ALL ABOARD FLORIDA

Draft Environmental Impact Statement and Section 4(f) Evaluation

ALL ABOARD FLORIDA

Intercity Passenger Rail Project

Orlando to Miami, Florida

Volume I: Text

September 2014

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

DRAFT 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

9/19/14
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 DEIS 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 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 DEIS evaluates a range of alternatives considered for the Project, and evaluates in detail three alignment alternatives. It 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 DEIS analyzes the cumulative effects of completing both phases of the Project, although the impacts exclusively from Phase 1 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.

Comments on Phase II of the All Aboard Florida project as described in this DEIS are due by December 3, 2014 and should be sent to FRA at the address below. Comments submitted electronically must be sent to Mr. John Winkle at this address: AAF_comments@vhb.com. Public information meetings will be held. Locations and times will be posted on the FRA website (www.fra.dot.gov) and the project website (www.allaboardflorida.com). Notice will be mailed to interested parties and published in newspapers of general circulation. FRA will issue a single document that consists of the Final Environmental Impact Statement and Record of Decision pursuant to Pub. L. 112-141, 126 Stat. 405, Section 1319(b) unless FRA determines that statutory criteria or practicability considerations preclude issuance of such a combined document.

Additional information concerning this document may be obtained by contacting the following:
Mr. John Winkle, Federal Railroad Administration, 1200 New Jersey Avenue, SE Room W38-311, Washington, DC 20590 (john.winkle@dot.gov).

Summary

This is the Draft Environmental Impact Statement (DEIS) for the proposed All Aboard Florida Orlando to Miami Intercity Passenger Rail 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.

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 $1.6 billion in 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 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 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.

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 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). 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 were not constructed). FRA has made no decision under the Railroad Rehabilitation and Improvement Financing (RRIF) program as to whether a loan would be provided for Phase I.

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 for public review of this new site concurrent with this DEIS.

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 DEIS analyzes the cumulative effects of completing both phases of the Project, although the impacts exclusively from Phase 1 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 and incorporating the mitigation measures identified therein. The bulk of the information in this DEIS 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), 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.

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.


SEMINOLE
VOLUSIA
LAKE
Orlando
ORANGE
MCO
Cocoa
BREVARD
Melbourne
OSCEOLA
POLK
INDIANRIVER
HARDEE
OKEECHOBEE
STLUCIE
Fort Pierce
HIGHLANDS
Stuart
DESOTO
MARTIN
GLADES
CHARLOTTE
West Palm Beach
PALMBEACH
LEE
HENDRY
COLLIER
BROWARD
Fort Lauderdale
MIAMI-DADE
Miami
MONROE
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
N
0
10
20 Miles
U.S. Department of Transportation
Federal Railroad Administration
S-1

AAF has applied for federal funds through the RRIF program, as described above, which is administered by the FRA. 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 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.

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) would be necessary to implement the Project.

An 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 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. The Notice of Intent for the AAF Project was published 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 DEIS, including concerns about noise and vibration impacts, impacts to navigation, impacts to wildlife and protected species, safety and 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 has prepared and published this DEIS 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 will be held during the 75-day public comment period.

- Final EIS (FEIS) – following the public comment period on the DEIS, FRA will prepare and publish a FEIS that responds to public and agency comments.
- Record of Decision (ROD) – FRA will issue a single document that consists of the Final Environmental Impact Statement and Record of Decision pursuant to Pub. L. 112-141, 126 Stat. 405, Section 1319(b) unless FRA determines that statutory criteria or practicability considerations preclude issuance of such a combined document. FRA may approve the RRIF loan request after the ROD has been finalized.

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 S-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."

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.

The DEIS 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 DEIS: 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 alternatives. AAF would provide regularly scheduled, hourly-service frequency 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. 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 million by year 2030. 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 grade crossings.

Alternative A would include a new rail corridor extending north through MCO to SR 528 (the MCO Segment), including the proposed VMF; a new rail alignment largely within the SR 528 ROW owned by the Orlando-Orange County Expressway Authority (OOCEA) and the Florida Department of Transportation (FDOT) from MCO to the FECR Corridor in Cocoa (the East West Corridor [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. Alternative A also includes modifications to seven bridges within the WPB-M Corridor and minor track modifications at the Miami Viaduct.

Alternative C differs from Alternative A within the OOCEA ROW section of the E-W Corridor. Alternative C 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 edge of the SR 528 OOCEA 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). 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. Alternative C also includes modifications to seven bridges within the WPB-M Corridor, a new location for the proposed Fort Lauderdale Station and minor track modifications at the Miami Viaduct.

Table S-1 DEIS Alternatives

Segment/Project Element	No-Action	Alternative A	Alternative C	Alternative E
MCO	No construction	2.5-mile new rail corridor	2.5-mile new rail corridor	2.5-mile new rail corridor
E-W Corridor	No construction	1.5-mile new rail corridor west of Narcoosee Road 17.5-mile new rail corridor within current SR 528 OOCEA ROW 15-mile new rail corridor within FDOT and utility ROWs 5 new bridges over water	1.5-mile new rail corridor west of Narcoosee Road 17.5-mile new rail corridor along boundary of current SR 528 OOCEA ROW 15-mile new rail corridor within FDOT and utility ROWs 5 new bridges over water	1.5-mile new rail corridor west of Narcoosee Road 17.5-mile new rail corridor 100 feet south of current SR 528 OOCEA 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 Add second track, straighten curves, Reconstruct 18 bridges	128.5 mile corridor Add second track, straighten curves, Reconstruct 18 bridges	128.5 mile corridor 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

Alternative E differs from Alternatives A and C within the OOCEA ROW section of the E-W Corridor. Alternative E would include a new rail corridor extending north through MCO to SR 528 (the

MCO Segment), including the proposed VMF; a new rail alignment 200 feet south of the SR 528 OOCEA ROW (the E-W Corridor) from MCO 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). 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. Alternative E also includes modifications to seven bridges within the WPB-M Corridor, a new location for the proposed Fort Lauderdale Station and minor track modifications at the Miami Viaduct.

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 DEIS.

Environmental Effects

This DEIS evaluates the environmental effects associated with the three Action Alternatives. The potential effects, both beneficial and adverse, of the three alternatives are summarized below. 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 OOCEA and FDOT to construct the E-W Corridor. AAF would purchase privately owned property in two locations, which would result in the permanent conversion of 45 acres of land from undeveloped land use to transportation use. The Project would be consistent with land use plans and the plans of the transportation stakeholders (GOAA, OOCEA 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.

Riders for AAF are expected 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 inter-city motorbus services, which totals approximately 152,600 annual bus passenger trips per year. The proposed service would divert 10 percent of its riders from the air service market, which totals approximately 152,600 annual aviation passenger trips per year. Two percent of the AAF long-distance ridership is forecast to come from Amtrak passenger rail services. In 2019, this amounts to approximately 31,000 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 (3 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, Loxahatchee River and New 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 would increase in comparison to the No-Action Alternative. 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.

Section 5.1.3, *Navigation*, describes navigation impacts in detail, along with 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 (NOx), sulfur dioxide (SO_2), volatile organic compounds (VOCs), particulate matter less than 10 microns in diameter (PM_{10}) 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, NOx by 192 tons, VOCs by 59 tons and PM_{10} 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.

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.

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 impact at a total of 3,317 residential, 513 institutional receptors, three TV studios, three recording studios, nine auditoriums and three 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 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.

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 (CO_2), methane (CH_4) and nitrous oxide (N_2O) show the Project would decrease emissions as a result of decreased automobile VMT. CO_2 emissions would decrease by 19,617 tons/year in 2019 and 31,477 tons/year in 2030. CH_4 emissions would decrease by 4.7 and 5.7 tons/year, respectively and N_2O 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. Wetlands would be filled to construct portions of the 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. Alternative A would result in 128 acres of direct impacts to aquatic resources (wetlands and surface waters). Alternative C would directly impact 165 acres of aquatic resources and Alternative E would directly impact 157 acres of aquatic resources. Impacts to wetlands providing high quality habitat to wildlife

would be the least with Alternative A and the greatest with Alternative C. The Project would have indirect effects on wetland quality and functions along the E-W Corridor but 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.

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 of the 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 USACE and NMFS have 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 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.

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, American alligator and the eastern indigo snake. One federally listed plant species may occur in a number of waterways that intersect the N-S and WPB-M Corridors. Due to the disturbed habitat located in the FECR ROW, it is unlikely any terrestrial federally listed plant species would occur within the Project footprint, but several species have been documented within the adjacent Jonathan Dickinson State Park. 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 federally listed species, in addition to conducting pre-construction surveys for rare species (caracara, red-cockaded woodpecker, gopher tortoise, sand skink and state-listed plants).

The USACE, the lead federal agency for ESA compliance, assessed the effects of the Project on federally listed species. The USACE found that the Project is "not likely to adversely affect" the wood stork, the eastern indigo snake, the West Indian manatee and the Florida scrub jay; and may affect, but is not likely to adversely affect, the blue-tailed mole skink or the Florida sand skink. USFWS and NMFS have concurred with this finding.

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. 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 residential properties. The N-S Corridor would not result in residential displacement, neighborhood fragmentation, or the loss of continuity between neighborhoods. The N-S Corridor is within the existing FECR corridor and would not displace residences or businesses. The relocated Fort Lauderdale Station would not 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 Action Alternatives (37.4 percent) and census tracts where low-income populations are 10 percent higher than the combined total for the census tracts crossed by the Project (23.3 percent).

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 effects to environmental justice communities from changes in land use. Although changes in noise would affect 110 residential parcels (105 moderate and four severe impacts) along the E-W Corridor, none of these parcels are within environmental justice communities. There would be no disproportionate effects from changes in noise. 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, loss of real estate taxes and also include 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 partial acquisition of one privately owned parcel outside the SR 528 ROW and would result in a negligible loss of property tax revenues for Brevard County. 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.

The Project would have long-term direct economic benefits to local populations through the creation of approximately 1,100 jobs on average per year through 2021 and labor income valued at nearly $294 million through 2021. During construction, the Project would create an estimated 10,400 jobs on average per year and labor income valued at nearly $1.2 billion. Overall, the Project would realize approximately $1.2 billion to Florida's Gross Domestic Product (GDP) in estimated annual economic development through 2021 and generate approximately $187 million in annual federal, state and local government tax revenue through 2021.[1]

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

1 Includes both direct, indirect and secondary federal, state and local government tax revenue generated from the Project.

potential for fewer vehicular crashes and fewer air emissions indicate that there will be no significant negative impacts on public health and safety.

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.

Cultural Resources

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, *Cultural Resources*, constitutes 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 or the E-W Corridor. 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 for 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. 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*.

The Project would have no direct or indirect effects (noise, vibration or change in setting) to the historic resources located 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, *Cultural Resources*, describes these environmental impacts in detail, along with indirect and secondary impacts and temporary construction impacts.

Recreation and other Section 4(f) Resources

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. The MCO Segment is within the property boundaries of MCO and no Section 4(f) resources are located on this property. The E-W Corridor (and SR 528) is adjacent to two Section 4(f) 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 Section 4(f) recreation resources are along the N-S Corridor. The existing N-S Corridor bisects two of these Section 4(f) 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 30 identified Section 4(f) 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 Section 4(f) 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 Section 4(f) 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) Evaluation*, 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. 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 and Vibration;
- Water Resources;
- Floodplains;
- Wetlands;
- Protected Species; and
- Social and Economic Environment.

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

The cumulative analysis for the Project shows that the combination of the AAF Passenger Rail Project impacts with other impacts would not result in a serious deterioration of environmental functions or exceed applicable significant thresholds.

Comparing the Alternatives

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

Table S-2 Comparison of Environmental Effects of Alternatives

		Action Alternatives		
Resource	**No-Action Alternative**	**Alternative A**	**Alternative C**	**Alternative E**
Land Use	No Effect	Minor land acquisition (45 acres); remaining land leased from GOAA, OOCEA, 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_2O 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	128 acres of wetland loss	165 acres of wetland loss	157 acres of wetland loss
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.
Essential Fish Habitat	No effect	No significant effect. BMPs to protect fish habitat would be implemented during bridge construction.		
Threatened and Endangered Species	No effect	No adverse effect		

Table S-2 Comparison of Environmental Effects (Continued)

		Action Alternatives		
Resource	**No-Action Alternative**	**Alternative A**	**Alternative C**	**Alternative E**
Communities and Demographics	No effect	No adverse effect		
Environmental Justice	No effect	No disproportionate adverse effect		
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 populations 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).		
Recreation and Other Section 4(f) Resources	No use	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 not identified a Preferred Alternative at this time.

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			
		Location in EIS	
Resource (FRA)	**Impact Category (FAA)[1]**	**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

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
LRTPs	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_2O	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 area potentially affected by the construction and operation of the Project; for archaeological properties, considered to be the area of ground proposed to be disturbed during construction of the undertaking, including grading, cut-and-fill, easements, staging areas, utility relocation, borrow pits, and biological mitigation areas; for historic architecture, considered to be the proposed construction footprint and properties near the undertaking where the undertaking would result in a substantial change from the historic use, access, or noise and vibration levels that were present 50 years ago, or during the period of significance of a property, if different.

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 (CO_2): A colorless, odorless gas that occurs naturally in the atmosphere; fossil fuel combustion emits significant quantities of CO_2.

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.

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 (O_3), particulate matter with a diameter of 10 microns or less (PM_{10}), 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 (CO_2).

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.

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 (NO_2) 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.

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

Ozone (O_3): 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 (PM_{10}) 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 (SOx): Sulfur-oxygen compounds that include the important criteria pollutants sulfur dioxide (SO_2) and sulfur trioxide (SO_3).

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.

1 Introduction

This Draft Environmental Impact Statement (DEIS) 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) published a Notice of Intent to prepare an Environmental Impact Statement (EIS) for the Project in the Federal Register on April 15, 2013. 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 DEIS.

1.1 Project Background

AAF has applied for $1.6 billion in 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 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.

1.1.1 Phased Approach to Project Implementation

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 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.


SEMINOLE
VOLUSIA
LAKE
Orlando
ORANGE
MCO
Cocoa
BREVARD
Melbourne
OSCEOLA
POLK
INDIANRIVER
HARDEE
OKEECHOBEE
STLUCIE
Fort Pierce
HIGHLANDS
Stuart
DESOTO
MARTIN
GLADES
CHARLOTTE
West Palm Beach
PALMBEACH
LEE
HENDRY
COLLIER
BROWARD
Fort Lauderdale
MIAMI-DADE
Miami
MONROE
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
N
0
10
20 Miles
U.S. Department of Transportation
Federal Railroad Administration
1.1-1

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.

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 the FONSI is attached to this DEIS as Appendix 1.1-A. 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.

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 FRAs 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 for public review of this new site concurrent with this DEIS. The Re-Evaluation document for the Fort Lauderdale Station is provided in Appendix 3.3-A.

1.1.2 Phase II – Loan Application and Environmental Review

Considering this phase 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 DEIS analyzes the cumulative effects of completing both phases of the Project, although the impacts exclusively from Phase 1 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 and incorporating the mitigation measures identified therein. 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), 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

The Applicant, AAF, will secure financing and will own the system and be responsible for the Project's development, construction, operation, and maintenance. The proposed action is Phase II of the Project and 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 DEIS 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 32.5-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 Orlando-Orange County Expressway Authority and FDOT, and secure Federal Highway Administration (FHWA) approval for occupancy of the I-95 ROW.

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 DEIS.

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 NEPA procedures (FRA 1999), FRA has evaluated in this DEIS 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 DEIS 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 authority granted by Sections 10 and 14 of the Rivers and Harbors Act (R&HA) (33 U.S.C § 401 *et seq*., as amended). USACE will provide 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 over navigable waters of the United States. USACE will also provide 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.

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 part 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 Polices 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 part 1.23 provide FHWA authority over approval of temporary or permanent occupancy or use within the boundaries of federal-aid highways.

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 DEIS 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 Office, 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 DEIS. 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 DEIS.

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 and Section 14 Permit
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
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

1.6 Organization of this Environmental Impact Statement

This DEIS 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 DEIS, 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 DEIS 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 DEIS 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 DEIS 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.

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 construction costs of building the Project. 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."

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, FRA 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 4 hours, 15 minutes via SR 528 to I-95 and 3 hours, 50 minutes via Florida's Turnpike. These times can vary substantially based on traffic, congestion, weather, and other factors.

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).


SEMINOLE
VOLUSIA
LAKE
ORANGE
Orlando
MCO
Cocoa
BREVARD
Melbourne
OSCEOLA
POLK
INDIANRIVER
HARDEE
OKEECHOBEE
STLUCIE
Fort Pierce
HIGHLANDS
DESOTO
Stuart
MARTIN
GLADES
CHARLOTTE
West Palm Beach
PBI
PALMBEACH
LEE
HENDRY
BROWARD
Fort Lauderdale
FLL
COLLIER
MIAMI-DADE
Miami
MIA
MONROE
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
N
0
10
20 Miles
U.S. Department of Transportation
Federal Railroad Administration
2.3-1

Table 2.3-1 Existing and Projected Annual Average Daily Traffic (AADT) and Volume to Capacity (V/C) Ratios

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). In 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 set up specific criteria for widening all roads on the FIHS. These 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 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."

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 (SB) trains per day and two northbound (NB) 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 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, the two routes had an on-time performance of 60 percent for the period of August 2012 to July 2013 (Amtrak 2013). This low on-time performance means that by the time a SB 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/Fort Lauderdale/Miami Airports (PBI, FLL, and 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 (M) annual passengers used MCO and 108,969 daily and 39.5M 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).

Table 2.3-2 Aviation Delays in the Project Corridor (2012)

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 SB buses and 10 NB 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 SB and 25 NB 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 municipal areas at the two ends of the project corridor are among the five largest cities in Florida, with increasing population growth. Orlando, at the northern end of the Project Corridor, is the fifth 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).

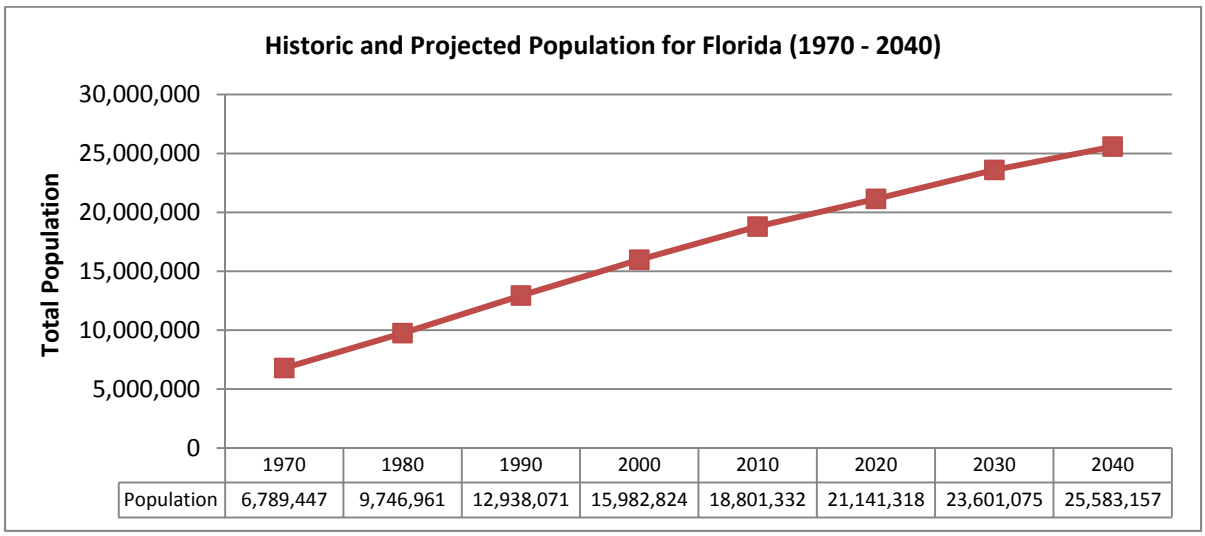


Figure 2.3-2 Projected Population for the State of Florida

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.

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).

Table 2.3-3 Employment Growth by Metropolitan Statistical Area

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, including Martin, Osceola, and Broward Counties (Table 2.3-4). This jobs-to-housing imbalance leads to longer home-to-work travel.

Table 2.3-4 Population Employed Outside of the County of Residence

County	Population	
	% Employed in County of Residence	% Employed Out of County of Residence
Orange County	87	13
Osceola County	49	51
Brevard County	93	7
Indian River County	85	15
Martin County	67	33
Palm Beach County	89	11
Broward County	78	22
Miami-Dade County	93	7

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.

In 2012, 91.4M 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 50M visitors a year. The number of visitors has increased from approximately 49M in 2008 to 57M in 2012, and is forecast to reach more than 59M in 2014 (Visit Orlando 2014). Miami saw

4.1M cruise passengers embark in 2010 (Miami-Dade County 2014), and saw 13.9M 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.

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.

Table 2.3-5 Summary of Rail Legislation and Related Activities in Florida 2000 – 2010

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.

Table 2.3-5 Summary of Rail Legislation and Related Activities in Florida 2000 – 2010 (Continued)

Date/Title	Description
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.

Table 2.3-6 Summary of High Speed Rail Legislation in Florida 2000 – 2010

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.

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 Phase II of the Orlando-Miami Passenger Rail Project were identified and evaluated, and provides a detailed description of the alternatives evaluated in this Draft Environmental Impact Statement (DEIS). 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 DEIS.

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. 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 means that the rail service 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

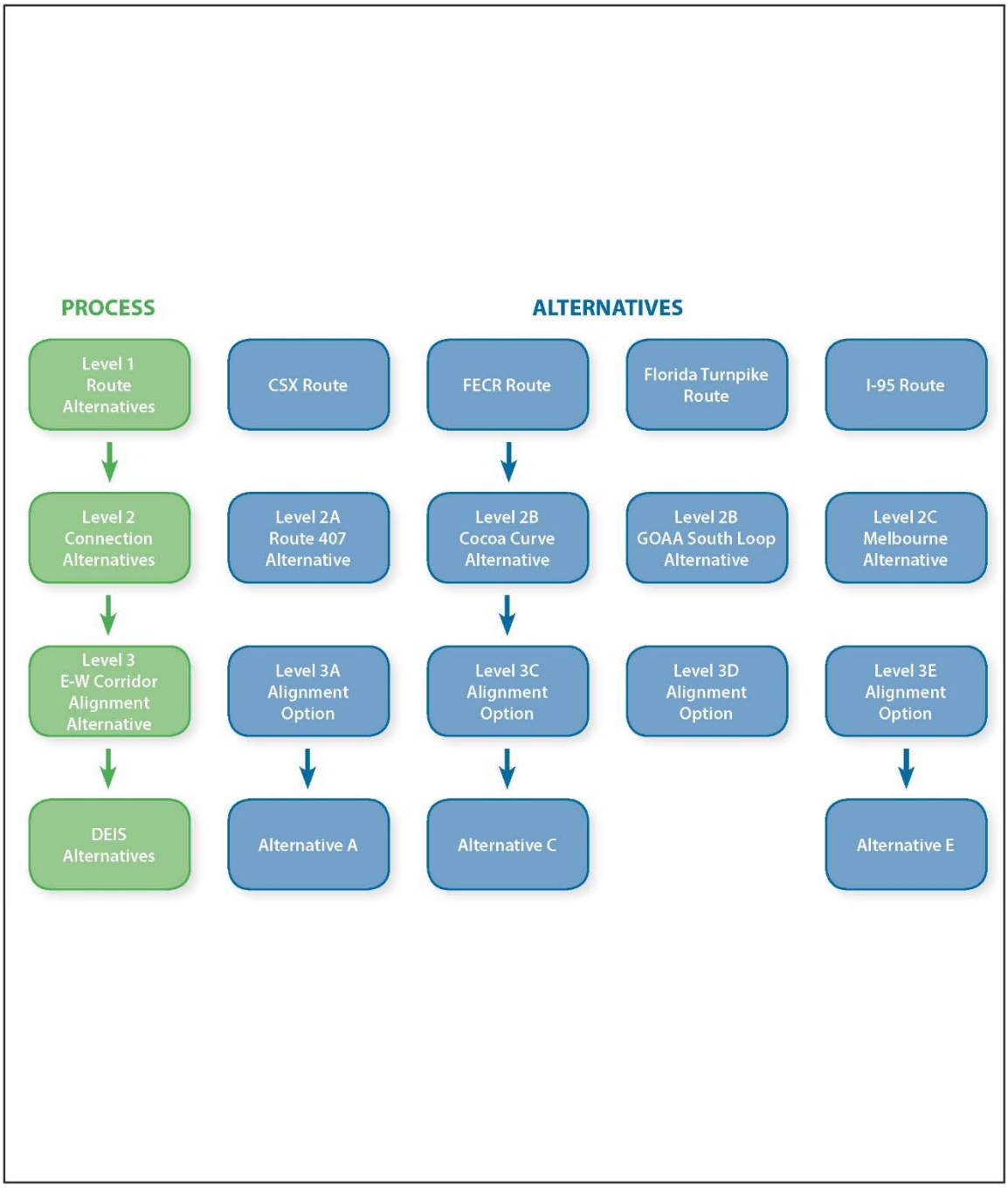
This section describes the alternatives that were identified and developed for the Project and the criteria used to evaluate each alternative. The analysis also included a preliminary comparison of potential impacts to key environmental resources. Alternatives were identified and screened in an iterative, 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 Orlando-Orange County Expressway Authority (OOCEA)-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;
- 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.



Screening Alternatives

All Aboard Florida Intercity Passenger Rail Project

U.S. Department of Transportation Federal Railroad Administration

3.2-1

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 was developed to assess (1) whether the alternative satisfies the purpose and need of the Project, (2) whether the alternative is practicable 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 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, 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). 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.

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.

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. Corridors which 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 (Louis Berger Group 2013) (see Appendix 3.3-F) 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 (Louis Berger Group 2013).

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.

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 100-foot construction footprint 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.

Conservation Lands

Publicly owned conservation lands are protected under Section 4(f) of the Department of Transportation Act. The potential direct and indirect impacts to conservation lands (including public and private 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 2003 *High Speed Rail Study* (HNTB 2003) 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. The description of the CSX, Florida Turnpike, and I-95 Route Alternatives is based on information from the 2003 *High Speed Rail Study*.

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 greater than 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. 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).

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 Florida Highway Administration 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, 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 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. The route requires purchase or lease of land from only five different landowners (including FDOT, OOCEA, and GOAA). 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. 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 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.

The CSX Route Alternative does not meet the Project purpose. Trip times would exceed the 3-hour target. Because of the substantial number of private land acquisitions, the Project could not be constructed in a reasonable time frame and would not be practicable 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 practicable. In addition, the CSX Route Alternative would have the second-highest level of wetland loss based on wetland acreage, and would not be the least environmentally damaging alternative as defined by the U.S. Army Corps of Engineers (USACE) with respect to Section 404 permitting.

Table 3.2-1 Screening Analysis Results – Level 1 Route Alternatives

		Alternative			
Criterion	**Metric**	**CSX**	**Florida Turnpike**	**I-95**	**FECR**
Land Access	Requires new rail connector across West Palm Beach	Yes	Yes	Yes	No
	Requires RR operating agreement for shared use	Yes	No	No	Yes (in place)
	Requires land from private landowners	Substantial (1,556 parcels)	Substantial (211 parcels)	Substantial (743 parcels)	2 private parcels (3 public)
	Requires lease from public transportation agencies	Yes	Yes	Yes	Yes (in place)
Logistics					
Use of Existing Infrastructure	Does the alternative use existing infrastructure?	Partially	No	No	Partially
Train Signaling and Control Systems	Does the alternative have a rail signal and control system in place?	Partially	No	No	Partially
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	134 acres
Conservation Lands[2]	Amount of resource potentially affected	13 miles	0 miles	12 miles	5 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

The Florida Turnpike Route Alternative does not meet the Project purpose. Because of the substantial number of private land acquisitions, the Project could not be constructed in a reasonable time frame and would not be practicable if AAF was unable to purchase these properties. Because it requires entirely new rail infrastructure, signal and control systems, this alternative would not be practicable based on cost. In addition, the Florida Turnpike Route Alternative would have the third-highest level of wetland loss based on wetland acreage, and would not be the least environmentally damaging alternative as defined by the USACE with respect to Section 404 permitting.

The I-95 Route Alternative does not meet the Project purpose. Because of the substantial number of private land acquisitions, the Project could not be constructed in a reasonable time frame and would not be practicable if AAF was unable to purchase these properties. Because it requires entirely new rail infrastructure, signal and control systems, this alternative would not be practicable based on cost. In addition, the I-95 Turnpike Route Alternative would have the highest level of wetland loss, and would not be the least environmentally damaging alternative.

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 (two), the Project could be constructed in a reasonable

time frame and would be practicable. Because it does not require entirely new rail infrastructure, signal and control systems, this alternative would be practicable based on cost. In addition, the FECR Alternative would have the lowest level of wetland loss based on wetland acreage, and would be the least environmentally damaging alternative as defined by the USACE with respect to Section 404 permitting, although impacts to conservation lands and threatened and endangered species habitats could be greater than for the Florida's Turnpike and I-95 alternatives.

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 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. 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. 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.

Data Sources: 2012 ESRI, AAF 2012, AMEC 2012

Route Alternatives

All Aboard Florida Intercity Passenger Rail Project

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U.S. Department of Transportation
Federal Railroad Administration

3.2-3

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. 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 practicable if AAF was unable to purchase these properties. This alternative has the second-highest wetland impacts based on acres of wetland lost, and would not be the least environmentally damaging alternative as defined by the USACE with respect to Section 404 permitting.

Table 3.2-2 Screening Analysis Results – Level 2 FECR Route Segment Alternatives

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>target
Environmental					
Wetlands and Waterways [1]	Amount of resource directly or indirectly impacted	534 acres	134 acres	285 acres	674 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	11	7	8

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 practicable because AAF has secured agreements to purchase these properties. This alternative has the lowest wetland impacts based on the acres of wetland loss, and would be the least environmentally damaging alternative as defined by the USACE with respect to Section 404 permitting.

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 practicable if AAF was unable to purchase these properties. This alternative has the third-highest wetland impacts based on the acres of wetland loss and would not be the least environmentally damaging alternative as defined by the USACE with respect to Section 404 permitting.

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 practicable if AAF was unable to purchase these properties. This alternative has the highest wetland impacts based on the acres of wetland loss, would result in substantial habitat fragmentation along the new alignment route, and would not be the least environmentally damaging alternative as defined by the USACE with respect to Section 404 permitting.

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 OOCEA, and is largely bordered by undeveloped land to the south. Level 3 evaluates the E-W Corridor alignment options developed within the OOCEA 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, OOCEA, 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).
- OOCEA's plan to expand SR 528 includes an additional eight lanes to the outside, an open median, and adding or modifying eight interchanges. OOCEA 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 four to six lanes, 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, OOCEA, 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.

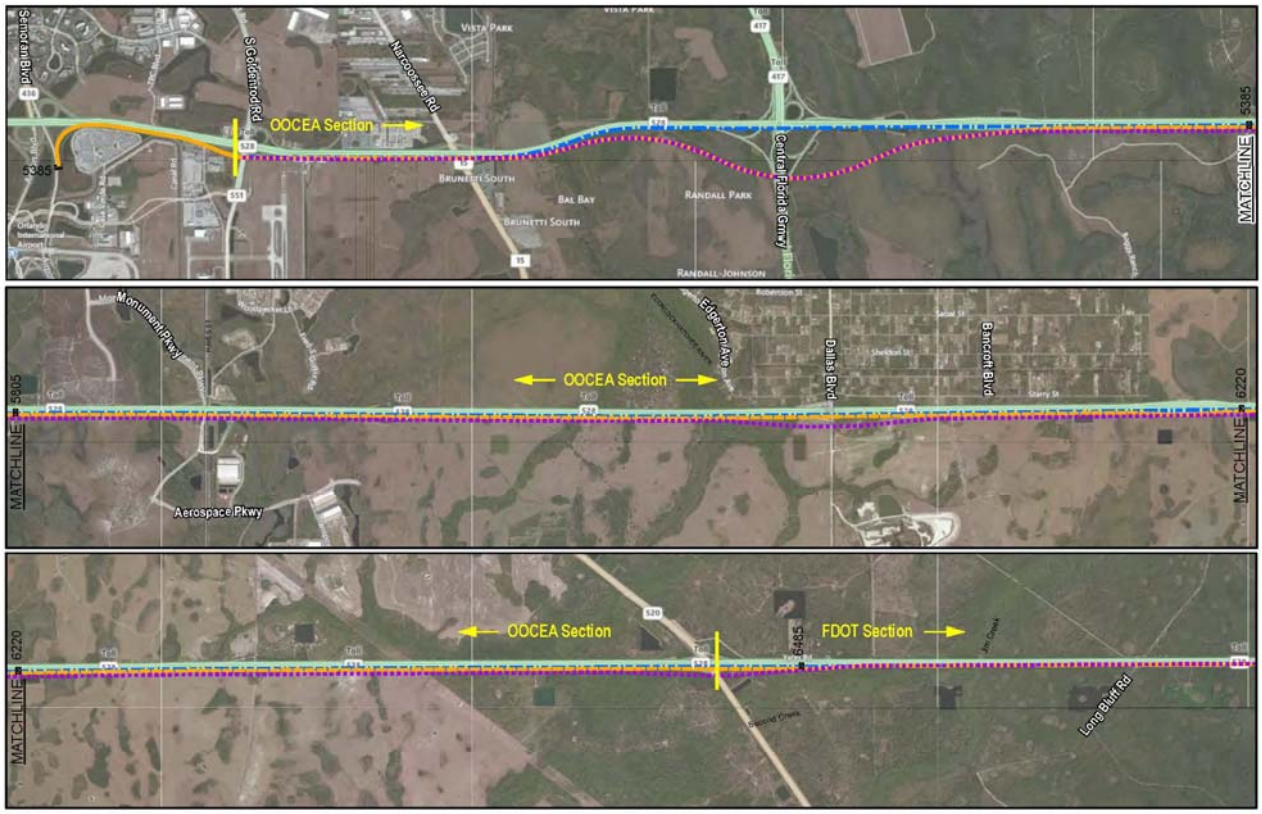
3.2.3.2 Alignment Option 3A

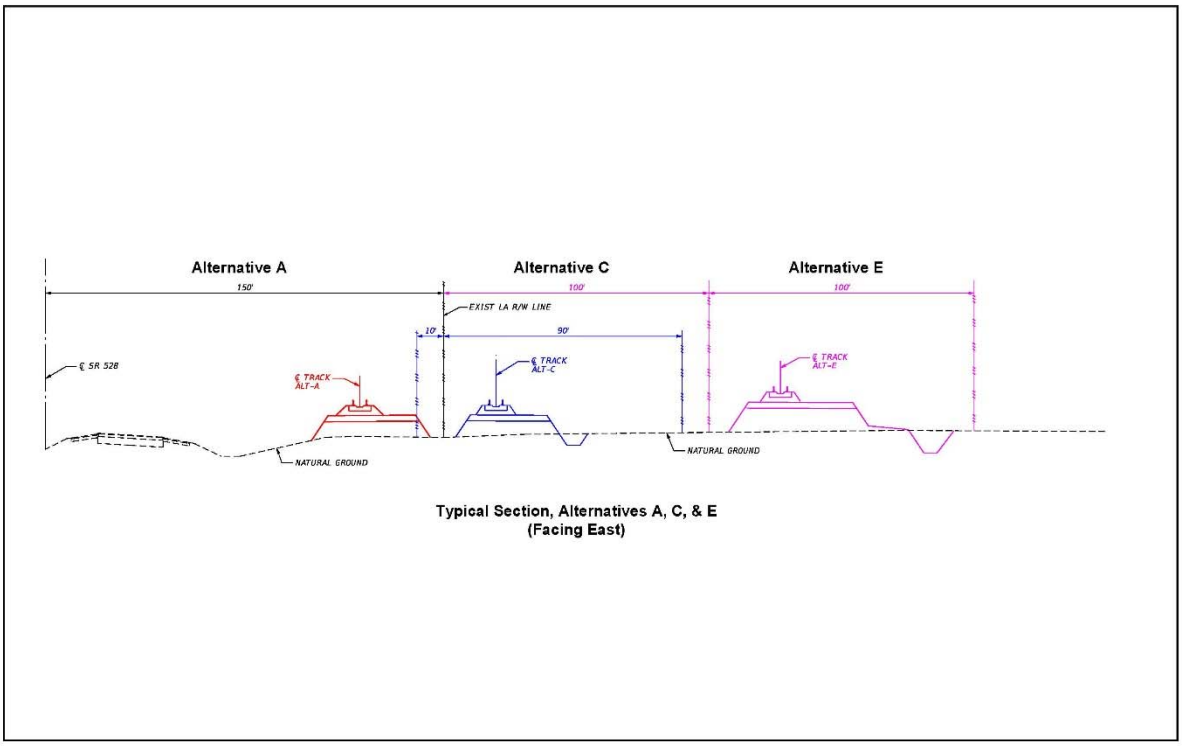
E-W Corridor Alignment Option 3A would construct a new 60-foot wide rail line within the SR 528 ROW east of SR 417 (Figures 3.2-4 and 3.2-5). The 60-foot ROW would accommodate two tracks, but would not include a parallel access road for maintenance of the rail alignment, as the rail line could be reached from SR 528. Land required to construct Option 3A would be leased from OOCEA and FDOT. AAF has secured lease agreements with both entities that would allow the construction of Option 3A. 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.

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 OOCEA 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. OOCEA 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. AAF has secured lease agreements with FDOT and OOCEA that would allow the construction of Option 3C. 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 OOCEA and were not compatible with OOCEA's future expansion plans.





Typical Section, Alignment Alternatives A, C, & E within OOCEA Section		
All Aboard Florida Intercity Passenger Rail Project		
NTS	U.S. Department of Transportation Federal Railroad Administration	3.2-5

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 OOCEA 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 OOCEA segment, the adjacent property owners have stated that they would not be willing to sell this land to AAF.

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 OOCEA and FDOT. OOCEA 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 has secured lease agreements with FDOT and OOCEA that would allow the construction of Option 3E. 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 OOCEA segment. This would reduce design and construction time, as well as construction costs.

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 practicable option. Alignment Option 3D would also have the highest amount of wetland impacts and therefore is not the least environmentally damaging alternative. Alignments 3A, 3C and 3E were retained for additional analysis.

Table 3.2-3 Screening Analysis Results –East-West Corridor Alignment Options[1]

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?	Yes	Yes	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	128 acres	165 acres	178 acres	158 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
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.

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 Station, 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.

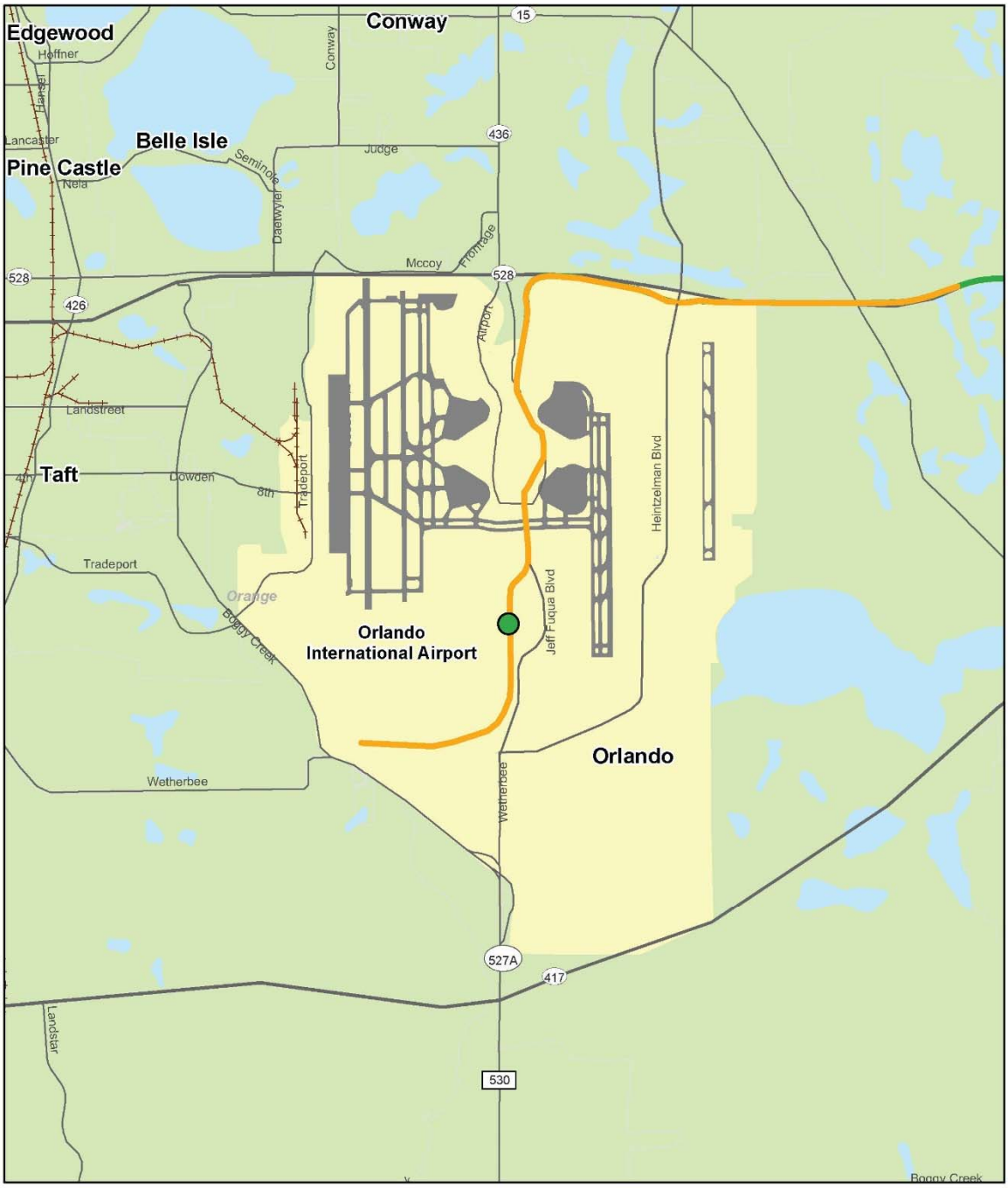
A site along the south side of SR 528, east of Dallas Boulevard, was proposed by an abutting landowner. This site is 16 miles from the GOAA Intermodal Station, and would result in increased non-revenue costs to move empty trains between the VMF and the station at the start and end of each run. This site 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 Station that is being planned and constructed by GOAA (Figure 3.2-7). According to GOAA, construction was scheduled to begin mid-2014. 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. However, the Project would not preclude future stations.

3.3 Alternatives Studied in Detail in the EIS

Chapter 5, *Environmental Consequences*, of this DEIS 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 OOCEA-controlled portion of SR 528 between SR 417 and SR 520). These alternatives were designed to accommodate OOCEA'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, OOCEA, and private landowners.


Edgewood
Hoffner
Conway
15
Conway
Lancaster
Belle Isle
Pine Castle
Nela
Seminole
Judge
436
Daetwyler
Mccoy
Frontage
528
528
426
Airport
Landstreet
Taft
Dowden
8th
Tradeport
Heintzelman Blvd
Tradeport
Orange
Boggy Creek
Orlando
International Airport
Jeff Fuqua Blvd
Orlando
Wetherbee
Wetherbee
527A
417
Landstar
530
Boggy Creek
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
N
0 0.25 0.5 1 Mile
U.S. Department of Transportation
Federal Railroad Administration
3.2-7

AAF has executed a lease agreement with OOCEA that allows them to construct any of the three alternatives, pending an OOCEA Board vote that the land to be occupied by AAF is "surplus." AAF has provided design concepts, which have been reviewed by OOCEA, that show any of the three alternatives can be constructed and not preclude future BeachLine Expressway widening. The OOCEA Board may not vote to declare any of the land within their existing ROW to be "surplus." In that case, Alternatives A and C would be eliminated since it would not be possible to lease the land. Currently, the OOCEA Board has not made a determination, so all three alignments are still being considered. All land acquisitions required for this segment of the Project would be carried out by OOCEA.

The sections below provide a detailed description of the No-Action Alternative and the three Action Alternatives studied in this DEIS. 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 DEIS 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 I 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-A).

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 this DEIS, AAF has prepared a supplemental Environmental Assessment for this facility. This EA is available on the FRA website for public review and comment for 30 days from the date of the DEIS availability. The document and details on how to submit comments can be found on FRA's website at www.fra.dot.gov. In Phase I, the Project would use the proposed VMF in West Palm Beach for maintenance and overnight vehicle storage.

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 DEIS in order to provide a complete description of the cumulative environmental impacts of the Project.

Subsequent sections of this DEIS will also evaluate 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. 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. Table 3.3-1 shows the future freight operations within the FECR Corridor that would occur in the absence of the Project.

Table 3.3-1 Existing and Future Freight Train Operations (No-Action Alternative)

	2013 (Existing)		2016	
Day	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.

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 required by FRA regulations to implement a new signal system that will provide positive train control (PTC) by 2015 (49 CFR Part 229). 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 1 project evaluated in the previous EA and FONSI). The Project evaluated in this EIS also includes bridge reconstruction within the WPB-M Corridor within the FECR ROW. 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. 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.

The following subsections describe each of the corridor segments for Alternative A, the proposed infrastructure, operations, and ridership. Detailed plans of Alternative A are provided in Appendix 3.3-B1 through 3.3-B4.


SEMINOLE
VOLUSIA
LAKE
ORANGE
Orlando
MCO
Cocoa
BREVARD
Melbourne
OSCEOLA
POLK
INDIANRIVER
HARDEE
OKEECHOBEE
STLUCIE
Fort Pierce
HIGHLANDS
DESOTO
Stuart
MARTIN
GLADES
CHARLOTTE
West Palm Beach
PBI
PALMBEACH
LEE
HENDRY
BROWARD
Fort Lauderdale
FLL
COLLIER
MIAMI-DADE
Miami
MIA
MONROE
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
N
0
10
20 Miles
U.S. Department of Transportation
Federal Railroad Administration
3.3-1

3.3.3.1 MCO Segment

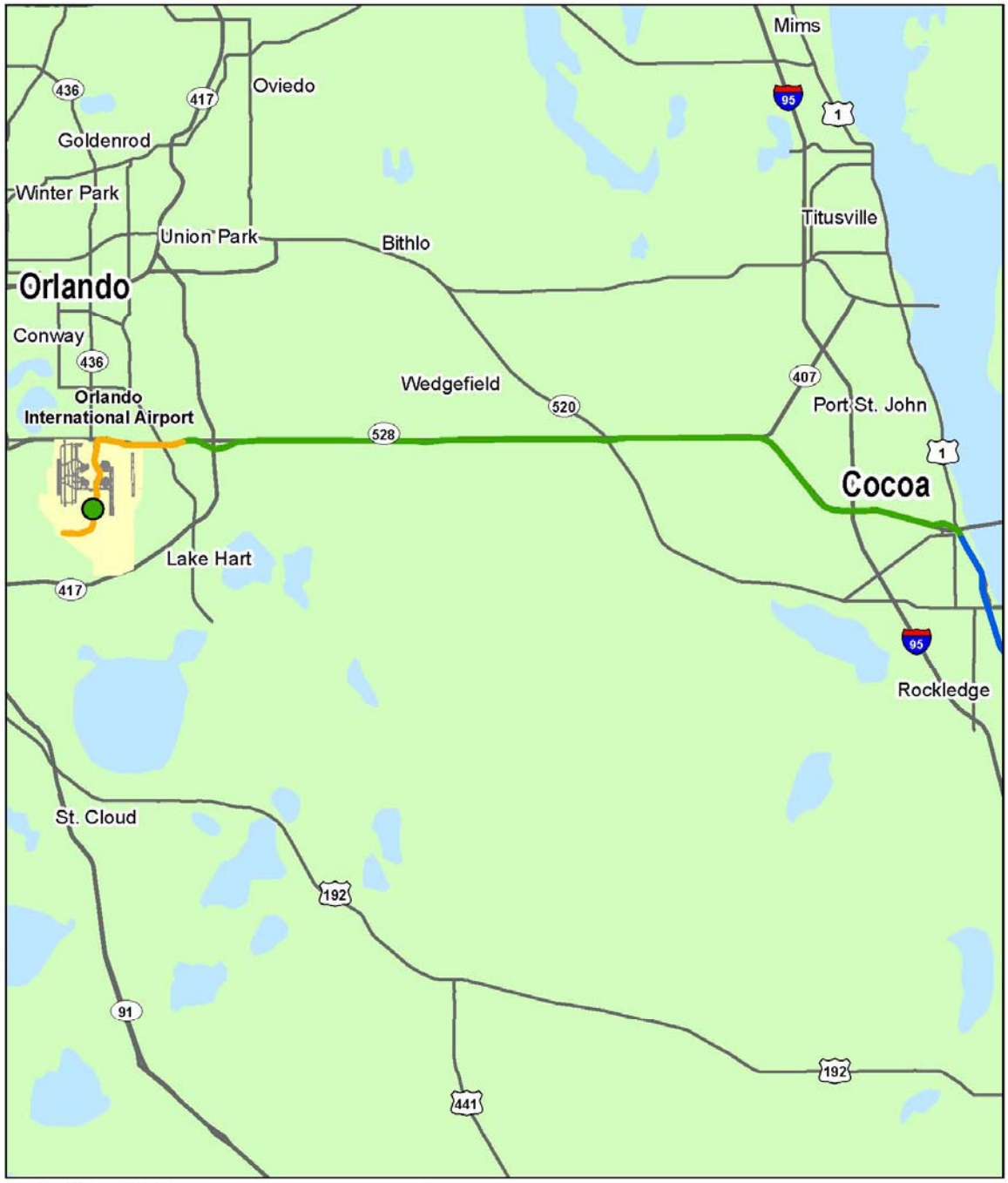
The MCO Segment (Figure 3.3-2) is approximately 2.5 miles long and would consist of two tracks, extending from the VMF to the E-W Corridor west of Goldenrod Road. The track would be at-grade between the VMF and the Intermodal Terminal Complex, where it would rise on structure to a three-track station 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 west of Goldenrod Road. The FAA must review all leases and/or agreements between AAF and GOAA prior to execution and have a determination of object/no object.

3.3.3.2 East-West Corridor

The E-W Corridor between Orlando and Cocoa, which is approximately 32.5 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 OOCEA (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.


Mims
Oviedo
Goldenrod
Winter Park
Union Park
Bithlo
Titusville
Orlando
Conway
Wedgefield
Orlando International Airport
Port St. John
Cocoa
Lake Hart
Rockledge
St. Cloud
436
417
95
1
520
528
407
91
192
441
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
N
0 1.25 2.5 5 Miles
U.S. Department of Transportation
Federal Railroad Administration
3.3-2

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

This section is approximately 1.5 miles long. 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, and begin to straddle the property line between the properties owned by OOCEA 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 30 feet before returning to an at-grade elevation. The alignment would begin to climb above grade again approximately 25 feet 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 3.3-2, there would be three structures in this section; all would be approximately 60 feet wide.

Table 3.3-2 Proposed Structures Alternative A, E-W Corridor West Section

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	28	4, 1, 6
SR 417 Tunnel	4,400	34	NA

Middle Section of East-West Corridor (SR 417 to SR 520)

This section is approximately 17.5 miles long. 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 100 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 3.3-3.

Table 3.3-3 Proposed Structures Alternative A, E-W Corridor Middle Section

Bridge	Proposed Structure Length (ft)	Proposed Structure Width (ft)	Number of Spans
Innovation Way, ICP Boulevard, CSX Rail	5,500	14	70
BeachLine Exit	1,500	14	17
Farm Access Road #1	200	14	3
Econolockhatchee River	1,700	14	21
Dallas Boulevard Off-Ramp	500	14	6
Dallas Blvd	165	14	2
Future Dallas Boulevard On-Ramp	250	14	4
Future Dallas Boulevard Interchange	1,200	14	17
Farm Access Road #2	180	14	3
SR 520	215	14	2
Ramp Connecting SR 520 to SR 528	1,300	14	16

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. The segment begins west of SR 520 where the alignment would be at grade and then climb above grade onto an embankment 10 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 40 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 35 feet before returning to grade. This would continue until 20 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 via a bridge, return to grade and cross under SR 528 to the south side at the interchange with U.S. 1. Retention ponds would be constructed in the middle of the interchange ramps in 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 3.3-4 lists the structures in this section.

Table 3.3-4 Proposed Structures Alternative A, E-W Corridor East Section

Bridge	Proposed Structure Length (ft)	Proposed Structure Width (ft)	Number of Spans
Second Creek	350	28	5
Jim Creek	250	28	4
Long Bluff Road	80	28	1
Future Wildlife Crossing	60	28	2
Taylor Creek	150	28	3
St. Johns River	550	28	13
Un-named Creek	100	28	1
Pine Street	80	28	1
I-95 Ramp	187	28	2
I-95 Ramp	222	28	2
I-95	288	28	2
I-95 Ramp	71	28	1
I-95 Ramp	115	28	1
SR 528	1,200	28	11
Industry Road	180	28	2
SR 528 (tunnel)	260	34	NA

3.3.3.3 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. 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 primarily take place 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;
- Reconstruct 18 bridges;
- Add approximately 109 miles of new second track;
- Eight miles of new third track;
- Upgrade highway and pedestrian crossings; and
- Upgrade signals and grade crossings.

The sections below provide detailed descriptions of each element.

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. A 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-B4).

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;
- In the vicinity of Masterson Street;
- South of Sarno Road; and
- In the vicinity of University Boulevard/Apollo Boulevard.

Indian River County:

- In the vicinity of 16th Street;
- In the vicinity of Indian River Drive; and
- South of Savannah Road.

Martin County:

- In the vicinity of Pinewood Street; and
- In the vicinity of Park Road.

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;
- 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; and
- In the vicinity of MP 254.04/Pleasant View Drive.

Martin County:

- In the vicinity of MP 254.05;
- In the vicinity of MP 255.75/NE Chardon Street;
- In the vicinity of MP 259.21/NE Dixie Highway;
- In the vicinity of MP 265.40/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 274.7/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.

Current track conditions along the FECR Corridor permits passenger trains to operate up to a maximum speed of 79 mph. 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 (FRA 2012b and 2012c). To maintain this track classification, AAF will complete infrastructure improvements to the mainline, including replacement of the second mainline track, reconstruction of existing crossovers

and the addition of 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.

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

There are approximately 170 highway-rail grade crossings within the N-S Corridor, of which 159 are at-grade and 11 are grade-separated. 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. Each affected highway-rail grade crossing will go through a diagnostic team review to determine the appropriate level of warning. To mitigate noise impacts from train horns AAF has committed, as part of the Project description, to install pole-mounted horns at all highway-rail grade crossings on the N-S Corridor and the WPB-M Corridor unless the community establishes a quiet zone. The grade crossings are described in more detail in Appendix 3.3-C.

Bridge and Structures

Bridge construction over waterways would be required at the 18 locations listed in Table 3.3-5, 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 (seven locations) (Figure 3.3-4). Bridge plans are currently at the conceptual design level. Sixteen new bridges would be constructed in-water or over water and would be fixed-span structures. 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.

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

N

U.S. Department of Transportation
Federal Railroad Administration

3.3-4

Table 3.3-5 Proposed Bridges, N-S Corridor

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	-	210	16	8
Moores Creek	Retain	1	72	16	3
Rio Waterway	Demolish	2	95	16	4
St. Lucie River	Rehabilitate	-	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	-	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.

3.3.3.4 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. 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.

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 3.3-6, four bridges would be rehabilitated, and seven would require construction to replace the original bridge with two new single-track bridges (the two Middle River crossings and the Oleta River), or retain the existing bridge and construct a new single-track bridge adjacent to the existing structure (four locations) (Figure 3.3-4). All new structures would be concrete, supported by concrete pilings, and would retain the existing vertical and horizontal clearances. The moveable bridge at the New River in Fort Lauderdale would be rehabilitated as part of Phase 1.

Table 3.3-6 Proposed Bridges over Waterways, West Palm Beach-Miami Corridor

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	13	6
Hillsboro Canal	Retain	1	206	16	8
Cypress Creek Canal	Retain	-			
North Fork Middle River	Demolish	2	192	16	(8)[1]
South Fork Middle River	Demolish	2	192	16	(8)[1]
New River	Rehabilitate	-	210	30	6
Tarpon River	Retain	-			
Dania Canal	Rehabilitate	-	79	30	1
Oleta River	Demolish	2	82	16	(26)[1]
Snake Creek Canal	Rehabilitate	-	160	27	7
Arch Creek	Retain	1	75	16	1
Biscayne Park Canal	Retain	-			
Little River Canal	Retain	-			

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

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-A).

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 1 project evaluated in the 2012 EA. Concurrently with this DEIS, FRA has prepared a supplemental EA for this facility which is available for public review on the FRA website (www.fra.dot.gov).

3.3.3.5 Orlando Vehicle Maintenance Facility

AAF's proposed VMF would occupy approximately 80 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). Following completion of construction of the Orlando to West Palm Beach Corridors and construction of the MCO VMF, the West Palm Beach VMF would be discontinued and all maintenance operations would take place at the MCO VMF.

3.3.3.6 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 FECI) 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.

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 A except for the Mid-Section of the E-W Corridor (Figure 3.2-3; see Appendix 3.3-D for detailed plans).

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 lease agreement with OOCEA, OOCEA 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 comingle with SR 528 drainage.

This section of Alternative C would begin at grade east of SR 417 and would rise up to an embankment almost 100 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 3.3-7.

3.3.5 Alternative E

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. 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-E for detailed plans).

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 of the SR 528 ROW and at the SR 520 interchange the proposed rail line would be approximately 500 feet south of the SR 528 ROW.

Table 3.3-7 Proposed Structures Alternative C, E-W Corridor Middle Section

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	800	14	8
Future Farm Access Road #1 Ramp	750	14	7
Farm Access Road #1	200	14	3
Future Farm Access Road #1 Ramp	400	14	4
Econolockhatchee 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	215	14	2
Ramp Connecting SR 520 to SR 528	300	14	4

This alternative includes an access road and is an average of 100 feet wide and will impact approximately 225 acres of land for the construction of the new rail line. In accordance with the lease agreement with OOCEA, OOCEA 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 Innovation Way, ICP Boulevard, the CSX Rail Line, 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 3.3-8.

Table 3.3-8 Proposed Structures Alternative E, E-W Corridor Middle Section

Bridge	Proposed Structure Length (ft)	Proposed Structure Width (ft)	Number of Spans
ICP Boulevard/RR	160	14	2
ICP Boulevard Ramp	190	14	2
Econolockhatchee River	249	14	3
Dallas Blvd	165	14	2
SR 520	215	14	2

1 Over Grade Bridge – rail goes over the road/river
2 Under-Grade Bridge – road goes over the rail

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.

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 3.3-9 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.

Table 3.3-9 Projected Average Passenger Rail Operating Speeds by County

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* (Louis Berger Group 2013) is provided in Appendix 3.3-F. FRA has reviewed and accepted this summary.

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.

3.5.2 Ridership Projections

The ridership analysis forecasts that passenger rail ridership would total approximately 3.5 million annual riders in 2019 (Table 3.3-10). 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.

Table 3.3-10 Projected Base-Case Ridership (2019)

Year	Short-Distance Service (West Palm Beach-Miami)	Long-Distance Service (Orlando to Southeast Florida)	Total
2019	1,944,500	1,526,300	3,470,800

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 3.3-11). 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.

Table 3.3-11 Estimate of Auto Vehicle Trips Diverted to AAF

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 Summary

As required by NEPA, this DEIS presents the alternatives developed for the Project, and evaluates these alternatives in light of their ability to satisfy the Project purpose, 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 DEIS. These Action Alternatives (Alternative A, Alternative C, and Alternative E) differ only in the location of the proposed tracks in the 17-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. Chapter 5, *Environmental Consequences*, of this DEIS 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.

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-A.

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-A 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 predominant land uses adjacent to the N-W Corridor in each county are shown in Appendix 4.1.1-A 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;
- 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, Vero Beach, Fort Pierce, 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-A 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.

Table 4.1.1-1 Local Land Use Plans

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, Division of Community Planning
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

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.


ORANGE
Orlando
MCO
LAKE
KISSIMMEE
Cocoa
Melbourne
WINTER HAVEN
OSCEOLA
BREVARD
POLK
INDIANRIVER
SEBRING
HARDEE
OKEECHOBEE
STLUCIE
Fort Pierce
OKEECHOBEE
DESOTO
HIGHLANDS
Stuart
GLADES
MARTIN
CHARLOTTE
West Palm Beach
WEST PALM BEACH
PBI
HENDRY
LEE
PALMBEACH
DELRAY BEACH
DEERFIELD BEACH
FORT LAUDERDALE
Fort Lauderdale
COLLIER
BROWARD
FLL
HOLLYWOOD
MIAMI
MIA
Miami
MONROE
MIAMI-DADE
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
N
0
10
20 Miles
U.S. Department of Transportation
Federal Railroad Administration
4.1.2-1

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.


MARTIN
1
West Palm Beach
WEST PALM BEACH
PBI
PALMBEACH
DELRAY BEACH
DEERFIELD BEACH
FORT LAUDERDALE
Fort Lauderdale
BROWARD
FLL
HOLLYWOOD
MIAMI
MIA
Miami
MIAMI-DADE
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
N
0
5
10 Miles
U.S. Department of Transportation
Federal Railroad Administration
4.1.2-2

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 15 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.


SEMINOLE
VOLUSIA
LAKE
ORANGE
Orlando
MCO
Cocoa
BREVARD
Melbourne
OSCEOLA
POLK
INDIANRIVER
HARDEE
OKEECHOBEE
STLUCIE
Fort Pierce
HIGHLANDS
DESOTO
Stuart
MARTIN
GLADES
CHARLOTTE
West Palm Beach
PBI
PALMBEACH
LEE
HENDRY
COLLIER
BROWARD
Fort Lauderdale
FLL
MIAMI-DADE
Miami
MIA
MONROE
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
N
0
10
20 Miles
U.S. Department of Transportation
Federal Railroad Administration
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.

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).

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 Orlando-Orange County Expressway Authority (OOCEA) 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 OOCEA 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

U.S. Department of Transportation Federal Railroad Administration

4.1.2-4

The average travel time between Orlando and Miami via automobile is 4 hours, 15 minutes via I-95 and 3 hours, 50 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.

Table 4.1.2-1 Existing Highway Volumes and Operational Characteristics

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	4-6	35,000-67,000	B-C
	Martin	6	39,000-66,500	B-C
	Palm Beach	10	66,000-179,500	B-D
Florida's Turnpike	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.

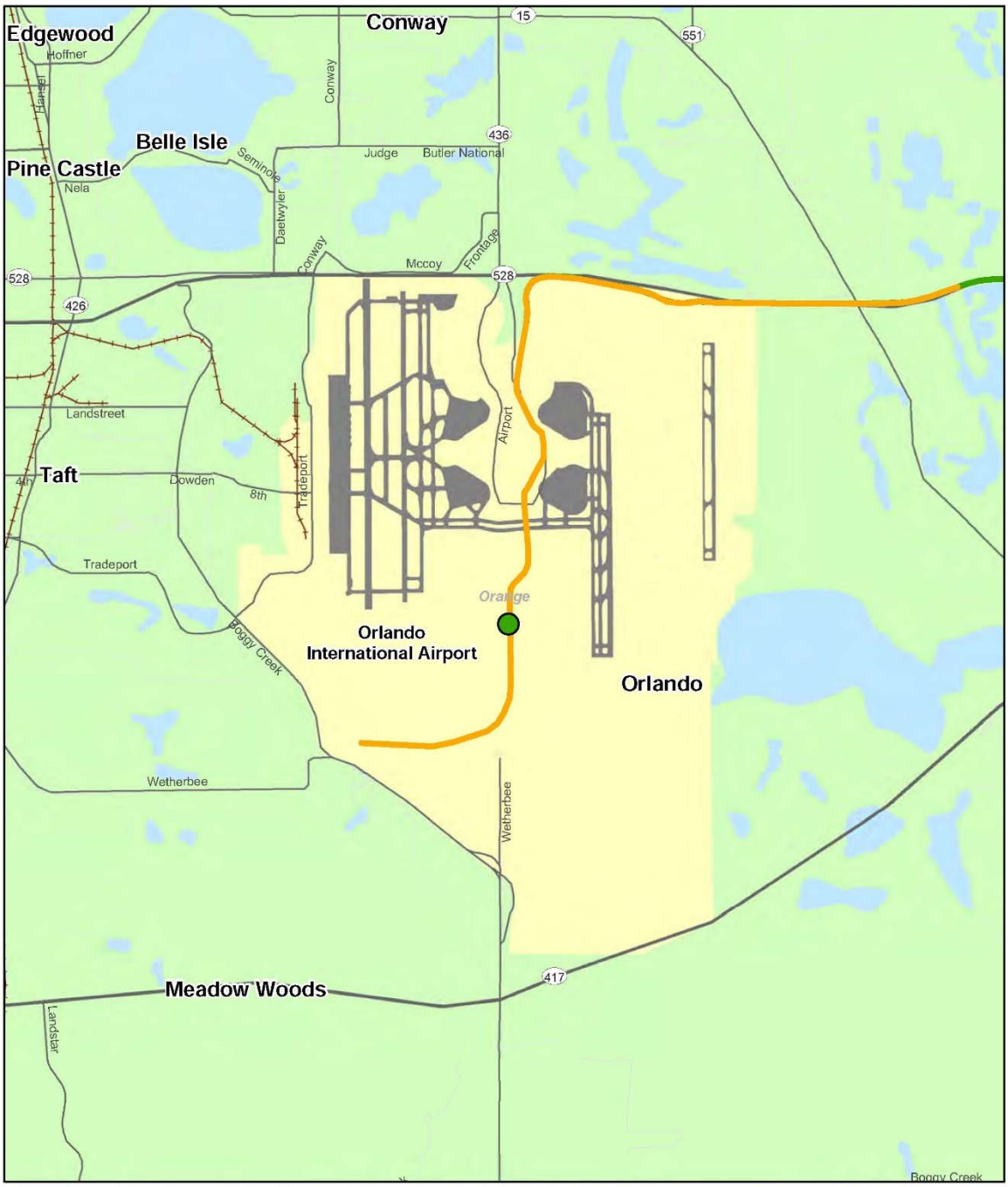

Edgewood
Hoffner
Conway
15
551
Belle Isle
Pine Castle
Nela
Seminole
Judge
Butler National
436
Daetwyler
Conway
Mccoy
Frontage
528
426
Landstreet
Taft
4th
Dowden
8th
Tradeport
Airport
Orange
Orlando International Airport
Orlando
Boggy Creek
Wetherbee
Meadow Woods
417
Landstar
Explanation of Features
E-W Corridor
MCO Segment
Proposed Station (By Others)
Data Sources: 2012 ESRI
Local Roadway Network at MCO
All Aboard Florida Intercity Passenger Rail Project
N
0 0.25 0.5 1 Mile
U.S. Department of Transportation
Federal Railroad Administration
4.1.2-5

Table 4.1.2-2 Existing Traffic Volumes for Local Roadways

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 1st Avenue	NW 2nd Ave to NW 1st 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.

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.

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.

Table 4.1.2-3 Summary of At-grade Crossings by County Within the N-S Corridor

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 second-track 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-B). 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-C, *Navigation Discipline Report*.

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. At a meeting held on August 12, 2013 (see Appendix 4.3.1-A 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. USCG also requested information on the navigation conditions at the New River Bridge within the WPB-M Corridor.

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 which have fixed bridges:

- 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).

In addition, this section provides information on the existing economic value of the maritime industry associated with the three moveable bridges.

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 include:

- 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;
- A detailed analysis of the marine industry at each bridge;
- Socioeconomic analyses; and
- Results from a discrete-event simulation model of vessel traffic.

Vessel Survey Modeling

Vessel traffic on the New River, Loxahatchee River, and St. Lucie River were characterized based on a traffic survey and video survey.

2014 Vessel Traffic Survey

As described in the 2014 *Navigation Discipline Report* (Appendix 4.1.3-C) video recordings from cameras located at FECR's bridges at the St. Lucie River, Loxahatchee River, and New River were provided by FECR. The videos contain approximately two to three weeks of data from the peak vessel traffic season, and in some instances a holiday, and were used to quantify the number and types of recognizable vessels that pass under the bridges under existing conditions. The raw data collected includes the number and size of commercial and recreational vessels that pass under the bridges. These data were summarized and organized to show differences and patterns between and within weekdays, weekends, and different times of the day (AMEC 2014a).

2014 Video Survey

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 peak 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 (e.g. closing times, the time the train arrives, and time it clears the bridge), as well as pictures of the vessels crossing (AMEC 2014a).

Economic Analysis

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* (Appendix 4.1.3-C) estimated the economic value of the marine industry in 2013 in order to determine a cost per trip for the socioeconomic impact analysis. 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).

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 impact of the marine industry on property values; accordingly, this report does not discuss property value impacts (AMEC 2014a).

This analysis expands on the methodology of the state's studies to estimate growth in direct, indirect, and induced economic activity (see Table 4.1.3-1), including total business volume, personal income, and employment (AMEC 2014a).

Table 4.1.3-1 Definition and Example of Direct, Indirect, and Induced Economic Effects

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.

4.1.3.2 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 six 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 50 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. 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, 14 freight trains cross the St. Lucie River Bridge 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 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).

As shown in Table 4.1.3-2, the average count of commercial vessels per day ranged from two 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 Daily Vessel Traffic at the St. Lucie, Loxahatchee, and New River Bridges, January 2014[1]

	St. Lucie River	Loxahatchee River	New River
Recreational Vessels			
Minimum	26	5	64
Maximum	406	500	356
Average	117	148	166
Commercial Vessels			
Minimum	2	0	29
Maximum	21	14	59
Average	4	9	49
Total Vessels			
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

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 A1A Route 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 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, 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 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).

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 at 33 CFR 111.313(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).

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.

4.1.3.3 Existing 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.

Martin County

As described in the *2014 Navigation Discipline Report* (Appendix 4.1.3-C), 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 4.1.3-3) (AMEC 2014a).

Table 4.1.3-3 Direct, Indirect, and Induced Benefits of the Marine Industry in Martin County

	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* (Appendix 4.1.3-C), 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 4.1.3-4) (AMEC 2014a).

Table 4.1.3-4 Direct, Indirect, and Induced Benefits of the Marine Industry in St. Lucie County

	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 4.1.3-5) (AMEC 2014a).

Table 4.1.3-5 Direct, Indirect, and Induced Benefits of the Marine Industry along the St. Lucie River

		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* (Appendix 4.1.3-C), 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 4.1.3-6) (AMEC 2014a).

Table 4.1.3-6 Direct, Indirect, and Induced Benefits of the Marine Industry in Palm Beach County

	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 4.1.3-7) (AMEC 2014a).

Table 4.1.3-7 Direct, Indirect, and Induced Benefits of the Marine Industry along the Loxahatchee River

	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 4.1.3-8) (AMEC 2014a).

Table 4.1.3-8 Direct, Indirect, and Induced Benefits of the Marine Industry in Broward County

	Original 2007 Model Results				Estimated 2013 Figures			
Benefit	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 $1,723.7 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 4.1.3-9) (AMEC 2014a).

Table 4.1.3-9 Direct, Indirect, and Induced Benefits of the Marine Industry along the New River

Benefit	Direct	Indirect	Induced	Total
Business Volume (in millions)	$1,226.5	$268.4	$228.9	**$1,723.7**
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.

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 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).

Table 4.2.1-1 National Ambient Air Quality Standards

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 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 (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than 10 microns in diameter (PM_{10}) 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, NO_2, 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.

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 (NOx), and VOCs. In the presence of heat and sunlight, NOx and VOCs chemically react to form O_3. NO_2 is one of a group of highly reactive gasses known as NOx. PM and SO_2 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 (O_3): Ozone (also known as smog) is a strong oxidizer and an irritant that affects the lung tissues and respiratory functions. Exposure to O_3 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 O_3 is formed as a result of complex photochemical reactions in the atmosphere involving VOCs, NOx, and high temperatures. The State of Florida is in attainment for O_3.

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 (NO_2): NO_2 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 NO_2 may cause acute respiratory disease in children. Because NO_2 is an important precursor in the formation of O_3, control of NO_2 emissions is an important component of overall pollution reduction strategies. The two primary sources of NO_2 in the U.S. are fuel combustion and transportation. All six counties within the Project Study Area are designated as attainment areas for NO_2.

Sulfur Dioxide (SO_2): SO_2 is emitted primarily from stationary source coal and oil combustion, steel mills, refineries, pulp and paper mills, and non-ferrous smelters. High concentrations of SO_2 may aggravate existing respiratory and cardiovascular disease; asthmatics and those with emphysema or bronchitis are the most sensitive to SO_2 exposure. SO_2 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 SO_2.

Particulate Matter (PM_{10} 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. PM_{10} 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 PM_{10} 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 PM_{10} 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, CO_2, CH_4 (methane), N_2O (nitrous oxide), ground-level O_3, 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.

Table 4.2.1-2 Existing Air Quality Conditions: Comparison to Federal and State Air Quality Standards

		Pollutant												
		Carbon Monoxide (ppm)		Lead ($\mu m/m^3$)		Nitrogen Dioxide (ppb)		Ozone (ppb)		PM_{10} ($\mu m/m^3$)	$PM_{2.5}$ ($\mu m/m^3$)		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
µm/m3 = 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, NO_2, SO_2, O_3, PM_{10}, 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 O_3, PM_{10}, 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 NO_2, O_3, 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, NO_2, SO_2, O_3, PM_{10}, 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

Table 4.2.1-3 2008 Baseline Mobile Source Emissions Inventories

	CO		SO_x		NO_x		PM_{10}		VOC	
County	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 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 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 an example of the types of activities that result in varying degrees of sound levels in dBA.

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.

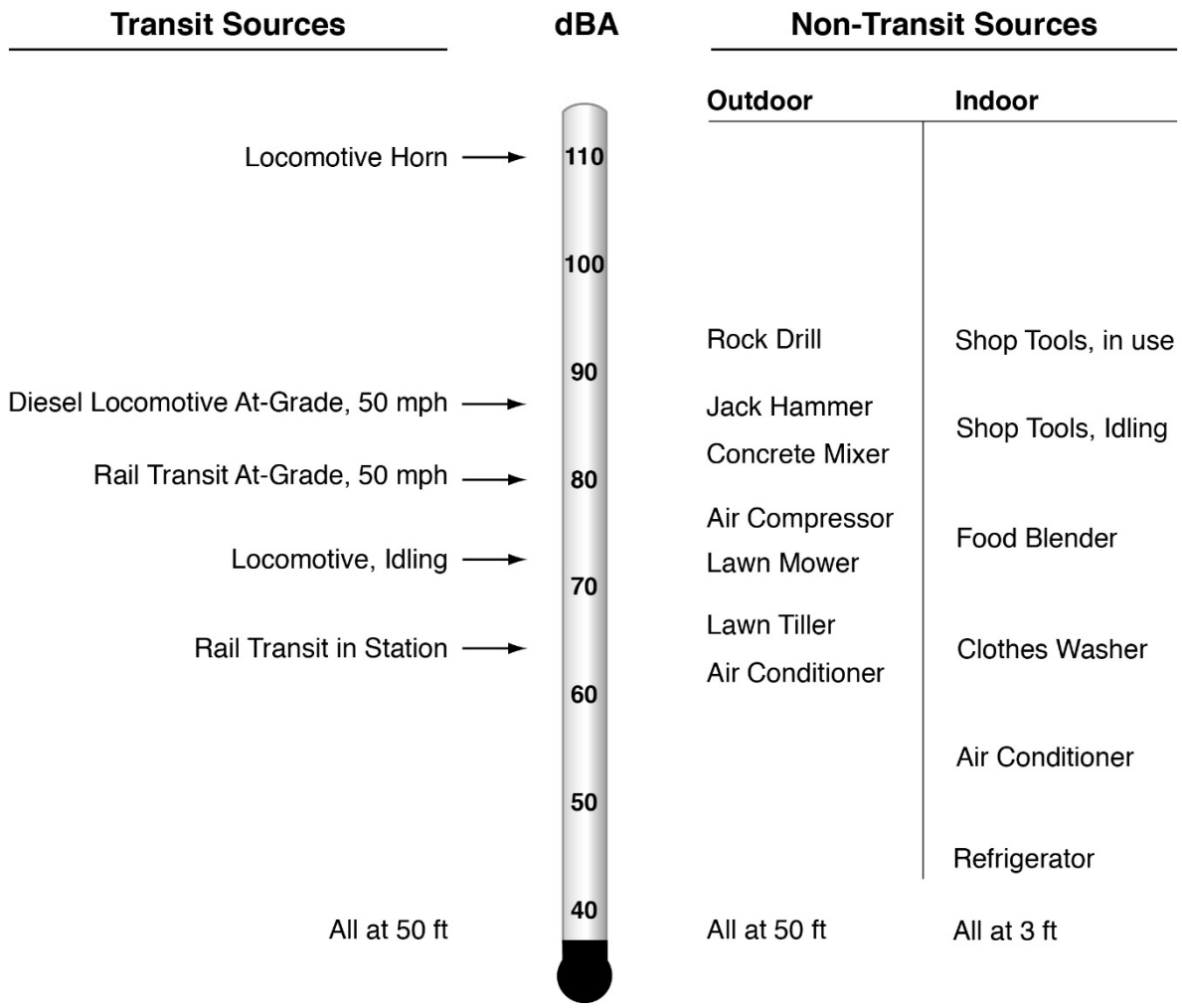


Figure 4.2.2-1 Sound Levels of Typical Noise Sources and Noise Environments

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).

Table 4.2.2-1 Land Use Categories and Metrics for Transit Noise

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor Leq(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 Leq(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 Leq 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.

Table 4.2.2-2 Existing Rail Operations by County (N-S 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.

Table 4.2.2-3 Existing Noise Conditions from Roads (E-W Corridor)

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.

Table 4.2.2-4 Number of Census Blocks per Population Density and Ambient Noise Level

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 Ldn at 50 feet from the tracks. Warning horn noise is 74 dBA Ldn at 50 feet, within ¼ mile of each at-grade crossing. Warning horns are the dominant noise sources near grade crossings.

Table 4.2.2-5 Existing Noise Conditions from Train Operations (N-S Corridor)

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.

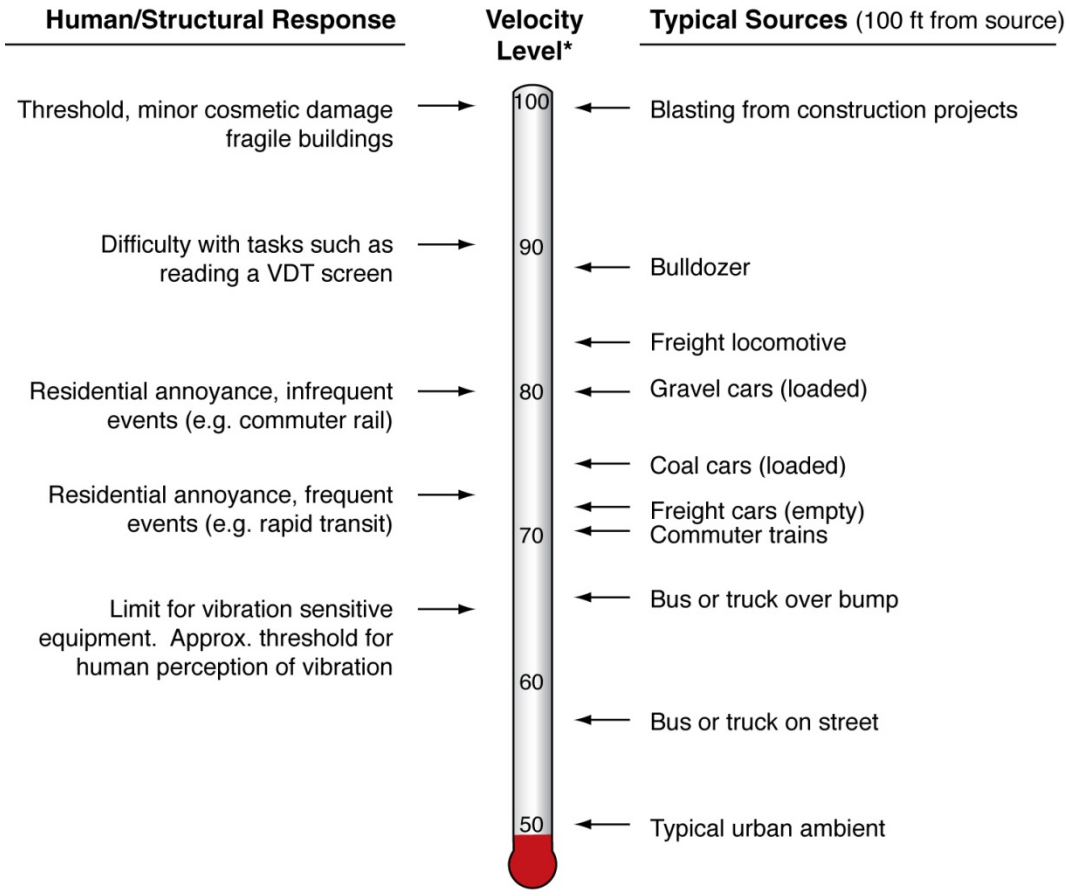


Figure 4.2.2-2 Typical Levels of Ground-Borne Vibration

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.

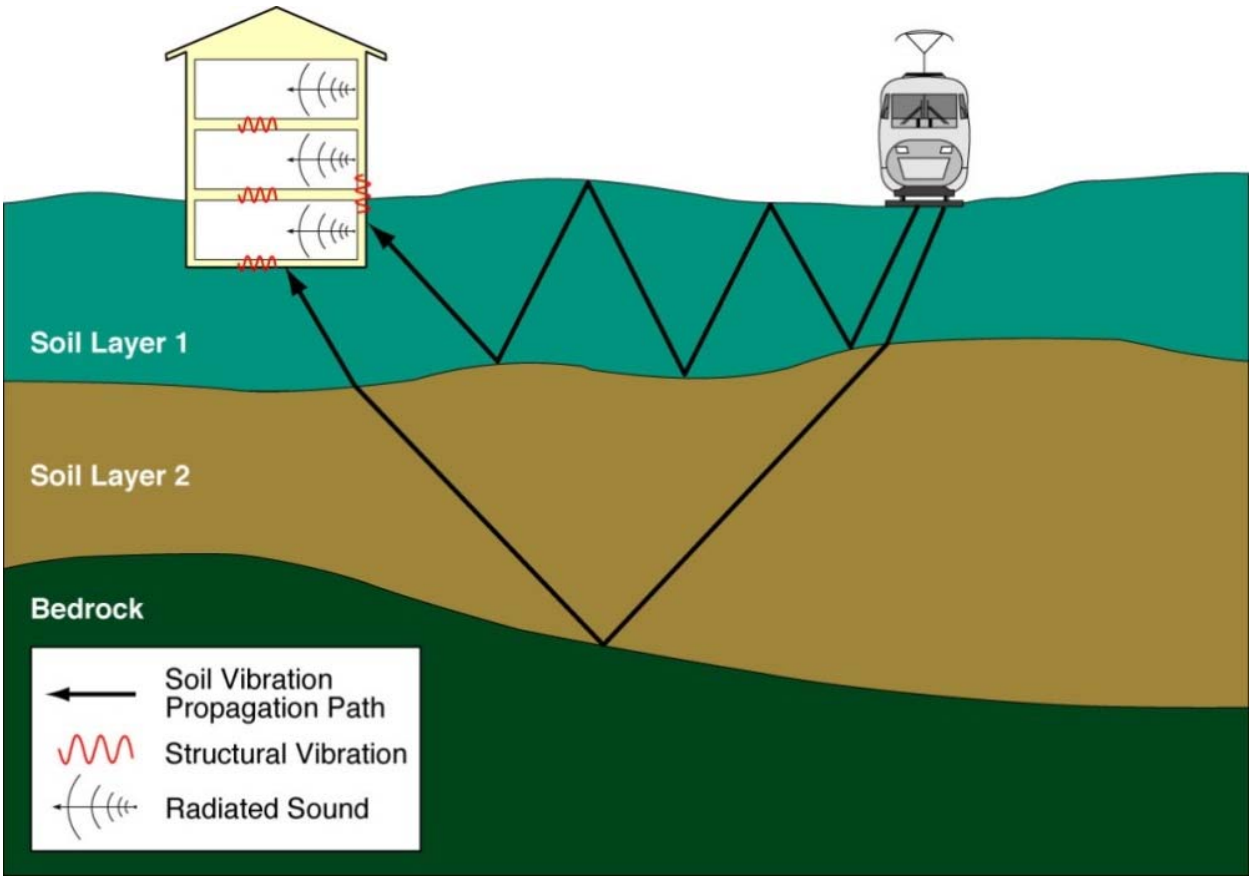


Figure 4.2.2-3 Propagation of Ground-Borne Vibration and Ground-Borne Noise into Buildings

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.

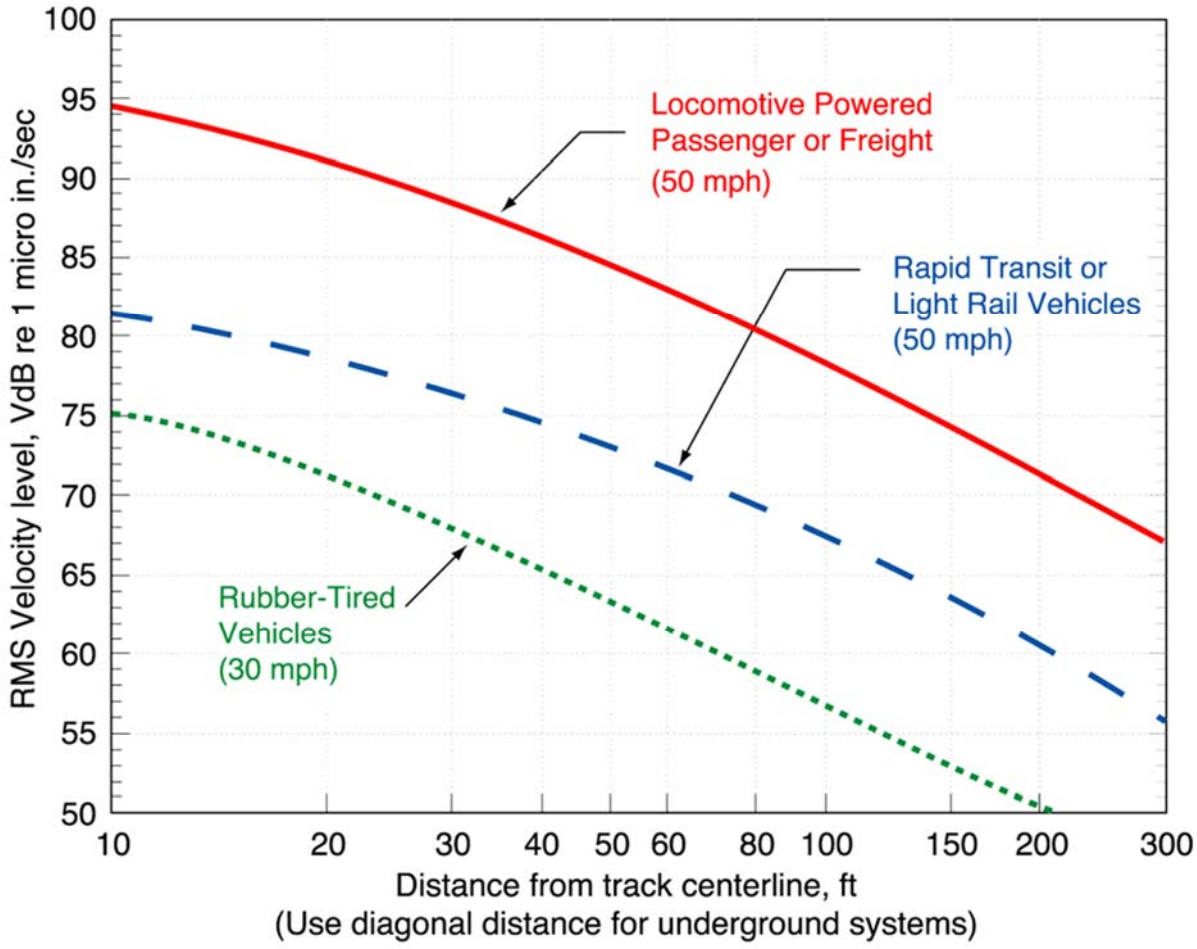


Figure 4.2.2-4 Generalized Vibration Curves for Trains and Rubber-Tired Vehicles

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.

Explanantion 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

N 0 5 10 Miles

U.S. Department of Transportation
Federal Railroad Administration

4.2.3-1

Path: F:\FEC\FECI_GDB\MXD\EIS\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.

Table 4.2.3-1 Prime and Unique Farmland Soils within the E-W Corridor

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 within the 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 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 Environmental Data Management, Inc. (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 FEC right-of-way. 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.

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.

Table 4.2.4-1 Summary of Risk Ratings for Potentially Contaminated Sites

	MCO Segment (Number)		E-W Corridor (Number)		N-S Corridor (Number)		WPB-M Corridor) (Number)
Risk Rating	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-A 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 32.5-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

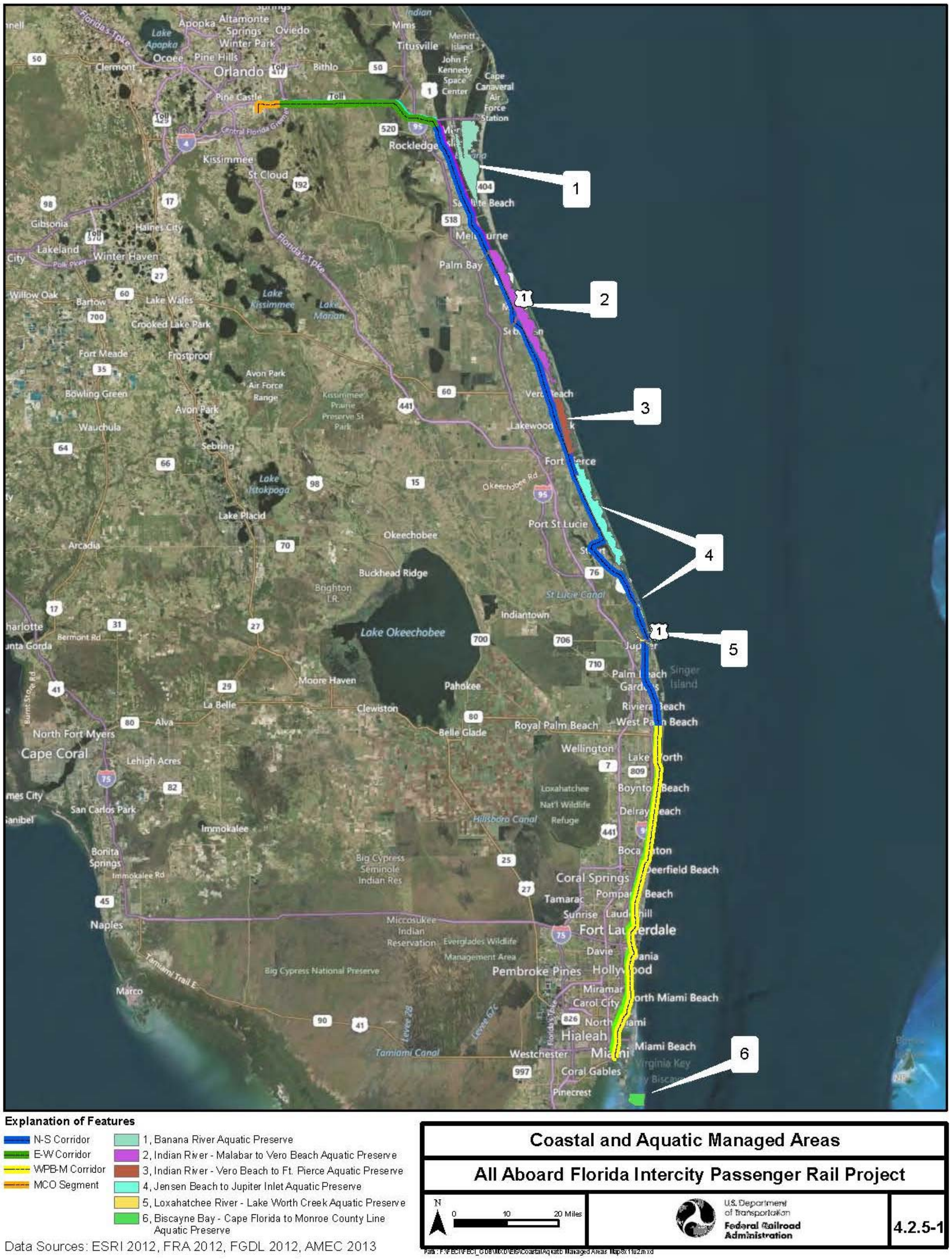
ACSC. No ACSCs occur within the Project Study Area. The FDEP Office of Coastal and Aquatic Managed Areas (CAMA) oversees the management of designated aquatic preserves in Florida.

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
N
0 10 20 Miles
U.S. Department of Transportation
Federal Railroad Administration
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 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 (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 (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 its 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 Final EIS.

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 which 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.

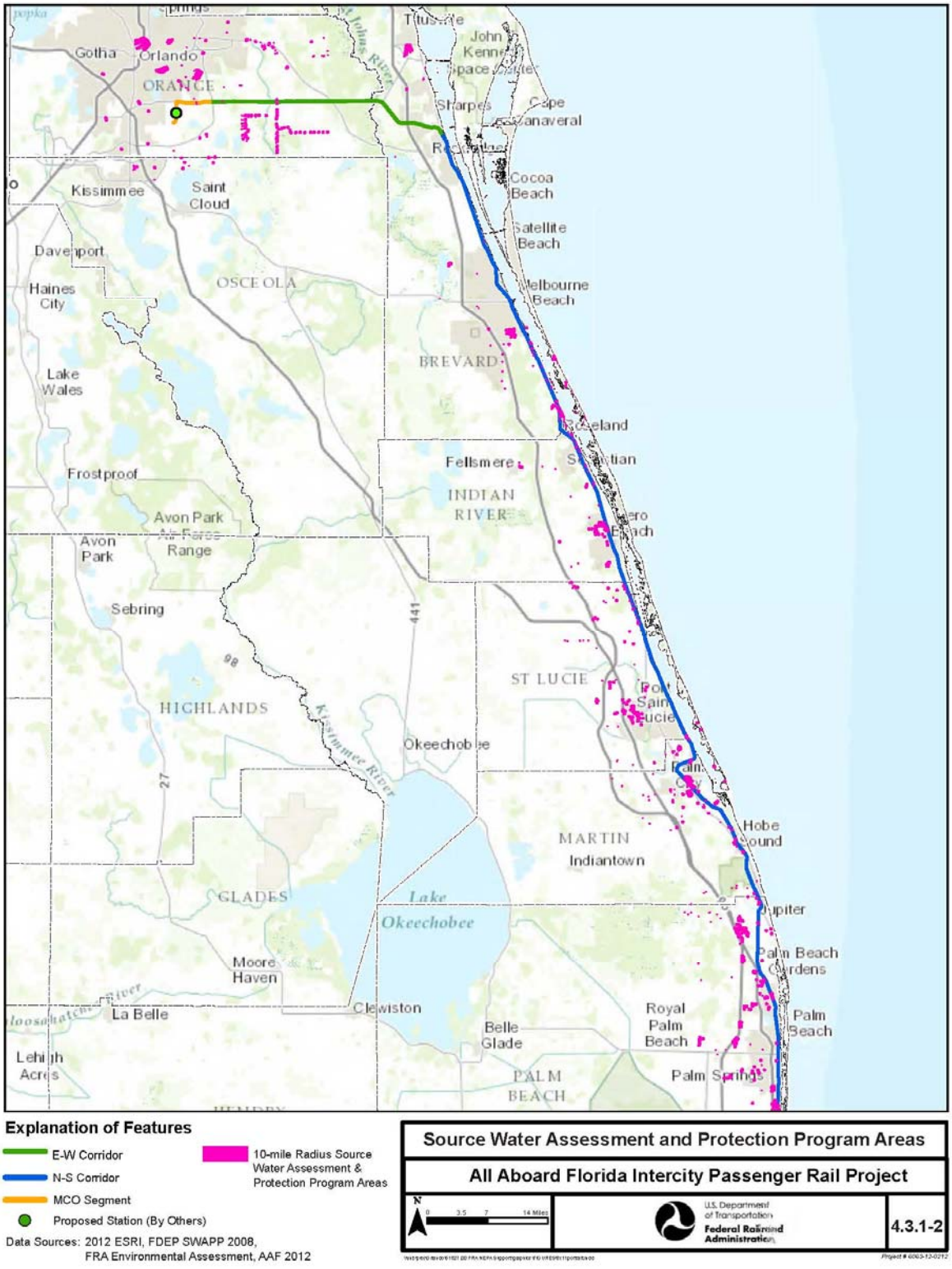
Surface water resources are lakes, rivers, and streams, and are important for ecological, economic, recreational, aesthetic, and human health reasons. Federal and state agencies classify water bodies based upon their characteristics, function, and use. Water quality is also monitored and classifications 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 ≥ 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 4.3.1-2. The Project would intersect SWAPP zones in all six counties.


Gotha
Orlando
ORANGE
Kissimmee
Saint Cloud
Davenport
Haines City
OSCEOLA
Lake Wales
Frostproof
Avon Park
Avon Park Air Force Range
Sebring
HIGHLANDS
Titusville
John Kennedy Space Center
Sharpes
Cape Canaveral
Cocoa Beach
Satellite Beach
Melbourne Beach
BREVARD
Fellsmere
INDIAN RIVER
ST LUCIE
Okeechobee
MARTIN
Indiantown
Hobe Sound
Jupiter
Palm Beach Gardens
Palm Beach
Royal Palm Beach
Palm Springs
Belle Glade
PALM BEACH
Lake Okeechobee
GLADES
Moore Haven
Clewiston
La Belle
Lehigh Acres
441
98
27
Kissimmee River
St Johns River
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
N
0 3.5 7 14 Miles
U.S. Department of Transportation
Federal Railroad Administration
4.3.1-2

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 4.3.1-3), 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.

Table 4.3.1-1 Surface Waters Classifications and Impairments in the MCO Segment and E-W Corridor

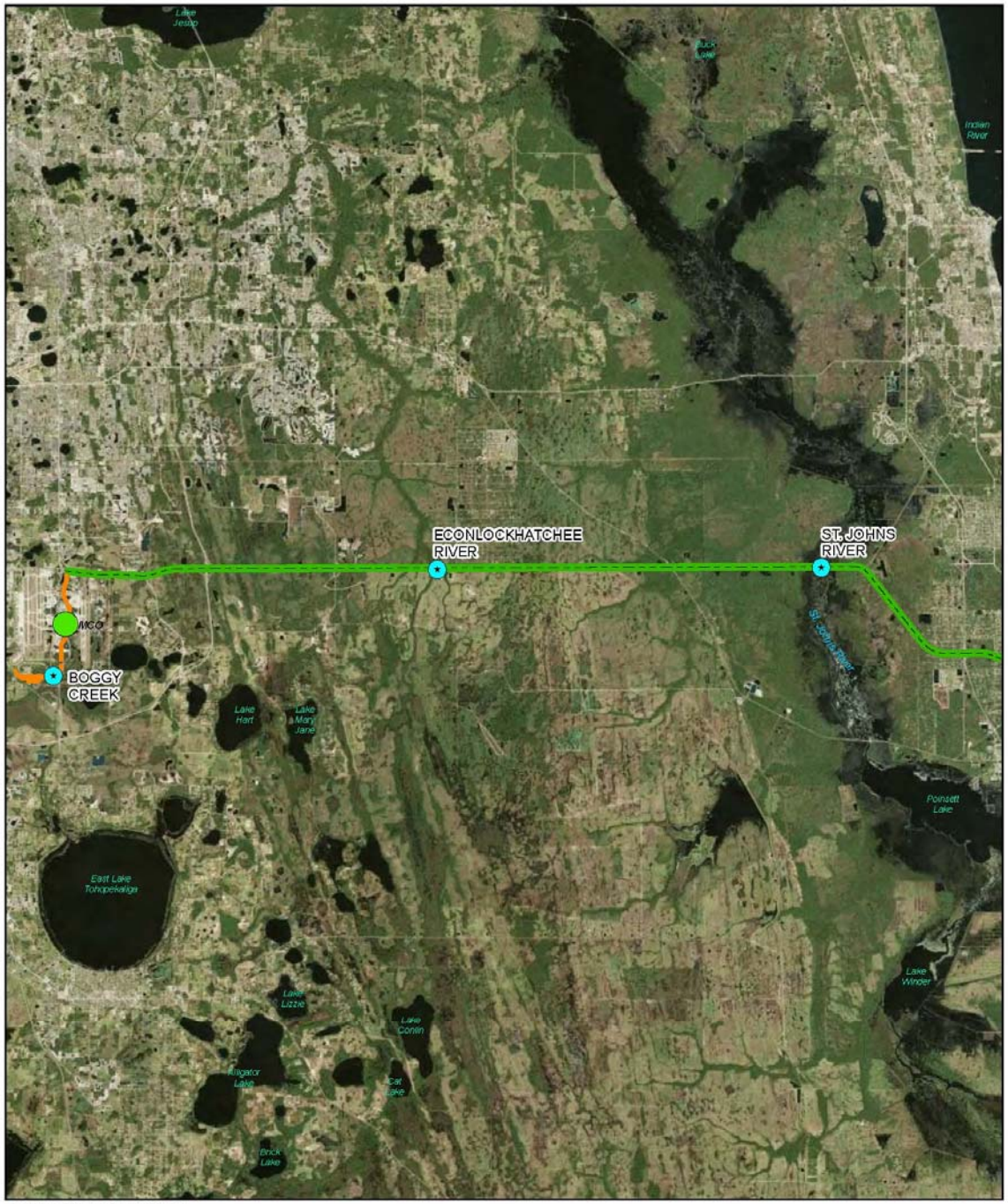
County	Name of Waterbody	Impaired	Source of Impairment	FDEP Classification[1]
Orange	Boggy Creek	Yes	Fecal Coliform	3F
Orange	Econlockhatchee River	Yes	Mercury (in fish tissue), Fecal Coliform	3F[2]
Orange	Second Creek			
Orange	Taylors Creek			
Orange Brevard	St. Johns River Above Puzzle Lake (South Segment)	Yes	Fecal Coliform, Dissolved Oxygen, Mercury (in fish tissue)	3F[2,3]

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
- 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 4.3.1-4), 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.


Lake Jessup
Indian River
ECONLOCKHATCHEE RIVER
ST. JOHNS RIVER
MCO
BOGGY CREEK
Lake Hart
Lake Mary Jane
Poinsett Lake
East Lake Tohopekaliga
Lake Lizzie
Lake Conlin
Alligator Lake
Cat Lake
Brick Lakes
Lake Winder
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
N
0 2 4 Miles
U.S. Department of Transportation
Federal Railroad Administration
4.3.1-3


ORLANDO
MCO
COCOA
HORSE CREEK
EAU GALLIE RIVER
CRANE CREEK
TURKEY CREEK
GOAT CREEK
ST. SEBASTIAN RIVER
NORTH CANAL
SOUTH CANAL
TAYLORS CREEK
MOORES CREEK
UNNAMED CREEK
ST. LUCIE RIVER
JUPITER RIVER
WEST PALM BEACH
UNNAMED TRIBUTARY 2
UNNAMED TRIBUTARY 1
TRIBUTARY TO MANATEE CREEK 2
TRIBUTARY TO MANATEE CREEK 1
Lake Kissimmee
Istokpoga Lake
The Everglades
Explanation of Features
Water Body Crossings
E-W Corridor
N-S Corridor
WPB-M Corridor
MCO Segment
Proposed Stations - WPB-M Corridor
Proposed Station (By Others)
Data Sources: ESRI Bing Maps 2012 Imagery, FRA 2012, AMEC 2013
N-S Corridor Waterway Crossings
All Aboard Florida Intercity Passenger Rail Project
N
0 5 10 Miles
U.S. Department of Transportation
Federal Railroad Administration
4.3.1-4

Table 4.3.1-2 Surface Waters Classifications and Impairments in the N-S Corridor, Cocoa to West Palm Beach

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 Indian River	St. Sebastian River Above Indian River	Yes	Mercury (in fish tissue), Dissolved Oxygen	3M[5]
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 Palm Beach	Loxahatchee River	Yes	Nutrients (historic chlorophyll-A), Mercury (in fish tissue), Bacteria (in shellfish)	3M[4,5]
Palm Beach	Earman River (Palm Beach Stations / D-Canals)	Yes	Dissolved Oxygen, Nutrients (chlorophyll-A)	3F

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
- 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 4.3.1-5), 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.

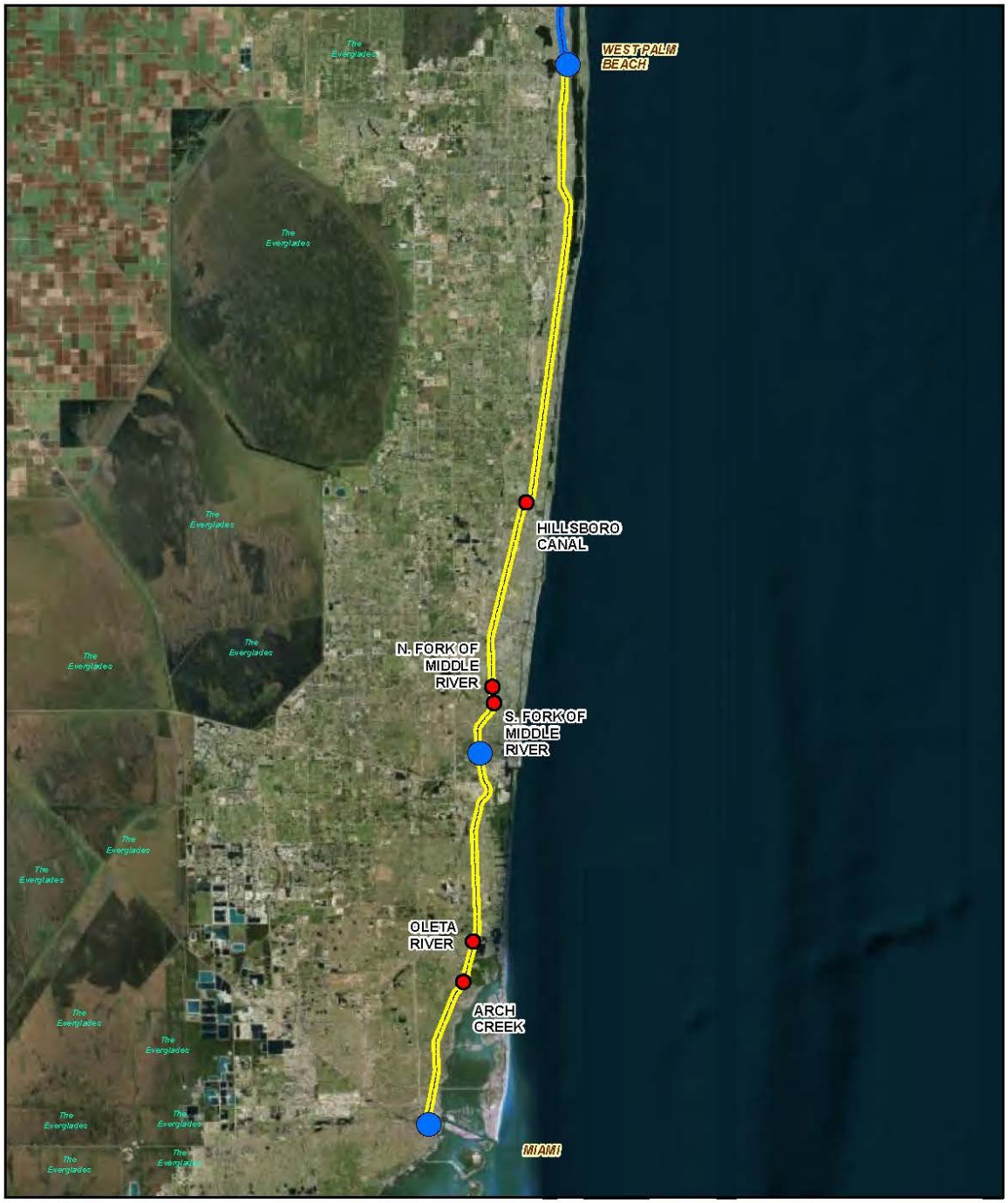

WEST PALM BEACH
HILLSBORO CANAL
N. FORK OF MIDDLE RIVER
S. FORK OF MIDDLE RIVER
OLETA RIVER
ARCH CREEK
MIAMI
The Everglades
Explanation of Features
Water Body Crossings
N-S Corridor
WPB-M Corridor
Proposed Stations - WPB-M Corridor
Data Sources: ESRI Bing Maps 2012 Imagery, FRA 2012, AMEC 2013
WPB-M Corridor Waterway Crossings
All Aboard Florida Intercity Passenger Rail Project
N
0 2.5 5 Miles
U.S. Department of Transportation
Federal Railroad Administration
4.3.1-5

Table 4.3.1-3 Surface Waters Classifications and Impairments in WPB-M Corridor, West Palm Beach to Miami

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	-		

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
- 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).

Table 4.3.1-4 Sole Source Aquifer Protection Zones in the Project Study Area

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. The surficial aquifer system is a major source of drinking water in Indian River County. The Floridan aquifer system exists under artesian conditions in Indian River County. However, it is not generally a major source of potable water in the area due to high chloride concentrations (Marella 1999; Miller 1990).

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, 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 its 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 Final EIS.

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-A provide depictions of the land use within the Project Study Area. Lists of characteristic plant species of each community are provided in Appendices 4.3.3-A1 and 4.3.3-A2.

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.

Table 4.3.3-2 Common Wetland Plant Species

Scientific Name	Common Name
Acer rubrum	Red maple
Cephalanthus occidentalis	Buttonbush
Cladium jamaicense	Sawgrass
Gordonia lasianthus	Loblolly bay
Ilex cassine	Dahoon holly
Itea virginica	Virginia willow
Liquidambar styraciflua	Sweetgum
Magnolia virginiana	Sweetbay
Melaleuca quinquinerva	Melaleuca
Myrica cerifera	Wax myrtle
Nyssa sylvatica var. *biflora*	Swamp tupelo
Panicum hemitomum	Maidencane
Persea borbonia	Red bay
Persea palustris	Swamp bay
Pinus elliottii	Slash pine
Pinus palustris	Longleaf pine
Pinus serotina	Pond pine
Quercus hemisphaerica	Laurel oak
Quercus nigra	Water oak
Rhododendron viscosum	Swamp azalea
Sabal minor	Dwarf palmetto
Sabal palmetto	Cabbage palm
Salix caroliniana	Carolina willow
Schinus terebinthefolia	Brazilian pepper
Taxodium ascendens	Pond cypress
Taxodium distichum	Bald cypress
Ulmus americana	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 (Table 4.3.3-2). 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. Barriers between habitats provided by either fences along the SR 528 right-of-way boundary or created by ecotones between disturbed and undisturbed habitat are limited and allow more natural connectivity between and within existing habitats.

4.3.4 Floodplains

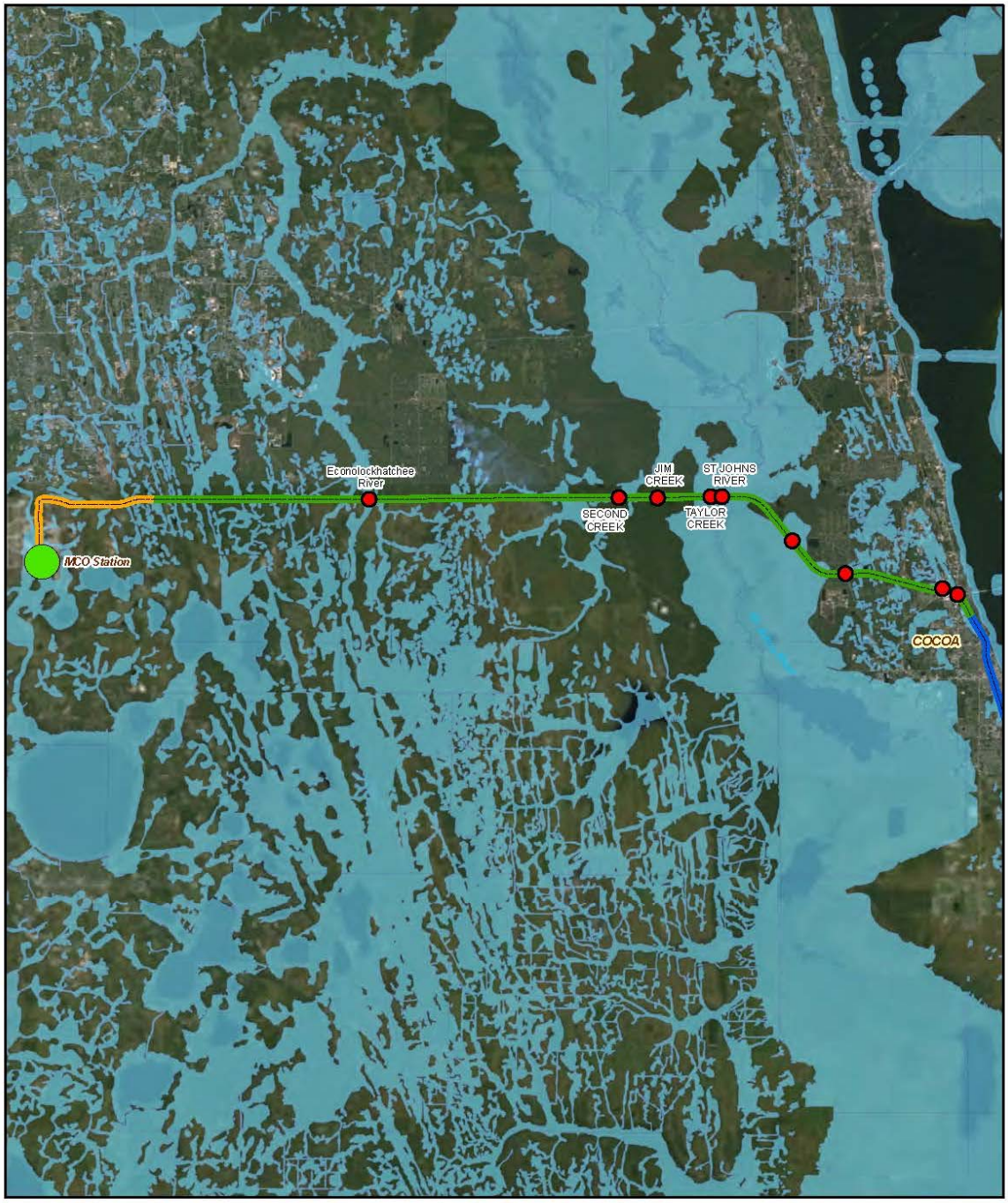
A floodplain is defined as any land area susceptible to being inundated by floodwaters from any water source (44 CFR part 59), whereas the 100-year floodplain is the area of land inundated by a flood event that has a 1 percent chance of being equaled or exceeded in any given year (FEMA 2013a). Floodplains 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.



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

N 0 2 4 Miles

U.S. Department of Transportation Federal Railroad Administration

4.3.4-1

Path: F:\FECI\FECI_GDB\MXD\EIS\EW FloodPlain Map.mxd


ORLANDO
COCOA
HORSE CREEK
EAU GALLIE RIVER
CRANE CREEK
TURKEY CREEK
GOAT CREEK
SEBASTIAN RIVER
NORTH CANAL
SOUTH CANAL
TAYLORS CREEK
MOORES CREEK
UNNAMED CREEK
ST. LUCIE RIVER
LOXAHATCHEE RIVER
WEST PALM BEACH
UNNAMED TRIBUTARY 2
UNNAMED TRIBUTARY 1
TRIBUTARY TO MANATEE CREEK 2
TRIBUTARY TO MANATEE CREEK 1
Explanantion 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
N
0
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0.3 Miles
U.S. Department of Transportation
Federal Railroad Administration
4.3.4-2
Path: F:\FEC\FECI_GDB\MXD\EA\NS Corridor FloodPlain Map.mxd

Table 4.3.4-1 Project Study Area 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.

Table 4.3.4-2 Floodway Crossings within the Project Study Area

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
South Canal	N-S	Indian River	AE
Main Canal	N-S	Indian River	AE
North Canal	N-S	Indian River	AE
Taylors Creek	N-S	St Lucie	VE
St. Sebastian River	N-S	St Lucie	AE
Moore's Creek	N-S	St Lucie	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
St. Lucie 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. Seven 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.

Table 4.3.4-3 Federal Flood Control Projects Within the Project Study Area

County	Federal Project Name	Local Name	Project Corridor
St. Lucie	C-25	Taylor Creek	N-S
Palm Beach	C-17	Earman River	WPB-M
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-A (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-A, *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. Table 4.3.5-2 provides a list of common plant species found in these communities. Table 4.3.5-3 provides a list of common wildlife species found in upland habitats.

Table 4.3.5-1 Existing Natural Upland Communities Located Within and Adjacent to the Project Study Area

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.

Table 4.3.5-2 Common Upland Plant Species

Scientific Name	Common Name
Andropogon spp.	Bluegrass, Bluestem
Aristida stricta var. *beyrichiana*	Wiregrass
Celtis laevigata	Sugarberry
Ceratiola ericoides	Florida rosemary
Dichanthelium spp.	Witchgrass
Gaylussacia dumosa	Dwarf huckleberry
Ilex glabra	gallberry
Lyonia spp.	Fetterbush
Myrica cerifera	Wax myrtle
Panicum spp.	Panic grass
Quercus geminate	Sand live oak
Quercus minima	Dwarf live oak
Rhus coppalinum	Winged sumac
Serenoa repens	Saw palmetto
Vaccinium arboretum	Sparkleberry
Vaccinium myrsinites	Shiny blueberry

Table 4.3.5-3 Key Upland Wildlife Species

Scientific Name	Common Name
Ammodramus savannarum floridanus	Florida grasshopper sparrow
Aphelocoma coerulescens	Florida scrub jay
Athene cunicularia floridana	Florida burrowing owl
Drymarchon corais couperi	Eastern indigo snake
Elanus leucurus	White-tailed kite
Falco sparverius paulus	Southeastern American kestrel
Gopherus polyphemus	Gopher tortoise
Grus canadensis pratensis	Florida sandhill crane
Haliaeetus leucocephalus	Bald eagle
Lampropeltis extenuata	Short-tailed snake
Lithobates capito	Gopher frog
Neoseps reynoldsi	Sand skink
Peromyscus polionotus	Beach mouse
Picoides borealis	Red-cockaded woodpecker
Pituopsis melanolucus mugitus	Florida pine snake
Podomys floridanus	Florida mouse
Polyborus plancus	Audubon's crested caracara
Puma concolor coryi	Florida panther
Sciurus niger avicennia	Big cypress fox squirrel
Sciurus niger shermani	Sherman's fox squirrel
Ursus americanus floridus	Florida black bear

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 indiangrass, 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.

Key wildlife species which inhabit dry prairie include several bird species that prefer open habitat with low groundcover such as Florida grasshopper sparrow, Florida burrowing owl, Audubon's crested caracara, white-tailed kite, Florida sandhill crane, and southeastern American kestrel. Other important wildlife species include gopher tortoise, eastern indigo snake, Florida mouse, and gopher frog.

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.

Key wildlife species that inhabit shrub and brushland habitats include gopher tortoise, eastern indigo snake, Florida mouse, and gopher frog. Florida black bear may also utilize large tracts of these habitats for foraging and migration.

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 indiangrass, 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 indigoberry, Spanish stopper, wild lime, coinvine, and gray nicker. Common groundcover species include seaoats, railroad vine, coral dropseed, and seashore paspalum.

Scrub occurring near the coast is important habitat for endangered beach mice populations during and after storm events that destroy the fore-dunes. Coastal scrub is also important for gopher tortoise.

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.

Listed wildlife species found in pine flatwoods in the Project Study Area include the eastern indigo snake, grasshopper sparrow, red-cockaded woodpecker, Florida pine snake, Sherman's fox squirrel, Big Cypress fox squirrel, and Florida black bear. Dry pine flatwoods may also be utilized by Florida mouse, Florida scrub-jay, gopher tortoise, and associated species such as the gopher frog. Bald eagles will nest in pine trees near water bodies within pine flatwoods.

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. Key wildlife species are similar to those species utilizing pine flatwoods.

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, eastern indigo snake, Audubon's crested caracara, Florida panther, Sherman's fox squirrel, and Big Cypress fox

squirrel. Bald eagles utilize pine trees found within hardwood forest or hardwood – coniferous mixed forest for nesting.

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.

Central Florida scrub habitat is utilized by a number of listed wildlife species including several found only on the Lake Wales Ridge (not within the Project Study Area). Additional species endemic to scrub and other xeric habitats in Florida include the sand skink, Florida mouse, and the short-tailed snake. Scrub is also important for gopher tortoise.

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.

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.

The Florida Wildlife Corridor

The Florida Wildlife Corridor project is a collaborative effort to connect natural lands, waters, forests, working farms, and ranches from the Everglades to Georgia, protecting a functional ecological corridor. The goals of the project (Florida Wildlife Corridor 2013) are:

- Protect and restore habitat and migration corridors essential for the survival of the diverse wildlife of Florida, including wide-ranging species such as panthers and black bears;
- Restore water levels in the Everglades and maintain the water supply of south Florida;
- Protect the St. Johns River and water supply for central and north Florida;

- Sustain food production, economies, and cultural legacies of working ranches and farms;
- Bolster local economies through opportunities such as hunting, fishing, birdwatching, and other forms of eco-tourism;
- Provide native wildlife and plants opportunities to adapt to a changing climate and sea level rise; and
- Provide an important linkage within the Project Study Area (Figure 4.3.5-1) via the Florida Wildlife Corridor between wildlife habitat areas north and south of SR 528.

Tosohatchee Wildlife Management Area

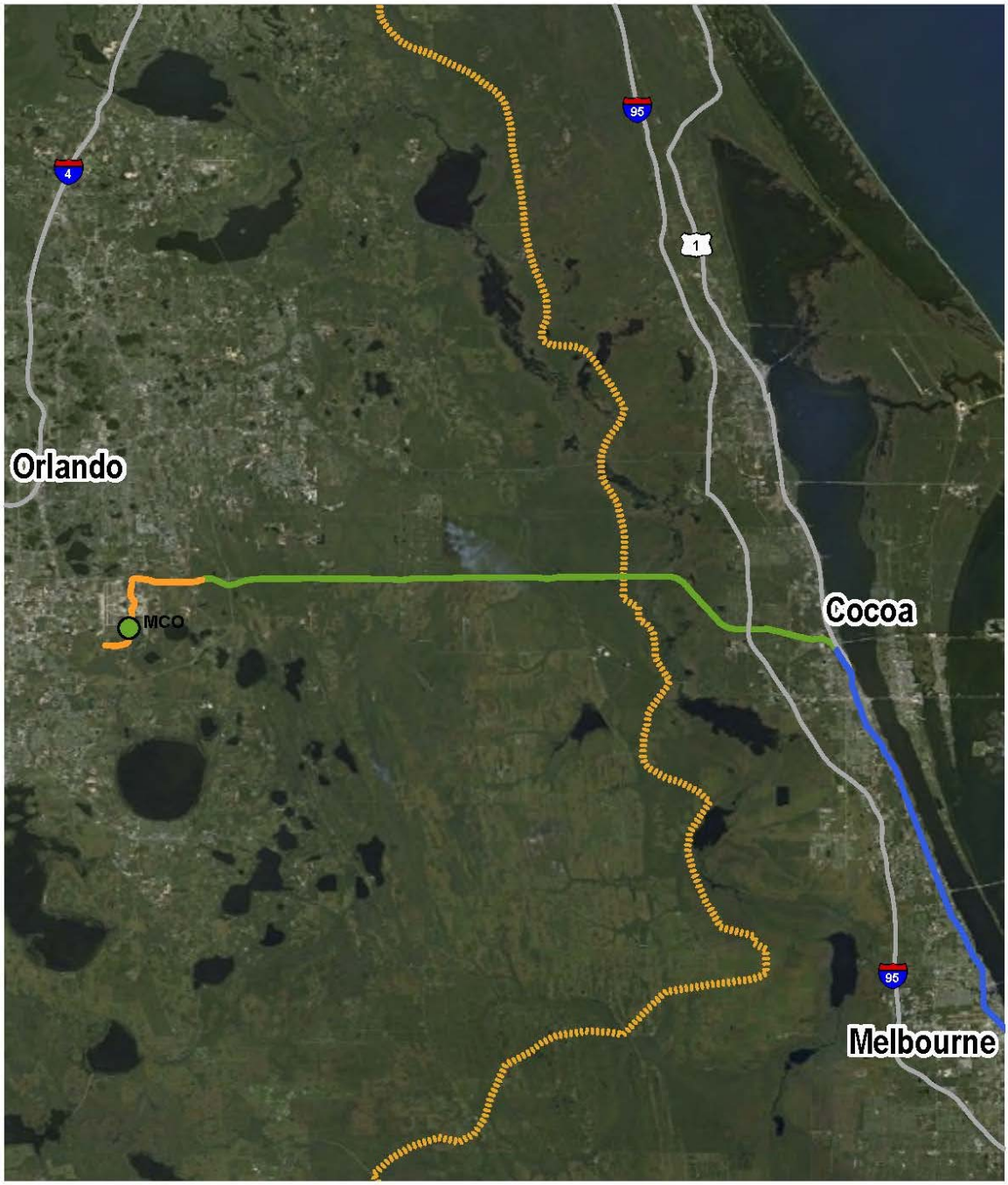
The Tosohatchee Wildlife Management Area covers 30,701 acres along 19 miles of the St. Johns River in eastern Orange County. Dominant natural communities include freshwater marsh, hardwood swamp, mesic hammocks, pine flatwoods, cypress, and rivers and streams. These habitats, and those of adjacent public lands, are essential to maintaining water quality and the ecological integrity of the St. Johns River (FWC 2008).

Helen and Allan Cruikshank 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).

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.).



Explanation of Features

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

Data Sources: 2012 ESRI, Florida Wildlife Corridor 2014

Florida Wildlife Corridor

All Aboard Florida Intercity Passenger Rail Project

N 0 1.75 3.5 7 Miles

U.S. Department of Transportation Federal Railroad Administration

4.3.5-1

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 Project Study Area is adjacent to the west boundary of the mainland tract.

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.

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 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-A. The list of the managed species groups that may utilize aquatic habitat along the N-S and WPB-M Corridors is presented in Table 4.3.5-4.

Table 4.3.5-4 Essential Fish Habitat within the Project Study Area

County	Site	EFH[1]	HAPC[1]
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
	St. Sebastian River	Spiny Lobster Snapper-Grouper Complex	None
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
	Moores Creek	Spiny Lobster Penaeid Shrimp Snapper-Grouper Complex	Snapper-Grouper Complex
	Warner Creek[2]	None	None
	Unnamed Creek	Spiny Lobster Penaeid Shrimp	Snapper-Grouper Complex
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

Table 4.3.5-4 Essential Fish Habitat within the Project Study Area (Continued)

County	Site	EFH[1]	HAPC[1]
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 Comples
	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. Low altitude aerial photography was utilized to identify areas which 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.

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.

Table 4.3.6-1 Rare Species and Habitat (Land Use) Assumptions for Terrestrial Species

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
Burrowing Owl	310, 320, 330, 411
Florida Mouse	310, 320, 330, 411
Pine Snake	310, 320, 330, 411
Short-Tailed Snake	310, 320, 330, 411
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.

4.3.6.2 Affected Environment

The desktop survey identified 38 plant and animal species that are both federally and state listed (Tables 4.3.6-2 and 4.3.6-3) and 36 plant and animal species listed only by the State of Florida (Tables 4.3.6-4 and 4.3.6-5) that may occur within or adjacent to the Project Study Area.

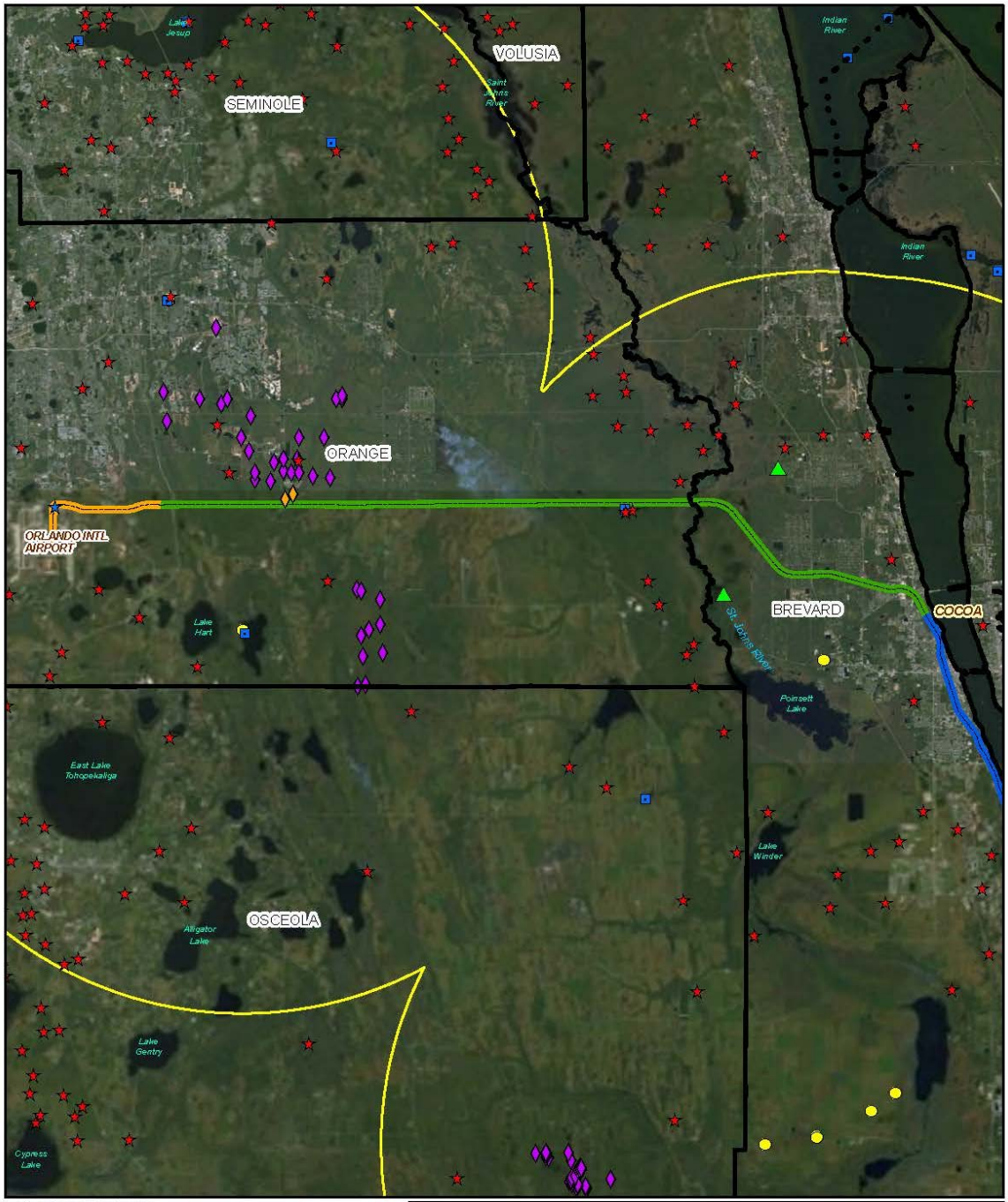
The MCO Segment, E-W Corridor, and N-S Corridor intersect USFWS Consultation Areas for: West Indian (Florida) manatee (Figure 4.3.6-4), Florida scrub-jay, red-cockaded woodpecker, Everglade snail kite, Audubon's crested caracara, piping plover, and Atlantic salt marsh snake (USFWS 2003a, 2003b, 2003c, 2003d, , 2003e, 2003f, and 2004a). 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.

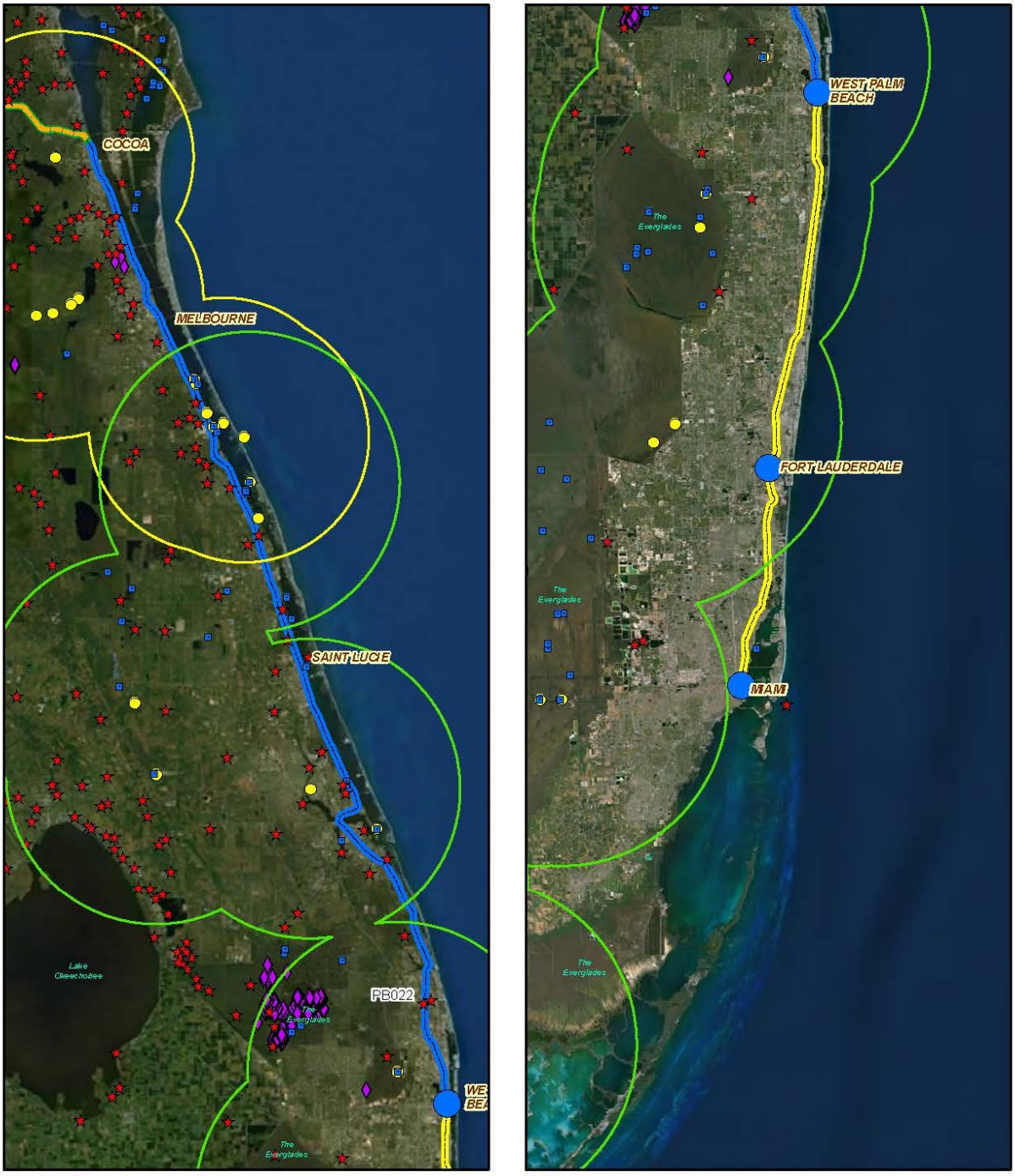
Table 4.3.6-2 Federal and State Protected Wildlife Species Known to Occur Within Project Study Area Counties

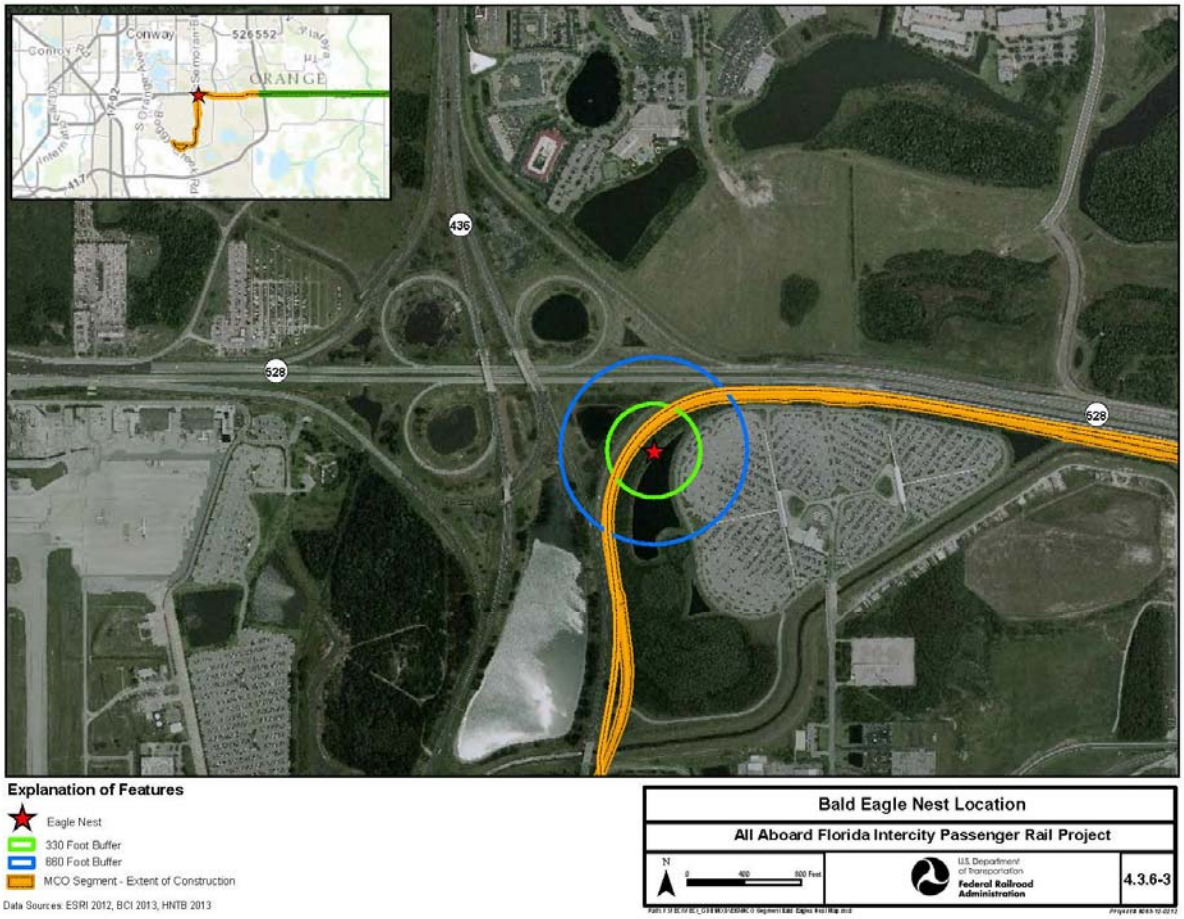
Listed Species	Scientific Name	Federal Status	State Status	Preferred Habitat
West Indian Manatee	*Trichechus manatus*	E	E	Coastal waters, bays, rivers, lakes
Southeastern Beach Mouse	*Peromyscus polionotus niveiventris*	E	T	Sand dunes
Florida panther	*Puma concolor coryi*	E	E	Large blocks of forested upland or wetland
Florida scrub-jay	*Aphelocoma coerulescens*	T	T	Fire-dominated low-growing oak scrub
Red knot	*Calidris canutus rufa*	C	Not listed	Beaches
Audubon's crested caracara	*Caracara cheriway*	T	T	Open country with cabbage palm
Piping plover	*Charadrius melodus*	T	T	Beaches and tidal mudflats
Kirtland's Warbler	*Dendroica kirtlandii*	E	E	Dense scrub
Wood stork	*Myceteria americana*	E	E	Freshwater wetlands
Red-cockaded woodpecker	*Picoides borealis*	E	E	Open mature pine woodland
Everglade snail kite	*Rostrhamnus socialibis plumbeus*	E	E	Large open freshwater marshes
American alligator	*Alligator mississippinesis*	SAT	SSC	Permanent bodies of freshwater
Loggerhead sea turtle	*Caretta*	T	T	Coastal and oceanic waters
Green sea turtle	*Chelonia mydas*	E	E	Coastal and oceanic waters
Kemp's Ridley sea turtle	*Lepidochelys kempii*	E	E	coastal and oceanic waters
Hawksbill sea turtle	*Eremochelys imbricata*	E	E	Coastal and oceanic waters
Leatherback sea turtle	*Demochelys coriacea*	E	E	Coastal and oceanic waters
Gopher tortoise	*Gopherus polyphemus*	C	T	Dry sandy uplands
Florida sand skink	*Neoseps reynoldsii*	T	T	Sparse dry scrub
Atlantic salt marsh snake	*Nerodia clarkia taeniata*	T	T	Coastal salt marshes
Eastern indigo snake	*Drymarchon corais couperi*	T	T	Wide range of upland and wetland habitats
Striped newt	*Notophthalmus parstriatus*	C	Not listed	Xeric uplands
Smalltooth sawfish	*Pristis pectinata*	T	T	Estuaries, bays, tidal creeks

E Endangered
T Threatened
C Candidate
SAT Threatened because of similarity of appearance
SSC State Special Concern


VOLUSIA
SEMINOLE
ORANGE
BREVARD
COCOA
OSCEOLA
ORLANDO INTL AIRPORT
Lake Jesup
Saint Johns River
Indian River
Lake Hart
St. Johns River
Poinsett Lake
East Lake Tohopekaliga
Lake Winder
Alligator Lake
Lake Gentry
Cypress Lake
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
WadingBird Active Rookeries, 1999 data
Protected Bird Species along the MCO Segment and E-W Corridor
All Aboard Florida Intercity Passenger Rail Project
N
0 2 4 Miles
U.S. Department of Transportation
Federal Railroad Administration
4.3.6-1

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).


COCOA
MELBOURNE
SAINT LUCIE
PB022
WE
BE
WEST PALM BEACH
FORT LAUDERDALE
MIAM
The Everglades
Lake Okeechobee
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
N
0 5 10 Miles
U.S. Department of Transportation
Federal Railroad Administration
4.3.6-2
Path: F:\FEC\FECI_GDB\MXD\EIS\NS_Corridor_Protected_Bird_Species_Location_Map.mxd


Conway
526552
ORANGE
436
528
528
Explanation of Features
Eagle Nest
330 Foot Buffer
880 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
N
0
400
800 Feet
U.S. Department of Transportation
Federal Railroad Administration
4.3.6-3

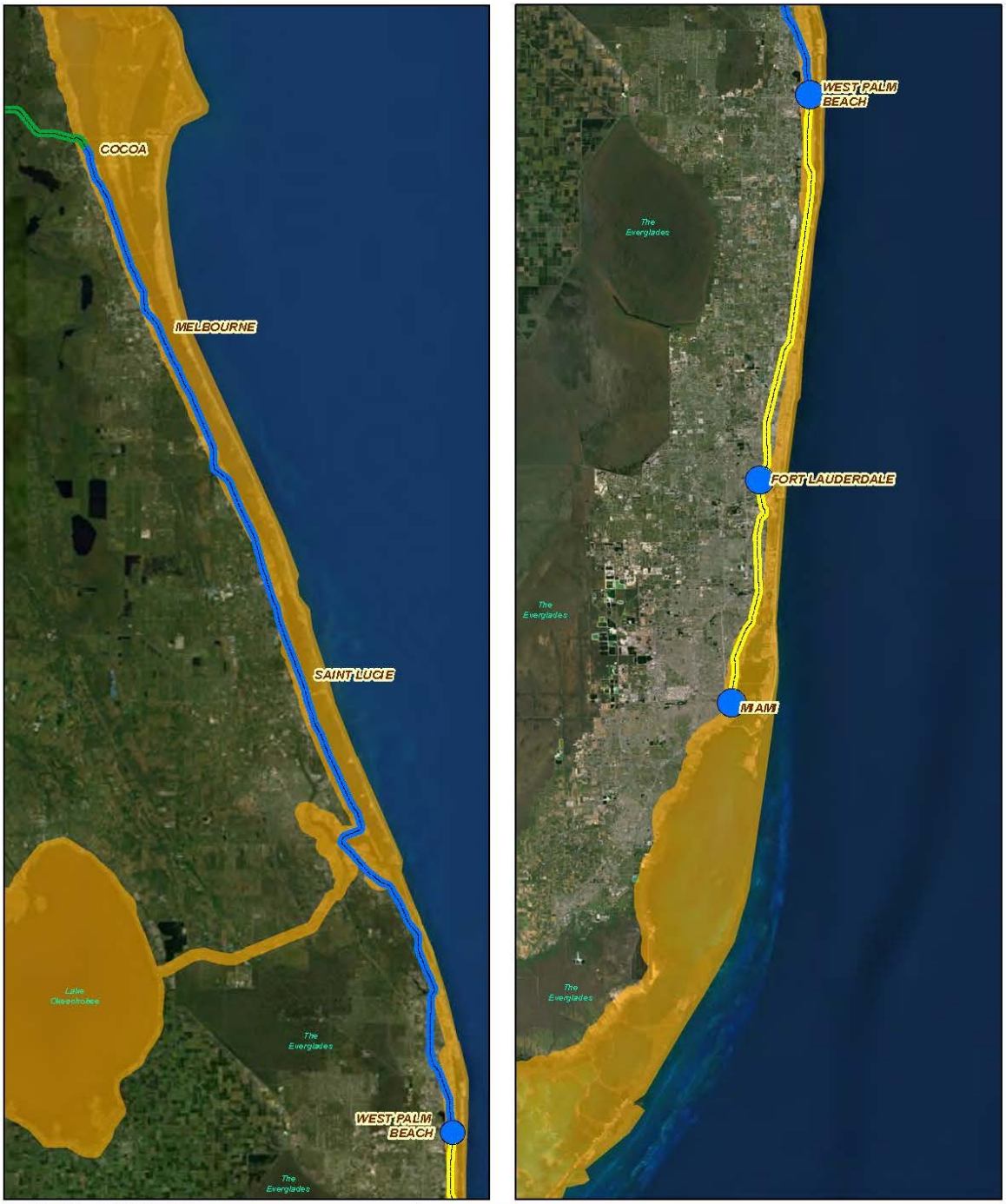

COCOA
MELBOURNE
SAINT LUCIE
WEST PALM BEACH
The Everglades
Lake Okeechobee
WEST PALM BEACH
FORT LAUDERDALE
MIAMI
Explanation of Features
Proposed Stations - WPB-M Corridor
E-W Corridor
N-S Corridor
WPB-M Corridor
West Indian Manatee Critical Habitat
West Indian Manatee Critical Habitat
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Table 4.3.6-3 Federal and State Protected Plant Species Known to Occur Within Project Study Area Counties

Listed Species	Scientific Name	Federal Status	State Status	Preferred Habitat
Four-petal pawpaw	*Asimina tetramera*	E	E	Sand pine scrub
Florida bonamia	*Bonamia grandiflora*	T	E	Open or disturbed sand scrub
Fragrant prickly-apple	*Ceereus eriophorus* var. *fragrans*	E	E	Scrub flatwoods and xeric hammocks
Florida perforated cladonia	*Cladonia perforata*	E	E	Rosemary scrub
Okeechobee gourd	*Cucurbita okeechobeensis*	E	E	Swamps along Lake Okeechobee
Beautiful pawpaw	*Deeringothamnus pulchellus*	E	E	Open longleaf pine woods
Lakela's mint	*Dicerandra immaculata*	E	E	Atlantic coastal ridge scrub
Scrub wild buckwheat	*Eriogonum longifolium* var. *gnaphalifolium*	T	E	Various scrub upland habitats
Johnson's seagrass	*Halophila johnsonii*	T	T	Tidal deltas, mouths of canals
Beach jacquemontia	*Jacquemontia reclinata*	E	E	Dunes, coastal strand
Papery whitlow-wort	*Paronychia chartacea*	T	E	Lake Wales ridge scrub
Tiny polygala	*Polygala smallii*	E	E	Scrub, sandhill
Sand lace	*Polygonella myriophylla*	E	E	Open sandy scrub
Scrub plum	*Prunus geniculata*	E	E	Sandhill and oak scrub
Carter's mustard	*Warea carteri*	E	E	Sandhill, inland and coastal scrub

E Endangered
T Threatened

Table 4.3.6-4 State-only Protected Wildlife Species Known to Occur Within Project Study Area Counties

Listed Species	Scientific Name	State Status	Preferred Habitat
Florida mouse	*Podomys floridanus*	SSC	Xeric sandy uplands
Sherman's fox squirrel	*Sciurus niger shermani*	SSC	Sandhill, pine flatwoods, pastures
American oystercatcher	*Haematopus palliates*	SSC	Beaches, sandbars, mudflats
Black skimmer	*Rynchops niger*	SSC	Coastal waters
Brown pelican	*Pelecanus occidentalis*	SSC	Coastal shallow estuarine waters
Burrowing owl	*Athene cunicularia*	SSC	Sparsely vegetated sandy uplands
Florida sandhill crane	*Grus canadensis pratensis*	ST	Prairies, pasture, freshwater marshe
Least tern	*Sterna antillarum*	ST	Beaches
Limpkin	*Aramus guarauna*	SSC	Mangroves, marshes, wetlands
Little blue heron	*Egretta caerulea*	SSC	Shallow open wetlands
Reddish egret	*Egretta rufescens*	SSC	Tidal flats and shores
Roseate spoonbill	*Platalea ajaja*	SSC	Coastal mangroves, tidal flats
Snowy egret	*Egretta thula*	SSC	Inland and coastal wetlands
Southeastern american kestrel	*Falco sparverius paulus*	ST	Open pine habitats, prairies, pastures
Tricolored heron	*Egretta tricolor*	SSC	Coastal and inland wetlands
White ibis	*Eudocimus albus*	SSC	Freshwater and brackish marshes
Florida pine snake	*Pituophis melanoleucus mugitus*	SSC	Open upland forests on dry sandy soils
Rim rock crowned snake	*Tantilla oolitica*	ST	Tropical hardwood hammocks, disturbed habitats
Gopher frog	*Lithobates capito*	SSC	Dry sandy uplands near water
Mangrove rivulus	*Rivulus marmoratus*	SSC	Mangrove forests

SSC Species of Special Concern
ST State Threatened

Table 4.3.6-5 State-only Protected Plant Species Known to Occur Within Project Study Area Counties

Listed Species	Scientific Name	State Status	Preferred Habitat
Curtiss' sandgrass	*Calamovilfa multiflorus*	ST	Wet flatwoods
Many-flowered grass-pink	*Calopogon multiflorus*	SE	Dry to moist longleaf pine forest
Sand dune spurge	*Chamaesyce cumulicola*	SE	Beach dunes
Piedmont joint grass	*Coelorachis tuberculosa*	ST	Freshwater marshes
Large-flowered rosemary	*Conardina grandiflora*	ST	Coastal scrub
Nodding pinweed	*Lechea cernua*	ST	Scrub and scrubby flatwoods
Pine pinweed	*Lechea divaricata*	SE	Scrub and scrubby flatwoods
Celestial lily	*Nemastylis floridana*	SE	Wet prairies, marshes, cabbage palm hammocks
Simpson's zephyrlily	*Zephyranthes simpsonii*	ST	Peaty-sandy soil

ST State Threatened
SE State Endangered

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.

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 eastern indigo snake, West Indian (Florida) manatee, Florida scrub-jay, smalltooth sawfish, 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, Everglades snail kite, and Atlantic salt marsh snake. 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: fragrant prickly apple, Lakela's mint, beach jacquemontia, sand lace, scrub plum, and clasping warea.

Areas within and adjacent to the WPB-M Corridor also may provide habitat for listed species. Table 4.3.6-6 and Table 4.3.6-7 list the protected species reported for the three counties crossed by the WPB-M Corridor.

Table 4.3.6-6 Federal and State Listed Animal Species Potentially in WPB-M Corridor Project Area

Listed Species	Scientific Name	Federal Status	State Status
Mangrove Rivulus	*Rivulus marmoratus*	N/A	SSC
Smalltooth Sawfish	*Pristis pectinata*	E	E
American Alligator	*Alligator mississippiensis*	SAT	SAT
American Crocodile	*Crocodylus acutus*	T	T
Eastern Indigo Snake	*Drymarchon corais couperi*	T	T
Green Sea Turtle	*Chelonia mydas*	E	E
Gopher Frog	*Lithobates capito*	N/A	SSC
Gopher Tortoise	*Gopherus polyphemus*	N/A	T
Hawksbill Sea Turtle	*Eretmochelys imbricate*	E	E
Leatherback Sea Turtle	*Dermochelys coriacea*	E	E
Loggerhead Sea Turtle	*Caretta*	T	T
Rim Rock Crowned Snake	*Tantilla oolitica*	N/A	T
Bald eagle	*Haliaeetus leucocephalus*	Delisted	Delisted
Everglades Snail Kite	*Rostrhamus sociabilis plumbeus*	E	E
Florida Burrowing Owl	*Athene cunicularia floridana*	N/A	SSC
Florida Scrub-jay	*Aphelocoma coerulescens*	T	T
Kirtland's Warbler	*Dendroica kirtlandii*	E	E
Piping Plover	*Charadruis melodus*	T	T
Little blue heron	*Egretta caerulea*	N/A	SSC
Red Knot	*Calidris canutus rufa*	C	N/A
Snowy egret	*Egretta thula*	N/A	SSC
Tricolored heron	*Egretta tricolor*	N/A	SSC
White ibis	*Eudocimus albus*	N/A	SSC
Wood stork	*Mycteria americana*	E	E
Florida Bonneted bat	*Eumops floridanus*	C	T
Florida mouse	*Podomys floridanus*	N/A	SSC
Southeastern Beach Mouse	*Peromyscus polionotusniveiventris*	T	T
West Indian Manatee	*Trichechus manatus*	E/CH	E/CH

E Endangered
T Threatened
C Candidate
CH Critical Habitat
SAT Threatened because of similarity of appearance
SSC State Special Concern

Table 4.3.6-7 Federal and State Listed Plant Species Potentially in WPB-M Corridor Project Area

Listed Species	Scientific Name	Federal Status	State Status
Bahama Brake	*Pteris bahamensis*	N/A	T
Bahama Sachsia	*Sachsia polycephala*	N/A	T
Banded Wild-pine	*Tillandsia flexuosa*	N/A	T
Blodgett's Wild-mercury	*Argythamnia blodgettii*	N/A	E
Celestial Lily	*Nemastylis floridana*	N/A	E
Christmas Berry	*Crossopetalum ilicifolium*	N/A	T
Clamshell Orchid	*Encyclia cochleata* var. *triandra*	N/A	E
Coastal Vervain	*Glandularia maritima*	N/A	E
Cutthroat Grass	*Panicum abscissum*	N/A	E
Eaton's Spike Moss	*Selaginella eatonii*	N/A	E
Florida Lantana	*Lantana depressa* var. *depressa*	N/A	E
Florida Royal Palm	*Roystonea elata*	N/A	E
Giant Orchid	*Pteroglossaspis ecristata*	N/A	T
Golden Leather Fern	*Acrostichum aureum*	N/A	T
Johnson's Seagrass	*Halophila johnsonii*	T/CH	T/CH
Large-flowered Rosemary	*Conradina grandiflora*	N/A	T
Lignum-vitae	*Guaiacum sanctum*	N/A	E
Nodding Pinweed	*Lechea cernua*	N/A	T
Pine Pinweed	*Lechea divaricata*	N/A	E
Pineland Jacquemontia	*Jacquemontia curtissii*	N/A	T
Porter's Broad-leaved Spurge	*Chamaesyce porteriana*	N/A	E
Redmargin Zephyrlily	*Zephyranthes simpsonii*	N/A	T
Rockland Painted-leaf	*Euphorbia pinetorum*	N/A	E
Sand-dune Spurge	*Chamaesyce cumulicola*	N/A	E
Small's Flax	*Linum carteri* var. *smallii*	N/A	E
Tiny polygala	*Polygala smallii*	E	E
Two-keeled Helmet Orchid	*Galeandra bicarinata*	N/A	E
West Indies Mahogany	*Swietenia mahagoni*	N/A	T

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, Vero Beach, Fort Pierce, 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 2012b). 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 approximately 2,310 persons per square mile (USCB 2013).

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 approximately 1,301 persons per square mile (USCB 2013).

The N-S Corridor is within the existing FECR Corridor, and passes through numerous incorporated municipalities: Cocoa, Melbourne, Vero Beach, Fort Pierce, Jupiter, Palm Beach Gardens, Riviera Beach, and West Palm Beach. Among these municipalities, West Palm Beach has the highest total population (98,795), while Vero Beach has the lowest total population (15,664) (USCB 2011). Between 2000 and 2011, Jupiter experienced the largest population gain of these communities, on a percentage basis (37.1 percent) (USCB 2000). Vero Beach was the only incorporated municipality in the Project Study Area whose population declined between 2000 and 2011 (-11.5 percent) (USCB 2000). Table 4.4.1-1 lists the total population, by county, in 2000 and 2011 for each of the incorporated municipalities within the Project Study Area.

Table 4.4.1-1 Total Population (2000 and 2011) of Incorporated Municipalities Crossed by the Project, by County

County	Municipality	Total Population (2000)	Total Population (2011)	Percent Increase in Total Population (2000 to 2011)
Orange	Orlando	185,951	236,532	27.2
Brevard	Cocoa	16,412	17,302	5.4
	Melbourne	71,382	76,538	7.2
Indian River	Vero Beach	17,705	15,664	-11.5
St. Lucie	Fort Pierce	37,516	42,373	12.9
Palm Beach	Jupiter	39,328	53,935	37.1
	Palm Beach Gardens	35,058	47,483	35.4
	Riviera Beach	29,884	32,508	8.8
	West Palm Beach	82,103	98,795	20.3

Source: USCB. 2000. Census 2000. http://factfinder2.census.gov. Accessed August 13, 2013; USCB. 2013. State and County Quick Facts. http://quickfacts.census.gov/qfd/states/12/1260975.html. Accessed August 14, 2013.

A brief description of the other incorporated municipalities within the Project Study Area is 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 approximately 2,258 persons per square mile (USCB 2013).
- Vero Beach's tourist attractions are an important part of the city's economy and the greater region known as the "Treasure Coast" (Vero Beach, Florida n.d.). Recreational activities and attractions in Vero Beach include golfing, water sports, fishing, beaches, museums, and nature tours (Visit Florida 2013b). Vero Beach has a land area of 11.4 square miles; its population density is approximately 1,374 persons per square mile (USCB 2013).
- 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 approximately 2,057 persons per square mile (USCB 2013).
- 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 approximately 2,509 persons per square mile (USCB 2013).
- 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 approximately 862 persons per square mile (USCB 2013).
- 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 approximately 3,824 persons per square mile (USCB 2013).

- 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 approximately 1,787 persons per square mile (USCB 2013).

The additional two municipalities served by proposed stations are described below.

- The City of Fort Lauderdale has a land area of 34.8 square miles; its population density is approximately 4,791 persons per square mile (USCB 2010a and 2011).
- The City of Miami has a land area of 35.9 square miles and has a population density of approximately 11,041 persons per square mile (USCB 2010a and 2011).

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).

Table 4.4.1-2 Total Population of Census Tracts Crossed by the Project, by County

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. 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) between Orlando and West Palm Beach, and census tracts where low-income populations are 10 percent higher than the combined total for the census tracts crossed by the alignments (23.3 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.

Table 4.4.2-1 Summary of the Minority/'Non-White' Populations per County

	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. 2011. *2007-2011 American Community Survey 5-Year Estimates: Total Population.* 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). Meaningfully higher populations of 'non-White' persons at the county level occur in St. Lucie and Palm Beach Counties. 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).

Table 4.4.2-2 Minority Population Concentrations

	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. 2011. *2007-2011 American Community Survey 5-Year Estimates: Total Population.* 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 (≥23.3 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.

Table 4.4.2-3 Summary of Poverty Data Status in the past 12 months at the State, County, and Census Tract Level within the Project Study Area

	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: S0801, Commuting Characteristics by Sex*. 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). Meaningful levels of low-income persons are present in Indian River, St. Lucie, and Palm Beach Counties. 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 20 (19.7 percent) reported poverty greater than 23.3 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. Nearly half (10) of the census tracts with poverty greater than 23.3 percent are in Palm Beach County and are the same tracts identified as having a high percent minority population.

Table 4.4.2-4 Low-Income Population Concentrations

	Census Tract	Percent Low-Income Population ≥23.3 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	--
	381000	26.5	--
Martin	000800	35.6	--
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: S0801, Commuting Characteristics by Sex*. 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).

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.

4.4.3.2 Affected Environment

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 4.4.3-1).

Table 4.4.3-1 Existing Labor Force and General Employment Data

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 4.4.3-2). 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).

Table 4.4.3-2 Summary of Economic Impacts of Agriculture, Natural Resources, and Related Industries Along the N-S Corridor

	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.

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. Section 4.1.3, *Navigation,* provides additional information on the economics of the maritime industry.

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 approximately 171 at-grade crossings. Two of these, located in Palm Beach County, do not have signals or safety equipment. The remaining 169 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.

Table 4.4.4-1 N-S Corridor At-Grade Crossing Accident Data by County

	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 types, including derailments, accidents between trains, trains and humans, or between trains and objects on the tracks.

Table 4.4.4-2 FECR Accidents, Cocoa to Miami – Years 2011 to 2007[1]

	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 below provides five years of accident data for the regional roadway system within the Project Study Area.

Table 4.4.4-3 Primary Regional Roadway System Traffic Accidents – Years 2011 to 2007[1]

	Year				
Accidents	**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 (see Table 4.2.4-2). 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 is 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.

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.

Table 4.4.4-4 FECR Safety and Security Practices

Rail Infrastructure	Current Practice
Buildings • 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.
Right-of-Way • 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.
Bridges • 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.
Underpasses	Generally underpasses are protected from trespassing to the same extent as any ROW area. Evacuation points to underpasses are provided and maintained.

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.

Table 4.4.4-5 Elderly/Senior Population Identified in Census Tracts within 1,000 feet of the Project Alignment

	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).

Table 4.4.4-6 Identified Sinkholes in the Project Study Area

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 Cultural Resources

Cultural resources as defined by the National Historic Preservation Act of 1966 (NHPA), as amended, are any "prehistoric or historic district, site, building, structure, or object included in or eligible for listing on the National Register of Historic Places" (NRHP). Cultural resources are found both above and below ground. Archaeological sites or archaeological resources represent the locations of prehistoric and historic activities. The term "historic structures" includes houses, buildings, bridges, and constructed

features that, with few exceptions, are at least 50 years old. Historic landscapes consist of lands that have been culturally modified. Linear historic resources can include canals, roads, railroads or other manmade linear features. Historic districts consist of historic structures and other elements that retain identity and integrity as a whole. Sacred sites, cemeteries, and burial places are also considered cultural resources, although they are generally not considered eligible for NRHP listing.

Section 106 of the NHPA requires all federal agencies to take into account, prior to authorizing an undertaking, the effect of that undertaking on cultural resources listed in or eligible for listing in the NRHP (16 USC 470(f)). NHPA establishes specific criteria for eligibility to the NRHP: (1) association with events that significantly contribute to our history; (2) associated with persons significant in our history; (3) embodying distinctive architectural styles or methods, high artistic values, or representing a significant entity whose components may lack individual distinction; or (4) have the potential to yield information important to prehistory or history. A key factor in determining eligibility is an evaluation of the integrity of location, design, setting, materials, workmanship, feeling, and association of the resources under consideration (National Park Service 2002). AAF, as a non-federal party, is assisting FRA in meeting its obligations under Section 106, and has conducted studies to determine if any cultural resources exist in the Project's Area of Potential Effect (APE) that are listed in or eligible for listing on the NRHP.

4.4.5.1 Methodology

All cultural resource investigations and consultations were conducted in accordance with Section 106 and its implementing regulations for Protection of Historic Properties at 36 CFR part 800. The investigations and consultations also complied with the field methods, data analysis, and reporting standards embodied in the Florida Division of Historical Resources (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).

AAF conducted initial consultation with FDHR, which is the State Historic Preservation Officer (SHPO), on March 28, 2013 prior to the initiation of the cultural resources survey to establish a methodology and APE. A copy of the meeting minutes is provided in Appendix 4.4.5-A1 On July 8, 2013, FRA and SHPO held a conference call to discuss the cultural resource 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 and archaeological resources, and the potential for additional unrecorded cultural resources. Archival research pertinent to the APE was conducted to determine the types, chronological placement, and location patterning of known cultural resources within 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. Field surveys, including subsurface testing, were conducted to identify other archaeological and historic resources eligible for listing on the NRHP. A Cultural Resources Assessment Survey Report (CRAS) was prepared for the SR 528 corridor between SR 520 and Cape Canaveral that identifies NRHP listed and eligible resources (Janus Research, Inc. 2005).

A separate Section 106 Determination of Effects Case Study Report was also prepared to determine potential effects of the Project on NRHP listed and eligible resources.

After consultation with the SHPO, 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). In general, the methodology for the E-W Corridor complied with FDHR standards for undeveloped acreage. The methodology for the N-S Corridor was consistent with that used in Section 3.3.7 of the 2012 EA.

Area of Potential Effect

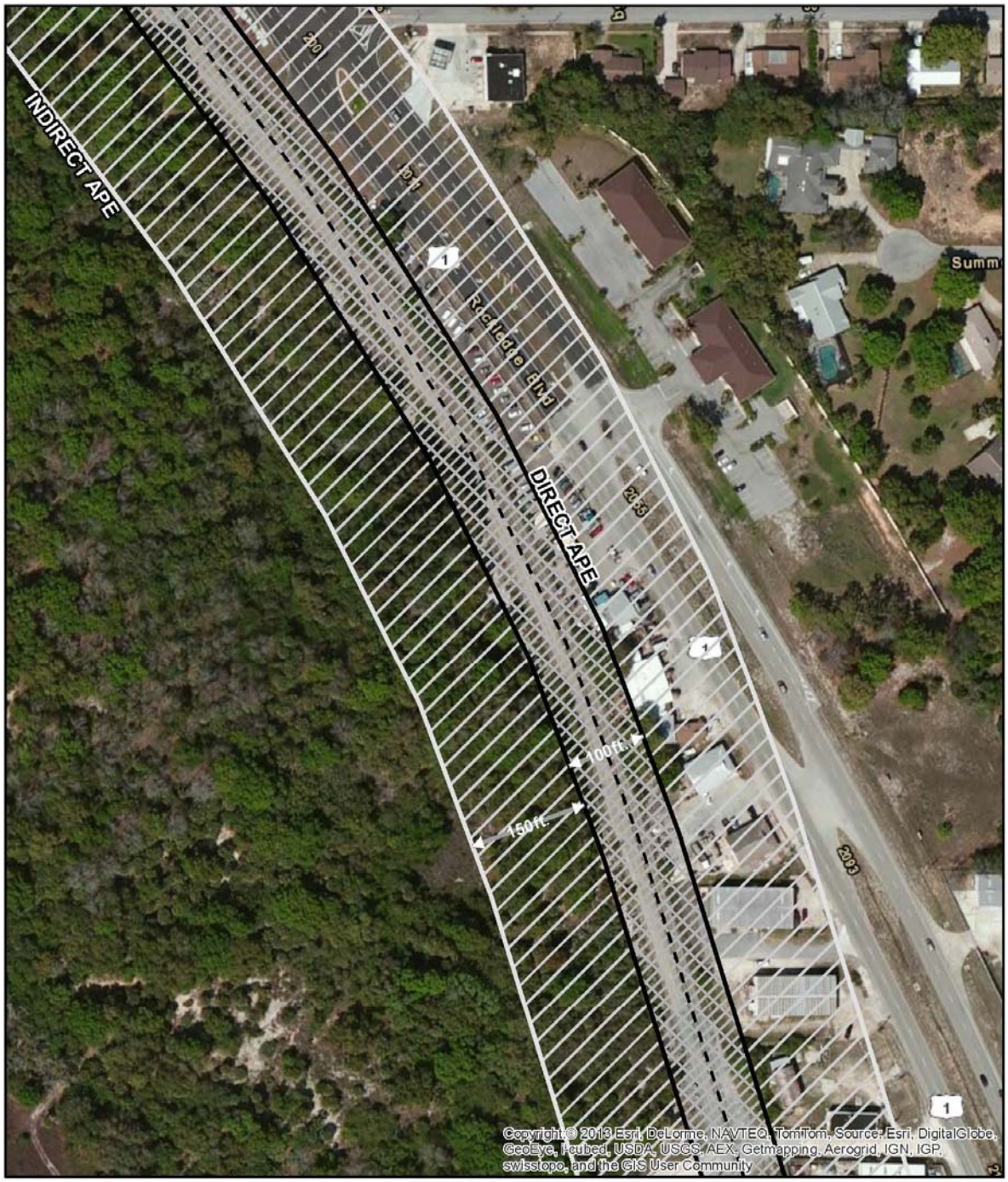
FRA established an appropriate APE for the Project in coordination with SHPO. The APE includes the geographic area or areas in which the Project may directly or indirectly cause changes in the character or use of archaeological and historic properties, if such properties exist. The APE was influenced by the scale and nature of the undertaking as well as its geographical setting. The APE included measures to identify and evaluate both archaeological and historical resources. Normally, archaeological and other below-ground resources will be affected by ground disturbing activities and changes in ownership status. 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. As a consequence, the survey methodologies for these two broad categories of sites differ.

FRA's coordination with SHPO considered what improvements and activities would occur in the E-W Corridor and in the N-S Corridor, and how the Project may impact cultural resources listed or eligible for the NRHP. The APE is based on the approved APE for the 2012 EA (Section 3.3.7).

For the alternative considered for the MCO Segment and the VMF, the archaeological APE included the limits of disturbance. For historic resources, the APE for the MCO Segment was 200 feet on either side of the railroad centerline, and for the VMF, the APE was the 47-acre area.

For the E-W Corridor, the archaeological APE included the limits of disturbance for the alternatives to be considered (approximately 100-foot average width). The archaeological archival research and reconnaissance APE for the E-W Corridor included all alignment alternatives. For historic resources, the APE was 200 feet on either side of the centerlines for the alternatives considered.

For the N-S Corridor, the archaeological resources APE was limited to the footprint of subsurface activities within the existing approximately 100-foot wide FECR Corridor. The historic resources APE included the N-S Corridor as well as 150 feet on either side of the N-S Corridor to allow for the consideration of indirect impacts. Figure 4.4.5-1 shows an example of the direct and indirect APE for the N-S Corridor.



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

N 0 0.0125 0.025 Miles

U.S. Department of Transportation Federal Railroad Administration

4.4.5-1

Consultation

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 preparation of the DEIS. The Project is being coordinated with appropriate potential consulting parties pursuant to Section 106 and Advisory Council on Historic Preservation (ACHP) guidance (36 CFR Part 800). Consultation materials are provided in Appendix 4.4.5-A1-5.

At an initial March 28, 2013 consultation meeting between AAF and SHPO, SHPO determined that unlike the West Palm Beach to Miami AAF Passenger Rail Project, the Project was not crossing or near historic districts and would not be affecting railroad terminals except at the MCO. Therefore, the level of coordination with local preservation planning representatives used in Phase I was not warranted In Phase II. During a July 8, 2013 conference call, FRA, SHPO, and AAF discussed potential consulting parties. SHPO concurred with FRA's determination that consultation with local entities was not required for Phase II.

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. SHPO has confirmed that these public meetings provided adequate opportunity for consultation (see Appendix 4.4.5-A1-5).

Due to previous Section 106 consultation meetings in affected communities (West Palm Beach, Fort Lauderdale, and Miami), SHPO determined that no additional separate Section 106 meetings were necessary. To date, FRA has not received written requests from individuals or organizations to participate as consulting parties.

FRA sent a letter concerning the Project to USFWS because a known archaeological site is located near the Hobe Sound National Wildlife Refuge (Appendix 4.4.5-A1-5). To date, FRA has not received a request by the USFWS to be a consulting party.

On April 23, 2013, FRA initiated consultation via e-mail and letter with five Native American Nations to determine whether traditional use areas or sacred lands would be crossed by the Project. The list of Native American tribes to be consulted was compiled in consultation with SHPO, and used prior contacts with Native American tribes for FRA regulated projects in Florida. Efforts to identify other interested Native American tribes included requesting all those who received letters to notify FRA and AAF of any additional groups or individuals who might be interested in providing comment. A list of Native American tribes contacted is included in Table 4.4.5.1. Copies of consultation letters and responses are included in Appendix 4.4.5-A1-5. 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-A1-5).

Table 4.4.5-1 Native American Consultation Contacts

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

Coordination between FRA, SHPO, and the Section 106 consulting parties will continue throughout the development of the EIS for the Project.

Four Certified Local Governments (CLG) and two local informants were also contacted regarding information on locally designated historic resources. Three CLGs responded to these inquiries. Table 4.4.5-2 summarizes this coordination.

Table 4.4.5-2 Certified Local Government/Local Informant Contacts Regarding Potential Locally Designated Cultural Resources Located Within the Phase II APE (Orlando to West Palm Beach)

City/Town	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
N/A	Christian Davenport, County Archaeologist	No response	July 10, 2013	N/A	Palm Beach
N/A	Leslie Olson, Planning Manager	No response	June 10, 2013	N/A	St. Lucie

4.4.5.2 Affected Environment

This section categorizes the existing cultural resources within the APE. The NRHP Criteria of Eligibility describe what makes a property historically significant (36 CFR 60.4). These criteria were used to evaluate the significance of the surveyed historic architectural and archaeological resources within the APE. To be eligible for the National Register, districts, sites, buildings, structures, and objects must 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;

b) that are associated with the lives of persons significant in our past;

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.

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 cultural resources 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 has been identified within the MCO Segment (Table 4.4.5-3). No historic structures have been identified within the MCO Segment (including the VMF) APE. Since no NRHP listed or eligible cultural resources were identified within the VMF APE during the previous surveys, no additional archival or cultural resources field work is, therefore, necessary for the VMF APE. This information is summarized in the CRAS and Section 106 Determinations of Effects Case Study Report. Appendix 4.4.5-B1-3 provides maps of cultural resources in proximity to the MCO Segment and VMF.

Table 4.4.5-3 Previously Recorded Archaeological Resources Within the MCO Segment

FMSF #	Site Name / Address	Style	National Register Status
8OR8277	South Terminal Northeast	Low-density pre-Columbian artifact scatter	Determined Ineligible for the National Register by SHPO

East-West Corridor

For identification of cultural resources, Alignment Alternative E was used to define the APE, as it represents the maximum limit of disturbance.

Historic Resources

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 resources 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 resources. This background research identified 28 previously conducted cultural resource surveys that have been performed within or adjacent to the E-W Corridor with Alternative E. Fieldwork was conducted to identify archaeological and historic resources in these areas.

Within the E-W Corridor APE, the only NRHP-eligible resource was the previously identified FECR Railway District (see Tables 4.4.5-4 through 4.4.5-6).

Table 4.4.5-4 Previously Recorded Historic Linear Resources within the E-W Corridor APE

FMSF #	Site Name / Address	Resource Group Type	National Register Status
8OR9850	Bull Slough Drainage Ditches	Historic Linear Resource	Determined Ineligible for the NRHP by SHPO
8BR1870	Florida East Coast Railway	Historic Linear Resource	Determined NRHP–Eligible by SHPO
8BR2697	US Highway 1/Cocoa Blvd	Historic Linear Resource	Portions Determined Ineligible for the NRHP by SHPO

Table 4.4.5-5 Previously Recorded Historic District within the E-W Corridor APE

FMSF #	Site Name / Address	Resource Group Type	National Register Status
8OR9851	Gee Bee Resource Group	Mixed District	Determined Ineligible for the NRHP by SHPO

Table 4.4.5-6 Previously Recorded Historic Resources Adjacent to the E-W Corridor APE

FMSF #	Site Name / Address	Construction Date	Style	National Register Status
8BR1735	Altered Image Tattoo / 2417 N Cocoa Blvd.	c. 1949	Frame Vernacular	Determined Ineligible for the NRHP by SHPO
8BR1735	Jumping Flea Market / 2507 N Cocoa Blvd.	c. 1940	Masonry Vernacular	Determined Ineligible for the NRHP by SHPO

Three additional historic resources are within the APE for the E-W Corridor (Table 4.4.5-7). Two of these resources are 1960s residences located in Brevard County. The third is a 1963 industrial structure located in Brevard County. None of these resources appear to be eligible for the NRHP (see Appendix 4.4.5-A1-5). Cultural resources identified within the E-W Corridor APE are shown on maps in Appendix 4.4.5-B1-5.

Table 4.4.5-7 Newly Identified E-W Corridor Historic Resources

FMSF #	Site Name/Address	Construction Date	Style	SHPO Evaluation of National Register Significance
8BR3066	5161 Palm Avenue	c. 1963	Masonry vernacular	Considered ineligible
8BR3067	3800 Pine Street	c. 1965	Masonry vernacular	Considered ineligible
8BR3068	2800 Clearlake Road	c. 1963	Industrial vernacular	Considered ineligible

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 cultural 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 *CRA Survey of the Proposed Magnolia Ranch Development Site, Orange County, Florida* (FMSF Survey No. 2420) and *CRA 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 32.5-mile E-W Corridor, Table 4.4.5-8 identifies estimated mileage and acreage for previously surveyed areas and evaluates the probability for identifying new archaeological sites in the areas that have not been surveyed. 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.

Table 4.4.5-8 E-W Corridor Areas and Estimated Mileage and Acreage of Areas Previously Surveyed and by Probability Classification for Areas Unsurveyed

Testing	Miles	Acreage	Percent of Total
Previously Surveyed	14.0	282.9	35.0
High Archaeological Site Potential (shovel testing planned)	1.3	26.3	3.3
Moderate Archaeological Site Potential (shovel testing planned)	0.8	15.7	1.9
Low Archaeological Site Potential (pedestrian survey planned)	22.9	462.8	57.4
Low Archaeological Site Potential (judgmental if shovel testing appropriate)	1.0	19.4	2.5

Archaeological field testing in the previously unsurveyed portions of the E-W Corridor 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.

North-South Corridor

Historic Resources

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 resources included individual resources and historic districts located along the FECR Corridor and on adjacent properties/parcels. The historic resources were identified through background research and a reconnaissance survey. Research identified 127 previously conducted cultural resource surveys that have been performed within or adjacent to the N-S Corridor. Historic resource forms (architectural, linear, and district) from FMSF identified previously recorded architectural and historical resources greater than 50 years of age and properties listed in the NRHP. Appendix 4.4.5-B shows the locations of known cultural resources relative to the N-S Corridor APE.

Background research identified 19 architectural/historical resources in Brevard County; three architectural/historical resources in Indian River County; three architectural/historical resources in St. Lucie County; six architectural/historical resources in Martin County; and three architectural/historical resources in Palm Beach County.

Previous studies and coordination with SHPO have identified the FECR Corridor (8BR1870/8IR1497/ 8IR1518/8SL3014/ MT1391/8MT1450/8PB12102) as eligible for listing on the NRHP as a linear district (Table 4.4.5-9). FECR 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.

Table 4.4.5-9 Historic Linear Resources Previously Identified in the N-S Corridor APE

FMSF #	Site Name / Address	Resource Group Type	National Register Status
8BR1870	Florida East Coast Railway	Linear Resource	Determined NRHP–Eligible by SHPO
8IR1497/ 8IR1518	Florida East Coast Railway	Linear Resource	Determined NRHP–Eligible by SHPO
8SL3014	FECR Railway-Lake Harbor Branch	Linear Resource	Determined NRHP–Eligible by SHPO
8MT1391/8MT1450	Florida East Coast Railway	Linear Resource	Determined NRHP–Eligible by SHPO
8PB12102	Florida East Coast Railway	Linear Resource	Determined NRHP–Eligible by SHPO

In addition, within the FECR Corridor, four bridges (8BR3058, 8BR3062/8IR1569, 8MT1382, and 8PB16041) have been identified as individually eligible for listing on the NRHP under Criterion A and Criterion C (Table 4.4.5-10). These four bridges are also considered contributing elements to the FECR Railway Historic District. An additional nine bridges are not considered individually eligible for listing on the NRHP but are still considered contributing elements to the FECR Railway Historic District. SHPO concurrence is expected for these eligibility recommendations. A request for concurrence with FRA's eligibility determination was submitted to SHPO on October 31, 2013 (see Appendix 4.4.5-A3).

Table 4.4.5-10 Historic Railway Bridges Identified Within the N-S Corridor APE

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	Individually Eligible, Contributing to an Eligible FECR Railway Linear Historic District
194.34	Brevard	8BR3059	Fixed Railway Bridge over the Crane Creek and Melbourne Street – Steel	1925	Contributing to an Eligible FECR Railway Linear Historic District
197.7	Brevard	8BR3060	Fixed Railway Bridge over the Turkey Creek – Steel	1925	Contributing to an Eligible FECR Railway Linear Historic District
202.59	Brevard	8BR3061	Fixed Railway Bridge over the Goat Creek – Steel	1959	Contributing to an Eligible FECR Railway Linear Historic District
212.07	Brevard and Indian River	8BR3062/ 8IR1569	Fixed Railway Bridge over the Sebastian River – Steel	1926	Individually Eligible; Contributing to an Eligible FECR Railway Linear Historic District
240.1	St. Lucie	8SL3191	Fixed Bridge over the Taylor Creek - Concrete with Steel Beam Span	1961	Contributing to an Eligible FECR Railway Linear Historic District
241.22	St. Lucie	8SL3192	Fixed Bridge over "C" Avenue – Concrete	1912/ 2003	Ineligible
259.95	Martin	8MT1623	Fixed Bridge over the Rio Waterway - Steel and Timber Piles	1958	Contributing to an Eligible FECR Railway Linear Historic District
260.93	Martin	8MT1382	Movable Bridge over the St. Lucie River – Steel	1938	Individually Eligible; Contributing to an Eligible FECR Railway Linear Historic District
266.86	Martin	8MT1624	Fixed Bridge over the Salerno Waterway - Steel and Timber Piles	1958	Contributing to an Eligible FECR Railway Linear Historic District
267.34	Martin	8MT1625	Fixed Bridge over the Tributary to Manatee Creek 1 - Steel and Timber Piles	1962	Contributing to an Eligible FECR Railway Linear Historic District
267.70	Martin	8MT1626	Fixed Bridge over the Tributary to Manatee Creek 2 - Steel and Timber Piles	1962	Contributing to an Eligible FECR Railway Linear Historic District
282.58	Palm Beach	8PB16041	Movable Bridge over the Loxahatchee River – Steel	1935	Individually Eligible; Contributing to an Eligible FECR Railway Linear Historic District

On properties adjacent to the FECR Corridor, one NRHP-listed site (Florida Power & Light Co. Ice Plant, 8BR215), one NRHP-eligible historic district (Union Cypress Saw Mill Historic District, 8BR2173; Table 4.4.5-11), one other NRHP-eligible linear resource (FECR Railway-Lake Harbor Branch, 8SL3014; Table 4.4.5-12), and ten other NRHP-eligible historic resources (residences, stores, and cemeteries) were identified (Table 4.4.5-13).

Table 4.4.5-11 Historic Resources Previously Identified Adjacent to the N-S Corridor APE

FMSF #	Site Name / Address	Construction Date	Style	National Register Status
8BR215	Florida Power & Light Co. Ice Plant / 1604 S, Harbor City Boulevard	1926	Industrial Vernacular	NRHP–Listed
8BR759	Whaley, Marion S Citrus Packing House/2275 Rockledge Blvd W.	1930	Frame Vernacular	Determined NRHP–Eligible by SHPO
8BR1710	Jorgensen's General Store/5390 US Hwy 1	1894	Frame Vernacular	Determined NRHP–Eligible by SHPO
8BR1723	Cocoa Cemetery Storage Building/ 101 N. Cocoa Blvd.	c. 1931	Masonry Vernacular	Determined NRHP–Eligible by SHPO
8BR1739	Ashley's Cafe & Lounge/ 1609 Rockledge Blvd. W.	c. 1932	Tudor Revival ca.1890-1940	Determined NRHP–Eligible by SHPO
8BR1741	Rockledge Gardens Nursery & Landscaping/2153 Rockledge Blvd. W.	c. 1930	Industrial Vernacular	Determined NRHP–Eligible by SHPO
8BR1744	Harvey's Groves/3700 US Hwy. 1 E.	c. 1939	Masonry Vernacular	Determined NRHP–Eligible by SHPO
8BR1765	Bohn Equipment Company/ 255 Olive St	c. 1927	Industrial Vernacular	Determined NRHP–Eligible by SHPO
8BR2779	317 Rosa Jones Dr. Residence	c. 1962	International ca. 1925-present	Determined NRHP–Eligible by SHPO
8IR1049	Florida East Coast Railroad Platform Structural Remains	20th century	American Railroad Fence and Platform Supports	Considered NRHP–Ineligible

Table 4.4.5-12 Historic District Previously Identified Adjacent to the N-S Corridor APE

FMSF #	Site Name / Address	Resource Group Type	National Register Status
8BR2173	Union Cypress Saw Mill Historic District	Mixed District	Determined NRHP–Eligible by SHPO

Table 4.4.5-13 Historic Cemeteries Previously Identified Adjacent to the N-S Corridor APE

FMSF #	Site Name / Address	Date Est.	National Register Status
8BR1777	Cocoa Cemetery	c. 1890	Determined NRHP–Eligible by SHPO
N/A	Unnamed Cemetery on West Railroad Avenue	c. 1960	Further Research Needed
8BR2808	Pinecrest Colored Cemetery	c. 1949	Further Research Needed

Archaeological Resources

Five archaeological resources were identified within the N-S Corridor from the record search (Table 4.4.5-14 and Appendix 4.4.5-B3). All of these sites have experienced some level of previous disturbances. Four of the archaeological sites have not been evaluated for NRHP eligibility by the SHPO and one site was previously determined not NHRP eligible by SHPO (Appendix 4.4.5-A). One known archaeological site was identified in Indian River County and one archaeological site was identified in Martin County. Three known archaeological sites were identified in St. Lucie County. No known archaeological sites were identified in the N-S Corridor in Brevard and Palm Beach Counties.

Table 4.4.5-14 Archaeological Sites Located within the N-S Corridor APE

FMSF #	Site Name / Address	Site Type	National Register Significance[1]
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	Not Evaluated by SHPO
8SL41	Fort Capron	Historic Fort	Not Evaluated by SHPO
8SL1136	Pineapple	Surface Scatter, Campsite, Homestead, and Farmstead	Ineligible
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

1 As recorded in the FMSF; may require re-evaluation

WPB-M Corridor

Historical Resources

The SHPO determined that the FECR Corridor itself is considered eligible for inclusion in the NRHP (FRA 2013a). Section 3.3.7.1 of the 2012 EA described eight historic railway bridges within the WPB-M Corridor (Table 4.4.5-15). The 2012 CRA identified the bridges. Each identified bridge is considered a contributing resource within a potential FECR Railway Linear Historic District. Potential NRHP eligibility on an individual basis was not determined, consistent with the evaluation methods developed with the SHPO/FDHR for the 2010 FECR Amtrak Passenger Rail Project and the SHPO/FDHR methods established for that project.

Table 4.4.5-15 Historic Railway Bridges Identified within the WPB-M Corridor APE

County	FMSF #	Site Name / Address	Date Estimate	National Register Status
Palm Beach	8PB15951	Fixed Railway Bridge over the C-15 Canal	1962	Contributing to a Potential FECR Railway Linear Historic District
Broward	8BD4860	Fixed Railway Bridge over the Cypress Creek/ C-14 Canal	1960	Contributing to a Potential FECR Railway Linear Historic District
Broward	8BD4861	Fixed Railway Bridge over the North Fork of Middle River	1957	Contributing to a Potential FECR Railway Linear Historic District
Broward	8BD4862	Fixed Railway Bridge over the South Fork of Middle River	1959	Contributing to a Potential FECR Railway Linear Historic District
Broward	8BD4863	Fixed Railway Bridge over the Dania Cut-Off Canal	1927	Contributing to a Potential FECR Railway Linear Historic District
Miami-Dade	8DA12596	Fixed Railway Bridge over the Oleta River	1963	Contributing to a Potential FECR Railway Linear Historic District
Miami-Dade	8DA12597	Fixed Railway Bridge over the Royal Glades/C-9 Canal	1956	Contributing to a Potential FECR Railway Linear Historic District
Miami-Dade	8DA12598	Fixed Railway Bridge over the Arch Creek	1930	Contributing to a Potential FECR Railway Linear Historic District

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.

Nineteen historic districts were identified within the WPB-M Corridor (Table 4.4.5-16). The FMSF identified four NRHP– listed districts. Fifteen districts have been determined NRHP–eligible by the SHPO or the 2012 CRA. The FMSF also identified four historic linear resources that have been determined NRHP–eligible by the SHPO or the 2012 CRA (Table 4.4.5-17). Thirty significant historic buildings are located within the WPB-M Corridor (Table 4.4.5-18). The FMSF identified six NRHP-listed buildings. Twenty-four buildings have been determined NRHP-eligible by the SHPO or the 2012 CRA. Four significant historic stations or railway related resources (Table 4.4.5-19) and two historic cemeteries (Table 4.4.5-20) were identified within the WPB-M Corridor APE.

Table 4.4.5-16 Historic Districts Identified within the WPB-M Corridor APE

County	FMSF #	Site Name / Address	Resource Group Type	National Register Status
Palm Beach	8PB5980	Northwest Neighborhood Historic District	Historic District	NRHP–Listed
Palm Beach	8PB9905	Lake Lucerne Commercial Historic District	Historic District	NRHP–Listed
Palm Beach	8PB10350	Grandview Heights Historic District	Historic District	NRHP–Listed
Palm Beach	8PB13713	Camino Real Historic District	Historic District	Determined NRHP–Eligible
Palm Beach	8PB14285	Del-Ida Park Historic District	Historic District	Considered NRHP–Eligible
Palm Beach	8PB15380	Atlantic Avenue Historic District	Historic District	Determined NRHP– Eligible
Palm Beach	N/A	Pearl City Historic District	Historic District	Considered NRHP–Eligible
Broward	8BD181	Downtown Fort Lauderdale Historic District	Historic District	Determined NRHP–Eligible
Broward	8BD3284	Hollywood Boulevard Historic Business District	FMSF Building Complex	NRHP–Listed
Broward	N/A	Northwest Pompano Historic District	Historic District	Considered NRHP-Eligible
Broward	N/A	Old Business District	Historic District	Considered NRHP–Eligible
Broward	N/A	Old Pompano Historic District	Historic District	Considered NRHP–Eligible
Miami-Dade	8DA378	Greynolds Park	Designed Historic Landscape	Considered NRHP–Eligible
Miami-Dade	8DA3536	Miami Shores Golf Course	Designed Historic Landscape	Considered NRHP–Eligible
Miami-Dade	N/A	Miami Shores Historic District	Historic District	Considered NRHP–Eligible
Miami-Dade	N/A	Biscayne Park Historic District	Historic District	Considered NRHP–Eligible
Miami-Dade	N/A	El Portal Historic District	Historic District	Considered NRHP–Eligible
Miami-Dade	N/A	MiMo/Biscayne Boulevard HistoricDistrict	Historic District	Considered NRHP–Eligible
Miami-Dade	N/A	Palm Grove Neighborhood HistoricDistrict	Historic District	Considered 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.

Table 4.4.5-17 Linear Resources Identified within the WPB-M Corridor APE

County	FMSF #	Site Name / Address	Resource Group Type	National Register Status
Palm Beach	8PB10311	Hillsboro Canal	Linear Resource	Determined NRHP– Eligible
Palm Beach	8PB10331	West Palm Beach Canal	Linear Resource	Determined NRHP– Eligible
Broward	8BD3229	Hillsboro Canal	Linear Resource	Determined NRHP– Eligible
Miami-Dade	N/A	El Portal – Little River - Seawall	Linear Resource	Considered 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.

Table 4.4.5-18 Historic Structures Identified within the WPB-M Corridor APE

County	FMSF #	Site Name / Address	Construction Date	Style	National Register Status
Palm Beach	8PB169	Administration Building/ Dixie Highway & Camino Real	1925	Mediterranean Revival ca. 1880-1940	NRHP–Listed
Palm Beach	8PB240	Hoot, Toot & Whistle/ 290 E. Atlantic Avenue	c.1926	Mission	Considered NRHP–Eligible
Palm Beach	8PB513	Andrews House/ 306 SE 1st Avenue	c.1909	Frame Vernacular	Considered NRHP– Eligible
Palm Beach	8PB835	Peninsular Plumbing Company Warehouse/501-513 Fern Street	c. 1938	Masonry Vernacular	Determined Ineligible by the SHPO; Noted as Eligible by Friederike Mittner West Palm Beach Historic Preservation Planner
Palm Beach	8PB8232	Seaboard Air Line Dining Car 6113/747 S. Dixie Highway	1947	Moderne ca. 1920-1940	NRHP–Listed
Palm Beach	8PB8233	Seaboard Air Line Lounge Car 6603/747 S. Dixie Highway	1947	Moderne ca. 1920-1940	NRHP–Listed
Palm Beach	8PB14806	470 Fern Street	c. 1930	Mediterranean Revival	Determined NRHP– Eligible by the SHPO
Palm Beach	8PB14808	500 Fern Street	c. 1949	Mediterranean Revival	Determined NRHP– Eligible by the SHPO
Palm Beach	N/A	Arc Rib Storage/502 Kanuga Drive	Not Available	Not Available	Considered NRHP– Eligible
Palm Beach	N/A	Delray Beach Antique Mall/ 1350 N. Federal Highway	Not Available	Not Available	Considered NRHP– Eligible
Palm Beach	N/A	Goodwill/1640 N. Federal Highway	Not Available	Not Available	Considered NRHP– Eligible
Palm Beach	N/A	Lantana Chamber of Commerce/ 212 Iris Avenue	Not Available	Not Available	Considered NRHP–Eligible
Palm Beach	N/A	Woodlawn Cemetery Gate/ 1500 S. Dixie Highway	Not Available	Not Available	Considered NRHP– Eligible
Palm Beach	N/A	3615 Henry Avenue	c.1925	Frame Vernacular	Considered NRHP– Eligible
Broward	8BD62	King-Cromartie House/229 SW 2nd Avenue	1907	Frame Vernacular	Considered NRHP– Eligible
Broward	8BD63	New River Inn/229 SW 2nd Avenue	1906	Masonry Vernacular	NRHP–Listed
Broward	8BD143	Hotel Poinciana/ 141 NW 1st Avenue	c.1920	Mission	Considered NRHP– Eligible
Broward	8BD212	Philemon Bryan House/ 227 SW 2nd Avenue	1906	Neo-Classical Revival ca. 1880-1940	Considered NRHP– Eligible
Broward	8BD227	Bryan, Tom M. Building/ 201-213 Himmarshee Street	c.1925	Mediterranean Revival ca. 1880-1940	Determined NRHP– Eligible
Broward	8BD376	The Hollywood Publishing Company/219 N 21st Avenue	1924	Masonry Vernacular	Considered NRHP– Eligible
Broward	8BD574	Ingram Arcade/ 2033-2051 Hollywood Blvd.	1921	Commercial	Considered NRHP– Eligible
Broward	8BD1976	Progresso Plaza/901 Progresso Drive	c.1925	Mediterranean Revival ca. 1880-1940	Determined NRHP– Eligible
Broward	8BD2237	Hamilton's Pharmacy/ McClellan Drugs/126 N Flagler Avenue	1925	Art Deco ca. 1920-1940	Considered NRHP– Eligible
Broward	8BD2258	Pompano Mercantile Company/ 114 N Flagler Avenue	1924	Mission	Considered NRHP– Eligible
Broward	8BD4179	Hollywood Armory/910 N Dixie Highway W	c.1954	Other	Determined NRHP– Eligible
Broward	N/A	Antique Car Museum/1527 SW 1st Avenue	Not Available	Not Available	Considered NRHP– Eligible
Broward	N/A	Sears Town/901 N Federal Highway	Not Available	Not Available	Considered NRHP– Eligible
Miami-Dade	8DA165	Reassembled Spanish Monastery AD 1141/16711 W Dixie Highway	1952	Masonry Vernacular	NRHP– Listed
Miami-Dade	8DA355	Dade County Courthouse/ Miami City Hall/73 W Flagler Street	1925	Neo-Classical Revival ca. 1880-1940	NRHP–Listed
Miami-Dade	N/A	N. Miami Beach/Peoples Gas Building/ System/15779 W. Dixie Highway	Not Available	Not Available	Considered 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.

Table 4.4.5-19 Historic Stations or Railroad Related Resources within the WPB-M Corridor APE

County	FMSF #	Site Name / Address	Construction Date	Style	National Register Status
Palm Beach	8PB96	FECR Railway Station/ S. Dixie Highway at SE 8th Street	1929	Mediterranean Revival ca. 1880-1940	NRHP–Listed
Palm Beach	N/A	Delray Beach FECR Depot and Water Tower/220 NE 1st Street	Not Available	Not Available	Considered NRHP– Eligible
Broward	N/A	Florida East Coast Freight House and Platform Machine Ramp/ 1801 SW 1st Avenue	1948; 1956	Not Available	Considered NRHP– Eligible
Broward	N/A	Florida East Coast Rail Yard/ 3125 S. Andrews Avenue	Not Available	Not Available	Considered 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.

Table 4.4.5-20 Historic Cemeteries Identified within the WPB-M Corridor APE

County	FMSF #	Site Name / Address	Date Est.	National Register Status
Palm Beach	N/A	Woodlawn Cemetery	Not Available	Considered NRHP-Eligible
Miami-Dade	8DA1090	City of Miami 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.

The FECR Corridor is located within the APE for each of the proposed station locations. During previous cultural resources assessment projects that have involved the FECR Corridor, the SHPO determined that the FECR Corridor itself is considered eligible for inclusion in the NRHP. Additional resources located directly within the APE for the station locations are discussed below.

Two NRHP-eligible historic buildings are located within the West Palm Beach Station North Site APE for Historic Resources (Table 4.4.5-21). The FMSF identified one historic building determined by the SHPO to be NRHP-eligible. The 2012 CRA identified one historic building as NRHP-eligible.

The FMSF identified one NRHP-listed historic district within the APE for the West Palm Beach Station Central Site (Table 4.4.5-21). Within this district, the 2012 CRA identified seven buildings that are contributing to the NRHP-listed historic district but are not individually eligible and three contributing buildings to the historic district that are individually NRHP-eligible. The FMSF also identified one NRHP-listed building and three buildings determined NRHP-eligible by SHPO. The 2012 CRA identified two buildings as NRHP-eligible.

The FMSF identified one NRHP-eligible historic district within the Fort Lauderdale Station North Site APE for Historic Resources (Table 4.4.5-21); this APE is applicable to the Relocated Fort Lauderdale Station site. Within this district, the FMSF identified one building that is contributing to the district and is NRHP-listed, two buildings that are contributing to the district and have previously been determined to be NRHP-eligible by SHPO, and one building that is a contributing element to the district but is not individually eligible. The 2012 CRA identified two additional buildings that are contributing to the NRHP-eligible historic district and are considered NRHP-eligible and one building that is contributing to the NRHP-eligible historic district and is considered individually ineligible.

The FMSF identified one NRHP-eligible historic district within the APE for the Fort Lauderdale Station South Site (Table 4.4.5-21). The FMSF identified one building that is contributing to the district and is NRHP-listed and two buildings that are contributing to the district and are determined NRHP-eligible by the SHPO. The 2012 CRA identified two additional buildings that are contributing to the district and are considered NRHP-eligible and two buildings that are contributing and considered ineligible for the NRHP.

The FMSF identified one NRHP-listed Historic District within the APE for the Miami–Central site (Table 4.4.5-21). The 2012 CRA identified one contributing resource within the NRHP-listed Historic District, which is ineligible on an individual basis. The FMSF also identified two buildings which are NRHP-listed or eligible. The 2012 CRA identified one NRHP-eligible building within the Historic Resources APE established for the Miami - Central Elevated Site.

An additional reconnaissance survey was conducted as part of the 2012 CRA to evaluate resources within one block of the proposed elevated railway track improvements for the Miami–Central Elevated Site. This resulted in the identification of one NRHP-eligible resource: X-Ray Clinic/171 NW 11th Street.

Within the Miami–South Site the FMSF identified one NRHP-listed historic district and five contributing buildings that are determined NRHP-eligible on an individual basis by SHPO. The 2012 CRA identified one contributing building within the NRHP-listed Historic District which is considered NRHP-eligible and one building that is considered is ineligible. The FMSF identified two additional NRHP-listed or eligible buildings within the Miami–South At Grade Site APE. The 2012 CRA identified one additional individually NRHP-eligible building (Table 4.4.5-21).

Table 4.4.5-21 Historic Resources within the WPB-M Corridor APE for Historic Resources Stations

Site	FMSF #	Site Name / Address	Construction Date	Style	National Register Status
West Palm Beach Central	8PB574	513-515 Clematis Street	c. 1921	Masonry Vernacular	Considered Ineligible; Contributing Resource within NRHP–Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB575	517-519 Clematis Street	c. 1929	Masonry Vernacular	Considered Ineligible; Contributing Resource within NRHP– Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB576	518-520 Clematis Street	1924	Masonry Vernacular	Considered NRHP– Eligible; Contributing Resource within NRHP– Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB577	521-527 Clematis Street	c. 1920	Masonry Vernacular	Considered Ineligible; Contributing Resource within NRHP– Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB578	522 Clematis Street	1919	Masonry Vernacular	Considered Ineligible; Contributing Resource within NRHP– Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB579	526 Clematis Street	1923	Masonry Vernacular	Considered Ineligible; Contributing Resource within NRHP– Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB580	W. E. Pope Building/529- 531 Clematis Street	1921	Masonry Vernacular	Considered Ineligible; Contributing Resource within NRHP– Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB581	528 Clematis Street	1929	Art Deco	Considered NRHP– Eligible; Contributing Resource within NRHP– Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB582	533 Clematis Street	1925	Neoclassical Revival	Considered NRHP– Eligible; Contributing Resource within NRHP– Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB585	540 Clematis Street	c. 1925	Masonry Vernacular	Considered Ineligible; Contributing Resource within NRHP– Listed Clematis Street Historic Commercial District (8PB10348)
West Palm Beach Central	8PB593	Alma Hotel/ 534 Datura Street	c. 1926	Mediterranean Revival	Considered NRHP– Eligible
West Palm Beach Central	8PB690	Ferndix Building/ 321-325 S. Dixie Highway	1925	Mission	NRHP–Listed in 1999
West Palm Beach Central	8PB835	Peninsular Plumbing Company Warehouse/ 501-513 Fern Street	c. 1938	Masonry Vernacular	Considered NRHP– Eligible
West Palm Beach Central	8PB10348	Clematis Street Historic Commercial District	Various	Various	NRHP–Listed
West Palm Beach Central	8PB14806	470 Fern Street	c. 1930	Mediterranean Revival	Determined NRHP– Eligible by the SHPO

Table 4.4.5-21 Historic Resources within the WPB-M Corridor APE for Historic Resources Stations (Continued)

Site	FMSF #	Site Name / Address	Construction Date	Style	National Register Status
West Palm Beach Central	8PB14807	West Palm Beach Employee Health Center/464 Fern Street	c. 1930	Mediterranean Revival	Determined NRHP– Eligible by the SHPO
West Palm Beach Central	8PB14808	Ballet Florida/ 500 Fern Street	c. 1949	Mediterranean Revival	Determined NRHP– Eligible by the SHPO
Fort Lauderdale North	8BD62	King-Cromartie House/ 229 SW 2nd Avenue	1907	Frame Vernacular	Considered NRHP–Eligible; Contributing Resource within NRHP– Eligible Ft. Lauderdale Historic District (8BD181)
Fort Lauderdale North	8BD63	New River Inn/ 231 SW 2nd Avenue	1906	Masonry Vernacular	NRHP–Listed; Contributing Resource within NRHP–Eligible Ft. Lauderdale Historic District (8BD181)
Fort Lauderdale North	8BD181	Ft. Lauderdale Historic District	Various	Various	Determined NRHP–Eligible by the SHPO
Fort Lauderdale North	8BD212	Philemon Nathanial Bryan House/ 227 SW 2nd Avenue	1906	Neoclassical Revival	Considered NRHP–Eligible; Contributing Resource within NRHP– Eligible Ft. Lauderdale Historic District (8BD181)
Fort Lauderdale North	8BD213	Davis Acetylene Building/N of 229 SW 2nd Avenue	c. 1905	Masonry Vernacular	Considered Ineligible; Contributing Resource within NRHP– Eligible Ft. Lauderdale Historic District (8BD181)
Fort Lauderdale North	8BD227	Tom Bryan Building/ 201-211 Himmarshee Street	c. 1925	Mediterranean Revival	Determined NRHP–Eligible by the SHPO; Contributing Resource within NRHP– Eligible Ft. Lauderdale Historic District (8BD181)
Fort Lauderdale North	8BD237	ROK:BRGR/ 208 Himmarshee Street	c. 1939	Masonry Vernacular	Determined Ineligible by the SHPO; Contributing Resource within NRHP– Eligible Ft. Lauderdale Historic District (8BD181)
Fort Lauderdale North	8BD239	Briny Irish Pub/ 214-220 SW 2nd Street	c. 1937	Masonry Vernacular	Determined NRHP–Eligible by the SHPO; Contributing Resource within NRHP– Eligible Ft. Lauderdale Historic District(8BD181)
Miami Central	8DA271	Salvation Army Citadel/ 49 NW 5th Street	c. 1925	Gothic Revival	Determined NRHP-Eligible by the SHPO
Miami Central	8DA1164	212-222 N Miami Avenue	c. 1922	Masonry Vernacular	Considered Ineligible; Contributing Resource within NRHP Listed Downtown Miami Historic District (8DA10001)
Miami Central	8DA2397	Lyric Theater/ 819 NW 2nd Avenue	c. 1914	Masonry Vernacular	NRHP-Listed
Miami Central	8DA10001	Downtown Miami Historic District	Various	Various	NRHP-Listed
Miami Central	8DA12603	201 NW 1st Avenue	c. 1914	Masonry Vernacular	Considered 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.

Archaeological Resources

As noted in Section 3.3.7.1 of the 2012 EA, the FMSF identified no previously recorded archeological sites within the Palm Beach County segment of the FECR Corridor Archaeological APE. The FMSF also listed no previously recorded NRHP-listed or eligible archaeological sites within the Miami-Dade County portion of the FECR Corridor Main Line Archaeological APE. Based on digital files available from the City of Miami illustrating the locations of Archaeological Conservation Areas, the Miami-Dade County segment of the

FECR Corridor Main Line Archaeological APE intersects one City of Miami Archaeological Conservation Area, which extends from the north bank of the Little River approximately 0.4 miles to the south.

One previously recorded archaeological site, Brickell Block (8BD2916), extends into the archaeological APE for the Broward County segment of FECR Corridor within the WPB-M Corridor. The Brickell Block is in an urban setting beneath a multi-story shopping and entertainment complex, and associated hardscape, including a parking lot. The significance of this site has not been evaluated by SHPO, but it is recorded as containing sensitive material. The Broward County segment also traverses through two areas defined by the City of Fort Lauderdale as archaeologically sensitive zones. These zones are between the New River and SW 4th Court, and approximately 500 feet to both the north and south of the Tarpon River.

The FMSF identified no previously recorded significant archaeological sites within the Archaeological APE established for the West Palm Beach Station North Site, West Palm Beach Station Central Site, Miami Station Central Site, Miami Station South Site, and the Fort Lauderdale Station North Site (including the Relocated Fort Lauderdale Station Site).

4.4.6 Recreation and Other Section 4(f) Resources

This section describes existing recreational properties along with properties that are protected under Section 4(f) of the USDOT Act of 1966 (49 USC § 303 et seq.) and Section 6(f) of the Land and Water Conservation Act of 1965 (16 USC § 460L) (other than the historic resources described in Section 4.4.5, *Cultural Resources*).

Section 4(f) resources are identified as parks, recreation areas, or wildlife and waterfowl refuges of national, state, or local significance that are available to the public. 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 been the subject of 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.

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.

Table 4.4.6-1 Section 4(f) Evaluation Sources

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
Comprehensive Growth Management Plan, Martin County	Martin County	2013
Palm Beach County 1989 Comprehensive Plan	Palm Beach County	2012

4.4.6.2 Affected Environment

Thirty-two Section 4(f) resources were identified within 300 feet of the Project alignment (Table 4.4.6-2; Appendix 4.4.6-A). Two of the identified Section 4(f) resources are along the E-W Corridor, while the remaining 30 are along the N-S Corridor. No Section 4(f) resources were identified along the MCO Segment. Two of the identified Section 4(f) resources 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 Section 4(f) resources (parks, recreational areas, or wildlife refuges) planned within 300 feet of the Project alignment.

Table 4.4.6-2 Section 4(f) and Section 6(f) Parks, Wildlife Refuges, Conservation, and Recreation Areas within the Orlando-West Palm Beach Project Study Area

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) bisected by the proposed alignment. Recreational activities include: hiking, bicycling, camping, horseback riding, fishing, limited hunting and wildlife viewing (FWC 2013a).
2	Canaveral Marshes Conservation Area	Brevard	Conservation area managed by SJRWMD bisected by the proposed alignment. Recreational activities include: fishing, hiking, bicycling, canoeing, boating, and wildlife viewing (SJRWMD 2013b).
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).
4	Rotary Park at Suntree	Brevard	Community park managed by Brevard County. Recreational facilities include a playground and a pavilion (Brevard County, Florida 2013c).
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).
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).
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).
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).
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.).
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).
12	Indrio Scrub Preserve	St. Lucie	Preserve managed by St. Lucie County. Recreational activities include hiking and wildlife viewing (St. Lucie County, Florida 2013a).
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).
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).
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).
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).

Table 4.4.6-2 Section 4(f) and Section 6(f) Parks, Wildlife Refuges, Conservation, and Recreation Areas within the Orlando-West Palm Beach Project Study Area (Continued)

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.).
21	Martin County Fairgrounds	Martin	Fairgrounds managed by Martin County. Intended use is to entertain and promote communities' traditions, talents, diversity, vision and agricultural heritage (Martin County Fair Association, Inc. 2013).
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	Seabranch Preserve State Park	Martin	Park managed by the State of Florida. Recreational activities include: hiking, picnicking, and wildlife viewing (Florida State Parks 2013).
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).
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).
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).
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).
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).
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 Section 4(f) recreational resources within 300 feet of the WPB-M Corridor (Table 4.4.6-3). Twenty of these recreational properties are within 100 feet of the corridor.

Table 4.4.6-3 Recreational Resources within 300 feet and 100 feet of the West Palm Beach – Miami Corridor

Resource Name	County/Municipality	Within 300 feet	Within 100 feet
Flamingo Park	West Palm Beach	X	
Mary Brandon Park	West Palm Beach	X	
City of West Palm Beach Municipal Golf Course	West Palm Beach	X	X
City of West Palm Beach Recreational Center	West Palm Beach	X	X
Hypoluxo Scrub Natural Area	Palm Beach County	X	X
Seacrest Scrub Natural Area	Palm Beach County	X	X
Lake Worth Shuffleboard Courts	Lake Worth	X	
Lake Worth Recreation Center	Lake Worth	X	
Veterans Park	Boyton Beach	X	
Bicentennial Park	Boyton Beach	X	
Pence Park	BoytonBeach	X	
Palm Beach CountyRecreation Center	BoytonBeach	X	
Worthing Park	Delray Beach	X	
Currie Commons Park	Delray Beach	X	
Miller Park	Delray Beach	X	
Leon M. WeekesEnvironmental Preserve	Delray Beach	X	X
Boca Isles Park	Boca Raton	X	
City of Boca RatonRecreation Center	Boca Raton	X	X
City of Boca Raton GopherTortoise Preserve	Boca Raton	X	X
Rosemary Ridge Preserve	Boca Raton	X	X
Poinciana Park/DogPark	Hollywood	X	
Dowdy Baseball Park	Hollywood	X	
Byrd Park	Dania	X	
Jaco Pastorius Park and Community Center	Oakland Park	X	X
Tarpon River Park	Fort Lauderdale	X	
Florence C. Hardy Park	Fort Lauderdale	X	
Sistrunk Park	Fort Lauderdale	X	X
Oakland Park Boat Ramp	Fort Lauderdale	X	
Midway Park	Fort Lauderdale	X	
City of Fort Lauderdale SW 9th Street Recreation Center	Fort Lauderdale	X	X
Florence C. Hardy Park and Southside Cultural Center	Fort Lauderdale	X	
Highlands Scrub Natural Area	Broward County	X	X
Broward County Planned Park	Broward County	X	X
Colohatchee Park	Winton Manors	X	X
Aqua Bowl Park	North Miami Beach	X	
Arthur I. Snyder Tennis Complex	North Miami Beach	X	
Oleta River State Park	Miami-Dade County	X	
Arch Creek Park	Miami-Dade County	X	X
Arch Creek Park Addition	Miami-Dade County	X	X
Greynolds Park	Miami-Dade County	X	X
Dorsey Park	City of Miami	X	
Woodson/Miami Design Park	City of Miami	X	X
Ed Abdella Field House and Athletics	City of Miami	X	X
El Portal Tot Lot	Village of El Portal	X	X

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.

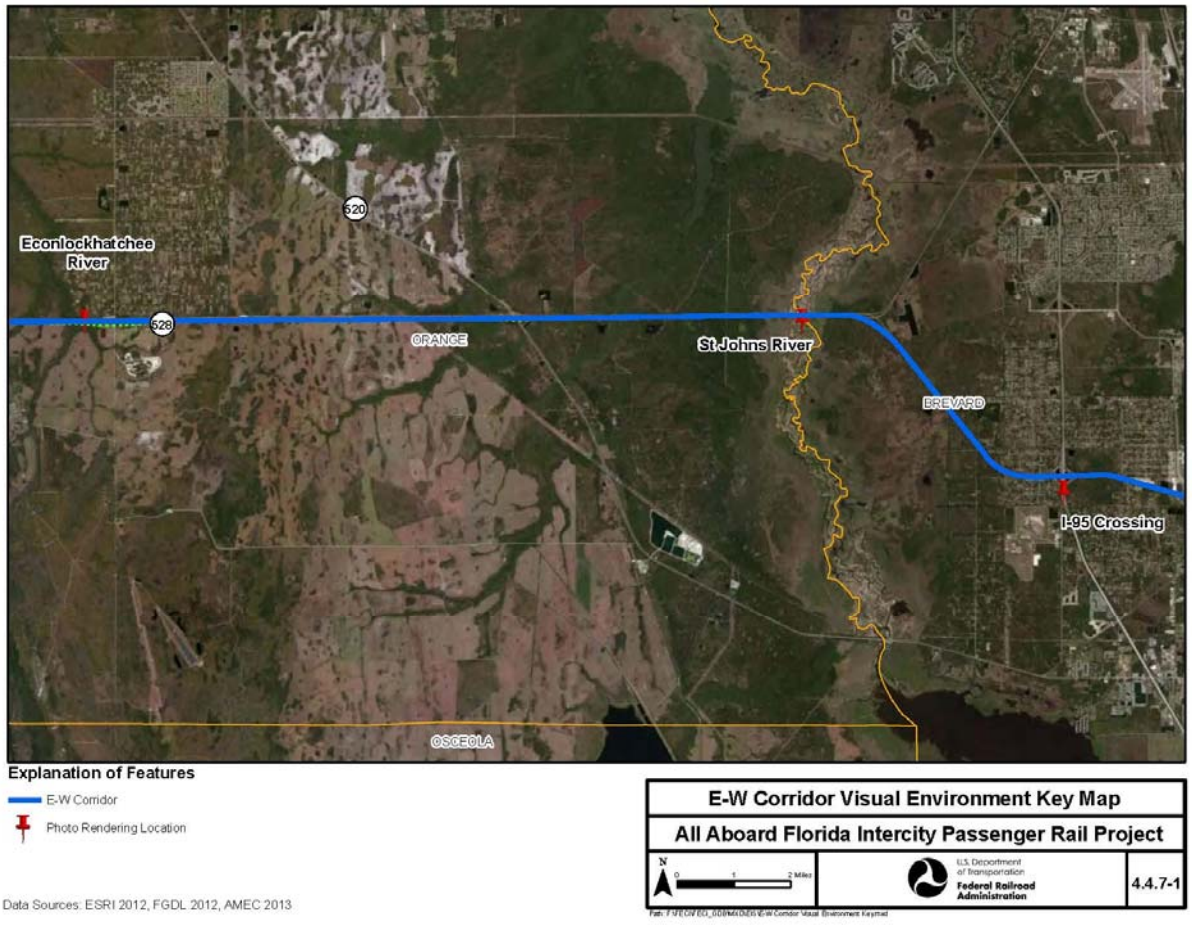
4.4.7 Visual and Scenic Resources

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.



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 and 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 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.

Visual and scenic resources associated with the WPB-M Corridor are similar to the N-S Corridor.

A - Econlockhatchee River - Existing View of River

B - Econlockhatchee River - Future View of River Alternative E

Source: HNTB

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

Path : P:\FEC\MISC_GIS\MXD\EIAIS-Waterbody crossing 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	U.S. Department of Transportation Federal Railroad Administration	4.4.7-3

Source: HNTB

Path: F:\FECI\FECI_GDB\MXD\EA\NG Waterbody crossing Map2.mxd

A - St. Johns River - Existing View from River

B - St. Johns River - Future View from River

Source: HNTB

Existing and Future Views of St. Johns River, North View		
All Aboard Florida Intercity Passenger Rail Project		
NTS	U.S. Department of Transportation Federal Railroad Administration	4.4.7-4

Path : P:\FEC\MFECI_GDB\MXD\EIAIS\Waterbody crossing 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_GDB\MXD\EA\NG Waterbody crossing Map2.mxd

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.

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.

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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*.

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 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 to approximately 423 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), Orlando-Orange County Expressway Authority (OOCEA), and the Florida Department of Transportation (FDOT). The Project is consistent with all local and regional land use 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 land use plans.

No-Action Alternative

Under the No-Action Alternative, construction and operation of the Project would not take place. Existing commuter railway services and opportunities 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 land use 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 is 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 is consistent with Orange County planning goals and objectives.

East-West Corridor

OOCEA 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 use of 44 acres of privately owned property in Brevard County east of I-95. Property acquisition would be limited to a small portion of one parcel (Parcel 24 35 10 00-1) outside the SR 528 right-of-way. Use of this property would permanently convert 44 acres (15.7 percent) of the parcel's approximately 280 acres from undeveloped land use to transportation use.

As described above, OOCEA 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, OOCEA would lease approximately 245 acres of the newly acquired land to AAF.

The E-W Corridor under Alternative A would be consistent with the land use plan (described below) of Brevard County. As explained in the MCO Segment discussion, the Project is consistent with growth management policies adopted by Orange County.

Brevard County's plan 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). The E-W Corridor under Alternative A would be consistent with Brevard County planning goals and objectives.

North-South Corridor

The N-S Corridor is entirely within the existing Florida East Coast Railway (FECR) Corridor; it would not require acquisition of privately owned property, and there would be no land use conversions.

The N-S Corridor would be consistent with the local land use plans of Indian River, St. Lucie, Martin, and Palm Beach Counties (described below). As explained in the E-W Corridor discussion, the Project is 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. The 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). The N-S Corridor would be consistent with Indian River County planning goals and objectives.

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). It also 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. The N-S Corridor would be consistent with St. Lucie County planning goals and objectives.

Martin County discusses the many positive effects of higher speed rail on transportation systems in its Comprehensive Growth Management Plan (Martin County, Division of Community Planning 2013). One of the goals of the County is to develop and implement a transportation network that is coordinated and consistent with municipal, county, regional, state, and federal planning programs. Martin County desires to plan for comprehensive long-range transportation needs, including a Florida higher speed railway. The County further desires to collaborate with the Florida High Speed Rail Authority (FHSRA) and a rail service provider to establish service between Martin County and nearby major regional hubs such as Port St. Lucie, Palm Beach County, and points beyond. The N-S Corridor would be consistent with Martin County planning goals and objectives.

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. The N-S Corridor would be consistent with Palm Beach County planning goals and objectives.

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 OOCEA in the segment of the corridor owned by OOCEA. This straddle design would require the same land acquisition and access arrangements with OOCEA, GOAA, and FDOT as described in the E-W Corridor under Alternative A. Under Alternative C, however, OOCEA would lease 374 acres of the newly acquired land to AAF, which would result in the use of 418 acres of land through either acquisition or leasing (44 acquired, 374 leased).

The E-W Corridor under Alternative C would be consistent with local land use plans. As explained under Alternative A, the Project is consistent with growth management policies adopted by Orange and Brevard Counties.

Alternative E

The E-W Corridor is the only component under Alternative E 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 OOCEA in the portion of the E-W Corridor that lies adjacent to the land currently owned by OOCEA. This offset would require the same land acquisition and access arrangements with OOCEA, GOAA, and FDOT as described in the E-W Corridor under Alternatives A and C. Under Alternative E, OOCEA would lease 374 acres of the newly acquired land to AAF, which would result in the use of 418 acres of land through either acquisition or leasing (44 acquired, 374 leased).

The E-W Corridor under Alternative E would be consistent with local land use plans. As explained under Alternative A, the Project is 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 nearly 670,000 residents by 2040 (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 use of one privately owned property outside the SR 528 right-of-way. AAF would acquire a small portion of this parcel; however, the amount of acres acquired would not be substantial enough to induce a land use conversion on the acres remaining under private ownership. The remainder of this parcel would continue as undeveloped and would be available for future development.

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 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 2013 FONSI. This evaluation considers impacts on all transportation modes and infrastructure, including automobile, motorbus, pedestrian, train, and aviation.

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. Nine major arterials with highway-rail grade crossings on the existing FECR Corridor were analyzed (Table 5.1.2-1).

Table 5.1.2-1 Grade Crossing Locations Evaluated

County	Location	Annual Average Daily Volume (AADT) (2011)
Brevard	Pineda Causeway	40,000
	Palm Bay Road	26,000
Indian River	Oslo Road	12,400
	19th Place/20th 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.

Table 5.1.2-2 Level of Service (LOS) Criteria

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-B). 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 2.5 to 2.8 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 (see Table 4.1.2-4), but would not have a significant impact on traffic.

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 5.1.2-3 shows the predicted diversion from other modes of transportation in 2019 (when passenger volumes are predicted to reach steady levels).

Table 5.1.2-3 Passenger Diversion from Other Modes of Transportation

Mode	Percent Diverted	Annual Ridership	Daily Ridership
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 5.1.2-3) 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 from private inter-city motorbus services (Table 5.1.2-3). 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

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, 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 5.1.2-4). 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 5.1.2-4, 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 nine 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 duration of the adverse impact (Table 5.1.2-4).

Table 5.1.2-4 At-grade Crossing Closures (2019)

		Freight			Passenger		Total	
County	Number of at-grade crossings[1]	Number of trains/ day	Train speed (mph)	Maximum closure (min/hour)[2]	Number of trains/ day	Train speed (mph)	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.

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.

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. As shown in Table 5.1.2-5, the majority of intersections operate at acceptable levels of service (LOS A to LOS C) in both the No-Action Alternative and with the Project, for the majority of the PM Peak Hour. The level of service degrades to LOS E or LOS F when a train passes. Two intersections (Pineda Causeway and Northlake Boulevard) operate at poor levels of service (LOS D to LOS E) for most of the PM Peak Hour, and degrade to LOS F for short periods due to train passage. As noted above, with the Project the PM Peak Hour train traffic would include one freight and two passenger trains. The Project would increase the amount of time that each intersection experiences LOS F conditions, in comparison to the No-Action Alternative, by 0 to 7.5 minutes in the PM Peak Hour. The greatest impact to local traffic would occur on Seaway Drive in Fort Pierce, at the FECR railroad crossing.

Table 5.1.2-5 Intersection Level of Service, N-S Corridor (minutes per hour) – 2016 PM Peak Hour

Intersection	Condition	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Pineda Causeway – Holy Trinity Road	No-Action	0	0	0	54.5	3	1.5
	Action Alternatives	0	0	0	56.5	2	1.5
Oslo Road – FECR	No-Action	57.5	0	0	0	0	2.5
	Action Alternatives	52.5	0	0	0	0	7.5
Oslo Road – Old Dixie Highway	No-Action	0	58.5	0	0	0	1.5
	Action Alternatives	0	55.5	0	0	0	4.5
19th Place/20th Place – FECR	No-Action	58	0	0	0	0	2
	Action Alternatives	53.5	0	0	0	0	6.5
20th Place-Commerce Ave	No-Action	58	0	0	0	0	2
	Action Alternatives	53.5	0	0	0	0	6.5
Seaway Drive – FECR	No-Action	56	0	0	0	0	4
	Action Alternatives	48.5	0	0	0	0	11.5
Seaway Drive – U.S. 1	No-Action	0	0	57.5	0	0	2.5
	Action Alternatives	0	0	52.5	0	0	7.5
North Causeway-Old Dixie Highway	No-Action	0	58.5	0	0	0	1.5
	Action Alternatives	0	55.5	0	0	0	4.5
SE Indian Street – FECR	No-Action	59	0	0	0	1	0
	Action Alternatives	57	0	0	0	3	0
SE Dixie Hwy – SE Indian St	No-Action	58	0	0	0	0	2
	Action Alternatives	54.5	0	0	0	0	5.5
East Monterey Rd - FECR	No-Action	59	0	0	0	1	0
	Action Alternatives	57	0	0	0	3	0
Monterey Rd – SE Dixie Hwy	No-Action	58	0	0	0	0	2
	Action Alternatives	56	0	0	0	0	4
Banyan Blvd-FECR	No-Action	0	0	0	0	57	3
	Action Alternatives	0	0	0	0	51	9
Northlake Blvd-Old Dixie Hwy	No-Action	0	0	0	58	0	2
	Action Alternatives	0	0	0	54	0	6
Northlake Blvd-Hwy 811	No-Action	0	0	0	0	58	2
	Action Alternatives	0	0	0	0	53	7

Source: AMEC

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 52 seconds. With only one such crossing event 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 1 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.

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 (e.g., maintenance of traffic plans) will be specified and required for construction.

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 4.3.1-1 and 4.3.1-4). 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 existing double-track drawbridge over the New River. No construction is planned at this bridge, but train frequencies would increase.
- The five fixed bridges that will be replaced (Eau Gallie River, Crane Creek, Turkey Creek, St. Sebastian River, Hillsboro Canal).

Freight traffic is predicted to increase under the No-Action Alternative from 14 trains under 2013 existing conditions to a projected 20 trains by 2016, increasing the number of bridge closures and vessel wait times at the St. Lucie River, Loxahatchee River, and New River Bridges.

Under Project conditions, an additional 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.

For commercial and recreational vessels, 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 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.

5.1.3.1 Methodology

This section explains how effects to navigation and marine-related economics were evaluated for the future No-Action Alternative and Project. Details of the methodology are provided in Appendix 4.1-3-C.

Operations Modeling

Estimates of rail traffic arrivals are based on the existing schedule. A model to predict this schedule was generated using Rail Traffic Controller (RTC)[2] 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).

Infrastructure changes as a result of the Project include extending the double track of the mainline across 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 will 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.

Table 5.1.3-1 Average Speeds of Passenger and Freight Trains

	No-Action Alternative	Project	
County	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.

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; this included the time the water way is unavailable during the bridge closing process before a train's arrival. 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

2 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.

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. The RTC model was run for the average number of marine vessels arriving per day (AMEC 2014a).

Economic Analysis

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-C) 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).

5.1.3.2 Navigation Impacts

This section describes the projected impacts to navigation under the No-Action Alternative and Project. Appendix 4.1-3-C provides a detailed analysis, including modeling results.

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 5.1.3-2, 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 5.1.3-2 Moveable Bridge Closures

Year	Number of Closures[1]	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

The total number of vessels that wait and the average vessel wait times at the St. Lucie River Bridge would increase under the 2016 No-Action Alternative.

Approximately 20 freight trains would pass over the St. Lucie River Bridge on any given day. As shown in Table 5.1.3-2, 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).

Under the No-Action Alternative, an increase in obstruction of passage compared to Existing Conditions is projected. This increase in obstruction of passage is due to a greater number of bridge closures as a result of the increased freight traffic. The number of vessels that experience a wait time would increase from 7 percent to 14 percent, which represents approximately 10.8 additional vessels per day. The average queue time for vessels experiencing a wait will increase by approximately 1.7 minutes. With the exception of a few specific hour periods, the vessel queue length under the No-Action Alternative rarely exceeds 10 vessels; it is projected that the queue length will be 10 vessels or fewer for 97.8 percent of the time. Table 5.1.3-4 presents vessel wait times for the St. Lucie River Bridge under the No-Action Alternative.

Loxahatchee River Bridge

The total number of vessels that wait and the average vessel wait times at the Loxahatchee River Bridge would increase under the No-Action Alternative.

Approximately 20 freight trains would pass over the Loxahatchee River Bridge on any given day. As shown in Table 5.1.3-2, 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).

Under the No-Action Alternative, an increase in obstruction of passage compared to existing conditions is projected. This increase in obstruction of passage is due to a greater number of bridge closures as a result of the increased freight traffic. The number of vessels that experience a wait time increases from 7 percent to 25 percent, which represents approximately 7 additional vessels. The average queue time for vessels experiencing a wait will increase by approximately 1.1 minutes. With the exception of a few specific hour periods, the vessel queue length under the No-Action Alternative rarely exceeds 10 vessels; it is projected that the queue length will be 10 vessels or fewer for 98.3 percent of the time. Table 5.1.3-6 presents vessel wait times for the Loxahatchee River Bridge under the No-Action Alternative.

New River Bridge

The total number of vessels that wait and the average vessel wait times at the New River Bridge would increase under the 2016 No-Action Alternative.

Approximately 20 freight trains would pass over the New River Bridge on any given day. As shown in Table 5.1.3-2, 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).

Under the No-Action Alternative, an increase in obstruction of passage compared to existing conditions is projected. This increase in obstruction of passage is due to a greater number of bridge closures as a result of the increased freight traffic. Combined, these factors increase the number of vessels that experience a wait time from 14 percent to 23 percent, which represents approximately 20 additional vessels per day. The average wait time for vessels that wait will increase by approximately 2 minutes. With the exception of a few specific hour periods, the vessel queue length under the No-Action Alternative rarely exceeds 10 vessels; it is projected that the queue length will be 10 vessels or fewer for 97.8 percent of the time. Table 5.1.3-8 presents vessel wait times for the New River Bridge under the No-Action Alternative.

Fixed Bridges

Under the No-Action Alternative, fixed bridges at other 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 would not affect navigation at these bridges.

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

The St. Lucie River Bridge would be rehabilitated as part of the Project. 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 5.1.3-2 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. Appendix 4.1.3-D also provides detailed information on hourly bridge closures.

Table 5.1.3-3 Summary of Projected Bridge Operations for the St. Lucie River Bridge

St. Lucie River Bridge	No-Action Alternative[1]	Project[2]
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.

The Project would result in an additional 24 closures per day of the St. Lucie River Bridge (Table 5.1.3-3). 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 St. Lucie River and associated waterways.

Table 5.1.3-4 Navigation Simulation Model Results for the St. Lucie River Bridge (2016)

	Units	No-Action Alternative	Project
Total Vessels			
Vessel Arrivals	(#/day)	157	157
Vessels with Zero Wait Time	(#/day)	135	90
% Vessels with Zero Wait Time		86%	58%
Vessels With Wait Time	(#/day)	22.5	66.7
% Vessels With Wait Time		14%	42%
Avg. Wait Time (all)[1]	(min)	1.4	3.4
Avg. Wait Time[2]	(min)	9.9	8.1
Most Likely Vessel Wait Time; >90% Probability of Occurring	(min)	<18.3	<17.6
Commercial Vessels			
Vessel Arrivals	(#/day)	9	9
Vessels with Zero Wait Time	(#/day)	7	4
% Vessels with Zero Wait Time		78%	51%
Vessels with Wait Time	(#/day)	2	4
% Vessels With Wait Time		22%	49%
Avg. Wait Time (all)[1]	(min)	1.8	3.7
Avg. Wait Time[2]	(min)	8.1	7.7
Most Likely Vessel Wait Time; >90% Probability of Occurring	(min)	<18.3	<16.6
Recreational Vessels			
Vessel Arrivals	(#/day)	148	148
Vessels with Zero Wait Time	(#/day)	127	86
% Vessels with Zero Wait Time		86%	58%
Vessels With Wait Time	(#/day)	21	63
% Vessels With Wait Time		14%	42%
Avg. Wait Time (all)[1]	(min)	1.4	3.4
Avg. Wait Time[2]	(min)	10.1	8.1
Most Likely Vessel Wait Time; >90% Probability of Occurring	(min)	<18.3	<17.7

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.
1 Average time all vessels will have to wait before crossing the bridge (average between vessels with wait time and vessels with no wait time)
2 Average time queue vessels will have to wait before crossing the bridge

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 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 5.1.3-3 (AMEC 2014a).

Table 5.1.3-4 shows the model results for marine traffic wait times for both commercial and recreational vessels at the St. Lucie River Bridge. Under Project conditions, the percentage of vessels that experience a wait under Project conditions would increase from 14 percent under the No-Action Alternative to 42 percent under the Project (approximately 44 additional vessels per day). The average wait time for all vessels (inclusive of those vessels that wait and those that do not wait) would increase from 1.4 minutes under the No-Action Alternative to 3.4 minutes under the Project. The average wait time of delayed vessels would decrease, from 9.9 minutes to 8.1 minutes. The most likely vessel wait time would be less under Project conditions as compared to the No-Action Alternative (AMEC 2014a). With the exception of a few specific hour periods, the vessel queue length rarely exceeds 10 vessels. The likelihood of a queue length greater than 10 in any given hour would increase from 0.2 percent (No-Action Alternative) to 4.3 percent under the Project conditions.

Vessel delays for the St. Lucie River Bridge are based on the modeled average of 157 arrivals per day. In actuality, there would be a range in the number of vessel arrivals depending on the day and time. For the St. Lucie River Bridge, arrivals ranged from 46 to 413 vessels during the 2014 Video Survey and arrivals were higher than 157 vessels 29 percent of the time. On peak days, navigation impacts may be substantially greater than what is depicted in Table 5.1.3-4.

Loxahatchee (Jupiter) River

The Project would reconstruct the second track at 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 5.1.3-2 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 5.1.3-5). 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 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.

Model results for the bridge operations under the Project and No-Action Alternative for the Loxahatchee River Bridge are presented in Table 5.1.3-5. Appendix 4.1.3-D also provides detailed information on hourly bridge closures.

Table 5.1.3-5 Summary of Projected Bridge Operations for the Loxahatchee River Bridge

Loxahatchee River Bridge	No-Action Alternative[1]	Project [2]
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.

Table 5.1.3-6 shows the model results for marine traffic wait times for both commercial and recreational vessels at the Loxahatchee River Bridge. Under Project conditions, the percentage of vessels that experience a wait under Project conditions would increase from 25 percent under the No-Action Alternative to 42 percent under the Project conditions (approximately 31 additional vessels per day). The average wait time for all vessels (inclusive of those vessels that wait and those that do not wait) would increase from 1.2 minutes under the No-Action Alternative to 2.2 minutes under the Project. The average wait time of delayed vessels would decrease, from 9.4 minutes to 5.7 minutes. The most likely vessel wait time is less under Project conditions as compared to the No-Action Alternative (AMEC 2014a). With the exception of a few specific hour periods, the vessel queue length rarely exceeds 10 vessels. The likelihood of a queue length greater than 10 in any given hour would decrease from 1.7 percent (No-Action Alternative) to 0.5 percent under the Project conditions.

Vessel delays for the Loxahatchee River Bridge are based on the modeled average of 121 arrivals per day. In actuality, there would be a range in the number of vessel arrivals depending on the day and time. For the Loxahatchee River Bridge, arrivals ranged from 19 to 502 vessels in the 2014 Video Survey and arrivals were higher than 121 vessels 43 percent of the time. On peak days, navigation impacts may be substantially greater than what is depicted in Table 5.1.3-6.

Table 5.1.3-6 Navigation Simulation Model Results for the Loxahatchee River Bridge (2016)

	Units	No-Action Alternative	Project
Total Vessels			
Vessel Arrivals	(#/day)	121	121
Vessels with Zero Wait Time	(#/day)	105	74
% Vessels with Zero Wait Time		87%	61%
Vessels With Wait Time	(#/day)	16	47
% Vessels With Wait Time		25%	42%
Avg. Wait Time (all)[1]	(min)	1.2	2.2
Avg. Wait Time[2]	(min)	9.4	5.7
Most Likely Vessel Wait Time; >90% Probability of Occurring	(min)	≤16.7	≤9.8
Commercial Vessels			
Vessel Arrivals	(#/day)	4	4
Vessels with Zero Wait Time	(#/day)	4	2
% Vessels with Zero Wait Time		84%	56%
Vessels with Wait Time	(#/day)	1	2
% Vessels With Wait Time		16%	44%
Avg. Wait Time (all)[1]	(min)	1.2	2.4
Avg. Wait Time[2]	(min)	6.7	5.4
Most Likely Vessel Wait Time; >90% Probability of Occurring	(min)	≤15.7	≤10.1
Recreational Vessels			
Vessel Arrivals	(#/day)	116	116
Vessels with Zero Wait Time	(#/day)	101	71
% Vessels with Zero Wait Time		87%	61%
Vessels With Wait Time	(#/day)	15	45
% Vessels With Wait Time		13%	39%
Avg. Wait Time (all)[1]	(min)	1.2	2.2
Avg. Wait Time[2]	(min)	9.5	5.7
Most Likely Vessel Wait Time; >90% Probability of Occurring	(min)	≤16.8	≤9.8

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.
1 Average time all vessels will have to wait before crossing the bridge (average between vessels with wait time and vessels with no wait time)
2 Average time queue vessels will have to wait before crossing the bridge

New River

The Project would not require any action at 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 5.1.3-2 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 5.1.3-7). 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 5.1.3-7). 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 5.1.3-7 (AMEC 2014a). Appendix 4.1.3-D also provides detailed information on hourly bridge closures.

Table 5.1.3-7 Summary of Projected Bridge Operations for the New River Bridge

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.

Table 5.1.3-8 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 23 percent under the No-Action Alternative to 36 percent (approximately 27 additional vessels per day). The average wait time for all vessels (inclusive of those vessels that wait and those that do not wait) would increase from 1.8 minutes under the No-Action Alternative to 2.2 minutes under the Project. The average wait time of delayed vessels would decrease, from 7.9 minutes to 6.3 minutes. The most likely vessel wait time is less under Project conditions as compared to the No-Action Alternative (AMEC 2014a). With the exception of a few specific hour periods, the vessel queue length rarely exceeds 10 vessels. The likelihood of a queue length greater than 10 in any given hour would decrease from 2.2 percent (No-Action Alternative) to 2.0 percent under the Project conditions.

Vessel delays for the New River Bridge are based on the modeled average of 215 arrivals per day. In actuality, there would be a range in the number of vessel arrivals depending on the day and time. For the

New River Bridge, arrivals ranged from 37 to 508 vessels during the 2014 Video Survey and arrivals were higher than 215 vessels 36 percent of the time. On peak days, navigation impacts may be substantially greater than what is depicted in Table 5.1.3-8.

Table 5.1.3-8 Navigation Simulation Model Results for the New River Bridge (2016)

	Units	No-Action Alternative	Project
Total Vessels			
Vessel Arrivals	(#/day)	215	215
Vessels with Zero Wait Time	(#/day)	165	139
% Vessels with Zero Wait Time		77%	64%
Vessels With Wait Time	(#/day)	50	76
% Vessels With Wait Time		23%	36%
Avg. Wait Time (all)[1]	(min)	1.8	2.2
Avg. Wait Time[2]	(min)	7.9	6.3
Most Likely Vessel Wait Time; >90% Probability of Occurring	(min)	≤16.4	≤12.2
Commercial Vessels			
Vessel Arrivals	(#/day)	49	49
Vessels with Zero Wait Time	(#/day)	35	29
% Vessels with Zero Wait Time		71%	59%
Vessels with Wait Time	(#/day)	14	20
% Vessels With Wait Time		29%	41%
Avg. Wait Time (all)[1]	(min)	2.1	2.6
Avg. Wait Time[2]	(min)	7.3	6.3
Most Likely Vessel Wait Time; >90% Probability of Occurring	(min)	≤17.0	≤12.9
Recreational Vessels			
Vessel Arrivals	(#/day)	165	165
Vessels with Zero Wait Time	(#/day)	130	109
% Vessels with Zero Wait Time		79%	66%
Vessels With Wait Time	(#/day)	35	56
% Vessels With Wait Time		21%	34%
Avg. Wait Time (all)[1]	(min)	1.7	2.1
Avg. Wait Time[2]	(min)	8.1	6.3
Most Likely Vessel Wait Time; >90% Probability of Occurring	(min)	≤16.3	≤12.0

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.
1 Average time all vessels will have to wait before crossing the bridge (average between vessels with wait time and vessels with no wait time)
2 Average time queue vessels will have to wait before crossing the bridge

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

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.

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 wetlands, 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 Economic Impacts

This section provides an overview of the economic impacts associated with the No-Action Alternative and the Project for the St. Lucie River, Loxahatchee River, and New River Bridges.

No-Action Alternative

As noted in Section 5.1.3.2, *Navigation Impacts,* freight traffic on the FECR Corridor is predicted to increase from 14 trains to 20 trains per day by 2016 under the No-Action Alternative. Under the No-Action Alternative, the infrastructure would not be improved and train speeds would not increase; therefore, the amount of overall closure time would increase.

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 vessel queues of 11 vessels per day. 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 5.1.3-9) of $209 per day or $76,285 annually. This value is the difference between the estimated economic impacts from the No-Action Alternative compared to the impact of Existing Conditions. 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).

Table 5.1.3-9 Economic Model Results for the St. Lucie River Bridge for Existing Conditions and No-Action Alternative

	Units	Existing Conditions	No-Action Alternative
Total Daily Wait Time for All Vessels	min/day	96	223
Commercial Industry			
Vessels Experiencing a Wait	#/day	2	15
Cost of Vessel Wait to Marine Industry	$/day	15	26
Percent Cost Compared to Marine Industry Value	%	0.0006	0.0011
Recreational Industry			
Vessels Experiencing a Wait	#/day	10	21
Cost of Vessel Wait to Marine Industry	$/day	143	341
Percent Cost Compared to Marine Industry Value	%	0.0065	0.0156

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

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 (AMEC 2014a).

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 5.1.3-10) of $125 per day or $45,625 annually. This value is the difference between the estimated economic impacts from the No-Action Alternative compared to the impact of Existing Conditions. 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).

Table 5.1.3-10 Economic Model Results for the Loxahatchee River Bridge for Existing Conditions and No-Action Alternative

	Units	Existing Conditions	No-Action Alternative
Total Daily Wait Time for All Vessels	min/day	74	147
Commercial Industry			
Vessels Experiencing a Wait	#/day	1	1
Cost of Vessel Wait to Marine Industry	$/day	7	9
Percent Cost Compared to Marine Industry Value	%	0.0005	0.0006
Recreational Industry			
Vessels Experiencing a Wait	#/day	8	15
Cost of Vessel Wait to Marine Industry	$/day	118	241
Percent Cost Compared to Marine Industry Value	%	0.0089	0.0182

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

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 (AMEC 2014a).

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 5.1.3-11) of $373.00 per day or $136,145 annually. This value is the difference between the estimated economic impacts from the No-Action Alternative compared to the impact of Existing Conditions. 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).

Table 5.1.3-11 Economic Model Results for the New River Bridge for Existing Conditions and No-Action Alternative

	Units	Existing Conditions	No-Action Alternative
Total Daily Wait Time for All Vessels	min/day	178	390
Commercial Industry			
Vessels Experiencing a Wait	#/day	11	14
Cost of Vessel Wait to Marine Industry	$/day	101	196
Percent Cost Compared to Marine Industry Value	%	0.0016	0.0031
Recreational Industry			
Vessels Experiencing a Wait	#/day	20	35
Cost of Vessel Wait to Marine Industry	$/day	215	493
Percent Cost Compared to Marine Industry Value	%	0.0040	0.0092

Source: AMEC. 2014a. *Navigation Discipline Report for the AAF Passenger Rail Project from Orlando to Miami, Florida*. July 2014.

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 (AMEC 2014a).

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 and would less likely be procured by transient waterway boaters. Therefore, the No-Action Alternative is not expected to have impacts to such businesses (AMEC 2014a).

Action Alternatives A, C, and E

The economic effects of extended bridge closures to the local 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.

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 5.1.3-12) 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).

Table 5.1.3-12 Economic Model Results for the St. Lucie River Bridge No-Action Alternative and Combined Effect

	Units	Existing Conditions	Project Alternatives	Difference
Average Wait Time for all Vessels	min	223	239	16
Commercial Industry				
Vessels Experiencing Wait Time	#/day	9	4	(5)
Cost of Vessel Delay to Marine Industry	$/day	26	55	29
Percent Cost Compared to Marine Industry Value	%	0.0011	0.0023	0.0012
Recreational Industry				
Vessels Experiencing Wait Time	#/day	148	165	17
Cost of Vessel Delay 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.

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 (AMEC 2014a).

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 (AMEC 2014a).

Loxahatchee River

As noted in Section 6.5 of the 2014 *Navigation Discipline Report* (Appendix 4.1-3-C), the Project would potentially result in minor economic impacts to jobs, economic growth, and development. The estimated economic impact under the Project Alternatives (Table 5.1.3-13) 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).

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 (AMEC 2014a).

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 (AMEC 2014a).

Table 5.1.3-13 Economic Model Results for the Loxahatchee River FECR Bridge No-Action Alternative and Combined Effect

	Units	Existing Conditions	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
Cost of Vessel Wait to Marine Industry Value	%	0.0182	0.0331	0.0150

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-C), 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 5.1.3-14), 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 versus Existing Conditions). 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).

Table 5.1.3-14 Economic Model Results for the New River Bridge No-Action Alternative and Combined Effect

	Units	Existing Conditions	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	117
Cost of Vessel Wait 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.

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 (AMEC 2014a).

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 (AMEC 2014a).

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.

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 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 (Louis Berger Group 2013) (Appendix 3.3-F) 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.

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 2) 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 reductions in new passenger trains, freight trains, and 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 377-mile round-trip distance, this would result in an annual VMT reduction of 42,313,720 in the start-up year (2016), and an annual VMT reduction of 149,328,070 by 2019, the year that near-full ridership is anticipated. In 2030, VMT reductions of 178,726,265 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.

Table 5.2.1-1 Projected Ridership, Vehicle-Trips Removed and VMT Reductions for Orlando-West Palm Beach Service

	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]	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

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, NOx, SO_2, VOCs, PM_{10}, $PM_{2.5}$, CO_2, CH_4, and N_2O. Emissions for all pollutants, except CO_2 in 2016, show an overall decrease. The lone exception is CO_2 if the Project is considered independently of the cumulative impacts in the Project Study Area. Under that analysis, CO_2 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 CO_2 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, 2016-2030[1]

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
NOx	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_2O	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 (-)

By 2019, the reduction in automobile travel from the Project would offset all CO_2 emissions from the passenger trains and provide an overall reduction in all pollutants including CO_2. The CO_2 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, NOx, SO_2, VOC, PM_{10}, 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, NOx by 192 tons, VOCs by 59 tons, and PM_{10} by 7 tons.

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.

Table 5.2.1-3 Summary of Emissions Reductions (tons/year) for Orlando to Miami, 2019-2030

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
NOx	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.

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

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 a 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 in either the opening year or the build-out year at any of the intersections or grade crossings.

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). As documented in Section 4.1.2, *Transportation*, the highest-volume grade crossings for the Project carry 40,000 AADT. 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 hot-spot CO modeling evaluation was not conducted for this EIS.

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, that 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 159 grade crossings between Cocoa and West Palm Beach where severe, unmitigated impacts would occur using locomotive-mounted horns. Therefore, the noise analysis assumes that wayside horns will be implemented as part 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. 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 (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 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.

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.

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.

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.

Table 5.2.2-1 Proposed Passenger Rail Operations (2016)

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 OOCEA 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-A. 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.

Table 5.2.2-2 Summary of Distance between SR 528 and Alternative Alignment

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.

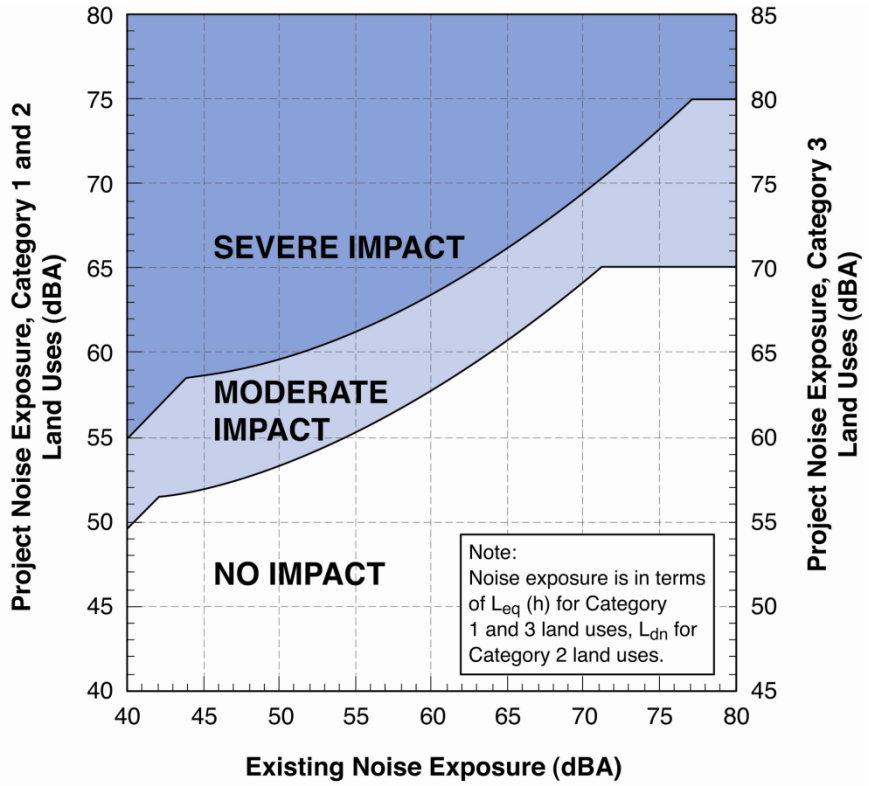


Figure 5.2.2-1 Noise Impact Criteria

Source: Federal Transit Administration. 2006. Transit Noise and Vibration Impact Assessment. USDOT Report Number FTA-VA-90-1003-06, May 2006.

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 4.2.2-4 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.

Table 5.2.2-3 Ground-borne Vibration and Ground-Borne Noise Impact Criteria

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.

Table 5.2.2-4 Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for Special Buildings

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.

Table 5.2.2-5 Distances to Potential Construction Noise Impact

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 159 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]

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 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.

Table 5.2.2-6 Summary of FRA Impact Contour Distances for MCO Segment

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.

3 Please note that AAF cannot create a quiet zone; the public entity must go through the application process with FRA.

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 Appendix 5.2.2-A 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.

Table 5.2.2-7 Noise Calculations for 65 Ldn Contours within MCO

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.

Table 5.2.2-8 Summary of Project Noise Levels for Residential Receptors at 50 ft. (dBA Ldn) along the E-W Corridor

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 (Leq) 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.

Table 5.2.2-9 Summary of Project Noise Levels - North-South Corridor

	Total Noise at 50 ft. (dBA)					
	Day (Leq)		Night (Leq)		Ldn	
County	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 dBA. As shown in Table 5.2.2-10, no receptors along the N-S Corridor would experience noise levels that exceed impact criteria.

Table 5.2.2-10 Summary of Noise Levels for Residential Receptors at 50 feet (dBA, L_{dn}) along the N-S Corridor

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

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.

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-A shows the noise impact contours along the corridor for all alternatives. Table 5.2.2-11 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.

Table 5.2.2-11 Summary of Noise Impacts (number of parcels)

	Category 1 (Quiet)		Category 2 (Residential)		Category 3 (Institutional)	
Corridor Segment	**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

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 5.2.2-12, 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).

Table 5.2.2-12 Summary of Vibration Impacts

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-A3.

As shown in Table 5.2.2-12, 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).

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. 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 along the N-S Corridor. 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. A summary of ground-borne vibration impacts from the Action Alternatives is provided in Table 5.2.2-12. Vibration mats will be used where appropriate to mitigate vibration impacts.

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 will likely be redevelopment around the stations, however these areas are already developed. Therefore, 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 5.2.2-13 presents the FTA criteria based on 1-hour L_{eq} limits at residential, commercial and industrial land uses.

Table 5.2.2-13 Construction Noise Impact Criteria

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. 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 5.2.2-14 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.

Table 5.2.2-14 Summary of Construction Noise Impacts – Project

	Category 1		Category 2		Category 3	
County	**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 5.2.2.15 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 18 and 19 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 impacts in the E-W Corridor and N-S Corridor, respectively.

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 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 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. Mitigation measures proposed for noise impacts (noise barriers or other measures as appropriate) and for vibration impacts (wheel and rail maintenance) would substantially reduce or eliminate these adverse impacts. AAF has committed to mitigate the adverse impacts of construction noise by a range of measures including time of construction, modifications to construction equipment, and selection of construction routes.

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 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.

Table 5.2.3-1 Summary of Soil and Farmland Losses for the No-Action and Build Alternatives (acres)

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-A) 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 exceed 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 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 the same.

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-A.

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.

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.

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.

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.

Table 5.2.4-1 Hazardous Materials Currently Transported on 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

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 USTs 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 Waste 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.

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.

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 EIS. 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 the Phase I to 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 *Beach and Shore Preservation*	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.	The Project would not impact beach and shore management along Florida's East Coast, specifically as it pertains to: • The Coastal Construction Permit Program. • The Coastal Construction Control Line Permit Program. • The Coastal Zone Protection Program. 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.
Chapter 163, Part II *Growth Policy; County and Municipal Planning; Land Development Regulation*	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.	The Project would be consistent with local, regional, and state comprehensive plans. Consistency with these plans has been included in the purpose and need criteria matrix used to develop the Action Alternatives.
Chapter 186 *State and Regional Planning*	Details state-level planning efforts. Requires the development of special statewide plans governing water use, land development, and transportation.	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 Statue Title 8 Planning and Development Section 187.101. Specifically, the Project meets the adopted air quality, energy, urban and downtown revitalization, and transportation policies, including the following listed below: • 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. 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. 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.

Table 5.2.5-1 Florida Coastal Management Program Consistency Review (Continued)

Statute	Scope	Consistency
Chapter 186 *State and Regional Planning (contd.)*	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 including 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 as well as 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 *Emergency Management*	Provides for planning and implementation of the state's response to, efforts to recover from, and the mitigation of natural and manmade disasters.	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. 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.
Chapter 253 *State Lands*	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. OOCEA 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 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 *State Parks and Preserves*	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 Section 404 Individual 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 *Land Acquisition for Conservation or Recreation*	Authorizes acquisition of environmentally endangered lands and outdoor recreation lands.	The Project would likely result in beneficial impacts; compensatory mitigation would be required including the potential acquisition of environmentally endangered lands. Impacts to delineated wetlands would require mitigation as required by Section 404 Individual 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 *Florida Greenways and Trails Act*	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 *Historical Resources*	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 *Historical Resources (contd.)*	Addresses management and preservation of the state's archaeological and historical resources.	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. 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. 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). 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.
Chapter 288 *Commercial Development and Capital Improvements*	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 throughout the region, including the provision of commuter and long distance passenger service on the FECR corridor.

Table 5.2.5-1 Florida Coastal Management Program Consistency Review (Continued)

Statute	Scope	Consistency
		The Project would have an indirect beneficial effect on future business opportunities and would likely promote tourism in the region.
Chapter 334 *Transportation Administration*	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 *Transportation Finance and Planning*	Addresses the finance and planning needs of the state's transportation system.	The Project would be funded by a loan under the RRIF Program pursuant to 49 CFR part 260. 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 *Water Resources*	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.	The Project would impact surface waters including wetlands 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. Section 404 Individual 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.
Chapter 373 *Water Resources (contd.)*	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.	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). The Project would be consistent with Florida's statutes and regulations regarding the water resources of the state.
Chapter 375 *Outdoor Recreation and Conservation Lands*	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 *Pollutant Discharge*	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

Table 5.2.5-1 Florida Coastal Management Program Consistency Review (Continued)

Statute	Scope	Consistency
Prevention and Removal		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 *Energy Resources*	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 *Fish and Wildlife Conservation*	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 *Fish and Wildlife Conservation (contd.)*	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 *Land and Water Management*	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 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 *Public Health, General Provisions*	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 *Mosquito Control*	Addresses mosquito control effort in the state.	The Project would not affect mosquito control efforts.
Chapter 403 *Environmental Control*	Establishes public policy concerning environmental control in the state.	AAF would coordinate all applicable permits in accordance with the FAC. The Project would adversely impact surface water bodies, including wetlands along the N-S and E-W Corridors. However, standard BMPs would be implemented during

Table 5.2.5-1 Florida Coastal Management Program Consistency Review (Continued)

Statute	Scope	Consistency
		construction activities and compensatory mitigation measures for impacts to wetlands would be required. 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. 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 *de minimis* 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. The Project would not significantly increase hazardous material or hazardous waste generated within the existing transportation corridors. Therefore, the Project would not impact water quality, air quality, pollution control, solid waste management, or other environmental control efforts.
Chapter 582 *Soil and Water Conservation*	Addresses means to conserve soil and water.	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. Therefore, the Project would be consistent with the Florida's statutes and regulations regarding soil and water conservation efforts.

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 CO_2-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.

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 EIS: 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. The region will also be vulnerable to an increasing number of intense storm events.

USACE Circular 1165-2-212 provides guidance for incorporating the direct and indirect physical impacts of projected future sea-level change across a project 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 DEIS 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 1 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 CO_2 (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, CO_2, CH_4, N_2O, ground-level O_3, 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 (CO_2), methane (CH_4) and nitrous oxide (N_2O) 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. CO_2 emissions are calculated to decrease by 19,617 tons/year in 2019 and 31,477 tons/year in 2030. CH_4 emissions would decrease by 4.7 and 5.7 tons/year, respectively, and N_2O 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 a rise of 3 to 7 inches is anticipated and by 2060 a rise of 9 to 24 inches is anticipated. A rise of 1 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.

Table 5.2.6-1 Projected Total Sea Level Rise and Sea Level Rise Acceleration

Time Range	Decadal Rate of Rise		
	Projected Rise (inches)	Historic (inches/decade)	Projected Rate of Sea Level Rise (inches/decade)
		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*. http://southeastfloridaclimatecompact.org/pdf/Sea%20Level%20Rise.pdf. Accessed January 7, 2014

Table 5.2.6-2 Estimated Timeframes for Sea Level Rise in Southeast Florida

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*. http://southeastfloridaclimatecompact.org/pdf/Sea%20Level%20Rise.pdf. Accessed January 7, 2014

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 (± 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.

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.

Table 5.2.6-3 Current and Projected Future Bridge Conditions (Horse Creek and Arch Creek)			
	2013	2030 (7-inch sea level rise)	2060 (24 inch sea level rise)
Horse Creek Bridge			
Top-of-bridge elevation	16.8 feet		
Bottom cord	12.2 feet		
100-year flood level	8.1 feet	8.8	10.1
Mean high water level	-0.58 feet	0	2.0
Arch Creek Bridge			
Top-of-bridge elevation	12.75 feet		
Bottom cord	6.0 feet		
100-year flood level	5.4 feet	6.0	7.4
Mean high water level	0.28 feet	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.

Table 5.3.1-1 Surface Water Impacts, Alternative A

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 reconstructing or replacing 18 bridges (Table 5.3.1-1). Figures depicting the bridge crossing locations are provided in Appendix 5.3.1-A. 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.

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 (Appendix 5.3.1-A). 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 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 (Appendix 5.3.1-A). 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 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 128 acres of direct impacts to aquatic resources (wetlands and surface waters). Alternative C would directly affect 165 acres of aquatic resources (wetlands and surface waters), and Alternative E would directly affect 157 acres of aquatic resources (wetlands and surface waters)

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. Section 404 of the federal Clean Water Act regulates discharges of dredged or fill material into waters of

the United States, including jurisdictional wetlands. EO 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 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 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 its 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 Final EIS.

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;
- 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.

5.3.3.1 Methodology

Direct wetland impacts within the MCO Segment and the E-W Corridor Alternatives A, C, and E were calculated as the area of wetland within a 100-foot wide corridor, 50 feet on each side of the planned railroad center line for each alternative alignment. This approximates the footprint of the constructed railroad corridor including the tracks, access road, and stormwater management system. This analysis assumes that wetlands identified within the 100-foot corridor and footprint of the VMF would be filled for the Project.

Direct wetland impacts for the N-S Corridor were estimated 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. The USACE has not

completed a preliminary jurisdictional determination of the N-S Corridor. Indirect effects to wetlands and other waters include the following impacts that could be caused by the placement of fill 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 which 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 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 loss would occur.

Alternative A

Alternative A would result in the loss of approximately 128 acres of aquatic resources, including 17 acres of surface waters and 111 acres of wetlands of which 70 acres are forested and 41 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.

MCO Segment

The MCO Segment would directly affect approximately 43 acres of aquatic resources including canals, marshy lake, reservoirs, mixed wetland hardwoods, cypress, wetland forested mixed, and freshwater marsh. Stormwater management ponds comprise the majority of wetlands affected by the Project.

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 and stormwater ponds within the airport itself provide minimal resources for wildlife utilization.

The loss of wetlands associated with the MCO Segment and VMF has been partially approved by the USACE under a prior permit issued to GOAA (USACE 1996).

Table 5.3.3-1 Alternative A - Direct Aquatic Resource Effects (acres)

FLUCCS	Description	MCO Segment	E-W Corridor	N-S Corridor	WPB-M Corridor	Total
510	Streams and Waterways	0.5	3.2	1.6	<0.1	7.5
525	Marshy Lake	0.5	0	0	0	0.5
530	Reservoirs	1.4	7.3	0	0	8.7
610-612	Wetland Hardwood Forest	0	0	0.3	<0.1	0.4
617	Mixed Wetland Hardwoods	24.0	10.1	0	0	34.1
618	Willow and Elderberry	0	1.2	0	0	1.2
621	Cypress	6.9	3.9	0	0	10.8
625	Hydric Pine Flatwoods	0	2.4	0	0	2.4
630	Wetland Forested Mixed	5.6	18.7	0	0	24.3
640	Vegetated Non-Forested Wetlands	0	0	< 0.1	0	< 0.1
641	Freshwater Marsh	4.5	7.0	0	0	12.5
643	Wet Prairie	0	4.8	0	0	4.8
646	Treeless Hydric Savannah	0	23.5	0	0	23.5
	Total Direct Effects (loss)	43.4	82.1	2.0	0.1	127.7

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.

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 wetland 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 2.0 acres due to bridge construction. These include streams and waterways, wetland hardwood forest, mangrove swamps and treeless hydric savannah. 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 1 - 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 165 acres of aquatic resources, including 7 acres of surface waters/aquatic habitat and 159 acres of wetlands, of which 98 acres are forested and 60 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.

Table 5.3.3-2 Alternative C - Direct Aquatic Resource Effects (acres)

FLUCCS	Description	MCO Segment	E-W Corridor	N-S Corridor	WPB-M Corridor	Total
510	Streams and Waterways	0.5	1.4	1.6	<0.1	3.6
525	Marshy Lake	0.5	0	0	0	0.5
530	Reservoirs	1.4	1.0	0	0	2.4
610-612	Wetland Hardwood Forest	0	0	0.3	<0.1	0.4
617	Mixed Wetland Hardwoods	24.0	15.1	0	0	39.1
618	Willow and Elderberry	0	1.8	0	0	1.8
621	Cypress	6.9	20.3	0	0	27.2
625	Hydric Pine Flatwoods	0	2.8	0	0	2.8
630	Wetland Forested Mixed	5.6	21.3	0	0	26.9
640	Vegetated Non-Forested Wetlands	0	0	< 0.1	0	< 0.1
641	Freshwater Marsh	4.5	11.6	0	0	16.1
643	Wet Prairie	0	11.0	0	0	11.0
646	Treeless Hydric Savannah	0	33.1	0	0	33.1
	Total Direct Effects	43.4	119.4	2.0	0.1	164.9

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.

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.

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. Alternative E would result in the loss of approximately 157 acres of aquatic resources, including 6 acres of surface waters/aquatic habitat and 152 acres of wetlands, of which 100 acres are forested and 53 acres are non-forested.

Alternative E would have the same effects as Alternative A within the MCO Segment and the N-S Corridor. Within the E-W Corridor, Alternative E would result in the loss of approximately 112 acres of aquatic resources, 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.

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 5.3.3-3 Alternative E - Direct Aquatic Resource Effects (acres)

FLUCCS	Description	MCO Segment	E-W Corridor	N-S Corridor	WPB-M Corridor	Total
510	Streams and Waterways	0.5	1.4	1.6	<0.1	3.6
525	Marshy Lake	0.5	0	0	0	0.5
530	Reservoirs	1.4	0.3	0	0	1.7
610-612	Wetland Hardwood Forest	0	0	0.3	<0.1	0.4
617	Mixed Wetland Hardwoods	24.0	13.4	0	0	37.4
618	Willow and Elderberry	0	1.5	0	0	1.5
621	Cypress	6.9	18.0	0	0	24.9
625	Hydric Pine Flatwoods	0	6.7	0	0	6.7
630	Wetland Forested Mixed	5.6	22.6	0	0	28.2
640	Vegetated Non-Forested Wetlands	0	0	< 0.1	0	< 0.1
641	Freshwater Marsh	4.5	9.4	0	0	13.9
643	Wet Prairie	0	7.7	0	0	7.7
646	Treeless Hydric Savannah	0	30.9	0	0	30.9
	Total Direct Effects	43.4	111.9	2.0	0.1	157.5

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.

Summary of Direct Impacts

Table 5.3.3-4 provides a comparison of acreages of direct effects to aquatic resources for all alternatives. No loss of aquatic resources would occur with the No-Action Alternative. Alternative A would result in 128 acres of direct loss, of which 111 acres would be forested and herbaceous wetlands. Alternative C would directly affect 165 acres (159 acres of wetlands), and Alternative E would directly affect 158 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.

Alternative A would result in the lowest acreage of loss of aquatic resources while Alternative C would result in the highest loss. 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.

Table 5.3.3-4 Total Direct Aquatic Resources Effects Resulting from Each Alternative (acres)

FLUCCS	Description	No-Action	A	C	E
510	Streams and Waterways	0	7.5	3.6	3.6
525	Marshy Lake	0	0.5	0.5	0.5
530	Reservoirs	0	8.7	2.4	1.7
610	Wetland Hardwood Forest	0	0.4	0.4	0.4
617	Mixed Wetland Hardwoods	0	34.1	39.1	37.4
618	Willow and Elderberry	0	1.2	1.8	1.5
621	Cypress	0	10.8	27.2	24.9
625	Hydric Pine Flatwoods	0	2.4	2.8	6.7
630	Wetland Forested Mixed	0	24.3	26.9	28.2
640	Vegetated Non-Forested Wetland	0	<0.1	<0.1	<0.1
641	Freshwater Marsh	0	12.5	16.1	13.9
643	Wet Prairie	0	4.8	11.0	7.7
646	Treeless Hydric Savannah	0	23.5	33.1	30.9
	Total Direct Effects	0	127.7	164.9	157.5

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.

Table 5.3.3-5 Total Direct Aquatic Resources Effects Resulting from Each Alternative (acres)

Description	No-Action	A	C	E
Surface Waters/Aquatic Habitat	0	16.7	6.5	5.8
Vegetated Wetlands				
Forested Wetland	0	70.5	98.2	99.2
Non-forested Wetland	0	40.9	60.3	52.6
Total Vegetated Wetland	0	127.7	164.9	157.5

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 many 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 a wetland to provide functions, and do not affect a wetland uniformly (except for some small wetlands). 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 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.

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 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. Temporary erosion control features, as specified in the FDOT's *Standard Specifications for Road and Bridge Construction*, Section 104, would 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 to195 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 the EO.

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-A 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 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.

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 Floodplains (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 the 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 4.3.4-3 to the SFWMD for operation and maintenance. Each modified CS&F project will be independently evaluated by the USACE and documented in the USACE Record of Decision.

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 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 5.3.4-4). 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.

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 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.

Table 5.3.5-1 Alternative A – Effects to Upland Communities (acres)

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 proposed for the N-S Corridor would occur within previously disturbed areas in the FECR Corridor and would not impact natural communities. Limited wildlife habitat exists within the N-S Corridor although field surveys indicate some utilization of disturbed 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.

Table 5.3.5-2 Alternative C – Effects to Upland Communities (acres)

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.

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.

Alternative E

As shown in Table 5.3.5-3, Alternative E 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.

Table 5.3.5-3 Alternative E – Effects to Upland Communities (acres)

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.

Table 5.3.5-4 Total Direct Upland Effects from Each Alternative (acres)

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	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.

Under Alternative C and Alternative E, a greater degree of impacts to upland habitats would occur for upland areas remaining between SR 528 and the railroad. The two alignments would create hydrologic barriers to the north and south, impounding water between them. The barriers would force the water between them to flow either east or west to a culvert or bridge location. The impounded water would cause 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.

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;
- *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 tends 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 of 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

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.

Table 5.3.5-5 Summary of Wildlife Noise Impact Criteria

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.

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 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.

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 wildlife habitat. The Project would also not adversely impact any wildlife corridor. 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. 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 28, 2013 the NMFS agreed with this determination (Appendix 5.3-6-B4). This determination did not include the additional bridge replacement proposed in Brevard and St. Lucie Counties. Consultation has been initiated with NMFS, Habitat Conservation Division regarding potential impacts to EFH associated with these bridges.

No-Action Alternative

Under the No-Action Alternative the Project would not be constructed or operated; there would be no impacts to EFH.

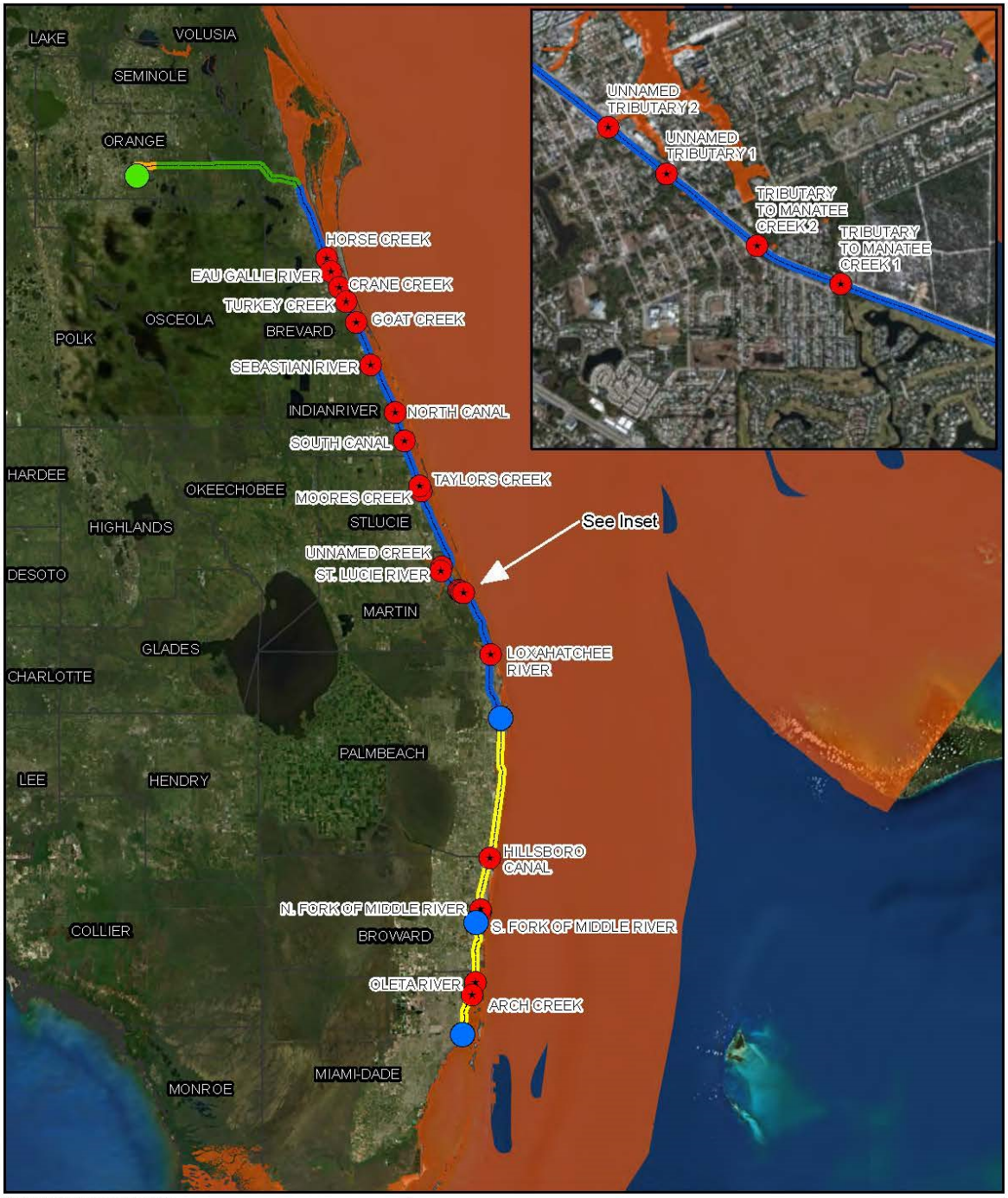
Action Alternatives A, C, and E

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 are 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) 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.


LAKE
VOLUSIA
SEMINOLE
ORANGE
OSCEOLA
POLK
BREVARD
HARDEE
OKEECHOBEE
HIGHLANDS
DESOTO
GLADES
CHARLOTTE
LEE
HENDRY
COLLIER
MONROE
MIAMI-DADE
BROWARD
PALMBEACH
MARTIN
STLUCIE
HORSE CREEK
EAU GALLIE RIVER
CRANE CREEK
TURKEY CREEK
GOAT CREEK
SEBASTIAN RIVER
INDIAN RIVER
NORTH CANAL
SOUTH CANAL
TAYLORS CREEK
MOORES CREEK
UNNAMED CREEK
ST. LUCIE RIVER
See Inset
LOXAHATCHEE RIVER
HILLSBORO CANAL
N. FORK OF MIDDLE RIVER
S. FORK OF MIDDLE RIVER
OLETA RIVER
ARCH CREEK
UNNAMED TRIBUTARY 2
UNNAMED TRIBUTARY 1
TRIBUTARY TO MANATEE CREEK 2
TRIBUTARY TO MANATEE CREEK 1
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
N
U.S. Department of Transportation
Federal Railroad Administration
5.3.5-1

The new pilings would have a variable impact on the managed 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 would 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. Air bubble curtains will be used during pile driving to minimize the potential impacts on federally managed species.

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 EIS, is the lead federal agency with ESA Section 7 responsibilities for the 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 "no adverse effect" for each of the listed species within the Project Area. The agencies charged with administering the ESA, the US Fish & Wildlife Service (USFWS), and the NOAA-NMFS, have concurred with these determinations (Appendix 5.3.6-B).

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.

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.

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	34.1	32.1	0	66.2
Sherman's Fox Squirrel	60.6	50.9	0	111.5
Burrowing Owl	34.1	32.1	0	66.2
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	34.1	32.1	0	66.2
Florida Pine Snake	34.1	32.1	0	66.2
Short-Tailed Snake	34.1	32.1	0	66.2
Gopher Frog	34.1	32.1	0	66.2
Mangrove rivulus	0	0	0.1	0.1

Federal Species

Bridge construction activities would impact West Indian manatee critical habitat, and potential habitat for sea turtles and the smalltooth sawfish, but construction activities would not disturb seagrass beds or require dredging.

Field surveys for Audubon's crested caracara nests would be completed subsequent to the selection of the final E-W Corridor alignment. 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, 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). Direct effects to a total of 134.2 acres of Suitable Foraging Habitat (SFH) would occur with the implementation of Alternative A.

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.

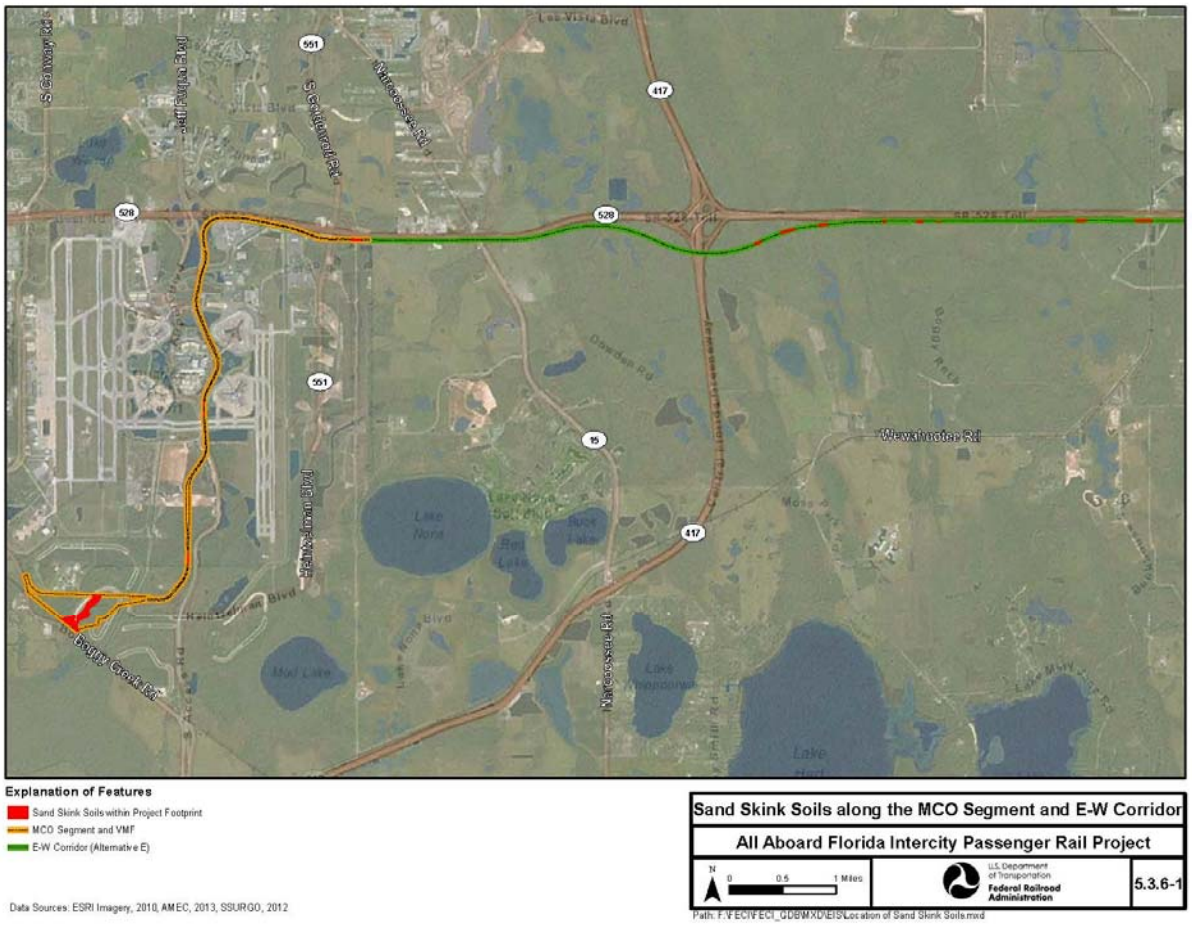
A review of GIS data of documented red-cockaded woodpecker nest cavities indicated no nests occur within the Project Study Area. Direct effects to red-cockaded woodpecker habitat which would occur with Alternative A total approximately 51 acres within the E-W Corridor.

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.

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.

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. Seagrass surveys conducted at the stream crossings indicated Johnson's seagrass is not located within the Project Study Area and would not be directly affected by the Project. Due to the disturbed habitat located in the FECR Corridor, it is unlikely any terrestrial federally listed plant species would occur within the Project Study Area, but several species have been documented within Jonathan Dickinson State Park in sand pine scrub, which is found adjacent to the railroad corridor, including four-petal pawpaw, Florida perforated cladonia, and tiny polygala.

On November 20, 2012, 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

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 66 acres. Subsequent to the selection of the final railway alignment, a FWC-compliant gopher tortoise survey would be completed to accurately characterize gopher tortoise utilization of the habitats.

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 survey will be completed once the final E-W Corridor alignment has been selected.

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.

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.

Table 5.3.6-2 Alternative C - 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	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	34.1	58.8	0	92.9
Sherman's Fox Squirrel	60.6	73.8	0	134.4
Burrowing Owl	34.1	58.8	0	92.9
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	34.1	58.8	0	92.9
Florida Pine Snake	34.1	58.8	0	92.9
Gopher Frog	34.1	58.8	0	92.9
Mangrove rivulus	0	0	0.1	0.1

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.

The route for Alternative C would place the railroad alignment farther from the highway than the route for Alternative A. This would lead to greater 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.

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.

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 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.

A survey of Audubon's crested caracara nests would not be completed along the E-W Corridor until the final alignment for the railroad is selected. 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.

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).

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	34.1	47.5	0	81.6
Sherman's Fox Squirrel	60.6	72.1	0	132.7
Burrowing Owl	34.1	47.5	0	81.6
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	34.1	47.5	0	81.6
Florida Pine Snake	34.1	47.5	0	81.6
Short-Tailed Snake	34.1	47.5	0	81.6
Gopher Frog	34.1	47.5	0	81.6
Mangrove rivulus	0	0	0.1	0.1

Alternative E 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, 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.

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. 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. 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 determined the construction conditions would be required for protecting manatees, smalltooth sawfish, indigo snakes, and sea turtles. Adjacency to Florida scrub-jay habitat was a concern, so scrub-jay surveys would also be required to determine how the operation of the rail would affect the species. 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, an email was sent to USFWS requesting confirmation of listed species occurrence and requirements for the Project Study Area. A response from the South Florida Office of the USFWS was received 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 this area it was determined the Project would have "no effect" to the Florida panther, Everglade kite snail, 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-B). 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 effect, 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, Habitat Conservation Division have provided letters of concurrence with USACE's findings, as documented in Appendix 5.3.6-B. Consultation is ongoing with USFWS, Vero Beach Field Office and NMFS, PRD.

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.

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 would not result in residential displacement, neighborhood fragmentation, or the loss of continuity between neighborhoods. The N-S Corridor is within the existing FECR Corridor, and would not displace residences or businesses. The existing FECR Corridor has supported freight and/or passenger service on a continuous basis for more than 100 years, and existing neighborhoods largely developed around these conditions.

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 nearly 670,000 residents by 2040 (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 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. 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.

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. Although there are Environmental Justice communities of concern present along the FECR Corridor, the implementation of directional, wayward, 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. Further, 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, wayward or crossing mounted horns.

This evaluation used demographic data collected from the 2010 U.S. Census and 2010 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 census tracts crossed by the alignments (23.3 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, increases in noise levels and effects to other resources. 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.

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.

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 Section 4(f) 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.

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. 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 3,317 residential parcels along the N-S Corridor, 820 (24.7 percent) of which are within environmental justice communities. All vibration impacts (including those within environmental justice communities) would be mitigated using ballast mats beneath rail lines, "frogs" at selected switch locations with nearby sensitive receptors, and special pile-driving methods at selected locations near sensitive receptors during construction. There would be no disproportionate adverse impacts from vibration in environmental justice communities along the N-S Corridor with the implementation of these measures.

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 Section 4(f) 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 1 Projects' 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.

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.

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. Partial acquisition of one privately owned parcel outside the SR 528 right-of-way would be required along the E-W Corridor, and would result in a negligible loss of property tax revenues for Brevard County. 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. The Project would have beneficial regional economic impacts from increased economic activity, tax revenues, construction jobs, and associated spending.

5.4.3.1 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, permanent

displacement of existing businesses and associated revenues, and employment displacement. 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.

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.

Action Alternatives A, C, and E

Potential direct effects of the Project on local economic conditions would be the same under all Action Alternatives.

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.).

Table 5.4.3-1 Summary of Economic Benefits of AAF Construction and Operations

		Operations	
Category	Construction	Average Annual	Total (2016-2021)
Jobs	Over 10,000	1,603	1,603
Labor Income	$1.2 Billion	$75 Million	$442 Million
Gross Domestic Product	$1.7 Billion	$105 Million	$619 Million
Total Economic Value	$3.4 Billion	$150 Million	$887 Million
Federal. State and Local Taxes	$291 Million	$21 Million	$126 Million

Source: WEG 2014

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 (schools, parks, public works, police, and fire protection).

Potential adverse effects to other elements of the transportation industry, due to diversion of riders, was also evaluated as a potential economic effect. 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.

The analysis also evaluated the potential economic effects of property acquisition within each project segment, as 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

The E-W Corridor would require partial acquisition of one parcel, which in 2013 had a total taxable value of $1,420,960 (Brevard County, Property Appraiser 2013). Acquisition would be limited to 15.8 percent of the overall parcel acreage, and a proportional taxable value of $224,145. Because AAF is only purchasing a portion of the parcel, effects on Brevard County are limited. The loss of municipal property tax revenues attributable to the E-W Corridor would not be significant enough to adversely impact government services.

As noted in Section 5.1.1, *Land Use*, partial land acquisition for the E-W Corridor under Alternative A would neither change the land use of the remainder of the parcel, nor result in commercial displacement or job losses. Current land use on the remainder of the parcel would continue as undeveloped.

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.

5.4.3.2 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. As noted in the economic benefits analysis prepared by WEG, potential indirect and secondary effects of the Project on local economic conditions are summarized in Table 5.4.3-2, and include construction and operational benefits of jobs, income, GDP increases, and tax revenues.

Table 5.4.3-2 Summary of Economic Benefits of TOD Construction and Operations

		Operations	
Category	Construction	Average Annual	Total (2016-2021)
Jobs	1,695	389	389
Labor Income	$658.8 Million	$20 Million	$66 Million
Gross Domestic Product	$980.5 Million	$60 Million	$204 Million
Total Economic Value	$1.8 Billion	$80 Million	$284 Million
Federal. State and Local Taxes	$187.4 Million	$14 Million	$48 Million

Source: WEG 2014

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.

5.4.3.3 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 5.4.3-1, constructing the Project is expected to generate over 10,000 jobs, with a total economic benefit of $3.4 Billion.

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. 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.

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 Alternatives 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 movement, 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. 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 a 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 14 (2014) 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 will be publishing 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).

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 may 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, 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.

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 signals[5]), 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.*

As stated in Section 3.3.5 of the 2012 EA, the WPB-M Corridor would 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 of 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 would occur. The WPB-M Corridor includes stops in the central business districts of West Palm Beach, Fort Lauderdale, and Miami. Each station would be ADA complaint and include safety features such as cameras in stations and parking lots, and regular police patrols.

5 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.

Security

Security considers the effects of the Project on the security of the rail system.

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, would 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. 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.

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 MCO Intermodal Facility and new passenger rail stations proposed as part of the WPB-M Corridor 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 corridor, 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 Pinecastle 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 Cultural Resources

Cultural resources as defined by the National Historic Preservation Act of 1966 (NHPA), as amended, are any "prehistoric or historic district, site, building, structure, or object included in or eligible for listing on the National Register of Historic Places (NRHP)."

Section 106 of the NHPA requires all federal agencies to take into account, prior to authorizing an undertaking, the effect of that undertaking on cultural resources 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 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. AAF, as a project applicant, is assisting the FRA in meeting its obligations under Section 106. Therefore, studies were conducted to determine the potential project effects, if any, on cultural resources.

This section of the DEIS constitutes FRA's Findings of Effect under Section 106 of the NHPA. No NRHP-listed or eligible resources were identified within the MCO Segment and VMF APE, or within the E-W Corridor. NRHP-listed or eligible resources were identified within the N-S Corridor, and include the FECR Railway Historic District and several historic railroad bridges as described in Section 4.4.5 of this EIS. For Phase I, FRA determined that the Project would have no adverse effect on these resources, and SHPO has concurred that the use of the historic rail line and restoration of passenger rail service would not constitute an adverse effect.

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) that are individually eligible for the NRHP. None of the bridges within the WPB-M Corridor are individually eligible for the NRHP. The Project will have no adverse effect on the FECR Railway Historic District. The Project would have no direct or indirect effects (noise, vibration, change in setting) to the historic resources located adjacent to the N-S Corridor.

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).

In consultation with the SHPO, 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 and FTA, FDOT, and GOAA 2005). In general, the methodology for the E-W Corridor complied with FDHR standards for undeveloped acreage. FRA issued a FONSI for the 2012 EA that covered the WPB-M Corridor in January 2013 (FRA 2013a). To the extent that actions have not changed since the 2012 EA, these would not be evaluated by FRA as part of the current Project. The methodology for the balance of the N-S Corridor was consistent with that used in the 2012 EA.

5.4.5.2 Environmental Consequences

This section identifies the potential beneficial and adverse effects to cultural resources 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.

No-Action Alternative

The No-Action Alternative is not anticipated to have any effect on cultural resources.

Action Alternatives A, C, and E

The effects of Alternatives A, C, and E would be identical with respect to cultural resources. This section provides a summary of impacts to cultural resources and FRA's recommendations of effects. The SHPO will use this DEIS as FRA's recommendations and will make a Section 106 finding based on the DEIS.

MCO Segment

The MCO Segment (including the VMF) APE has been previously surveyed and assessed for cultural resources during the development of the EA for the South Terminal Complex at the MCO (FAA and GOAA 1998). No NRHP-listed or eligible cultural resources were identified within the MCO Segment and VMF APE during the previous survey. FRA determined that the MCO Segment and VMF would have no effect on cultural resources.

East-West Corridor

Large portions of the 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 the summer of 2013 (Janus Research, Inc. 2013). One NRHP-eligible resource has been identified adjacent to the APE for the E-W Corridor—the FECR Railway Historic District, at the end of the E-W Corridor in Cocoa. FRA determined that the E-W Corridor would have no adverse effect on the FECR Railway Historic District.

The E-W Corridor has been determined to lack any cultural material and has no features indicative of archaeological site potential. Construction of the railroad and infrastructure would have no effect on cultural resources. New communications towers are proposed along the E-W Corridor to support the PTC 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 to contain no above- or below-ground cultural resources.

North-South Corridor

The N-S Corridor APE contains several NRHP-eligible cultural resources, including the FECR Railway Historic District, the Union Cypress Sawmill historic district, four bridges, and 10 other historic resources. There are also five identified archaeological sites.

FECR Railway Historic District

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 Railway Historic District, which is the central resource of the N-S Corridor, would not be adversely affected by the 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. Phase I (The AAF Passenger Rail Project – West Palm Beach to Miami) was determined to not have an adverse effect on the NRHP-eligible FECR Railway Historic District. The Project would include similar improvements for the N-S Corridor in Phase II.

FRA has made a recommendation of no adverse effect to the FECR Railway Historic District. SHPO concurrence is expected for this determination.

NRHP-Eligible Bridges and Contributing Element Bridges

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 considered contributing elements to the FECR Railway Historic District. Eight additional bridges (see Section 4.4.5) are not considered individually eligible for listing on the NRHP but are still considered contributing elements to the FECR Railway 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 which cannot be avoided (as documented in Chapter 6, *Section 4(f) Evaluation*). The St. Lucie River and Loxahatchee River bridges would be rehabilitated, as described in Section 3.3.3, but would not be substantially altered.

For Phase I, SHPO issued a 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. For Phase II, AAF will continue to consult with SHPO through the design process in order to ensure compatibility and appropriate sensitivity to the bridge resources and FECR Railway Historic District.

The adverse effect to the two historic bridges (the Eau Gallie River Bridge and the St. Sebastian River Bridge) would also constitute a "use" under Section 4(f) and requires a Section 4(f) evaluation, provided in Chapter 6, *Section 4(f) Evaluation*.

Adjacent Historic Resources

Improvements within the N-S Corridor would remain within the existing right-of-way, and will not require right-of-way acquisition from any adjacent historic districts or individual NRHP-listed or eligible historic resources. Therefore, the Project will have no effect on historic resources adjacent to the N-S Corridor or adjacent to at-grade crossings.

Archaeological Resources

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 (no additional right-of-way acquisition is anticipated). Five previously identified archaeological sites have been recorded within the N-S Corridor APE. Four of the archaeological sites were not previously evaluated for NRHP eligibility by SHPO. The Pineapple Site (Site 8SL1136) was determined not NRHP-eligible by SHPO. All of these archaeological sites have experienced some level of previous disturbances.

Two of the archaeological sites – Hobe Sound National Wildlife Refuge #3 Site (8MT1287) and the Fort Capron Site (8SL41) – initially appeared to have the potential to be affected by the Project.

The Hobe Sound National Wildlife Refuge #3 Site consists of a thin scatter of shell and a few aboriginal ceramic potsherd fragments situated on a dune bluff that was bisected during the construction of the railroad in the early part of the last century. Located at Mile Post 275.30, this is in an area where the rail line curves to the west. 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 and instead construction in this area will consist of installing rail tracks in their historic locations. No subsurface excavation will be required. Preliminary discussions with SHPO indicated that this design change would avoid the Hobe Sound National Wildlife Refuge #3 Site.

The Fort Capron Site consists of the archaeological remains of a 1850s military fort. Currently, the only visible remnants of Fort Capron are several ditches that extend to the east down towards the Indian River. The fort is located at Mile Post 238.3. 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, there would be no effects to the archaeological site caused by the Project.

Based on the information available, the Project would have no adverse effect on archaeological sites within the N-S Corridor. The no adverse effect finding is based on the condition that consultation with

SHPO will continue through the design process, as needed, in order 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, FRA consulted with the Florida SHPO pursuant to NHPA Section 106, and received concurrence on November 6, 2012 with FRA's finding that the Project would have no significant adverse effect on any of the historic and/or cultural resources found along the WPB-M Corridor. 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. The SHPO also concurred with FRA's finding that the relocated Ft. Lauderdale Station would have no adverse effect on historic resources (Appendix 3.3-A).

No additional work proposed within the West Palm Beach- Miami Corridor as part of Phase II would have an effect on any historical resource.

5.4.5.3 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

Additional private development along the E-W Corridor would not generally be required to comply with the cultural resource protections afforded by Section 106. However, SHPO does afford a level of historic preservation and protection, as do Florida state environmental regulations and permitting. Local government historic preservation commissions and ordinances provide some protection for historic sites and districts.

The Project would increase noise and vibration minimally above existing conditions in the N-S Corridor. 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. The noise and vibration changes will have no indirect adverse effects to cultural resources. None of the adjacent cultural resources are sensitive to noise, and vibration will not exceed damage thresholds (see Section 5.2.2). Therefore, it is anticipated that there will be no indirect adverse effects due to changes in noise or vibration to either the setting or physical structure of any historic property. The Project will not require soundproofing of any historic structure.

By returning the FECR Corridor to its historic configuration and historic use as a passenger rail line, the Project could indirectly benefit nearby cultural resources if historic structures and infrastructure are preserved, restored, or maintained due to increased funding or interest in historic preservation resulting from the Project. At this time, it is not known where any secondary development would occur and for this reason additional cultural resource surveys would not be practical. Potential negative indirect effects

could occur if increased development results in pressure to demolish or destroy cultural resources. FDHR and local historic and planning commissions (such as the West Palm Beach Historic Preservation Board and Planning Board) do afford a level of historic preservation and protection (for example, West Palm Beach Ordinance 4265-10 identifies development standards for the City's historic districts).

5.4.5.4 Temporary Construction-Period Effects

Temporary construction period effects generally consist of noise, dust, vibration, and traffic related to construction. These construction effects are temporary and would occur during and immediately following construction. 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. If any access, staging, borrow, or excess material placement areas are not located within the existing rights-of-way, these areas would be surveyed.

For the E-W Corridor, access would be primarily from public areas or the highway right-of-way (SR 528) but some private access may be required. Material staging areas would be located within the proposed railroad right-of-way. Site access has not yet been identified and therefore, construction effects have not been assessed. Construction activities will be conducted in a manner to avoid effects to known cultural resources listed or eligible for listing on the NRHP, as stipulated in the MOA.

Within the N-S Corridor, access to work areas will be primarily from public access points and therefore, will not affect cultural resources. If private property is proposed to be used for site access or for material staging, AAF will conduct such activities in such a manner to avoid effects to known cultural resources listed or eligible for listing on the NRHP, as stipulated in the MOA. Any construction staging areas not currently within the right-of-way will be surveyed.

As stated in Section 3.4 of the 2012 EA, the WPB-M Corridor will include construction primarily on existing exclusive right-of-way, and, therefore, would have no temporary effects on historic or archaeological resources.

5.4.5.5 Regulatory Compliance

This section outlines the regulatory compliance requirements for cultural resources. *Section 106 of the National Historic Preservation Act of 1966* as amended (36 CFR 800) provides the regulatory framework for the compliance guidelines for the identification and evaluation of cultural resources. Other relevant legislation and regulations include Executive Order 11593, *Protection and Enhancement of Cultural Environment*, and the *Procedures for the Protection of Historic Properties* (Appendix C) at 33 CFR part 325, Processing of Department of the Army Permits.

Mitigation measures for adverse effects to historic resources include avoidance, minimization, data recovery, and photographic recordation. The documentation for any of these mitigation measures must provide evidence that consultation has been completed with the SHPO, concerned Indian Tribes, and any other identified consulting parties. Actions that the parties agree upon to resolve adverse effects will be detailed in a Memorandum of Agreement or Programmatic Agreement, which is a legally binding agreement among the FRA, other participating federal agencies, the SHPO, and the Advisory Council on

Historic Preservation. A draft MOA will be included in the Final EIS. Once the agreement is signed by all appropriate parties and the filed with the Advisory Council on Historic Preservation, the Section 106 process is completed. FRA's Section 106 responsibilities are fulfilled when the agreement's stipulations are implemented.

The next steps in Section 106 compliance for the Project include SHPO review and concurrence with FRA's finding of adverse effect to the Eau Gallie River Bridge and St. Sebastian River Bridge, and developing a MOA or PA that stipulates measures to mitigate for these adverse effects, measures to address unanticipated discoveries of archaeological resources during construction, and measures to ensure that construction of new communications towers is consistent with the requirements of Section 106.

5.4.6 Recreation and Other Section 4(f) Resources

This section describes the potential effects to existing recreational properties along with properties that are protected under Section 4(f) of the USDOT Act of 1966 (publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state or local significance) and Section 6(f) of the Land and Water Conservation Act of 1965 (other than the historic resources described in Section 5.4.5, *Cultural Resources*) (49 USC 303, et seq., 16 USC 460L-460L-11).

A use of a Section 4(f) resource must be avoided unless there is no feasible and prudent avoidance alternative to use of the resource and all possible planning to minimize harm (such as avoidance, minimization, mitigation, or enhancement measures) is implemented or there is a *de minimis* impact determination. *De minimis* impacts to Section 4(f) resources are those effects that would have no adverse effect on the protected resource.

Section 6(f) resources are all parks and other recreational facilities that have been the subject of 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.

As documented below the Project would not require the use of any Section 4(f) property related to parks, recreation areas and wildlife or waterfowl refuges and would not result in a constructive use of any such Section 4(f) property. No Section 6(f) properties would be used by the Project. Chapter 6 of this EIS provides a detailed Section 4(f) Evaluation.

5.4.6.1 Methodology

Direct impacts to Section 4(f) recreation resources were characterized based on physical impacts to park and recreational properties, including:

- Land permanently incorporated into a transportation facility;
- Temporary occupancy of land that is adverse in terms of the statute'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 Section 4(f) land 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 (constructive use) were also evaluated. 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

Potential direct effects to Section 4(f) and Section 6(f) recreation resources could include the acquisition and permanent incorporation of land within these resources. The Project would not require the use of any Section 4(f) or Section 6(f) recreation area, park, or wildlife refuge.

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 no use of Section 4(f) or Section 6(f) recreation resources would occur.

Action Alternatives A, C, and E

Potential direct effects of the Project to Section 4(f) and Section 6(f) recreation resources would be the same under all Action Alternatives. The Project would not incorporate any Section 4(f) recreation area, park, or wildlife refuge.

MCO Segment

The MCO Segment would not require the use of Section 4(f) recreation resources. The MCO Segment is within the property boundaries of MCO; there are no Section 4(f) recreation resources or Section 6(f) lands within MCO, which is entirely within the property of the Orlando International Airport.

East-West Corridor

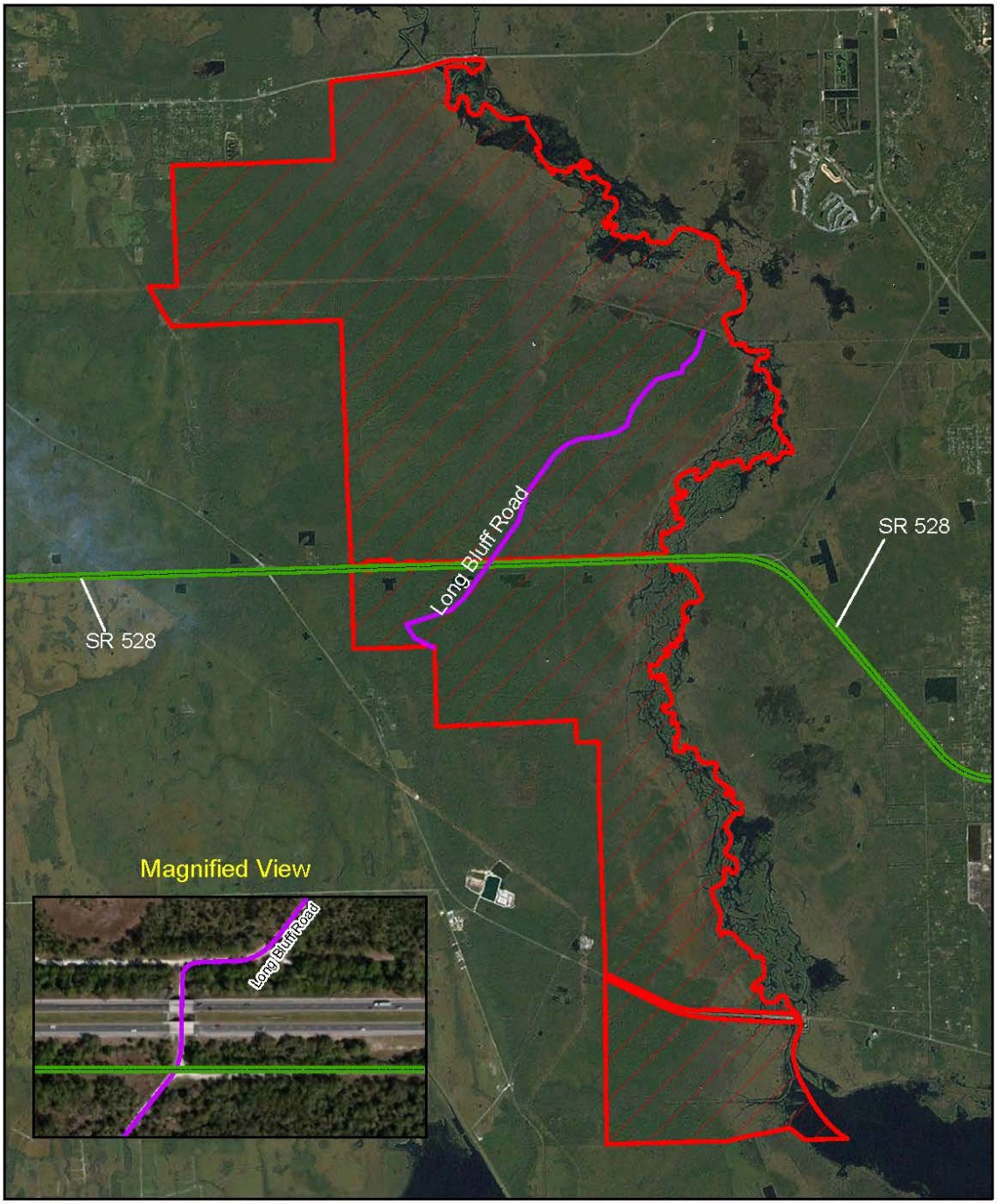
The E-W Corridor is adjacent to two Section 4(f) recreation resources east of the SR 528 and SR 520 interchange: the Tosohatchee WMA and Canaveral Marshes Conservation Area. Constructing the E-W Corridor would not require acquisition of new right-of-way within the property limits of these

Section 4(f) recreation resources, as the new railroad would be entirely within the SR 528 right-of-way owned by FDOT. No new communications towers would be placed in a Section 4(f) resource.

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. SR 528 also crosses over Long Bluff Road at this location. The Project would cross Long Bluff Road on a new overpass and no permanent land acquisition would be required.

AAF is in discussion with the Tosohatchee State Reserve (TSR) Land Manager[6] concerning the possibility of obtaining material for railway embankments from three ponds on the reserve lands that were originally created as borrow pits for the original SR 528 construction. According to AAF, the TSR desires that these three ponds be expanded and reshaped with the addition of habitat-friendly littoral shelves. AAF is currently surveying the pond areas to evaluate the existing ecological conditions and determine whether borrow material from the ponds would be suitable for constructing the Project. This activity is considered a temporary but beneficial occupancy of a Section 4(f) property with a *de minimis* effect. Section 6.4.3 of this EIS provides additional information on this use of the Tosohatchee WMA.

6 The Tosohatchee State Reserve is the umbrella for properties under the jurisdiction of multiple state agencies, and includes the Tosohatchee Wildlife Management Area.



Explanation of Features

- Long Bluff Road
- E-W Corridor
- Tosohatchee Wildlife Management Area

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

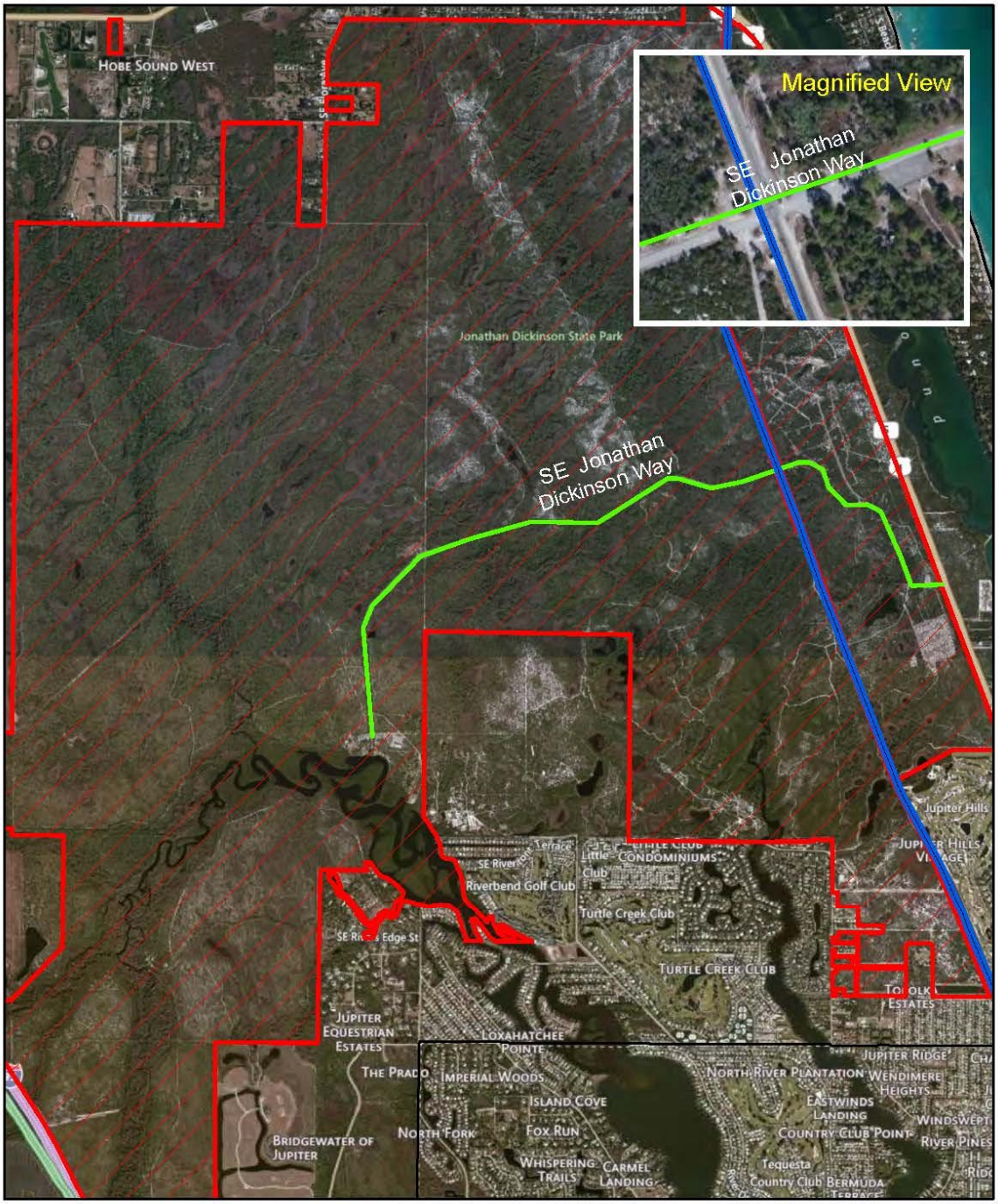
Tosohatchee Wildlife Management Area		
All Aboard Florida Intercity Passenger Rail Project		
N 0 10 20 Miles	U.S. Department of Transportation Federal Railroad Administration	5.4.6-1

North-South Corridor

Thirty Section 4(f) 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 would take place within the existing FECR-owned right of way, and would not require acquisition of new right-of-way within these Section 4(f) resource property limits.

The N-S Corridor crosses two roads within Jonathan Dickinson State Park: the Florida Trail (East Loop) and Southeast Jonathan Dickinson Way (Figure 5.4.6-2). Based on information provided by the Jonathan Dickinson State Park Manager (Nelson 2013) the Florida Trail (East Loop) is no longer open due to safety concerns related to existing freight traffic along the FECR Corridor. Southeast Jonathan Dickinson Way is an at-grade access road that connects Jonathan Dickinson State Park to US 1. The N-S Corridor would not result in the permanent closure of Southeast Jonathan Dickinson Way. All construction would take place within the existing FECR-owned right-of-way, and no land acquisition would be required. 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.

Two of the 30 identified Section 4(f) recreation resources along the N-S Corridor are also Section 6(f) resources: North Sebastian Conservation Area and Sawfish Bay Park. No land acquisition within either resource would be required.



Explanation of Features

- N-S Corridor
- SE Jonathan Dickinson Way
- Jonathan Dickinson State Park

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

Jonathan Dickinson State Park		
All Aboard Florida Intercity Passenger Rail Project		
N 0 0.3 0.6 Miles	U.S. Department of Transportation Federal Railroad Administration	5.4.6-2

Path: F:\FECI\FECI_GDB\MXD\EIS\Jonathan Dickinson State Park_AW.mxd

Phase I - West Palm Beach - Miami Corridor

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 Section 4(f) properties that are adjacent to the right-of-way. Phase I does not require direct acquisition of any Section 4(f) protected resources that would constitute a use under Section 4(f). The FRA, in the FONSI, found that Phase I would not use properties subject to the requirements of Section 4(f) of the Department of Transportation Act of 1966 or have a significant impact on recreational resources.

5.4.6.3 Constructive Use

A constructive use can occur when a 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 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 of constructive use of Section 4(f) recreation resources for the Project reviewed potential noise, vibration, aesthetics and access effects.

Noise

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) 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).

As stated in Section 3.3.8 of the 2012 EA, 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.

Vibration

Vibration, even at a severe level, 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. 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. 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; modifications proposed for this corridor would not substantially change existing aesthetic conditions for the two Section 4(f) properties present along this segment. 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.

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, and would maintain existing accessibility. The N-S Corridor would be entirely within the existing FECR Corridor, which currently crosses Southeast Jonathan Dickinson Way. Although these Section 4(f) recreation resources would not experience direct use associated with the Project, there may be temporary access restrictions to these roads during construction but that would not affect their use.

5.4.6.4 Temporary Construction-Period Effects

At Long Bluff Road, construction of a new railroad bridge would require temporary occupancy of an adjacent area of the Tosohatchee WMA to accommodate erosion and sediment control, construction staging areas, and traffic coordination. If temporary road or lane closures are necessary, AAF, in association with FRA, would coordinate with the land managing agency of the Section 4(f) recreational resources (FWC). As described in Chapter 6, *Section 4(f) Evaluation*, this would not constitute a constructive use of the Tosohatchee WMA.

5.4.6.5 Mitigation

The E-W Corridor would be constructed as an overpass so as not to interrupt the intended use of Long Bluff Road within the Tosohatchee WMA. Construction of the overpass may require the temporary

occupancy of construction areas within the Tosohatchee WMA; however, the construction areas would be stabilized with grass and mulch and the land returned to pre-construction conditions.

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 DEIS.

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, 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 rail bridge would be 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 Narcoosee 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, generally 60 feet tall or less. 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.

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 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 OOCEA 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 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. As defined by the EPA, 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 WPB-M Corridor 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.

5.4.9 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.

5.4.9.1 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.

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 DEIS 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.

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.

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).

GOAA has programmed construction of this facility for 2014 through 2016 (MCO 2012a). 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 OOCEA 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 OOCEA. 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, OOCEA 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).

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 2014. 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.

5.4.9.2 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 DEIS.

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-A2 and 3.3-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

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.

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.

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.

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 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.

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.

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.

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.

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.

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. OOCEA'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.

6 Section 4(f) Evaluation

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 public 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, or historical properties of national, state, or local significance. This chapter describes Section 4(f) resources that would be impacted by the alternatives under consideration for the Proposed Action. If a prudent and feasible alternative exists that avoids Section 4(f) resources and it meets the Project purpose and need, the DOT agencies may not select the alternative that uses a Section 4(f) resource. This chapter contains a prudent and feasible alternatives analysis, and discusses mitigation measures that would be employed to minimize harm to Section 4(f) properties resulting from use. Section 4(f) properties in the Project Study Area that will not be subject to a physical or constructive use under Section 4(f), were evaluated in Chapter 5, *Environmental Consequences*.

6.2 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 All Aboard Florida (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.

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."

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). The Fort Lauderdale Station was cleared by FRA in a Re-Evaluation, and a separate Supplemental EA has been prepared for the West Palm Beach VMF. 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).

6.3 Section 4(f) Applicability

Section 4(f) of the U.S. DOT Act (23 U.S.C. 138, 49 USC, Subtitle I, Section 303(c)) provides protection for publicly owned parks, recreation areas, public school playgrounds, 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). The DOT Act outlines Section 4(f) as follows:

> "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."
>
> The "use" of a property protected under Section 4(f) (23 U.S.C. 138 and re-codified at 49 USC, Subtitle I, Section 303(c)) has a very specific meaning and is defined as:
>
> - 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 land.
>
> In certain circumstances a constructive use can be found. "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 4f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the resource are substantially diminished."

6.4 Description and Use of Section 4(f) Resources

The following sections describe the context of the Section 4(f) historical and recreational properties that would be used by the Project, and the use of properties afforded protection under Section 4(f).

At this time, the FRA does not anticipate any temporary occupancy of Section 4(f) properties during construction as a result of the need for temporary construction easements or activities.

For each property that would be incorporated into the Project, this section provides an evaluation of location and design alternatives that would avoid the use of and/or minimize harm to Section 4(f) properties. Section 4(f) defines a "feasible and prudent alternative" as one that "avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4(f) property," as defined in 23 CFR 774. A detailed analysis of the alternatives reviewed to avoid use of Section 4(f) properties is provided in this section.

Publicly owned parks, wildlife refuges, and National Register-eligible historic resources protected under Section 4(f) are located along the entire proposed Project corridor. These resources are identified in Chapter 4, *Affected Environment* (see Section 4.4.5 for identification of cultural resources and Section 4.4.6 for parks, recreation areas, and wildlife refuges). Of these resources, two will be impacted by the Project and constitute a use under Section 4(f). Specifically, the Project activities will result in a Section 4(f) use (have an adverse effect to) two historic bridges. The Project will also result in a *de minimis* use of a public recreation area/wildlife refuge, as described below. Section 4(f) regulations, at 23 CFR 774.17, define a "*de minimis* impact" to parks, recreation areas and wildlife refuges, as "one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f)". Section 4(f) evaluations for these three resources are presented in the following sections.

6.4.1 Eau Gallie River Bridge

The Project requires that the Eau Gallie Bridge, a structure located within the FECR right-of-way, be demolished to construct a new structurally sound bridge able to accommodate the future passenger rail traffic.

6.4.1.1 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.

The existing bridge is eligible for listing in the National Register both as an individual resource and as a contributing resource 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 Eau Gallie Bridge and the FECR Corridor linear historic district). FRA is continuing to consult with the State Historic Preservation Office (SHPO) regarding concurrence with the FRA's adverse effect determination and mitigation measures.

6.4.1.2 Proposed Use

AAF proposes to construct a new twin 575-foot independent ballast deck bridge that will be located to the east of the existing railroad bridge. The existing bridge will be demolished. The demolition and removal of the existing bridge is necessary to protect navigation uses on the waterway, as determined by the U.S. Coast Guard (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 therefore constitutes a use under Section 4(f). The bridge is within the FECR right-of-way and no property acquisition is required.

6.4.1.3 Avoidance Alternatives

A comprehensive set of avoidance alternatives was considered to avoid demolishing the bridge, including the No-Action Alternative, rehabilitating and reusing the bridge, and retaining the bridge while constructing a new parallel bridge. These alternatives are described below.

No-Action Alternative

Under the No-Action 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 was not selected because a second track is required at this crossing to provide integrity with the rest of the system, which is being proposed as a two track system to support the additional number of trains and frequency of trips. A bottleneck at this location would increase travel times and would not meet the project purpose. This alternative is therefore not prudent.

Rehabilitate and Reuse Existing Bridge

This alternative would rehabilitate and reuse the existing bridge, and restore the second track on the west side of the deck. AAF assessed the condition of the 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. This alternative would not meet the project purpose and is neither feasible nor prudent.

Construct New Bridge and Retain Existing Bridge

This alternative would construct a new 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 (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.

6.4.1.4 Measures to Minimize Harm and Mitigate Impacts

AAF proposes to conduct historic research and prepare a Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) for the bridge prior to its demolition. FRA is continuing to consult with the SHPO regarding concurrence with the FRA's adverse effect determination and mitigation measures.

6.4.2 St. Sebastian River Bridge

The Project requires that the St. Sebastian River Bridge, a structure located within the FECR right-of-way, be demolished to construct a new structurally-sound bridge able to accommodate the future passenger and freight traffic.

6.4.2.1 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).

6.4.2.2 Proposed Use

AAF proposes to construct a new twin independent ballast deck structure with concrete piers, located to the east of the existing railroad bridges. The demolition and removal of the westernmost bridge 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 therefore constitutes a use under Section 4(f). The bridge is within the FECR right-of-way and no property acquisition is required.

6.4.2.3 Avoidance Alternatives

A comprehensive set of avoidance alternatives was considered to avoid demolishing the bridge, including the No-Action Alternative, rehabilitating and reusing, and retaining the bridge while constructing a new parallel bridge. These alternatives are described below.

No-Action Alternative

Under the No-Action Alternative, the westernmost 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.

This alternative is not prudent because a second track is required at this crossing to provide integrity with the rest of the system, which is being proposed as a two track system to support the additional number of trains and frequency of trips. A bottleneck at this location would increase travel times and would not meet the project purpose. This alternative is therefore not prudent.

Rehabilitate and Reuse Existing Bridge

This alternative would rehabilitate and reuse the existing westernmost bridge, and restore it to use as the second track at this location. AAF assessed the condition of the existing westernmost bridge and determined it was not feasible to rehabilitate the bridge due to its condition. 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. This alternative would not meet the project purpose and is neither feasible nor prudent.

Construct New Bridge and Retain Existing Bridge

This alternative would construct a new bridge to the east of the existing bridges. The westernmost bridge would be retained in its current abandoned 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 Coast Guard Bridge Permits for removal of bridges no longer used for transportation purposes.

6.4.2.4 Measures to Minimize Harm and Mitigate Impacts

AAF proposes to conduct historic research and a prepare HABS/HAER documentation for the westernmost bridge prior to its demolition. FRA is continuing to consult with the SHPO regarding concurrence with the FRA's adverse effect determination and mitigation measures.

6.4.3 Tosohatchee WMA

The Project will include two temporary uses of the Tosohatchee Wildlife Management Area (WMA), as described below.

6.4.3.1 Description of Property

The Tosohatchee WMA covers 30,701 acres along 19 miles of the St. Johns River in eastern Orange County. The purpose of the WMA is to provide both wildlife conservation and recreational opportunities for visitors. The E-W Corridor parallels the Tosohatchee WMA (see Figure 5.4.6-1 in Chapter 5) south of

SR 528 between SR 520 and the St. Johns River. The new railroad will be constructed within the layout of SR 528 at this location and does not require the use of land within the WMA.

6.4.3.2 Proposed Pond Use

AAF is evaluating using three ponds (former borrow pits) located within the WMA for borrow materials to construct the railroad embankment. These manmade ponds are south of SR 528 and are the result of the prior excavation of "borrow" materials to provide fill for the construction of SR 528. These three ponds, known as "T-shirt Pond," "Peek-a-boo Pond," and "Utah Pond," were originally cut in very sharp lines, and do not provide natural shorelines or typical shoreline vegetation zonation supportive of wildlife or fish. As shown on the Tosohatchee Wildlife Management Area trails map, there are public parking areas at these ponds and they are designated for fishing (see http://myfwc.com/media/305331/tosohatchee_trails.pdf). Currently, none of these ponds are used for stormwater treatment, but "Utah Pond" is planned as a future stormwater facility for the six-lane widening of SR 528.

AAF proposes to excavate material from and adjacent to these ponds, and to then rehabilitate the ponds by creating more natural shorelines, reshaping the ponds, and adding littoral shelves. These actions will enhance the fisheries habitat, increase the zonation of wetland plant communities, improve wildlife habitat, and expand the function of the ponds as a recreational resource. The Land Manager for the Tosohatchee State Reserve (TSR), which acts as the umbrella organization for properties under the jurisdiction of multiple state agencies and includes the Tosohatchee WMA, has indicated that this arrangement would be beneficial, and that a prior similar approach to a fourth borrow pond has proved beneficial. AAF is currently surveying the pond areas to evaluate the existing ecological conditions and determine whether borrow material from the ponds would be suitable for constructing the Project.

6.4.3.3 Proposed Construction Staging - Long Bluff Road

At Long Bluff Road, construction of a new railroad bridge would require temporary occupancy of an adjacent area of the Tosohatchee WMA to accommodate erosion and sediment control, construction staging areas, and traffic coordination. If temporary road or lane closures are necessary, AAF, in association with FRA, would coordinate with the land managing agency of the Section 4(f) recreational resources, the Florida Fish and Wildlife Conservation Commission (FWC).

6.4.3.4 *De Minimis* Determination

FRA has determined that the proposed pond reconfiguration and removal of fill material would be a temporary occupancy of a Section 4(f) resource, and that it is a *de minimis* use. The use is *de minimis* because it will not adversely affect the activities, features, and attributes that qualify the WMA for protection under Section 4(f). Specifically, it will have a net benefit on the wildlife conservation and recreational attributes of the three borrow ponds by providing natural shoreline topography and increasing suitable conditions for emergent aquatic vegetation beneficial to fisheries and wildlife. FRA is coordinating with the Land Manager regarding the use of the ponds and the FRA determination of the use as *de minimis*.

FRA has determined that the construction staging area at Long Bluff Road would be a temporary occupancy of a Section 4(f) resource, and that it is a *de minimis* use. The use is *de minimis* because it will

not adversely affect the activities, features, and attributes that qualify the WMA for protection under Section 4(f). Specifically, it will have a temporary effect on land immediately adjacent to the existing road, which will be restored to a natural condition following construction. FRA is coordinating with the Land Manager regarding the FRA determination of this temporary occupancy as a *de minimis* impact.

6.5 Findings

There is no feasible and prudent alternative to the demolition of the Eau Gallie River and St. Sebastian River bridges. 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, AAF proposes to conduct historic research and to prepare HABS/HAER documentation for the westernmost bridges prior to their demolition. Consultation with the SHPO is ongoing.

The use of borrow ponds located within the Tosohatchee WMA and their subsequent reconstruction and rehabilitation is found to be a *de minimis* impact under Section 4(f), as is the temporary occupancy of a portion of the WMA for bridge construction. The improvements proposed to these ponds will enhance their function as wildlife habitat and use for recreation, thus furthering the goals of the WMA, and the construction staging area is a temporary use, which will be fully restored with no loss of function.

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. Mitigation is addressed with respect to hazardous materials and solid waste disposal, wetlands, biological resources and natural ecological systems, Essential Fish Habitat (EFH), and threatened and endangered species. 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 as well as mitigation for unavoidable impacts. Mitigation measures are proposed for noise and vibration impacts, navigation effects, wetlands, biological resources and natural ecological systems, EFH, and threatened and endangered species. 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 7.2-2 provides a summary of BMPs that would be incorporated into the Project and additional mitigation measures proposed for unavoidable impacts as a result of the Project.

Table 7.2-1 Project BMPs and Mitigation Measures – Construction Period

Environmental Resource	BMPs and Mitigation Measures
Transportation	• Implement traffic management BMPs during construction activities
Air Quality	• 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	• 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	• Use appropriate special waste handling techniques • Implement dust control measures • Use proper technique for management/disposal of contaminated soil/groundwater
Water	• Implement sediment control BMPs (turbidity curtains and silt fences)
Essential Fish Habitat	• Use silt fences and turbidity curtains • Develop and implement an Erosion and Sedimentation Control Plan
Threatened and Endangered Species and Other Protected Species	• Siltation/turbidity barriers would be made of material that would not entrap/entangle species, and would not impede species movement. • Water vessels would 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 would follow routes of deep water. • Personnel would be instructed in the potential presence of threatened and endangered species in the vicinity. Personnel would be advised of the civil and criminal penalties for harming species. • 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. • Signs regarding species would be posted before and during in-water construction activities. • Feeding sites shall not be subjected to water management practices. • Construction would comply with the Bald Eagle Management Plan. • A Bald Eagle Disturbance Permit will be obtained. • An eastern indigo snake monitoring report would be submitted to the appropriate federal and local field offices. • Construction activities would occur during daylight hours in areas that might be visible from any sea turtle nesting beaches. • Construction completed from the water would utilize floating barges and turbidity barriers. • Use bubble curtains during pile driving. • Prior to ground disturbing activities, Florida Fish and Wildlife Conservation Commission-compliant gopher tortoise surveys shall be completed by a qualified gopher tortoise agent.

Table 7.2-2 Project Mitigation Measures for Unavoidable Impacts – Operational Period	
Environmental Resource	**Mitigation Measure**
Traffic and Grade Crossings	• Work with State and local traffic officials to adjust traffic signal timing as needed in Project Area • Implement or fund grade crossing safety enhancements identified in the Diagnostic Team Report (see Section 5.4.4.2)
Noise and Vibration	• Install noise barriers along the E-W Corridor where effective in reducing noise impacts near elevated structures • Maintain train wheels and rails to minimize vibration • Install pole-mounted horns at grade crossings
Water	• 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	• 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	• Purchase wetland mitigation credits
Biological Resources and Natural Ecological Systems	• Develop designs to provide wildlife passage under bridges and through culverts in critical areas. • Install wildlife crossing within the Tosohatchee Wildlife Management Area • Revegetate cleared areas when required by standard BMPs and applicable laws.
Essential Fish Habitat	• Obtain Section 404 permit and follow wetland mitigation conditions

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 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.

7.2.2 Navigation

AAF will implement a series of mitigation measures to reduce vessel delay and queueing 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.

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. These changes will result in emissions reductions and 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.

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. Constructing noise barriers along these portions of track 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 grade crossings, as described in Section 5.2 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. AAF is committed to cooperating with local jurisdictions and funding the necessary improvements should they seek to establish quiet zones in lieu of pole-mounted horns.

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 the Federal Railroad Administration (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. Where necessary and appropriate, ballast mats will be installed.

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.

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. Specific measures would be determined by and in compliance with permit requirements.

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 secure wetland permits including Environmental Resource Permits issued by the South Florida Water Management District and St. Johns River Water Management District, a CWA Section 404 Dredge and Fill permit issued by the U.S. Army Corps of Engineers (USACE), a Rivers and Harbors Act Section 10 permit also issued by the USACE, and a NPDES permit issued by the FDEP. Some of these permits may be jointly covered under a Joint Environmental Resource Permit.

AAF will minimize impacts to wetlands to the greatest extent practicable during the final design process 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 other methods. AAF will mitigate all unavoidable impacts to jurisdictional wetlands in compliance with the U.S. Environmental

Protection Agency and USACE's joint mitigation rule, 33 CFR Part 332. AAF has proposed to mitigate impacts through the purchase of in-kind mitigation bank credits. Because AAF has not yet submitted a permit application to the USACE for Section 404 authorization, and has not received a determination that the proposed alternative is the Least Environmentally Damaging Practicable Alternative (LEDPA), USACE cannot determine the amount of compensatory mitigation credit required to offset unavoidable effects. USACE's Section 404(b)(1) Guidelines analysis, determination of the LEDPA, and the required compensatory mitigation will be included in the USACE's record of decision for AAF's Section 404 permit application.

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 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 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 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 (Figure 5.3.5-1); and
- Cleared areas may be revegetated when required by standard BMPs and applicable laws.

AAF will design bridges and culverts along the E-W Corridor to facilitate wildlife passage, consistent with the existing bridges and culverts along SR 528 and with the Orlando Orange County Expressway Authority and FDOT's future plans. AAF will 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.

7.2.10 Essential Fish Habitat

Through consultation with National Marine Fisheries Service Habitat Conservation Division (NMFS HCD), USACE has assisted in identifying species groups with designated EFH and recommended the use of mitigation methods such as avoiding impacts to mangroves.

To mitigate for 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. The placement of fill and rip-rap in wetlands resulting from bridge construction is considered a permanent impact to jurisdictional wetlands. As a result, AAF will obtain an appropriate Section 404 permit from USACE prior to construction, and implement mitigation as required by the wetland permit conditions (see Section 5.2.2).

7.2.11 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 or protected species habitat. However, AAF is committed to these measures to address any significant, unmitigated impacts that may arise as a result of the Project.

7.2.11.1 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 2011):

- 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.

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).

7.2.11.2 Wood Stork Mitigation Measures

All personnel associated with the construction and operational phases of the Project will be instructed about the potential presence of wood storks. The construction site personnel will 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.

Feeding sites shall not be subjected to water management practices that alter traditional water levels or seasonally normal drying patterns and rates.

7.2.11.3 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.

7.2.11.4 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).

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 should 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.

7.2.11.5 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 a sea turtle, and would not block sea turtle access from designated critical habitat. Barriers shall be properly secured and routinely monitored to ensure turtles 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 will be instructed in the potential presence of protected sea turtles. Further, AAF will inform the construction site personnel and personnel associated with operating the ferry 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 nesting beach. No nighttime construction activities would be conducted in areas which project lighting could be visible from 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 to become entangled. Spill response kits will be maintained on board during construction.

In the unlikely event that a protected sea turtle species 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. The use of bubble curtains during pile driving will help to dampen noise by 5 to 22 dB depending on the pile type and other conditions (Howard 2013). NMFS has recommended that bubble curtains be used when impacts could occur. It is anticipated that the air bubble curtains would be utilized during pile driving to minimize the potential effects on federally managed species.

7.2.11.6 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 and sea turtles and would also provide protection to downstream populations of seagrass and other submerged aquatic vegetation.

7.2.11.7 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.

7.2.12 Cultural Resources

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. As mitigation, AAF will conduct historic research and prepare Historic American Buildings Survey and Historic American Engineering Record documentation for each bridge prior to its demolition. FRA is continuing to consult with the SHPO regarding concurrence with the FRA's adverse effect determination and potential mitigation measures.

7.2.13 Section 4(f) Resources

The Project would not require a use of Section 4(f) resources except for certain historic railroad bridges, as described in *Chapter 6, Section 4(f) Evaluation*. 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.

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 may require construction areas within the Tosohatchee Wildlife Management Area; however, the construction areas would be stabilized with grass and mulch and the land returned to pre-construction conditions.

AAF proposes to excavate material from and adjacent to three man-made ponds within the Tosohatchee Wildlife Management Area, and to then rehabilitate the ponds by creating more natural shorelines, reshaping the ponds, and adding littoral shelves. These actions will enhance the fisheries habitat, increase the zonation of wetland plant communities, improve wildlife habitat, and expand the function of the ponds as a recreational resource. The Land Manager for the Tosohatchee State Reserve, which acts as the umbrella organization for properties under the jurisdiction of multiple state agencies and includes the Tosohatchee Wildlife Management Area, has indicated that this arrangement would be beneficial, and that a prior similar approach to a fourth borrow pond has proved beneficial. AAF is currently surveying the pond areas to evaluate the existing ecological conditions and determine whether borrow material from the ponds would be suitable for constructing the Project.

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.

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 Draft Environmental Impact Statement (DEIS). 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 DEIS. 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 DEIS 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 Marines Fishery Service (NMFS). FAA's involvement in the DEIS 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 DEIS. 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.

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 DEIS 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 DEIS. Scoping provides agencies and the public with the opportunity to contribute to the technical

direction and analysis of the DEIS, 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 DEIS, 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.

Table 8.1-1 Public Scoping Meetings

Public Scoping Meeting	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.

8.2 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 DEIS. 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 non-governmental organizations during the NEPA process:

- Admiral's Cove Homeowners Association
- American Federation of Labor and Congress of Industrial Organizations Miami Chapter
- Associated Builders & Contractors
- Barefoot Bay Homeowners Association

- Black Archives
- Broward County Marine Steering Committee/Advisory Board
- Broward County National Association for the Advancement of Colored People
- Central Florida Hotel and Lodging Association
- Chamber of Commerce of the Palm Beaches
- City View Townhomes Association
- Cocoa Beach Regional Chamber of Commerce
- Council of Fort Lauderdale Civic Associations
- Downtown Fort Lauderdale Civic Association
- Efficient Transportation for the Community
- Federation of Boca Raton Homeowners Association
- Flagler Village Civic Association
- Florida Council of 100
- Florida Planning & Zoning Association
- Gold Coast League of Cities
- Indian River Freeholders Association
- International Drive Chamber of Commerce
- Kiwanis Club of West Palm Beach
- Leadership Orlando
- Martin County Chamber of Commerce
- MetroPlan Orlando
- Metro Orlando Economic Development Commission
- Miami-Dade County Citizen's Independent Transportation Trust
- Northern Palm Beach Chamber of Commerce
- Orlando Sentinel Transportation Forum
- Palm Beach Business Forum
- Palm Beach County Marine Industries Association
- Palm Beach County Realtors Association
- Palm Beach County Tourist Development Council
- Rotary Club of Orlando

- SeaWorld Orlando
- South Andrews Business Association
- St. Cloud Chamber of Commerce
- St. Lucie Economic Development Council
- St. Lucie River Working Group
- Town Square Neighborhood Development Corporation
- Treasure Coast Joint Advisory Committee
- Universal Studios
- Village of Biscayne Park
- Visit Orlando
- Vista Lakes Homeowners Association
- Walt Disney World
- West Palm Beach Downtown Development Authority
- Women in Transportation

8.5 Post-Scoping Comments

Numerous members of the public have submitted comments to FRA following the scoping comment period. More than 160 comments have been received since July 2013. 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.

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10 List of Preparers

Vanasse Hangen Brustlin, Inc.	
Dr. Lisa A. Standley Chief Environmental Scientist Technical Document Lead	Ph.D., Botany, University of Washington M.S., Botany, Cornell University 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 Environmental Planner DEIS Preparation	M.A., Global Leadership and Sustainable Development, Hawaii Pacific University B.A., Biology, Environmental Policy, Boston University 2 years of experience in environmental policy and management
Terry Byrne Senior Project Manager Transit and Rail Operations, and Train Control	39 years of experience in transit and rail industry specific to train control systems and rail operations
Rick Carey, P.E. Northern New England Director of Transit & Rail Rail Engineering	M.B.A., Bryant College B.S., Engineering, Civil, Mechanical, University of Rhode Island 27 years of experience in passenger and freight rail design and construction initiatives

Lisa DiTaranti, P.E. Northeast Director of Transit & Rail Rail Operations, Transportation, Ridership	B.S., Civil Engineering, Villanova University 29 years of experience in railroad planning and engineering consulting and 25 years of experience in preparing NEPA documents
Colin Foley, AICP Transportation Planner Alternatives Analysis	M.C.P., Transportation Planning, University of Pennsylvania B.S., History, Boston College 8 years of experience in transportation and environmental planning
Donny Goris-Kolb, AICP, LEED Green Associate Environmental Planner Social and Economic Impacts, Environmental Justice	M.U.P., University at Buffalo B.A., Sociology, Binghamton University 6 years of experience in environmental consulting and preparing NEPA documents
Marianne Iarossi Environmental Planner DEIS Preparation	M.R.P., Environmental Planning, University of Massachusetts B.S., Environmental Science, Geography and Regional Planning, Westfield State University 2 years of experience in environmental consulting and preparing NEPA documents
John Jennings, ASLA Principal Visual and Aesthetic Impacts	B.A., Landscape Architecture, University of Oregon 42 years of experience in design consulting of public open space and infrastructure projects
Mike McArdle Director, Transit & Rail Rail Operations and Engineering	B.S., Civil Engineering, University of Lowell 26 years of experience in transit and rail infrastructure projects

Kate McEneaney Permitting Specialist Section 4(f), DEIS Preparation	M.A., Energy and Environmental Analysis, Boston University B.A., Environmental Policy, Boston University 12 years of experience in permitting efforts for linear projects
Paul McKinlay, PG, LSP Director, Oil and Hazardous Materials Services Hazardous Materials and Solid Waste	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
Sean Murray Environmental Scientist Wetlands, Uplands, Wildlife, Threatened and Endangered Species	B.A., Biology and Environmental Science, University of Virginia 10 years of experience in environmental consulting and 3 years of experience in biological research
Curtis Ostrodka, AICP, LEED AP Senior Project Manager, Planning Social and Economic Impacts, Land Use	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
Heidi Richards Project Manager/Associate Air Quality	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

Christopher Rife Senior Project Manager Lead Document Author	M.S., Environmental Policy and Management, University of Denver B.A., Philosophy, Humboldt State University 21 years of experience in environmental consulting and 16 years of experience in preparing NEPA documents
Clayton Robertson Principal Environmental Scientist Biological Resources and Natural Ecological Systems; Wetlands	B.S., Natural Sciences, Zoology, University of South Florida 38 years of experience in regulatory and environmental consulting including ecological assessments, regulatory permitting and biological resource impact analyses
Gary Serviss, LEED AP Principal Scientist Farmlands Soils and Water	M.S., Biological Sciences, Florida Institute of Technology B.S., Marine Biology, Florida Institute of Technology 31 years of experience in environmental consulting and 9 years of experience in preparing NEPA documents
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

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11 Distribution List

This DEIS 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 DEIS 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

Federal Elected Officials

(Receives an executive summary of the DEIS and a CD of the full DEIS)

- 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)
- Representative Alcee Hasting (District 20)
- Representative Theodore Deutch (District 21)
- Representative Lois Frankel (District 22)
- Representative Debbie Wasserman Schultz (District 23)
- Representative Frederica Wilson (District 24)

Federal Agencies

(Receives an executive summary of the DEIS and a CD of the full DEIS)

- 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

State Elected Officials

(Receives an executive summary of the DEIS and a CD of the full DEIS)

- Governor Rick Scott
- Representative Linda Stewart (District 47)
- Representative Victor M. Torres, Jr. (District 48)
- Representative Tom Goodson (District 50)
- Representative Steve Crisafulli (District 51)
- Representative Ritch Workman (District 52)
- Representative John Tobia (District 53)
- Representative Debbie Mayfield (District 54)
- Representative MaryLynn Magar (District 82)
- Representative Gayle Harrell (District 83)
- Representative Larry Lee, Jr. (District 84)
- Representative Pat Rooney, Jr. (District 85)
- Representative Mark Pafford (District 86)
- Representative Dave Kerner (District 87)
- Representative Bobby Powell (District 88)
- Representative Bill Hager (District 89)
- Representative Gwyndolen Clarke-Reed (District 92)
- Representative George Moraitis (District 93)
- Representative Perry E. Thurston, Jr. (District 94)
- Representative Elaine J. Schwartz (District 99)
- Representative Joseph Gibbons (District 100)
- Representative Shevrin D. Jones (District 101)
- Representative Barbara Watson (District 107)
- Representative Daphne D. Campbell (District 108)
- Representative Cynthia A. Stafford (District 109)
- Representative David Richardson (District 113)
- Senator Andy Gardiner (District 13)
- Senator Darren Soto (District 14)
- Senator Thad Altman (District 16)
- Senator Joseph Abruzzo (District 25)
- Senator Jeff Clemens (District 27)
- Senator Jeremy Ring (District 29)

- Senator Christopher Smith (District 31)
- Senator Joe Negron (District 32)
- Senator Eleanor Sobel (District 33)
- Senator Maria Sachs (District 34)
- Senator Gwen Margolis (District 35)
- Senator Oscar Braynon II (District 36)
- Senator Dwight Bullard (District 39)
- Senator Miguel Diaz de la Portilla (District 40)

State Agencies

(Receives an executive summary of the DEIS and a CD of the full DEIS)

- 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

County Elected Officials and Departments

(Receives an executive summary of the DEIS and a CD of the full DEIS)

- County Commissioners and County Managers:
    - Brevard
    - Broward
    - Indian River
    - Martin
    - Miami-Dade
    - Orange
    - Osceola
    - Palm Beach
    - St. Lucie County

Local/Regional Agencies and Organizations

(Receives an executive summary of the DEIS and a CD of the full DEIS)

- 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

Municipalities

(Receives an executive summary of the DEIS and a CD of the full DEIS)

- Aventura
- Boca Raton
- Cocoa
- Dania Beach
- Edgewood
- 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
- Riviera Beach
- Sebastian
- Stuart
- St. Lucie
- El Portal
- Vero Beach
- West Palm Beach

Libraries

(Receives the full DEIS and a CD of the full DEIS)

- Cocoa
- Delray Beach
- Fort Lauderdale
- Fort Pierce
- Jupiter
- Melbourne
- Miami
- Orlando
- Palm Bay
- Port St. Lucie
- Sebastian
- Stuart
- West Palm Beach

Native American Sovereign Nations

(Receives an executive summary of the DEIS and a CD of the full DEIS)

- Miccosukee Tribe of Florida
- Muscogee Creek Nation
- Poarch Band of Creek Indians
- Seminole Nation of Oklahoma
- Seminole Tribe of Florida

Other Interested Parties

(Receives an executive summary of the DEIS and a CD of the full DEIS)

- 1000 Friends of Florida (Charles Pattison, President)
- Council of Fort Lauderdale Civic Association (Marilyn Mammano, President)
- Eagle's Nest Property Owners Association
- Farmland Reserve (David Wright)
- Gulfstream Sailing Club (Luis Oliveira)
- Hopping Green & Sams, P.A. (Frank Matthews)
- Jonathan Dickinson State Park (Mark Nelson, Manager)
- Jupiter Inlet District (Mike Grella)
- Marine Industries Association of South Florida
- The Palms at Boca Teeca (Robert Trainor, Vice President)
- Rails-to-Trails Conservancy
- Sierra Club (John Puhek)
- Tosohatchee State Preserve

An additional 120 persons were notified by email that the DEIS was available on the FRA's website.

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