



# ARIZONA PASSENGER RAIL CORRIDOR STUDY

## Tucson to Phoenix

# Final Tier 1 Environmental Impact Statement

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Multimodal Planning Division

## ARIZONA PASSENGER RAIL CORRIDOR STUDY: TUCSON TO PHOENIX

### Final Tier 1 Environmental Impact Statement

*Submitted pursuant to the National Environmental Policy Act (42 USC 4321 et seq.); Federal Railroad Administration Procedures for Considering Environmental Impacts (64 FR 28545, May 26, 1999); Council on Environmental Quality's regulations implementing NEPA (40 CFR parts 1500-1508); Federal Transit Administration's Environmental Impact and Related Procedures (23 CFR Part 771).*

by the

Federal Railroad Administration

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This Final Tier 1 Environmental Impact Statement (EIS) considers development of a passenger rail system to provide an alternate travel mode that would reduce travel times and improve service reliability between Tucson and Phoenix by providing intercity and commuter rail service. This Final Tier 1 EIS evaluates the potential effects of a passenger rail system within alternative corridors on land use, socioeconomic conditions, environmental justice, public health and safety, parklands, Section 4(f) and Section 6(f) resources, air quality, noise and vibration, hazardous materials, geology and topography, biological resources, water resources, energy use and climate change, visual and scenic resources, and cultural resources.

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## Abbreviations, Acronyms, and Short Forms

AA	Alternatives Analysis
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ALRIS	Arizona Land Resource Information System
AMA	Active Management Area
amsl	above mean sea level
APRCS	Arizona Passenger Rail Corridor Study
APTA	American Public Transportation Association
A.R.S.	Arizona Revised Statutes
ASLD	Arizona State Land Department
ASTM	American Society for Testing and Materials
AWLW	Arizona Wildlife Linkages Workgroup
AZGS	Arizona Geological Survey
AZPDES	Arizona Pollutant Discharge Elimination System
AZTDM2	Arizona Statewide Travel Demand Model version 2
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	best management practice
BRT	bus rapid transit
BTU	British thermal unit
C	candidate (ESA)
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CAG	Central Arizona Governments
CAP	Central Arizona Project
CART	Central Arizona Regional Transit
CCA	candidate conservation agreement
CCAA	candidate conservation agreement with assurances
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CH <sub>4</sub>	methane

CLS	Conservation Lands System
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalents
Corps	United States Army Corps of Engineers
Council	Advisory Council on Historic Preservation
CST	Corridor Support Team
CTPP	Census Transportation Planning Package
CWA	Clean Water Act
D	delisted (ESA)
dB	decibel(s)
dBA	A-weighted noise level in decibels
DHHS	Department of Health and Human Services
DMU	diesel multiple unit
DVD	digital video disc
E	endangered (ESA)
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMU	electric multiple unit
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute
<i>et seq.</i>	and the following (Latin <i>et sequentes</i> or <i>et sequentia</i> )
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FPPA	Farmland Protection and Policy Act
FR	Federal Register
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FY	fiscal year
GBN	ground borne noise
GBV	ground borne vibration
GHG	greenhouse gas
GIS	geographic information system
GRIC	Gila River Indian Community

HS	harvest restricted (native plants)
HOV	high occupancy vehicle
I-10	Interstate 10
L1UB	Lacustrine Limnetic Unconsolidated Bottom (wetland)
L2UB	Palustrine Littoral Unconsolidated Bottom (wetland)
L <sub>dn</sub>	day night noise level
LEP	limited English proficiency
L <sub>eq</sub>	equivalent noise level
L <sub>max</sub>	maximum pass by sound level
LQG	large quantity generator
LUST	leaking underground storage tank
LWCF	Land and Water Conservation Fund
MAG	Maricopa Association of Governments
MBTA	Migratory Bird Treaty Act
MF	multi family
MJ	Megajoule
MOA	memorandum of agreement
mpg	miles per gallon
mph	miles per hour
MPO	metropolitan planning organization
MSATs	mobile source air toxics
N <sub>2</sub> O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO <sub>2</sub>	nitrogen dioxide
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRPR	Natural Resources, Parks and Recreation (Pima County)
NWI	National Wetland Inventory
NWP	Nationwide Permit
O <sub>3</sub>	ozone
OHWM	ordinary high water mark
OU	operating unit

P&R	Parks and Recreation Department
PA	programmatic agreement
PAG	Pima Association of Governments
Pb	lead (chemical element)
PCAQCD	Pinal County Air Quality Control District
PE	proposed for listing as endangered (ESA)
PEL	Planning and Environmental Linkages
PEM	Palustrine Emergent (wetland)
PFO	Palustrine Forested (wetland)
PHX	Phoenix Sky Harbor International Airport
PKT	passenger kilometer traveled
PM <sub>2.5</sub>	particulate matter less than or equal to 2.5 microns
PM <sub>10</sub>	particulate matter less than or equal to 10 microns
ppb	parts per billion
ppm	parts per million
PSS	Palustrine Scrub Shrub (wetland)
PUB	Palustrine Unconsolidated Bottom (wetland)
R2UB	Riverine Lower Perennial Unconsolidated Bottom (wetland)
R2US	Riverine Lower Perennial Unconsolidated Shore (wetland)
R4SB	Riverine Intermittent Streambed (wetland)
R4SBax	Riverine Intermittent Streambed Temporarily Flooded Excavated (wetland)
R4SBJ	Riverine Intermittent Streambed Intermittently Flooded (wetland)
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
ROW	right-of-way
RMS	root-mean-square (velocity of gas particles)
RS	Recreation Services (City of Tempe)
S	sensitive (species)
SAFETEA LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
SCMPO	Sun Corridor Metropolitan Planning Organization
SDCP	Sonoran Desert Conservation Plan
SO <sub>2</sub>	sulfur dioxide
SF	single family
SHPO	State Historic Preservation Office
SR	salvage restricted (native plants)
SR	State Route



SRP-MIC	Salt River Pima-Maricopa Indian Community
spp.	species (plural)
ssp.	Subspecies
STOPS	Simplified Trips-on-Project Software
SWPPP	Stormwater Pollution Prevention Plan
T	threatened (ESA)
TCP	traditional cultural property
THPO	Tribal Historic Preservation Office
TIP	Transportation Improvement Program
Title VI	Title VI of the Civil Rights Act of 1964
TMDL	Total Maximum Daily Load
TNW	traditional navigable water(s)
TRI	toxic release inventory
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
TUS	Tucson International Airport
U.S.C.	United States Code
UP	Union Pacific Railroad
US	United States
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	underground storage tank
USDOT	United States Department of Transportation
var.	variety
VASR	Visual and Aesthetic Scenic Resources
VdB	vibration decibel(s)
VHT	vehicle hours travelled
VMT	vehicle miles travelled
VOC	volatile organic compounds
Waters	Waters of the United States
WSC	Wildlife of Special Concern (in Arizona)

## Preface

The Arizona Department of Transportation, through numerous planning studies, has identified the corridor defined by Phoenix and Tucson, the state's two most populous metropolitan areas, for investigating potential passenger rail service in the state. This Tier 1 Environmental Impact Statement (EIS) documents the potential environmental effects of constructing and operating a passenger rail system within alternative corridors considered in the Arizona Passenger Rail Corridor Study (APRCS), which was undertaken to investigate faster and more reliable travel modes between these two cities and intervening points.

The Tier 1 EIS is one of three documents created to satisfy the project planning requirements of the lead and cooperating agencies for the APRCS. The Federal Railroad Administration is the lead agency, and the Federal Transit Administration and Federal Highway Administration are cooperating agencies for the Tier 1 EIS. In accordance with the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq.*, the EIS looks at the effects that constructing and operating a passenger rail system would have on the natural, built, and social environment. It examines several alternative solutions developed to meet a recognized transportation need, so that decision makers can compare the environmental effects of two corridor alternatives and the No Build Alternative. The other deliverables of the APRCS, an Alternatives Analysis (AA) and a Service Development Plan (SDP), examine planning, operational, and funding issues in greater detail than normally reported in an EIS.

This document describes the potential environmental consequences of a passenger rail system within corridors each extending up to 1.0 mile in width. It considers the environmental context of each corridor alternative, relative to the intensity of effects anticipated from construction and operation of the proposed rail system. The EIS discloses both what is known and, to the extent practicable, what is not known about resources in the area, based on readily available data. The analysis discusses benefits as well as potential adverse impacts of implementing a rail system within each corridor alternative, as compared with taking no action.

The Draft Tier 1 EIS was circulated for public review and comment between September 11 and October 30, 2015, and has been updated and finalized as part of the NEPA process in response to comments received. The Final Tier 1 EIS is being published in conjunction with a Record of Decision documenting FRA's selection of a preferred corridor alternative and granting environmental clearance for further project development within the selected corridor.

In later phases, one or more design and construction projects for a passenger rail system will undergo Tier 2 environmental analysis. The Tier 2 NEPA document(s) will identify project-specific impacts and provide requirements for mitigating those impacts, allowing a project to be constructed.

## Introduction to the Final Tier 1 Environmental Impact Statement

The Arizona Department of Transportation’s (ADOT) current study of methods to move passengers between the cities of Tucson and Phoenix builds on work that ADOT and other agencies have undertaken in recent years. Because any project or projects resulting from this study would likely use federal funds, this Tier 1 Environmental Impact Statement (EIS) was prepared to satisfy the requirements of NEPA. NEPA requires federal agencies to consider the environment in their planning and decision-making through a systematic, interdisciplinary approach. Federal agencies assess the environmental impact of proposed actions and alternatives with the potential for significant effects on the environment.

FRA utilizes a “Tier 1” EIS to examine alternative corridors, rather than specific alignments, to guide decision-making, encourage coordination between agencies and jurisdictions, preserve right-of-way, and identify funding opportunities for future infrastructure projects. Taken together, the combined deliverables from the Arizona Passenger Rail Corridor Study (APRCS) provide the requisite analysis and preliminary engineering to complete an AA for FTA New Starts, along with a Tier 1 EIS and Service Development Plan for FRA.

This Tier 1 EIS was prepared in conjunction with a New Starts-compatible Alternatives Analysis (AA), to satisfy the Federal Transit Administration’s (FTA) approach to selecting an alternative for implementation. New Starts is a capital investment grant program administered by FTA for new and expanded rail, bus rapid transit, and ferry systems in key corridors.

Two different transportation needs—intercity connectivity and commuter mobility—have been identified, and two federal agencies are funding the APRCS. FRA is the designated lead agency and FTA and the Federal Highway Administration (FHWA) are cooperating agencies for the EIS, with ADOT serving as the sponsoring agency. Each federal agency has its own process for moving a proposed project from an array of possible alternatives to a single alternative, although both fulfill the environmental evaluation principles stipulated by NEPA. The APRCS follows a process designed to meet both agencies’ requirements for identifying a preferred alternative that would provide opportunities for intercity connectivity between Tucson and Phoenix while enhancing commuter mobility within the same study area.

### Study Location

Arizona, in the southwestern United States (US), is the sixth largest state in area and fifteenth most populous. Future growth anticipated within Arizona’s 114,000 square miles, however, can only take place within private developable land. Seventy (70) percent of Arizona is either public land managed by the Bureau of Land Management or Bureau of Reclamation or protected parkland, tribal land, or military facilities. State Trust land administered by the Arizona State

Land Department (ASLD) makes up another 13 percent and has the potential for future development, leaving only 17 percent of the state as private developable land.

Most of that area where growth could occur lies within a megaregion—a network of metropolitan areas that share environmental characteristics, infrastructure, economic linkages, development patterns, culture, and history—known as the Sun Corridor, where 86 percent of the state’s population already resides. This megaregion extends northwest beginning in the south at Nogales, through Tucson and Phoenix, and up to Prescott. Over the last decade it has been one of the fastest growing areas in the country.

At the heart of the Sun Corridor lie three counties—Pima, Pinal, and Maricopa—containing Arizona’s two largest cities, Tucson and Phoenix, and the developing region in between. For the APRCS, this most populous area of the state, which also happens to be the area where future growth is most likely to occur, was deemed most appropriate to be selected as the study area. This three county study area is strategic not only on a state level but also on a regional level. Phoenix is the sixth largest city in the US, in both population and land area. It is the only US city with a population above 1 million that is not served directly by an intercity or commuter rail system. Planned increases in vehicle carrying capacity on the study area roadway network are constrained by environmental and jurisdictional issues, while regional growth is projected to outpace and exceed the roadway network’s planned optimum capacity.

### **Final Tier 1 EIS Contents**

A detailed description of the transportation problem prompting this Study is contained in **Chapter 1, Purpose and Need**. Additionally, this chapter outlines the revisions made to the Draft Tier 1 EIS (DEIS), subsequent to public and agency review and FRA’s selection of the preferred alternative, that resulted in the Final Tier 1 EIS (FEIS).

The corridor alternatives examined in the DEIS were selected from a broad range of alternatives potentially meeting the purpose and need for a high-capacity transportation connection. The extensive process by which these preliminary alternatives were narrowed is described in detail in **Chapter 2, Alternatives Considered**.

**Chapter 3, Public Agency Coordination** outlines the extensive outreach efforts that ADOT and the federal lead agency have conducted in conjunction with identifying the purpose and need for the study and developing alternative transportation solutions. This coordination included the DEIS being circulated for public and agency review and comment, and public hearings held as part of the NEPA process. A brief summary of comments received is included in this chapter as well.

Train and automobile trip durations, passenger service frequency scenarios, and conceptual rail station locations and their associated impacts on transportation within the region, along with the transportation impacts of the No Build alternative, are explored in **Chapter 4, Transportation Impacts**.

Many aspects of the natural, social, and built environment could be affected, either positively or adversely, both by building and by operating a passenger rail system within the corridor alternatives, and by *not* building one. These are methodically examined in **Chapter 5, Error! Reference source not found.**, following guidance established by both the study's federal lead agency, FRA, as well as guidance from FTA, for implementing NEPA. As stated above, the analysis of potential environmental effects was reported at a corridor-level in this Tier 1 EIS.

**Chapter 6, Cost Analysis**, provides capital and operation/maintenance cost estimates for a passenger rail system. Costs were estimated at a corridor level to provide decision-makers with order-of-magnitude information on the potential cost of building, operating, and maintaining a passenger rail system within the corridor alternatives.

Information contained in the APRCS AA, as well as in prior chapters of this Tier 1 EIS, is distilled and summarized in **Chapter 7, Comparison of Alternatives**. This chapter compares the three alternatives' potential performance with respect to environmental impacts, financial feasibility, ease of implementation, and operating characteristics. FRA used this information, as well as agency and public comments on the DEIS, to select and approve a preferred alternative for undertaking Tier 2 studies for passenger rail service between Tucson and Phoenix.

**Chapter 8, Next Steps**, outlines the further steps ADOT and the federal lead agency will need to take to advance the APRCS into design of one or more operable segments of a passenger rail system that could be developed as individual projects. Subsequent Tier 2 NEPA documentation involving more detailed technical analysis of environmental conditions, impacts, and mitigation, would be undertaken at the project level.

The **appendices** of the FEIS contain comments on the DEIS and responses, background data, and technical information. The first two appendices consist of agency and public comments received on the DEIS, along with FRA's responses to those comments. Subsequent appendices are arranged alphabetically, and correspond either to the name of an environmental resource section in **Chapter 5**, or to another EIS chapter. An exception to this is the *Corridor Aerial Atlas Appendix*, consisting of 91 annotated aerial maps of the 1-mile-wide Yellow and Orange corridor alternatives that were studied in detail in the Tier 1 EIS over their entire length.





References in the EIS text to chapters, figures, tables, or sections contained within the EIS appear in bold type, while EIS appendix names are italicized, and EIS appendix table and figure numbers are indicated in plain type.