on the equipment and methods are defined.

7.2.4.4 Construction Vibration Mitigation

Vibration from construction activities does not often reach the levels that can damage structures, but it may be audible or perceptible in buildings very close to construction activities. The construction activity that typically generate the most severe vibrations is impact pile driving. To mitigate construction vibration, AAF's contractor will be required to implement equipment location and processes, as listed below.

Construction Equipment and Haul Routes:

- Route heavily loaded trucks away from residential streets, if possible. Select streets with fewest homes, if no alternatives are available.
- Operate earthmoving equipment on the construction lot as far away from vibration-sensitive sites as practicable.

Sequence of Operations:

- Phase demolition, earthmoving, and ground-impacting operations so as not to occur in the same time period. Unlike noise, the total vibration level produced could be significantly less when each vibration source operates separately.
- Avoid nighttime activities. People are more aware of vibration in their homes during the nighttime hours.

Alternative Construction Methods:

- Avoid impact pile driving where practicable in vibration-sensitive areas. Drilled piles or the use of a sonic or vibratory pile driver causes lower vibration levels where the geological conditions permit their use.
- Select demolition methods not involving impact, where possible. For example, sawing bridge decks into sections that can be loaded onto trucks results in lower vibration levels than impact demolition by pavement breakers, and milling generates lower vibration levels than excavation using clam shell or chisel drops.
- Avoid vibratory rollers and packers near sensitive areas.

Pile driving is potentially the greatest source of vibration associated with equipment used during construction of a project. However, there are some additional vibration effects of vibratory pile drivers that may limit their use in sensitive locations. A vibratory pile driver operates by continuously shaking the pile at a fixed frequency, literally vibrating it into the ground. Continuous operation at a fixed frequency may be more noticeable to nearby residents, even at lower vibration levels. Further, the steady-state excitation of the ground may increase resonance response of building components. Resonant response may be unacceptable in cases of fragile buildings or vibration-sensitive manufacturing processes. Impact pile drivers, in contrast, produce a high vibration level for a short time with sufficient time between impacts to allow any resonant response to decay.

7.2.5 Hazardous Materials and Solid Waste Disposal

AAF would implement BMPs during construction and include special waste handling, dust control, and management and disposal of contaminated soil and ground water in order to prevent construction delays and to provide adequate protection to workers and any nearby sensitive receptors. All remedial action plans must ensure that any nearby or adjacent receptors are adequately protected and the assessment and management of contaminated media encountered during the Project will be handled in accordance with applicable federal, state, and local laws and regulations.

7.2.6 Surface and Groundwater

AAF will provide water quality measures in the form of stormwater treatment (retention, detention, and treatment) as part of the Project to mitigate for creating additional impervious surface area and converting vegetated areas to ballasted railbed. Some commenters requested how stormwater mitigation will specifically be addressed. Specific measures will be identified as the design of the project advances based on applicable federal, state, and local regulatory conditions (see Chapter 1, Table 1.4-2).

Temporary effects to surface waters and groundwater during construction activities will be minimized through the application by AAF of BMPs. The Florida Department of Environmental Protection (FDEP) is responsible for issuing and enforcing National Pollutant Discharge Elimination System (NPDES) permits. These permits identify activities during construction to assure an acceptable standard of water quality. The Clean Water Act (CWA) Section 404 permit program requires that construction stormwater management and construction practices be addressed, including erosion prevention, sediment control, and in-water work. Regulatory agencies will closely review these practices to minimize effects.

During construction, AAF will use sediment control BMPs, including installation of turbidity curtains and silt fencing, to protect surface waters. Accidental spills of material such as fuels, lubricants, solvents, or

other liquids that could harm surface waters will be cleaned up in a timely manner in accordance with a Spill Prevention, Control, and Countermeasures Plan and BMPs to be prepared by contractors and approved by AAF. These measures would minimize the potential for temporary effects.

AAF will provide water-quality mitigation for additional impervious and semi-impervious surface areas in the form of stormwater treatment (retention, detention, and treatment) as part of the Project. BMP measures would be determined by and in compliance with permit requirements.

7.2.7 Wetlands

As part of the Project, AAF will seek Environmental Resource Permits issued by the South Florida Water Management District and St. Johns River Water Management District, a Department of the Army permit from the U.S. Army Corps of Engineers (USACE) pursuant to CWA Section 404, and a Rivers and Harbors Act Section 10 and NPDES permits issued by the FDEP. Some of the State permits may be jointly covered under a Joint Environmental Resource Permit.

USACE will require AAF to avoid and minimize impacts to waters of the United States, including jurisdictional wetlands, to the greatest extent practicable as required by the CWA Section 404(b)(1) Guidelines. This analysis will be included in USACE's Record of Decision for AAF's application for CWA Section 404 authorization. AAF has proposed measures to avoid and minimize wetland losses through the use of retaining walls and increasing bridge length over rivers and associated riparian zones to the greatest extent practicable. AAF has proposed to avoid and minimize secondary impacts to wetlands with the use of staked hay bales, silt fencing, and re-vegetation of construction areas to protect water quality in adjacent wetlands and construction mats in wetlands to reduce disturbance of soils.

Section 404 of the CWA requires AAF to provide compensatory mitigation for all unavoidable impacts to waters of the United States, including jurisdictional wetlands and surface waters. Mitigation proposed by AAF would be completed in accordance with the U.S. Environmental Protection Agency and USACE's joint mitigation rule, 33 CFR Part 332. To address federal permit requirements, AAF has proposed to mitigate impacts to waters of the United States through the purchase of in-kind mitigation bank credits from federally approved mitigation banks whose service area covers the project. AAF will provide mitigation as necessary to satisfy state permit requirements.

USACE will complete its Section 404(b)(1) Guidelines analysis and public interest review in its record of decision following publication of the Final EIS.

7.2.8 Floodplains

AAF will mitigate all floodplain impacts in accordance with applicable state and local laws regarding appropriate compensation and permitting. The construction design would minimize potential harm to the floodplain by retaining existing elevations where feasible, constructing stormwater mitigation measures and retention ponds, and minimizing fill in sensitive areas.

7.2.9 Biological Resources and Natural Ecological Systems

Impacts to biological resources and natural ecological systems have been minimized due to the fact that the E-W Corridor would be developed near an existing transportation corridor and would not

significantly increase fragmentation and noise impacts that do not already exist in this area. The same is true for the N-S Corridor as it will be developed on an existing rail corridor. No new at-grade crossings are proposed along the E-W Corridor that would have potential noise effects to wildlife related to warning horns typically utilized at at-grade crossings.

AAF would not change existing conditions along the existing FECR Corridor or exacerbate existing barriers to wildlife movement and therefore does not propose to construct any new wildlife passages along the N-S Corridor.

AAF will minimize effects to upland habitats and wildlife through implementation of standard construction BMPs and mitigation measures including:

- Designs to provide wildlife passage under bridges and through culverts in critical areas along the E-W Corridor; and
- Cleared areas may be revegetated when required by standard BMPs and applicable laws.

7.2.9.1 Wildlife Crossings

During final design of the railroad bridges and culverts crossing the Econlockhatchee River, its tributary, and Little Creek, AAF will consult with representatives of the USACE, SJRWMD, FWC, and the Orange County Environmental Protection Division to minimize potential impacts on wildlife habitat. Based on previous discussions with representatives of these organizations, AAF proposes to develop wildlife crossings at these overpasses. The migratory characteristics of three large mammals known to inhabit the corridor (Florida black bear, white-tail deer, and Florida panther) were evaluated. Due to the size and sensitivity of the Florida black bear it was used as the species in the development of corridor/bridge design. This enabled the needs of other species to be met as part of the design.

AAF plans to incorporate the following elements into the design of the railroad bridge crossings over the Econlockhatchee River and Little Creek to allow for dry wildlife passage:

- Creating a concrete ledge along the western wall of the bridge;
- Constructing an elevated shelf within the eastern most culvert to allow for dry passage during bank-full events; and
- Placing security fencing and potentially funnel fencing in select areas to encourage migration through the culvert and bridge.

AAF will also construct a new wildlife crossing approximately 4,100 feet east of Long Bluff Road, and will provide a passage with 8 to 10 feet of vertical clearance and approximately 50 feet of horizontal clearance. This wildlife crossing will match the wildlife crossing proposed by FDOT as part of the future SR 528 widening. The railroad wildlife crossing (along with the SR 528 crossing when constructed by FDOT) will enhance wildlife passage between the northern and southern sections of the Tosohatchee Preserve, and will function as part of the Florida Wildlife Corridor.

Some commenters requested that the FEIS identify commitments related to the minimization and avoidance of establishing and spreading invasive plant species during construction. The Project has the potential to increase invasive species occurrences in natural habitats, particularly along the E-W Corridor where new disturbance would occur adjacent to natural communities. However, this does not represent

a significant change, as the existing SR 528 corridor already provides opportunities for the spread of invasive species, and vegetation maintenance would be routinely conducted along the railroad corridor to allow for maintenance access. During construction, AAF will use imported soil as fill material that has been certified to be free of invasive plant seeds and rhizomes.

7.2.9.2 Essential Fish Habitat

AAF has completed Biological Assessments in accordance with National Marine Fisheries Service Habitat Conservation Division (NMFS, HCD) recommendations. These assessments quantified potential impacts to EFH and provided compensatory mitigation recommendations.

To minimize impacts to EFH, AAF will construct bridges over waterways in a manner to reduce erosion and sedimentation through implementation of BMPs (such as the use of silt fences and turbidity curtains) in accordance with an Erosion and Sedimentation Control Plan approved by NMFS to prevent further impacts to EFH. To mitigate impacts to EFH, AAF proposes to purchase in-kind federal credits from federally approved wetland mitigation banks (see Section 5.2.2).

7.2.10 Threatened and Endangered Species and Other Protected Species

USACE has facilitated several discussions with U.S. Fish and Wildlife Service (USFWS) and NMFS Protected Resource Division (PRD) regarding Endangered Species Act (ESA) consultation for this project. These discussions have aided in clarification of the details required in the Biological Assessment (BA) that was prepared by AAF in accordance with the *Final ESA Section 7 Consultation Handbook* (USFWS 1998) and submitted in September 2013. Based on the BA, effect findings were determined for species found throughout the project corridor also in September 2013. Consultation with USFWS and NMFS PRD has also helped develop mitigation methods for minimizing effects to threatened and endangered species.

Specific measures will be implemented by AAF to mitigate for potential temporary and permanent impacts to the habitat of federally listed species, as described below. In addition to these measures, AAF has committed to conducting pre-construction surveys for the following species:

- Audubon's crested caracara
- Florida scrub-jay
- Red-cockaded woodpecker
- Sand skinks
- State-listed plant species

None of the alternatives considered for this analysis would be expected to result in significant adverse impacts to protected species, protected species habitat, or designated critical habitat. However, AAF is committed to these measures to address any significant, unmitigated impacts that may arise as a result of the Project.

As required by USFWS, AAF has purchased two scrub-jay credits within a USFWS approved scrub-jay mitigation bank (Appendix 5.3.6-B). As required by USFWS, AAF would also take "reasonable and prudent measures" to minimize the incidental take including the avoidance of potential of scrub-jays to be killed

or injured by heavy equipment including the "destruction of active nests, with or without eggs." To fulfill this requirement, AAF would restrict clearing of vegetation within and immediately adjacent to occupied territory or unoccupied but suitable habitat during the nesting season (typically March 1 through June 30) in order to remove the potential to destroy active nests and kill or injure nestlings.

AAF's initial surveys for listed plant species focused on the areas of disturbance, and did not survey the entire FECR corridor. AAF is coordinating and will continue to coordinate with federal and state agencies as well as land managers and biologists within public lands to conduct appropriate pre-construction surveys and develop a transplanting plan for affected individual plants.

7.2.10.1 West Indian Manatee Mitigation Measures

AAF will conduct construction activities in accordance with *Standard Manatee Construction Conditions for In-Water Work*, which shall include, but are not limited to, the following BMPs (USFWS 2011b):

- Siltation/turbidity barriers will be made of material that would not entrap/entangle the manatee, and would not impede manatee movement. Barriers would be properly secured and routinely monitored to ensure manatees are not entangled.
- Within the construction area, water vessels associated with construction will operate at no wake/idle speeds at all times and in water depths where the draft of the vessel provides less than a 4-foot clearance from the sediment. Vessels will follow routes of deep water when possible.
- All personnel associated with the construction and operational phases of the Project will be instructed in the potential presence of manatees in the water. Construction site personnel associated with operating water craft will be advised of the civil and criminal penalties for harming, harassing, or killing species that are protected under the Marine Mammal Protection Act, ESA, and the Florida Manatee Sanctuary Act.
- If a manatee comes within 50 feet of the construction area or barrier, activities would cease, including vessels being shutdown, until the animal has moved on its own volition beyond the 50-foot radius of the construction operation. The animals would not be herded away or harassed into leaving.
- Florida Fish and Wildlife Conservation Commission-approved (FWC) temporary signs regarding manatees will be posted before and during in-water construction activities.

As required for in-water work within Important Manatee Areas, additional protection measures may include limiting in-water work to daylight hours and using dedicated manatee observers. For in-water work within the Eau Gallie River, Crane Creek, Turkey Creek, and Sebastian River, manatee observers will be approved by USFWS and FWC prior to initiation of construction activities. In the event of a collision with a manatee, the on-site construction manager would immediately notify the FWC hotline (1-888-404-3922) and USFWS in Jacksonville for north Florida (1-904-731-3336) and Vero Beach for south Florida (1-772-563-3909).

7.2.10.2 Wood Stork Mitigation Measures

All personnel associated with the construction and operational phases of the Project would be instructed about the potential presence of wood storks. The construction site personnel would also be informed of the civil and criminal penalties for harming, harassing, or killing species that are protected. Personnel

would avoid operating noise-making equipment unnecessarily if wood storks are present and wood storks would never be intentionally forced to fly.

AAF would minimize impacts to wood stork suitable foraging habitat (SFH), i.e., wetlands, to the greatest extent practicable during the final design process as required by the CWA Section 404(b)(1) Guidelines. The USFWS has reviewed the Project and determined the proposed work is not likely to adversely affect the wood stork. If required by the USFWS pursuant to the ESA, AAF will mitigate impacts through the purchase of in-kind mitigation bank credits.

7.2.10.3 Bald Eagle Mitigation Measures

In order to avoid a take under the Bald and Gold Eagle Protection Act, in constructing the Project AAF will comply with the FWC Bald Eagle Management Plan, which prescribes buffer areas around linear transportation projects and recommend that construction activities occur outside of breeding seasons (FWC 2008). AAF will also apply for a Bald Eagle Disturbance Permit, as required by FWC, in order to work within the buffer for nest OR-065.

7.2.10.4 Indigo Snake Mitigation Measures

AAF will construct the Project in accordance with *Standard Protection Measures for the Eastern Indigo Snake* (USFWS August 12 2013). Construction specifications will include the *Species Conservation Guidelines: Eastern Indigo Snake* (USFWS 2004b).

The appropriate field office will be notified at least 30 days prior to any land clearing or construction activities. All personnel associated with the construction and operational phases of the Project will be instructed in the potential presence of the eastern indigo snake. The construction site personnel will also be informed of the civil and criminal penalties for harming, harassing, or killing species that are protected.

AAF will develop a management plan for all construction personnel to follow. Informational signs shall be posted throughout the construction site and along any proposed access road to contain the following information:

- A description of the eastern indigo snake, its habits, and protection under federal law;
- Instructions not to inquire, harm, harass, or kill this species;
- Directions to cease activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming; and
- Telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered.

AAF will submit an eastern indigo snake monitoring report to the appropriate USFWS and FWC field office within 60 days of the conclusion of the construction phases. The report will be submitted whether or not eastern indigo snakes are observed. The report should contain the following information:

- Any sightings of eastern indigo snakes; and
- Other obligations required by the USFWS, as stipulated in the permit.

7.2.10.5 Sea Turtle and Smalltooth Sawfish Mitigation Measures

AAF will construct the Project in accordance with Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS Revised March 23, 2006) which include, but are not limited to the following BMPs:

- Siltation barriers would be made of material that would not entrap/entangle sea turtle or smalltooth sawfish, and would not block sea turtle or smalltooth sawfish access from designated critical habitat. Barriers shall be properly secured and routinely monitored to ensure turtles or sawfish are not entangled.
- Water vessels associated with construction would operate at no wake/idle speeds at all times in the construction area, and in water depths where the draft of the vessel provides less than a 4-foot clearance from the sediment.

All personnel associated with the construction and operational phases of the Project in waters accessible to smalltooth sawfish and swimming sea turtles will be instructed in the potential presence of the species. Further, AAF will inform the construction site personnel and personnel associated with in-water work of the civil and criminal penalties for harming, harassing, or killing species that are protected.

Construction activities will occur during daylight hours only in areas that might be visible from any sea turtle nesting beach. No nighttime construction activities would be conducted in areas from which project lighting could be visible on a nesting beach.

Construction completed from the water will be done from a floating barge using floating turbidity barriers made of materials that would not allow sea turtles or smalltooth sawfish to become entangled. Spill response kits will be maintained on board during construction.

In the unlikely event that a protected sea turtle or smalltooth sawfish approaches the Project during construction, work would immediately cease until the turtle moves at least 50 feet away on its own volition.

Noise from pile driving during construction could potentially affect federally managed species, and NMFS has recommended that bubble curtains be used when impacts could occur. AAF will use bubble curtains during pile driving, which will help to dampen noise by 5 to 22 dB depending on the pile type and other conditions (Howard 2013). Pile driving would be limited to three piles daily and would occur only during daylight hours. This would provide opportunities for sea turtle and smalltooth sawfish to traverse the construction area daily without exposure to high noise levels from pile driving.

7.2.10.6 Rare Plant Species Mitigation Measures

Staff biologists in Savanna Preserve State Park, Hobe Sound National Wildlife Refuge, and Jonathan Dickinson State Park have indicated fragrant prickly-apple and Lakela's mint are located within and adjacent to the FECR Corridor adjacent to boundaries of these protected areas. AAF will coordinate with USFWS and park biologists to conduct a survey within the FECR Corridor for protected plant species where the corridor intersects Savannas Preserve State Park, Hobe Sound National Wildlife Refuge, and Jonathan Dickinson State Park. Areas adjacent to the corridor will also be surveyed if ecological conditions meet the habitat requirements of listed species (fragrant prickly apple or Lakela's mint). If either plant species is observed within the area of construction, AAF will work with land managers and biologists from the adjacent conservation area to relocate the individual plants to an ecologically appropriate and safe

location within areas protected and managed for conservation purposes. Mitigation commitments include:

- Species specific survey would be conducted prior to the commencement of construction activities.
- A buffer of 20 feet would be established around individuals of each protected plant species during the survey period.
- Identified individuals would be relocated within protected areas of the above listed conservation areas.
- Proposed relocation areas would meet comparable ecological conditions to the area in which the individual was found.
- If possible, professional biologists would collect seeds for future propagation.
- If either of the endangered species is observed during the pre-construction surveys, AAF will advise FECR of the observation and recommend that FECR cease using herbicides to maintain the roadway within a buffer of 300 feet around the observed individual until after the plants have been relocated.

7.2.10.7 Johnson's Sea Grass Mitigation Measures

Bridge crossings that would require in-water work for bridge retrofits and/or construction of new bridges will be permitted individually through the USACE and the applicable state regional water management districts. Additionally, AAF will observe water quality protection measures at all of the in-water construction areas to protect manatees, swimming sea turtles, and smalltooth sawfish, and would also provide protection to downstream populations of seagrass and other submerged aquatic vegetation. AAF has surveyed for the presence of Johnson's sea grass and none was observed within the project limits.

7.2.10.8 Gopher Tortoise Mitigation Measures

Prior to commencement of any ground disturbing activities, AAF will complete FWC-compliant gopher tortoise surveys by a qualified gopher tortoise agent. If any tortoises, burrows, or other sign of tortoises are encountered within the Project footprint, AAF will obtain appropriate relocation permits, which would include specific mitigation measures to reduce the impacts to this species. If applicable, under the gopher tortoise relocation permit, gopher tortoises and commensals would be relocated to adjacent natural areas where possible in order to preserve the integrity of the local population.

7.2.11 Public Health and Safety

AAF has committed to developing a comprehensive safety program for the Project including guidelines and plans including: a passenger train emergency preparation plan, a safety and security certification plan, track safety standards, an operations system safety program plan, a right-of-way safety and security plan, and several FECR safety procedures, including, for example, FECR's Emergency Preparedness Plan (FECR 2012c).

7.2.12 Historic Properties

The Project would have an adverse effect on two bridges determined to be eligible for the National Register of Historic Places, the Eau Gallie River Bridge and the St. Sebastian River Bridge. Both bridges would be demolished in order to construct new bridges capable of carrying the proposed passenger trains. AAF will mitigate this adverse effect through the measures and commitments outlined in the draft *Memorandum of Agreement among the Federal Railroad Administration, the Florida State Historic Preservation Officer and All Aboard Florida – Operations, LLC for the Eau Gallie River and St. Sebastian River Bridges associated with the All Aboard Florida Intercity Passenger Rail Project Orlando to Miami, Florida* (Appendix 5.4.5). These measures include:

- Documentation (i.e., drawings, photographs, and written data) of current conditions in accordance with Historic American Engineering Record standards; and
- Development of a website that will focus on and highlight the contributions of Henry Morrison Flagler as well as the history of the Florida East Coast Railway and its passenger rail service along the corridor.

Other Project commitments include:

- Continue to consult with SHPO regarding appropriate design elements for the replacement of the two NRHP eligible bridges and the replacement of those bridges that are contributing elements to the FECR Historic District;
- Continue to consult with SHPO in the design and construction of replacement and updated crossing gates at grade crossings within historic districts abutting the FECR Historic District or in proximity to historic properties;
- Continue to consult with SHPO to assess and avoid any potential adverse effects to other historic properties as a result of changes to project design or APE;
- Place communications towers in locations that have been determined to contain no above or below ground historic properties;
- Implement alternative construction methods such as vibratory or sonic pile driving to reduce vibration impacts from pile driving at archaeological sites located within 135 feet of locations where pile driving occurs;
- Consult with SHPO concerning avoidance, minimization, and mitigation of adverse effects to any discoveries of significant archaeological resources inadvertently discovered during the Project in accordance with 36 CFR 800.13(b) and 36 CFR 79;
- Implement an Archaeological Monitoring Plan for all project work in the area of six identified archaeological sites (Hobe Sound National Wildlife Refuge #3 Site (8MT1287); the Fort Capron Site (8SL41); Vero Man/Vero Locality Site (8IRI/8IR9); Fort Pierce (8SL31); Railroad (8IR846); and Avenue A-Downtown Fort Pierce (8SL1772) and in any other areas designated by SHPO as stipulated in the MOA; and
- All architectural history work or archaeological work carried out shall be conducted by, or under the direct supervision of, a person or persons meeting the Secretary of the Interior's Professional Qualifications Standards for Architectural History (48 FR 44738-9).

As stipulated in the FONSI, AAF will continue to consult with SHPO and locally affected parties throughout the Phase I Station Design Process.

7.2.13 Public Parks, Recreation Areas, Wildlife and Waterfowl Refuges

During construction, two roads within Section 4(f) properties (the Tosohatchee Wildlife Management Area and Jonathan Dickinson State Park) would be temporarily affected by construction activities. These temporary effects will not constitute a use of these properties, based on AAF's commitments to construction methods and timing.

The E-W Corridor would be constructed as an overpass so as to not interrupt the intended use of Long Bluff Road within the Tosohatchee Wildlife Management Area. Construction of the overpass will not require use of the Tosohatchee Wildlife Management Area.

To ensure the safety of the users of Jonathan Dickinson State Park, AAF will implement at-grade crossing improvements where the N-S Corridor crosses Southeast Jonathan Dickinson Way. Safety improvements would include upgraded warning devices such as flashing lights, signage and pavement markings; median barriers; and a four-quadrant gate, which blocks both sides of each traffic lane. Electronic warning systems would be implemented, which would monitor and communicate train locations and speeds, and would stop the train if the crossing is not clear. Current safety measures at the existing at-grade crossing of the freight railway and Southeast Jonathan Dickinson Way include passive signage, flashing lights, and a two-quadrant gate. AAF will develop a construction management plan to reduce and minimize the effects of grade crossing reconstruction on park users. AAF, in association with FRA, will coordinate with the land managing agency.

7.2.14 Utilities and Energy Resources

During final design, AAF will coordinate with all of the affected utilities regarding the presence and potential relocation of underground and overhead utilities. Further, contractors would use phasing and hire professional utility locators to identify any potential conflicts in order to prevent or limit any interruptions in utility service.

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8 Summary of Public Involvement Process and Tribal Coordination

Public, agency, and tribal consultation and coordination on the Project was undertaken in accordance with Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations at 40 CFR parts 1500-1507 and U.S. Department of Transportation Order 5610.C. The public involvement process was conducted to obtain meaningful public input regarding the Project, which is described and analyzed in this Final Environmental Impact Statement (FEIS). Specifically, the public involvement process was undertaken to:

- Make diligent efforts to involve the public in preparing and implementing NEPA procedures;
- Hold or sponsor public information meetings or statutorily required public hearings;
- Provide public notice of NEPA-related hearings, public meetings, and the availability of environmental documents to inform individuals and agencies who may be interested or affected; and
- Solicit input from the public.

Federal Railroad Administration (FRA) is the lead agency for this EIS. Federal Aviation Administration (FAA), U.S. Army Corps of Engineers (USACE), and U.S. Coast Guard (USCG) are Cooperating Agencies on the DEIS, in accordance with NEPA and CEQ regulations (40 CFR part 1501.6). FRA and USACE have a Memorandum of Agreement (MOA) for this Project that establishes an agreement between FRA and USACE regarding the procedures to be followed in preparing this Environmental Impact Statement (EIS). USACE's role in the EIS has focused on its requirements under Section 404 of the Clean Water Act and Sections 10, 12, and 14 of the Rivers and Harbors Act. USACE has also taken the lead role with respect to Endangered Species Act Section 7 and Magnuson-Stevens Fishery Conservation and Management Act consultation with U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). FAA's involvement in the EIS was focused on the effects at the Project's northern terminus at Orlando International Airport. USCG's role has focused on navigation and bridges requiring USCG Bridge Permits.

This chapter summarizes the consultation and coordination process through which federal, state, and local agencies, elected officials, members of the public, and other interested entities were involved in the NEPA process for this EIS. The scoping process is described in Section 8.1, agency coordination in Section 8.2, tribal coordination in Section 8.3, and public involvement in Section 8.4. Section 8.5 describes the public review of the DEIS, and Section 8.6 describes the FEIS distribution.

8.1 Scoping

Scoping is an early, open, and on-going part of the NEPA process used to determine the range of alternatives, issues, and effects that the EIS will address in detail. The process includes consultation with appropriate federal, state, regional, and local agencies and occurs early in the NEPA process before final decisions have been made on the types of studies to be conducted, the Project Study Area, or content of the EIS. Scoping provides agencies and the public with the opportunity to contribute to the technical

direction and analysis of the EIS, and to contribute information that could be relevant to evaluation of the effects of the Project.

FRA initiated the formal scoping process for the Project on April 15, 2013 by publishing a Notice of Intent (NOI) to prepare an EIS in the Federal Register. A copy of the NOI is included in Appendix 8.1-A. The NOI provided a description of the Project and outlined the environmental review process. The NOI also included an announcement of the FRA's intent to conduct public and agency scoping meetings. Comments were invited on the scope of the EIS, including the purpose and need, alternatives to be considered, effects to be evaluated, and methodologies to be used in the evaluation. Comments on the scope were requested by May 15, 2013.

8.1.1 Agency Scoping Meeting

Representatives of federal, state, regional, and county agencies, and Native American Sovereign Nations, were invited to participate in the scoping process and to participate in an agency/tribal scoping meeting on May 1, 2013 at the Renaissance Orlando Airport Hotel, in Orlando, Florida. Federal agencies invited to participate included the U.S. Departments of Agriculture, U.S. Department of Commerce, U.S. Department of Defense, U.S. Department of the Interior, U.S. Department of Transportation, and U.S. Environmental Protection Agency. State agencies invited included the Florida Department of Environmental Protection (FDEP), Fish and Wildlife Commission (FWC), and the State Historic Preservation Office (SHPO). Regional and county agencies invited to participate included the St. Johns River Water Management District (SJRWMD), South Florida Water Management District, Greater Orlando Aviation Authority (GOAA), and Broward, Miami-Dade, and Orange Counties. Representatives from USACE, U.S. Environmental Protection Agency, USFWS, FAA, FDEP, Federal Highways Administration (FHWA), FWC, SJRWMD, Miami-Dade and Orange Counties, SHPO, National Park Service (NPS), USCG, and GOAA attended the agency scoping meeting.

At the meeting, FRA introduced the attendees, provided an overview of the Project with background information, and outlined the next steps in the NEPA process. Presentations by FRA and All Aboard Florida, LLC (AAF) provided the overview. The FRA also held a question-and-answer session, and solicited agency comments.

Agency comments on the DEIS scope were received from FAA, USCG, U.S. Department of Agriculture, NPS, Florida Department of Transportation (FDOT), and the Seminole Tribe of Florida Tribal Historic Preservation Office. The comments were reviewed by FRA. Comments from agencies pertained to land use and planning, Section 4(f) resources, surface transportation, and waterways.

8.1.2 Public Scoping Meetings

Following the publication of the NOI, in May 2013 five public scoping meetings were held in five different communities (Orlando, Miami, West Palm Beach, Fort Pierce, and Fort Lauderdale). Table 8.1-1 provides the locations, dates, number of attendees, and number of comments received at these public scoping meetings.

The first four public meetings were advertised in several newspapers and available in various locations near the Project Study Area, including *Florida Today*, *Orlando Sentinel*, *The Palm Beach Post*, *Sun Sentinel*,

St. Lucie News Tribune, La Voz, El Nuevo Herald, Miami Herald, el Sentinel, El Latino Semanal, and Haiti en Marche. The last public meeting was advertised in the *Sun Sentinel* and *el Sentinel*. Notices were published on several dates between April 17th and April 27, 2013. The notices were published in English, Spanish, and Haitian Creole.

Public Meeting	Scoping	Location	Date	Number of Attendees	Number of Comment Forms Received at the Meeting
Orlando		Renaissance Orlando Airport Hotel	May 1, 2013	135	61
Miami		Culmer Center	May 6, 2013	125	63
West Palm Beach		Gaines Park Community Center	May 7, 2013	138	67
Fort Pierce		Havert L. Fenn Center	May 9, 2013	75	38
Fort Lauderdale		Holiday Park Social Center	May 29, 2013	80	19
Total				553	248

Source: VHB, 2013.

Approximately 550 participants attended the five public scoping meetings. Attendees included elected officials, local government representatives, members of the business community, and residents from the communities in or near the Project Study Area. The meeting format was an open house style with attendees encouraged to view the various exhibits placed around the room. Questions were directed to representatives of FRA present at the meeting. A continuous loop visual presentation provided attendees with information about the Project, including the background and general information about NEPA and the scoping processes. Large aerial maps depicting the Project Study Area were also displayed at each scoping meeting.

Attendees wanting to submit a written comment were able to do so by filling out a comment form. Written comments could either be submitted during the public scoping meeting or mailed to the FRA. A total of 248 comment letters were received during the 30-day scoping period (April 15 to May 15, 2013). Each comment received was reviewed and analyzed, and was considered by the FRA during the preparation of this DEIS. Comments received from municipalities and the public pertained to alternatives, floodplains, hazardous materials, natural resources, noise and vibration, public outreach, safety, social, community, socio-economics, surface transportation, wetlands and waterways, wildlife, environmental justice, purpose and need, and water quality. Appendix 8.1-B, *Scoping Report*, provides a more detailed review of the scoping process and comments received.

8.1.3 Post-Scoping Comments

Numerous members of the public submitted comments to FRA following the scoping comment period. More than 160 comments were received between July 2013 and the publication of the DEIS. The vast majority of the concerns have focused on quality of life (including noise and safety) and potential impacts to the boating community as a result of increased bridge closures.

8.2 Agency Coordination

AAF initially coordinated with federal, state, regional, and county agencies regarding the Project from March 2012 through April 2013. These preliminary efforts focused on satisfying requirements for the submittal of environmental permit applications. Through this process AAF identified concerns of stakeholders and requirements of regulatory agencies that are relevant to the NEPA process.

As mentioned above, FRA initiated the NEPA process by publishing the NOI to prepare an EIS on April 15, 2013. The NOI provided a description of the Project and outlined the environmental review process. The NOI also announced FRA's intent to conduct public and agency scoping meetings (see Section 8.1). FRA coordinated with a range of Federal agencies throughout this process.

This coordination informed AAF and FRA regarding the regulatory requirements and critical environmental concerns of these agencies, as well as concerns of state and local authorities. Coordination included the agencies and entities listed below.

Federal agencies

- Federal Aviation Administration
- Federal Highway Administration
- Federal Railroad Administration
- National Marine Fisheries Service
- United States Army Corps of Engineers
- United States Coast Guard
- United States Fish and Wildlife Service

State government authorities, agencies, and elected officials

- Florida Department of Environmental Protection
- Florida Department of Transportation
- Florida Division of Historical Resources/State Historic Preservation Officer
- Florida Fish and Wildlife Conservation Commission
- Florida House of Representatives
- Florida Senate
- Florida Transportation Commission

Local government authorities, agencies, and elected officials

- Counties:
 - Orange
 - Osceola

- Brevard
- Indian River
- St. Lucie
- Martin
- Palm Beach
- Broward
- Miami/Dade
- Cities:
 - Aventura
 - Cocoa
 - Dania Beach
 - Fort Lauderdale
 - Fort Pierce
 - Jupiter
 - Lake Park
 - Lake Worth
 - Melbourne
 - Miami Gardens
 - North Miami Beach
 - Orlando
 - Palm Bay
 - Palm Beach Gardens
 - Pompano Beach
 - Port St. Lucie
 - Sebastian
 - Stuart
 - St. Lucie
 - El Portal
 - Vero Beach

- West Palm Beach
- Elected Officials:
 - District 4 Mayors/Managers
 - Miami-Dade City Managers
- Other Organizations:
 - East Central Florida Regional Planning Council
 - Greater Orlando Aviation Authority
 - Martin Metropolitan Planning Organization
 - Miami-Dade Metropolitan Planning Organization
 - Orlando-Orange County Expressway Authority
 - Palm Beach Metropolitan Planning Organization
 - Port of Palm Beach
 - South Florida Water Management District
 - Space Coast Transportation Planning Organization
 - St. Johns River Water Management District
 - St. Lucie Transportation Planning Organization

8.3 Tribal Coordination

Native American Sovereign Nations were invited to participate in the scoping process and participate in the scoping meeting on May 1, 2013 along with federal, state, and county agencies. The Native American Sovereign Nations invited to participate were the Miccosukee Tribe of Florida, Muscogee Creek Nation, Poarch Band of Creek Indians, Seminole Nation of Oklahoma, and Seminole Tribe of Florida. Comments from the Native American Sovereign Nations were received and reviewed by FRA, and were considered during development of the DEIS.

8.4 Public Involvement

Since AAF publicly announced the Project, it has employed a public outreach strategy including meetings, social media, and press releases to provide and solicit information relevant to the Project to and from agencies and the public. The public outreach strategy also served to keep local officials, community members, and other parties informed about the process and status of the EIS. AAF participated in numerous meetings with residents, businesses and community leaders, and public agencies throughout the state. Two websites (<http://www.allaboardflorida.com/> and <https://www.fra.dot.gov/Page/P0672>), a Facebook page (<https://www.facebook.com/AllAboardFlorida>), a Twitter account (@AllAboardFlorida), and email distribution list have also been created to increase outreach efforts to the public. AAF's public

involvement effort has also included a series of press releases to Florida press outlets and over national wire services.

Meetings and/or presentations were held to ensure agencies, communities, and other representatives were informed about the Project and development, in addition to the NEPA public outreach activities. AAF met with representatives from the following organizations during the NEPA process:

- 1,000 Friends of Florida
- Admiral's Cove Homeowners Association
- Adrienne Arsht Performing Arts Center
- African American Chamber of Commerce, Orlando
- American Federation of Labor and Congress of Industrial Organizations Miami Chapter
- American Planning Association
- Amway Center
- Antilles Homeowners
- Associated Builders & Contractors
- Association of Florida Community Developers
- Audubon Florida – Central Florida
- Barefoot Bay Homeowners Association
- Barry University
- Biscayne Gardens Civic Association (Miami-Dade County)
- Black Archives
- Boynton Beach Chamber of Commerce
- Boys & Girls Club of Palm Beach County
- Bradford Marine
- Brevard County African American Community of Colors
- Brevard Tourist Development Council
- Broward County Marine Steering Committee/Advisory Board
- Broward County National Association for the Advancement of Colored People
- Broward League of Cities
- Canaveral Groves Homeowners Association
- Central Florida Congress of Regional Leaders
- Central Florida Hotel and Lodging Association
- Central Florida Minister's Alliance
- Chamber of Commerce of the Palm Beaches
- City of Boca Raton
- City of Boynton Beach
- City of Delray Beach
- City of Fellsmere
- City of Hallandale Beach
- City of Hollywood
- City of Oakland Park
- City of Orlando District 2 Neighborhood Leaders Council
- City of Rockledge
- City View Home Owners Association
- City View Townhomes Association
- Cocoa Beach Convention and Visitors Bureau
- Cocoa Beach Regional Chamber of Commerce
- Council of Fort Lauderdale Civic Associations
- Delray Beach Chamber of Commerce
- Delray Beach Pineapple Grove Arts District Board
- Delray Beach Tennis Center
- Developers Diversified Realty
- Downtown Fort Lauderdale Civic Association

- Downtown Fort Lauderdale Transportation Authority
- East Central Florida Corridor Task Force
- Eclipse Condo
- Economic Council of Martin County
- Efficient Transportation for the Community
- Federation of Boca Raton Homeowners Association
- Fellsmere Optimist Club
- Flagler Village Civic Association
- Flagler Village Improvement Association
- Flamingo Park Neighborhood Association
- Florida Council of 100
- Florida Huddle
- Florida Inland Navigation District
- Florida League of Mayors
- Florida Not All Aboard
- Florida Planning & Zoning Association
- Florida Restaurant & Lodging Association
- Florida Surety Association
- Florida Utilities Coordination Committee Conference
- Fort Lauderdale Economic Development Advisory Board
- Four Seasons Hotel - Owners Palm Beach
- General Motors Treasure Coast Salaried Retirees Club
- Gold Coast League of Cities
- Greater Fort Lauderdale Convention & Visitor's Bureau
- Greater Miami Convention & Visitor's Bureau (GMCVB)
- Guardians of Martin County
- Gulfstream Park
- Havenwood Community Board of Directors Home Owners Association
- Hillsborough Metropolitan Planning Organization
- Hispanic Chamber of Commerce Orlando Florida Inland Navigation District
- History Broward - Historical Society of Broward County
- Human Power Delray
- Indian River Chamber of Commerce
- Indian River Freeholders Association
- Indian River Historical Society
- Indian River Maritime Company
- Indian River Neighborhood Association
- Indian River Republican Executive Committee
- Indian River Sheriff's Department
- Indian River Tax Collector
- Indian River Tea Party
- International Drive Chamber of Commerce
- IREM South Florida
- Jupiter Inlet District
- Jupiter Medical Center
- Kimley Horn
- Kiwanis Club of Davie
- Kiwanis Club of West Palm Beach
- Las Olas Merchants Association
- Latin Builders Association Board of Directors
- Lauderdale Isles Yacht Club
- Lauderdale Marine Center
- Leadership Broward
- Leadership Orlando

- Life Sciences South Florida Executive Committee
- Loxahatchee River Bridge working group
- Main Street Stuart
- Main Street Stuart/Downtown Business Association
- Marine Council Miami
- Marine Industries Association of South Florida
- Marine Industries Association of the Treasure Coast
- Martin County Boaters group
- Martin County Business Development Board
- Martin County Chamber of Commerce
- Martin County Hotel & Lodging Association
- Martin County Marine interests meeting
- Martin County Young Professionals
- Melbourne Airport
- Metro Orlando Economic Development Commission
- MetroPlan Orlando
- Miami Dade College & New World School of the Arts
- Miami Lighthouse for the Blind
- Miami Lighthouse Legislative Luncheon
- Miami Rotary Club
- Miami-Dade County Citizen's Independent Transportation Trust
- Model Railroad Association Melbourne
- NAIOP Central Florida Chapter
- New River Inn Museum & History
- Northern Palm Beach Chamber of Commerce
- Orange County Environmental Protection Division
- Orange County League of Women Voters
- Orange County League of Women Voters
- Orlando Business Journal Transportation Panel
- Orlando Magic
- Orlando Orange County Expressway Authority
- Orlando Sentinel Transportation Forum
- Palm Beach Atlantic University
- Palm Beach Business Forum
- Palm Beach County Business Development Board
- Palm Beach County Florida Engineering Society
- Palm Beach County League of Cities
- Palm Beach County Marine Industries Association
- Palm Beach County Realtors Association
- Palm Beach County Tourist Development Council
- Palm Beach Downtown Development Authority
- Palm Beach Economic Development Group
- Palm Beach Gardens Medical Center
- Palm City Chamber of Commerce
- Paso Metropolitan Planning Organization
- PGA Corridor Association
- Pinellas Metropolitan Planning Organization
- Piper Aircraft Vero Beach
- Poinciana Park Civic Association
- Port Canaveral
- River Oaks Homeowners Association
- Riverside Park Home owners Association

- Riverwalk (Fort Lauderdale)
- Rotary Club of Orlando
- SAFE – Delray Beach
- Sant La
- SeaWorld Orlando
- Sierra Club
- South Andrews Business Association
- South End Neighborhood Association
- South Florida Office Broker’s Association
- Space Coast Apartment Association
- Space Coast Audubon Society
- SR 528 Land Managers
- St. Cloud Chamber of Commerce
- St. Lucie County Chamber of Commerce
- St. Lucie Economic Development Council
- St. Lucie River Working Group
- Stuart/Martin Chamber of Commerce
- Tarpon River Civic Association
- The Historic Lyric Theater
- The Isles of Waterway Village Homeowners Association
- Tiger Bay Club of the Space Coast
- Titusville Model Railroad Club
- Town of Jupiter
- Town of Malabar Fire Dept Corals of Oakland Park Home owners Association
- Town Square Neighborhood Development Corporation
- Treasure Coast Business Summit
- Treasure Coast Joint Advisory Committee
- Treasure Coast Regional League of Cities
- Treasure Coast Regional Planning Council
- Unite Here
- United Way of Miami-Dade
- Universal Studios
- University Club
- University of Central Florida
- Urban Land Institute Orlando Chapter
- Urban League of Miami
- Vero Beach Chamber of Commerce
- Vero Beach High Speed Rail Advisory Board
- Vero Beach Main Street Organization
- Village of Biscayne Park
- Village of El Portal
- Visit Orlando
- Vista Lakes Homeowners Association
- Walt Disney World
- Wayne Huizenga School of Business
- West Palm Beach Downtown Development Authority
- West Palm Beach Historical Society
- Women in Transportation
- Worth Avenue Merchants Association
- Young Professionals in Yachting

8.5 DEIS Public Review

FRA released the DEIS for public review by posting it on FRA's website on September 19, 2014 and publishing a Notice of Availability in the Federal Register on September 26, 2014 (Federal Register Vol. 79, No. 187; Appendix 8.5-A). The DEIS was available to the public on the FRA's website (<https://www.fra.dot.gov/Page/P0672>) and at public libraries throughout the study area. Copies were sent to elected officials, federal and state agencies, and municipalities. FRA requested all comments be submitted by December 3, 2014, a 75-day comment period. Agency and public comments on the DEIS are included in this FEIS as Appendix 8.5-B1 through 8.5-B2.

During the comment period for the Draft Environmental Impact Statement, FRA received approximately 15,400 comments. The comments covered a wide range of issues and represented viewpoints from government agencies, organizations, business groups, businesses, residents and property owners. Comments were submitted in several formats:

- By email
- By US mail
- At public meetings (written)
- At public meetings (oral, transcribed by a court reporter).

FRA has reviewed all of the comments, many of which were form letters. More than 40 different form letters were received. Section 1.7 of this FEIS contains a summary of the public comments.

Comments fell into several broad categories:

- Support
- General opposition
- Opposition based on specific concerns
- Detailed and substantive comments concerning information provided in the DEIS.

Approximately 5,960 of the submittals generally supported the Project, and 9,500 were generally opposed. Most comments came from individuals in the general public, living, working or having property interests in the Project area, particularly residents of Martin, St. Lucie and Indian River Counties. Most comments from the public indicated that individuals did not want passenger rail operating within the FECR Corridor along the Florida coast, and preferred that AAF select an alternative alignment further inland. A substantial number of people commented on the potential impacts on boaters associated with increased closures of the three moveable bridges along the corridor.

During the public comment period, FRA held eight public information meetings to provide the public with the opportunity to learn about the proposed project, ask questions, and obtain information about the project and the DEIS, and to comment on the DEIS. Comments were accepted at the meetings in writing or orally, with the assistance of a court stenographer. FRA provided information on display boards, handouts, a rolling PowerPoint presentation, and video simulations. Technical experts for most environmental categories (for example; alternatives, wetlands, navigation, noise and vibration, wildlife, cultural resources, and traffic) were present to answer questions. FRA chose this format, rather than a

series of public hearings, to enable members of the public to become informed about the DEIS and the project and to facilitate answering public questions. Representatives from USACE and USCG attended the majority of these meetings to answer questions from the public relevant to their areas of jurisdiction. Table 8.6-1 provides a list of the public meeting locations and attendance. Attendance numbers are based on the number of persons who registered on a sign-in sheet, and may therefore slightly underestimate the actual number of attendees. Based on this information, a total of 2,681 persons attended the public meetings and provided 1,565 comments at the meetings. Public notice of the meetings was posted on the FRA's website, AAF's website, and advertised in local newspapers (*Miami Herald*, *El Nuevo Herald*, *Sun Sentinel*, *Palm Beach Post*, *TC Palm*, *Orlando Sentinel*, *El Sentinel*, *Haiti en Marche*). Interpreters were present to translate Spanish and Haitian Creole.

Public Meeting	Location	Date	Number of Attendees¹	Number of Comments Received at the Meeting
Miami	Miami-Dade College	October 27	190	109
Fort Lauderdale	Broward County Convention Center	October 28	271	151
West Palm Beach	West Palm Beach Marriott	October 29	272	155
Stuart	The Kane Center	October 30	784	555
Vero Beach	Indian River State College	November 5	462	236
Port St. Lucie	Port St. Lucie Civic Center	November 6	280	198
Cocoa	Cocoa Civic Center	November 12	180	68
Orlando	Wyndham Orlando Resort I-Drive	November 13	242	93
Total			2,681	1,565

¹ Based on the number of individuals who registered on the sign-in sheets provided by FRA. Additional persons may have been present but did not choose to register.

Source: VHB, 2015

Table 8.6-2 provides a list of the government and non-government organizations that submitted comments on the DEIS. Copies of comment letters received are provided in Appendix 8.5-B1 through Appendix 8.5-B6.

Table 8.6-2 DEIS Comment Letters Received (Government and Non-Government Organizations)	
Author	Category
Broward County Board of County Commissioners	Government
Central Florida Expressway Authority	Government
City of Fort Pierce	Government
City of Melbourne	Government
City of Palm Beach Gardens	Government
City of Sebastian	Government
City of Stuart	Government
City of Vero Beach	Government
East Central Florida Regional Planning Council	Government
Federal Aviation Administration	Government
Florida Department of Environmental Protection	Government
Florida Department of State	Government
Florida Department of Transportation	Government
Florida Fish and Wildlife Conservation Commission	Government
Fort Pierce Historic Preservation Board	Government
Indian River County Board of County of Commissioners	Government
Martin County Board of County Commissioners	Government
Metroplan Orlando	Government
Miami Downtown Development Authority	Government
National Oceanic And Atmospheric Administration	Government
Orange County Environmental Protection Division	Government
Palm Beach County	Government
Representative Andrew Crenshaw	Elected Official
Representative Patrick E. Murphy	Elected Official
School Board of Martin County, Florida	Government
Seminole Tribe of Florida Tribal Historic Preservation Office	Government
South Florida Regional Planning Council	Government
St. Lucie County Board of County Commissioners	Government
St. Lucie County, Planning and Development Services	Government
The Jupiter Inlet Board of Commissioners	Government
Town of Jupiter Island	Government
Town of Orchid	Government
Town of St. Lucie Village	Government
Treasure Coast Legislative Delegation	Elected Officials
Treasure Coast Regional Planning Council	Government
United States Coast Guard	Government
United States Department of the Interior Fish and Wildlife Service South Florida Ecological Services Office	Government
United States Department of the Interior Fish and Wildlife Service Hobe Sound National Wildlife Refuge	Government
United States Department of the Interior Office of Environmental Policy and Compliance	Government
United States Environmental Protection Agency	Government
1000 Friends of Florida	Non-Government Organization
American Boat Builders and Repairers Association	Non-Government Organization
Audubon Florida	Non-Government Organization

Table 8.6-2 DEIS Comment Letters Received (Government and Non-Government Organizations)	
Author	Category
Barefoot Bay Recreation District	Non-Government Organization
Breezy Village Association Inc.	Non-Government Organization
Citizens Against Rail Expansion in Florida	Non-Government Organization
Citizens Against the Train	Non-Government Organization
Coalition of Concerned Ft. Lauderdale Area Property Owners, Boaters and Marine Industry Businesses	Non-Government Organization
Coral Gables Chamber of Commerce	Non-Government Organization
Crossroads Yacht Club, Inc.	Non-Government Organization
Cultural Council of Indian River County	Non-Government Organization
Fort Lauderdale Downtown Development Authority	Non-Government Organization
Friends of St. Sebastian River	Non-Government Organization
Greater Fort Lauderdale Alliance, Broward County	Non-Government Organization
Greater Fort Lauderdale Convention & Visitors Bureau	Non-Government Organization
Heritage Ridge North Property Owners Association, Inc.	Non-Government Organization
Indian River Chamber of Commerce	Non-Government Organization
Indian River County Chamber of Commerce	Non-Government Organization
Indian River County Historical Society, Inc.	Non-Government Organization
Indian River County Train Impact Coalition	Non-Government Organization
Indian River Neighborhood Association	Non-Government Organization
Marina Mile Yachting Center	Non-Government Organization
Marine Industries Association of South Florida	Non-Government Organization
Marine Industry Association of Palm Beach County	Non-Government Organization
Martin Health System	Non-Government Organization
National Marine Manufacturers Association	Non-Government Organization
North Beach Civic Association, Wabasso, FL	Non-Government Organization
Pelican Island Audubon Society, Indian River County	Non-Government Organization
Progressive Civic League of Gifford, Florida	Non-Government Organization
Rio Civic Club	Non-Government Organization
Sandhill Cover Residents Council	Non-Government Organization
Sebastian River Area Chamber of Commerce	Non-Government Organization
Stop the Train Task Force	Non-Government Organization
The Beacon Council	Non-Government Organization
The Guardians of Martin County	Non-Government Organization
The Moorings of Vero Property Owners' Association, Inc.	Non-Government Organization
Treasured Lands Foundation	Non-Government Organization
U.S. Superyacht Association	Non-Government Organization
Vista Gardens Association, Inc.	Non-Government Organization
Vista Villas Homeowner's Association, Inc.	Non-Government Organization

Source: VHB; 2015

8.6 Distribution of the FEIS

This FEIS has been made available to the public by posting on FRA's website (<https://www.fra.dot.gov/Page/P0672>) and by publishing a Notice of Availability in the Federal Register. Copies of the FEIS were sent to public libraries throughout the study area, elected officials, federal and state agencies, and municipalities. Notice of availability was also sent by email to all parties who provided email addresses in their comments on the DEIS. Chapter 11, Distribution List, provides a list of all parties who received the FEIS and the format in which it was distributed.

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10 List of Preparers

Vanasse Hangen Brustlin, Inc.

Dr. Lisa A. Standley	Ph.D., Botany, University of Washington
Chief Environmental Scientist	M.S., Botany, Cornell University
Technical Document Lead	B.S., Ecology and Systematics, Cornell University

26 years of experience in environmental consulting and 21 years of experience in preparing NEPA documents

Lauren Ballou	M.A., Global Leadership and Sustainable Development, Hawaii Pacific University
Environmental Planner	B.A., Biology, Environmental Policy, Boston University
DEIS Preparation	

2 years of experience in environmental policy and management

Terry Byrne	39 years of experience in transit and rail industry specific to train control systems and rail operations
Senior Project Manager	
Transit and Rail Operations, and Train Control	

Rick Carey, P.E.	M.B.A., Bryant College
Northern New England Director of Transit & Rail Rail Engineering	B.S., Engineering, Civil, Mechanical, University of Rhode Island

27 years of experience in passenger and freight rail design and construction initiatives

<p>Lisa DiTaranti, P.E. Northeast Director of Transit & Rail Rail Operations, Transportation, Ridership</p>	<p>B.S., Civil Engineering, Villanova University</p> <p>29 years of experience in railroad planning and engineering consulting and 25 years of experience in preparing NEPA documents</p>
---	---

<p>Colin Foley, AICP Transportation Planner Alternatives Analysis</p>	<p>M.C.P., Transportation Planning, University of Pennsylvania</p> <p>B.S., History, Boston College</p> <p>8 years of experience in transportation and environmental planning</p>
---	---

<p>Donny Goris-Kolb, AICP, LEED Green Associate Environmental Planner Social and Economic Impacts, Environmental Justice</p>	<p>M.U.P., University at Buffalo</p> <p>B.A., Sociology, Binghamton University</p> <p>6 years of experience in environmental consulting and preparing NEPA documents</p>
--	--

<p>Marianne Iarossi Environmental Planner DEIS Preparation</p>	<p>M.R.P., Environmental Planning, University of Massachusetts</p> <p>B.S., Environmental Science, Geography and Regional Planning, Westfield State University</p> <p>2 years of experience in environmental consulting and preparing NEPA documents</p>
--	--

<p>John Jennings, ASLA Principal Visual and Aesthetic Impacts</p>	<p>B.A., Landscape Architecture, University of Oregon</p> <p>42 years of experience in design consulting of public open space and infrastructure projects</p>
---	---

<p>Mike McArdle Director, Transit & Rail Rail Operations and Engineering</p>	<p>B.S., Civil Engineering, University of Lowell</p> <p>26 years of experience in transit and rail infrastructure projects</p>
--	--

<p>Kate McEneaney Permitting Specialist Section 4(f), DEIS Preparation</p>	<p>M.A., Energy and Environmental Analysis, Boston University B.A., Environmental Policy, Boston University 12 years of experience in permitting efforts for linear projects</p>
<p>Paul McKinlay, PG, LSP Director, Oil and Hazardous Materials Services Hazardous Materials and Solid Waste</p>	<p>M.A., Geology, Boston University B.A., Geology, Boston University Professional Geologist, New Hampshire and Licensed Site Professional in Massachusetts 17 years of experience in Oil and Hazardous Materials</p>
<p>Sean Murray Environmental Scientist Wetlands, Uplands, Wildlife, Threatened and Endangered Species</p>	<p>B.A., Biology and Environmental Science, University of Virginia 10 years of experience in environmental consulting and 3 years of experience in biological research</p>
<p>Curtis Ostrodka, AICP, LEED AP Senior Project Manager, Planning Social and Economic Impacts, Land Use</p>	<p>M.U.P, University of Virginia B.S., Natural Resources and Environmental Sciences, University of Illinois 10 years of experience in environmental and land use planning consulting</p>
<p>Heidi Richards Project Manager/Associate Air Quality</p>	<p>B.S., Civil Engineering, University of Vermont 22 years of experience in transportation planning consulting and 15 years of experience in preparing information for NEPA documents</p>

<p>Christopher Rife Senior Project Manager Lead Document Author</p>	<p>M.S., Environmental Policy and Management, University of Denver B.A., Philosophy, Humboldt State University</p> <p>21 years of experience in environmental consulting and 16 years of experience in preparing NEPA documents</p>
<p>Clayton Robertson Principal Environmental Scientist Biological Resources and Natural Ecological Systems; Wetlands</p>	<p>B.S., Natural Sciences, Zoology, University of South Florida</p> <p>38 years of experience in regulatory and environmental consulting including ecological assessments, regulatory permitting and biological resource impact analyses</p>
<p>Charlie Russo Environmental Planner FEIS Preparation</p>	<p>A.L.M., Sustainability and Environmental Management, Harvard University Extension School B.S., Journalism, Syracuse University</p> <p>8 years of experience in environmental consulting document preparation</p>
<p>Gary Serviss, LEED AP Principal Scientist Farmlands Soils and Water</p>	<p>M.S., Biological Sciences, Florida Institute of Technology B.S., Marine Biology, Florida Institute of Technology</p> <p>31 years of experience in environmental consulting and 9 years of experience in preparing NEPA documents</p>
<p>Kimberly Threlfall PMP, LEED AP</p>	<p>B.A., Colgate University</p> <p>14 years of experience in preparing NEPA documents for a wide range of transportation and National Park Service projects.</p>

Tom Wholley Director, Air Quality and Noise Services Air Quality	B.S., Civil Engineering, University of Massachusetts 42 years of professional experience in air quality and noise analyses
Autumn Young Ward Airport Planner Lead Technical Reviewer	M.S., Aeronautics, Embry Riddle Aeronautical University B.S., Aviation Business Administration, Embry Riddle Aeronautical University 11 years of experience in aviation with 9 years of experience in preparing NEPA documents
Paul Yeargain, P.E., CFM Director of Water Resources Water, Floodplain Impacts	M.S., Civil Engineering, University of Central Florida B.S., Civil Engineering, University of Maryland 22 years of experience in stormwater management, floodplain management, and permitting

HMMH

Jason Ross, P.E.
Vice President
Noise and Vibration

M.E., Acoustics, Pennsylvania State University
B.S., Mechanical Engineering, University of Colorado,
Boulder

15 years of experience in environmental consulting
and rail and transit noise and vibration

South Arc

Martin Dickinson, RPA
President
Cultural Resources

M.A., Anthropology (Archaeology), University of
Florida
B.A., Anthropology, University of South Florida

33 years of experience in cultural resource
management and environmental consulting and
preparation of EA/EIS/NEPA documentation

Lucy Wayne, Ph.D., RPA
Vice President
Cultural Resources

Ph.D., Architecture (Preservation Planning),
University of Florida
M.A., Anthropology (Archaeology), University of
Florida
B.A., Art History, Mary Washington College

31 years of experience in cultural resource
management consulting and preparation of
EA/EIS/NEPA documentation

11 Distribution List

This FEIS is being distributed to Federal, state and municipal agencies and to the interested parties listed below. This list includes those entities that the Federal Railroad Administration's *Procedures for Considering Environmental Impacts* require as part of the review of the document, including representatives of government agencies and community groups concerned with the Proposed Project. Copies of this FEIS are also available at the libraries listed below and through the FRA website (<https://www.fra.dot.gov/Page/P0672>). For more information regarding this document or for additional copies of this report please contact:

John Winkle
FRA Environmental Specialist
Office of Railroad Policy and Development
1200 New Jersey Ave. SE
Washington, D.C. 20590
(202) 493-6067
john.winkle@dot.gov

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- Senator Bill Nelson
- Senator Marco Rubio
- Representative Bill Posey (District 8)
- Representative Alan Grayson (District 9)
- Representative Daniel Webster (District 10)
- Representative Patrick Murphy (District 18)
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- Federal Aviation Administration
- Federal Highway Administration
- National Oceanic and Atmospheric Administration - National Marine Fisheries Service
- National Park Service

- United States Army Corps of Engineers
- United States Coast Guard
- United States Environmental Protection Agency (Washington D.C. and Regional)
- United States Fish and Wildlife Service (North Florida Ecological Services Office and South Florida Ecological Services Office)

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- Florida Department of Environmental Protection
- Florida Department of Transportation
- Florida Division of Historical Resources/State Historic Preservation Officer
- Florida Fish and Wildlife Conservation Commission
- State Environmental Management Office

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- County Commissioners and County Managers:
 - Brevard
 - Broward
 - Indian River
 - Martin
 - Miami-Dade
 - Orange
 - Osceola
 - Palm Beach
 - St. Lucie County

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- East Central Florida Regional Planning Council
- Greater Orlando Aviation Authority

- Martin Metropolitan Planning Organization
- Miami-Dade Metropolitan Planning Organization
- MetroPlan Orlando
- Orange County Environmental Protection
- Orlando-Orange County Expressway Authority
- Palm Beach Metropolitan Planning Organization
- South Florida Water Management District
- South Florida Regional Planning Council
- Space Coast Transportation Planning Organization
- St. Johns River Water Management District
- St. Lucie Transportation Planning Organization
- Treasure Coast Regional Planning Council

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- Lake Worth
- Melbourne
- Miami Gardens
- North Miami Beach
- Orlando
- Palm Bay
- Palm Beach Gardens
- Pompano Beach
- Port St. Lucie
- Riviera Beach
- Sebastian
- Stuart

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- Stuart
- West Palm Beach

Native American Sovereign Nations

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- Miccosukee Tribe of Florida
- Muscogee Creek Nation
- Poarch Band of Creek Indians
- Seminole Nation of Oklahoma
- Seminole Tribe of Florida

Other Interested Parties

(Received email notification that the FEIS was available on the FRA's website)

More than 2,000 persons were notified of the release of the FEIS.

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