Tier 1 Draft Environmental Impact Statement

North-South Corridor Study

U.S. Route 60 to Interstate 10
Pinal County, Arizona

FHWA-AZ-EIS-19-02-D

prepared by
Arizona Department of Transportation

in cooperation with
Federal Railroad Administration
U.S. Army Corps of Engineers
U.S. Bureau of Indian Affairs – San Carlos Irrigation Project
U.S. Bureau of Land Management
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Western Area Power Administration
Arizona Game and Fish Department

September 2019

ADOT

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by ADOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated April 16, 2019, and executed by FHWA and ADOT.

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Federal-aid Project No. STP-999-A(365)X
ADOT Project No. 999 PN 000 H7454 01L

Submitted pursuant to 42 USC § 4332(2)(c), 49 USC § 303, and 33 USC § 1251

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Abstract

This Tier 1 Draft Environmental Impact Statement documents the potential effects associated with the proposed action corridor alternatives, which identify a new approximately 55-mile-long freeway between U.S. Route 60 in Apache Junction and Interstate 10 near Eloy and Picacho in Pinal County, Arizona. The freeway would also connect with State Route 24 in Queen Creek. The purpose of the proposed action is to enhance the area's transportation network to accommodate existing and future populations, improve access to future activity centers, improve regional mobility, provide an alternative to avoid traffic congestion on Interstate 10, improve north-to-south connectivity, and integrate the region's transportation network. The action corridor alternatives consist of an Eastern Alternative with options, a Western Alternative with options, and combinations of both to avoid and minimize environmental impacts. Other alternatives were evaluated but eliminated from further study. This Tier 1 Draft Environmental Impact Statement describes potential impacts on the natural and built environments in the study area. Alternative 7, with the E1b and E3b Options, has been identified as the Preferred Alternative.

Paul O'Brien

Paul O'Brien, P.E., Administrator
Environmental Planning
Arizona Department of Transportation

09/06/19
Date

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by ADOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated April 16, 2019, and executed by FHWA and ADOT.

Americans with Disabilities Act
Individuals requiring reasonable accommodation of any type under the Americans with Disabilities Act should contact Laura Douglas at 602.712.7683 or at ldouglas@azdot.gov.

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ADOT

Tier 1 Draft Environmental Impact Statement

North-South Corridor Study

Public Hearings

Three public hearings to provide information and accept comments on the Draft Environmental Impact Statement will be held on the following dates:

Tuesday, October 1, 2019
5:30 to 7:30 p.m.
Florence High School
1000 South Main Street
Florence, Arizona 85132

Thursday, October 10, 2019
5:30 to 7:30 p.m.
Eloy City Hall
595 North C Street, Suite 104
Eloy, Arizona 85131

Tuesday, October 15, 2019
5:30 to 7:30 p.m.
Poston Butte High School
32375 North Gantzel Road
San Tan Valley, Arizona 85143

Dates, times, and locations of the public hearings will be announced through notices published in newspapers of general circulation and on the study website:

www.azdot.gov/planning/transportation-studies/north-south-corridor-study/overview

Review Comments

A comment period will begin on the date a notice is published in the *Federal Register*. Notice will take place on September 6, 2019. The comment period will end on October 29, 2019.

Comments should be sent to:

Asadul (Asad) Karim, P.E., Project Manager
Arizona Department of Transportation
205 S. 17th Ave., MD 605E
Phoenix, AZ 85007

Comments can also be sent by email to:

northsouth@azdot.gov

Document Availability

The Draft Environmental Impact Statement is available online at:

www.azdot.gov/planning/transportation-studies/north-south-corridor-study/overview

It is also available for review only and at no charge at the following locations:

Eloy Santa Cruz Library
1000 North Main Street
Eloy, Arizona 85131
520.466.3814

Coolidge Public Library
160 West Central Avenue
Coolidge, Arizona 85128
520.723.6030

Florence Community Library
778 North Main Street
Florence, AZ 85132
520.868.7500

Apache Junction Public Library
1177 North Idaho Road
Apache Junction, Arizona 85119
480.474.8558

Queen Creek Library
21802 South Ellsworth Road
Queen Creek, Arizona 85142
602.652.3000

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Appendices (in separate volumes)

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Abbreviations and Acronyms

ADT	average daily traffic
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AGFD	Arizona Game and Fish Department
AMA	Active Management Area
A.R.S.	Arizona Revised Statutes
ASLD	Arizona State Land Department
ASM	Arizona State Museum
ASR	*Alternatives Selection Report*
AZGS	Arizona Geological Survey
AZPDES	Arizona Pollutant Discharge Elimination System
AZTDM2	second-generation Arizona statewide travel demand model
CAG	Central Arizona Governments
CAP	Central Arizona Project
CCA	candidate conservation agreement species
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
Corridor	North-South Corridor
CWA	Clean Water Act
dBA	A-weighted decibel
DEIS	Draft Environmental Impact Statement
EDR	Environmental Data Resources, Inc.
EIS	Environmental Impact Statement
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FPPA	Farmland Protection and Policy Act
FRA	Federal Railroad Administration
Framework Program	Statewide Transportation Planning Framework Program
FRS	flood-retarding structure
GHG	greenhouse gas
GIS	geographic information system

GSF	groundwater savings facility
I-10	Interstate 10
ISA	Initial Site Assessment
LE	federally listed endangered
LEDPA	least environmentally damaging practicable alternative
LEP	limited English proficiency
L_{eq}	equivalent sound level
L_{eq}(h)	1-hour equivalent sound level
LOS	level of service
LT	federally listed threatened
LWCF	Land and Water Conservation Fund
$\mu g/m^3$	micrograms per cubic meter
MAG	Maricopa Association of Governments
MBTA	Migratory Bird Treaty Act
MPA	municipal planning area
mpg	miles per gallon
mph	miles per hour
MPO	metropolitan planning organization
MSATs	mobile source air toxics
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSCS	North-South Corridor Study
O_3	ozone
OHWM	ordinary high water mark
Pb	lead
PM	particulate matter
PM_{10}	particulate matter with a diameter of 10 microns or less
$PM_{2.5}$	particulate matter with a diameter of 2.5 microns or less
ppb	parts per billion
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision

ROW	right-of-way
RSRSM	*2008 Pinal County Regionally Significant Routes Plan for Safety and Mobility*
SC	species of concern
SCMPO	Sun Corridor Metropolitan Planning Organization
SERI	Species of Economic and Recreation Importance
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	sulfur dioxide
SR	State Route
TCP	traditional cultural property
Uniform Act	Uniform Relocation Assistance and Real Property Acquisitions Policy Act
UPRR	Union Pacific Railroad
US 60	United States Route 60
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDOT	U.S. Department of Transportation
USF	underground storage facility
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VHT	vehicle hours traveled
VMT	vehicle miles traveled
Waters	waters of the United States

Summary

The Arizona Department of Transportation (ADOT), acting as the lead agency, is considering the construction and operation of a north-to-south transportation corridor in Pinal County, Arizona. If an action alternative is selected and constructed, the facility would improve connectivity and accessibility and introduce additional roadway capacity to support projected population and employment growth in Pinal County and across the larger region. The Federal Highway Administration (FHWA) participated as a joint lead agency in planning and preparing technical and environmental documents prior to the signing of a Memorandum of Understanding for the Surface Transportation Project Delivery Program (23 United States Code § 327).

The North-South Corridor Study (NSCS) Tier 1 Draft Environmental Impact Statement (DEIS, Project No. FHWA-AZ-EIS-19-02-D) has been prepared to evaluate the potential short-term and long-term impacts associated with proposed action corridor alternatives. These action corridor alternatives were developed based on input from the public; coordination with local, regional, state, and federal agencies and tribes; and findings from previous studies. The action corridor alternatives carried forward for detailed analysis in this Tier 1 DEIS best meet the purpose and need for the proposed action.

This summary chapter provides a brief overview of this Tier 1 DEIS. Table S-1 lists the main topics.

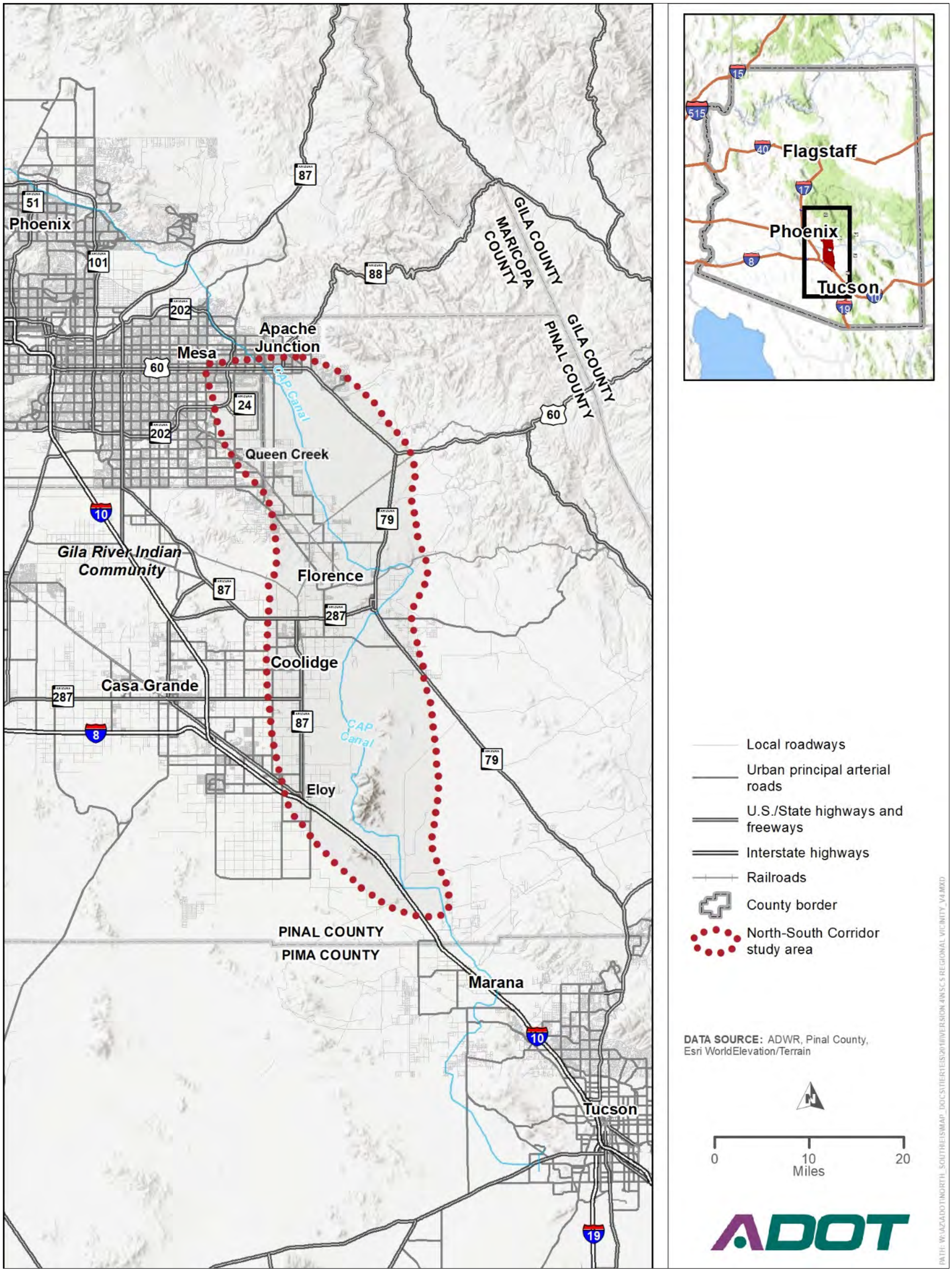
Table S-1. Summary chapter organization

Given the size of the North-South Corridor (Corridor) and the need to identify future funding to build the Corridor, this study is using a “tiered” approach. This Tier 1 DEIS analyzes the proposed action on a broad scale. During subsequent Tier 2 studies, additional National Environmental Policy Act (NEPA) documents would be prepared to analyze individual projects in greater detail, with the goal of advancing construction of certain portions of the Corridor. According to the Transportation Research Board (2009), a tiered approach may be used to address the complex NEPA process associated with lengthy corridors and to facilitate corridor preservation when construction would not occur for many years.

Study Area Description

The Corridor study area is bounded on the north by U.S. Route 60 (US 60) and extends south for approximately 45 miles to Interstate 10 (I-10) (Figure S-1). The Corridor’s northern terminus is near Apache Junction on US 60, and the southern terminus is at I-10 between Eloy and Marana. Coolidge and Florence are in the central part of the study area. An extension of State Route (SR) 24 from its currently designed terminus at Ironwood Drive to the Corridor is part of this study.

Figure S-1. North-South Corridor regional location



Scoping and Study Background

Project scoping is an early step in the NEPA process, the results of which are summarized in the *North-South Corridor Study Draft Agency and Public Scoping Summary*, dated February 2011 (see Appendix M, *Public Involvement*). The NSCS scoping effort engaged federal, state, local, and tribal governments and members of the public to facilitate the early identification of concerns, potential impacts, relevant effects of past actions, and possible alternative actions.

The scoping process was open to agencies and the public to identify the range—or scope—of issues to be addressed during engineering, planning, and environmental studies. The agency and public scoping meetings occurred in October 2010 at locations throughout the study area. Additional information regarding the scoping phase is found in this Tier 1 DEIS in Section 5.1.2, *Scoping Phase (2010)*.

For the NSCS, the scoping period began with the publication of a Notice of Intent to complete a project-level environmental impact statement (EIS) in the *Federal Register* on September 20, 2010. Between October 2010 and early 2016, the NEPA EIS phase of the NSCS progressed with the development and evaluation of alternatives, as documented in the *Alternatives Selection Report* (ASR). Subsequent environmental technical analyses and conceptual design work supported a project-level DEIS. Throughout these efforts, ADOT and FHWA held regular meetings with cooperating agencies, participating agencies, tribes, and many key stakeholders. The agencies also conducted public meetings for the ASR and numerous individual stakeholder meetings as the study advanced. In 2016, ADOT and FHWA converted the project-level NEPA EIS process to a Tier 1-level EIS, in accordance with Council on Environmental Quality regulations (40 Code of Federal Regulations § 1502.20). A revised Notice of Intent was published in the *Federal Register* on October 3, 2016. This Tier 1 EIS process will be followed by detailed project-level (Tier 2) environmental reviews by ADOT for specific alternatives, incorporating and referencing the decisions and analyses conducted as part of this Tier 1 review.

Purpose and Need

This section describes the purpose of and need for the proposed action—a new north-to-south transportation corridor in Pinal County. The purpose and need is discussed in detail in this Tier 1 DEIS in Chapter 1, *Purpose and Need*.

Purpose of the Proposed Action

Addressing anticipated transportation capacity deficiencies would enhance overall transportation network mobility by avoiding anticipated congestion on I-10 and regionally significant routes that would be operational by 2040. The addition of a continuous, unfragmented north-to-south transportation facility in the study area would facilitate regional mobility. A north-to-south transportation corridor would improve connectivity between Phoenix, southeastern Maricopa County, Pinal County, and Tucson.

The 2040 population of Pinal County is estimated at approximately 800,000, about twice the 2015 population of 406,468. Existing regional transportation facilities cannot accommodate the projected travel demand resulting from this growth. ADOT's Statewide Transportation Planning Framework Program showed that when Pinal County reaches full development build-out, I-10 would be heavily congested, creating substantial delays on local arterial streets, county roads, and state highways for interstate and intrastate travelers between Phoenix and Tucson.

To address transportation needs in the study area, the purpose of this proposed action is to provide a continuous, access-controlled north-to-south transportation corridor that would:

- Enhance the transportation network to accommodate existing and future populations – Consistent with state, regional, and municipal planning initiatives, the new corridor would accommodate anticipated growth in the study area and across the larger region.

- Improve access to future activity centers – The new corridor would benefit the study area's new activity and population centers and undeveloped lands identified for conversion that are in various stages of the local or regional planning processes.
- Improve regional mobility – The new corridor would provide additional roadway capacity ahead of full development build-out to avoid congestion associated with anticipated growth.
- Provide an alternative to avoid congestion on I-10 – The new corridor would provide an unfragmented alternative to I-10 to reduce traffic delays at full development build-out.
- Improve north-to-south connectivity – The new corridor would connect eastern portions of the Phoenix metropolitan area with Pinal County and destinations to the south, including Tucson.
- Integrate the region's transportation network – The new corridor would provide a critical link, currently missing, in the transportation network to provide regional connectivity.

Eliminating the study area's anticipated north-to-south transportation capacity deficiencies is essential to: (1) establish and expand efficient transportation networks to facilitate mobility both within the study area and across the larger region and (2) efficiently connect with and alleviate congestion on the region's two existing major freeways (US 60 and I-10). The transportation system would not function efficiently without the linkages provided by continuous, unfragmented north-to-south transportation capacity in the study area. Without addressing the north-to-south capacity deficiencies and improving regional mobility, the integrity and efficiencies of other transportation improvements identified in the Statewide Transportation Planning Framework Program and other studies would be compromised, congestion would worsen, and increased travel times would affect residents, employees, and visitors alike.

Need for the Proposed Action

Adding north-to-south transportation capacity in the study area would facilitate the connection between US 60 and I-10. The current connection is a fragmented assortment of rural roads with missing linkages throughout. While this fragmentation of north-to-south routes does not cause substantial congestion now, anticipated future land use patterns coupled with population and employment projections indicate that the urbanized areas of Phoenix and Tucson could develop into a megapolitan area with over 8 million people by 2050 (Arizona Department of Administration 2015a). As a result of the lack of continuous north-to-south roadway connections in the study area and the anticipated growth and travel demand that will accompany growth, the following study area characteristics and transportation deficiencies drive the need for a continuous north-to-south transportation facility between US 60 and I-10:

Insufficient infrastructure to accommodate projected population and employment growth and to support local, regional, and statewide planning efforts. As shown in Table S-2, population in Pinal County is expected to nearly double (an increase of 97 percent), and employment is expected to increase by a factor of 2.8 (an increase of 178 percent) by 2040. Local governments and Central Arizona Governments (the regional planning agency) anticipate stress on the local transportation network's capacity, and local land use and transportation plans all call for a major north-to-south transportation facility in the study area to accommodate anticipated growth. An improved and expanded north-to-south transportation system is needed to provide the transportation infrastructure shown in statewide, regional, and local planning documents.

Table S-2. Population and employment in Maricopa, Pinal, and Pima Counties, 2015–2040

Geographical area[a]	2015	2040	Percentage change
Population			
Maricopa County	4,076,438	6,031,000	47.9
Pinal County	406,468	800,700	97.0
Pima County	1,009,371	1,276,700	26.5
Employment			
Maricopa County	1,923,012	2,863,967	48.9
Pinal County	68,364	189,682	177.5
Pima County	465,594	495,569	6.4

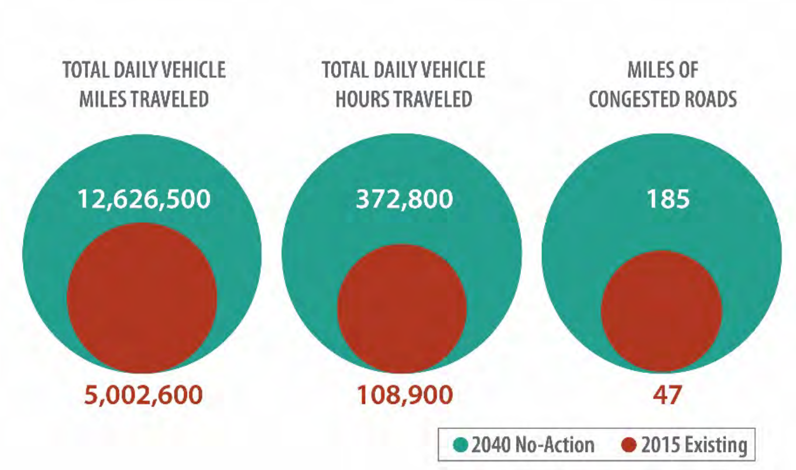
Sources: Arizona Department of Administration (2015a), Arizona Department of Transportation (2018)
[a] includes all of Maricopa, Pinal, and Pima Counties

Inadequate roadway capacity to meet future demand. Population and employment growth in Maricopa, Pima, and Pinal Counties will place additional demand on the existing fragmented and discontinuous transportation network in Pinal County and will result in a lack of adequate, continuous, north-to-south transportation capacity in southeastern Maricopa County and Pinal County. Lack of capacity will translate into congestion and increased travel times, which would only worsen with continued growth, contributing to long user delays. In the study area, the existing roadway network cannot meet future demand and capacity challenges of high-volume, long-distance through trips for moving both people and freight.

Figure S-2 illustrates the projected increase in vehicle miles traveled (VMT) and vehicle hours traveled (VHT) in the study area by 2040.[1] An integrated, multimodal transportation system requires additional unfragmented, north-to-south capacity in the study area to accommodate these future needs. Without additional capacity, delays and congestion would hamper the efficiency of existing and planned roadway networks.

[1] VMT is the total number of vehicle miles traveled within a specific geographic area (typically the study area) over a given period of time. VHT is the total vehicle hours spent traveling on the roadway network in a specified area (also typically the study area) during a given time period.

Figure S-2. Existing and 2040 traffic projections



Source: second-generation Arizona statewide travel demand model (AZTDM2), 2016, existing and 2040 No-Action model information

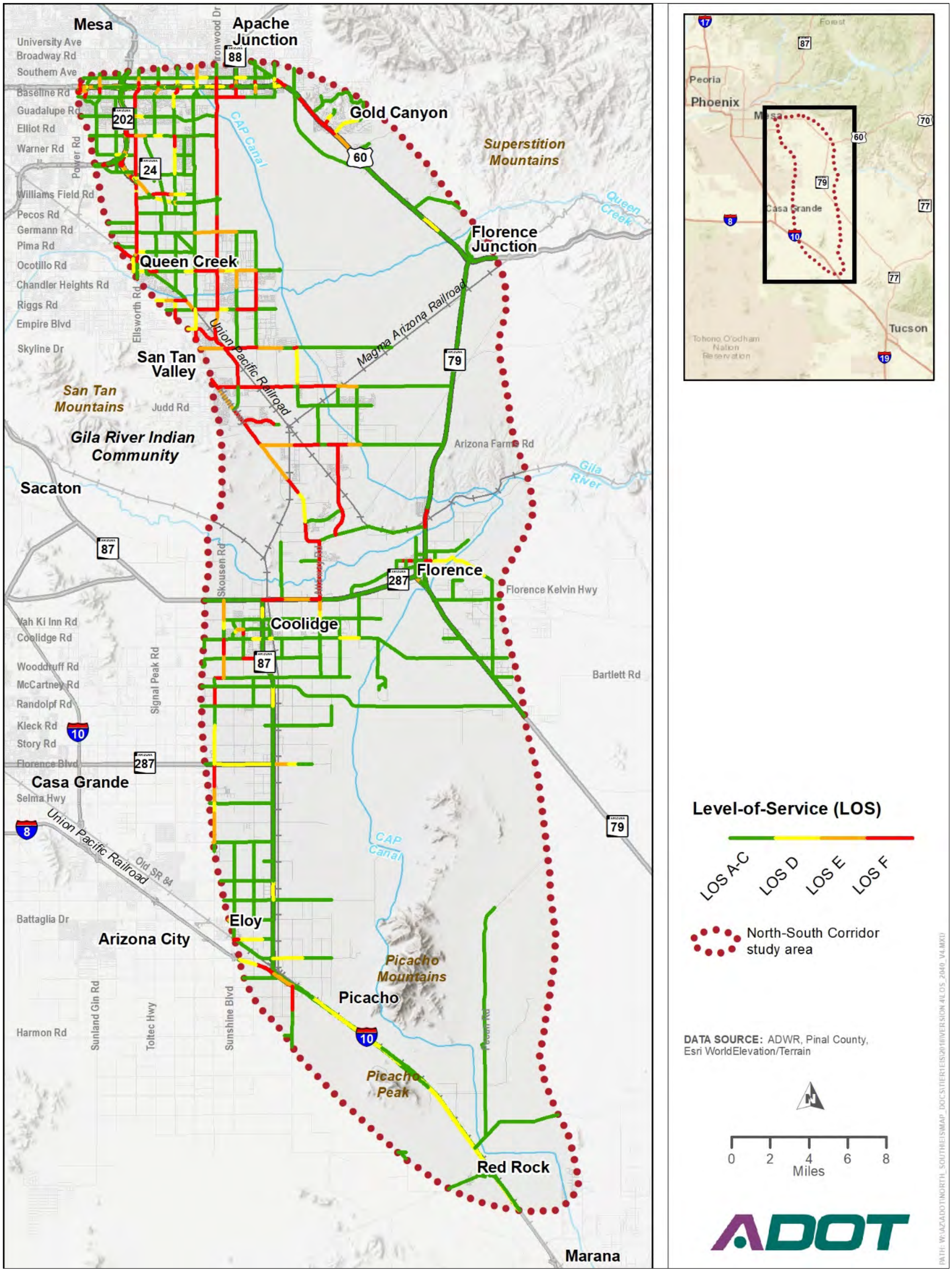
Lack of transportation system connectivity and need to enhance system linkages. A continuous north-to-south transportation corridor would provide a critical missing link in the southeastern Maricopa County and Pinal County transportation system. Currently, travelers heading north from the Tucson area on westbound I-10 who wish to reach areas east of central Phoenix while continuing to travel on a high-capacity roadway must go through central Phoenix to access SR 202L or through southern Phoenix to access US 60. SR 79 provides access along the eastern edge of the study area north of Florence. South of Florence, SR 79 travels southeast toward Oracle Junction, where it ends at its junction with SR 77, approximately 25 miles north of Tucson. SR 79 is not a high-capacity route, and operates as a local route through Florence with numerous access points and businesses along the route.

A continuous north-to-south facility would help integrate the study area's surface transportation network. System continuity and connectivity would be critical in improving the effectiveness of individual network segments, the use of transit, and congestion management strategies (such as operational improvements addressing intersection upgrades, access management, traffic signal improvements, and intelligent transportation systems—the use of technology to improve traffic flow). Providing direct system linkage within the existing fragmented system would reduce costs associated with hundreds of thousands of trips that would take place over future years and decades.

Providing connectivity and more direct trips in the study area would reduce VHT, which would, in turn, reduce energy use and costs. A continuous north-to-south corridor could potentially reduce energy consumption by as much as 6 million gallons per year in the region. Moreover, according to the U.S. Department of Transportation, in 2016 the national average value of travel time savings for auto drivers and truck drivers was $13.60 and $27.20 per hour, respectively; therefore, substantial reductions in travel time can result in substantial savings for the average driver.

Limited alternatives to avoid congestion on I-10. I-10 provides the primary connection between Phoenix and Tucson. Today, portions of I-10 in the study area and across the larger region regularly experience highly congested travel. There are no alternative routes through this area of Pinal County that provide a direct route. Traffic diverted from I-10 because of congestion or closure must mix with local traffic on rural state highways through the area, contributing to local traffic. By 2040, the study area will have 185 miles of congested roadways (Figure S-3).

Figure S-3. Study area forecast conditions (2040) level of service



Source: second-generation Arizona statewide travel demand model (AZTDM2), 2017

Without unfragmented, north-to-south transportation alternatives to I-10, congestion is anticipated to worsen with the study area's projected growth. It is anticipated that during the peak evening travel period, I-10 would operate at a failing level of service (LOS)[2] by 2040 (LOS is described in detail in this Tier 1 DEIS in Section 1.4.4, *Existing and Forecast Travel Demand*). A continuous north-to-south transportation corridor connecting southeastern Maricopa County—by way of US 60, SR 202L, and SR 24—with I-10 would provide the necessary congestion relief to enhance mobility on I-10.

The 2040 traffic analysis results show that the key corridors will experience, on average, nearly 200 percent more traffic than in 2015. With the added traffic, performance is estimated to degrade on many of these facilities, including SR 79 north of Hunt Highway. Overall, approximately 43 percent of local roadways in the study area would operate at LOS E or F in 2040 under the No-Action condition. Additional traffic analysis information for the proposed action is in Appendix B, *Traffic Information*.

Other Desired Outcomes of the Proposed Action

In addition to meeting the NSCS purpose and need, the proposed action is expected to integrate into the social, economic, and environmental fabric of the study area over the next 20 years. Other desired outcomes in addition to the transportation benefits achieved by the proposed action include:

- Protecting and enhancing the natural environment along the Corridor:
  - alignments developed in Tier 2 studies that allow for continued wildlife movement
  - limited disruption of sensitive wildlife habitat areas to reduce the possibility for growth-inducing impacts
- Supporting local and regional land use plans and preservation goals:
  - alternatives developed in the Tier 1 study that considered regional and local adopted plans
  - alignments developed in Tier 2 studies that allow for the protection of identified open space, agricultural, or other undeveloped land
  - alternatives developed in the Tier 1 study that avoided identified culturally sensitive properties
  - avoidance of culturally sensitive properties during Tier 2 studies to the extent feasible and practicable
- Supporting equitable economic opportunities:
  - provide access to employment, educational, and civic centers and institutions within the study area and the larger Phoenix metropolitan area
  - accommodation of right-of-way (where appropriate and feasible) for intercity passenger rail serving the local population and greater region, including the Tucson and Phoenix metropolitan areas
- Complementing other planned transportation improvements along new and established corridors in the study area:
  - maximization of efficiency of Corridor mobility through coordination with other ongoing and planned projects
  - alignments developed in Tier 2 studies that integrate with the most current transportation and land use planning to respond to growth and not induce growth

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[2] LOS is a qualitative measure used to describe traffic conditions. It is measured on a scale ranging from A to F, with LOS A representing the best performance and LOS F indicating the worst.

Other Major Actions in the Study Area

Within the study area, several other transportation improvement projects along key corridors are planned within the 2040 time frame of the proposed action:

- SR 287 – widened to four lanes continuously, from SR 79 to western study area boundary
- Hunt Highway – widened to six lanes continuously, from SR 79 to western study area boundary
- I-10 – widened to six lanes throughout study area limits
- US 60 – widened to eight lanes west of Ironwood Drive and to six lanes east of Ironwood Drive

Alternatives Considered

Eight full-length action corridor alternatives (and options) are studied in detail in this Tier 1 DEIS. The study area is divided into four segments that incorporate transition areas to allow the action corridor alternatives to shift east to west or west to east and to facilitate the evaluation of proposed action-related impacts.

The following sections describe the early alternatives documented in the 2014 ASR and the action corridor alternatives discussed in this Tier 1 DEIS.

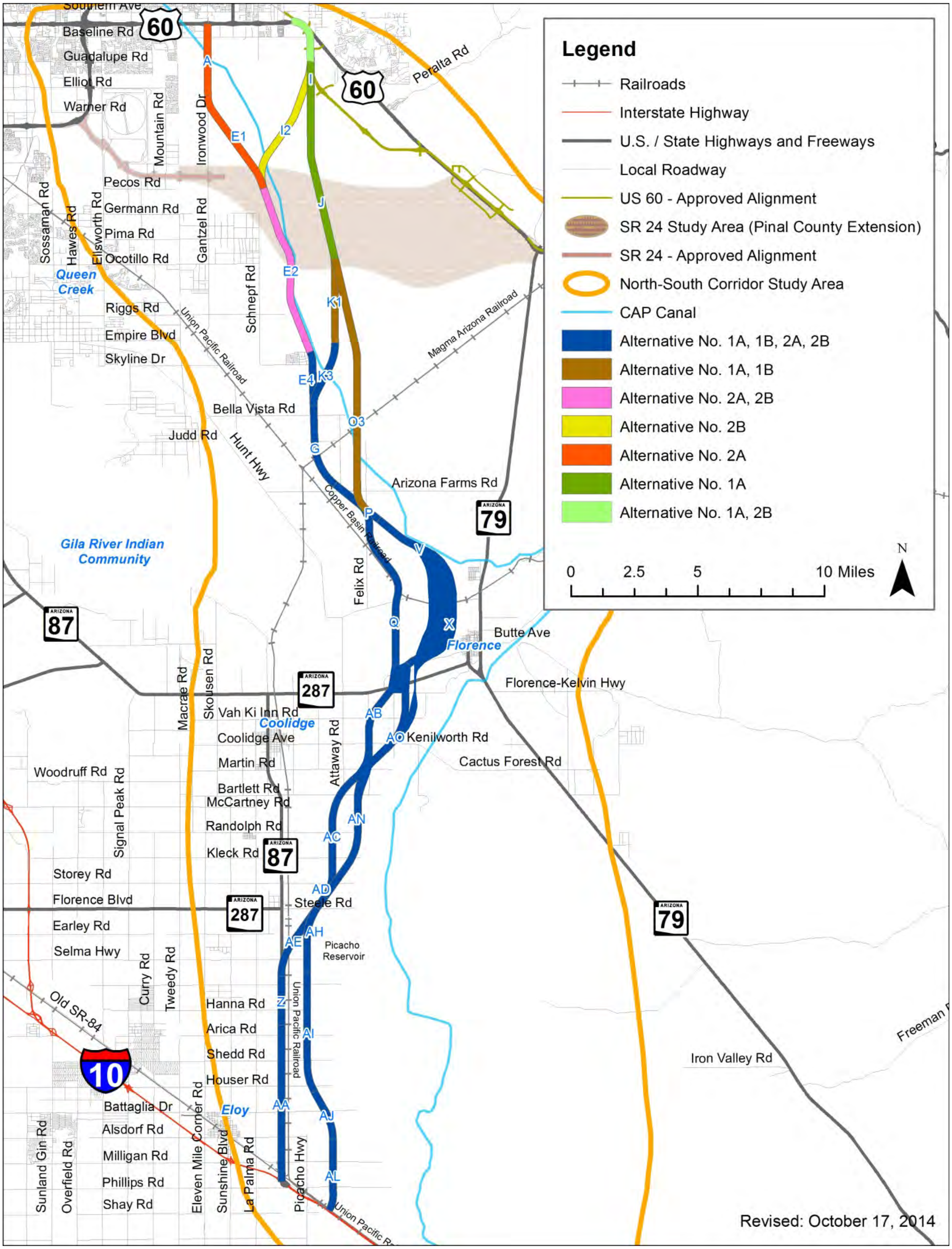
Alternatives Selection Report

The initial alternatives development and screening process produced 1,500-foot-wide route alternatives recommended to be carried forward into a project-level DEIS for detailed analysis. Described in detail in the ASR (ADOT 2014a), the process:

- incorporated analyses of all reasonable alternatives
- supported the iterative nature of the NEPA process
- provided a record of the investigation and selection process
- determined optimal route alternatives (as constrained by the proposed action’s purpose and need, agency and public input, and environmental, engineering, social, and economic data)

Figure S-4 shows the route alternatives that were recommended for evaluation in the project-level DEIS.

Figure S-4. Recommended route alternatives (map from the 2014 *Alternatives Selection Report*)



Source: Arizona Department of Transportation (2014a)

Modifications to Alternatives Identified in the Alternatives Selection Report

After publication of the ASR in October 2014, the alternatives recommended for further study were refined and additional options were studied. Major changes to the process and/or alternatives are described here. Additional refinements are described in this Tier 1 DEIS in Chapter 2, *Alternatives*.

Corridor Route Alternative Options and Refinements

ADOT's *Williams Gateway Corridor Definition Study* (2006), which recommended the implementation of the North-South Corridor, also recommended that the proposed SR 802 (now known as SR 24) in Maricopa County be extended to the east into Pinal County and connect with US 60 or SR 79. In 2015, the Maricopa Association of Governments prepared the *SR-24 Williams Gateway Freeway, Ellsworth Road – Ironwood Road Interim Phase II Feasibility Study*. The study recommended an interim second phase of construction for SR 24 between Ellsworth Road and Ironwood Drive. This extension sets the footprint of SR 24 just east of Ironwood Drive. As a result, ADOT recommended that the SR 24 study be incorporated into the NSCS, and that the route be evaluated east to the North-South Freeway, but not all the way to US 60 or SR 79—that potential extension could be evaluated at a future date.

The study team developed four alternatives to connect the two Eastern and two Western Alternatives to the planned extension of SR 24 east of Ironwood Drive.

Conversion to a Tier 1 Draft Environmental Impact Statement

To obtain NEPA approval for a project-level EIS, the study would need to follow federal guidelines dated February 9, 2011 (Supplement to January 28, 2008, "Transportation Planning Requirements and their Relationship to NEPA Process Completion"). According to the guidelines, funding sources for the proposed action would need to be identified before ADOT could sign the final project-level EIS Record of Decision (ROD). To continue and complete the study as a federally approved NEPA action, as a result of fiscal constraint, the study transitioned to a Tier 1 EIS from the initial project-level EIS.

Western Alternative at Gila River Crossing

FHWA challenged the study team to develop a route that provided a viable Western Alternative for consideration that avoided impacts on known cultural resource sites at the Gila River crossing. To do so, the study team returned to the ASR to consider whether any of the 56 original route alternatives might be reevaluated. Routes east of and including SR 79 were not considered for two reasons: (1) they were not contemplated as part of the ASR, and (2) routes that far to the east would not effectively address the purpose and need of improving regional mobility and connectivity.

A western alignment was developed near the previously eliminated ASR alignments "C" and "D," which connected Ironwood Drive in the northern portion of the study area with the SR 87 alignment in the southern portion of the study area (see Figure 2.2-1 in Chapter 2, *Alternatives*). These westernmost alignments in the ASR were not advanced from the ASR primarily because of low ratings from the public and local agencies.

At its northern end, the new Western Alternative branches off the ASR alignments near Arizona Farms Road. The route avoids existing development north of Hunt Highway, crossing the route at close to a right angle before shifting to the south to avoid a Union Pacific Railroad crossing. South of Hunt Highway, the new corridor generally trends north-to-south for much of its length, avoiding impacts on environmentally sensitive resources along its course. South of the Gila River and SR 287, the alternative shifts approximately 0.5 mile to the east to minimize impacts on existing development before rejoining the ASR alignments at the McCartney Road alignment.

Alternatives Evaluated in this Tier 1 Draft Environmental Impact Statement

The following sections describe the No-Action Alternative—which provides a baseline against which to consider impacts of the proposed action—and the action corridor alternatives.

No-Action Alternative

The No-Action Alternative would entail not implementing the proposed action (no new freeway would be built). It is important to note that the No-Action Alternative would also produce environmental impacts, resulting from doing nothing to address the purpose and need for building a major new transportation facility in the study area. Discussing the No-Action Alternative in an EIS is important because it serves as a benchmark that decision makers can use to compare the magnitude of environmental effects and transportation changes of the action corridor alternatives. Other transportation projects that have been programmed in the applicable regional transportation plan would be constructed. In addition, major land use changes anticipated to occur by the horizon year are included in the No-Action Alternative.

Action Corridor Alternatives

After several refinements to the ASR alignments, including the consideration of environmentally sensitive resources, the 1,500-foot-wide action corridor alternatives recommended for evaluation in this Tier 1 DEIS were identified. Figure S-5 shows the action corridor alternatives, separated into four segments that partition the study area. Table S-3 lists the action corridor alternatives, as shown in Figure S-5.

Table S-3. Action corridor alternatives, by segment

Segment	Eastern Alternative	Western Alternative
1	E1a Alternative E1b Alternative	W1a Alternative W1b Alternative
2	E2a Alternative E2b Alternative	W2a Alternative W2b Alternative
3	E3a Alternative E3b Alternative E3c Alternative E3d Alternative	W3 Alternative
4	E4 Alternative	W4 Alternative

When considered as connected corridors that run the length of the study area, the 1,500-foot-wide action corridor alternatives include a Western Alternative (shown in orange on Figure S-5), an Eastern Alternative (shown in purple on Figure S-5), and combinations of both to avoid and minimize environmental impacts. The action corridor alternatives in Segments 1, 2, and 3 include options (shown in paler colors of orange and purple relating to the Western and Eastern Alternatives, respectively, on Figure S-5). In total, there are eight full-length action corridor alternatives with options that result in a total of 40 possible continuous through-routes that are evaluated in this Tier 1 DEIS.

Figure S-5. Tier 1 action corridor alternatives, by segment

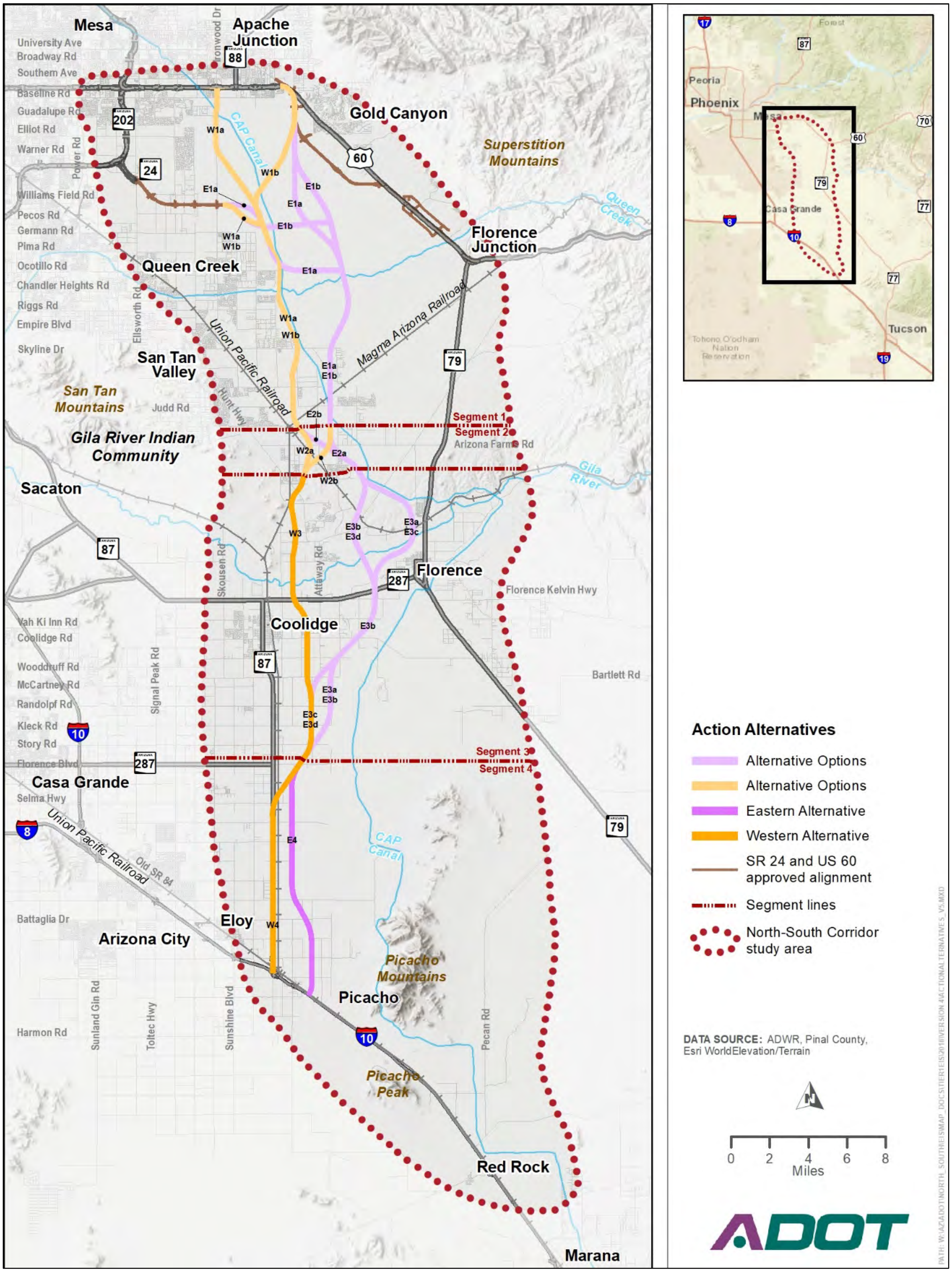


Table S-4 presents the action corridor alternatives, with options, that combine to create the eight full-length action corridor alternatives (Alternatives 1 through 8).

Table S-4. Full-length action corridor alternatives

Alt.	Option 1	Option 2	Option 3	Option 4
1	W1a, W2a, W3, W4	W1b, W2a, W3, W4	—[a]	—
2	W1a, E2b, E3a or E3c, W4	W1b, E2b, E3a or E3c, W4	W1a, E2b, E3b or E3d, W4	W1b, E2b, E3b or E3d, W4
3	W1a, E2b, E3a or E3c, E4	W1b, E2b, E3a or E3c, E4	W1a, E2b, E3b or E3d, E4	W1b, E2b, E3b or E3d, E4
4	W1a, W2a, W3, E4	W1b, W2a, W3, E4	—	—
5	E1a, W2b, W3, W4	E1b, W2b, W3, W4	—	—
6	E1a, E2a, E3a or E3c, W4	E1b, E2a, E3a or E3c, W4	E1a, E2a, E3b or E3d, W4	E1b, E2a, E3b or E3d, W4
7	E1a, E2a, E3a or E3c, E4	E1b, E2a, E3a or E3c, E4	E1a, E2a, E3b or E3d, E4	E1b, E2a, E3b or E3d, E4
8	E1a, W2b, W3, E4	E1b, W2b, W3, E4	—	—

[a] not applicable

Environmental Impacts

At the Tier 1 EIS level—with the location of a project-level Tier 2 EIS alignment and footprint unknown—the environmental impact assessment was largely qualitative. Therefore, a risk-assessment approach was used to determine the likelihood of adverse impacts associated with the 1,500-foot-wide action corridor alternatives.

In general, a five-level scale was used to evaluate the action corridor alternatives, depending on the resource and the type of impact under consideration, as described below:

1. High degree of benefit to or no risk of impacts; resource is not present in the Corridor
2. Some benefit to or minimal risk of impacts; resource may be present but impacts are not likely
3. No effect or low risk of impacts; resource may be present but impacts likely avoided
4. Some adverse impact or moderate risk of impacts; resource present and impacts may occur
5. Substantial adverse impact or high risk of impacts; resource present and impacts are likely unavoidable

The alternatives evaluation also considered recreational and historic resources protected under Section 4(f) of the Department of Transportation Act of 1966. The risk of use based on the location of known Section 4(f) properties is identified in this Tier 1-level evaluation. Preliminary Section 4(f) determinations, however, were not made because permanent incorporation, temporary occupancy, or constructive uses cannot be identified without a specific project footprint. Moreover, several historic properties would need to be evaluated for listing in the National Register of Historic Places during the consultation process required by Section 106 of the National Historic Preservation Act, and the result of that evaluation would determine whether they are Section 4(f) properties. Since no preliminary Section 4(f) determinations were made for this Tier 1 DEIS, Section 4(f) impacts were not considered in the elimination of alternatives, but the risk of such impacts was noted.

No-Action Alternative

As a baseline for comparison, consistent with NEPA requirements, the study team defined and evaluated a No-Action Alternative that includes all reasonably foreseeable transportation and development projects in the study area.

The No-Action Alternative would not result in impacts that would be associated with any of the action corridor alternatives, as discussed in this Tier 1 DEIS in Chapter 3, *Affected Environment and Environmental Consequences*. However, the No-Action Alternative would not meet the purpose and need. Between 2015 and 2040, the daily total VMT in the study area would increase from 5 million to 12.6 million, and the daily total VHT would increase from approximately 110,000 to over 370,000. These increases would result in more miles of congested roadways in the study area, from 47 miles in 2015 to 185 miles in 2040. Without the proposed action, numerous regionally significant routes in the study area would operate at an unacceptable LOS, with many routes operating at LOS F. Moreover, the absence of the proposed action would limit circulation and access in the study area as land uses are converted from undeveloped and low-density agriculture and a rural development pattern to higher-density residential neighborhoods, commercial centers with new job opportunities, and additional community and public facilities to serve the new neighborhoods.

The No-Action Alternative would not meet the proposed action's purpose and need because it:

- would not provide the necessary transportation mobility, circulation, and access needs to accommodate the projected population and employment growth in the study area;
- would not support local, regional, and statewide planning efforts;
- would not address the lack of transportation system connectivity and the need to enhance system linkages; and
- would not provide an alternative to avoid congestion on I-10.

Action Corridor Alternatives

The results of the analyses of the action corridor alternatives are presented in this Tier 1 DEIS in Chapter 3, *Affected Environment and Environmental Consequences,* and in Chapter 4, *Indirect and Cumulative Impacts*. Additional detail is provided in the evaluation matrix included in the *Corridor Selection Report, North-South Corridor Study* (in Appendix C, *Alternatives Screening*).

The following sections summarize the environmental impacts that would result from the action corridor alternatives, by segment, for the following areas: transportation and traffic operations, land use planning, and the human, built, and natural environments. Input from stakeholders is also discussed.

Focusing on the five-level scale discussed previously helped the study team determine to what degree each action corridor alternative would meet the proposed action's purpose and need, as described in this Tier 1 DEIS in Chapter 1, *Purpose and Need*.

This discussion focuses on resource areas where the action corridor alternatives would have differing impacts. Some resources—such as air quality—would experience equal impacts under all the action corridor alternatives. For more information regarding the resource areas analyzed in this Tier 1 DEIS, refer to Chapter 3, *Affected Environment and Environmental Consequences*, which covers the topics listed in Table S-5.

Table S-5. Resource areas discussed in Chapter 3

Section	Topic	Section	Topic
3.1	Chapter overview	3.11	Biological resources
3.2	Land use	3.12	Hydrology, floodplains, and water resources
3.3	Social conditions	3.13	Waters of the United States
3.4	Economics	3.14	Cultural resources
3.5	Parkland and recreational facilities	3.15	Hazardous materials
3.6	Prime and unique farmland	3.16	Energy
3.7	Air quality	3.17	Environmental justice and Title VI
3.8	Noise	3.18	Temporary construction impacts
3.9	Visual resources	3.19	Section 4(f) and Section 6(f) resources
3.10	Topography, geology, and soils		

With regard to recreational and historic resources protected under Section 4(f) of the Department of Transportation Act of 1966, this Tier 1 DEIS discusses such resources in Section 3.19, *Section 4(f) and Section 6(f) Resources*. The discussion provides sufficient data to inform an assessment of the risk of the action corridor alternatives potentially affecting Section 4(f) resources. Data collected through the planning process, including information in cultural resource reports prepared for the study for review and concurrence by the State Historic Preservation Office for compliance with Section 106 of the National Historic Preservation Act, have informed the development and refinement of action corridor alternatives in this Tier 1 DEIS phase.

Segment 1

Four action corridor alternatives (E1a, E1b, W1a, and W1b) are under consideration in Segment 1, and a summary of how the alternatives perform in comparison with each other is presented below.

Transportation and Traffic Operations

As modeled, average weekday traffic volumes would be greatest with the W1a Alternative, and less with the eastern connection with US 60 (that is, with E1a, E1b, and W1b). While each of the action corridor alternatives would have a positive effect by reducing regional traffic congestion, the W1a Alternative would result in the greatest reduction in regional congestion, followed by W1b and E1a/E1b (no discernable difference exists between E1a and E1b). The W1a Alternative would require constructing collector and distributor roads to carry local traffic on Ironwood Drive, resulting in a wider freeway footprint to maintain freeway, local road, and traffic interchange operations. This would create a substantial barrier to east-to-west traffic through the area. The E1a, E1b, and W1b Alternatives would necessitate the development of Elliot Road to facilitate local access to the facility (currently, no plans exist to extend Elliot Road east of the CAP Canal), adding to the cost of these alternatives.

Excluding the SR 24 connection, the E1a, E1b, W1a, and W1b Alternatives are similar in length (19, 18.7, 18.8, and 19.1 miles, respectively). The SR 24 connections vary substantially between alternatives, with the W1a and W1b Alternatives being the shortest (at 2.35 and 2.36 miles, respectively), followed by the E1b Alternative at 5.93 miles, and the E1a Alternative being the longest at 8 miles. Shorter alternatives provide faster travel times for through Corridor drivers. It is worth noting that the number of through-trips for the Corridor represents a relatively small percentage of all trips.

Land Use Planning

Segment 1 jurisdictions' general plans are supportive of a North-South Freeway facility, which is referenced without identifying a preferred alternative.

All action corridor alternatives would be compatible with future land uses because they all cross areas planned for residential or business land uses. Of the alternatives, the W1a Alternative provides access to the largest existing and anticipated population, employment, and activity centers. Most land east of the CAP Canal is owned by the Arizona State Land Department (ASLD), which has developed conceptual plans for this area, known as Superstition Vistas. Projections for the area are not reflected in the 2040 planning horizon as documented in the State Demographer's projections; however, the *Superstition Vistas Conceptual Plan* notes that anywhere from 250,000 to 1 million people may live there in the future. The E1a, W1a, and W1b Alternatives risk affecting access to and use of the Rittenhouse Army Heliport (an active military training facility).

Human Environment

The W1a Alternative would have the greatest potential impact on residential properties. The W1b Alternative would avoid many of the potential W1a Alternative residential impacts at US 60; however, it would have the same potential impacts on single-family homes as the E1a and E1b Alternatives at the US 60 juncture, with additional potential impacts south of the SR 24 connection. The E1a and E1b Alternatives would have the fewest potential residential impacts. A Tier 2 alignment, developed to avoid impacts to the extent possible, would affect fewer properties. A system traffic interchange at Ironwood Drive with the W1a Alternative would likely require the acquisition of nonresidential property as well, whereas the connection with the E1a, E1b, and W1b Alternatives east of Goldfield Road may have less of a potential impact on nonresidential properties.

Regarding social conditions, the E1a, E1b, and W1b Alternatives have the potential to affect substantially fewer community facilities than the W1a Alternative. However, the E1a, W1a, and W1b Alternatives risk affecting access to and use of the Rittenhouse Army Heliport, while the E1b Alternative would not. The E1a and E1b Alternatives would have little effect on identified low-income and minority populations. The W1a and W1b Alternatives both would result in potential disproportionately high and adverse effects on minority and low-income populations. The E1a and E1b Alternatives would result in a moderate risk of impacts on farmland, while the W1a and W1b Alternatives would result in a high risk of farmland impacts.

Built Environment

In Segment 1, all of the action corridor alternatives would have a high risk of impacts on existing or planned parks and recreational facilities. The E1a, E1b, and W1b Alternatives would affect the planned expansion area of Silly Mountain Park; however, the actual impacts of a Tier 2 alignment may avoid impacts on the park since planning documents for the park identify a future transportation facility through the park (see Section 3.5, *Parkland and Recreational Facilities*). The W1a Alternative would affect a golf course at the system traffic interchange with US 60, and trails that cross the alternative. All the action corridor alternatives have a moderate risk of impacts on trails; however, potential impacts may be avoided or minimized during Tier 2 studies. Therefore, in Segment 1, the E1a, E1b, and W1b Alternatives are preferred over the W1a Alternative.

The W1a Alternative would result in a high risk of noise impacts based on existing land uses; a low risk of noise impacts is associated with the E1a, E1b, and W1b Alternatives.

Regarding cultural resources, the W1a and W1b Alternatives would result in a high risk of impacts on archaeological sites and no risk of impacts on historical districts, buildings, or structures. The E1a and E1b Alternatives would result in a minimal risk of impacts on known archaeological sites and no risk of impacts on historical districts, buildings, or structures.

Natural Environment

The W1a and W1b Alternatives have a high risk of land subsidence or earth fissure impacts, while the E1a and E1b Alternatives have a moderate risk of these impacts. Regarding biological resources, the E1a and E1b Alternatives would affect wildlife slightly more than the W1a and W1b Alternatives (moderate versus low risk, respectively); however, a moderate risk of impacts on wildlife habitat is associated with all alternatives. The E1b and W1b Alternatives would cross flood control structures, resulting in potential impacts on mesquite/shrub habitat that is not unique and that could be mitigated. Therefore, between the E1a and E1b Alternatives, virtually no difference exists in potential adverse impacts on biological resources. The E1b and W1b Alternatives would result in moderate risks of impacts on conservation and wildlife management land, while the other two alternatives would present no risk to these resources. All the alternatives have a high risk of impacts on protected native plants and would result in a high number of ephemeral drainage crossings. The E1b and W1a Alternatives would have a moderate risk of floodplain encroachment, and the E1a and W1b Alternatives would have a low risk. Finally, the W1a and W1b Alternatives would result in a moderate risk of groundwater impacts, while the E1a and E1b Alternatives would have no groundwater impact risk.

Stakeholder Input

During a series of meetings held in May 2017, the Four Southern Tribes (Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation) preferred the No-Action Alternative; however, if an action corridor alternative were selected, their preference among the alternatives was also identified. In Segment 1, the Four Southern Tribes preferred the E1a Alternative.

Additional input was solicited from the public and the cooperating and participating agencies as part of the public outreach conducted in November and December of 2017. Of the 10 agencies that submitted preferences in Segment 1, 6 identified the W1a Alternative as preferred, 3 identified the E1b Alternative as preferred, and 1 identified the W1b Alternative as preferred. The public input provided no consensus regarding the Segment 1 alternatives, with the greatest preference for the W1a Alternative (40 positive comments), followed closely by E1b (39 positive comments). Opposition was greatest for the W1b Alternative (42 negative comments), followed by W1a (35 negative comments).

Segment 2

Four action corridor alternatives (E2a, E2b, W2a, and W2b) are under consideration in Segment 2, and a summary of how the alternatives perform in comparison with each other is presented below.

Transportation and Traffic Operations

The alternatives in Segment 2 primarily serve as connectors between the Eastern and Western Alternatives, with the E2a and E2b Alternatives providing the eastern connections to Segment 3 and the W2a and W2b Alternatives providing the western connections to Segment 3. The W2a Alternative, at 2.6 miles, is the shortest alternative. The E2b Alternative is the longest alternative, at 3.7 miles.

Land Use Planning

The Town of Florence *2020 General Plan* future land use map identifies the Town's preferred alternative for the proposed action in Segment 2 as the E2a Alternative; this was later reaffirmed in the Town of Florence Resolution 1490-14 (December 2014, see Appendix A, *Agency Coordination*).

In Segment 2, the alternatives are close to each other, with few variations in existing land uses within 2 miles. The E2b Alternative is closest to the most employment centers. None of the alternatives is close to many homes or activity centers. All the alternatives would affect planned and conceptual development plans in Segment 2, although the E2a and W2a Alternatives would minimize such impacts by following a more north-to-south alignment through the area as opposed to the E2b and W2b Alternatives, which cross east-to-west through the area.

Human Environment

In Segment 2, the risk of impacts on community facilities is low because no community facilities would be affected; however, the action corridor alternatives may affect populations with minority concentrations (note that the census geographies do not allow differentiation of the alternatives in Segment 2). No homes or businesses are at risk of displacement in Segment 2. A moderate risk of farmland impacts is associated with all the alternatives.

Built Environment

The W2a and W2b Alternatives would result in a moderate risk of impacts on existing or planned parks and trails because they cross the proposed Copper Basin Railroad Trail and may trigger Section 4(f) impacts, whereas the E2a and E2b Alternatives would result in a low risk to these facilities. No noise impacts on sensitive receptors are associated with any of the Segment 2 alternatives. Because no known cultural resources would be affected in Segment 2, the risk of impacts is low.

Natural Environment

All alternatives in Segment 2 would have a minimal risk of land subsidence or earth fissure impacts. All alternatives have a low risk of impacts on wildlife and wildlife habitat, a minimal risk of impacts on protected native plants, a minimal number of ephemeral drainage crossings, and no risk of floodplain encroachment.

Stakeholder Input

Of the six agencies that submitted preferences in Segment 2, the E2a Alternative was preferred by three, the W2a Alternative was preferred by two, and the E2b Alternative was preferred by one. In Segment 2, the Four Southern Tribes preferred the W2b Alternative. The public input provided no consensus regarding the Segment 2 alternatives, with the E2a Alternative receiving the most support (12 positive comments) and the most opposition (7 negative comments).

Segment 3

Five action corridor alternatives (E3a, E3b, E3c, E3d, and W3) are under consideration in Segment 3, and a summary of how the alternatives perform in comparison with each other is presented below.

Transportation and Traffic Operations

As modeled, average weekday traffic volumes with the action corridor alternatives in Segment 3 are greatest with the W3 Alternative and less with the E3a, E3b, E3c, and E3d Alternatives. While any of the alternatives would reduce regional congestion, the W3 Alternative would result in the greatest reduction, followed by, in order, the E3b, E3d, E3a, and E3c Alternatives. The W3 Alternative is the shortest (15 miles), while the Eastern Alternatives range from nearly 10 percent longer (E3b and E3d) to 23 percent longer (E3a and E3c), resulting in longer travel times for through Corridor drivers (when evaluating the Corridor length, it is worth noting that the number of through-trips for the Corridor is estimated to be a small percentage of all trips along the Corridor).

Land Use Planning

The City of Coolidge *General Plan* identifies the E3a or E3b Alternative (with modifications) as the City's preferred alternative. The Town of Florence *2020 General Plan* identifies the E3a Alternative (with modifications) as the Town's preferred alternative. Land use planning in the area is most consistent with the E3a Alternative, which is generally consistent with the Town of Florence's *2020 General Plan*. The Town has worked with landowners in the area to plan around a conceptual corridor, and the Town Council has passed a resolution supporting the E3a Alternative (December 2014, see Appendix A, *Agency Coordination*).

The W3 Alternative is closest to the biggest existing population and a high number of activity centers within 2 miles. Given their proximity to Florence, the E3a and E3c Alternatives are closest to a substantially high number of existing activity centers, and the E3c Alternative captures the most existing employment in the segment. The City of Coolidge has submitted agency stakeholder comments opposing the W3 Alternative, which is described as inconsistent with the City's adopted general plan and development plans that are planned throughout the alternative. While all alternatives cross areas planned for residential growth, the E3a, E3b, E3c, and E3d Alternatives would provide the most direct access to large planned commercial and industrial centers in the study area.

Human Environment

In Segment 3, the E3c and E3d Alternatives would perform best with regard to social conditions—with either benefits to or no effects on community facilities and minority and low-income populations. The E3a and E3c Alternatives would enhance access to community facilities in Florence for areas to the north and for other neighboring communities, whereas no community facilities would be affected by or benefit directly from the E3b or E3d Alternatives. The W3 Alternative would reduce access to an existing community church and would result in the greatest potential adverse impacts on minority and low-income populations. The E3a and E3b Alternatives have the potential to affect the greatest number of homes in Segment 3, whereas the E3c Alternative, E3d Alternative, and the W3 Alternative have a lower risk of impacts on residences.

Each of the Segment 3 alternatives would affect active or anticipated sand and gravel mining operations near the Gila River, with the E3b and E3d Alternatives also affecting the western end of the Florence Copper mine. All alternatives have a high risk of impacts on farmland.

Built Environment

In Segment 3, the Eastern Alternatives would have a moderate risk of impacts on existing and planned parks and recreational facilities, and the Western Alternative would have a higher risk of impacts on these facilities. The W3 Alternative would likely affect a portion of the Pinal County Existing Multiuse Trail Corridor that runs adjacent to the Pima Lateral Canal in Coolidge. Therefore, in Segment 3, the Eastern Alternatives are preferred over the W3 Alternative with regard to parks and recreational resources.

The E3a and E3b Alternatives would have a moderate risk of noise impacts, whereas the E3c, E3d, and W3 Alternatives would have a low risk of noise impacts.

All alternatives in Segment 3 have a moderate risk of impacts on archaeological resources, while the W3 Alternative would have a low risk of impacts on known historic districts, buildings, or structures. The Southern Pacific Railroad Wellton-Phoenix-Eloy Line intersects the W3 Alternative. The Southern Pacific Railroad Mesa-Winkelman Line intersects the E3a, E3b, E3c, and E3d Alternatives. The North Side Canal intersects the E3a, E3b, E3c, and E3d Alternatives. The Pima Lateral Canal intersects the E3a, E3b, E3c, E3d, and W3 Alternatives. The Kenilworth Elementary School, a historic property, extends 400 feet into the W3 Alternative.

Natural Environment

All alternatives in Segment 3 have a high risk of land subsidence or earth fissure impacts. Regarding biological resources, the impacts are mostly the same for all Segment 3 alternatives: a moderate risk of impacts on wildlife, wildlife habitat, and protected native plants, and no risk of impacts on conservation and wildlife management land. The E3a, E3c, E3d, and W3 Alternatives would result in a moderate number of ephemeral drainage crossings, whereas the E3b Alternative would result in a low number of crossings. The E3a and E3c Alternatives have a high risk of floodplain encroachment, while the E3b and E3d Alternatives have a moderate risk and the W3 Alternative has a low risk.

Stakeholder Input

Of the eight agencies that provided preferences in Segment 3, the E3a Alternative was preferred by four agencies, the E3b Alternative was preferred by three agencies, the W3 and E3c Alternatives were each supported by two agencies, and the E3d Alternative was preferred by one agency (note that several agencies identified multiple preferred alternatives in the same segment). In Segment 3, the Four Southern Tribes preferred the W3 Alternative. The public input on the Segment 3 alternatives resulted in the E3a Alternative receiving the most support (23 positive comments), followed by E3c (17 positive comments). Opposition was consistent across all Segment 3 alternatives (3 negative comments for each).

Segment 4

Two action corridor alternatives (E4 and W4) are under consideration in Segment 4, and a summary of how the alternatives perform in comparison with each other is presented below.

Transportation and Traffic Operations

As modeled, average weekday traffic volumes on the Segment 4 alternatives are greatest with the W4 Alternative, the difference being a function of whether the Corridor is east or west in Segment 1 (the W1a Alternative would generate the most traffic in Segment 4, while the E1a and E1b Alternatives would generate the least traffic in Segment 4). The W4 Alternative is 11.7 miles long, while the E4 Alternative is 12.8 miles long. Where the W4 Alternative is coincident with SR 87, access would need to be provided to properties along the route.

Land Use Planning

The City of Coolidge has identified a preferred alternative in its *2025 General Plan* that is similar to the E4 Alternative. The Eloy *2010 General Plan Update* Circulation Element map shows the City’s preferred alternative as the W4 Alternative.

In Segment 4, both alternatives are within 2 miles of moderate population and employment; however, the W4 Alternative is near more activity centers because it is closer to the developed parts of Eloy. The City of Coolidge anticipates the development of the Inland Port Arizona and Pinal Logistics Park east of SR 87 in its incorporated area.

Human Environment

Both Segment 4 alternatives would potentially adversely affect community facilities, but the W4 Alternative would also potentially adversely affect minority and low-income populations. The W4 Alternative would have a moderate risk of both residential and business displacements. The E4 Alternative would have a low risk of residential and business displacements. Both alternatives have a high risk of farmland impacts.

Built Environment

In Segment 4, both alternatives would have a moderate risk of impacts on existing and planned parks and recreational facilities. The W4 Alternative would have a moderate risk of noise impacts, whereas the E4 Alternative would have a minimal risk of noise impacts. Both alternatives would have a moderate risk of impacts on archaeological resources. However, the W4 Alternative would have a moderate risk of impacts on known historic districts, buildings, or structures, while the E4 Alternative would have no risk. The Southern Pacific Railroad Main Line Sunset Route intersects the E4 and W4 Alternatives. The Southern Pacific Railroad Wellton-Phoenix-Eloy Line intersects the W4 Alternative. The Casa Grande Canal intersects the E4 and W4 Alternatives. The Florence-Casa Grande Canal Extension intersects the E4 and W4 Alternatives. The El Paso Natural Gas Pipeline No. 1007 intersects the E4 and W4 Alternatives.

Natural Environment

Both alternatives in Segment 4 would have a high risk of land subsidence or earth fissure impacts. The biological conditions are about the same, with both alternatives having a low risk of impacts on wildlife, wildlife habitat, conservation and wildlife management land, and protected plant species. Also, both Segment 4 alternatives would have a minimal number of ephemeral drainage crossings. The E4 Alternative would have a moderate risk of floodplain encroachment, while the W4 Alternative would have no risk of floodplain encroachment.

Stakeholder Input

Of the five agencies that provided preferences in Segment 4, the E4 Alternative was preferred by three agencies and the W4 Alternative was preferred by two agencies. The Four Southern Tribes did not identify a preferred alternative in Segment 4. In Segment 4, the greatest public preference and opposition was registered for the W4 Alternative (12 positive comments and 2 negative comments), compared with the E4 Alternative, which received 7 positive comments and 1 negative comment.

Evaluation of Alternatives

Overall, only a few objections to the concept of the North-South Corridor have been stated by agencies, tribes, and the public. Among the agencies that participated in the outreach efforts, several did not favor one action corridor alternative over another; several favored one or more of the action corridor alternatives over the others; and one (Bureau of Reclamation) did not support any action corridor alternative in Segment 1. The Four Southern Tribes preferred that improvements be made to existing roads in the study area.

Public comments were related to concerns about property impacts, connectivity, and traffic congestion, among other issues. Approximately 37 percent of the public respondents offered general support for the roadway infrastructure improvements, and 34 percent expressed an interest for one or more alternatives. A smaller number (26 percent) voiced opposition to one or more of the alternatives.

Preferred Alternative

This section describes how the study team identified a preferred action corridor alternative in each segment, and how the alternatives from each segment combine to create the preferred corridor alternative.

The identification of a preferred alternative was based on how well each action corridor alternative met the proposed action’s purpose and need and to what degree other desirable outcomes would be achieved. To address transportation needs in the study area and the purpose of the proposed action (described in this Tier 1 DEIS in Section 1.5, *Purpose of the Proposed Action*), the preferred alternative should meet the following objectives:

- Enhance the transportation network to accommodate existing and future populations.
- Improve access to future activity centers.
- Improve regional mobility.

- Provide an alternative to avoid congestion on I-10.
- Improve north-to-south connectivity.
- Integrate the region’s transportation network.

These objectives address the need for a continuous, unfragmented north-to-south transportation facility in the study area to facilitate regional mobility, to improve access to a growing population and activity centers, and to improve connectivity between Phoenix, southeastern Maricopa County, Pinal County, and Tucson. However, the benefits of a new transportation facility must be balanced with potential impacts on the environment and other likely effects. Other desired outcomes of the proposed action to balance likely effects (described in this Tier 1 DEIS in Section 1.6, *Other Desired Outcomes of the Proposed Action*) are as follows:

- Protect and enhance the natural environment along the Corridor.
- Support local and regional land use plans and preservation goals.
- Support equitable economic opportunities.
- Complement other planned transportation improvements along new and established corridors in the study area.

Finally, the identification of a preferred alternative was informed by a qualitative “least environmentally damaging practicable alternative” (LEDPA) consistency analysis performed for each segment, with regard to potential impacts on waters of the United States (Waters). At the Tier 2 phase, if an individual permit is needed, the U.S. Army Corps of Engineers requires that the preferred alternative be the LEDPA, in accordance with Section 404(b)(1) of the Clean Water Act (33 United States Code § 1344). Based on the risks identified in this qualitative LEDPA consistency analysis, a preliminary LEDPA determination was made for each segment. Future Tier 2 studies will provide the quantitative analysis necessary to support a final LEDPA determination.

Identification of Action Corridor Alternatives in Each Segment

The following sections compare the action corridor alternatives in each segment to identify which is the preferred alternative based on how well it meets the proposed action’s objectives (purpose and need) and how it fared after the study team’s evaluation, as presented in this Tier 1 DEIS in Section 6.2, *Comparison of Alternatives*. Additional discussion regarding the degree to which each action corridor alternative achieves the other desirable outcomes is also included.

Segment 1

Each of the action corridor alternatives would reduce regional congestion, although the W1a Alternative performed better in modeling because it is close to population and employment centers. All the alternatives would meet the purpose and need to improve regional mobility and provide improved connectivity; however, the E1b Alternative would best improve access to future activity centers and ASLD’s planned development areas of Lost Dutchman Heights and Superstition Vistas.

In Segment 1, the E1b Alternative is the most compatible with land use planning in the area and would result in the lowest risk of impacts on the human environment. Considering the built environment in Segment 1, the E1a and E1b Alternatives would result in fewer impacts than the W1a and W1b Alternatives. Overall, the E1a Alternative would have the lowest potential for impacts on natural resources as a whole, considering all potential geological, hydrological, biological, and jurisdictional Waters impacts, although both the E1a and E1b Alternatives would result in a greater risk of impacts on wildlife.

In Segment 1, the risk of Section 4(f) impacts associated with the W1a and W1b Alternatives is greater than the risk of Section 4(f) impacts associated with the E1a and E1b Alternatives, which have either no impacts on Section 4(f) resources or impacts that may be avoided or minimized during Tier 2 studies.

In considering the other desirable outcomes of the proposed action, the W1a Alternative may better protect the natural environment, with mitigation, compared with the E1a, E1b, and W1b Alternatives. However, the E1a and E1b Alternatives better support regional land use plans and better complement other planned transportation improvements in the study area, with direct access to the US 60 bypass (also provided by the W1b Alternative) and the ability to expand the transportation network to the east as development occurs. All the alternatives support equitable economic opportunities with access to employment and activity centers.

Considering the proposed action's objectives, the analysis of potential impacts, the other desirable outcomes, and the preliminary LEDPA determination, the E1b Alternative is the preferred action corridor alternative in Segment 1.

Segment 2

In Segment 2, the E2a and E2b Alternatives would result in less risk of impacts on environmental resources than the W2a and W2b Alternatives; however, neither the E2a nor E2b Alternative would perform better than the other. As a result, the better-performing alternatives in Segments 1 and 3 and the preliminary LEDPA determination guided the selection of the E2a Alternative to connect the preferred action corridor alternatives in Segments 1 and 3.

Segment 3

Each of the action corridor alternatives in Segment 3 would reduce regional congestion; however, the W3 Alternative would perform better because it is close to population and activity centers, followed by the E3b and E3d Alternatives. All the alternatives would meet the proposed action's purpose and need to improve regional mobility, connectivity, and access to future activity centers.

The E3a Alternative is the most compatible with local land use planning, followed closely by the E3c Alternative. The E3b and E3d Alternatives would result in the least risk of impacts on the human environment, while the W3 Alternative would result in somewhat greater impacts. In addition, the risk of Section 4(f) impacts in Segment 3 with the W3 Alternative is higher than with any of the Eastern Alternatives. With regard to impacts on the built environment, each alternative would result in some impacts. Regarding the natural environment, the W3 Alternative would result in fewer impacts than the other alternatives. The adopted general plans of the local jurisdictions directly affected by the alternatives in Segment 3—the City of Coolidge and Town of Florence—support the E3a Alternative.

At the Tier 2 EIS phase, the U.S. Army Corps of Engineers requires that the preferred alternative be the LEDPA with regard to impacts on Waters, considering that the environmental impacts among all the alternatives is necessary. The E3b and E3d Alternatives would result in the fewest impacts on Waters, with a more direct crossing of the Gila River, and the E3b Alternative would have the fewest drainage crossings.

In considering the other desirable outcomes of the proposed action, all of the Segment 3 alternatives would result in comparable impacts on the natural environment. However, the Eastern Alternatives better support regional land use plans, with better access for planned developments and better support of equitable economic opportunities with access to employment and activity centers in Florence. The Eastern Alternatives complement other planned transportation improvements slightly better with the ability to expand the transportation network to the east as planned development occurs.

Considering the proposed action's objectives, the results of the analysis of potential impacts (including potential impacts on Waters), other desirable outcomes, and the preliminary LEDPA determination, the E3b Alternative is the preferred action corridor alternative in Segment 3.

Segment 4

Both alternatives in Segment 4 would meet the proposed action's purpose and need to improve regional mobility, connectivity, and access to future activity centers.

In Segment 4, the E4 Alternative would result in a lower risk of impacts on the human and built environments. Considering the natural environment, neither Segment 4 alternative outperforms the other across all performance measures. The risk of impacts on Section 4(f) properties is higher with the W4 Alternative than with the E4 Alternative.

In considering the other desirable outcomes of the proposed action, both alternatives would similarly protect the natural environment, support equitable economic opportunities, and complement other planned transportation improvements in the study area. However, the E4 Alternative would better support regional land use plans.

Considering the proposed action objectives, the results of the analysis of potential impacts showing the E4 Alternative resulting in fewer environmental impacts, other desirable outcomes, and the preliminary LEDPA determination, the E4 Alternative is the preferred action corridor alternative in Segment 4.

Identification of Full-length Action Corridor Alternatives

The preceding section provided a segment-by-segment evaluation of the action corridor alternatives, to facilitate an understanding of the environmental impacts of the action corridor alternatives at the segment level. Impacts of the eight full-length action corridor alternatives (and options) result from the combination of impacts described in the segment-by-segment evaluation.

For the eight full-length action corridor alternatives (and options), the following sections provide an end-to-end evaluation of transportation and traffic operations, land use planning, and the human, built, and natural environments. Stakeholder input is also described. The discussion compares the full-length action corridor alternatives to identify which is the preferred alternative based on how well it meets the proposed action's objectives (purpose and need) and how it fared after the study team's evaluation, as presented in Section 6.2, *Comparison of Alternatives*. Additional discussion regarding the degree to which each action corridor alternative achieves the other desirable outcomes is also included.

Transportation and Traffic Operations

All of the action corridor alternatives would meet the proposed action's purpose and need by improving transportation and traffic operations throughout the study area. The degree to which the action corridor alternatives address select evaluation criteria, however, varies by alternative. The quickest or most direct end-to-end route was a measured criterion; however, note that most trips in the Corridor are between destinations and are not through-trips. Access to activity centers, areas of existing and future population and employment, and regional connectivity were also considered when comparing the alternatives.

CORRIDOR LENGTH

A comparison of the action corridor alternatives' lengths is presented in this Tier 1 DEIS in Chapter 2, *Alternatives*. The full-length action corridor alternatives and their options result in a range of values. Because the Corridor is anticipated to operate at free-flow conditions (that is, LOS C or better), a shorter alternative results in a shorter travel time from one end of the Corridor to the other. Travel demand modeling of the alternatives shows that only a small number of trips are actually through-trips, with most trips originating in the study area. All of the action corridor alternatives (and options) would result in reduced travel time through the Corridor, relative to 2040 conditions with the No-Action Alternative. Alternative 1 (with W1a) would be the shortest through Corridor trip (48.1 miles north-to-south). Alternative 3 (with W1b, E2b, and E3c) would be the longest through Corridor trip (54 miles north-to-south)—approximately 12 percent longer than Alternative 1 (with W1a).

AVERAGE WEEKDAY TRAFFIC VOLUMES

Average weekday traffic volumes would vary substantially along the extent of each of the full-length action corridor alternatives. In general, the Western Alternatives would draw more traffic, given the closer proximity to existing populations in Queen Creek, Mesa, the San Tan Valley area, and Coolidge. The projected traffic volumes through the Corridor would decrease from north to south, so that in the southern end of the Corridor at I-10, the volumes would be one-tenth the volumes at the northern end. This information is further discussed in Appendix B, *Traffic Information*.

REGIONAL TRAFFIC CONGESTION

As discussed in Section 2.5, *Transportation Performance of the Alternatives*, all of the full-length action corridor alternatives would improve regional congestion throughout the study area compared with the No-Action Alternative. The amount of regional congestion relief varies by the action corridor alternative (and options). The No-Action Alternative would result in congested conditions for 46 percent of the VMT. Alternative 1 (with W1a) would result in the greatest reduction in congested conditions, with 33 percent of the VMT in congested conditions—a 28 percent reduction of VMT in congested conditions compared with the No-Action Alternative. Similar reductions in congested conditions would result with Alternatives 2, 3, and 4 and their options, with a range of 34 to 35 percent of the VMT in congested conditions. Alternatives 7 and 8 (with options) would result in 39 percent of VMT in congested conditions—still an improvement of 15 percent compared with the VMT in congested conditions with the No-Action Alternative.

Land Use Planning

With the exception of Coolidge and Florence, all of the municipal planning areas (MPAs) affected by the full-length action corridor alternatives are contained within one segment of the study area. Jurisdictions in the northern portion of the study area have not identified a preferred alternative.[3] The Town of Florence's *General Plan* is generally consistent with Alternatives 6 or 7 (with E3a) in Segment 3. The City of Coolidge's *General Plan* is generally consistent with Alternatives 3 or 7 (with E3a) in Segment 3. In the southern portion of the study area, the City of Eloy's *General Plan* is generally consistent with Alternatives 1, 2, 5, and 6.

Pinal County's *Comprehensive Plan* does not identify a preferred alternative; however, the plan recognizes the important role ASLD will play in development of the county as a result of Superstition Vistas, a 275-square-mile area entirely in Pinal County that is managed by ASLD on behalf of State Trust beneficiaries. At the northern end of Superstition Vistas is another large ASLD parcel, Lost Dutchman Heights, within the Apache Junction MPA. Alternatives 5 through 8 are generally consistent with the planning for the Lost Dutchman Heights area.

Human Environment

Impacts on the human environment for each of the end-to-end action corridor alternatives are discussed as a sum of the parts—meaning the segment-by-segment evaluation of environmental impacts.

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[3] Any additional input received by ADOT following the *Corridor Selection Report* and public review process in 2017 will be incorporated and considered following the public review of the DEIS and will be included in the Final EIS and ROD.

Alternative 7 would have the lowest risk of impacts on the human environment because it incorporates the Eastern Alternatives in Segments 1, 3, and 4, which have lower risks of impacts on the human environment. Alternative 1 would have the greatest risk of impacts on the human environment because of the inclusion of the Western Alternatives in Segments 1, 3, and 4.

Built Environment

As with impacts on the human environment, impacts on the built environment for each of the end-to-end action corridor alternatives are also discussed as a sum of the parts. Alternative 7 would have the lowest risk of impacts on the built environment because it incorporates the Eastern Alternatives in Segments 1, 3, and 4, which have lower risks of impacts on the built environment. Alternative 1 would have the greatest risk of impacts on the built environment because it includes the Western Alternatives in Segments 1, 3, and 4.

Natural Environment

For the natural environment, the types of impacts evaluated varied throughout the Corridor's length. Other than earth fissures, none of the impacts are clear differentiators among the alternatives. Earth fissures are present throughout the Corridor; however, Alternatives 5 to 8 would avoid the high risk of earth fissures posed by the alternatives that use the Western Alternative in Segment 1 (Alternatives 1 to 4). A high risk of floodplain encroachment exists with Alternatives 2, 3, 6, and 7 (with E3a and E3c); however, this risk is mitigated when these alternatives are combined with E3b or E3d.

Stakeholder Input

Public input did not provide a clear consensus regarding a full-length action corridor alternative preference. Cooperating and participating agencies were asked for their preferences as part of the public input process. The Four Southern Tribes identified their preferences during stakeholder outreach in May 2017. The jurisdictions provided responses consistent with their adopted land use plans, but in several instances provided additional information regarding their preferences, or stated preferences regarding alternatives outside of their MPAs (as summarized in Appendix C, *Alternatives Screening*, with the full comments of stakeholders in the appendix to the report). Table S-6 summarizes agency responses received as part of the outreach effort.

Table S-6. Cooperating and participating agency preferences for an action corridor alternative

Agency	Full-length action corridor alternative								Stated preferences
	1	2	3	4	5	6	7	8	
Arizona Game and Fish Department	X								W1a, W2a, W3, W4
Arizona State Land Department							X		E1b, E2a, E3b, E4
City of Apache Junction						X	X		E1b, E2a, E3a; no preference in Segment 4
City of Coolidge			X				X		No preference in Segments 1 and 2; E3a or E3b; E4
City of Eloy	X	X			X	X			No preference in Segments 1, 2, and 3; W4
City of Mesa	X	X	X	X					W1a; no preference in Segments 2, 3, and 4
Flood Control District of Maricopa County									—
Phoenix-Mesa Gateway Airport Authority	X	X	X	X					W1a or W1b; no preference in Segments 2, 3, and 4
Pinal County		X	X						W1b, E2b, E3a or E3c; no preference in Segment 4
Salt River Project						X	X		E1b, E2a, E3a or E3c; no preference in Segment 4
Town of Queen Creek	X	X	X	X					W1a; no preference in Segments 2, 3, and 4
Four Southern Tribes					X			X	E1b, W2b, W3; no preference in Segment 4[a]
U.S. Army Corps of Engineers									—
U.S. Bureau of Land Management									—
U.S. Bureau of Reclamation			X						W1a or W1b; E2a, E2b, or W2a; E3b, E3d, or W3; E4
U.S. Environmental Protection Agency	X								W1a, W2a, W3, W4

Notes: "X" indicated stated preference.

In instances where an agency commented, but did not provide a preference, the cell is left blank.

When preference in Segment 2 was left blank, connecting segment was noted where preferences in Segments 1 and 3 were stated.

Any additional input received by the Arizona Department of Transportation following the *Corridor Selection Report* and public review process in 2017 will be incorporated and considered following the public review of the Draft Environmental Impact Statement and will be included in the Final Environmental Impact Statement and Record of Decision.

[a] During a series of meetings in May 2017, the Four Southern Tribes noted that they preferred the No-Action Alternative; however, if an action corridor alternative is selected, their preference among the action corridor alternatives is noted. Refer to the *Corridor Selection Report, North-South Corridor Study* (in Appendix C, *Alternatives Screening*).

Preferred Corridor Alternative

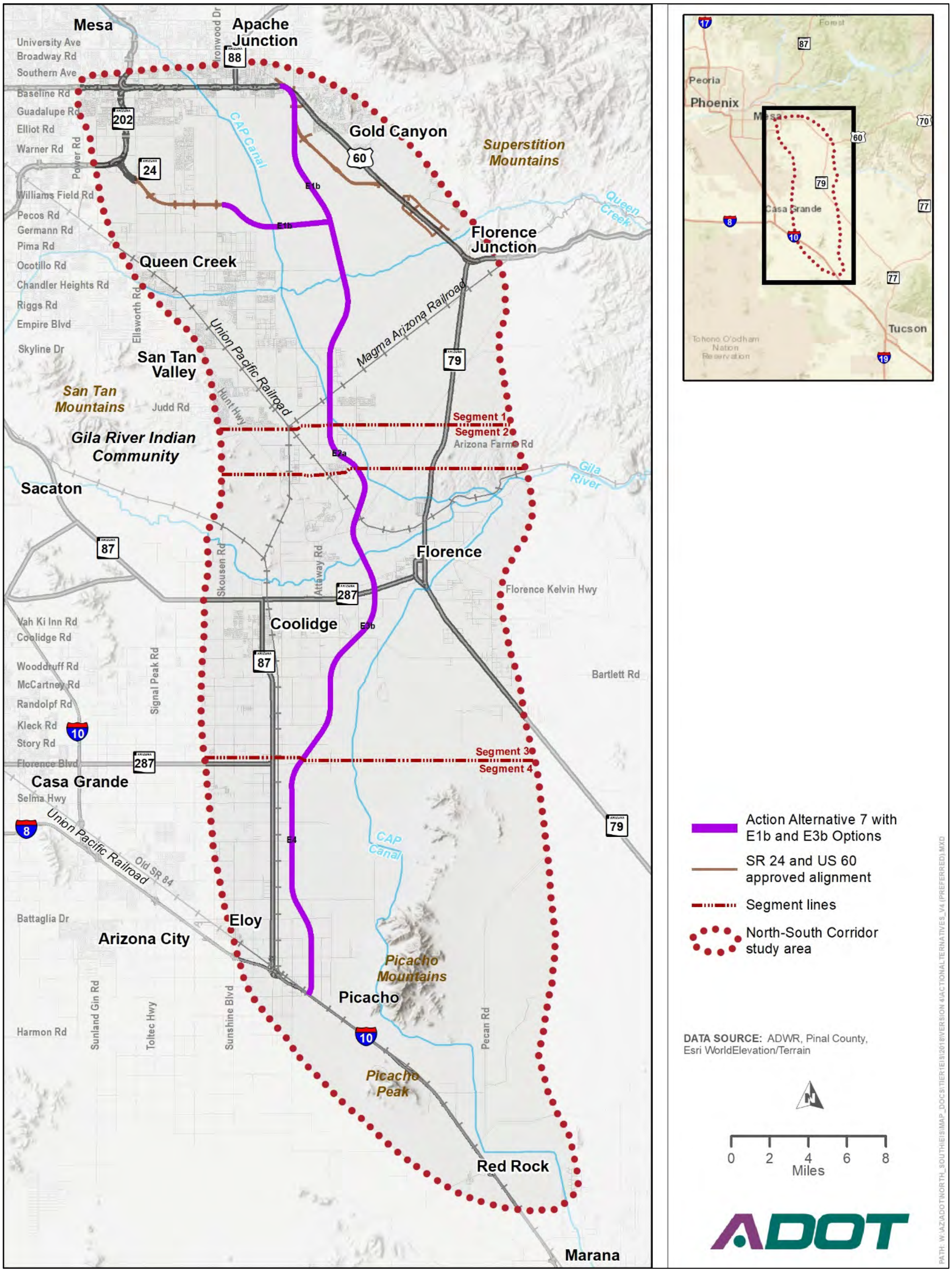
Based on the results of the analyses presented in this Tier 1 DEIS and summarized in Sections 6.2 (*Comparison of Alternatives*), 6.3.1 (*Identification of Action Corridor Alternatives in Each Segment*) by segment, and 6.3.2 (*Identification of Full-length Action Corridor Alternatives*) by full-length alternative, the following action corridor alternatives form the preferred corridor alternative:

- Segment 1 – E1b Alternative
- Segment 2 – E2a Alternative
- Segment 3 – E3b Alternative
- Segment 4 – E4 Alternative

This combination of action corridor alternatives creates Alternative 7, with the E1b and E3b options (as described in Section 2.3.2, *Full-length Action Corridor Alternatives*), and is recommended as the preferred corridor alternative (Figure S-6).

Alternative 7 best meets the proposed action's purpose and need while minimizing adverse effects on the human, built, and natural environments. During Tier 2 studies, when specific alignments are developed, evaluated, and advanced in the current 1,500-foot-wide preferred corridor, all efforts to avoid, minimize, or mitigate adverse impacts would be made.

Figure S-6. Preferred corridor: Alternative 7, with the E1b and E3b options



Coordination with Agencies, Stakeholders, and the Public

In accordance with requirements under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and the *North-South Corridor Study SAFETEA-LU Section 6002 Coordination Plan for Agency and Public Involvement* (ADOT 2017a), between 2010 and 2018, ADOT and FHWA held meetings with cooperating and participating agencies, study stakeholders, and members of the public. The outcome of these meetings indicated support by most attendees for the construction and operation of the proposed action.

ADOT has provided opportunities for agency and public involvement throughout the course of the study. Approximately 100 public stakeholder and 90 agency meetings were held between 2009 and 2018, and interested parties had opportunities to provide input through the study telephone hotline, website, email, traditional mail, and other means. Specific opportunities to provide input included:

- agency and public scoping meetings
- presentations at city council/local agency meetings
- presentations at industry association meetings
- individual agency and stakeholder coordination meetings
- feedback on newsletters
- public information workshops and meetings
- stakeholder agency progress meetings
- workshop and meetings with Native American tribes
- public comment period for action corridor alternatives

ADOT and the study team implemented an extensive public involvement program, meeting with numerous agencies, tribes, special interest groups, civic organizations, and businesses to discuss the study and to answer questions about the Corridor and the Tier 1 EIS environmental review process.

Throughout the study process, news releases, social media, newsletters, brochures, questionnaires, a study website, an online webmap (with features allowing people to make comments), and public meetings were used to disseminate information about the NSCS and to gather input from the public and other interested parties.

Next Steps

After ADOT publishes the Tier 1 DEIS and the public hearings and comment period are completed, ADOT will prepare a combined Tier 1 Final EIS (FEIS) and ROD, which will identify an action corridor alternative or the No-Action Alternative as the Selected Alternative. Should an action corridor alternative be selected and funding for further study become available, ADOT will then evaluate potential alignment configurations within the Selected Alternative in the Tier 2 NEPA process, continuing in its role as the lead agency under a Memorandum of Understanding for the Surface Transportation Project Delivery Program (23 United States Code § 327).

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1 Purpose and Need

The Arizona Department of Transportation (ADOT) is considering the construction and operation of a north-to-south transportation corridor in Pinal County, Arizona. If an action alternative is selected and constructed, the facility would improve connectivity and accessibility and introduce additional roadway capacity to support projected population and employment growth in Pinal County and across the larger region. The Federal Highway Administration (FHWA) participated as a joint lead agency in planning and preparing technical and environmental documents prior to the signing of a Memorandum of Understanding for the Surface Transportation Project Delivery Program (23 United States Code [USC] § 327).

1.1 Introduction

1.1.1 Tiered Environmental Review Process

The North-South Corridor Study (NSCS) Tier 1 Draft Environmental Impact Statement (DEIS, Project No. FHWA-AZ-EIS-19-02-D) has been prepared to evaluate the potential short-term and long-term impacts associated with proposed action corridor alternatives. These action corridor alternatives were developed based on input from the public; coordination with local, regional, state, and federal agencies and tribes; and findings from previous studies. The action corridor alternatives carried forward for detailed analysis in this Tier 1 DEIS best meet the purpose and need for the proposed action.

This Tier 1 DEIS, including the discussion of the proposed action's purpose and need, was prepared in accordance with:

- 42 USC § 4332 – National Environmental Policy Act (NEPA) of 1969, as amended
- 23 USC § 327 – Surface Transportation Project Delivery Program
- 23 Code of Federal Regulations (CFR) § 450.212 – Transportation Planning Studies and Project Development
- 23 CFR Part 771 – Environmental Impact and Related Procedures
- FHWA Technical Advisory T 6640.8A – Guidance for Preparing and Processing Environmental and Section 4(f) Documents (FHWA 1987)
- FHWA guidance – Elements of Purpose and Need (FHWA 2018)

Many federal agencies have adopted their own policies for implementing NEPA, all of which follow the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500 to 1508). FHWA, in coordination with the Federal Transit Administration, has also developed Environmental Impact and Related Procedures (23 CFR Part 771) to supplement the CEQ regulations. These regulations set forth all FHWA and U.S. Department of Transportation (USDOT) requirements under NEPA for the processing of highway and public transportation projects. As such, FHWA policy (23 CFR § 109) ensures:

> that possible adverse economic, social, and environmental effects relating to any proposed project on any Federal-aid system have been fully considered in developing such project, and that the final decisions on the project are made in the best overall public interest, taking into consideration the need for fast, safe and efficient transportation, public services, and the costs of eliminating or minimizing such adverse effects and the following: (1.) air, noise, and water pollution; (2.) destruction or disruption of man-made and natural resources, aesthetic values, community cohesion and the availability of public facilities and services; (3.) adverse employment effects, and

tax and property values losses; (4.) injurious displacement of people, businesses and farms; and (5.) disruption of desirable community and regional growth.

The above-mentioned policies and procedures establish the context for evaluating potential impacts that may be borne by individual resources as a result of a proposed action. In addition, numerous other statutory requirements must be considered when evaluating potential impacts on both the natural and human environments. Applicable laws and statutory requirements are described in greater detail for the resource topics to which they apply in Chapter 3, *Affected Environment and Environmental Consequences*.

This document is part of a "tiered" NEPA review in accordance with CEQ's NEPA regulations. The Tier 1 environmental review for the proposed action broadly assesses environmental impacts associated with the action corridor alternatives, followed by detailed project-level (Tier 2) environmental reviews by ADOT for specific alternatives that will incorporate and reference the decisions and analyses conducted as part of this Tier 1 review. This Tier 1 DEIS informs the public, agencies, and other stakeholders about the No-Action Alternative and action corridor alternatives being considered by ADOT, and their potential effects on human, built, and natural environmental resources. If an action corridor alternative is selected, this Tier 1 DEIS will identify a preferred corridor alternative to be carried forward for analysis in the Tier 1 Final Environmental Impact Statement (FEIS) and subsequent Tier 2 studies.

For the NSCS, the scoping period began with the publication of a Notice of Intent to complete a project-level environmental impact statement (EIS) in the *Federal Register* on September 20, 2010. Between October 2010 and early 2016, the NEPA EIS phase of the NSCS progressed with the development and evaluation of alternatives, as documented in the *Alternatives Selection Report* (ASR) in October 2014. Subsequent environmental technical analyses and conceptual design work supported a project-level DEIS. Throughout these efforts, ADOT and FHWA held regular meetings with cooperating agencies, participating agencies, tribes, and many key stakeholders. The agencies also conducted public meetings for the ASR and numerous individual stakeholder meetings as the study advanced. In 2016, ADOT and FHWA converted the project-level NEPA EIS process to a Tier 1-level EIS, in accordance with CEQ regulations codified at 40 CFR § 1502.20. A revised Notice of Intent was published in the *Federal Register* on October 3, 2016.

An overview of the contents of this Tier 1 DEIS is provided below:

- Summary – Summarizes the contents of this Tier 1 DEIS.
- Chapter 1, *Purpose and Need* – Introduces the reader to the study area and discusses the purpose of and need for the proposed action.
- Chapter 2, *Alternatives* – Describes the study area's transportation network, how the action corridor alternatives were developed, and how the alternatives would perform, from a traffic perspective.
- Chapter 3, *Affected Environment and Environmental Consequences* – Discusses the potential environmental impacts resulting from the action corridor alternatives.
- Chapter 4, *Indirect and Cumulative Impacts* – Describes potential indirect and cumulative effects resulting from the proposed action.
- Chapter 5, *Comments, Coordination, and Public Involvement* – Provides information about agency and stakeholder outreach and public involvement activities.
- Chapter 6, *Evaluation of Alternatives* – Identifies the Preferred Alternative.
- Chapter 7, *References* – Lists the documents referred to during preparation of this Tier 1 DEIS.
- Chapter 8, *Preparers* – Lists the individuals who prepared this Tier 1 DEIS.

- Appendix – Provides additional information regarding topics discussed in this Tier 1 DEIS, as follows:
  - Appendix A, *Agency Coordination*
  - Appendix B, *Traffic Information*
  - Appendix C, *Alternatives Screening*
  - Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*
  - Appendix E, *Social Conditions Information*
  - Appendix F, *Air Quality Information*
  - Appendix G, *Noise Information*
  - Appendix H, *Geotechnical Information*
  - Appendix I, *Biological Resources Information*
  - Appendix J, *Section 106 Consultation*
  - Appendix K, *Hazardous Materials Information*
  - Appendix L, *Utility Information*
  - Appendix M, *Public Involvement*
  - Appendix N, *Public Hearing*

1.1.2 Corridor Location and Study Area

The North-South Corridor (Corridor) study area is bounded on the north by U.S. Route 60 (US 60) and extends south for approximately 45 miles to Interstate 10 (I-10) (Figure 1.1-1). The Corridor's northern terminus is near Apache Junction on US 60, and the southern terminus is at I-10 between Marana and Eloy. Coolidge and Florence are in the central part of the study area. An extension of State Route (SR) 24 from its currently designed terminus at Ironwood Drive to the Corridor is incorporated into this study.

To facilitate the development of alternatives, an approximately 900-square-mile study area was delineated. The individual areas of analysis for the action corridor alternatives carried forward in this Tier 1 DEIS are generally much smaller than the study area; however, this area represents the location where the need for transportation improvements has been identified and where the greatest extent of potential impacts would be evaluated. The study area is generally bounded by US 60 on the north; I-10 on the south; roughly SR 202L, the Gila River Indian Community, and SR 87 on the west; and roughly SR 79 on the east. The study area is primarily located in Pinal County but also includes a small portion of southeastern Maricopa County. It includes incorporated cities and towns such as Apache Junction, Mesa, Queen Creek, Florence, Coolidge, and Eloy; portions of the Gila River Indian Community and the Tohono O'odham Nation; and unincorporated areas in Pinal and Maricopa Counties. Figure 1.1-2 shows the study area, the existing transportation network, and major points of interest.

1.1.3 Study Partners

The need for a north-to-south transportation corridor has been under consideration at the local, regional, and state level for more than 15 years. As a result of extensive dialogue between and among agencies and stakeholders regarding the feasibility of a new transportation facility, the NSCS EIS process was initiated—one of the earlier stages of project development and precursor to this Tier 1 DEIS. This began a formalized process to identify agencies and other stakeholders to be partners with ADOT throughout the decision-making process.

At the onset of the study in 2010, detailed coordination and public involvement plans were prepared. They identify how and to what extent coordination and outreach efforts would occur throughout the decision-making process. Letters were sent to a number of federal, state, and local agencies and other stakeholders notifying them of the intent of the NSCS ASR and subsequent project-level DEIS and requested their participation in the decision-making process. Since that time, the decision was made to complete a Tier 1 EIS, as discussed in Section 2.2.4, *Conversion to a Tier 1 Environmental Impact Statement*.

Figure 1.1-1. North-South Corridor regional location

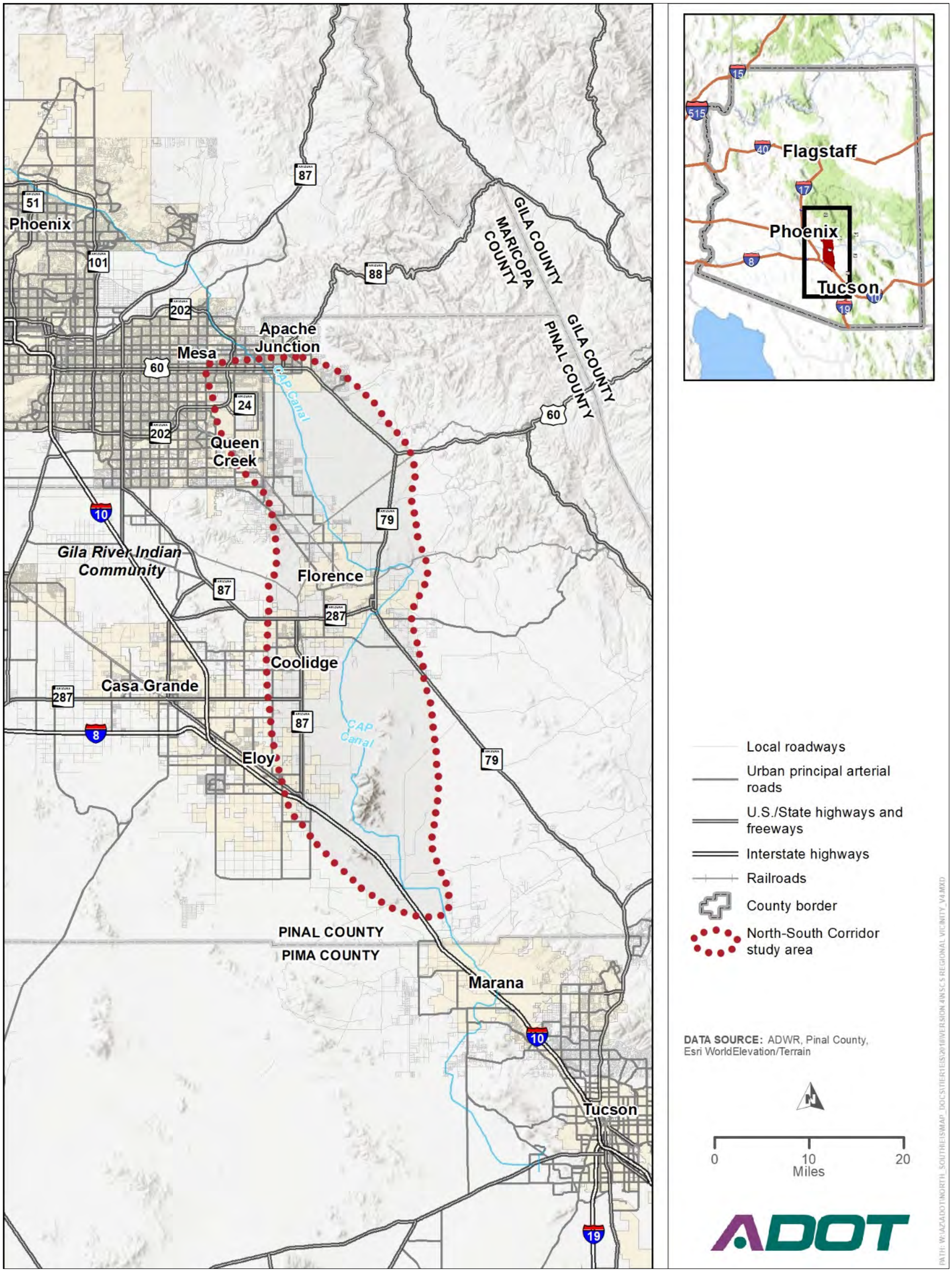
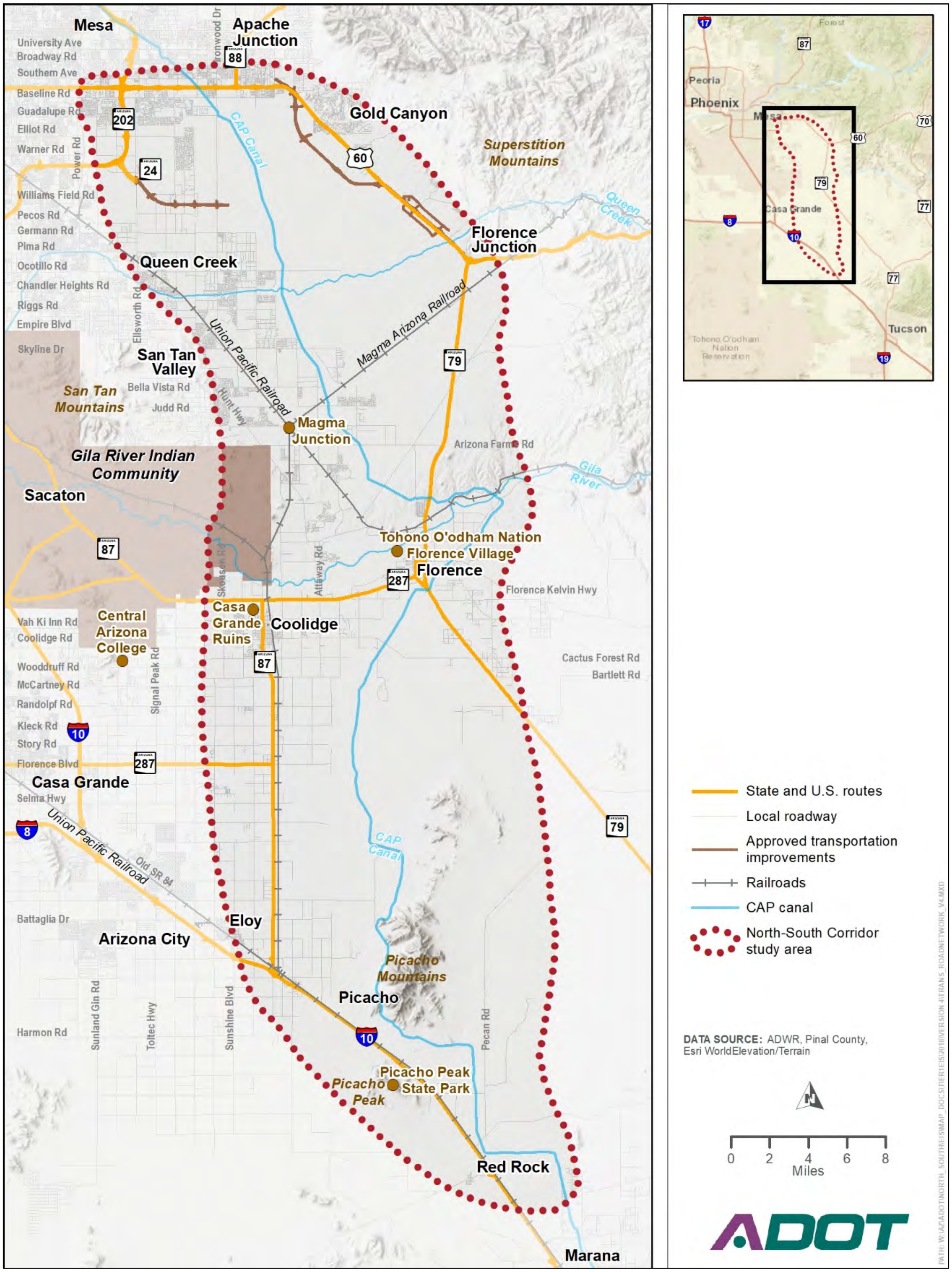


Figure 1.1-2. Study area and roadway network



The lead agency for the project is ADOT. Cooperating and participating agencies from the project-level EIS process were asked whether they wanted to participate in the Tier 1 EIS, and other agencies were added, as germane to the Tier 1 study and anticipated issues. These agencies that have elected to be part of the decision-making process for this study are identified by category in Table 1.1-1. All efforts to engage these agencies and other stakeholders in the decision-making process are documented in the *North-South Corridor Study SAFETEA-LU Section 6002 Coordination Plan for Agency and Public Involvement* (ADOT 2017a). Appendix A, *Agency Coordination*, documents correspondence with agencies during the NSCS process.

Table 1.1-1. Cooperating and participating agencies

Cooperating agencies	
Arizona Game and Fish Department	U.S. Bureau of Land Management
Federal Railroad Administration	U.S. Environmental Protection Agency
U.S. Army Corps of Engineers	U.S. Fish and Wildlife Service
U.S. Bureau of Indian Affairs – San Carlos Irrigation Project	Western Area Power Administration
Participating agencies	
Arizona Department of Public Safety	Maricopa County Department of Transportation
Arizona State Historic Preservation Office	National Park Service
Arizona State Land Department	Phoenix-Mesa Gateway Airport Authority
Arizona State Parks	Pinal County
Central Arizona Governments	Salt River Project
City of Apache Junction	San Carlos Apache Tribe
City of Casa Grande	Sun Corridor Metropolitan Planning Organization
City of Coolidge	Town of Florence
City of Eloy	U.S. Bureau of Indian Affairs – Western Regional Office
Flood Control District of Maricopa County	U.S. Bureau of Reclamation
Hopi Tribe	

Source: Arizona Department of Transportation (2017a), agency correspondence

Lead Agency. In accordance with 40 CFR § 1508.16, the lead agencies are those preparing or taking primary responsibility for preparing the EIS. For the NSCS, ADOT is acting as the lead agency and manages the Section 6002 process and the EIS preparation, provides opportunities for public and agency involvement, approves the environmental document (including this Tier 1 EIS, and NEPA clearance with Tier 2 studies), and provides funding. In addition, ADOT will maintain the constructed facility if an action alternative is selected. FHWA participated as a joint lead agency in planning and preparing technical and environmental documents prior to the signing of a Memorandum of Understanding for the Surface Transportation Project Delivery Program (23 USC § 327).

Cooperating Agencies. NEPA regulations [23 CFR § 771.111(d)] require that those federal agencies with jurisdiction by law (with permitting or land transfer authority) or with special expertise regarding any potential project-induced environmental impact be invited to serve as cooperating agencies for an EIS. By agreement with lead agencies, a state or local agency with similar qualifications or a Native American tribe with interest in the affected land may also become a cooperating agency. Agencies are required by law to acknowledge and accept or decline the invitation.

Participating Agencies. Participating agencies can include federal, state, tribal,[1] regional, and local governmental agencies with an interest in the proposed action. Federal agencies that decline the request to be a cooperating agency are designated as a participating agency unless formally documented otherwise. Nongovernmental organizations and private entities cannot serve as participating agencies.

Stakeholders. They include nongovernmental agencies, private entities, and members of the public.

1.2 Existing Transportation Network

This section discusses why additional capacity in Pinal County's transportation network is necessary. It provides an overview of regulatory requirements, existing transportation infrastructure, previous transportation studies, existing and future land use, population and employment projections, and existing and projected traffic volumes that—when examined together—support the purpose and need for the proposed action. An understanding of such factors also informs the decision-making process that will be used to identify a preferred alternative. Future conditions in 2040, when the proposed north-to-south transportation corridor would be operational, were evaluated. The purpose and need for the proposed action are based on public and stakeholder input regarding the transportation issues that should be addressed by the Corridor.

The study area's existing transportation network is fragmented and discontinuous, as is often the case in largely undeveloped areas. Figure 1.1-2 shows the study area's existing roadway network. Because no primary north-to-south transportation corridor currently exists, a traveler from Apache Junction to Eloy would have to use five different roadways to complete the trip. Existing roadways in the study area that have historically served a rural or arterial function have and will continue to experience increased traffic as land is converted from agriculture or undeveloped desert to residential and commercial uses.

1.2.1 Interstate and U.S. Highways

Primary freeways in or near the study area include I-10, Interstate 8, and US 60 (Figure 1.1-2). These freeways are located on the outer edges of the study area and provide connections to secondary roadways, including SR 87, SR 79, SR 287, and Hunt Highway.

I-10 is the primary vehicular corridor between Tucson and Phoenix. Congestion on I-10 in Tucson and Phoenix and between the two cities continues to increase, particularly during peak travel times. ADOT is widening I-10 between Casa Grande and Tucson; the work is scheduled for completion in the fall of 2019. ADOT is also widening I-10 through Picacho, including reconstructing the I-10/SR 87 traffic interchange and replacing bridges at the interchange underpass and over the Union Pacific Railroad (UPRR) on SR 87. The recently completed widening of I-10 between Picacho and Marana and the planned widening of I-10 between Interstate 8 and Picacho have been designed to alleviate some of the pressure on the existing network.

US 60 is an east-to-west roadway in the northern part of the study area. In the west, it connects with I-10. In the northwestern part of the study area, US 60 connects with SR 202L, and it continues east through Apache Junction where it turns southeast through Gold Canyon and connects with SR 79, which runs along the eastern edge of the study area.

1.2.2 State Highways

State highways carry most of the regional traffic in Pinal County. In the study area, these facilities include SR 24, SR 202L, SR 87, SR 287, and SR 79. Generally, these highways are one lane in each direction in rural areas, with some wider cross sections in urbanized areas such as Coolidge and Florence. SR 24,

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[1] Native American tribes invited by the study team to be participating agencies that have not responded continue to receive the same information and outreach as participating agencies.

which extends from SR 202L to Ellsworth Road in far eastern Maricopa County, is an urban freeway with two lanes in each direction. Plans are in place to extend the route 2 miles east into Pinal County.

In the study area, SR 87 runs east-to-west just north of downtown Coolidge. It connects with SR 287 in Coolidge and SR 79 in Florence. SR 287 continues south to Eloy while SR 79 runs north through Florence and connects with US 60 before it turns northwest toward Gold Canyon and Apache Junction.

1.2.3 Regionally Significant Routes

Regionally significant routes were identified in Pinal County's 2006 *Small Area Transportation Study* and were further evaluated in Pinal County's 2008 *Regionally Significant Routes Plan for Safety and Mobility Final Report*. The need for these routes stems from rapid residential and commercial development, increased congestion and associated safety concerns, and limited capacity of the existing Pinal County roadway network, which also lacks continuity and connectivity.

The vision for regionally significant routes is to: (1) provide continuity across Pinal County and through urban areas, and (2) connect to adjacent counties and state highways. These routes should provide a high level of safety and service through corridor management and access control. Routes will be planned, programmed, designed, and constructed in consideration of community and environmental values. Many of the primary arterial streets in the study area, which provide access to more densely populated areas, are designated regionally significant routes. Figure 1.2-1 shows the Pinal County Regionally Significant Routes network.

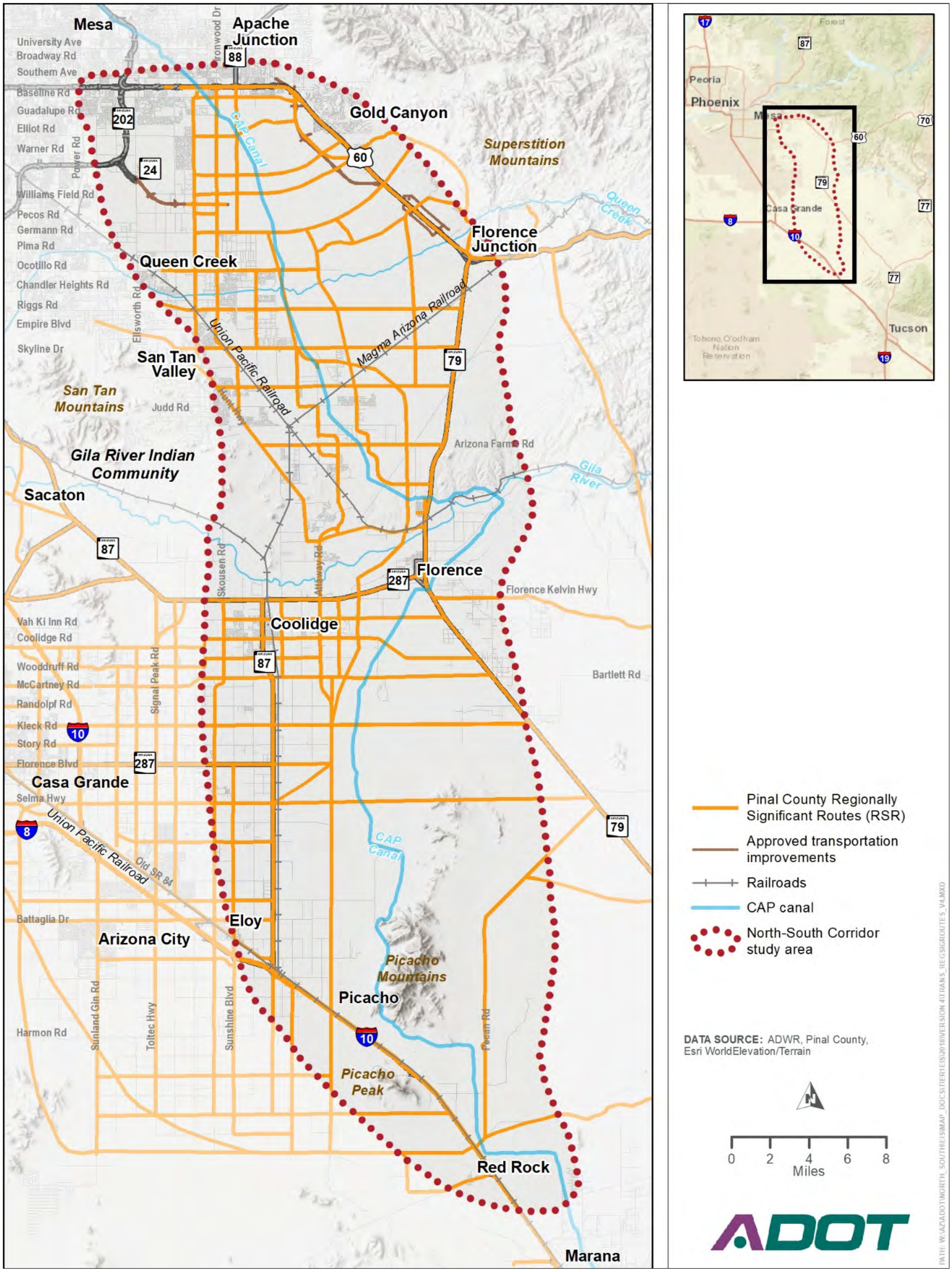
1.2.4 Transit

Public transit service in Pinal County is limited. No countywide services exist, and many of the available services are for the elderly and those with limited mobility. Current public transit options include the Central Arizona Regional Transit bus line that connects Florence, Coolidge, Central Arizona College, and Casa Grande and the Cotton Express Service, a shuttle bus in the Coolidge area. Both of these services are operated by the City of Coolidge Transit Department.

Pinal County's 2011 *Pinal County Transit Feasibility Study* determined that current countywide demand for transit service is low, yet may be feasible in some locations with greater density or transit-dependent populations. The study states that demand for transit service is likely to increase as the county's population and employment base continue to grow.

The ongoing Southeast Valley Transit Study, which was initiated by the Maricopa Association of Governments (MAG), will identify a series of short-term, mid-term, and long-term recommendations to promote a transit system that connects the communities of the Southeast Valley and provides linkages to the existing and planned regional transit network. Participating communities in the study area include Apache Junction, Queen Creek, Florence, and the surrounding unincorporated parts of Pinal County. The NSCS does not include a transit component, and any potential improved public transportation in the study area would be addressed separately.

Figure 1.2-1. Planned Regionally Significant Routes in Pinal County



1.2.5 Freight Rail

UPRR has rail lines carrying freight through the study area. In the study area, UPRR is currently double-tracking its transcontinental Sunset Route, which parallels I-10, and a second line that runs north from the Sunset Route along SR 87 into Coolidge, where it turns northwest toward Phoenix. UPRR is working with the Arizona State Land Department (ASLD) and appropriate government entities to construct a new classification rail yard in the southern end of the study area near Picacho Peak State Park (UPRR 2010). UPRR currently interchanges with three railroads on its Phoenix Subdivision: Copper Basin Railway at Magma Junction, the dormant Magma Arizona Railroad at Magma Junction, and BNSF Railway at Phoenix. A continuous north-to-south transportation facility between US 60 and I-10 as proposed would improve truck goods movement through the corridor. Freight rail was not identified as a present need; however, alternatives for consideration should not preclude freight goods movement.

1.2.6 Passenger Rail

Using UPRR rail tracks in the study area, Amtrak provides passenger rail service on its Sunset Limited route, which begins in Orlando, Florida, and ends in Los Angeles, California. Currently, it makes no stops in the study area—the closest stops are in Tucson and Maricopa (Amtrak 2016).

Together with local governments and planning organizations in Maricopa, Pinal, and Pima Counties, ADOT and the Federal Railroad Administration (FRA) have proposed a passenger rail line between Tucson and Phoenix, with several stops between the two termini. To support the planning effort, a Tier 1 FEIS has been completed (ADOT 2015a), and FRA signed the Record of Decision (ROD) in 2016. One of the routing options for the passenger rail selected route is concurrent with the North-South Corridor through much of the study area, between I-10 and the Magma Arizona Railroad. Figure 1.2-2 shows the relationship of the two passenger rail alternative routing options approved in the ROD. The rail passenger demand, primarily intercity travel to and from Phoenix or Tucson, would be accommodated with the proposed passenger rail service, and a north-to-south transportation facility proposed in the NSCS would not preclude any future expansion if necessary.

Figure 1.2-2. Passenger rail alternatives selected in the Record of Decision for the *Arizona Passenger Rail Corridor Study* Tier 1 Final Environmental Impact Statement (2016)

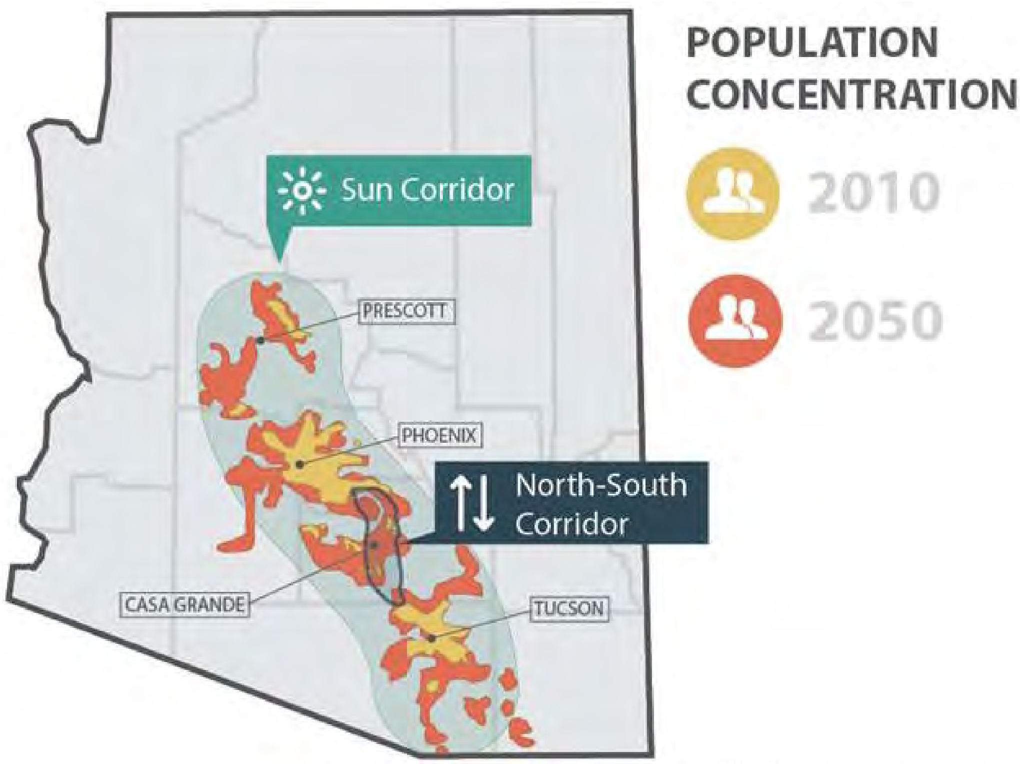
Source: From Arizona Department of Transportation (2016a)

1.3 Project Background

1.3.1 Regional Growth

The Sun Corridor region, which is home to Phoenix, Tucson, and Pinal County, is one of the 11 megapolitan areas in the United States that demographers have identified as the focus of most of the country's future growth. The region is expected to extend from the Mexican border to beyond Prescott by 2040 (Morrison Institute for Public Policy 2008). Figure 1.3-1 illustrates the Sun Corridor and the areas of projected population growth by 2050.

Figure 1.3-1. Sun Corridor population growth areas



Source: Morrison Institute for Public Policy (2008); map adapted from Maricopa Association of Governments

According to the Lincoln Institute of Land Policy, a megapolitan area is identified according to 10 criteria (Lang and Dhavale 2005):

- combines at least two existing metropolitan areas, but may include dozens of them
- totals more than 10 million projected residents by 2040
- derives from contiguous metropolitan and micropolitan areas
- constitutes an organic cultural region with a distinct history and identity
- occupies a roughly similar physical environment
- links large centers through major transportation infrastructure
- forms a functional urban network via goods and service flows
- creates a usable geography that is suitable for large-scale regional planning
- lies within the United States
- consists of counties as the most basic unit

Although somewhat slowed since the economic downturn in the late 2000s, residential and commercial development in and around the Phoenix metropolitan area has been substantial since the 1970s. Initial post-World War II growth was to the northeast, with secondary and more recent growth concentrated in the southwestern and southeastern parts of Maricopa County. Much of the area is at or approaching full development build-out.

In Tucson, development in the 1970s began to move northwest from the central core, in part because federal lands and other geographic features restricted development. The city's future development is expected to be primarily concentrated along the I-10 and Interstate 19 corridors. As these metropolitan areas continue to grow, previously undeveloped lands between the two in Pinal County will experience increased development demand and will likely be converted to support residential and commercial growth. This pressure can be seen in various locations throughout Pinal County, particularly those areas close to US 60, such as Apache Junction, and unincorporated areas such as Gold Canyon and San Tan Valley.

As the population and employment bases continue to grow and previously undeveloped lands are converted, additional roadway capacity will be necessary to support projected travel demand and to improve connectivity and accessibility in areas without existing major corridors. Specifically, as related to the study area, transportation improvements would improve travel times in the region, improve the efficiency of existing freeway and arterial street networks, create a more direct connection to the eastern portion of the Phoenix metropolitan area, help relieve traffic congestion on I-10, and perform functions and provide services identified in local, regional, and statewide plans.

1.3.2 Transportation Planning in the North-South Corridor

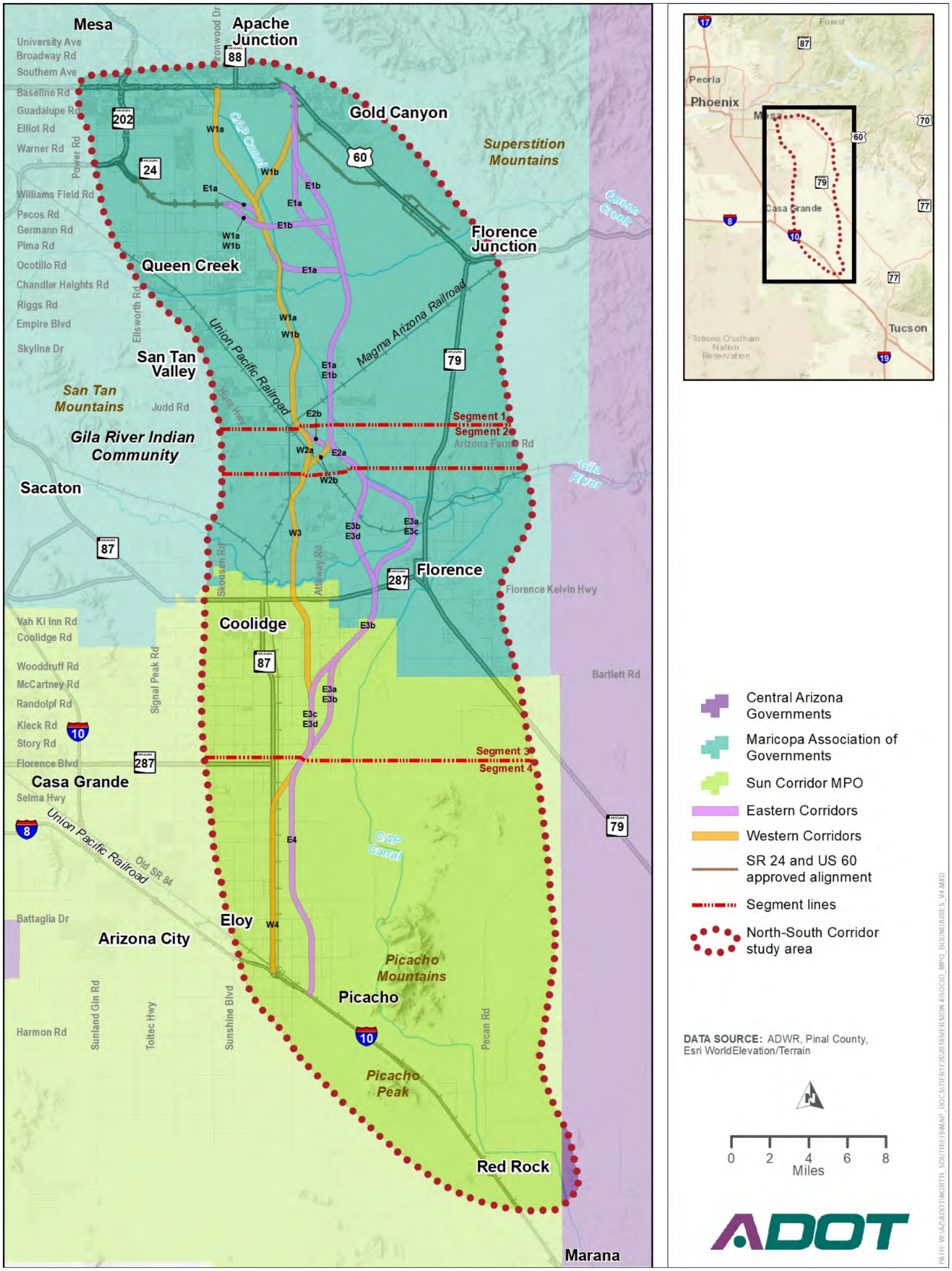
Federal regulations state that metropolitan planning organizations (MPOs) are responsible for, among other objectives, responding to anticipated commercial and residential growth by providing for the development of accessible, integrated, connected, intermodal transportation networks for people and freight to support the metropolitan area's economic vitality (49 USC §§ 5303–5306). A lag in implementing needed transportation facilities typically results in traffic congestion, which in turn reduces the efficiency of the transportation infrastructure and increases travel time, air pollution, and fuel consumption.

State legislation requires that ADOT develop a long-range statewide transportation plan. Consistency with local planning is emphasized, including the requirement that ADOT's long-range planning employ local and regional land use plans, facilitate—not direct—growth, and coordinate with regional planning efforts. It also requires local and regional agencies to submit a standardized report of their transportation needs to ADOT each year.

Transportation coordination and planning in the study area is divided between two MPOs: MAG and the Sun Corridor Metropolitan Planning Organization (SCMPO). After the 2010 census, when Casa Grande's population reached 50,000, SCMPO was formed to provide transportation planning services to the communities of Casa Grande, Coolidge, and Eloy and rural portions of Pinal County. Coordination activities include developing a 5-year Transportation Improvement Program, monitoring local project development, providing input to the State Transportation Improvement Program, identifying transportation enhancement projects, completing federal reporting, and coordinating various transit programs. Figure 1.3-2 shows the boundaries of MPOs in and near the study area.

MAG is the designated MPO and regional air quality planning agency for all jurisdictions in Maricopa County, including the Phoenix urbanized area and the contiguous urbanized area in Pinal County, including Florence and Maricopa. In addition, through Executive Order 2011-04 from the governor, MAG develops population estimates and projections for the region.

Figure 1.3-2. Metropolitan planning organization boundaries



1.3.3 Previous Transportation Studies in the Study Area

Transportation studies prepared by or for ADOT, MAG, Central Arizona Governments (CAG), SCMPO, and other local government agencies provide a baseline for evaluating a possible solution for meeting future transportation needs in the study area. Previous studies provide valuable information about current conditions, existing and anticipated system deficiencies, projected growth and development patterns, and municipal and stakeholder objectives. These studies have helped identify short-term and long-term improvements to enhance mobility, access, and safety in the study area. The preparation of these materials has helped foster partnerships and coordination efforts between and among the varying agencies that will facilitate the comprehensive planning efforts necessary to improve transportation mobility in the study area. These plans are summarized below.

Southeast Maricopa and Northern Pinal County Area Transportation Study. This study, which was initiated by ADOT, CAG, and MAG in 2001 and completed in 2003, was the first formal attempt to (1) evaluate transportation between Maricopa and Pinal Counties, (2) examine long-range transportation needs in the study area, and (3) identify projects to address these needs. Findings from the study indicate that $12 billion to $14 billion in transportation infrastructure investment is necessary to meet the growing demand in the area bounded by US 60 and SR 79 to the east, SR 202L and the Gila River Indian Community to the west, US 60 to the north, and Coolidge and Florence to the south. Recommendations include approximately 3,000 lane miles of new and improved arterial streets, an enhanced transit system, improvements to existing freeway corridors, and 95 miles of new freeway.

The study recommended four corridors to enhance mobility in the area of analysis. One of these corridors, the Apache Junction and Coolidge Corridor, would provide a new north-to-south transportation corridor in Pinal County. It would connect US 60 in the north with I-10 in the south, generally follow SR 87 south of Coolidge, and then continue north for 36 miles where it would connect with US 60 near Apache Junction. If built as a freeway, the corridor was anticipated to carry between 46,000 and 110,000 vehicles per day in 2030 and cost $1.6 billion to construct. The Apache Junction and Coolidge Corridor was later renamed the North-South Corridor Extension (ADOT 2008a).

Pinal County Corridors Definition Study. In 2004, House Bill 2456 designated ADOT, CAG, and MAG as the responsible parties for further definition of the four corridors identified in the *Southeast Maricopa and Northern Pinal County Area Transportation Study* for the purpose of right-of-way (ROW) preservation. The bill required a joint study to be initiated before the end of 2004 to provide information to the State Transportation Board for adoption into the State Highway System by the end of 2008. The State Transportation Board directed ADOT to develop studies to examine the need for each of the four proposed corridors identified in the above-mentioned study, their ability to accommodate anticipated growth, and performance impacts of each corridor on other regional and state roads. Subsequently, ADOT initiated the *Pinal County Corridors Definition Study* in 2004.

The final report provided details for the future development of roadway alignments and corridor design concepts and identified required environmental studies. In 2006, recommendations set forth in the report, which included a north-to-south transportation corridor, were adopted by the State Transportation Board into MoveAZ, the then-current statewide long-range transportation plan. While no funding was identified for the purchase of ROW or construction of a north-to-south transportation corridor, inclusion in MoveAZ allowed for the funding of studies that would identify potential alignments of a north-to-south transportation corridor.

Regional Framework Studies. The *Southern Pinal and Northern Pima Corridors Definition Study*, completed in 2008, sought to determine the need for and feasibility of high-capacity corridors in southern Pinal County and northern Pima County as well as the potential of extending a major transportation corridor in the study area south of Florence. This study was replaced with the Statewide Transportation Planning Framework Program (Framework Program) effort, initiated in 2008.

The Framework Program's main goal was to plan a seamless transportation system that would efficiently move the state's rapidly growing population and ensure economic competitiveness. The study team examined transportation needs in Arizona through 2050 with no cost constraints and conducted extensive outreach efforts. The resultant document, the *Statewide Transportation Planning Framework Final Report* (ADOT 2010a), provides a long-term vision for transportation in Arizona. Accepted in 2010, the vision serves as the basis for upcoming transportation planning efforts that assign funding to prioritized projects.

Four studies were prepared as part of this effort. Tasks associated with the Central Arizona Regional Framework Study included projecting travel demand, reviewing land use plans and other applicable materials, and evaluating other factors that would inform recommendations for the area. The study identified the need for a major north-to-south transportation corridor in the study area.

Coolidge-Florence Regional Transportation Plan. A collaborative effort by ADOT, the City of Coolidge, and Town of Florence, this plan developed a regional multimodal transportation system plan for the Coolidge and Florence planning areas. Based on anticipated growth in 2008, traffic projections with and without a north-to-south transportation corridor in 2025 were modeled. Recommendations set forth in the plan identified continued, coordinated efforts regarding a design concept study for a north-to-south transportation corridor (ADOT, City of Coolidge, and Town of Florence 2008).

Queen Creek Small Area Transportation Study. This 2008 study sought to identify long-term transportation planning issues for Queen Creek. While the study primarily focused on areas within the Queen Creek municipal limits, it identified a north-to-south transportation corridor in the study area and the need for coordinating future road systems to promote connectivity between and among communities (Town of Queen Creek 2008a, updated 2018).

US 60 Alignment Study: Superstition Freeway to Florence Junction Study. Completed in 2011, this study advanced the recommendations set forth in ADOT's *US 60 Corridor Definition Study* through the evaluation of improvements to US 60 between mileposts 199 and 211 (ADOT 2010b). Residential development has been significant in this area in recent years and is anticipated to increase in the future with the anticipated implementation of the Lost Dutchman Heights (formerly Portalis) and Superstition Vistas developments (these planned developments are shown in Chapter 3, *Affected Environment and Environmental Consequences*, in Figure 3.2-5). In 2011, the US 60 project received environmental clearance with a finding of no significant impact (ADOT 2011a).

Apache Junction Comprehensive Transportation Study. A joint effort between the City of Apache Junction and ADOT, this study sought to develop a long-range multimodal transportation plan to address the city's most critical current and future transportation needs. The study (1) evaluated growing demands placed on the city's local roads and streets, the Lost Dutchman Heights (formerly Portalis) area, and the larger region, and (2) considered public transportation, bicycle, and pedestrian needs, and additional multimodal opportunities necessary to accommodate growth and development. The study identified a series of short-range, mid-range, and long-range improvements to the transportation network as well as the potential realignment of US 60 and a north-to-south transportation corridor (ADOT 2012a).

Regional Transportation Plans. The MPOs in the region have identified the need for a north-to-south transportation corridor through Pinal County. MAG's 2035 *Regional Transportation Plan* identifies ROW protection for the North-South Freeway Corridor (including SR 24) in the Pinal County area of the MAG metropolitan planning area as a currently unfunded project.

The *CAG Regional Transportation Plan* (2015) recognizes the need for a north-to-south facility with a connection to SR 24 that would provide a critical alternative for travel between I-10 and the Phoenix metropolitan area. The plan also notes that a freeway facility would foster economic development and support the growing communities of Florence, Coolidge, and Eloy as well as northern Pinal County. The plan does not identify funding for the north-to-south facility.

1.4 Need for the Proposed Action

Under 49 USC §§ 5303–5306 and other federal legislation, it is the intent of the United States Congress that metropolitan and statewide transportation planning be the foundation for highway and transit project decisions. Based on the findings of a number of local and regional studies, including the *Southeast Maricopa/Northern Pinal County Area Transportation Study Final Report* (ADOT, CAG, and MAG 2003) and *Pinal County Corridors Definition Study Final Report* (ADOT 2007), a north-to-south transportation corridor was included in the 2004 statewide long-range transportation plan (MoveAZ). The need for a north-to-south transportation corridor was confirmed in the *Central Arizona Regional Framework Study* (ADOT 2009) as part of the Framework Program.

1.4.1 Summary of Needs

Adding north-to-south transportation capacity in the study area would facilitate the connection between US 60 and I-10. The current connection is a fragmented assortment of rural roads with missing linkages throughout. While this fragmentation of north-to-south routes does not cause substantial congestion now, anticipated future land use patterns coupled with population and employment projections indicate that the urbanized areas of Phoenix and Tucson could develop into a megapolitan area with over 8 million people by 2050 (Arizona Department of Administration 2015a). As a result of the lack of continuous north-to-south roadway connections in the study area and the anticipated growth and travel demand that will accompany growth, the following study area characteristics and transportation deficiencies drive the need for a continuous north-to-south transportation facility between US 60 and I-10:

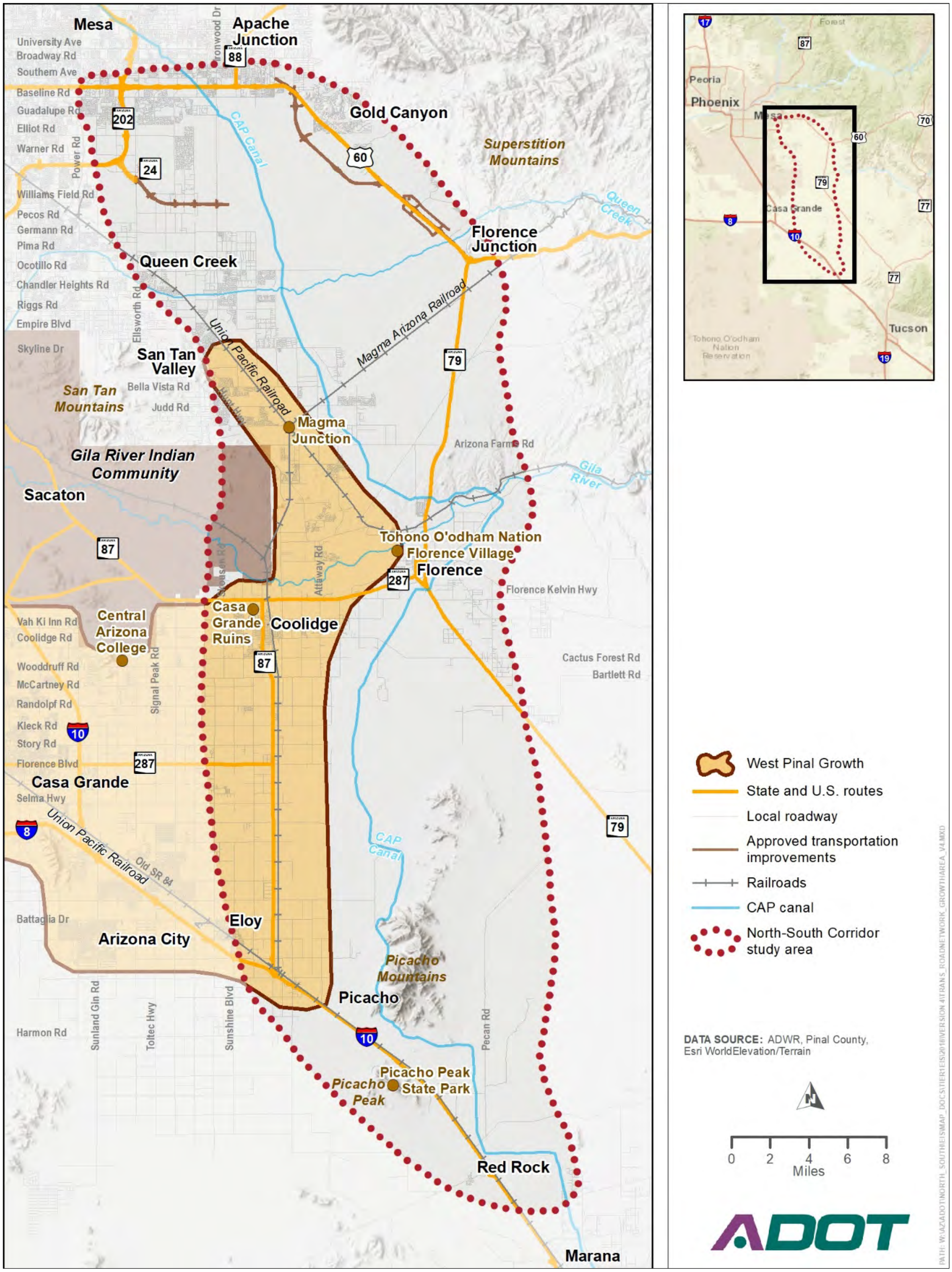
Insufficient infrastructure to accommodate projected population and employment growth and to support local, regional, and statewide planning efforts. As shown in Table 1.4-1, population in Pinal County is expected to nearly double (an increase of 97 percent), and employment is expected to increase by a factor of 2.8 (an increase of 178 percent) by 2040. Local governments and CAG anticipate stress on the local transportation network's capacity, and local land use and transportation plans all call for a major north-to-south transportation facility in the study area to accommodate anticipated growth. An improved and expanded north-to-south transportation system is needed to provide the transportation infrastructure shown in statewide, regional, and local planning documents. Figure 1.4-1 depicts the West Pinal Growth Area within the study area, encompassing Coolidge and Casa Grande, as identified in the *Pinal County Comprehensive Plan*.

Table 1.4-1. Population and employment in Maricopa, Pinal, and Pima Counties, 2015–2040

Geographical area[a]	2015	2040	Percentage change
Population			
Maricopa County	4,076,438	6,031,000	47.9
Pinal County	406,468	800,700	97.0
Pima County	1,009,371	1,276,700	26.5
Employment			
Maricopa County	1,923,012	2,863,967	48.9
Pinal County	68,364	189,682	177.5
Pima County	465,594	495,569	6.4

Sources: Arizona Department of Administration (2015a), Arizona Department of Transportation (2018)
[a] includes all of Maricopa, Pinal, and Pima Counties

Figure 1.4-1. *Pinal County Comprehensive Plan* growth area within study area

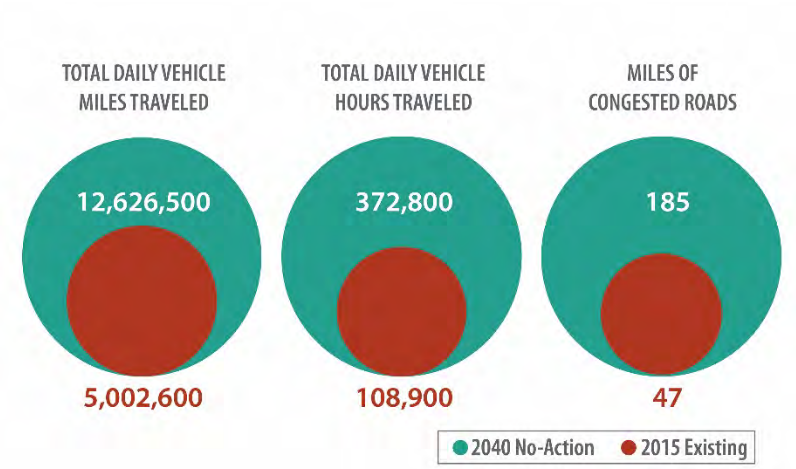


Source: Pinal County (2015)

Inadequate roadway capacity to meet future demand. Population and employment growth in Maricopa, Pima, and Pinal Counties will place additional demand on the existing fragmented and discontinuous transportation network in Pinal County and will result in a lack of adequate, continuous, north-to-south transportation capacity in southeastern Maricopa County and Pinal County. Lack of capacity will translate into congestion and increased travel times, which would only worsen with continued growth, contributing to long user delays. In the study area, the existing roadway network cannot meet future demand and capacity challenges of high-volume, long-distance through trips for moving both people and freight.

Figure 1.4-2 illustrates the projected increase in vehicle miles traveled (VMT) and vehicle hours traveled (VHT) in the study area by 2040. An integrated, multimodal transportation system requires additional unfragmented, north-to-south capacity in the study area to accommodate these future needs. Without additional capacity, delays and congestion would hamper the efficiency of existing and planned roadway networks.

Figure 1.4-2. Existing and 2040 traffic projections



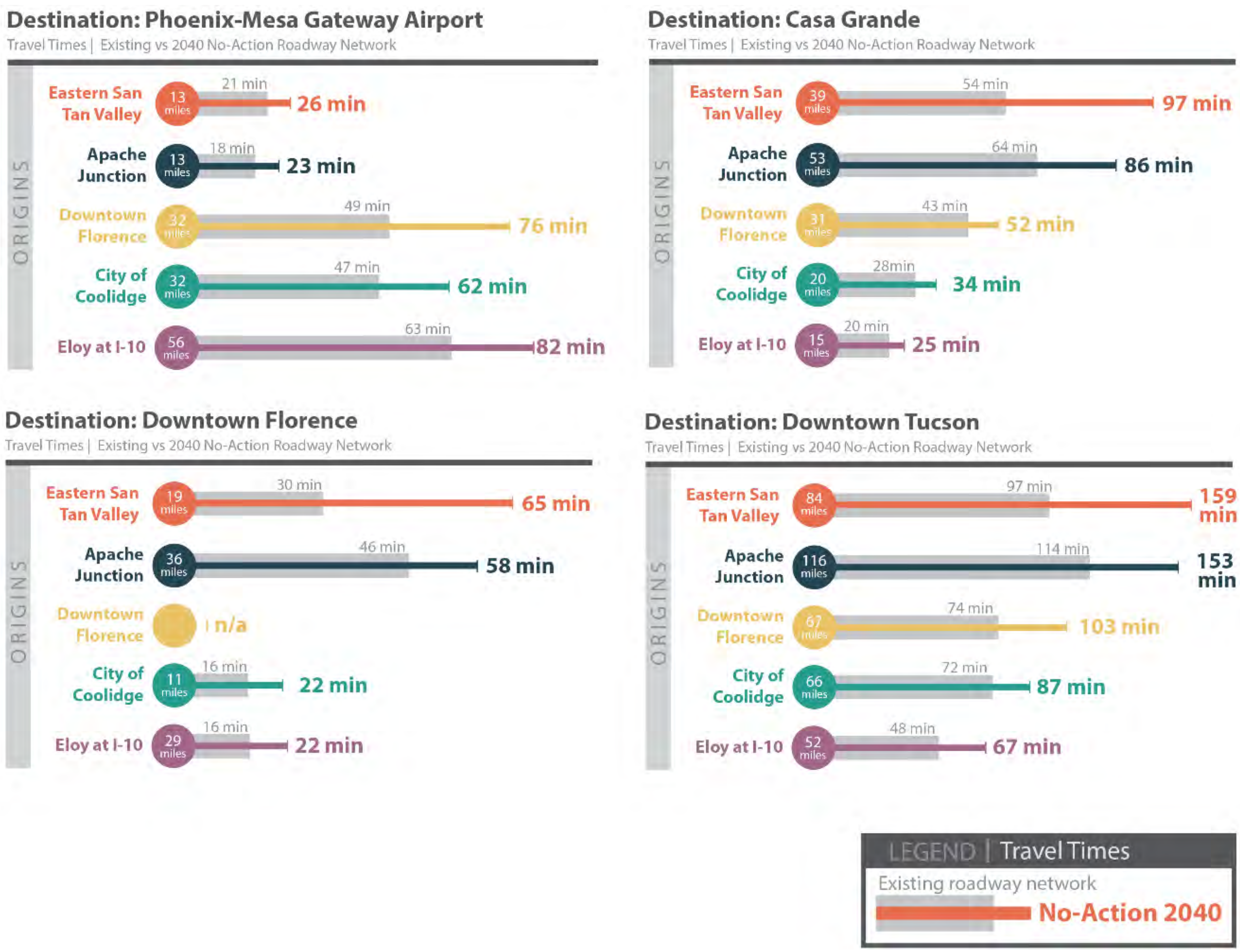
Source: second-generation Arizona statewide travel demand model (AZTDM2), 2016, existing and 2040 No-Action model information

Lack of transportation system connectivity and need to enhance system linkages. A continuous north-to-south transportation corridor would provide a critical missing link in the southeastern Maricopa County and Pinal County transportation system. Currently, travelers heading north from the Tucson area on westbound I-10 who wish to reach areas east of central Phoenix while continuing to travel on a high-capacity roadway must go through central Phoenix to access SR 202L or through southern Phoenix to access US 60. SR 79 provides access along the eastern edge of the study area north of Florence. South of Florence, SR 79 travels southeast toward Oracle Junction, where it ends at its junction with SR 77, approximately 25 miles north of Tucson. SR 79 is not a high-capacity route, and operates as a local route through Florence with numerous access points and businesses along the route.

Travel times in 2040 from select origins in the study area to select destinations in the region are shown in Figure 1.4-3. A continuous north-to-south facility would help integrate the study area's surface transportation network. System continuity and connectivity would be critical in improving the effectiveness of individual network segments, the use of transit, and congestion management strategies (such as operational improvements addressing intersection upgrades, access management, traffic signal improvements, and intelligent transportation systems—the use of technology to improve traffic flow). Providing direct system linkage within the existing fragmented system would reduce costs associated with hundreds of thousands of trips that would take place over future years and decades.

Providing connectivity and more direct trips in the study area would reduce VHT, which would, in turn, reduce energy use and costs. A continuous north-to-south corridor could potentially reduce energy consumption by as much as 6 million gallons per year in the region. Moreover, according to USDOT, in 2016 the national average value of travel time savings for auto drivers and truck drivers was $13.60 and $27.20 per hour, respectively; therefore, substantial reductions in travel time can result in substantial savings for the average driver.

Figure 1.4-3. Select existing and 2040 No-Action travel times



Source: second-generation Arizona statewide travel demand model (AZTDM2), 2017, 2040 No-Action model information

Limited alternatives to avoid congestion on I-10. I-10 provides the primary connection between Phoenix and Tucson. Today, portions of I-10 in the study area and across the larger region regularly experience highly congested travel. There are no alternative routes through this area of Pinal County that provide a direct route. Traffic diverted from I-10 because of congestion or closure must mix with local traffic on rural state highways through the area, contributing to local traffic. By 2040, the study area will have 185 miles of congested roadways (Figure 1.4-2). Without unfragmented, north-to-south transportation alternatives to I-10, congestion is anticipated to worsen with the study area's projected growth. It is anticipated that during the peak evening travel period, I-10 would operate at a failing level of service (LOS) by 2040 (LOS is described in detail in Section 1.4.4, *Existing and Forecast Travel Demand*). A continuous north-to-south transportation corridor connecting southeastern Maricopa County—by way of US 60, SR 202L, and SR 24—with I-10 would provide the necessary congestion relief to enhance mobility on I-10.

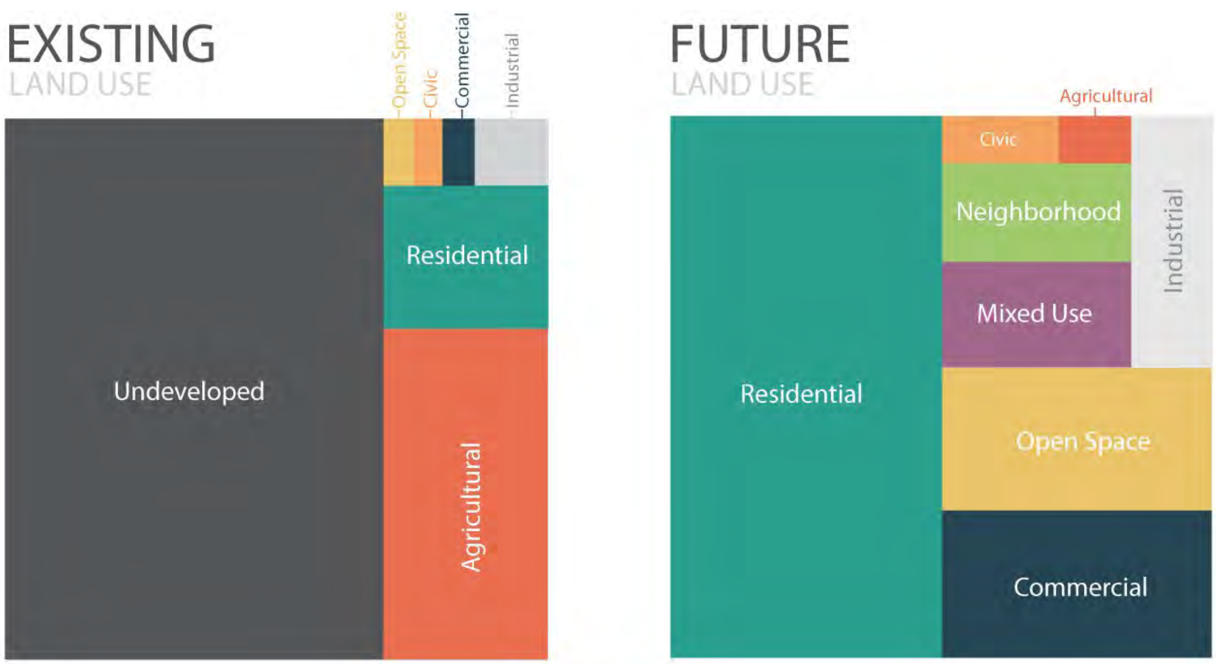
1.4.2 Existing and Projected Land Use

Pinal County historically has been a relatively agricultural and undeveloped landscape. Substantial population and employment growth across the Phoenix and Tucson metropolitan areas has resulted in the conversion of previously undeveloped lands and increased development pressure in Pinal County. While notable development has occurred in concentrated areas in the study area in recent years, much of the area remains agricultural and undeveloped.

The study area is a mix of incorporated municipal and unincorporated county and ASLD lands. Each incorporated municipality has an identified municipal planning area (MPA), which represents the respective municipality's area of planning concern and is based on the anticipated future incorporated boundaries of that municipality. The incorporation of these lands, and subsequent development, depends on annexation from the county or ASLD.

Figure 1.4-4 illustrates the existing and anticipated future land use distribution in the study area. Under existing conditions, nearly 70 percent of this land is undeveloped and another 19 percent is classified as agricultural. Less than 10 percent of land is residential, and smaller amounts are industrial, commercial, or open space.

Figure 1.4-4. Existing and future land use distribution in the study area



Source: compilation of data from municipal entities and remote sensing, 2017
Note: Undeveloped land is vacant land, much of which is privately owned (or State Trust land), and as such it is subject to future development. The future land use reflects the jurisdictions' adopted general plans and ratio of build-out land uses they envision.

According to municipal and county land use plans, which each have varying horizon years, nearly 500,000 acres classified as agricultural or undeveloped today would be converted to residential and commercial development at full development build-out (no estimate is available for when full build-out will occur). According to these plans, future land use would be 50 percent residential and mixed use. Neighborhood land uses, which are a combination of residential and commercial with varying densities, would represent 13 percent of total study area lands.

Commercial land use is anticipated to increase to 14 percent, from less than 1 percent in existing conditions. Much of this commercial development would be concentrated in the northern part of the study area just south of Apache Junction, in and around the Phoenix-Mesa Gateway Airport, and in Coolidge where a new regional shopping mall is planned. Open space areas would increase from under 1 percent to 13 percent. Most of the open space lands would be concentrated in the eastern and southern parts of the study area. Agricultural lands would decrease from approximately 20 percent under existing conditions to less than 1 percent.

1.4.3 Population and Employment Growth

Population and employment in the study area are expected to grow substantially by 2040. Existing and projected population and employment in Pinal, Pima, and Maricopa Counties (including those areas outside the study area) are presented in Table 1.4-1.

Development in the Sun Corridor and the availability of developable land in Pinal County are placing development pressure on the region as the Phoenix and Tucson metropolitan areas continue to reach full development build-out. Pinal County is experiencing increased pressure to convert previously undeveloped lands to support additional growth. As shown in Table 1.4-1, the population in Pinal County is projected to increase by approximately 97 percent by 2040, whereas the more developed Pima and Maricopa Counties are projected to increase by approximately 48 and 27 percent, respectively.

Pinal County is projected to experience substantial employment growth by 2040 (178 percent increase). Both Maricopa and Pima Counties are projected to increase their employment base as well, but at a notably slower rate than Pinal County. Employment in Maricopa County is projected to increase approximately 49 percent by 2040, whereas Pima County's employment base would increase by 6 percent.

For the study area, existing population and employment numbers are available only from the current MPO projection series that reports figures in 10-year increments beginning in 2010. Population in the study area is projected to increase by 118 percent by 2040 (Table 1.4-2). Much of this growth will occur outside existing incorporated municipal limits but within identified MPAs. In their general plans, study area municipalities have identified how and to what extent land would be converted to support new residential development. In addition, these municipalities anticipate that a north-to-south transportation corridor would support this growth.

Table 1.4-2. Study area population and employment, 2015–2040

Demographic	2015	2040	Percentage change
Population	275,657	601,053	118
Employment	36,416	162,685	347

Source: 2015 and 2040 population and employment estimates and projections from the second-generation Arizona statewide travel demand model (AZTDM2)

In their general plans, study area municipalities have identified one or more commercial cores where they envision commercial and other business activities. In and around residential areas, commercial areas would be dedicated to providing retail, dining, and entertainment as well as low-density office space. However, high-density employment growth areas would be concentrated in areas away from residential development. Many study area municipalities have identified such areas in their general plans as well as the sectors in which this growth is anticipated.

Given the large amount of land available for development, study area municipalities have the ability to implement measures to incentivize businesses, particularly those that meet the objectives of identified employment growth areas, to locate within their boundaries.

As shown in Table 1.4-2, employment growth in the study area is anticipated to be substantial—nearly a 350 percent increase by 2040. This would take the form of over 125,000 new jobs. Queen Creek, in Maricopa County, is projected to experience the most job growth. Much of this would be concentrated close to the Phoenix-Mesa Gateway Airport, where businesses would benefit from this proximity. This would also be true in Mesa.

In Pinal County, job growth is expected to occur in Apache Junction, Florence, Coolidge, and Eloy in the study area, and in Casa Grande just west of the study area (Figure 1.4-5). Eloy, the southernmost municipality in the study area, would benefit from its location adjacent to I-10 and proximity to areas between Tucson and Phoenix. In Apache Junction, employment growth would be concentrated along US 60 and in planned areas such as Superstition Vistas. Florence would continue to develop its current employment base (military and government) and introduce new business sectors.

With the growth in population and employment, community facilities, medical facilities, shopping centers, and other community resources would experience more activity. Access to activity centers in and near Apache Junction, Florence, Coolidge, Eloy, and master-planned communities would become crucial to the viability of the growing communities.

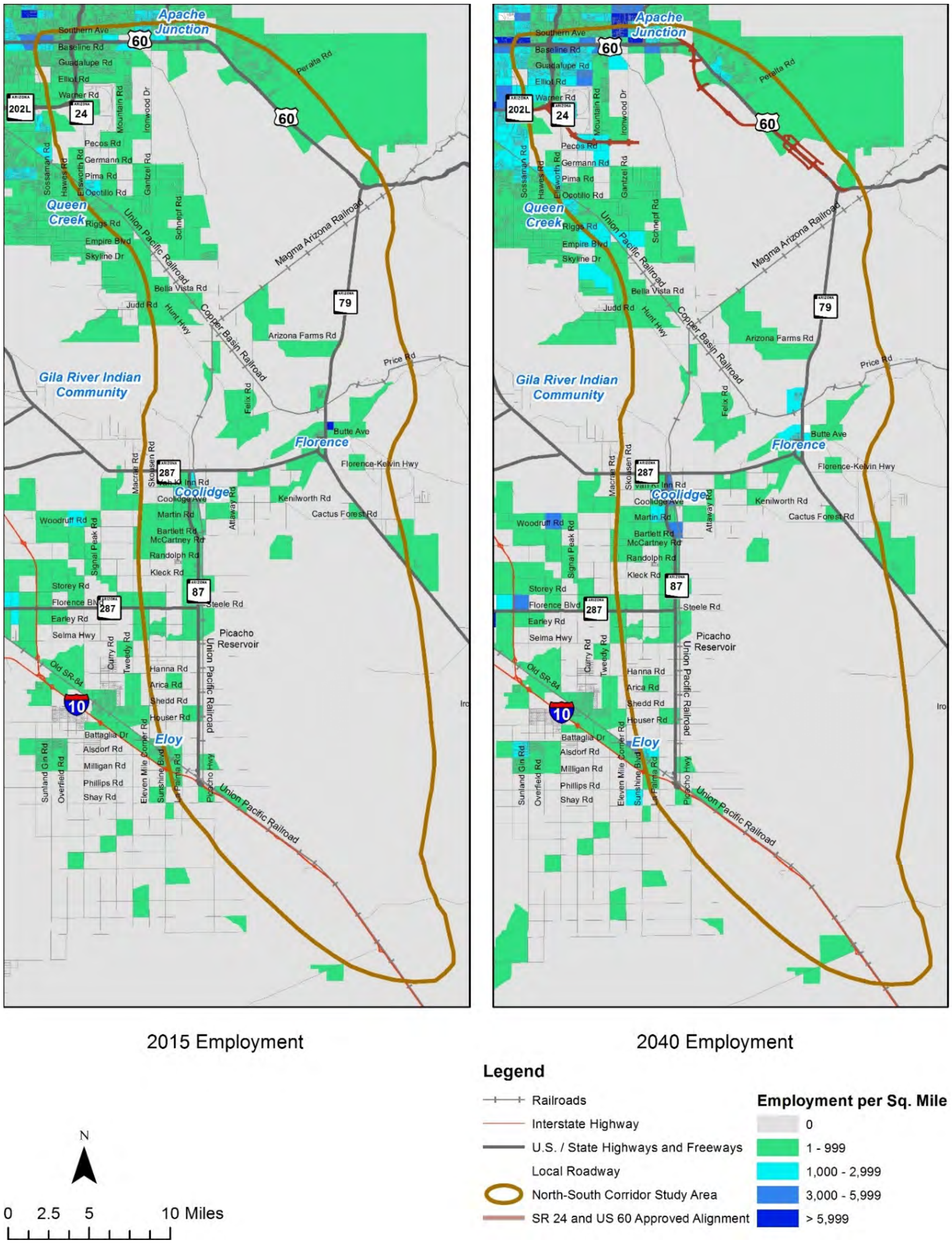
1.4.4 Existing and Forecast Travel Demand

Travel purposes can include work, personal, movement of goods, and delivery of services; travel modes include cars, trucks, transit, bicycles, and walking. Taken in its entirety, the amount of travel occurring in a region is referred to as transportation demand. To meet individual travel needs with any chosen mode or modes, a region must have an adequate transportation network. The extent of transportation infrastructure that can accommodate travel demand is referred to as capacity.

Traffic operational characteristics are typically described in terms of LOS. LOS is measured on a scale ranging from A to F, with A representing the best performance and F indicating the worst. As described in the Transportation Research Board's *Highway Capacity Manual* (2010), LOS A corresponds to minimal delay at signalized intersections and free-flow conditions on highways. LOS F means long delays at signalized intersections and congested stop-and-go conditions on highways. Traffic flow conditions for each LOS are presented in Figure 1.4-6.

A transportation network is designed to accommodate the expected transportation demand, that is, a certain volume of travel, at an acceptable LOS. Once that volume is exceeded, the network begins to operate inefficiently. When capacity deficiency occurs or is projected to occur, improvements that would be necessary to address these deficiencies are typically identified in the jurisdiction's long-range transportation plan. Pinal County identifies LOS C or better as acceptable.

Figure 1.4-5. Employment growth projections for Pinal County, 2010 to 2040



Source: second-generation Arizona statewide travel demand model (AZTDM2), 2017

Figure 1.4-6. Level of service flow conditions

Level of Service	Flow Conditions	Technical Descriptions
LOS A		Free flow conditions with minimal delays. minimum congestion
LOS B		Stable flow conditions with occasional delays. minimum congestion
LOS C		Stable flow conditions with periodic delays. low congestion
LOS D		Restricted flow conditions with regular delays due to moderate congestion. moderate congestion
LOS E		Constrained flow conditions with extended delays due to high congestion. high congestion
LOS F		Forced flow conditions with excessive delays due to excessive congestion. very high congestion

Source: Transportation Research Board (2010)

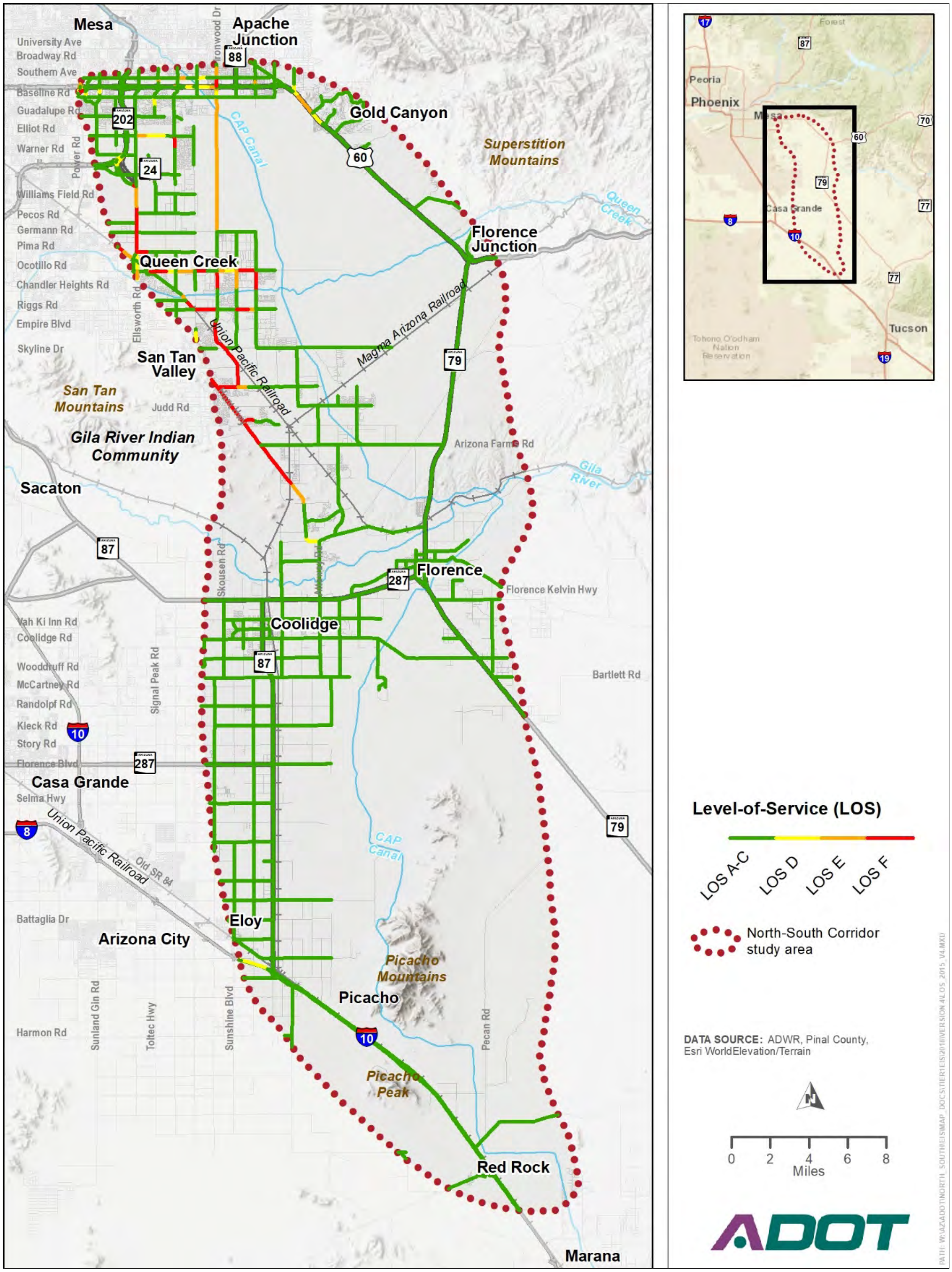
The second-generation Arizona statewide travel demand model (AZTDM2), developed based on existing and projected population and employment numbers provided by area MPOs, National Household Travel Survey data for Arizona, and enhanced truck and long-distance travel models, uses a 2040 horizon to determine travel patterns in the state. The model includes scenarios with and without the operation of a north-to-south transportation corridor by 2040. In the No-Action condition, the north-to-south transportation corridor is not in place; however, the model assumes that the following improvements to key corridors would be made irrespective of implementation of a north-to-south transportation corridor:

- SR 287 – widened to four lanes continuously, from SR 79 to western study area boundary
- Hunt Highway – widened to six lanes continuously, from SR 79 to western study area boundary
- I-10 – widened to six lanes throughout study area limits
- US 60 – widened to eight lanes west of Ironwood Drive and to six lanes east of Ironwood Drive

Capacity and LOS are two related terms. Capacity analysis tries to give a clear understanding of how much traffic a given transportation facility can accommodate; LOS tries to answer how well a given facility is managing the traffic situation. Capacity and LOS vary with a number of factors, including the type of facility, prevailing traffic, road conditions, etc.

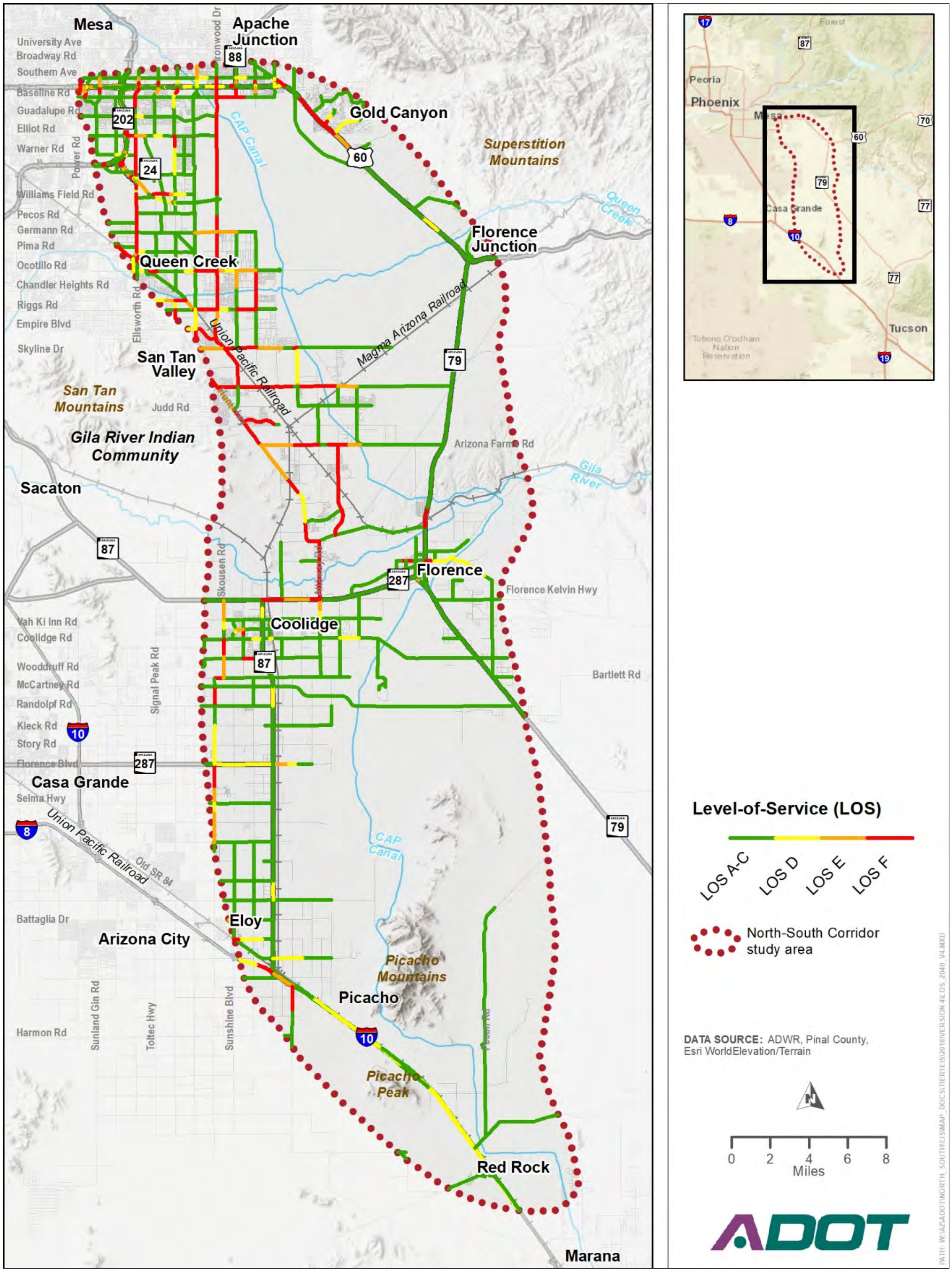
Figures 1.4-7 and 1.4-8 show the study area traffic volumes for key through-route corridors in the study area under existing conditions and 2040 conditions, based on modeling results from AZTDM2.

Figure 1.4-7. Study area existing conditions (2015) level of service



Source: second-generation Arizona statewide travel demand model (AZTDM2), 2016

Figure 1.4-8. Study area forecast conditions (2040) level of service



Source: second-generation Arizona statewide travel demand model (AZTDM2), 2017

The 2040 results show that the key corridors will experience, on average, nearly 200 percent more traffic than in 2015. With the added traffic, performance is estimated to degrade on many of these facilities, including SR 79 north of Hunt Highway. Overall, approximately 43 percent of local roadways in the study area would operate at LOS E or F in 2040 under the No-Action condition.

Additional information regarding the traffic analysis for the proposed action is in Appendix B, *Traffic Information*.

1.5 Purpose of the Proposed Action

Addressing anticipated transportation capacity deficiencies would enhance overall transportation network mobility by avoiding anticipated congestion on I-10 and regionally significant routes such as SR 24, SR 87, Hunt Highway, and Ironwood Drive, among others that would be operational by 2040. The addition of a continuous, unfragmented north-to-south transportation facility in the study area would facilitate regional mobility. A north-to-south transportation corridor would improve connectivity between Phoenix, southeastern Maricopa County, Pinal County, and Tucson.

The 2040 population of Pinal County is estimated at approximately 800,000, about twice the 2015 population of 406,468. Existing regional transportation facilities cannot accommodate the projected travel demand resulting from this growth. The Framework Program showed that at Pinal County full development build-out, I-10 would be heavily congested, creating substantial delays on local arterial streets, county roads, and state highways for interstate and intrastate travelers between Phoenix and Tucson.

To address transportation needs in the study area, the purpose of this proposed action is to provide a continuous, access-controlled north-to-south transportation corridor that would:

- Enhance the transportation network to accommodate existing and future populations – Consistent with state, regional, and municipal planning initiatives, the new corridor would accommodate anticipated growth in the study area and across the larger region.
- Improve access to future activity centers – The new corridor would benefit the study area's new activity and population centers and undeveloped lands identified for conversion that are in various stages of the local or regional planning processes.
- Improve regional mobility – The new corridor would provide additional roadway capacity ahead of full development build-out to avoid congestion associated with anticipated growth.
- Provide an alternative to avoid congestion on I-10 – The new corridor would provide an unfragmented alternative to I-10 to reduce traffic delays at full development build-out.
- Improve north-to-south connectivity – The new corridor would connect eastern portions of the Phoenix metropolitan area with Pinal County and destinations to the south, including Tucson.
- Integrate the region's transportation network – The new corridor would provide a critical link, currently missing, in the transportation network to provide regional connectivity.

Eliminating the study area's anticipated north-to-south transportation capacity deficiencies is essential to: (1) establish and expand efficient transportation networks to facilitate mobility both within the study area and across the larger region and (2) efficiently connect with and alleviate congestion on the region's two existing major freeways (US 60 and I-10). The transportation system would not function efficiently without the linkages provided by continuous, unfragmented north-to-south transportation capacity in the study area. Without addressing the north-to-south capacity deficiencies and improving regional mobility, the integrity and efficiencies of the Framework Program and other studies would be compromised, congestion would worsen, and increased travel times would affect residents, employees, and visitors alike.

1.6 Other Desired Outcomes of the Proposed Action

In addition to meeting the NSCS purpose and need, the proposed action is expected to integrate into the social, economic, and environmental fabric of the study area over the next 20 years. Other desired outcomes in addition to the transportation benefits achieved by the proposed action include:

- Protecting and enhancing the natural environment along the Corridor:
  - alignments developed in Tier 2 studies that allow for continued wildlife movement
  - limited disruption of sensitive wildlife habitat areas to reduce the possibility for growth-inducing impacts
- Supporting local and regional land use plans and preservation goals:
  - alternatives developed in the Tier 1 study that considered regional and local adopted plans
  - alignments developed in Tier 2 studies that allow for the protection of identified open space, agricultural, or other undeveloped land
  - alternatives developed in the Tier 1 study that avoided identified culturally sensitive properties
  - avoidance of culturally sensitive properties during Tier 2 studies to the extent feasible and practicable
- Supporting equitable economic opportunities:
  - provision of access to employment, educational, and civic centers and institutions within the study area and the larger Phoenix metropolitan area
  - accommodation of ROW (where appropriate and feasible) for intercity passenger rail serving the local population and greater region, including the Tucson and Phoenix metropolitan areas
- Complementing other planned transportation improvements along new and established corridors in the study area:
  - maximization of efficiency of Corridor mobility through coordination with other ongoing and planned projects
  - alignments developed in Tier 2 studies that integrate with the most current transportation and land use planning to respond to growth and not induce growth

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2 Alternatives

This chapter describes the existing transportation network in the study area, the steps taken to identify the alternatives studied in detail in this Tier 1 DEIS, and the traffic performance of the alternatives. With a purpose and need established for the proposed action (as described in Chapter 1, *Purpose and Need*), the next step in the EIS process was to identify a range of reasonable alternatives to be studied in detail in this Tier 1 DEIS—consisting of *action corridor alternatives* that would entail implementing the proposed action to build a new freeway in the study area and a *No-Action Alternative* that would entail not implementing the proposed action (no new freeway would be built). Identifying reasonable alternatives to the proposed action allows for a meaningful comparison of how the alternatives would affect the environment (as described in Chapter 3, *Affected Environment and Environmental Consequences*).

The alternatives development and screening process is a hallmark of the NEPA process, using various criteria (such as the proposed action's purpose and need, environmental impacts, and public input) to screen out alternatives with unacceptable attributes in the early stages of the study process. Thus, by the time the drafting of the DEIS begins, the study team would have identified a range of reasonable alternatives for further analysis in the DEIS.

All identified action corridor alternatives for the proposed action could affect the natural and human environment in some way; such impacts would be unavoidable with implementation of a build alternative following the Tier 2 phase because of the size of the proposed action. It is important to note, however, that the No-Action Alternative would also produce environmental impacts, resulting from doing nothing to address the purpose and need for building a major new transportation facility in the study area. Discussing the No-Action Alternative in an EIS is important because it serves as a benchmark that decision makers can use to compare the magnitude of environmental effects and transportation changes of the action corridor alternatives.

Federal regulations require that an EIS "rigorously explore and objectively evaluate all reasonable alternatives" (40 CFR § 1502.14). Given the size of the study area, the study team identified hundreds of potential alignments for the proposed action during the initial alternatives development process. Federal guidance calls for producing a range of alternatives to be evaluated and compared in the EIS (*Federal Register* 46: 18026 [1981]). This chapter describes the process of identifying numerous initial alignments and then screening those alignments to produce the reasonable range of alternatives compared in this Tier 1 DEIS. The chapter is presented as follows:

- Section 2.1, *Transportation Setting* – Describes the study area's existing transportation conditions.
- Section 2.2, *Corridor Alternatives Development and Screening* – Describes the alternatives development and screening process, beginning with an initial screening of modal and route alternatives. It led to the identification of 1,500-foot-wide route alternatives. The discussion includes a description of land uses considered and sensitive areas avoided to the extent practicable, and how the route alternatives were developed and modified to address various constraints. The section also discusses modifications to accommodate connections with SR 24. Finally, the section discusses the study's transition to a Tier 1 EIS process and refinements to the 1,500-foot-wide corridors that led to the action corridor alternatives evaluated in this Tier 1 DEIS.
- Section 2.3, *Action Corridor Alternatives* – Discusses the 1,500-foot-wide action corridor alternatives considered in this Tier 1 DEIS. This section describes each of the full-length corridors in detail, providing information regarding locations and features, facility characteristics, ability to accommodate passenger rail, and general benefits. Corridor segments used to facilitate the analysis of the environmental impacts are also described.

- Section 2.4, *No-Action Alternative* – Describes the No-Action Alternative in terms of future transportation projects and major land use changes that would occur in the study area without the proposed action.
- Section 2.5, *Transportation Performance of the Alternatives* – Describes the performance of the No-Action Alternative and action corridor alternatives in terms of transportation performance criteria. The *Traffic Report, North-South Corridor Study* provides additional information on this topic (see Appendix B, *Traffic Information*).

2.1 Transportation Setting

The study area is over 45 miles long and encompasses 900 square miles (Figure 1.1-1). It is bounded by US 60 on the north; I-10 on the south; roughly SR 202L, the Gila River Indian Community, and SR 87 on the west; and roughly SR 79 on the east. The study area includes a small portion of Maricopa County, Pinal County, Apache Junction, Queen Creek, the Gila River Indian Community, the Tohono O’odham Nation, Florence, Coolidge, and Eloy.

2.1.1 Transportation Planning and Policy Guidance

Local jurisdictions, Pinal County, MPOs, and ADOT have prepared planning and policy guidance documents for transportation in the study area. These studies—which were prepared to support the transportation needs accompanying the region’s growth and land development—are summarized in Section 1.3.3, *Previous Transportation Studies in the Study Area*.

One of the guidance documents supporting these planning documents is the 2008 *Pinal County Regionally Significant Routes Plan for Safety and Mobility* (RSRSM) document, funded by Pinal County to provide guidance for the County and other stakeholders (both public and private) to implement “regionally significant routes” and preserve ROW for these routes. It is notable that all Pinal County jurisdictions, including the Gila River Indian Community, CAG, and ADOT, have supported this document, which was updated and adopted in June 2017 by the Pinal County Board of Supervisors. Figure 2.1-1 shows the Pinal County regionally significant routes.

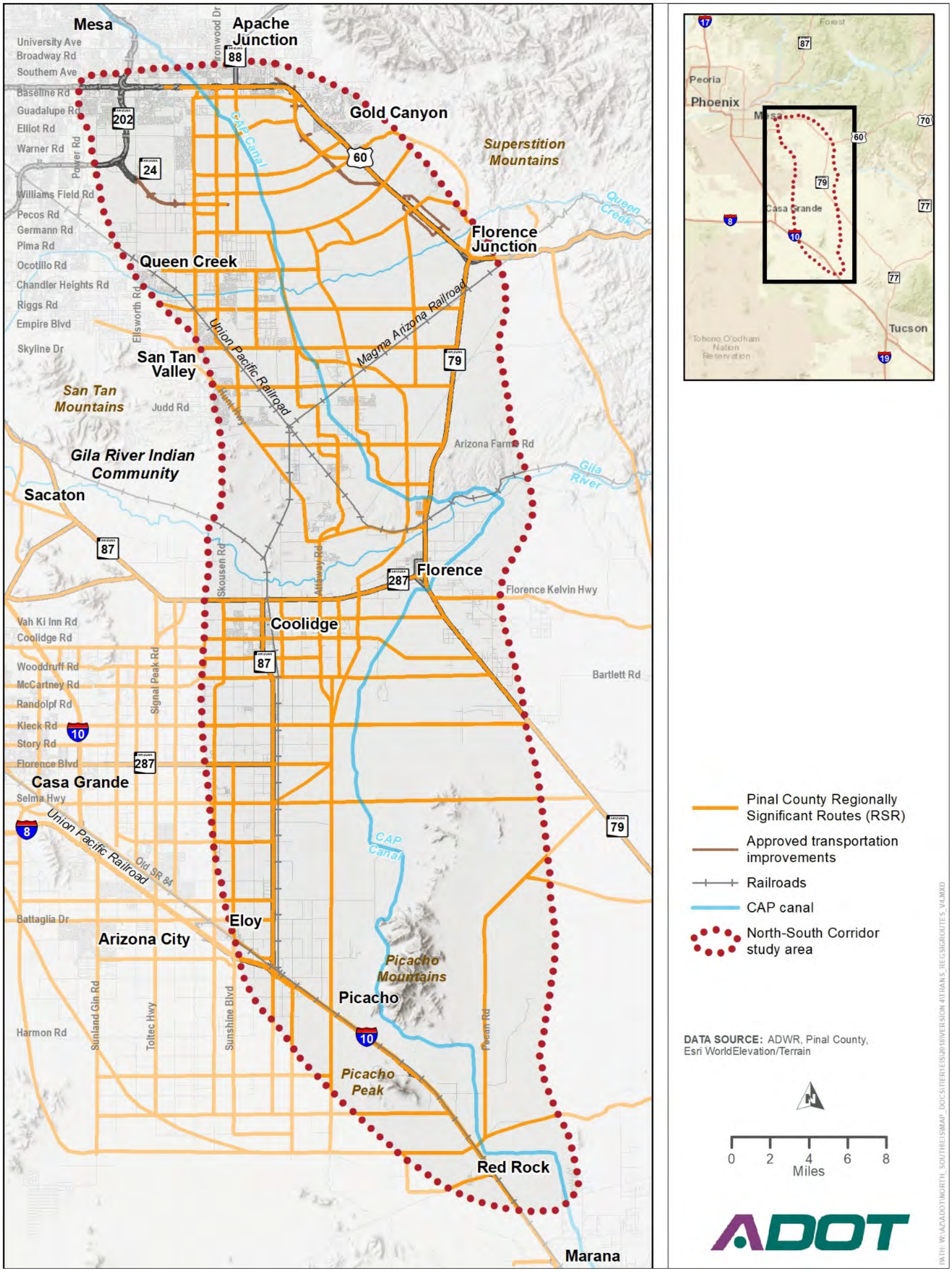
The intent of the RSRSM is to provide continuity across Pinal County and through urban areas, and to connect with adjacent counties and state highways. Many of the primary arterial streets in the study area, which provide access to more densely populated areas, are designated as regionally significant routes.

As noted in Chapter 1, *Purpose and Need*, ADOT and FRA have proposed a passenger rail line between Phoenix and Tucson. ADOT and FHWA determined that the Corridor should not preclude passenger rail, allowing it to be developed as a multipurpose corridor, should the rail study identify the Corridor as a preferred alternative. The proposed action’s design takes this into account by including intercity passenger rail design requirements (such as turn radius and grades) into the criteria.

The *Arizona Passenger Rail Corridor Study* ROD was approved by FRA in 2016. The study identified a routing option that would align with the North-South Corridor from its southern terminus with I-10 to approximately the Magma Arizona Railroad, north of the Gila River. The rail study deferred to the NSCS to identify which action corridor alternative would be followed by intercity passenger rail for this segment, should the build alternative be selected as the preferred alternative.

The Pinal Regional Transportation Authority’s *Pinal Regional Transportation Plan* represents the County’s 20-year transportation plan and includes funding for ROW acquisition and construction of portions of the “North-South Parkway.” The County’s depiction of the North-South Parkway alignment is only representational; it does not represent an alignment that is evaluated in this Tier 1 DEIS. The other roadway improvements identified in the plan (which defer the actual route of the North-South Parkway to this ongoing NEPA process) are incorporated as part of the No-Action Alternative.

Figure 2.1-1. Pinal County regionally significant routes



2.1.2 Transportation Conditions

2.1.2.1 Existing Roadway Facilities

The primary freeway serving Maricopa, Pinal, and Pima Counties is I-10, which is the main connection between Phoenix and Tucson. I-10 is primarily six lanes between Phoenix and Tucson, with several segments limited to four lanes. I-10 provides the only freeway access in the southern portion of the study area. The northern portion of the study area is served by US 60, SR 202L, and the Maricopa County segment of SR 24, which extends from SR 202L east to Ellsworth Road.

Several state highways carry most of the regional traffic in Pinal County. These highways have driveways, direct access to businesses and homes, traffic signals, and sometimes pedestrian crossings (unlike freeways, which are controlled-access highways, and vehicles may enter only by using ramps at interchanges). These facilities include SR 87, SR 287, and SR 79, which are all primarily two-lane highways with the exception of portions that pass through the urbanized areas of Florence, Coolidge, and Eloy.

The study area has a limited network of arterial streets, including Hunt Highway, Ellsworth Road, Ironwood Drive, Gantzel Road, Bella Vista Road, Arizona Farms Road, Attaway Road, and Cactus Forest Road. Figure 2.1-2 shows the study area's roadway network.

In the northern portion of the study area, most of the land to the east of the Central Arizona Project (CAP) Canal is owned by ASLD; this area, referred to as the Superstition Vistas planning area, covers approximately 175,000 acres (see Figure 3.2-5). In 2011, the *Comprehensive Plan* for Pinal County was amended to incorporate the Gateway/Superstition Vistas Growth Area. The conceptual land use plan for the region anticipates more than 800,000 residents in the area. US 60 and SR 79 ring this area to the east, but no improved through routes connect this area with development that is occurring to the west.

In the center portion of the study area, new development in the San Tan Valley (an unincorporated area between Queen Creek to the north and west, Apache Junction to the north, and Florence to the south) is extending south and east toward the well-established communities of Florence and Coolidge. The Gila River creates an east-to-west barrier to the dominant north-to-south transportation movement in this area.

In the southern portion of the study area, most of the land east of the CAP Canal is owned by ASLD. ASLD does not currently have development plans for this area. However, both the Cities of Eloy and Coolidge are planning for development in this area, associated with access to I-10, which traverses the southern end of the study area, and to UPRR, which runs north-to-south adjacent to SR 87.

2.1.2.2 Traffic Conditions

Existing traffic conditions in the study area vary considerably, with most congested routes in the northern portion of the study area (north of Arizona Farms Road). Figure 2.1-3 shows the No-Action Alternative study area-wide 2015 traffic performance.

The percentage of truck traffic in the study area ranges from 6 percent on US 60 to 22 percent on I-10. Agricultural activity throughout the study area results in farm equipment occasionally traveling on local routes to move between operation centers, or to move agricultural products to the regional market. This, coupled with the predominance of single-lane routes, may result in localized delays not reflected in the annualized average LOS results reported in Table 2.1-1.

Figure 2.1-2. Study area roadway network

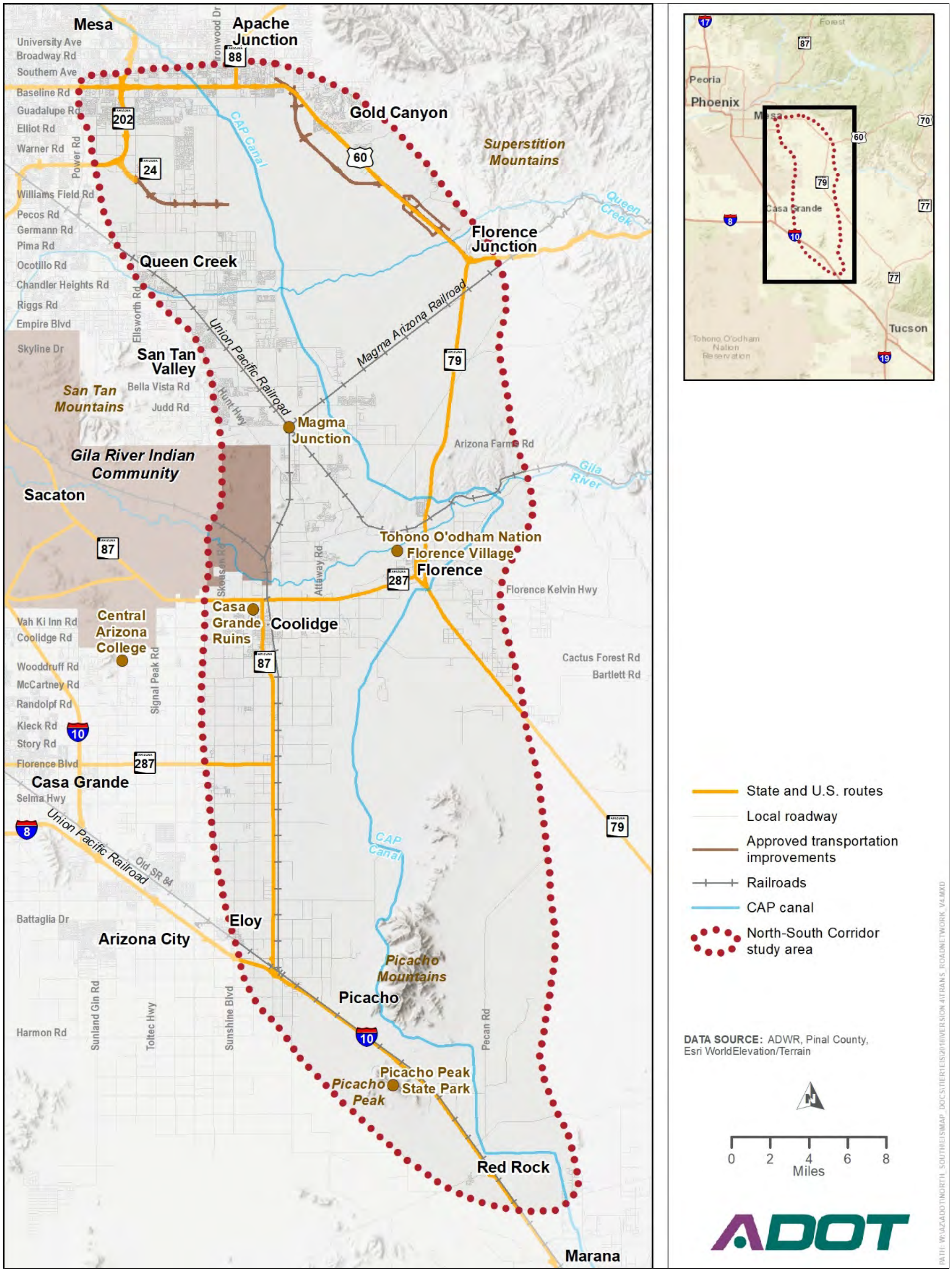
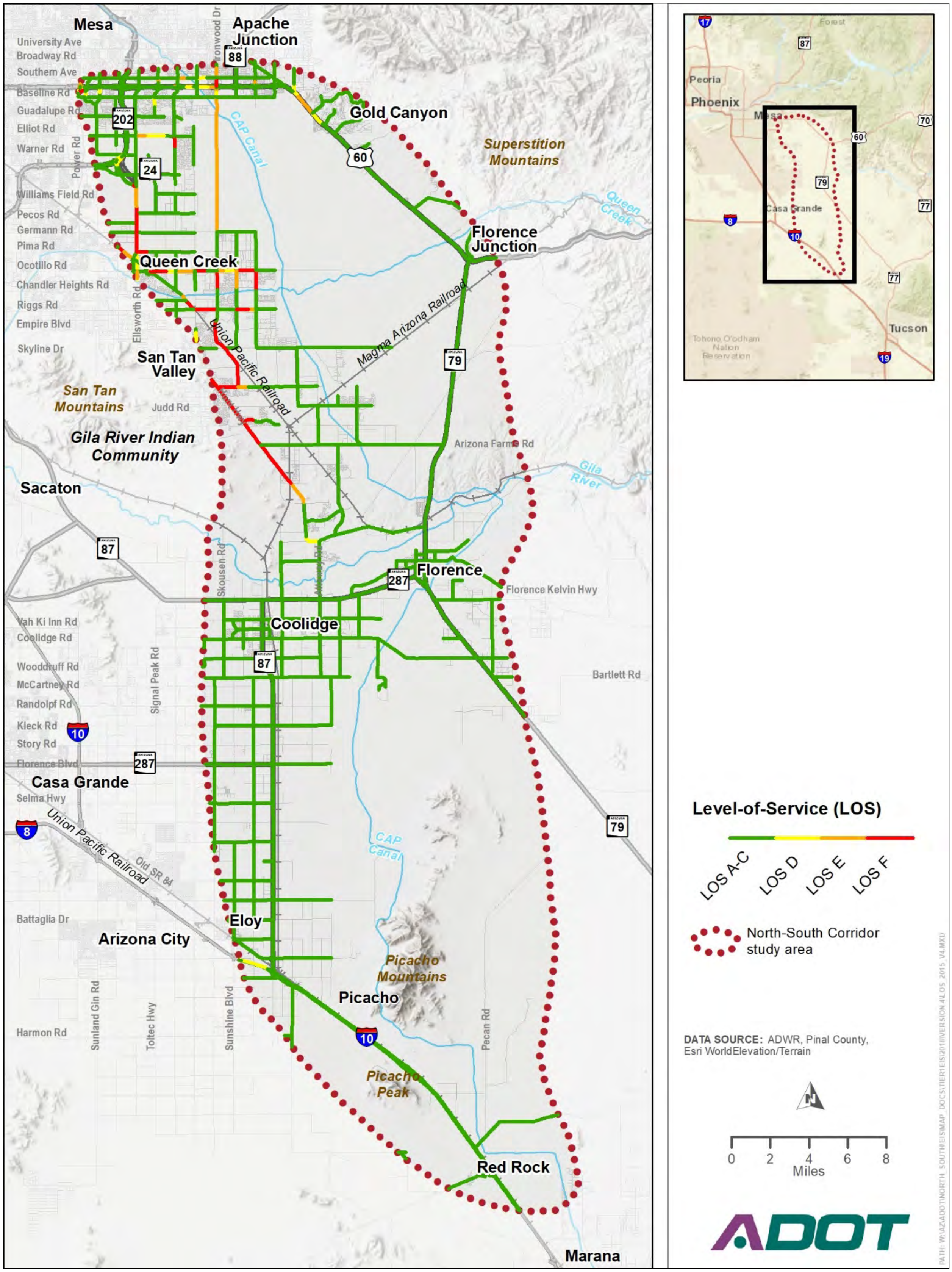


Figure 2.1-3. Study area-wide 2015 performance in level of service



Source: Arizona Department of Transportation (2018)

Table 2.1-1 summarizes traffic volumes and LOS for major routes in the study area. LOS is a grading system commonly used to qualitatively characterize traffic conditions. It refers to the ratio of roadway volume to capacity (v/c). As roadway traffic volumes increase, relative to roadway capacity, the LOS degrades. LOS ranges from LOS A (free-flow traffic conditions with little or no delay experienced by motorists) to LOS F (congested conditions where traffic flows exceed a road's capacity, resulting in long queues and delays). LOS C is generally considered acceptable in rural areas, whereas LOS D or better is acceptable for urban areas.

Table 2.1-1. Traffic volumes and level of service for regionally significant routes

Route	Location	Existing (2015)		
		Average daily traffic	Volume-to-capacity ratio	Level of service[a]
Hunt Highway	Arizona Farms Road to Franklin Road	10,200	1.01	F
State Route 79	Hunt Highway to Diversion Dam Road	8,300	0.46	A–C
Ironwood-Gantzel Road	Baseline Road to State Route 24	17,400	0.87	E
Schnepf Road	Combs Road to Skyline Drive	6,200	0.62	A–C
Attaway Road	Hunt Highway to State Route 287	4,100	0.41	A–C
State Route 87 (Arizona Boulevard)	Vah Ki Inn Road to Martin Road	7,500	0.21	A–C
Hunt Highway	Bella Vista Road to Copper Mine Road	29,100	2.39	F
Riggs-Combs Road	Signal Butte Road to Schnepf Road	10,100	1.01	F
Skyline Drive	Schnepf Road to Quail Run Lane	4,500	0.44	A–C
Bella Vista Road	Gantzel Road to Quail Run Lane	5,900	0.59	A–C
Arizona Farms Road	Hunt Highway to Copper Basin Railway	2,600	0.26	A–C
Coolidge Avenue	State Route 87 to Attaway Road	1,000	0.10	A–C
State Route 287	Christenson Road to Attaway Road	6,600	0.37	A–C
Houser Road	Sunshine Boulevard to Sorrel Road	600	0.06	A–C
U.S. Route 60	Peralta Road to State Route 79	9,600	0.27	A–C
Ocotillo Road	Rittenhouse Road to Ironwood Drive	19,800	1.00	F
State Route 287	Attaway Road to Valley Farms Road	5,600	0.31	A–C
Interstate 10	Sunshine Boulevard to State Route 87	56,500	0.70	A–C

[a] Relationship of volume-to-capacity ratio and level of service (LOS):
LOS A–C: volume-to-capacity ratio ≤0.72
LOS D: volume-to-capacity ratio >0.72 and ≤0.84
LOS E: volume-to-capacity ratio >0.84 and ≤1.00
LOS F: volume-to-capacity ratio >1.00
Volume-to-capacity ratio is a measure comparing a road's use with its capacity; a larger number indicates higher use.

As discussed in Chapter 1, *Purpose and Need*, travel times from specific locations throughout the study area are high today. In the northern portion of the study area, San Tan Valley experiences some of the worst congestion. Peak period travel speeds between San Tan Valley and regional destinations such as the Phoenix Mesa-Gateway Airport to the northwest and downtown Florence to the southeast are under 40 miles per hour (mph), the slowest in the area.

Given the growth expected for the region's population and employment through 2040, travel times are forecast to increase considerably from today's levels. Travel modeling shows that by 2040, peak period travel speeds in the northern portion of the study area would be less than half of what they are today. The trip between San Tan Valley and the Phoenix Mesa-Gateway Airport is expected to take over 45 minutes by 2040, more than twice the time it takes today in congested conditions.

As can be seen on Figure 2.1-3, the lack of continuous through routes is a significant issue facing the regional transportation network. The discontinuous, disconnected network makes for considerable travel times both within and through the study area.

2.1.2.3 Existing Nonroadway Transportation Facilities

Railroads

UPRR has rail lines carrying freight in the study area. The UPRR east-to-west Sunset Route crosses the entire state of Arizona, passing through Cochise, Benson, Tucson, Picacho, Eloy, Casa Grande, Maricopa, Gila Bend, Wellton, and Yuma.

Traffic on the Sunset Route ranges from 44 to 49 trains per day. This is UPRR's main line, connecting southern California with Texas and the south-central United States. In the study area, the Sunset Route runs parallel to I-10. Amtrak provides passenger service on the Sunset Route. The Sunset Limited service route begins in Orlando, Florida, and ends in Los Angeles, California, but it does not have stops in the study area (the closest stops are in Tucson and Maricopa).

UPRR has a second line in the study area, the Phoenix Subdivision, which runs north from the Sunset Route along SR 87 into Coolidge, where it turns to the northwest and serves the Phoenix metropolitan area. UPRR interchanges with three railroads on its Phoenix Subdivision: Copper Basin Railway at Magma Junction, the dormant Magma Arizona Railroad at Magma Junction, and BNSF Railway at Phoenix.

The Copper Basin Railway extends 55 miles from its interchange with UPRR at Magma to Winkelman. The line is owned by ASARCO, LLC, a copper mining, smelting, and refining company. The Magma Arizona Railroad is a 28-mile-long line owned by BHP Billiton and connects UPRR and Copper Basin Railway at Magma with the BHP Superior mine. This copper mine closed in 1995. The Magma Arizona Railroad is out of service, although it is expected to be reactivated when the Superior mine reopens.

Transit Facilities

Public transit service in Pinal County is limited. No countywide services exist, and most available services are for senior citizens and disabled residents. Limited Amtrak passenger rail service operates along UPRR (paralleling I-10); however, the closest stops are in Tucson and Maricopa.

The City of Coolidge operates a local circulator bus system, The Cotton Express, which provides deviated fixed-route bus service and on-demand service throughout central Coolidge (extending approximately 3 miles).

Bicycle and Pedestrian Facilities

Pedestrian and bicycle facilities in the study area are largely limited to sidewalks in existing residential subdivisions and in the central cores of the established communities of Queen Creek, Florence, Coolidge, and Eloy.

Pinal County's *Subdivision & Infrastructure Design Manual* requires minimum 8-foot-wide sidewalks on major and minor arterial streets developed in the county. Major and minor collector streets include progressively narrower sidewalk requirements. However, sidewalks are not required for residential subdivisions with lots 1 acre and greater in size. Pinal County also requires bicycle lanes on both sides of all arterial and major collector streets; however, because most of these routes are not improved, bicycle lanes do not exist on most routes.

State highways throughout the study area typically have wide shoulders to accommodate bicycle and pedestrian travel. Off-street trails are addressed in Section 3.5, *Parkland and Recreational Facilities*.

2.2 Corridor Alternatives Development and Screening

This study officially began with a Notice of Intent filed in the *Federal Register* on September 20, 2010, with the anticipation of completing an ASR, a design concept report, and a project-level EIS. The first steps in defining the proposed action included scoping (see Section 2.2.1) and determining the study area. The study area is the area within which data are collected to identify all known environmental resources. The study area (over 900 square miles) was large enough that it would encompass all potential conceptual alternatives.

Since that time, the study advanced through three general phases:

1. *Alternatives Selection Report*: The ASR identified a number of feasible 1,500-foot-wide route alternatives. This process and the alternatives recommended for analysis at the EIS level were documented in the ASR (ADOT 2014a).
2. Project-level DEIS: For the project-level DEIS, the study team narrowed the most promising alternatives to 400 feet to identify action alternatives and began an in-depth environmental evaluation of the affected environment and the impacts of the No-Action and action alternatives.
3. Tier 1 DEIS: The study's conversion to a Tier 1 DEIS resulted in reevaluating the ASR's 1,500-foot-wide route alternatives, evaluating their environmental impacts, and identifying a preferred action corridor alternative for consideration in subsequent Tier 2 studies.

The process is described in the following sections, followed by a discussion of additional alternative analyses and modifications—after the conversion to a Tier 1 EIS process—that led to the action corridor alternatives being considered in this Tier 1 DEIS.

2.2.1 Scoping

Project scoping is an early step in the NEPA process, the results of which are summarized in the *North-South Corridor Study Draft Agency and Public Scoping Summary*, dated February 2011 (see Appendix M, *Public Involvement*). Publication of the Notice of Intent in the *Federal Register* on September 20, 2010, represented the official start of the EIS process and initiated the scoping process. Agency and public involvement in the study is consistent with that prescribed in the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Section 6002 Coordination Plan for Agency and Public Involvement* (November 2011, last updated in February 2017).

The scoping process was open to agencies and the public to identify the range—or scope—of issues to be addressed during the development of engineering, planning, and environmental studies. The agency scoping meeting occurred on October 5, 2010, and the public scoping meetings occurred on October 19, 21, 26, and 28, 2010, in locations throughout the study area. Additional information regarding the scoping phase is found in Section 5.1.2, *Scoping Phase (2010)*.

2.2.1.1 How Was the Study Area Defined?

Early in the study process, a study area was delineated to define the alternatives analysis boundaries. Considering that I-10 is an existing transportation corridor passing through Pinal County and connecting the Phoenix and Tucson metropolitan areas, the study team looked to the area east of I-10 for opportunities to provide another route connecting the state's largest urban areas, especially considering the rapid population growth occurring in the eastern part of the Phoenix metropolitan area, in communities such as Mesa and Apache Junction, and anticipated growth in Pinal County.

The study team created a 45-mile-long study area that encompassed 900 square miles. The study area is generally bounded by US 60 on the north; I-10 on the south; SR 202L, the Gila River Indian Community, and SR 87 on the west; and SR 79 on the east. The study team collected data for the study area to identify its existing characteristics, including transportation infrastructure, population, development, military facilities, open space, topography, geotechnical conditions, drainage features, land owners, utilities, and environmental features (biological resources, cultural resources, noise levels, hazardous material sites, and socioeconomic conditions). Further information regarding these surveys is provided in Chapter 3, *Affected Environment and Environmental Consequences*.

2.2.2 Alternatives Selection Report

The initial alternatives development and screening process produced 1,500-foot-wide route alternatives recommended to be carried forward into a project-level DEIS for detailed analysis. Described in detail in the ASR (ADOT 2014a), the process:

- incorporated analyses of all reasonable alternatives
- supported the iterative nature of the NEPA process
- provided a record of the investigation and selection process
- determined optimal route alternatives (as constrained by the proposed action's purpose and need, agency and public input, and environmental, engineering, social, and economic data)

This section describes how the alternatives selection process was conducted, how alternatives were initially screened (beginning with modal alternatives and then moving on to route alternatives), how the study team analyzed the alternatives in detail, and which alternatives were selected for further study.

2.2.2.1 How Was the Alternatives Selection Process Conducted?

Although the concept of a new north-to-south transportation facility in Pinal County had been considered by state and regional transportation planners since the early 2000s, the formal process of studying the proposed Corridor did not begin until the September 20, 2010, Notice of Intent. Meetings began shortly thereafter in October 2010 to engage agencies, Native American tribes, and members of the public in the process of identifying alternatives for the proposed action. These outreach efforts were followed by a "scoping" period, during which the study team gathered data and developed criteria for screening alternatives based on discussions with local agencies, the public, and the tribes.

Preliminary engineering efforts identified potential constraints to building a new transportation facility in the study area, and early environmental studies and coordination with cooperating agencies and tribes identified environmentally sensitive areas that should be avoided. The study team held numerous meetings with agencies and members of the public to provide information regarding the study findings thus far, and used feedback gathered at those meetings to refine the alternatives under consideration. The process culminated in the 2014 publication of the ASR that recommended alternatives to be studied in detail in the project-level DEIS.

2.2.2.2 Who Was Involved in the Process?

ADOT is lead agency for the study and is guiding the proposed action through the process. The cooperating and participating agencies are also involved in developing the proposed action (see Section 1.1.3, *Study Partners*, for more information). Chapter 8, *Preparers*, lists the people who prepared this Tier 1 DEIS.

The study team coordinated with agency representatives and members of the public during the alternatives selection process to develop a better understanding of the overall study area, and to gauge people's opinions regarding potential transportation improvements—more information regarding the outreach effort is provided in Chapter 5, *Comments, Coordination, and Public Involvement*.

2.2.2.3 What Alternatives Were Considered?

The ASR process featured two stages. Stage 1 involved evaluating a wide range of modal alternatives (as well as taking no action) to improve transportation conditions in the study area. Stage 2 involved developing and evaluating route alternatives that would accommodate a major transportation facility in the study area.

Stage 1 – Modal Alternatives Evaluation

The study team began by considering the study area's existing transportation network and studying various modes of transportation that could meet the proposed action's purpose and need. This "modal" analysis considered whether the existing network—with some upgrades and expansions—could handle future travel demand on its own.

During the Stage 1 alternatives screening process, the study team examined the following modal alternatives:

- Transportation demand management – A strategy to reduce overall demand on the transportation network. Transportation demand management strategies may include offering park-and-ride lots and express bus service to encourage the use of mass transit (thereby reducing the number of vehicles on the network) or encouraging telecommuting to reduce the number of trips on the network.
- Transportation system management – A strategy to encourage more efficient use of the transportation system by using technologies that optimize available roadway capacity. Typical transportation system management strategies include better timing of traffic signals and information systems that help motorists avoid areas experiencing heavy traffic congestion.
- Arterial street improvements – The full implementation of planned transportation network improvements, including ADOT improvements on state highways, Pinal County improvements on roads of regional significance, and municipalities' improvements on local roads.
- Transit improvements – A strategy to incentivize the use of higher-occupancy vehicles (such as buses and trains) rather than lower-occupancy automobiles. Transit improvements include developing regional bus transit systems and introducing passenger rail service between Phoenix and Tucson, through the study area.

Given that the existing network relies heavily on automobile transportation, the study team also considered mass transit as an alternative form of transportation. This initial screening determined that the modal alternatives previously described would not meet the proposed action's purpose and need, and a new transportation facility—in the form of a freeway—would be needed to accommodate the travel needs of the study area's future population. The study team then began studying where a freeway could be located and producing a recommended set of alternatives for study.

Based on this analysis, the study team decided that developing and evaluating route alternatives for a new freeway was justified (in Stage 2) and that other modal strategies should also be included in long-range transportation improvements in the study area.

Stage 2 – Route Alternatives Evaluation

For the Stage 2 evaluation of freeway route alternatives, the study team used various evaluation criteria that focused on (1) identifying a feasible route for building a freeway, from an engineering perspective; (2) minimizing adverse environmental impacts resulting from the freeway, with consideration of both the natural and built environments and social and economic conditions; and (3) identifying a freeway route that would be acceptable to agencies and members of the public. Performance measures were developed to assess how well potential alternatives satisfied these criteria.

Stage 2 of the process developed and screened route alternatives to identify a reasonable set of continuous alternatives that could be advanced for detailed study. Alternatives were developed using input from agencies and members of the public.

ROUTE ALTERNATIVES

Possible route alternatives were identified, and input from agencies and the public was used to refine the alternatives. Ultimately, the 1,500-foot-wide route alternatives were defined by 56 route segments, each labeled with a letter or letter-number combination (Figure 2.2-1). Different combinations of the route segments could produce hundreds of continuous route alternatives.

STATE ROUTE 79

SR 79 has been suggested as a possible alternative to the proposed action to meet the purpose and need, as described in Chapter 1, *Purpose and Need.* Enhancements to SR 79, however, would not address the proposed action's purpose and need, for the reasons discussed below:

- SR 79 is far from existing and planned development. While the route has a western inflection point in Florence, the route is aligned to the northeast from Florence to Florence Junction (at SR 79's junction with US 60, approximately 13 miles east of Ironwood Drive in the northern portion of the study area) and is aligned southeast from Florence to Oracle Junction (outside of the study area and approximately 22 miles east of I-10). Today, most existing and planned development in the study area is occurring west of the CAP Canal, which is nearly 7 miles west of SR 79 (general area for much of the development occurring today). As the distance from Florence increases north and south along SR 79, so does the distance between SR 79 and planned development.
- SR 79 is east of the CAP Canal. Additional east-to-west roads built to access the facility would have to cross the CAP Canal. The *Pinal Regional Transportation Plan* does not identify funding to connect any of the regionally significant routes with SR 79. Without additional east-to-west connections, SR 79 would not serve regional traffic needs and would do little to alleviate local traffic congestion.
- Traffic modeling shows that SR 79 is expected to perform poorly—at LOS D—by 2040 in the Florence area at the bridge over the Gila River; this is a substantial degradation in its traffic-handling capacity from 2015. Future enhancements to the route may allow it to perform better locally, but the route would not draw sufficient out-of-direction traffic from routes such as Hunt Highway, SR 87, and SR 287, which are all anticipated to operate at LOS F by 2040. South and north of Florence, traffic modeling forecasts acceptable traffic volumes on SR 79 through 2040, even without improvements. This demonstrates that south and north of Florence, SR 79 would not relieve local congestion in the study area, which is projected to increase through 2040.

Figure 2.2-1. Possible route alternatives for evaluation in the project-level EIS (map from the 2014 *Alternatives Selection Report*)

Source: Arizona Department of Transportation (2014a)

2.2.2.4 How Were the Alternatives Analyzed?

During the screening of modal alternatives, the study team used a travel demand model to determine how well the various modes of transportation would meet the proposed action's purpose and need. The analysis used AZTDM2, which incorporates adopted statewide socioeconomic forecasts, with regionally significant roadways identified by Pinal County forming the transportation network (additional information on the travel demand modeling may be found in Section 2.5, *Transportation Performance of the Alternatives*).

A travel demand model relies on many sources of information, including how many people will live in a particular area in the future, their anticipated day-to-day travel destinations, how they would reach their destinations (for example, by driving or taking the bus), how many trips they would make, and which routes they are likely to use. Using this information, the model can predict future travel patterns, can create different scenarios for the future transportation network, and determine how well the network performs (in terms of meeting travel demand without excessive congestion and delays) under such scenarios.

For the screening of freeway alternatives, the study team relied on engineering and environmental studies and agency and public feedback to identify potential routes. The process was supported by geographic information system (GIS) analyses that helped study team members quantify potential impacts for each alternative (for example, how many railroads and canals an alternative would cross, or how many acres of sensitive habitat it would pass through). The study team evaluated the alternatives according to how they performed under the engineering, environmental, and agency and public support criteria. Poorly performing alternatives were dropped from consideration, while well-performing alternatives were advanced to undergo additional evaluations. This iterative process continued until the study team was able to identify a reasonable number of alternatives recommended for evaluation in the project-level DEIS. Appendix C, *Alternatives Screening*, provides further information regarding alternatives screening.

2.2.2.5 Which Corridor Route Alternatives Advanced for Further Consideration?

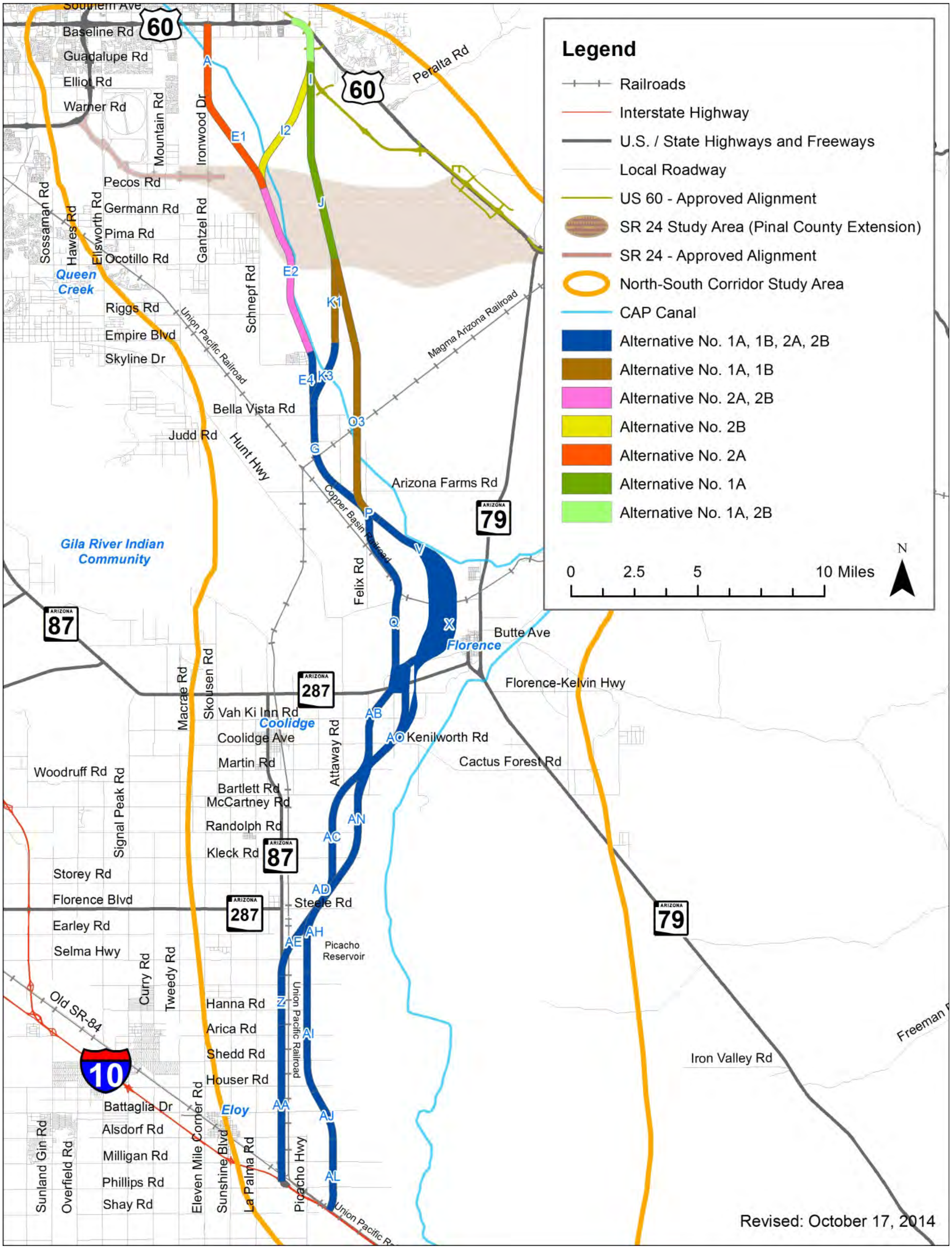
Corridor route alternatives with high ratings were connected to develop continuous route alternatives, sometimes using mid-rated route alternatives to connect along the length of the Corridor. No low-rated route alternatives were used.

The study team met with stakeholder agencies to present the preliminary continuous route alternatives. A consistent comment received from stakeholders was to retain alternatives west of the CAP Canal in the northern portion of the study area for further evaluation. Based on the agency feedback and supplemental information regarding sensitive environmental resources near the Gila River, the study team produced recommended route alternatives for further study in the project-level DEIS (Figure 2.2-2).

Individual route segments in the recommended route alternatives could be combined in any reasonable fashion during the study's project-level DEIS phase to produce many combinations of continuous route alternatives.

The study team documented the alternatives selection process in the ASR, completed in October 2014, which identifies the route alternatives recommended for further study in the project-level EIS and a location/design concept report. Public information meetings were held in the fall of 2014 to provide information regarding the recently completed alternatives analysis process and ASR and to elicit input from study stakeholders and the public in general. This public input was reviewed by the study team, and a summary report of public input was prepared and is available for viewing on the NSCS website.

Figure 2.2-2. Recommended route alternatives (map from the 2014 *Alternatives Selection Report*)



Source: Arizona Department of Transportation (2014a)

2.2.3 Corridor Route Alternative Options and Refinements

After publication of the ASR in October 2014, the alternatives recommended for further study were refined and additional options were studied. The sections that follow describe the refinement process that followed the ASR.

2.2.3.1 Incorporation of the SR 24 Extension into the Action Alternatives

At that time, the regional roadway network for Pinal County was delineated by the RSRSM study. The RSRSM study defined the regionally significant routes for the County to identify corridors for ROW preservation. However, implementation of most of the identified roadway system was predicated on development.

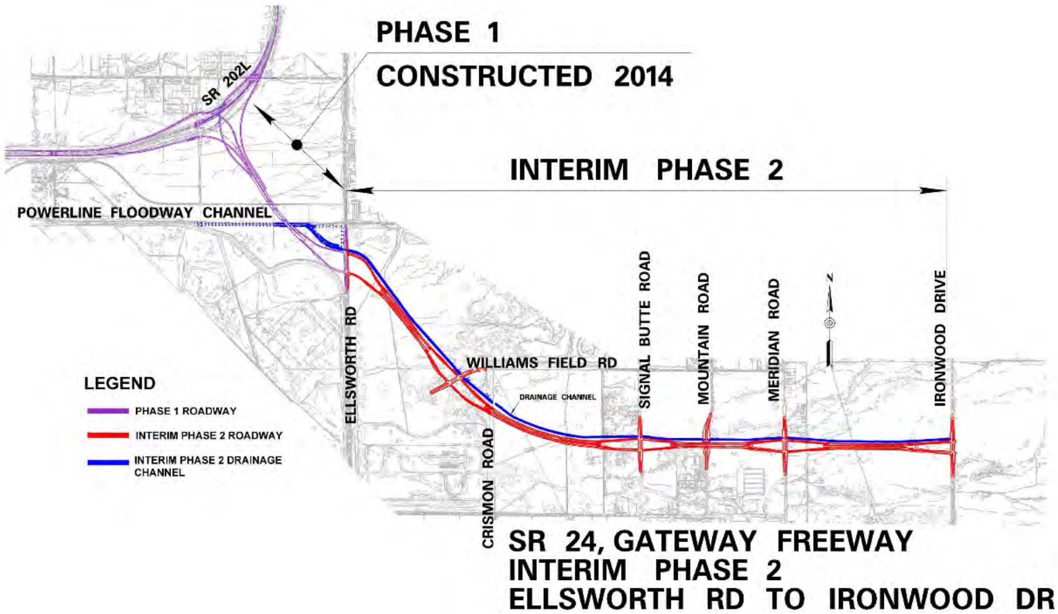
Today, congestion in the Southeast Valley of the Phoenix area partially results from the lack of regional facilities and the fact that development does not occur in a pattern that would build out the arterial street network as needed, but rather as necessary to support development projects. As a result, the system of arterial streets is developed to support developments, but with undeveloped land between these developments and a limited number of through facilities with limited lane capacity, bottlenecks occur. In addition, traffic traveling from the San Tan Valley and throughout Pinal County must make its way along the discontinuous surface street system to reach the Phoenix metropolitan area.

Given the need for a more comprehensive approach to developing the arterial street system, MAG has proposed a framework study for the southeastern portion of the Phoenix metropolitan area (as of August 2019, this study had not begun). This framework study would evaluate the roadway network needed to support the proposed North-South Freeway. As a result, ADOT recommended that the SR 24 study be incorporated into the NSCS, and that the route be evaluated up to the North-South Freeway, but not all the way to US 60 or SR 79—that need would be evaluated by MAG's proposed framework study.

The conceptual alignment alternatives for SR 24 proposed in the fall of 2008 were developed with the assumption that they would continue east from SR 202L to US 60 in the area of SR 79. In addition, they were developed in advance of the alternatives currently under consideration for the North-South Freeway. Since that time, several changes occurred that affected planning for the SR 24 alternatives.

The NEPA study and design for the SR 24 extension to Ironwood Drive, completed in 2011, identified three phases of construction. The initial phase of construction (SR 202L to Ellsworth Road) was completed in 2014. The second phase would have continued the route 3 miles east to Meridian Road, and the third phase would have extended it an additional mile east to Ironwood Drive. However, in 2015, with development in the area outpacing what was projected in the final 2011 environmental assessment, MAG prepared the *SR-24 Williams Gateway Freeway, Ellsworth Road – Ironwood Road Interim Phase II Feasibility Study*. This study triggered a revaluation of the final 2011 environmental assessment, and an interim second phase of construction between Ellsworth Road and Ironwood Drive (see Figure 2.2-3) was approved by FHWA in January 2018. Construction of this segment is planned to commence in 2019. This extension sets the footprint of SR 24 at a half mile south of Williams Field Road, establishing a starting point for alternatives just east of Ironwood Drive.

Figure 2.2-3. Approved second phase of SR 24 construction (map from SR 24 design concept report)



Source: Arizona Department of Transportation (2017b)

ADOT is currently considering the extension of SR 24 east from Ironwood Drive and establishing a logical terminus at the North-South Freeway (the end would be determined by the selected alternative). Alternatives for consideration should not preclude an extension to the east because future studies may recommend this extension.

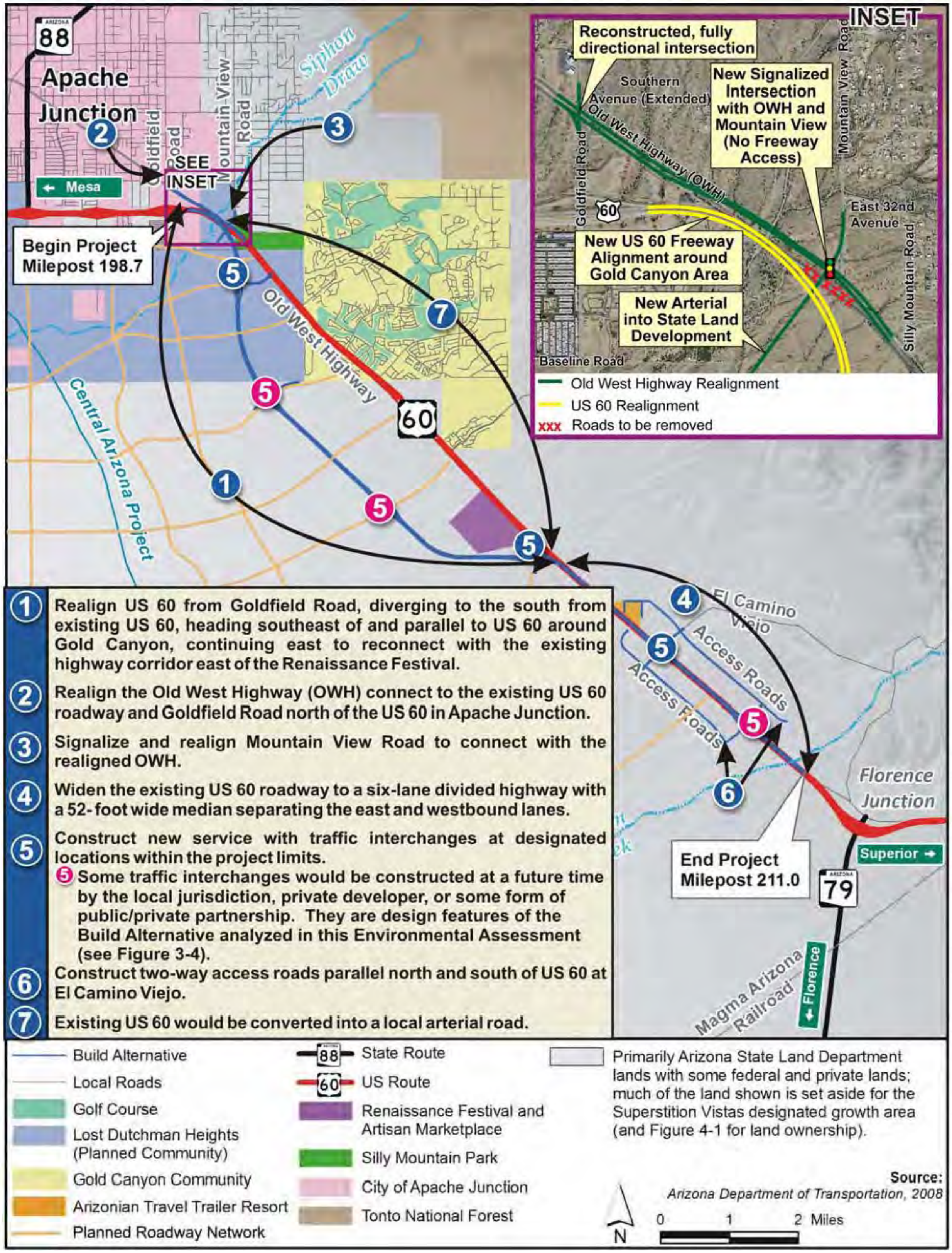
These factors provide the context for an SR 24 extension to the North-South Freeway, substantially reducing the area of options to consider for the system traffic interchange connecting the two freeways.

2.2.3.2 US 60 Bypass Connection

As Figure 2.2-4 (from the US 60 alignment study) illustrates, the US 60 bypass realigns US 60 between Mountain View Road and just south of the Renaissance Festival and Artisan Marketplace.

Along the northern portion of the bypass, the alignment of the North-South Freeway Eastern Alternative would be co-located with the bypass alignment as the freeway ties into US 60. South of US 60, the two freeways would split, with the US 60 bypass continuing southeast and the North-South Freeway continuing south or southwest, depending on the selected action corridor alternative.

Figure 2.2-4. Approved US 60 bypass, as shown in a map from the US 60 alignment study (2010)



Source: From ADOT, *US 60 Alignment Study: Superstition Freeway to Florence Junction Draft Environmental Assessment*, Figure 3-2: Build Alternative

2.2.3.3 Alternative Options Considered and Eliminated from Further Consideration

The following two optional routes were suggested by agencies and eliminated from further consideration through the NEPA process.

Options to Connect with SR 88 (Idaho Road)

In 2015, FHWA requested that ADOT consider adding options that would connect the North-South Freeway with US 60 at SR 88 (Idaho Road). This connection with US 60 would avoid some of the impacts on the community and businesses that would be affected by the US 60 connection at Ironwood Drive. The options were considered as avoidance alternatives if the Corridor resulted in environmental impacts at the system traffic interchange with US 60 under consideration. Two options were developed:

- Option A1 – a northbound transition from Segment E1 along the Western Alternative, crossing the CAP Canal, and following the Idaho Road alignment at Baseline Road, terminating with a system traffic interchange at US 60.
- Option A2 – a northbound transition from Segment J along the Eastern Alternative, following the Idaho Road alignment at Baseline Road, terminating with a system traffic interchange at US 60.

The Idaho Road options were shared with agency stakeholders in July 2015. Most of the land traversed by these options is owned by ASLD and planned for future development (see Section 3.2, *Land Use*, for more information). As a result, ASLD opposed the proposed Idaho Road options because a freeway in those locations would affect the planned 7,700-acre Lost Dutchman Heights development. Moreover, Salt River Project expressed written support for ASLD's opposition to the proposed Idaho Road options, citing concerns over impacts on Lost Dutchman Heights and on the Flood Control District of Maricopa County's flood-retarding structures (FRSs) in the area. Both agencies submitted formal letters to ADOT stating these positions in January 2016 (see Appendix A, *Agency Coordination*). As a result of this opposition, the Idaho Road options were eliminated from further study.

2.2.4 Conversion to a Tier 1 Environmental Impact Statement

To obtain NEPA approval for a project-level EIS, the study would need to follow federal guidelines dated February 9, 2011 (*Supplement to January 28, 2008, "Transportation Planning Requirements and their Relationship to NEPA Process Completion"*). According to the guidelines, funding sources for the proposed action would need to be identified before ADOT could sign the final project-level EIS ROD. Given the realities of funding, and the need for the study to serve long-term planning purposes, the decision was made to convert the project-level EIS to a tiered EIS. This change allows the study to be completed as a federally approved NEPA action.

This change allows the timing of the final project-level NEPA approval in Tier 2 to more closely correlate with the actual timing of project construction, because Tier 2 studies can be completed over time as construction funding becomes available. Tier 2 projects may occur in segments, with individual NEPA analyses and decisions advancing different segments of the corridor in response to need and funding.

In recent years, the use of tiering for NEPA documents has increased; CEQ regulations allow tiering as an option to organize analyses and decision-making in complex circumstances while taking into account the timing of different decisions (40 CFR Parts 1500–1508; 40 CFR § 1502.20; 23 CFR Part 771). A revised Notice of Intent for the Tier 1 EIS was published in the *Federal Register* on October 3, 2016, to reinitiate the NEPA process.

In accordance with this approach, the Tier 1 DEIS for the Corridor will provide the basis for an informed decision on a 1,500-foot-wide corridor for a new transportation facility between Apache Junction and Eloy, in which a narrower future transportation facility alignment will be identified in Tier 2. As a result, the environmental analyses documented in this Tier 1 DEIS provide an appropriate level of detail needed to make an informed decision on a preferred corridor, if an action corridor alternative is selected. The Tier 1 study does not provide for the selection of a route location; instead, the appropriate level of detailed engineering and environmental analyses to inform a specific alignment decision would be completed in subsequent Tier 2 studies.

With the conversion to a Tier 1 EIS, the 400-foot-wide alignments developed as part of the project-level DEIS process after completing the ASR were no longer being considered. The study team would instead consider the 1,500-foot-wide route alternatives for the Corridor that were developed and subsequently refined (as described in this chapter) through the NEPA process. Should an action corridor alternative be selected, a specific route location would be selected during the subsequent Tier 2 studies.

2.2.4.1 Modifications to Avoid Environmentally Sensitive Resources

As the study continued and further environmental and land use data were made available to the study team, additional modifications to the 1,500-foot-wide route alternatives (see Figure 2.2-2) were made.

Concurrent with the conversion of the NSCS to a Tier 1 EIS, project-level evaluation work on the alignments identified a number of sensitive cultural resources that would be affected by the alignments. Given the sensitive nature of these sites, specific information regarding the sites is provided in reports that have been shared with affected parties, but is not part of the public record for the NSCS. Additional information on cultural resources may be found in Section 3.14, *Cultural Resources.*

To avoid impacts on these sites, the 1,500-foot-wide route alternatives for the Corridor were modified. These modifications took place near the Gila River, near Florence’s historic downtown, and near the Queen Creek crossing. The changes were discussed with the Four Southern Tribes (Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O’odham Nation) in compliance with Section 106 of the National Historic Preservation Act (NHPA, see Section 3.14, *Cultural Resources)*.

Gila River Crossing and Downtown Florence

Because of impacts on environmentally sensitive resources on the northern and southern banks of the Gila River, the ASR segments “AB” and “X” were no longer considered viable. This meant that the transition option that allowed consideration of the “Q” alignment across the Gila River was no longer viable because of impacts on these environmentally sensitive resources.

To address these concerns, the study team modified the Eastern Alternative through this area to avoid the environmentally sensitive resource impacts. North of Coolidge Avenue, approximately 2 miles south of SR 287, the action corridor alternatives were shifted farther east (where they cross SR 287). To avoid environmentally sensitive resource along the Gila River, the Eastern Alternatives were modified to cross the Gila River approximately 0.5 mile east of the ASR alignments.

Queen Creek Crossing

Near Queen Creek, the Eastern Alternatives were modified to avoid impacts on environmentally sensitive resources. This involved shifting the ASR alignments referred to as “J” and “O3” approximately 1.5 miles to the east. Also, given potential impacts on the environmentally sensitive resources, the transition options identified in the ASR as “K1” and “K3” were eliminated from consideration. This change affected the SR 24 connection with the Corridor by extending the SR 24 alternatives 1.5 miles to the east to make the connection. North of Queen Creek, the “I2” transition option was retained.

2.2.4.2 Modifications to Support a Western Alternative

FHWA challenged the study team to develop a route that provided a viable Western Alternative for consideration that avoided impacts on known cultural resource sites at the Gila River crossing. To do so, the study team returned to the ASR to consider whether any of the 56 original route alternatives might be reevaluated. Routes east of and including SR 79 were not considered for two reasons: (1) they were not contemplated as part of the ASR, and (2) routes that far to the east would not effectively address the purpose and need of improving regional mobility and connectivity.

A western alignment was developed near the previously eliminated ASR alignments “C” and “D,” which connected Ironwood Drive in the northern portion of the study area with the SR 87 alignment in the southern portion of the study area (see Figure 2.2-2). These westernmost alignments in the ASR were not advanced from the ASR primarily because of low ratings from the public and local agencies.

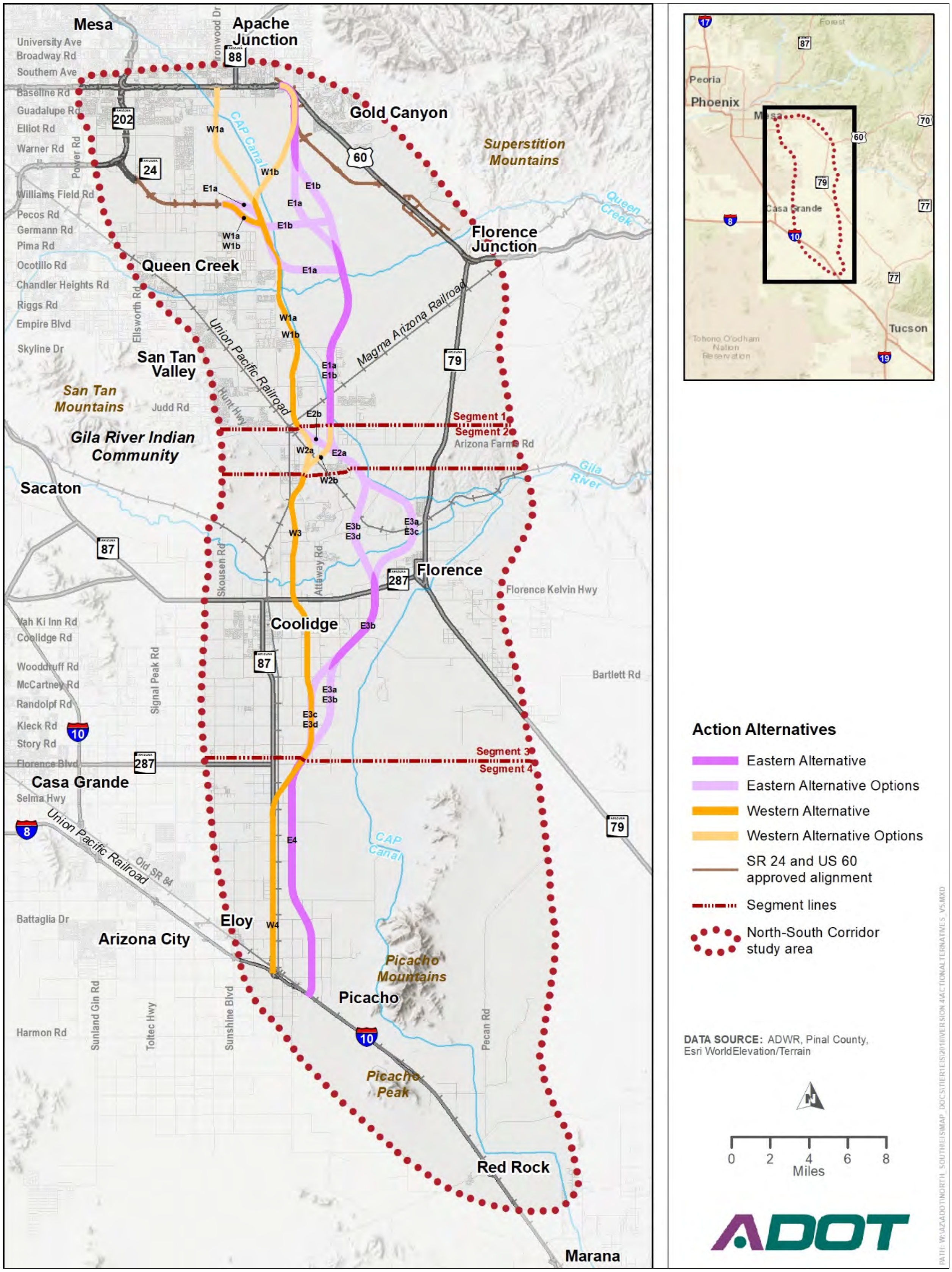
At its northern end, the new Western Alternative branches off the ASR alignments near Arizona Farms Road. The route avoids existing development north of Hunt Highway, crossing the route at close to a right angle before shifting to the south to avoid a UPRR crossing. South of Hunt Highway, the new corridor generally trends north-to-south for much of its length, avoiding impacts on environmentally sensitive resources along its course. South of the Gila River and SR 287, the alternative shifts approximately 0.5 mile to the east to minimize impacts on existing development before rejoining the ASR alignments at the McCartney Road alignment.

2.2.5 Action Corridor Alternatives Recommended for Evaluation

After several refinements to the ASR alignments, including the consideration of environmentally sensitive resources after the NSCS conversion to a Tier 1 EIS study, the 1,500-foot-wide action corridor alternatives recommended for evaluation in this Tier 1 DEIS were identified. Figure 2.2-5 shows the action corridor alternatives, separated into four segments that partition the study area.

When considered as connected corridors that run the length of the study area, the 1,500-foot-wide action corridor alternatives include a Western Alternative (shown in orange on Figure 2.2-5), an Eastern Alternative (shown in purple on Figure 2.2-5), and combinations of both to avoid and minimize environmental impacts. The action corridor alternatives in Segments 1, 2, and 3 include options (shown in paler colors of orange and purple relating to the Western and Eastern Alternatives, respectively, on Figure 2.2-5). In total, eight full-length action corridor alternatives with options that result in a total of 40 possible continuous through routes are evaluated in this Tier 1 DEIS and are described in detail in Section 2.3, *Action Corridor Alternatives*.

Figure 2.2-5. Tier 1 action corridor alternatives, by segment



2.3 Action Corridor Alternatives

As indicated in the previous section, after completion of the ASR in October 2014, and subsequent corridor refinements, eight full-length action corridor alternatives and options (allowing for a total of 40 continuous action corridor alternatives) are studied in detail in this Tier 1 DEIS. An overview of the study area, including the segments and naming conventions used in the evaluation of potential impacts in Chapter 3, *Affected Environment and Environmental Consequences*, is presented first. Specific details for each of the eight full-length action corridor alternatives are presented next. Appendix C, *Alternatives Screening*, provides further information regarding the alternatives.

2.3.1 Action Corridor Alternatives, by Segment

The purpose of the proposed action is to provide a new north-to-south transportation facility that connects the growing communities in central Pinal County with US 60 and I-10, and the extension of SR 24, which currently connects with SR 202L (Santan Freeway) west of the study area in the Phoenix area. All action corridor alternatives would be access-controlled freeways with three travel lanes in each direction and would not preclude future passenger rail in the freeway ROW.

The study area is divided into four segments that incorporate transition areas to allow the action corridor alternatives to shift east to west or west to east and to facilitate the evaluation of proposed action-related impacts (see Figure 2.2-5). Table 2.3-1 identifies the approximate limits of the four segments. The ability to shift east to west or west to east allows each segment to be studied separately, facilitating the avoidance of sensitive resources as necessary while maintaining a continuous north-to-south freeway corridor.

Table 2.3-1. Approximate limits of study area segments

Segment	Northern limit	Southern limit
1	U.S. Route 60	1 mile north of Arizona Farms Road
2	1 mile north of Arizona Farms Road	1.5 miles south of Arizona Farms Road
3	1.5 miles south of Arizona Farms Road	1 mile south of Storey Road
4	1 mile south of Storey Road	Interstate 10

To facilitate the evaluation of the action corridor alternatives by segment, they are named according to their location to the east (E) or west (W) and their segment (1, 2, 3, or 4). Letters are added to the name if multiple options are under consideration (a, b, c, or d). Table 2.3-2 lists the action corridor alternatives.

Table 2.3-2. Action corridor alternatives, by segment

Segment	Eastern Alternative	Western Alternative
1	E1a Alternative E1b Alternative	W1a Alternative W1b Alternative
2	E2a Alternative E2b Alternative	W2a Alternative W2b Alternative
3	E3a Alternative E3b Alternative E3c Alternative E3d Alternative	W3 Alternative
4	E4 Alternative	W4 Alternative

2.3.2 Full-length Action Corridor Alternatives

The eight full-length action corridor alternatives are described in detail below. These alternatives were developed based on their ability to maintain eastern or western alignments along their lengths, or to shift from east to west or west to east between the study area segments to avoid or minimize impacts on environmental resources. Table 2.3-3 identifies the segmented action corridor alternatives incorporated into each of the eight full-length action corridor alternatives and shows the total corridor length.

Table 2.3-3 also compares the characteristics of the eight full-length action corridor alternatives. The lengths of the North-South Corridor (north-to-south) and SR 24 (east-to-west) sections are shown to illustrate how each alternative varies based on the options selected.

Table 2.3-3. Comparison of characteristics of the full-length action corridor alternatives, by segment and length

Characteristic	Full-length action corridor alternative							
	1	2	3	4	5	6	7	8
Total possible segment configurations	2[a]	8[a,b]	8[a,b]	2[a]	2[c]	8[b,c]	8[b,c]	2[c]
Length of North-South Corridor (miles)	48.1–48.4	50.6–52.9	51.6–54	49.2–49.5	48.5–48.8	49.6–52	50.7–53	49.5–49.8
Length of State Route 24 (miles)	2.4	2.4	2.4	2.4	5.9–8	5.9–8	5.9–8	5.9–8
Total length (miles)[d]	50.5–50.8	52.9–55.3	54–56.3	51.5–51.8	54.4–56.8	55.6–60	56.6–61	55.5–57.8
Option 1	W1a, W2a, W3, W4	W1a, E2b, E3a or E3c, W4	W1a, E2b, E3a or E3c, E4	W1a, W2a, W3, E4	E1a, W2b, W3, W4	E1a, E2a, E3a or E3c, W4	E1a, E2a, E3a or E3c, E4	E1a, W2b, W3, E4
Option 2	W1b, W2a, W3, W4	W1b, E2b, E3a or E3c, W4	W1b, E2b, E3a or E3c, E4	W1b, W2a, W3, E4	E1b, W2b, W3, W4	E1b, E2a, E3a or E3c, W4	E1b, E2a, E3a or E3c, E4	E1b, W2b, W3, E4
Option 3	—[e]	W1a, E2b, E3b or E3d, W4	W1a, E2b, E3b or E3d, E4	—	—	E1a, E2a, E3b or E3d, W4	E1a, E2a, E3b or E3d, E4	—
Option 4	—	W1b, E2b, E3b or E3d, W4	W1b, E2b, E3b or E3d, E4	—	—	E1b, E2a, E3b or E3d, W4	E1b, E2a, E3b or E3d, E4	—

[a] W1a or W1b [b] E3a or E3b or E3c or E3d [c] E1a or E1b
[d] Action corridor alternatives' length is inclusive of the east-to-west State Route 24 connection.
[e] not applicable

All of the action corridor alternatives have two options in Segment 1: the Eastern Alternative has E1a and E1b and the Western Alternative has W1a and W1b. In Segment 3, the Eastern Alternative has four options: E3a, E3b, E3c, or E3d. Therefore, any of the alternatives that follow the Eastern Alternative in Segment 3 have a total of eight options available.

The range of lengths shown in Table 2.3-3 is a result of the various options. In Segment 1, the W1a Alternative is 0.3 mile shorter than W1b, and the E1a Alternative is 2.4 miles longer than E1b. The difference in the two Eastern Alternatives' SR 24 connections contribute to the differences in these alternatives. In Segment 3, the differences between E3a and E3c, and between E3b and E3d, are insignificant from a traffic perspective; therefore, the E3a and E3b results are representative of E3c and E3d, respectively. The E3a Alternative is 1.9 miles longer than the E3b Alternative. In Segment 4, the E4 Alternative is 1.1 miles longer than the W4 Alternative.

For both the Eastern and Western Alternatives, the anticipated 2040 travel time from I-10 near Eloy to the eastern Phoenix metropolitan area would drop from 83 minutes with the No-Action Alternative to 47 minutes with the Eastern Alternative and 45 minutes with the Western Alternative. For all of the action corridor alternatives, the Corridor is projected to operate at an acceptable LOS for its entire length. The annual average daily traffic (ADT) is expected to range from 5,000 vehicles per day or fewer at the proposed action’s juncture with I-10 at the south to as many as 45,000 vehicles per day at its northern terminus with US 60. Approximately 9 percent of the vehicles on the Corridor would be trucks.

2.3.2.1 Segment 1

Segment 1 begins in the northern end of the Corridor at US 60 and continues south to the junction of Magma Arizona Railroad and UPRR, just north of Arizona Farms Road. Segment 1 contains two Eastern Alternatives (E1a and E1b) and two Western Alternatives (W1a and W1b).

The E1a and E1b Alternatives connect with US 60 just north of Gold Canyon, where the east-to-west-aligned US 60 curves to the southeast. In Segment 1, the Eastern Alternatives are east of the CAP Canal from their northern terminus with US 60 to just south of the Magma Arizona Railroad, where they cross the CAP Canal. This is the only instance where the alternatives are east of the CAP Canal. The E1a and E1b Alternatives follow similar alignments except where they connect with SR 24—the E1a Alternative makes a southern connection to SR 24, crossing the CAP Canal at the Ocotillo Road alignment, and the E1b Alternative makes a northern connection to SR 24, crossing the CAP Canal at the Germann Road alignment. The north-to-south length of the E1a and E1b Alternatives varies by only three-tenths of a mile (19 and 18.7 miles, respectively); however, the southern E1a Alternative SR 24 connection adds an additional 8 miles to the segment length, while the northern E1b Alternative SR 24 connection adds slightly less than 6 miles to the segment’s overall length.

The W1a and W1b Alternatives share a similar footprint in Segment 1 for most of their length. North of the connection with SR 24, they split. The W1a Alternative follows the Ironwood Drive alignment to its juncture with US 60. The W1b Alternative crosses the CAP Canal just north of the Williams Field Road alignment and joins US 60 to the east, just north of Gold Canyon, where the east-to-west-aligned US 60 curves to the southeast. The overall north-to-south length of the W1a and W1b Alternatives varies by only three-tenths of a mile (18.8 and 19.1 miles, respectively), and the SR 24 connection adds approximately the same length to each alternative (2.4 miles).

2.3.2.2 Segment 2

Segment 2 is a relatively short transition segment. From north to south, this segment begins at the junction of Magma Arizona Railroad and UPRR, just north of Arizona Farms Road, and ends approximately 2 miles to the south. Segment 2 includes the E2a Alternative, which connects the Eastern Alternatives in Segment 1 with the Eastern Alternatives in Segment 3, and the E2b Alternative, which connects the Eastern Alternatives in Segment 1 with the Western Alternative in Segment 3. Segment 2 also includes the W2a Alternative, which connects the Western Alternatives in Segment 1 with the Western Alternative in Segment 3, and the W2b Alternative, which connects the Eastern Alternatives in Segment 1 with the Western Alternative in Segment 3.

2.3.2.3 Segment 3

Segment 3 continues from about 2 miles south of Arizona Farms Road to approximately SR 287 (Florence Boulevard). This segment has one Western Alternative and four Eastern Alternatives: E3a, E3b, E3c, and E3d.

The Segment 3 Eastern Alternatives (E3a, E3b, E3c, and E3d) split in two locations in Segment 3. From north to south, they split as they cross the Gila River, with the E3a and E3c Alternatives to the east and the E3b and E3d Alternatives to the west. The alternatives rejoin each other south of the Gila River (at approximately SR 287). They split again around a property identified for a future regional commercial development just north of Woodruff Road, with the E3a and E3b Alternatives to the east and the E3c and E3d Alternatives to the west.

The W3 Alternative was developed after completion of the ASR in response to potential impacts on environmentally sensitive resources by the ASR route alternatives. The general alignment of W3 is somewhat consistent with an alternative that was evaluated in the ASR, but that was eliminated from further evaluation because of poor impact ratings during the Stage 1 modal alternatives evaluation (see Section 2.2.2.3, *What Alternatives Were Considered?*).

2.3.2.4 Segment 4

Segment 4 extends from approximately SR 287 (Florence Boulevard) to I-10, which is the southern terminus of the action corridor alternatives. Segment 4 includes one Eastern Alternative (E4) and one Western Alternative (W4). From the north, the E4 Alternative is approximately 1 mile east of SR 87 until Battaglia Road, where it is aligned 2 miles east of SR 87. This shift was made to establish adequate spacing between the Corridor’s system traffic interchange with I-10 and the existing service traffic interchange at I-10 and SR 87. The W4 Alternative is largely co-located with SR 87 for its length.

Figures 2.3-1 to 2.3-8 show the full-length action corridor alternatives.

Figure 2.3-1. Alternative 1, with two Segment 1 options

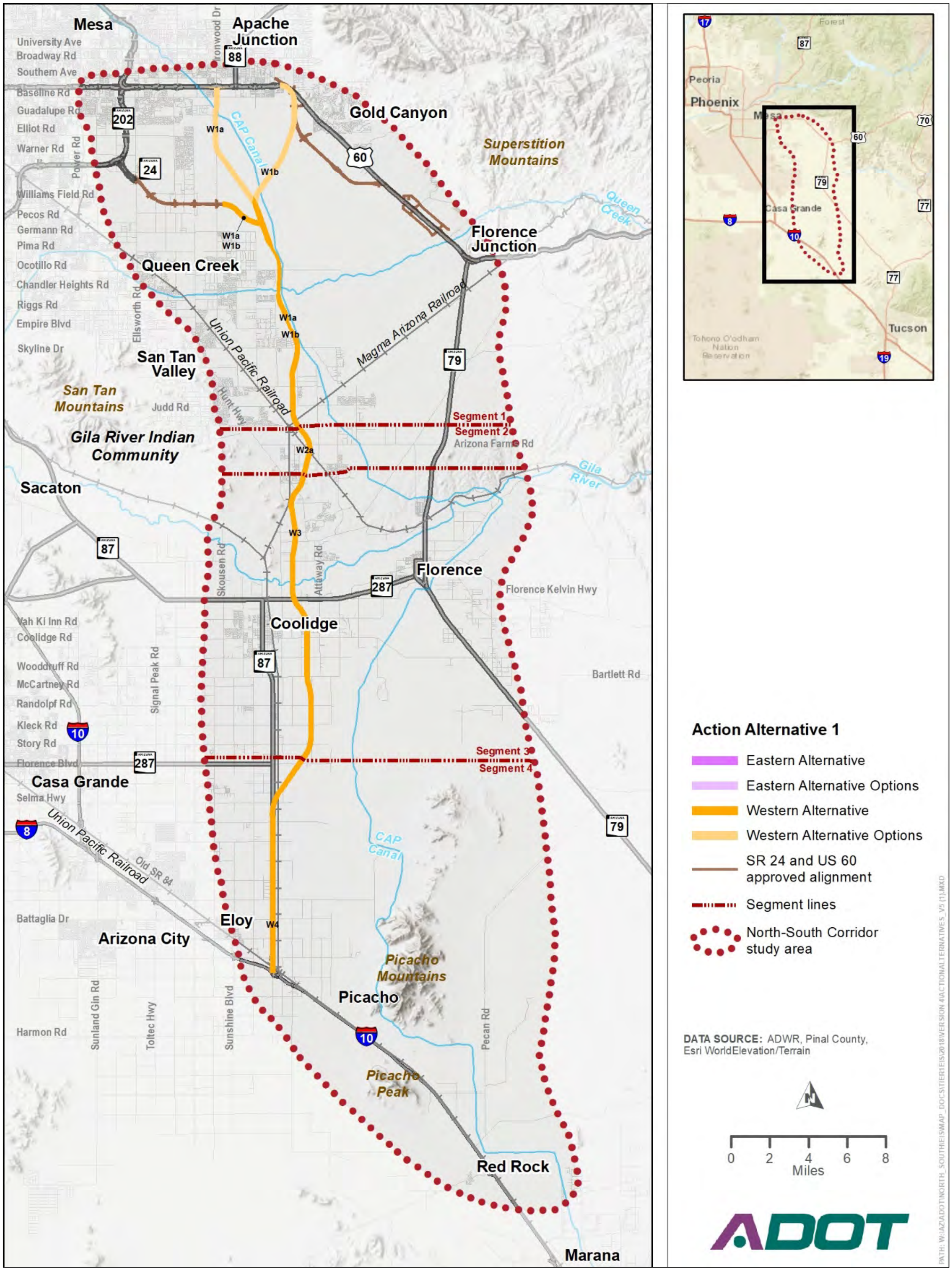


Figure 2.3-2. Alternative 2, with two Segment 1 options and four Segment 3 options

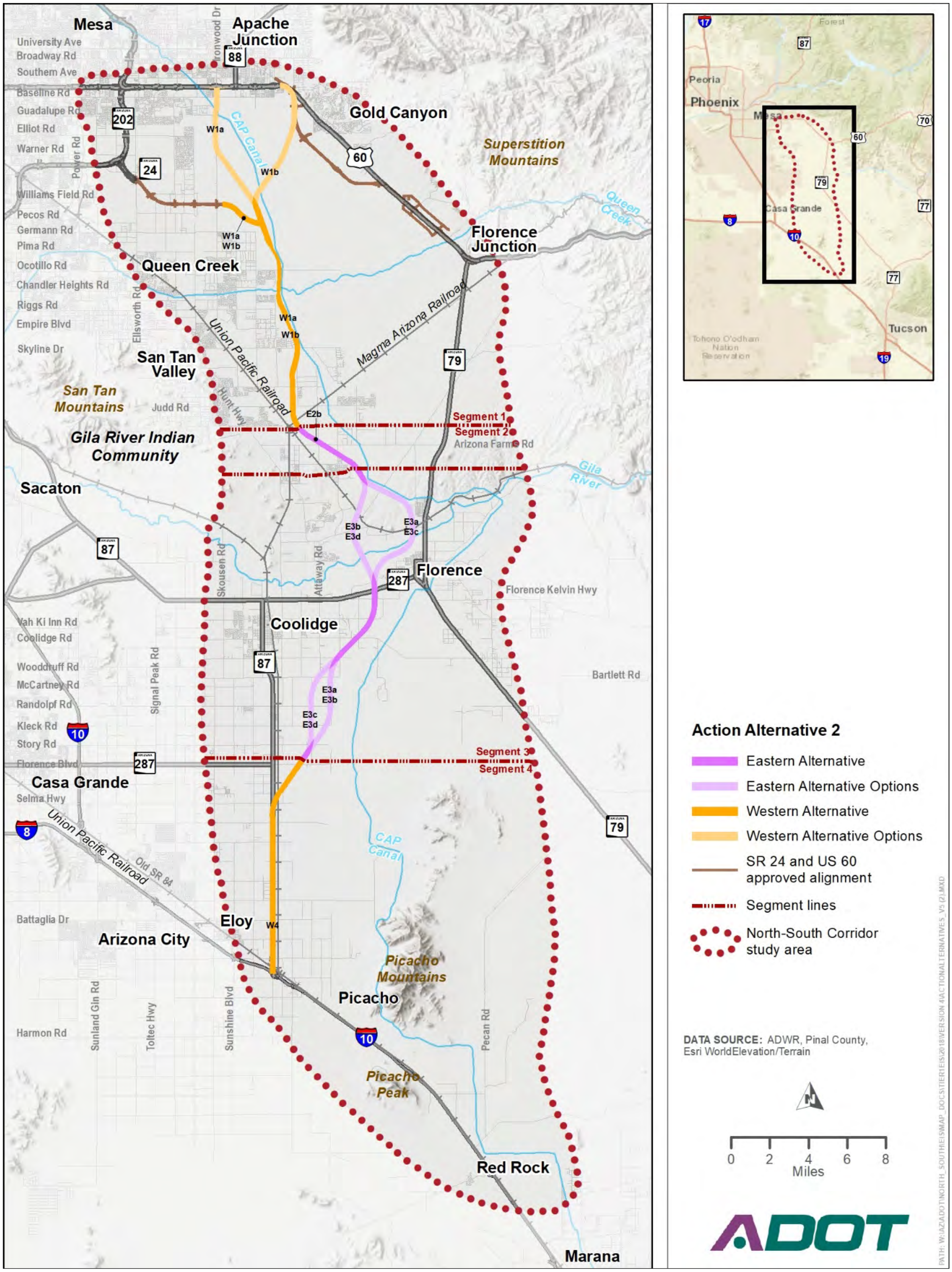


Figure 2.3-3. Alternative 3, with two Segment 1 options and four Segment 3 options

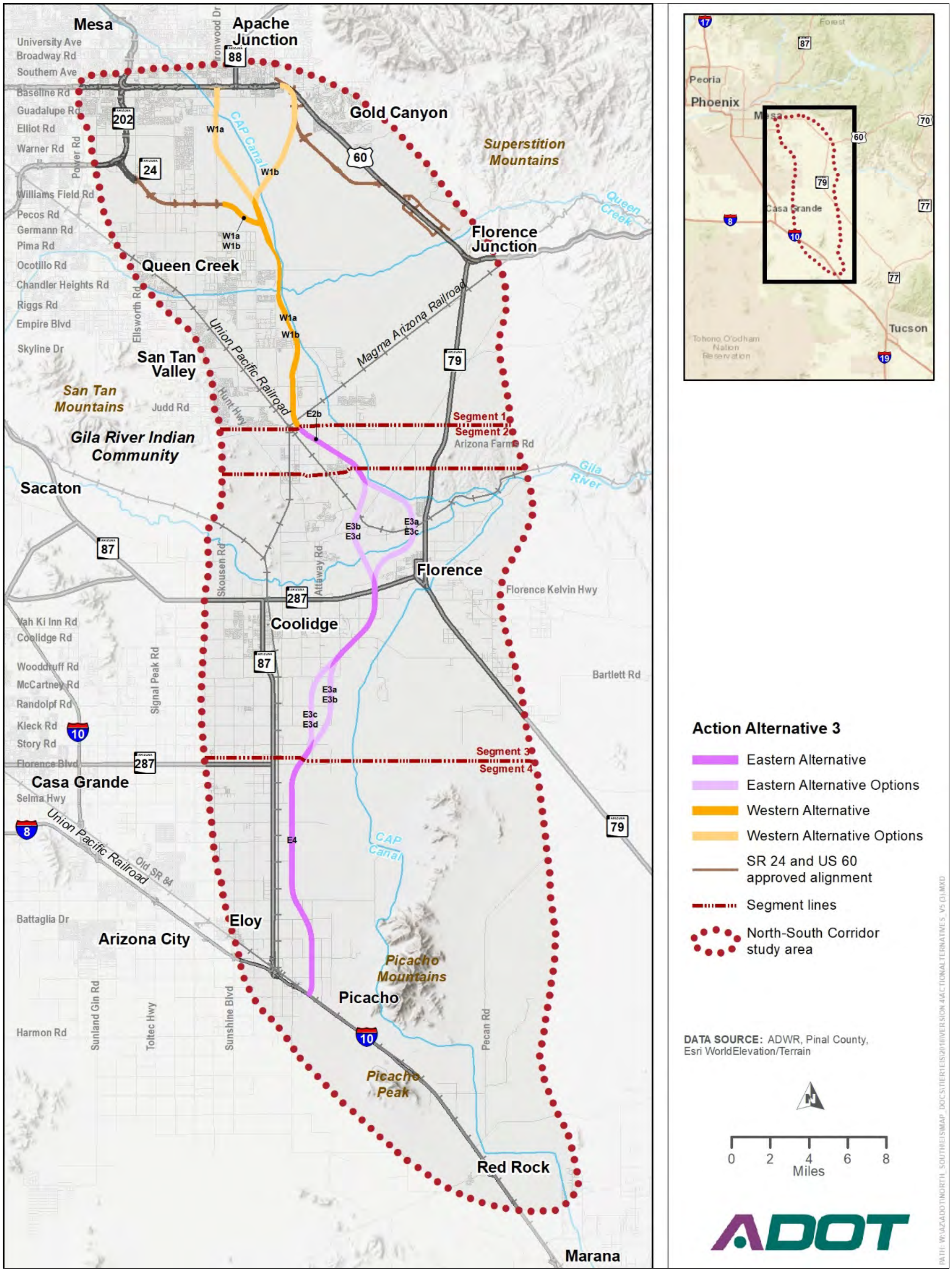


Figure 2.3-4. Alternative 4, with two Segment 1 options

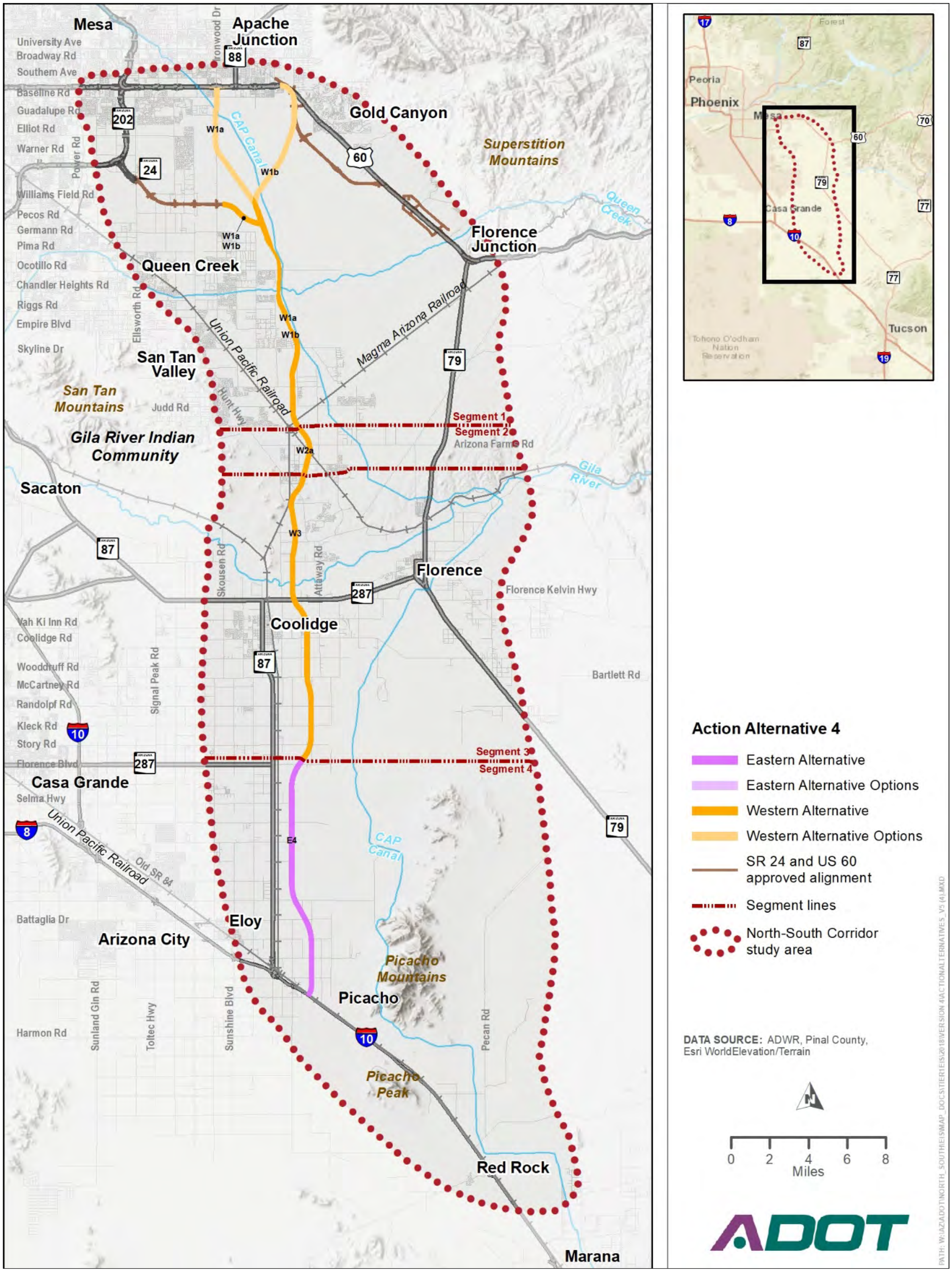


Figure 2.3-5. Alternative 5, with two Segment 1 options

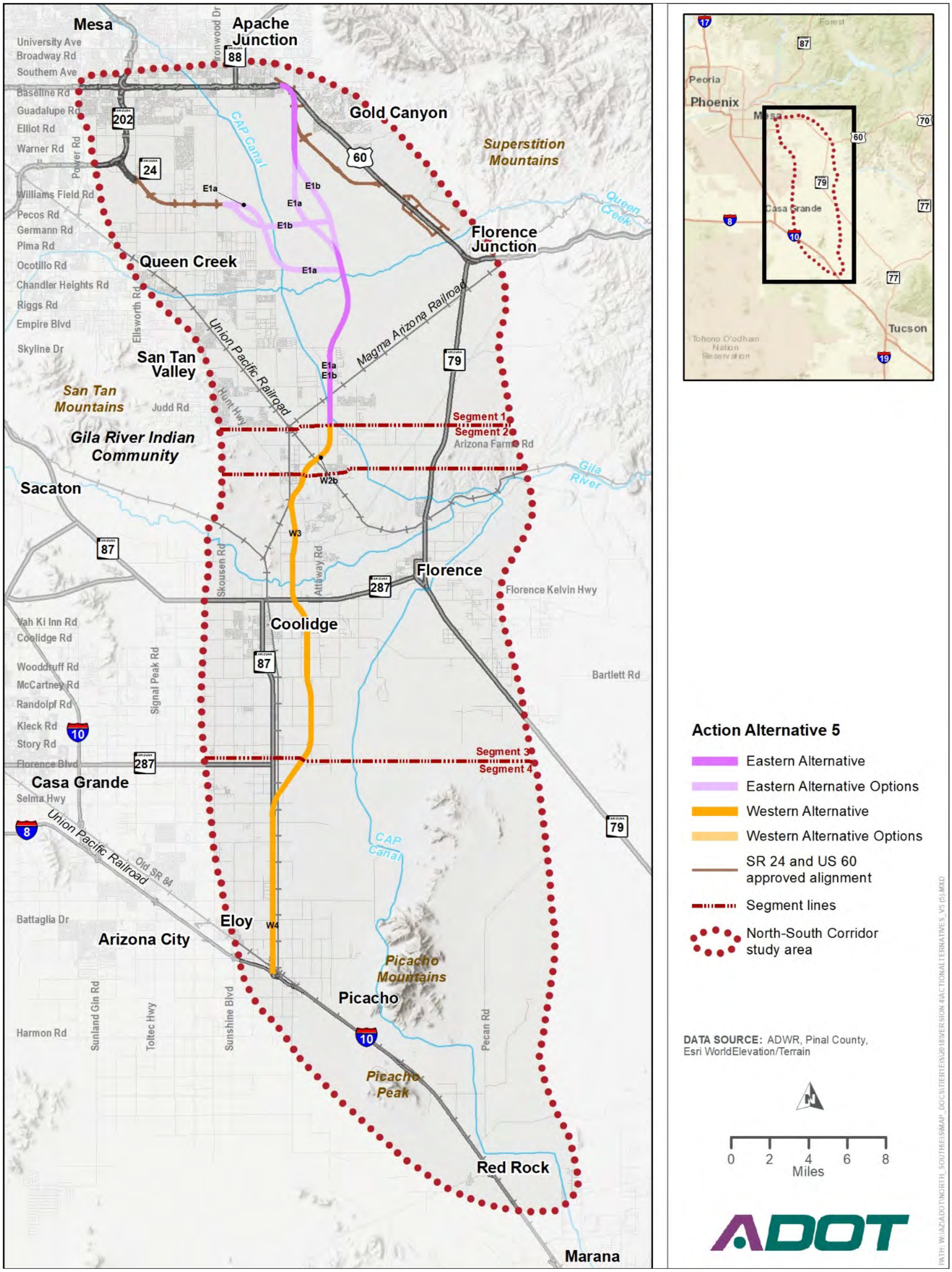


Figure 2.3-6. Alternative 6, with two Segment 1 options and four Segment 3 options

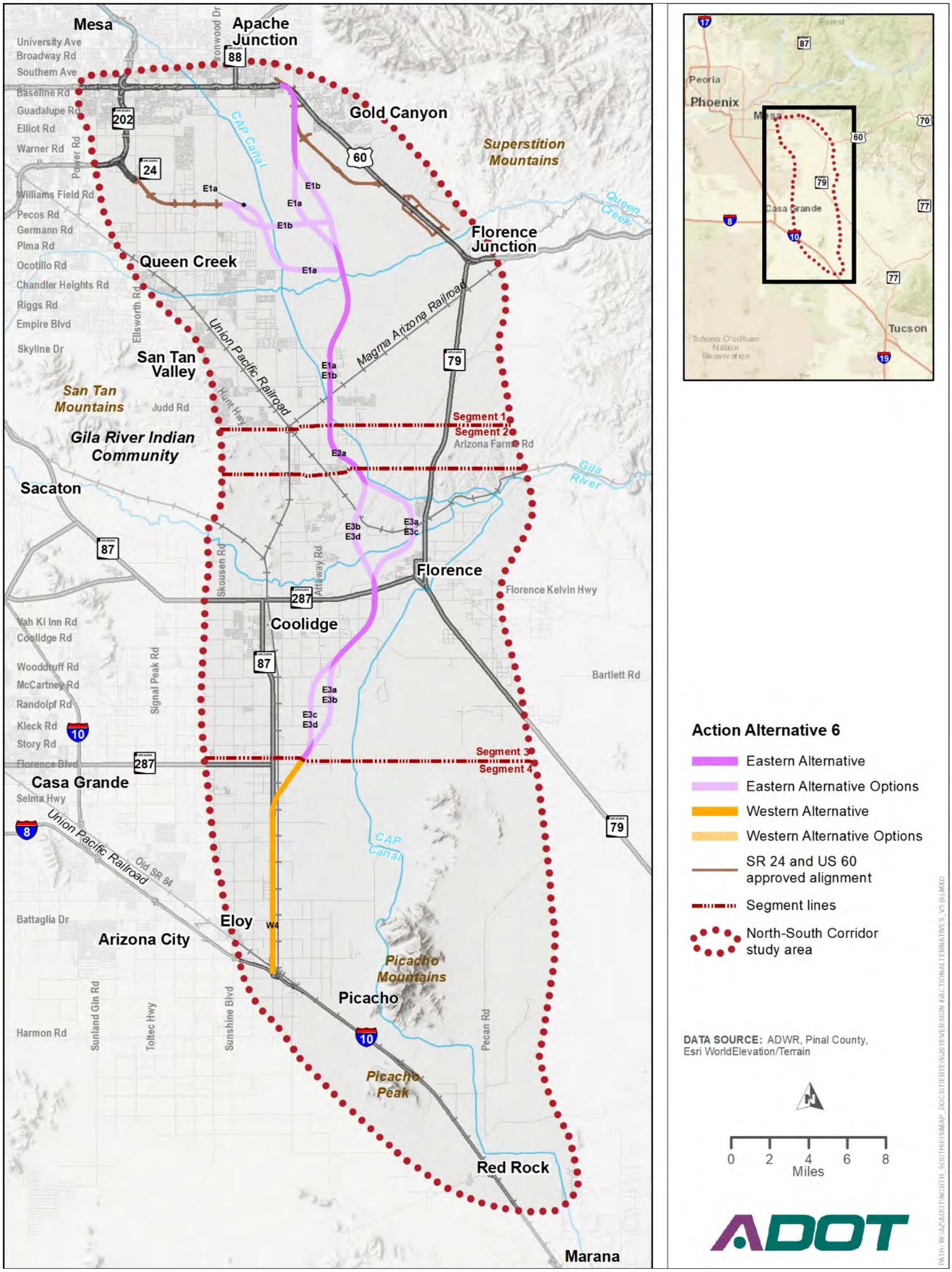


Figure 2.3-7. Alternative 7, with two Segment 1 options and four Segment 3 options

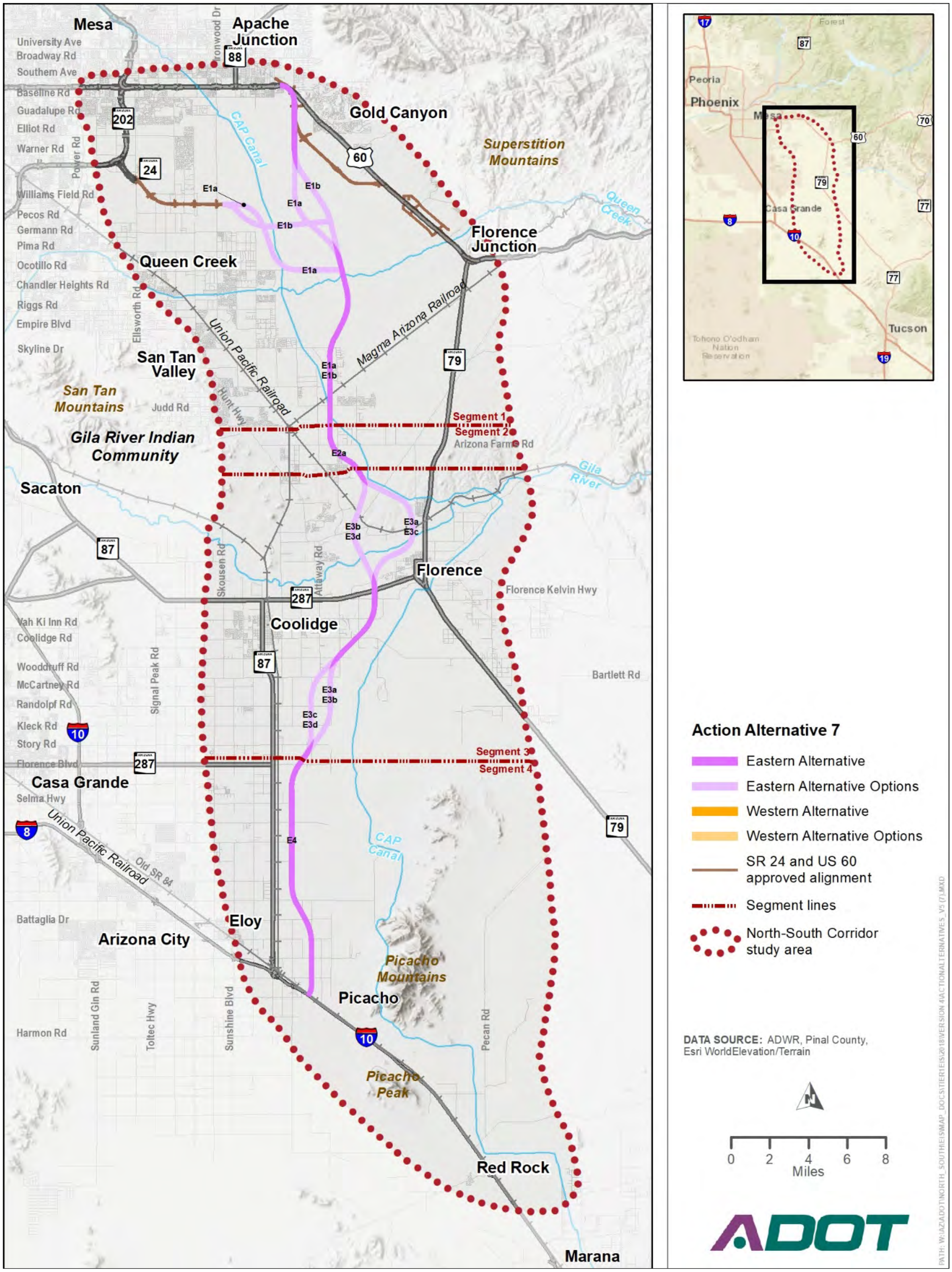
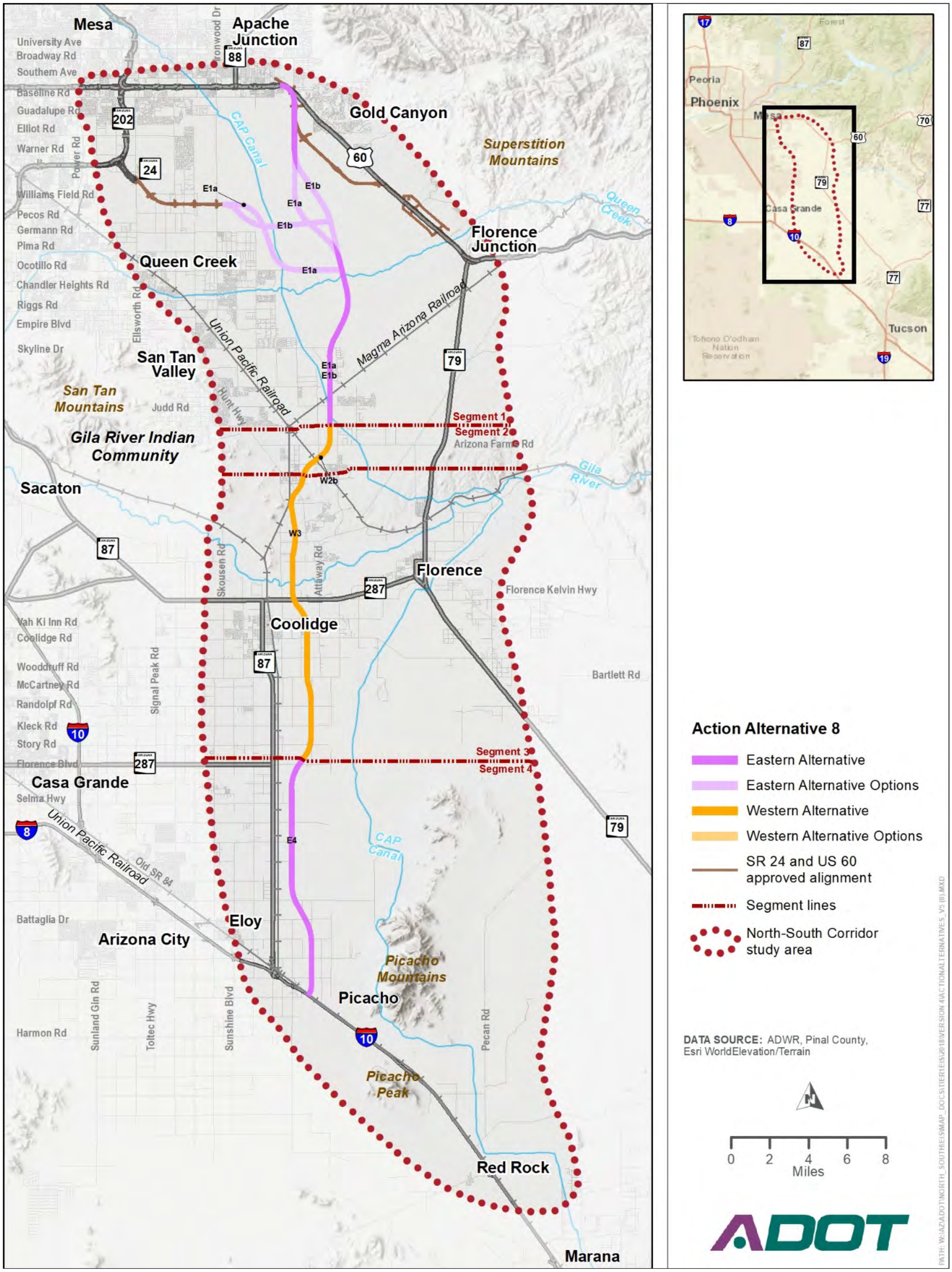


Figure 2.3-8. Alternative 8, with two Segment 1 options



2.3.3 Potential Traffic Interchanges

The location of potential traffic interchanges for the facility would be determined at the Tier 2 study phase. At the Tier 1 EIS phase, the known connections are the proposed Corridor's termini at US 60 in the north and I-10 in the south. Additionally, should an action corridor alternative be selected, the Corridor would include a connection with SR 24.

Pinal County has identified routes of regional significance (see Figure 2.1-1). The County's vision for these routes is to (1) provide continuity across Pinal County and through urban areas, and (2) connect to adjacent counties and state highways. Based on this information, guidance for the spacing of interchanges provided by FHWA, and coordination with affected jurisdictions, the eight full-length action corridor alternatives may have 18 or 19 traffic interchanges, depending on whether the Western Alternative or Eastern Alternative, respectively, is chosen in Segment 1, as indicated in Table 2.3-4.

Table 2.3-4. Potential interchange locations

Interchange	Eastern Alternative	Western Alternative	Comments
Segment 1			
U.S. Route 60	●	●	E1a, E1b, W1a, and W1b Alternatives – system traffic interchange with U.S. Route 60
U.S. Route 60 bypass[a]	●	○	E1a, E1b, and W1b Alternatives – system traffic interchange with proposed U.S. Route 60 bypass
Elliot Road	●	●	E1a, E1b, and W1b Alternatives – Elliot Road access complicated by interchange with proposed U.S. Route 60 bypass
State Route 24	●	●	Eastern Alternatives – two system traffic interchange options (E1a, E1b)
Ocotillo Road	●	●	E1a Alternative – Ocotillo Road access complicated by interchange with State Route 24
Riggs/Combs Road	●	●	E1a, E1b, W1a, and W1b Alternatives – service traffic interchange
Skyline Drive	●	●	E1a, E1b, W1a, and W1b Alternatives – service traffic interchange
Bella Vista Road	●	●	E1a, E1b, W1a, and W1b Alternatives – service traffic interchange
Segment 2			
Arizona Farms Road	●	●	E2a, E2b, W2a, and W2b Alternatives – service traffic interchange
Segment 3			
Hunt Highway	●	●	E3a, E3b, E3c, E3d, and W3 Alternatives – service traffic interchange
State Route 287	●	●	E3a, E3b, E3c, E3d, and W3 Alternatives – service traffic interchange
Martin Road	●	●	E3a, E3b, E3c, E3d, and W3 Alternatives – service traffic interchange
Bartlett Road	●	●	E3a, E3b, E3c, E3d, and W3 Alternatives – service traffic interchange
Kleck Road	●	●	E3a, E3b, E3c, E3d, and W3 Alternatives – service traffic interchange

Table 2.3-4. Potential interchange locations

Interchange	Eastern Alternative	Western Alternative	Comments
		Segment 4	
Steele Road	●	●	E4 and W4 Alternatives – service traffic interchange
Selma Highway	●	●	E4 and W4 Alternatives – service traffic interchange
Hanna Road	●	●	E4 and W4 Alternatives – service traffic interchange
Houser Road	●	●	E4 and W4 Alternatives – service traffic interchange
Interstate 10	● (red)	● (red)	E4 and W4 Alternatives – system traffic interchange; southbound movement not anticipated at this time

Notes: ● = service traffic interchange, ● (red) = system traffic interchange, ○ = alternative and route do not cross
[a] Design of the action corridor alternative and proposed U.S. Route 60 Bypass would be determined through a subsequent Tier 2 study.

2.4 No-Action Alternative

A No-Action Alternative is included for detailed study in accordance with NEPA requirements to compare beneficial and adverse impacts of the action corridor alternatives in the horizon year (2040) with the consequences of not advancing one of the action corridor alternatives. The No-Action Alternative would not construct a north-to-south freeway. However, with the No-Action Alternative, other transportation projects that have been programmed in the applicable regional transportation plan would be constructed. In addition, major land use changes anticipated to occur by 2040 are included in the No-Action Alternative.

2.4.1 Programmed Transportation Projects

The 2040 No-Action Alternative represents the future baseline conditions without a new north-to-south freeway. Improvements to major transportation corridors that are reflected in the 2040 network include:

- Hunt Highway widened to six lanes continuously, from SR 79 to western study area boundary
- I-10 widened to six lanes throughout study area limits
- Ocotillo Road – widened from Gantzel Road to Kenworthy Road
- Korsten/Kleck Road widened to four lanes to the action corridor alternative[1]
- Selma Highway widened to four lanes from SR 87 to the action corridor alternative

These projects are transportation improvements that ADOT or local agencies have identified as funded in their 5-year construction programs or as part of their fiscally constrained long-range plans.

2.4.2 Major Land Use Changes

As discussed in Section 1.4, *Need for the Proposed Action*, land use in the study area is projected to transform from predominantly undeveloped and agricultural uses today to predominantly residential uses with a blend of commercial, open space, industrial, and other uses. The No-Action Alternative includes

[1] The Pinal County *Regional Transportation Plan* identifies the eastern project limits as the "North South Corridor," and notes that the actual alignments are currently under study by ADOT.

consideration of a number of large developments planned for the area (these developments are depicted in Section 3.2, *Land Use*, Figure 3.2-5).

These planned developments would reasonably and foreseeably occur independent of a north-to-south freeway being constructed. With implementation of the No-Action Alternative, existing and future residents and businesses would experience degraded mobility in the study area, difficulty in accessing the wide variety of land uses in the horizon year, and increased travel times in and through the study area.

2.5 Transportation Performance of the Alternatives

2.5.1 Methodology

The study considered a number of measures in the evaluation of the action corridor alternatives, including characteristics such as length, access and interchanges, accessibility (measured by travel time between identified locations), and regional performance measures including VMT, congested VMT, VHT, and congested VHT. These and other transportation analysis terms are defined as:

- VMT (vehicle miles traveled): The total number of vehicle miles traveled within a specific geographic area (typically the study area, unless defined otherwise) over a given period of time.
- VHT (vehicle hours traveled): The total vehicle hours spent traveling on the roadway network in a specified area (typically the study area, unless defined otherwise) during a specified time period.
- ADT (average daily traffic): The total volume of traffic during a given time period divided by the number of days in that time period—representative of average traffic in a 1-day time period.
- Vehicle v/c (volume-to-capacity) ratio: The ratio of vehicle demand to the roadway capacity, used as a performance measure to assess travel conditions on regional facilities in the study area.

Performance measures are often reported for the year, which removes factors such as seasonal variation in travel (an important factor when one considers seasonal residents, tourism, and variable school schedules).

This study used the AZTDM2 model to forecast travel throughout the region. AZTDM2 produces travel forecasts for planning horizons up to 30 years in the future based on population and employment growth projections established by the Arizona State Demographer's Office.

AZTDM2 is consistent with FHWA's *Interim Guidance on the Application of Travel and Land Use Forecasting in NEPA* (2010). Additional detail regarding forecasting and modeling may be found in the *Traffic Report, North-South Corridor Study* (Appendix B, *Traffic Information*).

2.5.2 No-Action Alternative

Population and employment projections for the study area for the 2040 build year are presented in Chapter 1, *Purpose and Need*. These projections indicate that by 2040, Pinal County's population is expected to nearly double, and employment is anticipated to increase by 1.7 times the 2015 level. This forecast growth drives regional transportation demand.

2.5.2.1 2040 Forecast Traffic Conditions

Travel demand modeling for the NSCS was performed to forecast 2040 future conditions. The modeling used the AZTDM2. The model, used and maintained by ADOT, uses population and employment projections from the State Office of Employment and Population Statistics. Their application to smaller traffic analysis zones is coordinated with MPOs, councils of governments, and other local agencies.

The 2040 base roadway network was developed using input from stakeholders in the study area including MAG, SCMPO, and CAG. The 2040 base network represents their respective future transportation networks and long-range transportation plans (note that the 2040 AZTDM2 includes a north-to-south access-controlled facility as one of the anticipated improvements—this was removed for modeling the No-Action Alternative). The *Traffic Report, North-South Corridor Study* provides the detailed results of this analysis (see Appendix B, *Traffic Information*). The model evaluated a 2040 No-Action Alternative, representing future conditions without the action corridor alternatives. Improvements on key corridors that are reflected in the 2040 network include:

- SR 287 – widened from two to four lanes continuously, from SR 79 to western study area boundary
- Hunt Highway – widened to six lanes continuously, from SR 79 to western study area boundary
- I-10 – widened to six lanes throughout study area limits
- Ocotillo Road – widened from Gantzel Road to Kenworthy Road
- Selma Highway – widened from SR 87 to Eleven Mile Corner Road
- Kleck Road – extended from the proposed Corridor alignment to I-10

The forecast 2040 volumes for the key corridors are summarized in Table 2.5-1.

With the additional traffic forecast on these facilities, performance is estimated to degrade. All of the state highways in the study area are anticipated to experience increased delay, including:

- SR 79, north of Hunt Highway to the CAP Canal – decreases in performance to LOS D
- SR 87, Vah Ki Inn Road to Martin Road – decreases in performance to LOS F
- SR 287, Christenson Road to Attaway Road, and from Attaway Road to Valley Farms Road – decreases in performance to LOS F

US 60 near Apache Junction is forecast to see a substantial increase in traffic. The 2040 results illustrate that the key corridors will experience substantially more traffic as compared with 2015. The greatest increases in traffic are projected to occur south of Arizona Farms Road.

While the model reflects the currently planned and committed roadway improvements in the study area, additional improvements will likely be planned and programmed in advance of 2040 to respond to increased demand and address these shortcomings. The increased projected traffic, however, indicates the change expected throughout the region, in particular in the central portion of the study area.

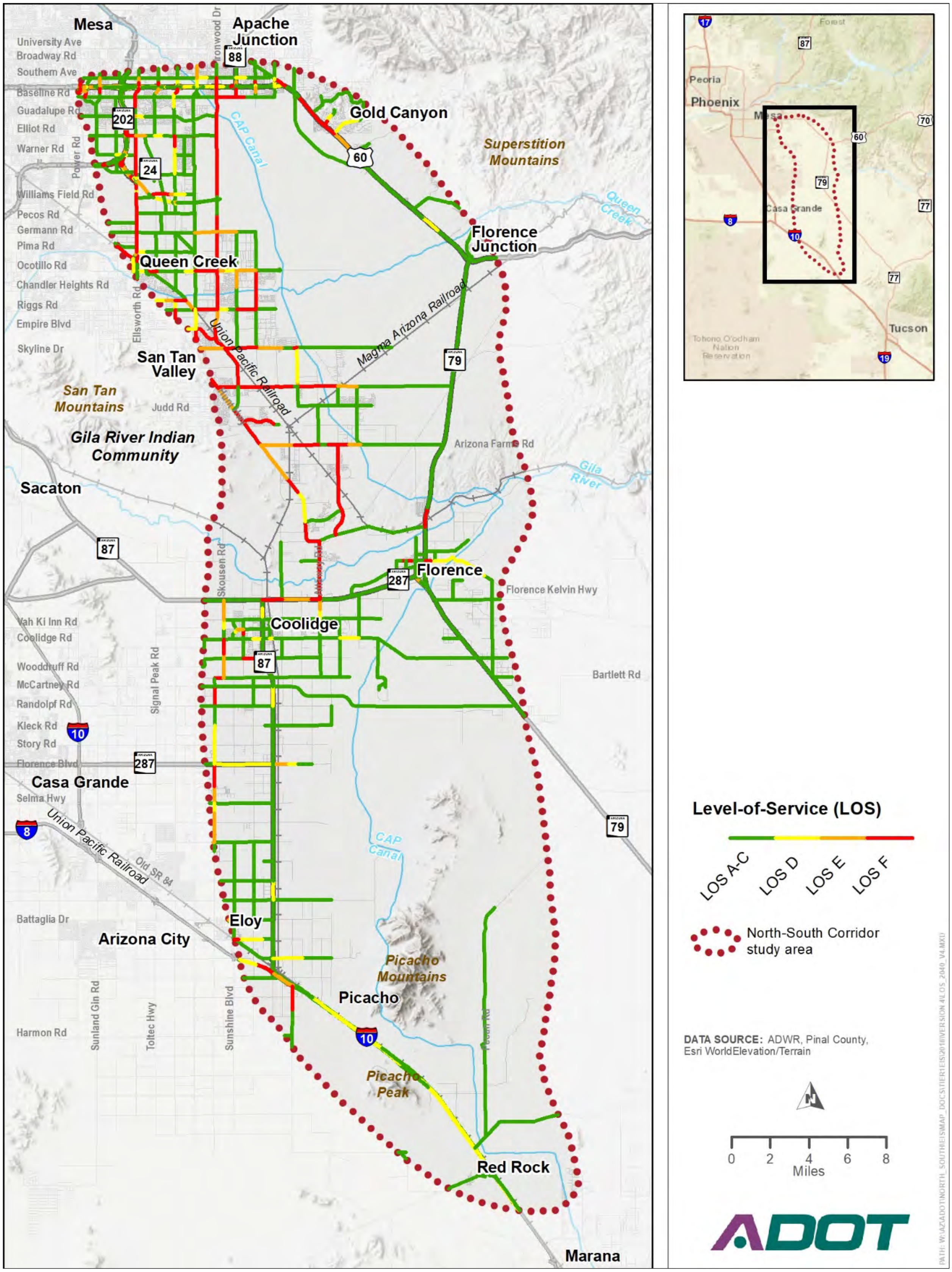
Table 2.5-1. 2040 regionally significant routes with the No-Action Alternative

Regionally significant route	Location	Existing (2015) ADT	2040 No-Action		
			ADT	Volume-to-capacity ratio	LOS
Hunt Highway	Arizona Farms Road to Franklin Road	10,200	37,300	>1.00	F
SR 79	Hunt Highway to Diversion Dam Road	8,300	26,300	0.73	D
Ironwood-Gantzel Road	Baseline Road to SR 24	17,400	26,800	>1.00	F
Schnepf Road	Combs Road to Skyline Drive	6,200	14,200	>1.00	F
Attaway Road	Hunt Highway to SR 287	4,100	25,600	>1.00	F
SR 87 (Arizona Boulevard)	Vah Ki Inn Road to Martin Road	7,500	36,600	>1.00	F
Hunt Highway	Bella Vista Road to Copper Mine Road	29,100	85,600	>1.00	F
Riggs-Combs Road	Signal Butte Road to Schnepf Road	10,100	32,500	>1.00	F
Skyline Drive	Schnepf Road to Quail Run Lane	4,500	13,700	>1.00	F
Bella Vista Road	Gantzel Road to Quail Run Lane	5,900	10,600	>1.00	F
Arizona Farms Road	Hunt Highway to Copper Basin Railway	2,600	6,500	0.65	A–C
Coolidge Avenue	SR 87 to Attaway Road	1,000	6,300	0.62	A–C
SR 287	Christenson Road to Attaway Road	6,600	41,400	>1.00	F
Houser Road	Sunshine Boulevard to Sorrel Road	600	5,500	0.55	A–C
U.S. Route 60	Peralta Road to SR 79	9,600	24,800	0.68	A–C
Ocotillo Road	Rittenhouse Road to Ironwood Drive	19,800	31,200	>1.00	F
SR 287	Attaway Road to Valley Farms Road	5,600	24,200	>1.00	F
Interstate 10	Sunshine Boulevard to SR 87	56,500	96,000	0.79	D

Notes: ADT = average daily traffic, LOS = level of service, SR = State Route
Volume-to-capacity ratio is a measure comparing a road's use with its capacity; a larger number indicates higher use.

Figure 2.5-1 shows the No-Action Alternative study area-wide 2040 performance, in terms of LOS.

Figure 2.5-1. No-Action Alternative study area-wide 2040 performance in level of service



Source: Arizona Department of Transportation (2018)

Table 2.5-2 shows the 2015 overall study area traffic performance compared with the projected 2040 traffic performance. Between 2015 and 2040, VMT would increase by 1.5 times, while VHT would increase by nearly 2.5 times as a result of the nearly four times as many miles of congested roads in the study area.

Table 2.5-2. Traffic performance, 2015 and 2040, with the No-Action Alternative

Condition	Total vehicle miles traveled (daily)	Total vehicle hours traveled (daily)	Miles of congested roads
2015 existing	5,002,600	108,900	47
2040 No-Action Alternative	12,626,500	372,800	185

2.5.2.2 Accessibility

By 2040, it is anticipated that many of the regionally significant routes in the study area will operate at LOS F (see Table 2.5-1). Accessibility to and from destinations throughout the study area will become more difficult. All of the major north-to-south routes will operate at LOS F, with the exception of SR 79, which is anticipated to operate at LOS D through the town of Florence.

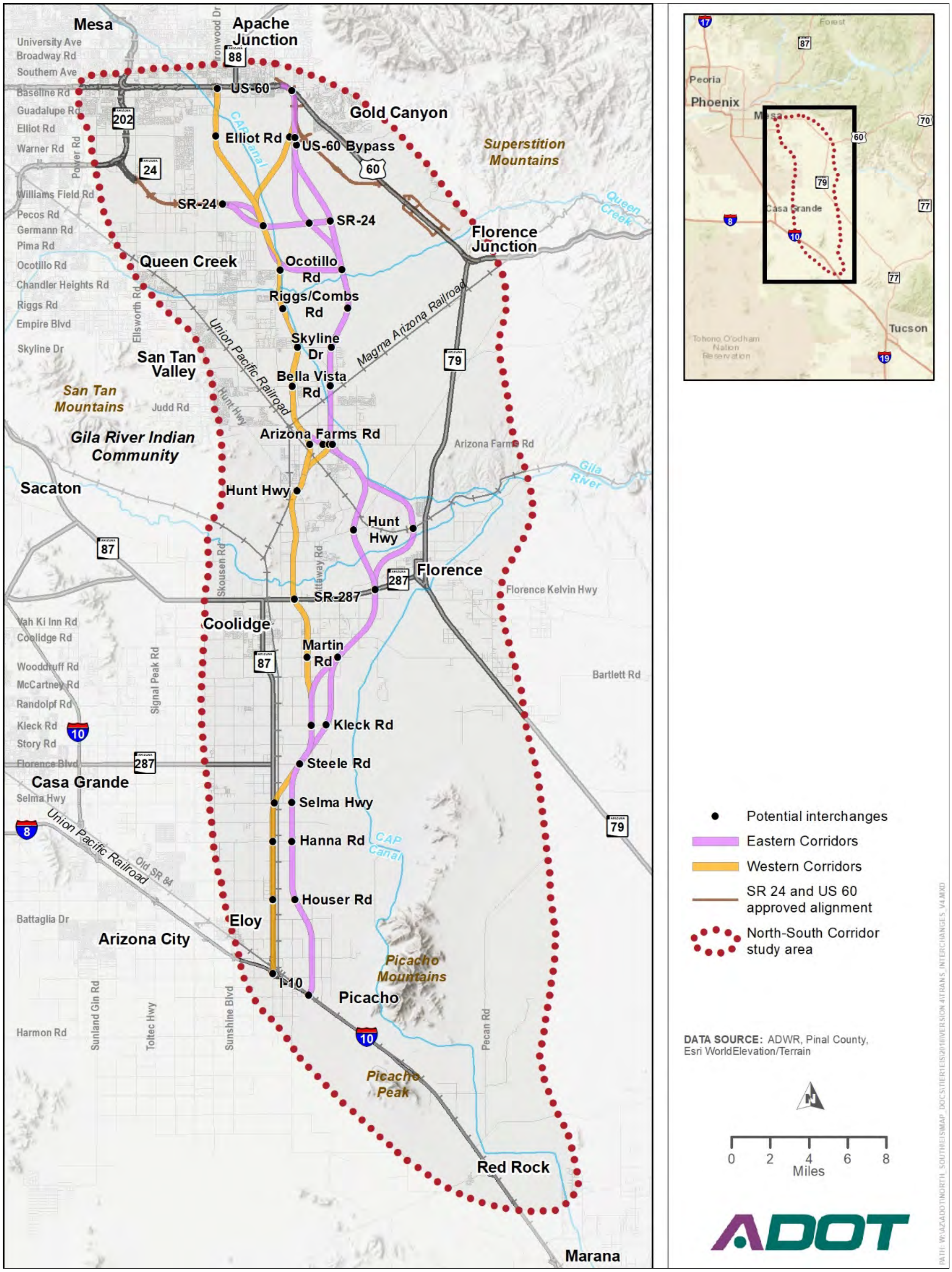
2.5.2.3 Safety

Most the study area consists of undeveloped land lacking improved roadways, or improved rural one-lane roads. Rural roadways have higher crash rates than other types of roadways. Safety issues associated with rural roadways often include nighttime visibility, speeding, animal crossings, and fixed objects next to the roadway. In the event of an incident along I-10, traffic would have to be diverted along local routes through the study area, further compounding congestion in the area.

2.5.3 Action Corridor Alternatives

As currently envisioned, the action corridor alternatives may have interchanges with the local arterial street system, on average, every 2 to 3 miles (Figure 2.5-2). As a result of the limited roadway network planned for the study area, local access to and across the action corridor alternatives would be limited to the arterial crossings where intersections are planned. These potential intersections were previously noted in Table 2.3-4.

Figure 2.5-2. North-South Corridor potential traffic interchange locations



2.5.3.1 Travel Time

As noted in Table 2.5-1, traffic is projected to increase throughout the study area, with the greatest increases anticipated in the area south of Arizona Farms Road. In 2015, a peak period trip between San Tan Valley and downtown Florence took less than half an hour; by 2040, with the No-Action Alternative, that same trip is anticipated to take twice that time.[2]

Table 2.5-3 compares 2040 travel times through the Corridor for the No-Action Alternative and the action corridor alternatives. The volumes are reported as ranges in those instances where the segment options (Segments 1 and 3) would affect through-travel times.

Table 2.5-3. North-South Corridor 2040 average travel time comparison

Condition/ Action corridor alternative	Average travel time (minutes), Eloy to Apache Junction	Travel time savings as compared with 2040 No-Action Alternative
Existing (2018)[a]	65	Not applicable
2040 No-Action	83	Not applicable
1	45	38
2	47–48	35–36
3	48	36
4	45	38
5	46	37
6	49	34
7	49	34
8	46	37

[a] existing travel time derived from Google Maps

Table 2.5-3 shows that in 2040, through travel in the Corridor with any of the action corridor alternatives shows improvement over the No-Action Alternative. Both Alternative 1 (which would provide the most direct through route with a north-to-south length of 48.1 to 48.4 miles, depending on option W1a or W1b, respectively) would provide the greatest through-corridor travel time savings of all the alternatives. Alternative 7 (50.7 to 53 miles long, depending on option E1a or E1b in Segment 1 and option E3a or E3c in Segment 3) is the longest through route and, along with Alternative 6 (49.6 to 52 miles long, depending on option E1a or E1b in Segment 1 and option E3a or E3c in Segment 3), would provide the least through-corridor travel time savings of all the alternatives.

2.5.3.2 Traffic Conditions

Representative evaluation alternatives were modeled to evaluate the performance of the eight full-length action corridor alternatives (and options) using the AZTDM2 model. These representative evaluation alternatives provide the traffic output information used to develop the performance evaluation for the eight full-length action corridor alternatives and their options (more detail on traffic modeling may be found in Appendix B, *Traffic Information*).

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[2] 2015 travel time calculated with Google Maps; 2040 travel time determined using Arizona statewide travel demand model

The study area-wide performance results for each of the action corridor alternatives are summarized in Table 2.5-4. The study area was divided based on the Corridor segments (see Section 2.3.1, *Action Corridor Alternatives, by Segment*). Each alternative's performance was compiled based on the action corridor alternative segments from the modeled results.

The results show an increase in study area-wide VMT for each action corridor alternative, compared with the 2040 No-Action Alternative. The increase of the total VMT in the study area roadway network shows traffic being attracted to the Corridor. In addition, a decrease of total VHT is anticipated with construction of both the Corridor and the SR 24 extension. This decrease in VHT with the Corridor indicates that travelers would more efficiently reach their desired destinations with any of the action corridor alternatives.

Table 2.5-4 summarizes annual 2040 ADT volumes for each action corridor alternative, organized by segment. The table shows how the action corridor alternatives would alleviate congestion in the region. While all of the action corridor alternatives would reduce regional congestion,[3] as compared with the No-Action Alternative, overall regional congestion would be lowest with Alternative 3, with an 8 percent reduction of congested VHT compared with the No-Action Alternative. Alternative 7 would improve regional congestion; however, it would have the least impact of the action corridor alternatives, with only a 7 percent reduction of congested VHT compared with the No-Action Alternative.

Table 2.5-5 summarizes the performance of each action corridor alternative in terms of ADT volumes. The table shows the Western Alternatives would attract the highest ADT volumes through the Corridor. Table 2.5-5 shows that for all alternatives, volumes on the action corridor alternatives would be consistently highest at the northern end of the corridor (Segment 1), and would decrease through each subsequent segment (Segments 2, 3, and 4). As a general comparison of alternatives, Alternative 1 would have the highest overall Corridor traffic volume of the action corridor alternatives. Alternative 7 would have the lowest overall Corridor traffic volume.

The action corridor alternatives that provide an eastern connection to US 60 (E1a and E1b) result in as much as 40 percent lower traffic volume at US 60 than those that include a western connection to US 60 (W1a and W1b). The difference decreases progressively through the segments to the south, so that by Segment 4 the greatest difference between E4 and W4 is approximately 20 percent.

Table 2.5-6 summarizes the LOS for segments of the regionally significant routes in the study area, compared with the No-Action Alternative. Table 2.5-6 shows that many of the regionally significant routes through the study area will experience unacceptable LOS in the No-Action condition. All of the action corridor alternatives are shown to improve the LOS on specific corridor segments (Arizona Farms Road, Attaway Road, Ironwood-Gantzel Road, SR 287, SR 79, and SR 87); however, some congestion is still anticipated in the region regardless of the action corridor alternative selected. Some of this modeled congestion is a result of the lack of local roadway network in the model. The traffic model considers future population projections; however, the roadway network in the model future years is based only on what is currently programmed. As development occurs, more local roads would be constructed and as the network is completed, local congestion would likely improve. Future traffic congestion on regionally significant routes would result from increasing travel demand caused by projected population and employment growth, even with construction of the proposed action, because travelers would continue to use the regional routes to reach certain destinations.

[3] Congested VHT in Segment 2 would increase, compared with the No-Action Alternative, but note that actual hours of congestion in this short transition section with the No-Action Alternative are less than 2 percent of overall hours of congestion in the Corridor.

Table 2.5-4. Total area-wide annual traffic performance summary for full-length action corridor alternatives and options (noted as range of values, as appropriate)

Segment	Measure	No-Action	Full-length action corridor alternative							
			1	2	3	4	5	6	7	8
1	VMT (millions)	8.740	9.436–9.477	9.282–9.295	9.282–9.295	9.436–9.477	9.344–9.474	9.344–9.474	9.344–9.361	9.477
	Congested VMT (%)	55	42–44	43	43	42–44	48	48	48–49	48
	VHT (000s)	291.3	260–261	260–261	260–261	260–261	268–270	268–270	268–270	261
	Congested VHT (%)	73	59–60	60–61	60–61	59–60	63–64	63–64	64	63
2	VMT (millions)	0.220	.287–.290	.199	.199	.288–.290	0..297	0.175	0.175	.175-.297
	Congested VMT (%)	61	46-47	61-65	61-65	46-47	37	74	74	37-74
	VHT (000s)	7.200	8.200-8.300	5.700	5.700	8.200-8.300	8.500	6.200	6.200	6.200-8.500
	Congested VHT (%)	61	64-66	70-75	70-75	64–66	49	79	79	49-79
3	VMT (millions)	1.442	1.576–1.578	1.626–1.645	1.586–1.645	1.576–1.578	1.457	1.586–1.645	1.586	1.457-1.586
	Congested VMT (%)	55	27	30–32	30-36	27	27	30–36	36	27-36
	VHT (000s)	40.900	36.200-36.300	37.500–38.600	36.9–38.6	36.2-36.3	35.5	36.9–38.6	36.90	35.6-36.9
	Congested VHT (%)	61	33	37–38	37–43	33	37	37–43	43	37-43
4	VMT (millions)	2.235	2.345	2.320–2.339	2.304	2.334	2.345	2.320-2.339	2.304	2.304-2.334
	Congested VMT (%)	1	1	1	1	1	1	1	1	1
	VHT (000s)	33.800	35.8	35.3–35.7	35.1	35.7	35.8	35.3-35.7	35.1	35.1-35.7
	Congested VHT (%)	1	2	1–2	2	2	2	1-2	2	2
Total	VMT (millions)	12.637	13.644–13.690	13.427–13.478	13.370–13.443	13.633–13.680	13.443–13.573	13.424–13.633	13.408–13.426	13.413-13.694
	Congested VMT (%)	46	33-35	34–35	35	34-35	38	39	39	38
	VHT (000s)	373.000	340–342	339–341	338–341	340–342	347–349	346–350	346–348	338-343
	Congested VHT (%)	65	50	52	52–53	50–51	54–55	55	56	54-55

Notes: VHT = vehicle hours traveled, VMT = vehicle miles traveled. Cells with a range of values are a result of the available alternative options. Results were derived from modeled alternatives as described in Appendix B, *Traffic Information*.

Table 2.5-5. North-South Corridor performance comparison with full-length action corridor alternatives

	Location	Full-length action corridor alternative average daily traffic volume (000s)							
		1	2	3	4	5	6	7	8
Segment 1	US 60 to Elliot Road	42.8–45.0	44.0–44.4	44.0–44.4	42.8–45.0	25.2–30.0	25.2–30.0	25.2–28.3	25.2–30.0
	Elliot Road to SR 24	39.0–49.4	46.8–47.7	46.8–47.7	39.0–49.4	18.0–25.4	18.0–25.4	18.0–23.4	18.0–25.4
	SR 24 to Ocotillo Road	69.2–70.9	64.2–65.9	64.2–65.9	69.2–70.9	18.0–47.2	18.0–47.2	18.0–42.7	18.0–47.2
	Ocotillo Road to Riggs/Combs Road	54.1	46.8–48.5	48.5–46.8	54.1	38.2–41.9	37.0–41.9	37.0–38.2	37.0–41.9
	Riggs/Combs Road to Skyline Drive	58.3–59.1	48.4–50.2	48.4–50.2	58.3–59.1	37.3–42.1	36.7–42.1	36.7–37.3	36.7–42.1
	Skyline Drive to Bella Vista Road	60.8–61.1	49.8–51.8	49.8–51.8	60.8–61.1	38.5–44.4	38.0–44.4	38.0–38.5	38.0–44.4
	Bella Vista Road to Arizona Farms Road	50.4–50.7	29.6–31.3	29.6–31.3	50.4–50.7	25.3–31.8	25.3–31.8	25.3	25.3–31.8
Segment 2	Arizona Farms Road to Hunt Highway	39.8–40.0	29.6–31.3	29.6–31.3	39.8–40.0	31.8	25.3	25.3	31.8
Segment 3	Hunt Highway to SR 287	39.6–39.9	18.6–19.9	15.1–19.9	39.6–39.9	38.8	15.1–19.9	15.1	38.8
	SR 287 to Bartlett Road (Martin Road)	21.9	17.8–21.4	15.7–21.4	21.9	19.2	15.7–21.4	15.7	19.2
Segment 4	Bartlett Road (Martin Road) to Kleck Road	20.0	18.6–21.8	16.1–21.8	20.0	18.5	16.1–21.8	16.1	18.5
	Kleck Road to Steele Road	19.2.	17.7–19.8	15.2	17.6	19.2	17.7–19.8	15.2	17.6
	Steele Road to Selma Highway	9.9.	9.1–9.9	6.6	8.1	9.9	9.1–9.8	6.6	8.1
	Selma Highway to Hanna Road	12.0–12.1.	11.9–12.6	6.4	7.5	12.0–12.1	11.9–12.6	6.4	7.5
	Hanna Road to Houser Road	10.5–11.3	10.5–11.3	5.5	6.7	5.3–11.1	10.5–11.3	5.5	6.7
	Houser Road to I-10	4.9.–5.0	3.9–4.6	2.5	3.9	4.9–5.0	3.9–4.6	2.5	3.9

Notes: SR = State Route, US 60 = U.S. Route 60. Cells with a range of values are a result of the available alternative options. Results were derived from modeled alternatives as described in Appendix B, *Traffic Information*.

Table 2.5-6. 2040 level of service summary for regionally significant routes

Regionally significant route	Location	No-Action LOS	Full-length action corridor alternative LOS							
			1	2	3	4	5	6	7	8
Arizona Farms Road	Hunt Highway to Copper Basin Railroad	F	F	E	E	F	D	F	F	D
Attaway Road	Hunt Highway to State Route 287	F	A–C	E	E	A–C	A–C	E	E	A–C
Bella Vista Road	Gantzel Road to Quail Run Lane	F	F	F	F	F	F	F	F	F
Coolidge Avenue	State Route 87 to Attaway Road	A–C	A–C	A–C	A–C	A–C	A–C	A–C	A–C	A–C
Hunt Highway	Belle Vista Road to Copper Mine Road	F	F	F	F	F	F	F	F	F
	Arizona Farms Road to Franklin Road	F	F	F	F	F	F	F	F	F
Interstate 10	Sunshine Boulevard to State Route 87	D	D	D	D	D	D	D	D	D
Ironwood-Gantzel Road	Baseline Road to State Route 24	F	A–C	A–C	A–C	A–C	D–E	D–E	D–E	D–E
Ocotillo Road	Rittenhouse Road to Ironwood Drive	F	F	F	F	F	F	F	F	F
Riggs-Combs Road	Signal Butte Road to Schnepf Road	F	F	F	F	F	F	F	F	F
Schnepf Road	Combs Road to Skyline Drive	F	F	F	F	F	F	F	F	F
Selma Highway	Eleven Mile Corner Road to State Route 87	A–C	A–C	A–C	A–C	A–C	A–C	A–C	A–C	A–C
Skyline Drive	Schnepf Road to Quail Run Lane	F	F	F	F	F	F	F	F	F
State Route 287	Attaway Road to Valley Farms Road	F	F	F	F	F	F	F	F	F
	Christenson Road to Attaway Road	F	D	D	D–E	D–E	D	D	D–E	D–E
State Route 79	Hunt Highway to Diversion Dam Road	D	A–D	A–D	A–D	A–D	A–D	A–D	A–D	A–D
State Route 87 (Arizona Boulevard)	Vah Ki Inn Road to Martin Road	F	D	D–E	D–E	D	D	D–E	D–E	D
U.S. Route 60	Peralta Road to State Route 79	A–C	A–C	A–C	A–C	A–C	A–C	A–C	A–C	A–C

Notes: Cell color represents level of service (LOS), where LOS C or better is represented by green, LOS D and E are represented by orange, and LOS F is represented by red.
LOS values are derived from the Arizona statewide travel demand model representative model runs; ranges are indicative of varied results determined by the various alternative options.

The results show that additional capacity improvements to the existing roadway network are necessary to accommodate the anticipated traffic throughout the region. Although these additional roadway projects are not planned and committed at this time (those that are planned and committed are discussed in Chapter 4, *Indirect and Cumulative Impacts*), it is anticipated that with the development that is projected to occur, additional roadway improvement projects will be completed. Were an action alternative selected, these projects would provide improved access to the facility. The Corridor would be able to accommodate significantly more volume. A common generalized reference for annual ADT for a six-lane freeway operating in an urbanized environment at LOS C is 93,000. The highest volume reported in Table 2.5-5 for any of the alternatives is approximately 71,000 (Alternative 1, between SR 24 and Ocotillo Road).

All of the action corridor alternatives would remove non-localized traffic from key roadways in the study area, resulting in less traffic congestion and decreased travel times because the action corridor alternatives would provide a more direct route from US 60 in Apache Junction to I-10 in Eloy.

2.5.3.3 Access

At the Tier 1 phase, it is possible to anticipate some access issues that may arise if a preferred action corridor alternative is selected. Table 2.3-4 identifies the locations of potential traffic interchanges. Should an action corridor alternative be selected, a full-access facility with grade separation may be implemented in phases. At-grade intersections could be temporarily allowed, as determined through a Tier 2 implementation plan. It is anticipated that the section line roads that intersect the proposed facility may eventually be grade-separated (depending on the specific phasing and implementation plan). Quarter-section and local streets would typically not be grade-separated, and this condition may result in blocking access to properties accessed by these routes. At the Tier 2 phase, access would be evaluated and efforts would be made to maintain access to existing development.

Segment 1

At the US 60 system traffic interchange at the northern terminus of the proposed action, the E1a, E1b, and W1b Alternatives share a footprint. In the southwestern quadrant of this connection, access to the Dolce Vita residential development is from the west and would not be affected. Depending on the system traffic interchange configuration, access to US 60 from Goldfield Road may be affected. The area to the south is entirely undeveloped, and circulation patterns and access would be developed to accommodate the proposed action.

The area of the E1a and E1b Alternatives is undeveloped south to Skyline Drive, and circulation patterns and access would be developed during Tier 2 studies to accommodate the proposed action.

At the US 60 system traffic interchange, the W1a Alternative would be aligned with Ironwood Drive, a major north-to-south arterial serving traffic traveling to and from the San Tan Valley area. This route experiences considerable local through traffic, and development abutting Ironwood Drive has direct access to the road. The area east of Ironwood Drive is largely undeveloped, and circulation patterns and access would be developed to accommodate the proposed action. Local access may be difficult to provide where the W1a Alternative parallels the CAP Canal, complicating access to properties between the canal and the proposed action.

Segment 2

The largely undeveloped nature of Segment 2 means that circulation patterns and access would be developed to accommodate the proposed action.

Segment 3

Although development plans exist for much of this area, the area of the Eastern Alternatives, north of the Gila River, is entirely undeveloped. Traffic circulation patterns and access would be developed at the Tier 2 phase to accommodate the proposed action. The E3a and E3c Alternatives follow the CAP Canal. The action corridor alternatives crossing Hunt Highway would be just over 0.5 mile west of the Hunt Highway intersection with SR 79. The E3b and E3d Alternatives traverse the conceptual circulation plan for the Merrill Ranch master-planned community.

South of SR 287, much of the land in the area of the E3a, E3b, E3c, and E3d Alternatives is active agricultural land, and circulation patterns and access would be developed to accommodate the proposed action.

The W3 Alternative in Segment 3 traverses largely undeveloped and agricultural land north of the Gila River, although access along Nafziger Road to an active aggregate mine on the northern bank of the Gila River would be affected. Where the W3 Alternative merges with the E3d and E3c Alternatives, access to properties along the section-line Fast Track Lane would be affected.

Segment 4

South of Steele Road, the E4 Alternative is aligned with Vail Road. South of Houser Road, the E4 Alternative shifts 1 mile east. Should the E4 Alternative be selected, a Tier 2 phase project would evaluate methods to acquire or restore access to parcels east of the E4 Alternative.

South of Steele Road, the W4 Alternative crosses UPRR before following the SR 87 alignment 8.5 miles to the south at the system traffic interchange with I-10. This alignment is approximately 0.25 mile west of UPRR; access to parcels between the ROW and railroad would need to be evaluated and addressed at the Tier 2 phase. An alignment along SR 87 would also affect access to businesses along SR 87 just north of I-10.

2.5.3.4 Accessibility

Jurisdictions throughout the Corridor have identified access to a north-to-south corridor as important to implementing their adopted plans. A measure of the accessibility of the Corridor may be derived by assessing the access each of the affected jurisdictions would have to the facility (where access is measured by the travel time between the action corridor alternative and a common central location). For each of the jurisdictions directly affected by the action corridor alternatives, the municipal offices were used as a central location, and the time of travel from the action corridor alternative to the town center is reported. The travel times were derived from the model runs, and they measure the 2040 evening peak period travel time from the action corridor alternative to the jurisdiction’s current municipal offices.

Apache Junction

Travel time between the action corridor alternatives and the City of Apache Junction office at 300 East Superstition Boulevard was determined for 2040. For this destination, the difference in travel times between the action corridor alternatives is nominal.

Florence

Travel time between the action corridor alternatives and the Town of Florence office at 775 North Main Street was determined for 2040. Travel times for the Eastern Alternatives (E3a, E3b, E3c, and E3d) range from 5 to 7 minutes, whereas the W3 Alternative travel time for northbound travelers is 12 minutes and for southbound travelers is 14 minutes.

Coolidge

Travel time between the action corridor alternatives and the City of Coolidge office at 130 West Central Avenue was determined for 2040. Travel times for the Eastern Alternatives (E3a, E3b, E3c, and E3d) to Coolidge range from 9 minutes northbound to 13 minutes southbound. Travel time for the W3 Alternative to Coolidge is 6 minutes.

Eloy

Travel time between the action corridor alternatives and the City of Eloy office at 628 North Main Street was determined for 2040. Travel time to the City of Eloy office for both the E4 and W4 Alternatives is approximately 8 minutes.

These examples illustrate a measure of accessibility to the jurisdictions through which the Corridor passes. The difference in accessibility (as measured by the travel time that each of the affected jurisdiction's municipal offices would have to the action corridor alternatives) is most pronounced in Segment 3 (affecting the City of Coolidge and Town of Florence), where the greatest east-to-west separation between action corridor alternatives occurs.

2.5.3.5 Safety

It is anticipated that developing an access-controlled facility through the area would improve safety by reducing local congestion and by separating through trips from local trips.

3 Affected Environment and Environmental Consequences

This chapter describes the proposed action's potential impacts on the natural, human, and built environments. Each section describes the regulatory context governing the analysis and the methodology for assessing impacts. The existing environmental conditions are described, followed by a discussion of the environmental consequences of building and operating the proposed action. Strategies for avoiding, minimizing, or mitigating potential adverse impacts are described, and an overview of subsequent Tier 2 studies is provided. Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.1 Overview

This section provides an overview of the topics discussed in this chapter, describes how the potential environmental impacts of the action corridor alternatives were analyzed using a segment-by-segment or full-length corridor approach, and describes how a preferred corridor alternative was identified in Chapter 6, *Evaluation of Alternatives*, based on the potential environmental impacts presented in this chapter.

3.1.1 Environmental Topics

Table 3.1-1 lists the environmental resources discussed in this chapter.

Table 3.1-1. Environmental resources discussed in Chapter 3

Section	Topic	Section	Topic
3.1	Chapter overview	3.11	Biological resources
3.2	Land use	3.12	Hydrology, floodplains, and water resources
3.3	Social conditions	3.13	Waters of the United States
3.4	Economics	3.14	Cultural resources
3.5	Parkland and recreational facilities	3.15	Hazardous materials
3.6	Prime and unique farmland	3.16	Energy
3.7	Air quality	3.17	Environmental justice and Title VI
3.8	Noise	3.18	Temporary construction impacts
3.9	Visual resources	3.19	Section 4(f) and Section 6(f) resources
3.10	Topography, geology, and soils		

The study team did not analyze the following environmental resources because they do not occur in the study area: wild and scenic rivers, outstanding waters, wilderness areas, national natural landmarks, scenic roads and parkways, and coastal zones or barriers.

3.1.2 Approach to Analysis of Environmental Impacts

Most of the environmental impacts discussed in this chapter are described using a segment-by-segment approach—meaning that potential impacts of the action corridor alternatives are discussed based on the limits of Segments 1 through 4 of the study area. The exceptions are air quality (Section 3.7) and energy (Section 3.16), where the potential environmental impacts are described for the full-length action corridor alternatives. Additional considerations for indirect and cumulative impacts are discussed in Chapter 4.

As noted in Chapter 2, *Alternatives*, the study area is divided into four segments that incorporate transition areas to allow the action corridor alternatives to shift east to west or west to east. The ability to make these shifts facilitates the avoidance of sensitive resources as necessary while maintaining a continuous north-to-south corridor. For air quality and energy, however, the segment-by-segment approach was not appropriate because shifting the corridor between segments would not make an appreciable difference with regard to regional air quality impacts or corridor-length energy use.

3.1.3 Approach to Identification of a Preferred Corridor Alternative

Potential impacts on the natural, human, and built environments discussed in this chapter informed the identification of a preferred corridor alternative, as discussed in detail in Chapter 6, *Evaluation of Alternatives*. The study team also used information regarding transportation and traffic operations, land use planning, stakeholder input, and the project purpose and need (see Chapter 1, *Purpose and Need*) to identify the preferred corridor alternative. Chapter 6 identifies the preferred corridor alternative by segment (Section 6.3.1) and by full-length corridor (Section 6.3.2). This final synthesis of the largely segment-by-segment analysis of environmental resources within the study area ensured that the study team did not overlook corridor-length environmental impacts in the process of identifying a preferred corridor alternative.

3.2 Land Use

The study area for the land use analysis encompassed the approximately 900-square-mile area that was defined early in the study process (Figure 3.2-1). The study area encompassed north-central Pinal County and a small portion of southeastern Maricopa County. Study area municipalities are the Cities of Apache Junction, Mesa, Coolidge, and Eloy, and the Towns of Queen Creek and Florence. Sovereign nations with land in the study area are the Gila River Indian Community and Tohono O'odham Nation. The study area does not necessarily follow tribal, municipal, or county boundaries, and only land in the study area was included in the analysis.

Located in the Sun Corridor, the study area has experienced substantial growth, which is projected to continue through 2040. Because of its proximity to Phoenix and Tucson, Pinal County has become a focus area for future development and economic growth in the Sun Corridor. Development pressure has begun to change the historically rural character of study area municipalities. Since 1990, Pinal County's population has increased by a factor of nearly 3.5, from 116,867 to 406,468 in 2015. By 2040, the county is projected to nearly double its 2015 population. As a result, and in accordance with Arizona Revised Statutes (A.R.S.), governing agencies in the study area have implemented policies regulating how, where, and to what extent future development may occur.

This section describes existing land ownership, management, land use, and zoning, and future land use for Maricopa and Pinal Counties and incorporated municipalities in the study area. It then describes how conditions are anticipated to change by 2040, with and without the proposed action, taking into account planned and projected development. This section then discusses whether the action corridor alternatives are consistent with existing land use plans and whether they would result in property acquisitions and displacements. Information is organized by the aforementioned categories and is presented by county and municipality to the extent feasible.

3.2.1 Regulatory Context

ADOT prepares all environmental documents in accordance with the requirements of NEPA. CEQ Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500 through 1508) stipulate that "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" be fully documented and evaluated in the appropriate environmental document. The regulations further state that to "better integrate environmental impact statements into state or local planning processes, statements shall discuss any inconsistency of a proposed action with any approved state or local plan and laws (whether or not federally sanctioned). Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law."

State law requires that municipalities and counties maintain a general or comprehensive plan, respectively. The plans are a municipal statement of land development policies that set forth objectives, principles, and standards for local growth and redevelopment.

The general framework identified in the guidance includes (1) understanding existing conditions and trends, (2) establishing policy assumptions, (3) estimating regional population and employment growth resulting from the change in accessibility, (4) inventorying land with development potential, and (5) assigning population to specific locations (FHWA 2010). Each step is either addressed in this document or has been used to inform the purpose and need for the proposed action.

3.2.2 Methodology

The study team analyzed existing study area land uses using a combination of aerial photographs, GIS data, digital orthophoto quadrangles, and consultation with representatives from the affected jurisdictions.

Existing land use data provided by county and municipal governments were input into electronic GIS files so that the impacts of each action corridor alternative could be evaluated. The data layers in the GIS files included the general land use types in the study area: agricultural, commercial, industrial, open space, public/quasi-public, residential, and undeveloped.

Open space includes public land designated as either active or passive open space (for example, parks and preserves). Note that the existing land use as described in this section does not necessarily match current zoning and land use plans because these plans and zoning programs are continually updated.

The study team collected regional and local land use and transportation plans from regional planning organizations, counties, and local jurisdictions. The team reviewed information in each plan for future land use, the future transportation network, and any discussion of potential future alignments of the Corridor.

To assess the expected impacts on land use from the action corridor alternatives, the study team used aerial photographs and GIS analysis to identify the types of land uses in each action corridor alternative and the number of acres that would be converted to a roadway use, along with how many potential property acquisitions or displacements would occur. In addition, the team analyzed each alternative's consistency with local and regional land use plans.

3.2.3 Affected Environment

Municipal information is based on existing incorporated municipal boundaries, not the MPAs. Each incorporated municipality in the study area has an MPA that identifies its area of planning concern, which is based on the anticipated future incorporated boundaries of that municipality. However, because land outside incorporated areas is considered county land until annexed, it was treated as such in this evaluation.

This study, as discussed in Section 3.2.4, *Environmental Consequences*, assumed that land identified within the MPAs will be incorporated by the 2040 build year of the proposed action and, subsequently, it is included in municipal calculations later in the section (No-Action Alternative).

Figure 3.2-1 depicts existing incorporated municipal boundaries and MPAs in the study area. The square mileage and acreage of incorporated municipal and MPA limits in the study area are presented in Table 3.2-1. Based on a study area of approximately 903 square miles, incorporated municipal land represents 22 percent of the total study area land, tribal land represents approximately 2 percent, and the remaining 76 percent is unincorporated Pinal County land.

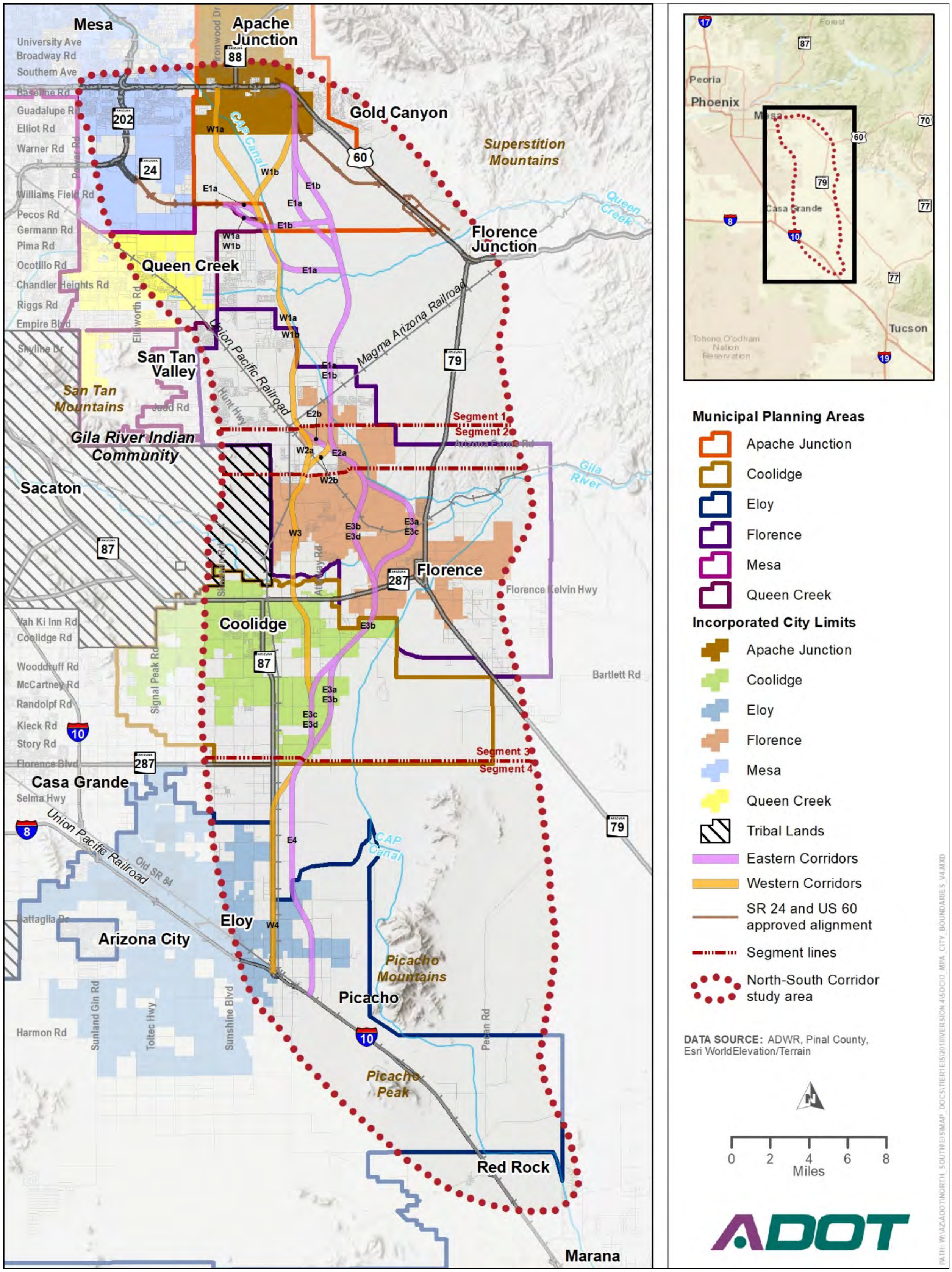
Table 3.2-1. Incorporated, municipal planning, and sovereign nation area of jurisdictions in the study area

Municipality[a]	Incorporated limits		Municipal planning area limits[b]	
	Square miles	Acres	Square miles	Acres
Apache Junction	19.5	12,487	69.0	44,171
Mesa	36.6	23,396	44.2	28,259
Queen Creek	12.0	7,653	23.0	14,748
Florence	61.6	39,409	165.0	105,578[c]
Coolidge	45.9	29,358	109.9	70,327
Eloy	21.6	13,811	132.2	84,588
Incorporated area subtotal	**197.1**	**126,114**	**—**	**—**
Gila River Indian Community	19.5	12,511	19.5	12,511
Tohono O’odham Nation	0.1	44	0.1	44
Unincorporated	685.9	438,996	—	—
Total area	**902.6**	**577,664**	**—**	**—**

[a] Only the acreage and square mileage included in the study area limits are reported.

[b] Land that overlaps two or more municipal planning areas is considered part of Pinal or Maricopa County and is not reported in the municipal planning area limits summary.

Figure 3.2-1. Municipal planning areas and incorporated boundaries



3.2.3.1 Land Ownership and Management

Most land in the study area is either owned by ASLD or private land owners (Table 3.2-2). ASLD manages State Trust land on behalf of the trust's beneficiaries, and this land may transfer to private interests through sale or lease for residential, commercial, or employment development or for agricultural or natural resource extraction uses. It is anticipated that much of the future growth in the study area would result from the sale of ASLD land for development. Figure 3.2-2 shows land ownership in the study area.

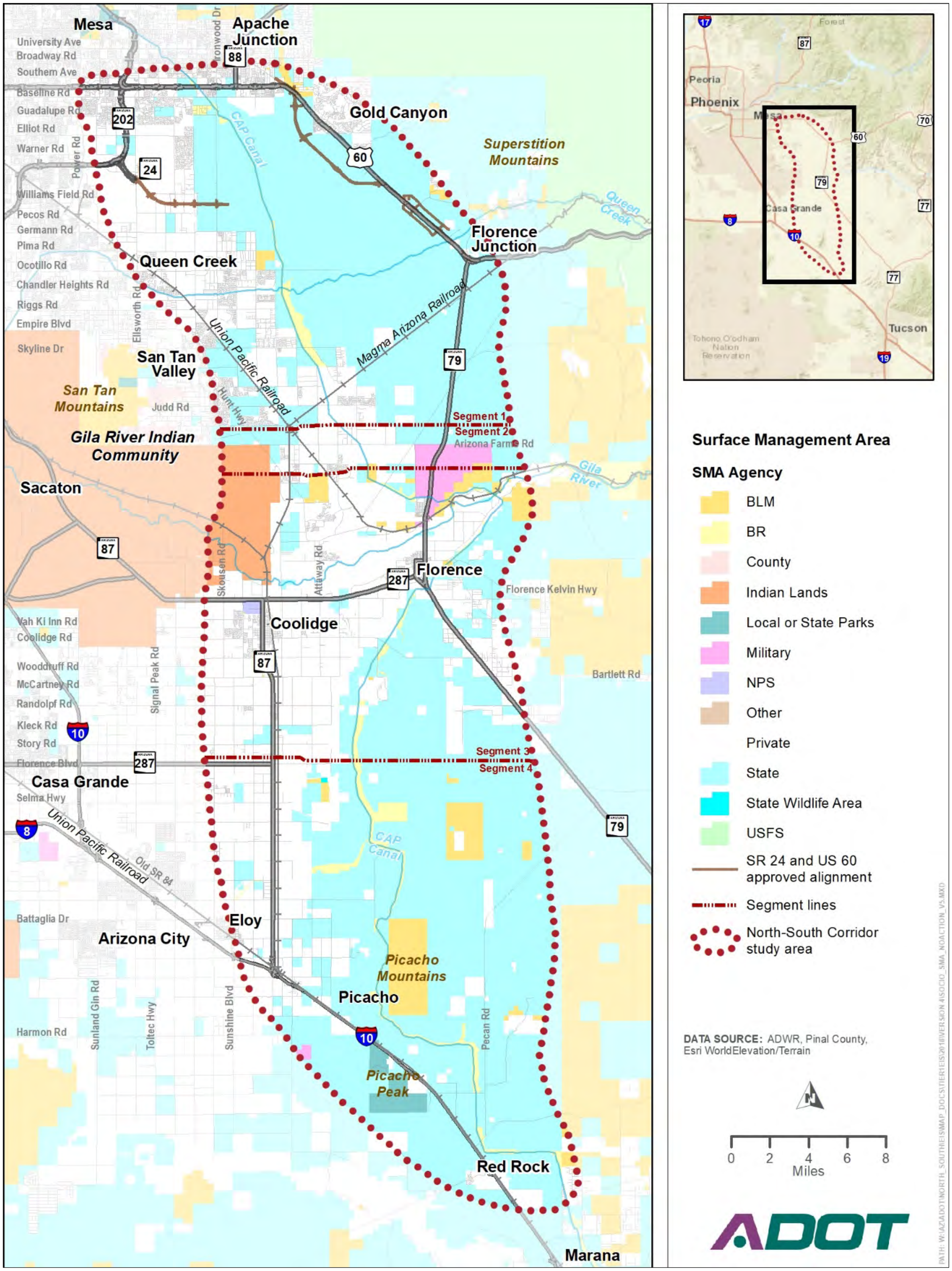
Table 3.2-2. State, federal agency, and sovereign nation existing land ownership and management in the study area, 2015

Land owner/manager	Percentage of study area
Arizona State Land Department	52.1
Private entity	39.2
U.S. Bureau of Land Management	2.9
Gila River Indian Community	2.2
U.S. Bureau of Reclamation	1.9
Florence Military Reservation[a]	1.0
Arizona State Parks	0.6
Casa Grande Ruins National Monument	0.1
Arizona Game and Fish Department	<0.1
Parks and Recreation	<0.1
Tohono O'odham Nation	<0.1
Total	**100.0**

Source: Arizona State Land Department, Arizona Land Resource Information System (2012). Arizona Land Resource Information System land ownership information does not include local planning agencies' land ownership.

Note: The Florence Military Reservation is managed by the Arizona Army National Guard, in cooperation with other state and federal agencies.

Figure 3.2-2. Surface land management in the study area



Federal, tribal, and non-ASLD land in the study area includes:

- U.S. Bureau of Land Management – This agency's land is located south of Tonto National Forest (which is north of and outside the study area), near Gold Canyon, at the Florence Military Reservation, at the Rittenhouse Army Heliport (which is operated by the Arizona Army National Guard), and in large swaths in the southern portion of the study area, near Eloy. Smaller parcels of U.S. Bureau of Land Management land are dispersed throughout the study area.
- Military – Land in the study area owned or managed by the Arizona Army National Guard.
  - The Florence Military Reservation is on unincorporated Pinal County and incorporated Florence land, north of downtown Florence. The approximately 40-square-mile site is managed by the Arizona Army National Guard in cooperation with other state and federal agencies.
  - Rittenhouse Army Heliport is on unincorporated Pinal County land, east of Queen Creek. The facility is owned by the Arizona Army National Guard. The site is listed as a military helicopter training and staging field with night and day operations.
- National Park Service – Managed by the National Park Service, Casa Grande Ruins National Monument is one of the largest prehistoric structures ever built in North America. The monument is in Coolidge, south of SR 87 and west of SR 287.
- State – State land (excluding ASLD land, discussed separately) in the study area includes McFarland State Historic Park, Picacho Peak State Park, and a 53-acre parcel adjacent to Picacho Reservoir managed by the Arizona Game and Fish Department (AGFD).
- Tribal – Two tribal nations have sovereign land in the study area. A brief description of these is provided below, with additional detail presented in Section 3.14, *Cultural Resources*.
  - The Gila River Indian Community is located west of Florence. Approximately 12,522 acres of undeveloped tribal land is located in the study area (Gila River Indian Community 2015).
  - The Tohono O'odham Nation contains more than 2.8 million acres on four land bases. One of the smaller bases, Florence Village, is located in the study area, north of SR 287. Florence Village is approximately 44 acres (Tohono O'odham Nation 2014).
- U.S. Bureau of Reclamation – The 336-mile CAP Canal was constructed by the U.S. Bureau of Reclamation. In 1971, the Central Arizona Water Conservation District was formed and since then has managed and operated the canal.

3.2.3.2 Existing Land Use

Existing land use by county, municipality, and tribal nation is described in detail below and is presented in Table 3.2-3 and Figure 3.2-3.

Table 3.2-3. Existing land use in the study area, 2015

Geographic area[a]	Total acres[b]	Agricultural (%)	Commercial (%)	Industrial (%)	Open space (%)	Public/ Quasi-public (%)	Residential[c] (%)	Undeveloped (%)
Maricopa County	13,410	37.1	4.7	0.0	0.1	2.4	30.3	25.8
Pinal County	423,820	10.7	0.1	1.2	0.7	1.0	6.3	80.0
Apache Junction	12,545	0.0	0.6	2.3	1.4	2.5	19.1	74.0
Mesa	23,396	9.1	11.3	3.6	2.2	2.4	37.0	34.3
Queen Creek	558	98.3	0.0	0.0	0.0	0.0	1.7	0.0
Florence	39,654	30.4	0.1	5.9	0.1	1.4	7.7	54.5
Coolidge	37,734	82.7	0.7	2.3	1.8	0.9	7.0	4.5
Eloy	13,851	75.6	0.0	4.5	0.0	0.3	2.0	17.6
Tribal land	12,566	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Study area	**577,534**	**18.5**	**0.7**	**1.8**	**0.7**	**1.1**	**8.3**	**68.9**

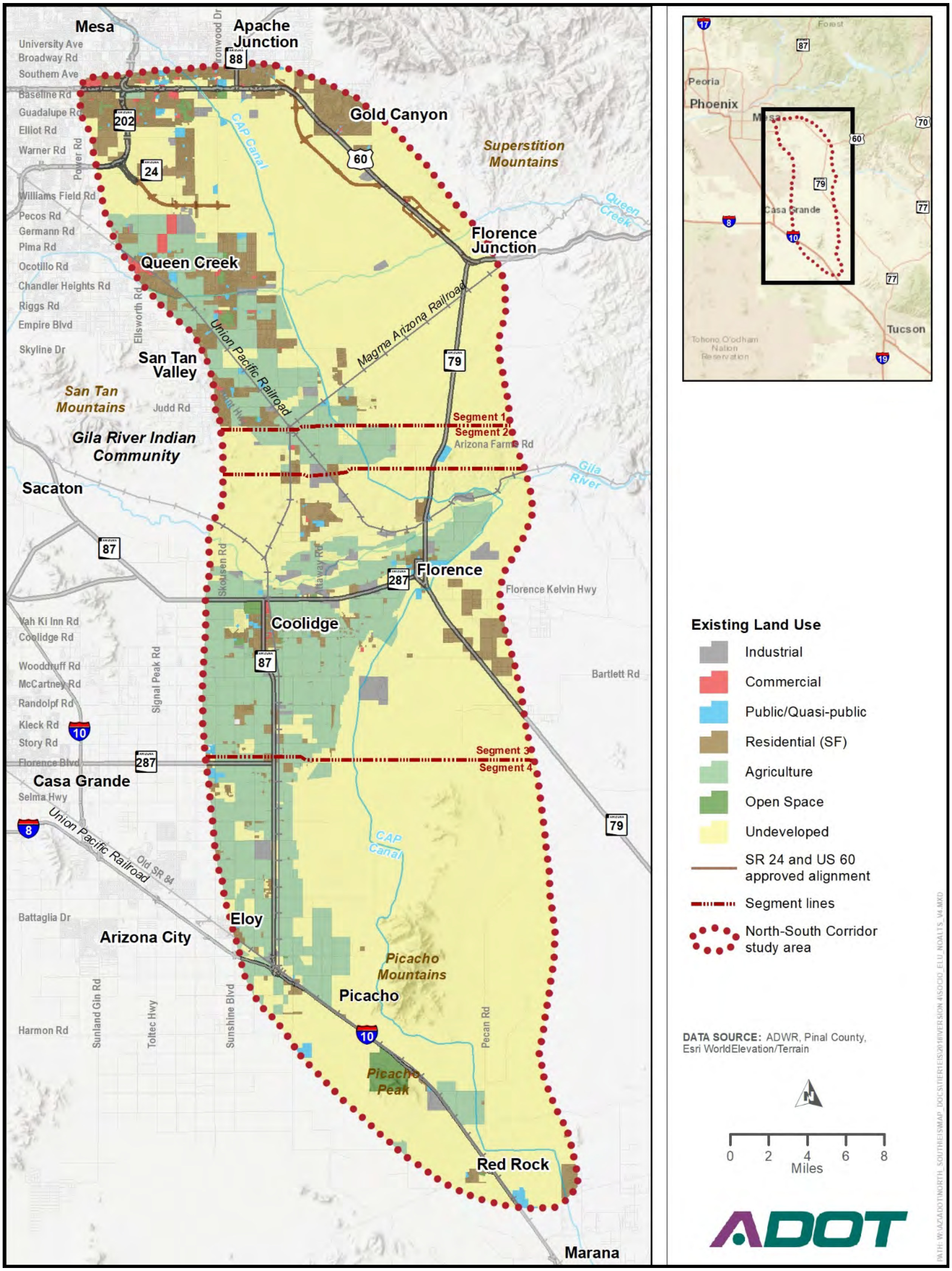
Source: compilation of data from municipal entities and remote sensing, 2016

[a] Information presented for study area municipalities is based on incorporated municipal limits and not municipal planning area boundaries. Unincorporated areas are counted as part of county land.

[b] Acreage is reported for only the portion of tribal, municipal, or county land within the study area.

[c] Residential includes single-family, multifamily, and mobile home park/manufactured housing.

Figure 3.2-3. Existing land use



Maricopa County

Only a small portion of Maricopa County is in the study area. This includes incorporated areas in Mesa and Queen Creek and unincorporated county land (land use discussions for these jurisdictions are provided below).

Pinal County

Most of Pinal County land in the study area that is outside incorporated municipal limits is generally classified as agricultural or undeveloped. Historically, most suburban and urban development in Pinal County has occurred in incorporated municipalities. Recently, however, many homes have been constructed in unincorporated areas.

Apache Junction

Apache Junction is located in Maricopa and Pinal Counties, with portions in far northern Pinal County and far eastern Maricopa County. US 60 is the primary east-to-west corridor connecting Apache Junction with the unincorporated area of Gold Canyon to the east and Phoenix to the west. Ironwood Drive, an important north-to-south arterial street in Apache Junction and Pinal County, traverses the western portion of the city.

Mesa

Mesa is in Maricopa County in the northwestern part of the study area. Major thoroughfares include US 60 and SR 202L. The Phoenix-Mesa Gateway Airport is in the far southeastern portion of Mesa that is in the study area. This area has seen significant development in the past 10 years, including both employment uses and residential development.

Queen Creek

Queen Creek is primarily in southeastern Maricopa County, with a small section in northwestern Pinal County. It is in the western portion of the study area, south of Mesa. Most of Queen Creek within the study area is agricultural and residential development. The area traversed by the existing and planned SR 24 (from SR 202L to Ironwood Drive) is undeveloped ASLD land.

Florence

Florence, the Pinal County seat, is located along the Gila River where SR 287 and SR 79 intersect. Currently, large portions of Florence are undeveloped or in agricultural use—land that is being converting to residential use. This includes Anthem at Merrill Ranch, a developing 3,100-acre, 8,500-home master-planned community adjacent to Hunt Highway. The Florence Townsite Historic District was listed on the National Register of Historic Places (NRHP) in 1982 and includes over 140 historic buildings. The historic town center includes a cluster of commercial businesses and numerous buildings used to support county government activities.

Coolidge

While the city has retained much of its agricultural base, it has also experienced substantial residential growth since 2000. Single-family homes are the dominant residential type and are concentrated around the downtown core. Casa Grande Ruins National Monument is north of downtown. The Coolidge Municipal Airport is southeast of downtown. Approximately 11,000 acres of Pinal County land were recently annexed by the City, and the landowner proposes to construct a new inland port[1] and industrial

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[1] Inland ports are locations where international cargo bypasses coastal ports of entry and goes through customs and other processing at an inland location, with goods typically transported inland by rail.

site 0.25 mile east of SR 87 between Hanna and Houser Roads (Southwest Traffic Engineering, LLC 2015).

Eloy

Eloy is in the southern portion of the study area. It is primarily served by I-10 and SR 87 and secondarily by a smaller arterial street network. UPRR tracks run parallel to I-10 and north-to-south along SR 87, an area the City plans for industrial and mixed-use development.

3.2.3.3 Planned Land Use

County and municipal land use plans are designed to serve as long-range visions for how a jurisdiction would like to develop over the next 20 to 30 years. This section provides an overview of jurisdictional planning documents and regional transportation plans, and notes whether the plans identify the Corridor.

State law sets forth the general parameters that jurisdictions follow when developing a zoning ordinance or modifications thereof (rezoning). Specifically, the statutes stipulate that the zoning ordinance and subsequent updates must be consistent with the respective jurisdiction’s comprehensive or general plan. As a result, the future land use map included in the comprehensive and general plans reflects anticipated growth based on allowable uses and densities. It should be noted that the future land use maps include land in the MPAs that has yet to be annexed. The zoning ordinance, however, includes only currently incorporated areas and is routinely updated as land is incorporated.

County and Municipal Plans

MARICOPA COUNTY

The Maricopa County *Vision 2030 Comprehensive Plan* was approved by the Maricopa County Board of Supervisors in January 2016. The plan does not mention the Corridor; however, the Maricopa County Department of Transportation *Major Streets and Routes Plan* (2011) references the North-South Freeway as a proposed high-capacity facility.

PINAL COUNTY

The vision and strategic direction for Pinal County are outlined in the *2009 Pinal County Comprehensive Plan* (updated 2015). Chapter 4 of the plan (*Mobility and Connectivity*) states that introducing new major roadways would help alleviate some of the pressure on the existing roadway and freight network while also providing economic advantages for the county. The plan recognizes that the alignment of a north-to-south transportation corridor and other proposed projects are subject to change (Pinal County 2015).

APACHE JUNCTION

The Apache Junction *2010 General Plan* was adopted by the City in 2010. The plan stipulates that connecting regional transportation systems and providing additional access points to and from US 60 are priorities for improving circulation in the city. The plan does not specifically mention the Corridor (City of Apache Junction 2010).

MESA

The Mesa *2040 General Plan* was adopted in 2014. The plan does not reference the Corridor (City of Mesa 2014).

QUEEN CREEK

The 2018 *General Plan* was approved by voters on May 15, 2018. The plan does not identify a preferred alignment (Town of Queen Creek 2018).

FLORENCE

The Florence *2020 General Plan* was adopted in 2008. The *2020 General Plan* Future Land Use map was amended in 2014 to reflect the "North-South ADOT Freeway Conceptual Corridor" (Town of Florence 2014).

COOLIDGE

The Coolidge *General Plan 2025* was adopted in 2014. In December 2016, the City amended the plan's Circulation Element to show the City's preferred alignment and potential traffic interchange locations for the Corridor.

ELOY

The City of Eloy *2010 General Plan Update* was adopted in 2011. The *General Plan* Circulation Element map was amended in 2015 to show the City's preferred Corridor alignment.

Regional Plans

Transportation studies influencing the study area and region were summarized in the 2014 ASR. Additional information regarding these plans is presented in Section 1.3.3, *Previous Transportation Studies in the Study Area*. The regional transportation plan affecting and implementing local planning documents is described below.

PINAL REGIONAL TRANSPORTATION PLAN

The Pinal Regional Transportation Authority was formed in 2015 by the Pinal County Board of Supervisors (in accordance with A.R.S. § 48-5302). The Pinal Regional Transportation Authority is a public, political, tax-levying improvement subdivision of the state. The *Pinal Regional Transportation Plan*, approved by Pinal County voters on November 7, 2017, represents the County's 20-year transportation plan and includes funding for ROW acquisition and construction of portions of the "North-South Parkway." Pinal County voters also approved Proposition 417, which levies a half-cent transportation excise tax to fund transportation projects over the next 20 years.

Future Land Use

Anticipated future land use in the study area is presented in Table 3.2-4 and Figure 3.2-4. By 2040, new development in the study area is projected to be substantial because the study area is centrally located in the Sun Corridor between Phoenix and Tucson and because over 90 percent of the study area is available for development (39 percent is privately owned and 52 percent is ASLD land).

Table 3.2-4. Future land use in the study area under the No-Action Alternative, 2040

Geographic area[a]	Total acres[b]	Agricultural (%)	Business park (%)	Commercial (%)	Industrial (%)	Mixed use (%)	Neighborhood[c] (%)	Open space (%)	Public/ Quasi-public (%)	Residential[d] (%)
Pinal County[e]	205,436.8	0.0	5.1	0.3	3.2	1.6	0.9	28.5	0.9	59.4
Apache Junction	44,170.8	2.2	0.8	0.0	0.0	0.0	0.0	5.8	0.5	90.7
Mesa[f]	28,258.2	0.0	17.2	3.8	0.0	42.1	0.0	0.1	2.3	34.4
Queen Creek[f]	14,748.7	0.0	28.9	2.9	7.8	14.4	0.0	3.0	1.0	41.9
Florence	105,537.3	0.2	0.0	6.3	12.7	0.4	0.0	10.2	8.3	62.1
Coolidge	70,326.5	7.4	0.0	13.8	4.3	0.5	51.0	0.4	3.5	19.0
Eloy	84,587.9	0.1	1.4	2.4	11.3	6.4	0.0	4.5	1.1	72.4
Tribal land	12,565.7	0.0	0.0	0.0	0.0	99.6	0.0	0.0	0.0	0.4
Other[g]	11,902.5	0.0	17.2	3.8	0.0	42.1	0.0	0.1	2.3	34.4
Study area	**577,534.4**	**1.1**	**3.7**	**3.6**	**6.5**	**6.2**	**6.5**	**13.2**	**2.6**	**56.4**

Source: compilation of data from municipal entities and remote sensing, 2016

[a] Acreage is reported only for the portion of tribal, municipal, and county land in the study area.

[b] Information presented for study area municipalities is based on municipal planning area boundaries.

[c] Neighborhood refers to a land use category in Coolidge that allows a mixture of uses, including neighborhood-scale commercial, professional office, and single-family and multifamily residential at varying densities, along with other community facilities and services, parks, and open space.

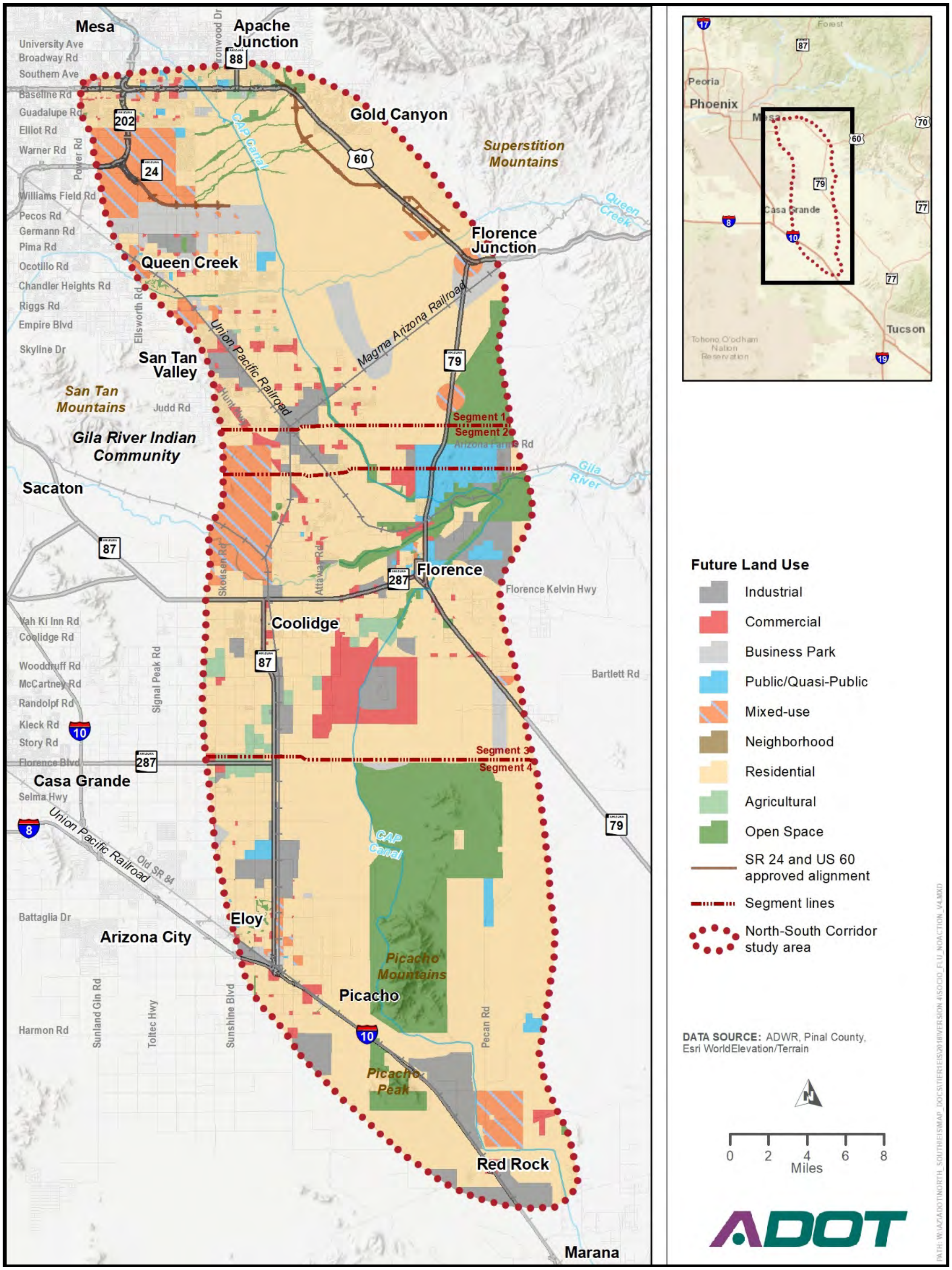
[d] Residential includes single-family and multifamily housing.

[e] Land identified in more than one municipal planning area is included in the Pinal County total.

[f] Previously reported unincorporated land in Maricopa County is now presented in either the Mesa or Queen Creek municipal planning area.

[g] The "other" category includes land in the Marana municipal planning area.

Figure 3.2-4. Future land use under the No-Action Alternative, 2040



Planned Developments

Study area municipalities identify more than 100 planned or proposed residential developments (subdivisions or master-planned communities) and several economic activity centers that may be constructed by the 2040 build year of the proposed action. Some of these potential developments are well along in the development process; others are still conceptual. These developments are reflected in the jurisdictions' general plan land use maps, which, along with the *Pinal County Comprehensive Plan*, are represented in Figure 3.2-4, and the referenced larger planned developments in the study area are described below and shown in Figure 3.2-5.

Lost Dutchman Heights is a proposed 7,700-acre development on ASLD land. The development would be east and west of the CAP Canal, and south of US 60, from Baseline Road to Elliot Road. The proposed project includes nearly 40,000 housing units, 6 to 8 million square feet of commercial space, and approximately 250 acres of light industrial business park development. Major arterial streets in Lost Dutchman Heights are planned to match up with the grid system. Project planning is reflected in Apache Junction's *General Plan* and *Comprehensive Transportation Study*, which shows the general location of the roadway network for the project.

Superstition Vistas is a 275-square-mile tract of undeveloped ASLD land that extends from Apache Junction to Florence. Once built in full, the area would accommodate up to 1 million residents and include commercial and open space land uses. Superstition Vistas is anticipated to be built over the next several decades. A developer-sponsored comprehensive plan for the area was completed in 2012, and in late 2012 the Pinal County Board of Supervisors approved the Superstition Vistas amendment to the *Pinal County Comprehensive Plan*.

Mesa Gateway Employment Center is the area surrounding the Phoenix-Mesa Gateway Airport. The 2008 strategic plan for this area envisions a regional employment center with the potential to attract up to 100,000 jobs.

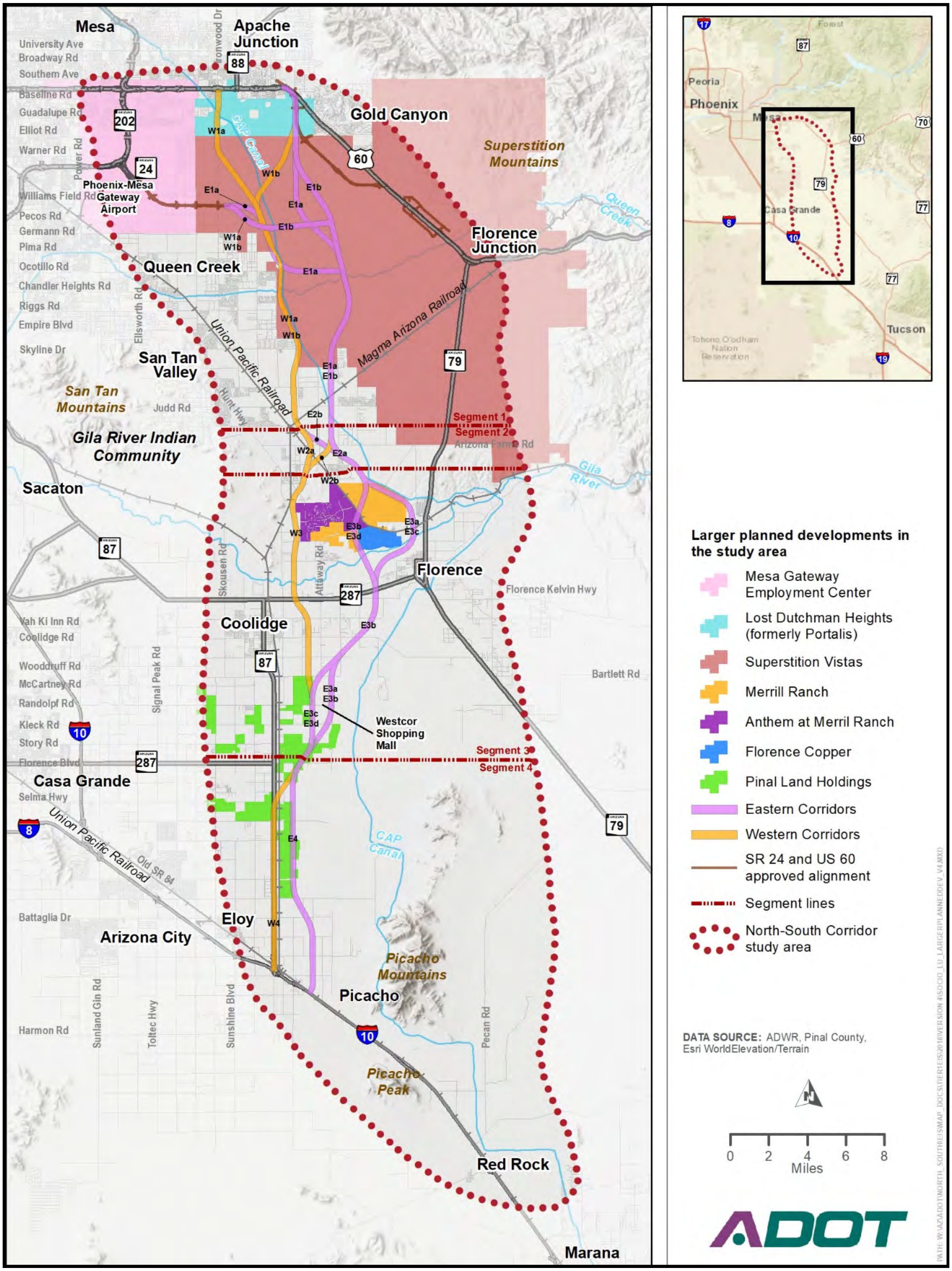
Anthem at Merrill Ranch is a large master-planned community (3,100 acres) of 8,500 housing units within the Florence portion of the study area. At this time, approximately 2,500 single-family housing units have been built.

Florence Copper is a 1,342-acre site where mineral exploration and development activities have occurred since the 1960s. The site currently operates in-situ copper recovery production test facilities including injection, recovery, and monitoring wells; solution storage tanks; and a water impoundment. The site is planned to advance to commercial production (SRK Consulting 2010). The in-situ copper recovery process is used to recover copper from the subsurface without significant land disturbance.

Westcor Shopping Mall is a large regional commercial center proposed southeast of downtown Coolidge.

Inland Port Arizona and Pinal Logistics Park is a proposed inland port and industrial site on approximately 1,500 acres of Pinal Land Holdings land, east of SR 87 in the city of Coolidge.

Figure 3.2-5. Larger planned developments in the study area



3.2.4 Environmental Consequences

The following sections describe anticipated conditions in the study area, both with and without the proposed action, by the 2040 build year of the proposed action. While the existing conditions analysis was based on currently incorporated municipal boundaries, the impact analysis assumes that all land identified in the MPAs will have been annexed by the respective jurisdictions by 2040. In some instances, MPA boundaries are still being determined. Land that is currently reported in more than one MPA is presented under Pinal County.

3.2.4.1 No-Action Alternative

Under the No-Action Alternative, land in the study area would continue to be converted from agricultural and undeveloped use to residential and commercial uses. In their comprehensive or general plans, study area jurisdictions have identified their preferred long-term land use scenarios. The No-Action Alternative analysis is based primarily on a review of these plans and on information provided by individual jurisdictions regarding planned and proposed development.

The *Pinal Regional Transportation Plan* contains potential transportation projects through 2037, including the “North-South Parkway.” The plan forms the basis of the No-Action Alternative by considering all planned transportation projects except for the North-South Freeway. With the No-Action Alternative, the North-South Freeway would not be constructed and no other new project or projects would be identified in the *Pinal Regional Transportation Plan* to replace the North-South Freeway to improve regional mobility.

With the No-Action Alternative, no direct impacts on land uses would occur as a result of the North-South Freeway. With the expected population growth rate, by 2040 much of the agricultural land in incorporated areas of the study area would be converted to urban uses, particularly residential, with or without the North-South Freeway. The growth can occur without the facility because the study area has readily available land and good, but congested, transportation access to regional destinations. This access is one of the reasons why the area has changed substantially from agricultural uses to suburban development.

Under the No-Action Alternative, development in the study area is anticipated to be substantial by 2040. Municipal and county partners have identified more than 100 planned and proposed developments in the study area. Some of these developments, and the existing infrastructure, would be affected to varying degrees under the action corridor alternatives. However, as described in the next section, much of the new development in the study area would be supported by the introduction of a new north-to-south transportation corridor.

Land use plans for jurisdictions in the study area show a mixture of residential and commercial uses in the future to support the projected growth in population and employment. With both the No-Action and action corridor alternatives, the Pinal Regional Transportation Authority would continue to develop other projects in the *Pinal Regional Transportation Plan*, independent of the North-South Freeway. The impacts of these projects, which are independent of the North-South Freeway, would be evaluated in separate environmental documents.

Based on travel demand modeling scenarios, the construction of new roads that are local in scale would not adequately handle the projected demand.

3.2.4.2 Action Corridor Alternatives

The analysis conducted for the action corridor alternatives assumed that land would be similarly converted as described under the No-Action Alternative. As a result, the analysis considered the extent to which the proposed action corridor alternatives would affect existing and future land use, evaluated whether the action corridor alternatives would be consistent with identified planning and policy documents, and determined whether they would potentially result in property acquisitions and displacements.

Existing Land Use

The direct land use impact of the action corridor alternatives is the ROW needed for the alignment, which would be established in subsequent Tier 2 studies. However, overlaying the action corridor alternatives on the existing land uses provides an understanding of the types and areas of impact that may be experienced with the selection of an action alternative. Table 3.2-5 shows the area of existing land uses within the action corridor alternatives for each of the study area segments.

Table 3.2-5. Acreage of affected existing land uses, by action corridor alternative

Action corridor alternative	Land use							Total
	Agricultural	Commercial	Industrial	Public/ Quasi-public	Residential	Open space	Vacant/ Undeveloped	
Segment 1								
E1a	168	0	0	6	20	0	4,688	4,883
E1b	168	0	0	0	20	0	4,263	4,451
W1a	744	3	3	8	69	64	2,725	3,614
W1b	744	0	0	8	40	0	2,873	3,664
Segment 2								
E2a	454	0	0	0	2	0	57	514
E2b	612	0	0	0	0	0	57	669
W2a	374	0	1	0	0	0	103	479
W2b	436	0	29	0	2	0	94	560
Segment 3								
E3a	2,180	0	126	0	74	0	989	3,369
E3b	1,993	0	128	0	56	0	842	3,018
E3c	2,130	0	126	0	35	0	1,098	3,389
E3d	1,943	0	128	0	17	0	951	3,038
W3	1,615	0	69	9	23	0	1,045	2,760
Segment 4								
E4	1,619	0	14	0	15	0	632	2,280
W4	1,405	0	98	1	136	0	447	2,088

Source: analysis of action corridor alternatives and existing land uses (2015), using aerial photography

SEGMENT 1

The E1a, E1b, and W1b Alternatives share a similar footprint at their system traffic interchange with US 60. Residential development at the southwestern corner of this interchange would be affected by the Corridor; however, an alignment in the Corridor may avoid these impacts. The development's access is from the west from Goldfield Road and would not be affected. Depending on the system traffic interchange configuration, access to US 60 from Goldfield Road may be affected. South of US 60, these alternatives cross undeveloped land for most of their lengths (the W1b Alternative merges with the W1a Alternative west of the CAP Canal). The merged E1a and E1b Alternatives would affect rural residential properties south of Skyline Drive, although an alignment in the Corridor may avoid these properties. South of the Magma Arizona Railroad, the E1a and E1b Alternatives cross the CAP Canal and agricultural land.

The W1a Alternative would have a system traffic interchange with US 60 at the Ironwood Drive alignment. All four corners of this interchange are developed. Depending on the interchange configuration, access to US 60 from Ironwood Drive may be affected. Apache Junction High School is situated in the northeastern quadrant of the interchange. Depending on the intersection configuration, an alignment in the Corridor may avoid direct impacts on Apache Junction High School. The southwestern quadrant is occupied by a manufactured home development with access from both Ironwood Drive and Baseline Road. The southeastern quadrant is occupied by a golf course. Ironwood Drive has an annual ADT volume of nearly 30,000. Depending on the alignment, the W1a Alternative may require through frontage roads because of traffic volume and local access issues. These include the industrial development west of the W1a Alternative and an existing wastewater treatment plant to the east, both accessed exclusively from Ironwood Drive by way of Guadalupe Road.

South of Elliot Road, the W1a Alternative shifts off the Ironwood Drive alignment and turns southeast over undeveloped land, east of the planned connection with SR 24, to where the W1b Alternative merges with the W1a Alternative (just north of the proposed system traffic interchange with SR 24) and is coincident with the E1b Alternative's SR 24 connection.

A Salt River Project power substation extends approximately 400 feet into the W1a, W1b, and E1a Alternative footprints. South of Germann Road, the alternatives cross through the eastern side of the Rittenhouse Army Heliport, located adjacent to existing residential development to the west and south, with the CAP Canal to the east. The E1a Alternative crosses the CAP Canal at Ocotillo Road, where it follows the Ocotillo Road alignment.

South of the Rittenhouse Army Heliport, the W1a and W1b Alternatives follow the western edge of the CAP Canal ROW across undeveloped and agricultural land immediately east of existing residential subdivisions. The alternatives would affect a rural residential development north of Skyline Drive. South of Skyline Drive, the W1a and W1b Alternatives traverse undeveloped and agricultural land for the remainder of Segment 1.

SEGMENT 2

In Segment 2, the merged Eastern and Western Alternatives each split east and west across agricultural land, with only the E2b Alternative directly affecting rural residential development located in the southwestern quadrant of Arizona Farms and Attaway Roads.

SEGMENT 3

At the northern end of Segment 3, the E3a, E3b, E3c, and E3d Alternatives traverse undeveloped land. The alternatives split in the northern part of the segment, and the E3a and E3c Alternatives follow the CAP Canal, then turn south just west of a mobile home and recreational vehicle park on SR 79, north of the Gila River. South of Segment 2, the E3b and E3d Alternatives follow a southwesterly alignment across the UPRR and Hunt Highway across undeveloped land approximately 0.75 mile east of the developed Anthem at Merrill Ranch master-planned community. South of Hunt Highway, the E3b and E3d Alternatives curve to the southeast and are immediately adjacent to the southwestern portion of the Florence Copper property (the proposed in-situ copper recovery facilities/activities and related mine facilities are not anticipated to pose any geological risks or issues for the alternatives). The E3b and E3d Alternatives cross agricultural land before crossing the Gila River immediately east of sand and gravel mining activities on the northern bank of the river. The E3a and E3c Alternatives cross the Gila River approximately 0.5 mile west of SR 79 before turning to the west across agricultural fields and an active private wedding and event site in Florence. The E3a and E3c Alternatives continue across agricultural land before turning south across Adamsville Road, where they rejoin the E3b and E3d Alternatives and cross undeveloped land and SR 287.

South of SR 287, the Eastern Alternatives would affect an electrical substation, although a Tier 2 alignment in this corridor may avoid impacts on this property. The Eastern Alternatives continue southeast across agricultural land, affecting several rural residences east and west of the crossing of Valley Farms Road and Coolidge Avenue. The Eastern Alternatives continue southwest across Martin Road, splitting around the regional shopping center planned for the southwestern corner of Bartlett and Wheeler Roads.

The E3a and E3b Alternatives follow Wheeler Road south, affecting several rural residential properties south of Bartlett Road.

South of Kleck Road, the E3a and E3b Alternatives traverse agricultural land, rejoin the E3c and E3d Alternatives, and continue southwest across agricultural land before splitting south of Steele Road.

A developed subdivision along Hunt Highway south of Arizona Farms Road extends approximately 300 feet into the W3 Alternative (no homes are within the action corridor alternative footprint). The W3 Alternative then crosses Hunt Highway and turns south at UPRR and continues across undeveloped land. South of the North Side Canal, the W3 Alternative crosses agricultural land and the Gila River just west of sand and gravel operations on the river’s northern bank.

South of the Gila River, the W3 Alternative crosses agricultural land and would affect several rural homes on the northern side of SR 287 and extends less than 200 feet over the edge of an existing cemetery. The W3 Alternative traverses agricultural land and would affect several rural homes before merging with the E3c and E3d Alternatives south of Bartlett Road on the Fast Track Road alignment.

The W3, E3c, and E3d Alternatives traverse agricultural and undeveloped land until joining the E3a and E3b Alternatives at Storey Road. There the merged alternatives curve to the southwest across agricultural land at the southern end of Segment 3.

SEGMENT 4

South of Steele Road, the Eastern and Western Alternatives would affect a rural residential property before diverging. The E4 Alternative follows the Fast Track Road alignment past Picacho Reservoir and across agricultural and undeveloped land to its juncture with I-10.

After diverging, the W4 Alternative continues southwest across UPRR to SR 87, with which it is coincident south from Selma Highway to its juncture with I-10. UPRR runs parallel to SR 87 on the eastern side to its juncture with the UPRR Sunset Line on the northern side of I-10. South of Hanna Road, the W4 Alternative crosses less than 200 feet over the eastern edge of the Eloy Detention Center. South of Shedd Road, the W4 Alternative would affect a number of rural homes whose primary access is from SR 87. SR 87 is a two-lane road today, and any alignment coincident with SR 87 would require frontage roads or other means of preserving access to the agricultural land east of SR 87 and west of UPRR.

Additional rural homes would be affected south of Alsdorf Road because they are situated along the western side of SR 87, with access only from SR 87. At the southern end of the W4 Alternative, south of Battaglia Drive, a cotton warehousing facility is on the eastern side of the alternative and an agricultural chemical supply site is on the western side. Another cotton warehouse facility may be affected by the W4 Alternative and the proposed traffic interchange with I-10.

Future Land Use

The land use impact analysis included a review of all study area jurisdictions' comprehensive or general plans and an evaluation of the action corridor alternatives to determine consistency with these documents and to assess the potential direct and indirect impacts of each action corridor alternative on different land use types.

The discussion that follows compares the action corridor alternatives by segment. Land in areas where action corridor alternatives overlap is considered for all applicable action corridor alternatives. Future land use and the action corridor alternatives are presented in Figure 3.2-6.

Land Use Compatibility

Table 3.2-6 describes whether the action corridor alternatives would be compatible with anticipated future land use patterns for areas near the proposed action. While the analysis that follows assumes that all planned developments would be constructed by 2040, there may be an opportunity to work with municipal and county partners, other landowners, and developers to increase land use compatibility. This would depend on identifying a preferred alternative prior to constructing the developments.

Figure 3.2-6. Future land use under the action corridor alternatives, 2040

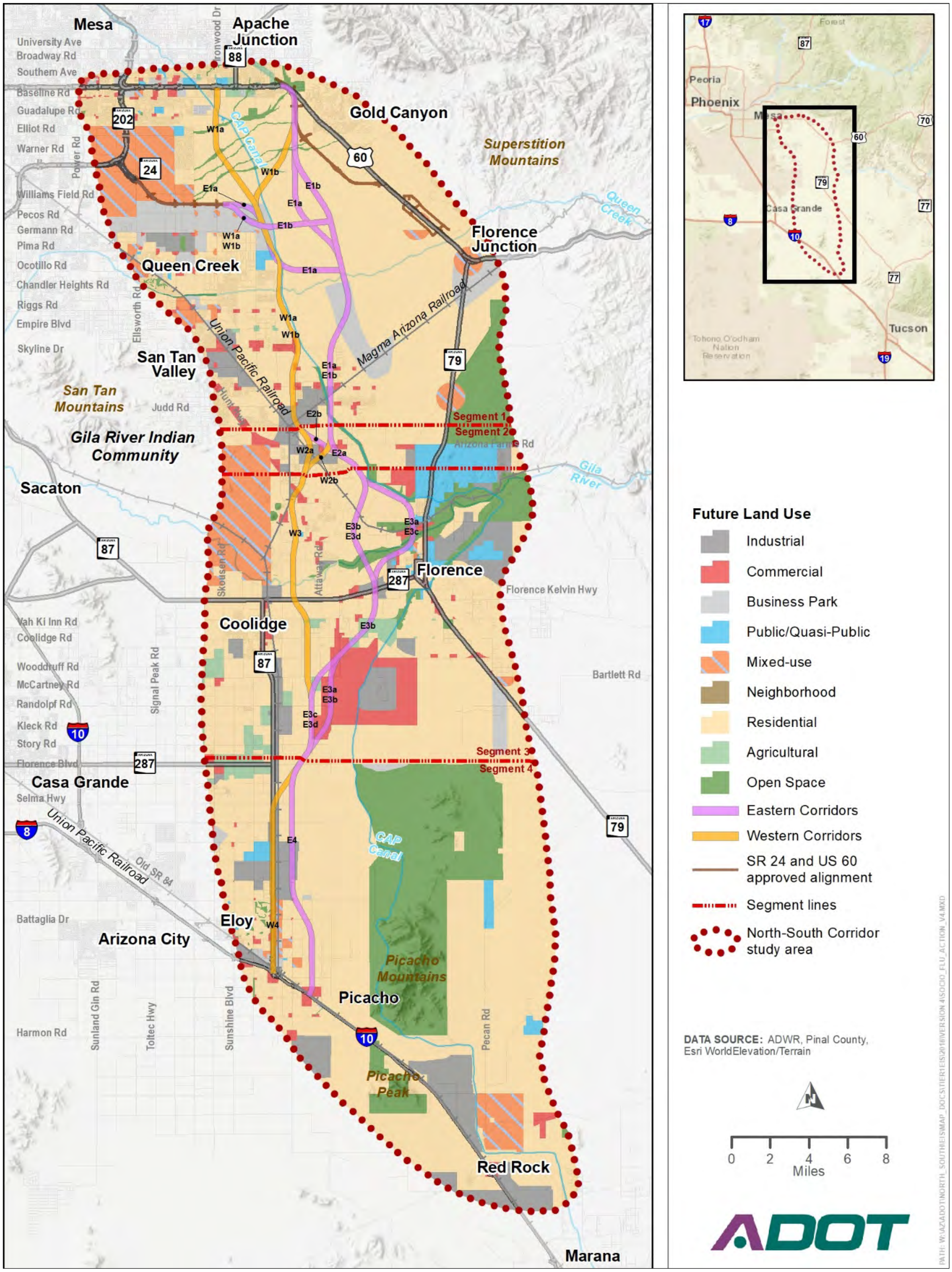


Table 3.2-6. Land use compatibility with the action corridor alternatives

Action corridor alternative	Land use compatibility
Segment 1	
Segment 1	• Most of the affected land in Segment 1 is owned by ASLD and is undeveloped.
E1a	• Almost all of the land potentially affected by the E1a Alternative is ASLD land proposed for future master-planned communities such as Lost Dutchman Heights (north of Elliot Road) and Superstition Vistas (south of Elliot Road). • Because most land is currently undeveloped, the E1a Alternative provides more opportunities to design an alignment that minimizes impacts on existing development and lessens impacts on the Lost Dutchman Heights development. • Affects the o developing Dolce Vita residential development at US 60 (the development extends less than 400 feet into the 1,500-foot corridor). o Rittenhouse Army Heliport. o Sonoran Villages planned multifamily development. o planned Dobson Farms residential subdivision.
E1b	• Almost all of the land potentially affected by the E1b Alternative is ASLD land proposed for future master-planned communities such as Lost Dutchman Heights (north of Elliot Road) and Superstition Vistas (south of Elliot Road). • Because most land is currently undeveloped, the E1b Alternative provides more opportunities to design an alignment that minimizes impacts on existing development and lessens impacts on the Lost Dutchman Heights development, and is the preferred alignment for ASLD's Superstition Vistas planning area. • Requires crossing the Rittenhouse Flood Retarding Structure, which is planned to be raised. • Affects the o developing Dolce Vita residential development at US 60 (the development extends less than 400 feet into the 1,500-foot corridor). o Sonoran Villages planned multifamily development. o planned Dobson Farms residential subdivision.
W1a	• Almost all of the land potentially affected by the W1a Alternative is ASLD land proposed for the Lost Dutchman Heights future master-planned community (north of Elliot Road). • Would require mitigation where the alternative is aligned with Ironwood Drive because of the volume of local traffic on this route and local access that uses Ironwood Drive today. • Affects the o Rittenhouse Army Heliport. o planned Quail Run Estates residential subdivision. o planned Bella Vista residential subdivision. o developing Skyline Estates residential subdivision.
W1b	• Does not affect the Lost Dutchman Heights development and would be relatively more compatible with ASLD's Superstition Vistas planning area than would be the W1a Alternative. • Affects future land use the most because of the development planned along Ironwood Drive. Under all Segment 1 alternatives, the majority of potentially affected land is planned as residential. • Requires crossing the Vineyard Flood Retarding Structure, which is planned to be raised. • Affects the o developing Dolce Vita residential development at US 60 (the development extends less than 400 feet into the 1,500-foot corridor). o Rittenhouse Army Heliport. o planned Quail Run Estates residential subdivision. o planned Bella Vista residential subdivision. o developing Skyline Estates residential subdivision.

Table 3.2-6. Land use compatibility with the action corridor alternatives

Action corridor alternative	Land use compatibility
Segment 2	
E2a	• Potentially affects the o planned Dobson Farms residential subdivision. o northeastern corner of the conceptual Arizona Farms residential subdivision. o planned regional commercial and high-density residential land on Arizona Farms Road, a potential traffic interchange (although not as much as E2b because E2a is less skewed). o conceptual Paloroso residential subdivision. o planned Felix Farms residential subdivision. o Mesquite Trails residential subdivision (although a Tier 2 alignment in this alternative may avoid impacts on the platted portion of this development).
E2b	• May create access issues for remnant parcels, depending on the alignment, because of the close proximity of the Magma and Union Pacific Railroads. • Potentially affects the o planned Dobson Farms residential subdivision. o northeastern corner of the conceptual Arizona Farms residential subdivision. o planned regional commercial and high-density residential land on Arizona Farms Road, a potential traffic interchange. o conceptual Paloroso residential subdivision. o planned Felix Farms residential subdivision. o Mesquite Trails residential subdivision.
W2a	• May create access issues for remnant parcels, depending on the alignment, because of the close proximity of the Magma and Union Pacific Railroads. • Potentially affects the o planned Dobson Farms residential subdivision. o northeastern corner of the conceptual Arizona Farms residential subdivision. o conceptual Magic Ranch residential subdivision.
W2b	• Potentially affects the o planned Dobson Farms residential subdivision. o conceptual Arizona Farms residential subdivision. o conceptual Magic Ranch residential subdivision.
Segment 3	
E3a	• Potentially affects the o planned Mesquite Trails residential subdivision. o northeastern edge of the planned Merrill Ranch residential subdivision where it borders the CAP Canal. o planned Heritage Creek Estates residential subdivision. o Town of Florence Territory Square Zoning District. The area potentially affected is planned for a mix of civic and recreation uses, and includes a new roadway parallel to the Gila River extending from Plant Road to SR 79. o conceptual Dobson/Florence residential subdivision. o conceptual Florence Industrial Park on the northern side of SR 287. o eastern edge of the planned Urton Farms residential subdivision. o planned Sendera residential subdivision. o eastern edge of the planned Westcor regional shopping center at the southwestern corner of Bartlett and Wheeler Roads.
E3b	• Potentially affects the o planned Mesquite Trails residential subdivision. o planned Merrill Ranch residential subdivision north and south of the Hunt Highway. o developing Anthem at Merrill Ranch residential subdivision. o conceptual Dobson/Florence residential subdivision. o conceptual Florence Industrial Park on the northern side of SR 287. o eastern edge of the planned Urton Farms residential subdivision. o planned Sendera residential subdivision. o eastern edge of the planned Westcor regional shopping center at the southwestern corner of Bartlett and Wheeler Roads.

Table 3.2-6. Land use compatibility with the action corridor alternatives

Action corridor alternative	Land use compatibility
E3c	• Potentially affects the o planned Mesquite Trails residential subdivision. o northeastern edge of the planned Merrill Ranch residential subdivision where it borders the CAP Canal. o planned Heritage Creek Estates residential subdivision. o Town of Florence Territory Square Zoning District. The area potentially affected is planned for a mix of civic and recreation uses, and includes a new roadway parallel to the Gila River extending from Plant Road to SR 79. o conceptual Dobson/Florence residential subdivision. o conceptual Florence Industrial Park on the northern side of SR 287. o eastern edge of the planned Urton Farms residential subdivision. o planned Sendera residential subdivision. o western edge of the planned Westcor regional shopping center at the southwestern corner of Bartlett and Wheeler Roads. o planned Sontesta residential subdivision.
E3d	• Potentially affects the o planned Mesquite Trails residential subdivision. o planned Merrill Ranch residential subdivision north and south of the Hunt Highway. o developing Anthem at Merrill Ranch residential subdivision. o conceptual Dobson/Florence residential subdivision. o conceptual Florence Industrial Park on the northern side of SR 287. o eastern edge of the planned Urton Farms residential subdivision. o planned Sendera residential subdivision. o western edge of the planned Westcor regional shopping center at the southwestern corner of Bartlett and Wheeler Roads. o planned Sontesta residential subdivision.
W3	• Potentially affects the o edge of the developing Oasis at Magic Ranch subdivision (no homes are within the alternative corridor footprint). o conceptual Magic Ranch residential subdivision. o conceptual Twin Peaks residential subdivision. o portion of the planned Walker Butte residential subdivision, east of the Southern railroad. o developing Anthem at Merrill Ranch residential subdivision. o planned Patria residential subdivision. o planned Kachina Heights residential subdivision. o planned Sontesta residential subdivision.
Segment 4	
E4	• Potentially affects the o planned Hanna Picacho residential development. o conceptual Bool Eloy 2180 residential development. • Supports the conceptual Inland Port Arizona and Pinal Logistics Park, an inland port and industrial site proposed on approximately 1,500 acres east of SR 87 between Hanna and Houser Roads.
W4	• Potentially affects the o conceptual Bool Eloy 2180 residential development. o planned Roberts Resort residential development. o planned Pamilla residential development. o planned Daybreak at Picacho residential development.

Notes: ASLD = Arizona State Land Department, CAP = Central Arizona Project, SR = State Route, US 60 = U.S. Route 60

Planning and Policy Documents

The need for a north-to-south transportation corridor has increased as study area municipalities and the larger Sun Corridor have experienced substantial growth over the past 30 years. More recently, and as mentioned previously, a number of studies have been commissioned to evaluate the need for an enhanced transportation network in and around the study area.

As these studies have advanced and confirmed the need for a north-to-south transportation corridor based on existing and projected demand, some study area jurisdictions have incorporated the proposed action into their comprehensive or general plans. Other jurisdictions have not specifically identified the proposed action in their comprehensive or general plans but have identified the need for improved regional connectivity and a safe, efficient transportation network.

Tables 3.2-7 and 3.2-8 describe how and to what extent the proposed action would be consistent with existing comprehensive and general plans and regional transportation plans.

Overall, study area jurisdictions are in agreement that a new north-to-south transportation corridor is necessary; however, the preferred alignment of that corridor is disputed.

Table 3.2-7. Comprehensive and general plans' consistency with the action corridor alternatives

Geographic area plan	North-South Corridor referenced?	Preferred alternative identified?	Action corridor alternatives' consistency comments
Pinal County *2009 Pinal County Comprehensive Plan*	Yes	No	Generally consistent with the comprehensive plan. A north-to-south transportation corridor has been incorporated into the transportation element of the *2009 Pinal County Comprehensive Plan*; however, it does not specify a preferred alternative.
Maricopa County *Vision 2030 Comprehensive Plan*	No	No	Generally consistent with the comprehensive plan. The action corridor alternatives would help achieve transportation-specific goals identified in the plan.
City of Apache Junction *2010 General Plan*	No	No	Generally consistent with the general plan. The action corridor alternatives would (1) improve access to and from US 60 and (2) introduce a roadway network that can support future development south of Baseline Road. Both goals were identified in the general plan.
City of Mesa *2040 General Plan*	No	No	Generally consistent with the general plan. The proposed action would support municipal goals of concentrated economic development along US 60 and the area surrounding the Phoenix-Mesa Gateway Airport.
Town of Queen Creek *General Plan Update 2018*	Yes	No	Generally consistent with the general plan. Identifies the SR 24 extension and North-South Freeway as contributing to the Town's regional transportation access, and alleviating congestion as a result of regional through traffic that affects the community today. Identifies the need for multijurisdictional coordination regarding implementing and maintaining a regional transportation network that can accommodate existing and projected demand.
Town of Florence *2020 General Plan*	Yes	E1a/E1b, E2a, E3a/E3c	Generally consistent with the general plan. The extent of this consistency will be determined once a preferred alternative is identified. The plan's future land use map identifies the Town's preferred alignment for the proposed action. This was later reaffirmed in the Town of Florence Resolution 1490-14 (December 2014, see Appendix A). The resolution supports the E1a/E1b, E2a, and E3a/E3c Alternatives and does not support the E3b/E3d Alternatives.

Table 3.2-7. Comprehensive and general plans' consistency with the action corridor alternatives

Geographic area plan	North-South Corridor referenced?	Preferred alternative identified?	Action corridor alternatives' consistency comments
City of Coolidge *2025 General Plan*	Yes	E3a/E3b, E4	Consistent with the general plan. The extent of this consistency will be determined once a preferred alternative is identified. The plan's future land use map identifies the Town's preferred alignment for the proposed action. The City's identified corridor follows the *Alternatives Selection Report* "AB" segment (no longer a viable option), and then generally follows the E3a/E3b and E4 Alternatives. The plan stipulates that the economic impact of a north-to-south transportation corridor through the city would be "significant and one of the most important transportation and land use goals that must be addressed by local, county, and state leaders as well as private property owners" (City of Coolidge 2014).
City of Eloy *2010 General Plan Update*	No	W4	Consistent with the general plan. The extent of this consistency will be determined once a preferred alternative is identified. In a letter from December 2014, the City of Eloy expressed support for the W4 Alternative for the following reasons: (1) reduced right-of-way acquisition and mitigation costs, (2) proximity and connectivity to downtown Eloy, (3) better distribution of vehicular and transit trips, and (4) enhanced opportunities for economic development along the SR 87 corridor. This was later reaffirmed in the City of Eloy Resolution 15-1343 (March 2015).

Source: comprehensive and general plans prepared by or for study area geographies (dates vary)
Notes: SR = State Route, US 60 = U.S. Route 60

Table 3.2-8. Regional and other transportation plans' consistency with the action corridor alternatives

Study	North-South Corridor referenced?	Preferred alternative identified?	Action corridor alternatives' consistency comments
Pinal Regional Transportation Plan, May 2016[a]	Yes	No	Consistent with the plan. The comprehensive multimodal regional transportation plan elements are financed with a transaction privilege (sales) tax for regional transportation purposes, including right-of-way acquisition for the North-South Freeway alignment.
Southeast Maricopa/ Northern Pinal County Area Transportation Plan, 2003	Yes	Illustrative alignment included	Consistent with the plan. The plan identified four new primary thoroughfares, one of which was the Apache Junction Coolidge Corridor (later renamed the North-South Corridor). Generally follows the Western Alternative, with two options identified at the southern end (one east-west, aligned with Interstate 8, and one north-south co-located with SR 87).
Pinal County Corridors Definition Study, 2007	Yes	West alignment; the study illustrates a western alignment that bypasses Florence	Largely consistent with the plan. Recommendations set forth in the report included a north-to-south transportation corridor and were adopted into MoveAZ, the then-current statewide long-range transportation plan. Inclusion in MoveAZ allowed for funding studies that would identify potential alignments of a north-to-south transportation corridor. The study noted that there is no need for a north-to-south corridor south of SR 287.
Statewide Transportation Planning Framework Program, 2010	Yes	Illustrative alignment included	Consistent with the plan. The Central Arizona Regional Framework Study, which was undertaken as part of the Framework Program, identified the need for a major north-to-south transportation corridor in the study area.
Pinal County Regionally Significant Routes Plan for Safety and Mobility, 2017 update	Yes	Illustrative alignment	Consistent with the plan. An illustrative alignment notes that the alignment is currently under study by ADOT. The document identifies both the Eloy (W4) and Coolidge (E4) Alternatives as Council-approved corridors.
Coolidge-Florence Regional Transportation Plan, 2008	Yes	No	Consistent with the plan. This plan developed a regional multimodal transportation system for the Coolidge-Florence planning areas. Based on anticipated growth in 2008, traffic projections with and without a north-to-south transportation corridor in 2025 were modeled. Recommendations set forth in the plan identified continued coordinated efforts regarding a design concept study for a north-to-south transportation corridor.
Queen Creek Small Area Transportation Study, 2008	Yes	No	Consistent with the plan. The study focused on identifying long-term transportation planning issues, primarily within Queen Creek's municipal limits. However, it also identified a north-to-south transportation corridor and need for coordinating future road systems to promote connectivity between and among communities.

Sources: regional plans prepared by or for study area geographies (dates vary)
Notes: ADOT = Arizona Department of Transportation, SR = State Route
[a] The *Pinal Regional Transportation Plan* was approved by Pinal County voters on November 7, 2017.

Potential Acquisitions and Displacements

The action corridor alternatives would result in property acquisitions and the potential displacement of residents, businesses, and community facilities depending on the exact ROW needs to accommodate a Tier 2 alignment. In areas that are currently developed, the risk that ROW requirements would affect existing properties is higher than in currently undeveloped areas. Agricultural land impacts would be greatest with action corridor alternatives that use Western Alternative options in Segment 1, Eastern Alternative options in Segment 3, and the E4 Alternative in Segment 4. Agricultural and farmland acquisition impacts are discussed in Section 3.6, *Prime and Unique Farmland*.

Table 3.2-9 shows the number of residential properties that may potentially be affected with each action corridor alternative. These represent the properties within the 1,500-foot action corridor alternative footprints; impacts based on a Tier 2 alignment would be lower. Business impacts are not calculated because the impact on business properties is difficult to assess prior to defining a Tier 2 alignment.

Table 3.2-9. Residential properties potentially displaced by action corridor alternatives

Action corridor alternative	Potential displacements	Action corridor alternative	Potential displacements
Segment 1		***Segment 3***	
E1a	64	E3a	17
E1b	64	E3b	16
W1a	315	E3c	5
W1b	72	E3d	4
Segment 2		W3	2
E2a	0	***Segment 4***	
E2b	0	E4	3
W2a	0	W4	57
W2b	0		

Sources: compilation of Pinal County Assessor information (2017) and review of aerial photography (2016)

In Segment 1, existing residential development concentrated in the northern end of the Eastern and Western Alternatives is at the greatest risk of displacement. The W1a Alternative would affect a considerable number of homes at the juncture of Ironwood Drive and US 60, although the number would be less with a Tier 2 alignment. With the E1a, E1b, and W1b Alternatives, the Corridor overlays homes south of US 60 and east of Goldfield Road, although the number would be less with a Tier 2 alignment. In addition, farther south in Segment 1, there are a few locations where both the Eastern and Western 1,500-foot-wide corridors include homes; however, actual impacts would be less once a Tier 2 alignment defined.

Several businesses are located on either side of US 60 where the Corridor would meet US 60. A system traffic interchange at Ironwood Drive with the W1a Alternative would likely require the acquisition of nonresidential property, whereas the connection with the E1a, E1b, and W1b Alternatives east of Goldfield Road may have less of an impact on nonresidential properties.

In Segment 2, none of the action corridor alternatives would displace residents, businesses, or community facilities.

In Segment 3, the W3 Alternative may potentially affect a few rural residences located south of SR 287, and a private airport south of Bartlett Road and west of Fast Track Road. The E3a and E3c Alternatives, which follow a more eastern alignment closer to Florence, would avoid affecting developed property south to Adamsville Road, with the exception of potential impacts on a rural residence and a portion of the private commercial event center located immediately south of the Gila River. The E3b and E3d Alternatives would not affect developed property. All Eastern Alternatives have the potential to affect isolated residential, civic, and commercial property south of Adamsville Road—the extent of these impacts would be determined during Tier 2 studies. The E3a and E3b Alternatives may potentially affect a few rural residences along Wheeler and Kleck Roads.

In Segment 4, the E4 and W4 Alternatives have the potential to affect isolated rural residences south to Shedd Road. However, between Shedd and Houser Roads and between Alsdorf Road and I-10, the W4 Alternative may affect several residential and commercial properties because it would be co-located with SR 87. The E4 Alternative would not result in any displacements.

Land acquisition and relocation assistance services would be available to all affected parties and individuals in accordance with the Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970, as amended (Uniform Act). The Uniform Act is implemented through 49 CFR Part 24, which provides regulations for federally funded highway projects. Objectives of the Uniform Act include:

- Providing uniform, fair, and equitable treatment of persons whose property is acquired or who are displaced as a result of a federally funded project.
- Ensuring relocation assistance is provided to displaced persons to lessen the emotional and financial impact of being displaced.
- Ensuring that no individual or family is displaced unless decent, safe, and sanitary housing is available within the displaced person’s financial means.
- Improving the housing conditions of displaced persons currently living in substandard housing.
- Encouraging and expediting acquisition by agreement and without coercion.

3.2.5 Potential Avoidance, Minimization, and Mitigation Strategies

Construction of the North-South Freeway would result in direct, indirect, and cumulative impacts that could require mitigation. At this stage in the development of the proposed freeway, potential mitigation measures can be identified only in general terms—such as minimizing impacts on residential and sensitive environmental areas—until a specific alignment is defined during Tier 2 studies.

The following describes potential mitigation measures to consider as future commitments to avoid, minimize, or mitigate adverse impacts on land use that may result from implementing the proposed action. ADOT may elect to modify, remove, or add measures to mitigate impacts, as appropriate and feasible, as the decision-making process advances and a preferred alternative is identified. Potential mitigation measures identified to date include:

- ADOT would continue to be an active participant in a broader effort with MPOs, local jurisdictions, resource agencies, and private stakeholders to cooperatively plan development in the study area. The effort would coordinate wildlife connectivity, local land use planning, and context-sensitive design for the facility.
- ADOT would coordinate with the entities managing affected public land (for example, ASLD, BLM, and U.S. Bureau of Reclamation) to accommodate the proposed action. In the case of ASLD, ADOT would continue to engage with the Superstition Vistas Steering Committee or other entities involved in planning efforts for this area of State Trust land.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.2.5.1 Local Agency Mitigation Strategies

The following describes potential mitigation measures for local planning agencies to consider as future commitments to avoid, minimize, or mitigate adverse impacts on land use that may result from implementing the proposed action. ADOT would work with municipal and county partners to determine the extent to which the below-mentioned measures are appropriate.

- Amending general plans as necessary, depending on individual municipality amendment requirements as stipulated by State law. A.R.S. § 9-461.06 requires each municipality to prepare a plan for addressing major amendments to its general plan. Depending on the municipal requirements, a major amendment process may be triggered by changes to the land use plan to accommodate the proposed action (or the No-Action Alternative, in the case of Pinal County). By statute, major amendments may be considered only once per calendar year.
- Clustering development in certain areas or allowing new development patterns to accommodate a transportation corridor through the area.
- Considering, on a case-by-case basis, mitigation initiated by private landowners as advocated by affected jurisdictions to improve the compatibility of land uses adjacent to the proposed action. The implementation of this strategy would be the responsibility of the affected jurisdictions and landowners and would be subject to the affected jurisdiction's land development approval process.
- Rezoning undeveloped land to more freeway-compatible uses.

3.2.6 Subsequent Tier 2 Analysis

Future Tier 2 studies would address specific impacts on private and public property, planned developments, zoning regulations, neighborhoods, or community facilities. The approach to acquisitions, easements, and displacements, including ownership (public or private), would be determined as part of project-specific Tier 2 studies. Tier 2 studies would also address compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and the Civil Rights Act of 1964, which ensure that property owners (residential and business) receive fair market value for their property and that displaced persons receive fair and equitable treatment and do not suffer disproportionate harm because of programs designed for overall public benefit.

Additionally, the specific alignment and locations of traffic interchanges would be planned in coordination with local government entities and with public input to minimize the potential for land use conflicts and to develop appropriate mitigation specific to each location.

3.2.6.1 Conclusion

Based on 2040 projections under the No-Action Alternative, the implementation of new arterial and local roads would not adequately handle the projected travel demand. Study area municipalities recognize the need to implement a regional transportation network that can move people and goods within and through the entire study area. Some study area jurisdictions have incorporated a north-to-south transportation corridor in their general plans; others have not specifically identified the proposed action in their comprehensive or general plans but have identified the need for improved regional connectivity and a safe, efficient transportation network. A north-to-south transportation corridor would be consistent with comprehensive and general plans for all study area municipalities; however, the extent to which this is recognized would depend on the alternative selected. All action corridor alternatives would require that land to accommodate a Tier 2 alignment within the 1,500-foot corridors be converted to a transportation use.

In the northern part of the study area, the E1b Alternative would result in fewer impacts on existing development in areas adjacent to US 60, would minimize impacts on the Lost Dutchman Heights development, and, along with E1a Alternative, is the preferred alignment for ASLD's plan for Superstition Vistas. The W1a Alternative would have the greatest impact on existing development. The location of a facility within the W1a Alternative, either along or adjacent to Ironwood Drive, would create traffic and access issues. The W1b Alternative would avoid these impacts; however, it would require crossing the Vineyard FRS and the CAP Canal. The E1a, W1a, and W1b Alternatives would affect the Rittenhouse Army Heliport. All of the action corridor alternatives require crossing the CAP Canal; however the Eastern Alternatives require a second crossing to facilitate the SR 24 connection.

The existing development affected in Segment 2 is primarily agricultural; however, numerous planned developments would be affected by the alternatives. The E2b Alternative's skew with the potential interchange at Arizona Farms Road would result in the greatest impacts on planned developments in this area.

The W3 Alternative is not supported by the affected jurisdictions of Florence and Coolidge; however, it is the preferred alternative of the Four Southern Tribes (Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation). The E3a and E3c Alternatives are similar to the Town of Florence's preferred alternative. The differences are primarily a result of adjustments to avoid environmentally sensitive sites in the areas north and south of the Gila River and to meet the project design criteria for accommodating future intercity passenger rail.

The W4 Alternative is preferred by the City of Eloy, which cited economic development opportunities with a route situated along SR 87. The City of Coolidge prefers the E4 Alternative because it would support recently annexed industrial and manufacturing land uses planned for the Inland Port Arizona and Pinal Logistics Park.

From a land use perspective, the E1b, E2a, E3a, and E4 Alternatives are the most consistent with land use planning in the study area. With the exception of the E4 Alternative, the noted action corridor alternatives are largely consistent with the affected jurisdictions' adopted land use plans. In the case of Segment 4, City of Eloy plans have adopted the W4 Alternative, whereas the City of Coolidge has adopted the E4 Alternative. Based on the land use impacts (including potential displacements and acquisitions), the W4 Alternative would have greater land use impacts.

3.3 Social Conditions

This section provides an overview of the study area's setting for social conditions and preliminary information concerning social conditions in the action corridor alternatives.

Social conditions are characteristics and cultural behaviors that develop from people interacting with each other in their communities and over time. Social conditions include demographic characteristics, availability of and access to community facilities, and community cohesion, all of which are described in this section.

3.3.1 Regulatory Context

CEQ regulations specify that "effects" include social and economic effects. Section 1508.14 of the CEQ regulations states when an EIS is prepared and economic or social and natural or physical environmental effects are interrelated, then the document will discuss all of these effects on the human environment. The Intermodal Surface Transportation Efficiency Act of 1991 incorporated 23 USC §§ 109(h) and 128, requiring that social and economic impacts of proposed federal-aid projects be determined, evaluated, and eliminated or minimized as part of project development. These include destruction or disruption of human-made and natural resources, aesthetic values, community cohesion, and the availability of public facilities and services; adverse employment effects and tax and property value losses; injurious displacement of people, businesses, and farms; and disruption of desirable community and regional growth. Implementing regulations for the legislation are contained in 23 CFR Part 771. Many of the provisions originating in the Intermodal Surface Transportation Efficiency Act of 1991 have been continued or expanded in subsequent surface transportation legislation, including the Transportation Efficiency Act for the 21st Century and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.

This section assesses the effects of the action corridor alternatives on communities in the study area. In September 1996, FHWA published *Community Impact Assessment: A Quick Reference for Transportation* (Publication No. FHWA-PD-96-036) that lays out a process to better understand affected communities and residents and to evaluate the likely consequences of a proposed action such that human values and concerns receive proper attention during project development. The community impact assessment discussed in this section is also consistent with FHWA's Livability Initiative, which recognizes the relationships between transportation, infrastructure, land use, and community needs. The assessment evaluates the effects of a transportation action on a community and its quality of life.

3.3.2 Methodology

The evaluation presented in this section is based on available information regarding regional social conditions, which include demographic characteristics, availability of and access to community facilities, and community cohesion. The following sources describe the existing community character and resources in the study area:

- socioeconomic data, including population, race/ethnicity, age, housing, income, and employment:
    - U.S. Census Bureau's American Community Survey 2011 to 2015 5-year estimates, place data for the state of Arizona, Maricopa and Pinal Counties, and jurisdictions in the study area, as defined in Section 1.1.2, *Corridor Location and Study Area*
    - U.S. Census Bureau's American Community Survey 2011 to 2015 5-year estimates, block groups within or adjacent to the study area, assigned to each segment of the corridor

- community facilities, including educational, medical, recreational, and other public facilities:
    - data obtained from jurisdictional GIS databases, review of Google Earth imagery, and direct field observation

3.3.3 Affected Environment

This section describes existing demographic characteristics of the regional and study area populations, including population trends, race and ethnicity, age, employment, income, and housing. It also describes existing community facilities and services in the study area.

3.3.3.1 Demographic Characteristics

The following provides an overview of population and housing characteristics across the region and throughout the study area. Indicators presented below include historic and existing population, race and ethnicity, age, employment, income and poverty, and housing characteristics. Data have been retrieved from several sources, including the U.S. Census Bureau's American Community Survey 2011 to 2015 5-year estimates. Demographic characteristics are first presented in the regional context, followed by the specific study area segments.

Geographic areas included in the regional context are the state of Arizona, Maricopa and Pinal Counties, and incorporated municipalities in the 900-square-mile study area. Appendix E, *Social Conditions Information*, provides the methodology used to identify the appropriate census block groups included in each segment and action corridor alternative. Block groups that overlap multiple segments were assigned to only one segment, based on the methodology described in detail in Appendix E. Segment 2 includes portions of multiple block groups that were assigned to other segments; therefore, no block groups were analyzed for Segment 2, as noted in the following sections.

Population Trends

The regional population has increased substantially over the last several decades. Between 1970 and 2000, Arizona's population increased more than 187 percent (Table 3.3-1). During the same period, Maricopa County's population, where Phoenix is located, increased by over 215 percent. Pinal County, which has a considerably smaller population than Maricopa County, experienced slower population growth during this period; however, between 2000 and 2015, Pinal County experienced a 124 percent increase in population.

In 1970, the population of Maricopa County represented 55 percent of the total Arizona population—increasing to more than 60 percent in 2015. Comparatively, the 1970 Pinal County population represented less than 4 percent of the state population. This increased to approximately 6 percent by 2015.

Table 3.3-1. Population trends, 1970 to 2015

Geographic area	1970	1980	1990	2000	2010	2015	% change 1970–2000	% change 2000–2015
Arizona	1,794,912	2,737,774	3,684,097	5,160,586	6,411,999	6,758,251	187.5	31.0
Maricopa County	980,133	1,520,840	2,132,249	3,092,197	3,823,609	4,167,947	215.5	34.8
Pinal County	69,547	91,342	116,867	181,280	385,738	406,584	160.7	124.3

Race and Ethnicity

White non-Hispanics represent approximately 57 percent of Arizona's population, and of Maricopa and Pinal Counties (Table 3.3-2), while Hispanics or Latinos (of any race) represent approximately 30 percent. However, Eloy has a lower percentage of White non-Hispanics (23 percent) and a higher percentage of Hispanics or Latinos (of any race) (62 percent). Alternatively, Apache Junction and Queen Creek have higher percentages of White non-Hispanics (above 75 percent) and lower percentages of Hispanics or Latinos (of any race) (below 18 percent).

Arizona, Pinal County, Florence, and Coolidge all have populations of American Indians or Alaska Natives above 4 percent. In Pinal County, this is largely attributable to members of the Gila River Indian Community and Tohono O'odham Nation living in the county. The highest percentage of Black or African American residents is in Eloy (7 percent), followed by Florence (6 percent). Populations of Asians are below 4 percent in every jurisdiction.

Table 3.3-2. Race and ethnicity characteristics in the region

Geographic area	Total population	White alone (%)	Black or African American alone (%)	American Indian and Alaska Native alone (%)	Asian alone (%)	Other[a] (%)	Hispanic or Latino[b] (%)
Arizona	6,641,928	56.5	4.0	4.0	2.9	2.3	30.3
Maricopa County	4,018,145	57.3	4.9	1.6	3.7	2.3	30.1
Pinal County	389,772	58.0	4.4	4.7	1.6	2.2	29.1
Apache Junction	36,586	79.7	0.8	1.3	1.1	2.4	14.6
Mesa	458,860	64.0	3.4	1.8	1.9	2.3	26.6
Queen Creek	30,143	76.0	2.2	1.1	1.4	1.5	17.7
Florence	30,770	50.8	5.8	4.2	0.7	1.8	36.7
Coolidge	11,973	45.2	4.5	5.3	0.4	2.5	42.1
Eloy	16,954	22.8	7.3	1.6	2.6	3.8	61.9

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B03002
[a] The "other" category includes those who identify themselves as non-Hispanic and Native Hawaiian and Other Pacific Islander alone, some other race alone, or two or more races.
[b] The Hispanic or Latino category includes all races.

The race and ethnicity characteristics of the study area are shown in Table 3.3-3 and discussed below.

Segment 1. The action corridor alternatives in Segment 1 all have similar race and ethnicity characteristics, with approximately 75 percent White non-Hispanic and approximately 17 percent Hispanic. All other populations in the study area have representations of 3 percent or less.

Segment 2. No block groups were analyzed for Segment 2. All block groups that fall within Segment 2 are also in adjacent segments; therefore, these population characteristics are summarized for adjacent segments. See Appendix E for a detailed description of the analysis methodology.

Segment 3. Over a third of the populations in the E3a and E3c Alternatives identify themselves as Hispanic or Latino (37 percent), while the percentage in the E3b and E3d Alternatives is lower, at 26 percent. The percentage in the W3 Alternative is 28 percent. Moreover, the E3a, E3b, E3c, and E3d Alternatives have almost no representation from other non-White racial/ethnic categories (approximately 1 percent), while the W3 Alternative has a slightly higher representation (ranging from 1 to 5 percent).

Segment 4. In Segment 4, the E4 Alternative has a higher percentage of White non-Hispanic (57 percent) and a lower percentage of Hispanic or Latino (43 percent), while the W4 Alternative has a higher percentage of Hispanic or Latino and Black or African American (78 and 8 percent, respectively).

Table 3.3-3. Race and ethnicity characteristics in the study area

Action corridor alternative	Total population	White alone (%)	Black or African American alone (%)	American Indian and Alaska Native alone (%)	Asian alone (%)	Other[a] (%)	Hispanic or Latino[b] (%)	Minority (%)
Segment 1								
E1a	32,036	75.3	2.6	1.0	1.9	2.0	17.2	24.7
E1b	27,165	73.6	2.8	1.2	1.9	2.0	18.5	26.4
W1a	27,200	75.6	3.1	1.2	1.0	2.3	16.9	24.4
W1b	33,662	75.9	2.8	0.9	1.9	2.4	16.1	24.1
Segment 2[c]								
E2a, E2b, W2a, W2b	—	—	—	—	—	—	—	—
Segment 3								
E3a, E3c	10,353	59.0	1.4	1.6	0.3	0.7	37.0	41.0
E3b, E3d	12,678	67.3	1.1	1.3	0.3	1.3	28.6	36.7
W3	12,027	61.6	3.8	5.6	0.4	1.9	26.7	38.4
Segment 4								
E4	4,777	57.0	2.1	1.3	0.5	2.2	36.8	43.0
W4	14,182	24.3	8.2	2.1	2.9	5.0	57.4	75.7

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B03002
[a] The "other" category includes those who identify themselves as non-Hispanic and Native Hawaiian and Other Pacific Islander alone, some other race alone, or two or more races.
[b] The Hispanic or Latino category includes all races.
[c] No block groups were analyzed for Segment 2 because all block groups that fall within Segment 2 are summarized in adjacent segments. See Appendix E for analysis methodology.

Age

Queen Creek has the highest percentage of residents under 18 years of age (40 percent) and the lowest percentage over 65 years of age (7 percent) (Table 3.3-4). Eloy has approximately 10 percent of over 65 years of age residents, while other jurisdictions have higher percentages, between 13 and 30 percent. Florence has the lowest percentage of under 18 years of age residents (13 percent), while other jurisdictions, apart from Queen Creek, have approximately 16 to 28 percent.

Table 3.3-4. Age characteristics in the region

Geographic area	Total population	Under 18 years of age (%)	18–44 years of age (%)	45–64 years of age (%)	65 years of age and over (%)
Arizona	6,641,928	24.3	35.9	24.5	15.4
Maricopa County	4,018,145	25.3	37.4	24.0	13.5
Pinal County	389,772	24.9	34.8	23.0	17.2
Apache Junction	36,586	19.5	25.1	24.9	30.4
Mesa	458,860	24.7	36.1	23.6	15.6
Queen Creek	30,143	39.6	33.7	19.5	7.2
Florence	30,770	13.2	45.5	23.9	17.5
Coolidge	11,973	28.1	32.1	27.3	12.6
Eloy	16,954	16.4	51.4	22.4	9.9

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B01001

Age characteristics for the study area are shown in Table 3.3-5 and discussed below.

Table 3.3-5. Age characteristics in the study area

Action corridor alternative	Total population	Under 18 years of age (%)	18–44 years of age (%)	45–64 years of age (%)	65 years of age and over (%)
Segment 1					
E1a	32,036	26.9	32.2	22.1	18.7
E1b	27,165	24.9	31.6	23.0	20.4
W1a	27,200	28.2	34.8	18.8	18.1
W1b	33,662	26.1	33.6	21.8	18.4
Segment 2[a]					
E2a, E2b, W2a, W2b	—	—	—	—	—
Segment 3					
E3a, E3c	10,353	18.1	24.5	27.5	29.9
E3b, E3d	12,678	19.7	23.6	23.9	32.8
W3	12,027	30.8	32.1	18.6	18.5
Segment 4					
E4	4,777	25.2	31.8	19.0	23.9
W4	14,182	13.8	52.6	21.8	11.7

Source: U.S. Census Bureau, American Community Survey 2010 to 2014 5-year estimates, Table B01001
[a] No block groups were analyzed for Segment 2 because all block groups that fall within Segment 2 are summarized in adjacent segments. See Appendix E for analysis methodology.

Segment 1. Overall, Segment 1 action corridor alternatives demonstrate similar age characteristics, with approximately 55 percent of residents between 18 and 64 years of age, approximately 25 percent under 18 years of age, and approximately 20 percent over 65 years of age.

Segment 2. No block groups were analyzed for Segment 2 because all block groups that fall within Segment 2 are summarized in adjacent segments. See Appendix E for a detailed description of the analysis methodology.

Segment 3. In Segment 3, the E3a, E3b, E3c, and E3d Alternatives demonstrate similar age characteristics, with approximately 20 percent under 18 years of age, about 50 percent between 18 and 64 years of age, and approximately 30 percent over 65. The W3 Alternative has about 31 percent under 18 years of age, about 51 percent between 18 and 64 years of age, and about 19 percent over 65.

Segment 4. In Segment 4, the E4 Alternative has a higher percentage of residents under 18 years of age (25 percent), while the W4 Alternative has a lower percentage (14 percent). The E4 Alternative has a lower percentage of residents between 18 and 64 years of age (50 percent), while the W4 Alternative has a higher percentage (75 percent). The E4 Alternative also has a higher percentage of residents over 65 years of age (24 percent), while the W4 Alternative has a lower percentage (12 percent).

Employment

Approximately 60 percent or more of Maricopa County and Arizona residents 16 years of age and older are in the labor force, whereas approximately 50 percent of Pinal County residents are employed (Table 3.3-6). Among study area municipalities, Eloy and Florence have the lowest share of residents in the labor force (24 and 21 percent, respectively), although over 70 percent are between 18 to 65 years of age. This is likely a result of the large prison populations in these areas. Apache Junction and Eloy have the highest unemployment rates (approximately 14 percent), while Florence, Mesa, and Queen Creek report unemployment rates near or below the rates in Maricopa and Pinal Counties.

Table 3.3-6. Labor force characteristics in the region

Geographic area	Total population 16 years of age and older[a]			Civilian labor force[b]		
	Total population	In the labor force (%)	Not in the labor force (%)	Total civilian labor force	Employed (%)	Unemployed (%)
Arizona	5,207,123	59.7	40.3	3,076,629	91.1	8.9
Maricopa County	3,115,673	63.5	36.5	1,968,588	92.3	7.7
Pinal County	302,678	49.7	50.3	150,055	89.3	10.7
Apache Junction	30,112	43.0	57.0	12,955	85.5	14.5
Mesa	358,227	62.3	37.7	222,837	92.2	7.8
Queen Creek	19,286	67.7	32.3	13,058	97.1	2.9
Florence[c]	27,166	20.7	79.3	5,627	92.8	7.2
Coolidge	8,871	52.6	47.4	4,670	87.8	12.2
Eloy[c]	14,314	24.3	75.7	3,479	85.7	14.3

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B23025

[a] The prison population is not included in the labor force.

[b] Employment in the armed forces is not included in the civilian labor force.

[c] Florence and Eloy have incarcerated populations not in the labor force that may skew the data for these jurisdictions.

Employment characteristics in the study area are shown in Table 3.3-7 and discussed below.

Segment 1. In Segment 1, the action corridor alternatives all demonstrate similar employment characteristics, with approximately 55 percent of the total population 16 years of age and over in the labor force and approximately 9 to 11 percent unemployed.

Segment 2. No block groups were analyzed for Segment 2 because all block groups that fall within Segment 2 are summarized in adjacent segments. See Appendix E for a detailed description of the analysis methodology.

Segment 3. In Segment 3, between 38 and 48 percent of the population 16 years of age and over is in the labor force for all action corridor alternatives, while the unemployment rates range between 8 and 11 percent.

Segment 4. In Segment 4, the E4 Alternative has a higher percentage of the population 16 years of age and over that is in the labor force (47 percent), while the W4 Alternative has a low percentage (16 percent). Unemployment rates range between 6 and 8 percent.

Table 3.3-7. Labor force characteristics in the study area

Action corridor alternative	Total population 16 years of age and older[a]			Civilian labor force[b]		
	Total population	In the labor force (%)	Not in the labor force (%)	Total civilian labor force	Employed (%)	Unemployed (%)
Segment 1						
E1a	24,222	55.0	45.0	13,274	89.5	10.5
E1b	20,954	53.6	46.4	11,218	88.7	11.3
W1a	20,137	54.1	45.9	10,860	91.4	8.6
W1b	25,657	54.8	45.2	14,025	90.4	9.6
Segment 2[c]						
E2a, E2b, W2a, W2b	—	—	—	—	—	—
Segment 3[d]						
E3a, E3c	8,768	45.7	54.3	3,414	88.4	11.6
E3b, E3d	10,482	38.2	61.8	4,004	92.1	7.9
W3	8,606	48.8	51.2	4,202	90.0	10.0
Segment 4[d]						
E4	3,851	47.6	52.4	1,812	94.0	6.0
W4	12,465	16.6	83.4	2,065	92.0	8.0

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B23025

[a] The prison population is not included in the labor force.

[b] Employment in the armed forces is not included in the civilian labor force.

[c] No block groups were analyzed for Segment 2 because all block groups that fall within Segment 2 are summarized in adjacent segments. See Appendix E for analysis methodology.

[d] Florence and Eloy have incarcerated populations not in the labor force that may skew the data for these jurisdictions.

Income and Poverty

Table 3.3-8 shows the median household income and percentage of individuals with income below the federal poverty level in the region. Additional information specific to poverty levels and the spatial distribution of people with incomes below the poverty level is presented in Section 3.17, *Environmental Justice and Title VI*.

Maricopa and Pinal Counties and Arizona have median household incomes of approximately $50,000 per year. Mesa and Florence household incomes are similar to the state and county; however, Queen Creek has a substantially higher median household income ($83,678) and Eloy and Apache Junction have much lower median household incomes ($31,033 and $35,671, respectively).

Table 3.3-8 shows that approximately 17 percent of individuals in Maricopa and Pinal Counties have incomes below the federal poverty level. These percentages are slightly lower than that for the state of Arizona. Apache Junction, Coolidge, and Eloy have much higher percentages of incomes below the poverty level (24, 27, and 36 percent, respectively), while Queen Creek has the lowest percentage (9 percent).

Table 3.3-8. Median household income and individuals below poverty level in the region

Geographic area	Median household income ($)	Persons for whom poverty is determined	Persons below poverty level (%)[a]
Arizona	50,255	6,488,917	18.2
Maricopa County	54,229	3,965,553	17.0
Pinal County	49,477	365,192	17.3
Apache Junction	35,671	36,172	24.0
Mesa	48,809	455,299	16.5
Queen Creek	83,678	30,068	8.6
Florence[b]	47,891	16,864	16.8
Coolidge	39,621	11,857	27.4
Eloy[b]	31,033	9,537	36.2

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B17021, Table C17002

[a] Federal poverty levels are assigned by age and household size. 2015 levels include $11,770 income for an individual under 65 and approximately $24,250 for a family of four (U.S. Census 2015 Poverty Thresholds, Table 2014). From http://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html, accessed November 2017.

[b] Florence and Eloy have incarcerated populations with zero to very low income that may skew the data for these jurisdictions.

Income and poverty characteristics of the study area are shown in Table 3.3-9 and discussed below.

Segment 1. Median household income is higher in the E1a and E1b Alternatives (approximately $53,000), and ranges from approximately $43,000 to $47,000 in the W1b and W1a Alternatives, respectively. The Segment 1 action corridor alternatives demonstrate similar poverty rates (approximately 11 percent).

Segment 2. No block groups were analyzed for Segment 2 because all block groups that fall within Segment 2 are summarized in adjacent segments. See Appendix E for a detailed description of the analysis methodology.

Segment 3. The highest median household incomes are similar in the E3b, E3d, and W3 Alternatives (approximately $52,000 to $53,000), and approximately $48,000 in the E3a and E3c Alternatives. The E3a and E3c Alternatives have the highest poverty rate, at approximately 20 percent, while poverty rates in the E3b, E3d, and W3 Alternatives range from 15 to 17 percent.

Segment 4. In Segment 4, the E4 Alternative has a higher median household income of approximately $41,000, while the W4 Alternative has a lower median household income (approximately $30,000). The poverty rate in the E4 Alternative is approximately 22 percent, compared with 37 percent for the W4 Alternative.

Table 3.3-9. Median household income and individuals below poverty level in the study area

Action corridor alternative	Median household income ($)	Persons for whom poverty is determined	Persons below poverty level (%)
Segment 1			
E1a	53,394	31,919	11.8
E1b	53,270	27,062	11.7
W1a	47,241	27,083	11.1
W1b	43,304	33,545	11.8
Segment 2[a]			
E2a, E2b, W2a, W2b	—	—	—
Segment 3[b]			
E3a, E3c	48,354	10,043	20.0
E3b, E3d	53,085	12,376	15.3
W3	52,311	11,986	16.9
Segment 4[b]			
E4	41,536	4,770	22.3
W4	30,748	6,703	37.0

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B17021, Table C17002

[a] No block groups were analyzed for Segment 2 because all block groups that fall within Segment 2 are summarized in adjacent segments. See Appendix E for analysis methodology.

[b] Florence and Eloy have incarcerated populations with zero to very low income that may skew the data for these jurisdictions. Additionally, some block groups did not have available data for these populations.

Housing

Arizona and Maricopa County have housing occupancy rates greater than 80 percent, as do Coolidge, Eloy, and Mesa (Table 3.3-10). Apache Junction and Florence have rates of approximately 73 percent, which are slightly lower than Pinal County as a whole (78 percent). Approximately 60 to 70 percent of the occupied units in Maricopa and Pinal Counties and Arizona are owner-occupied. Among the study area municipalities, Queen Creek has the highest occupancy rate (88 percent). Of the occupied housing units, Mesa has the lowest percentage of owner-occupied units (60 percent) and Queen Creek has the highest percentage (79 percent). The average household sizes range from 2 to 4 people, with renter-occupied households generally having slightly larger household sizes.

Table 3.3-10. Housing tenure and average household size in the region

Geographic area	Housing units			Owner- and renter-occupied housing units			Average household size	
	Total	Occupied (%)	Vacant (%)	Occupied	Owner-occupied (%)	Renter-occupied (%)	Owner-occupied	Renter-occupied
Arizona	2,890,664	83.4	16.6	2,412,212	62.8	37.2	2.67	2.72
Maricopa County	1,668,555	86.5	13.5	1,442,518	60.7	39.3	2.74	2.76
Pinal County	163,490	78.1	21.9	127,599	72.2	27.8	2.71	3.28
Apache Junction	21,766	73.2	26.8	15,933	71.2	28.8	2.22	2.46
Mesa	200,782	84.1	15.9	168,914	60.2	39.8	2.67	2.74
Queen Creek	10,002	87.6	12.4	8,758	79.5	20.5	3.37	3.71
Florence[a]	9,319	73.3	26.7	6,832	71.8	28.2	2.46	2.54
Coolidge	4,688	81.2	18.8	3,806	59.7	40.3	2.86	3.55
Eloy[a]	3,953	82.0	18.0	3,241	63.8	36.2	2.92	3.04

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B25002, Table B25003, Table B25010
[a] Florence and Eloy have incarcerated populations that live in group quarters, not households, that may skew the data for these jurisdictions.

Housing tenure and household size for the study area are shown in Table 3.3-11. Discussions of key housing characteristics are below.

Segment 1. In Segment 1, the W1b Alternative has the most housing units (15,392), and the W1a Alternative has the lowest vacancy percentage (20 percent). The E1a and E1b Alternatives have vacancy rates of 23 and 24 percent, respectively. The majority of housing units in all action corridor alternatives are owner-occupied (approximately 78 percent) with household sizes ranging from 2 to 3 persons per household.

Segment 2. No block groups were analyzed for Segment 2 because all block groups that fall within Segment 2 are summarized in adjacent segments. See Appendix E for a detailed description of the analysis methodology.

Segment 3. In Segment 3, the E3b and E3d Alternatives have the most housing units (7,353) and the highest vacancy percentage (30 percent). The owner occupancy rate in Segment 3 ranges from 68 to 76 percent, and the average household sizes range between 3.5 and 3.8 persons per household.

Segment 4. In Segment 4, the W4 Alternative has the most housing units (2,975) and the highest vacancy percentage (21 percent). The E4 Alternative has a higher owner occupancy rate of approximately 80 percent, while the W4 Alternative has a rate of approximately 67 percent. The average household sizes range from 2 to 3 persons per household.

Table 3.3-11. Housing tenure and average household size in the study area

Action corridor alternative	Housing units			Owner- and renter-occupied housing units			Average household size	
	Total	Occupied (%)	Vacant (%)	Occupied	Owner-occupied (%)	Renter-occupied (%)	Owner-occupied	Renter-occupied
Segment 1								
E1a	14,799	77.2	22.8	11,420	77.9	22.1	2.71	2.97
E1b	13,244	75.8	24.2	10,043	78.9	21.1	2.67	2.83
W1a	11,824	80.0	20.0	9,462	77.8	22.2	2.58	2.81
W1b	15,392	78.2	21.8	12,032	77.6	22.4	2.67	2.85
Segment 2[a]								
E2a, E2b, W2a, W2b	—	—	—	—	—	—	—	—
Segment 3[b]								
E3a, E3c	5,898	71.7	28.3	4,231	68.7	31.3	2.45	2.74
E3b, E3d	7,353	70.0	30.0	5,149	76.0	24.0	2.53	2.66
W3	5,156	77.0	23.0	3,968	75.0	25.0	2.88	3.82
Segment 4[b]								
E4	2,215	80.3	19.7	1,779	80.2	19.8	2.55	3.14
W4	2,975	78.6	21.4	2,337	66.6	33.4	2.26	2.54

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B25002, Table B25003, Table B25010

[a] No block groups were analyzed for Segment 2 because all block groups that fall within Segment 2 are summarized in adjacent segments. See Appendix E for analysis methodology.

[b] Florence and Eloy have incarcerated populations that live in group quarters, not households, that may skew the data for these jurisdictions.

3.3.3.2 Community Facilities and Services

Community facilities and services include those organizations, both public and private, that fulfill a social function or provide services to the community. Community facilities and services include schools, colleges, and libraries; hospitals, health care facilities, and nursing homes; police, fire, and emergency medical services; municipal services and other civic institutions; religious institutions; and parks and recreational facilities. This section provides an overview of community facilities and services within 0.5 mile of the action corridor alternatives. Parks and recreational facilities, as well as other open space resources, are discussed separately in Section 3.5, *Parkland and Recreational Facilities*.

Table 3.3-12 lists the community facilities and services within 0.5 mile of the action corridor alternatives in each segment. These resources are generally concentrated close to incorporated municipalities (Figures 3.3-1 and 3.3-2).

Table 3.3-12. Community facilities within 0.5 mile of action corridor alternatives

Action corridor alternative	Educational	Municipal	Social	Medical	Religious	Other
Segment 1						
E1a	None	None	None	None	Mountain View Lutheran Church	Rittenhouse Army Heliport
E1b	None	None	None	None	Mountain View Lutheran Church	None
W1a	Apache Junction High School, Cactus Canyon Junior High School, Mountain Shadows Education Center, Apache Junction Unified School District	None	Apache Junction Multi-generational Center	None	None	Rittenhouse Army Heliport
W1b	None	None	None	None	Mountain View Lutheran Church	Rittenhouse Army Heliport
Segment 2						
E2a, E2b, W2a, W2b	None	None	None	None	None	None
Segment 3						
E3a, E3c	None	Town of Florence (Town Hall, Elections Department, Post Office, Fire Department)	None	None	None	Adamsville Cemetery
E3b, E3d	None	None	None	None	None	None
W3	None	None	None	None	Calvary Coolidge Church	None
Segment 4						
E4	None	Kenilworth School	None	None	None	None
W4	None	None	None	None	None	Eloy Memorial Park

Figure 3.3-1. Community facilities and services, Segments 1 and 2

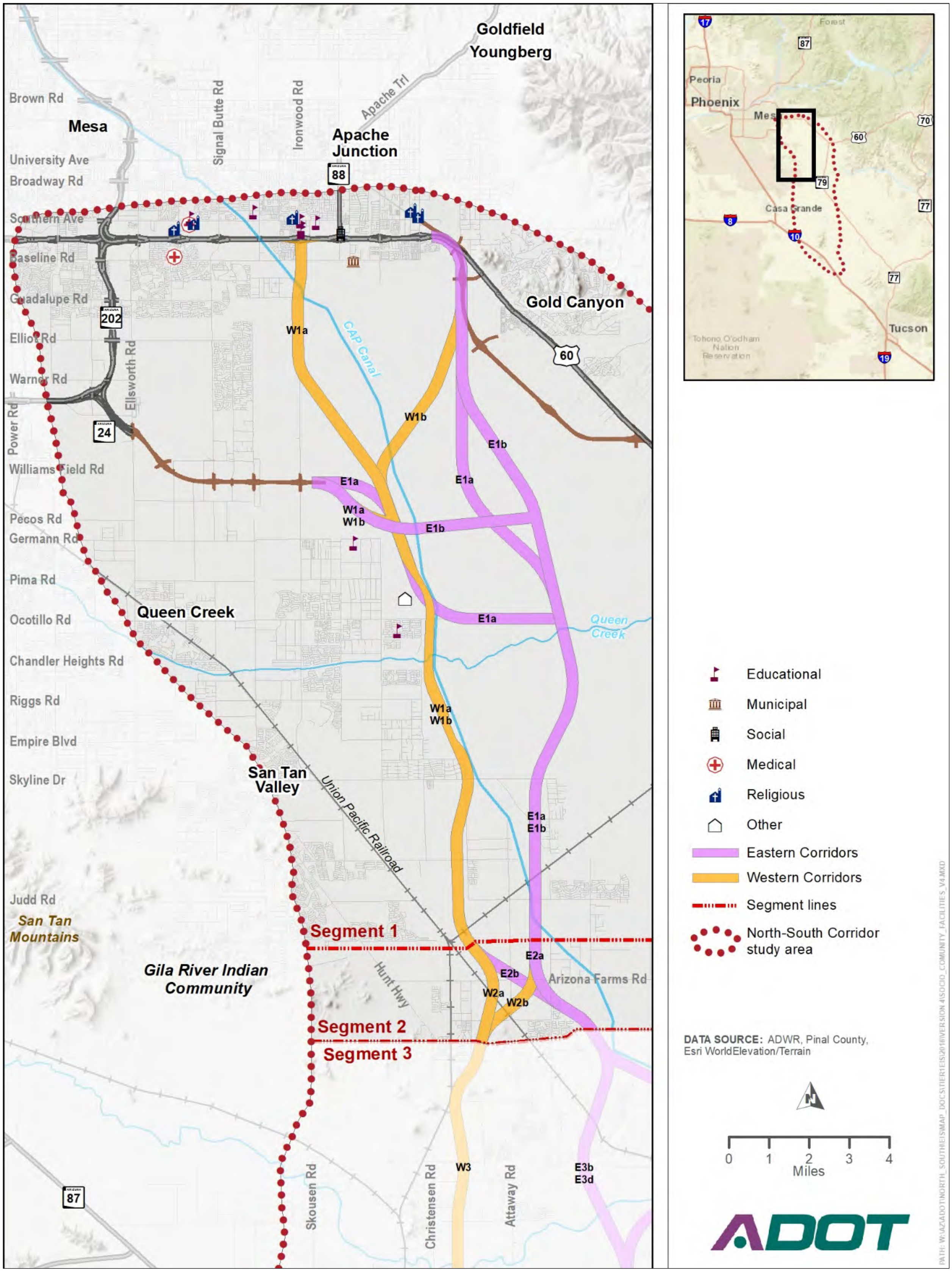
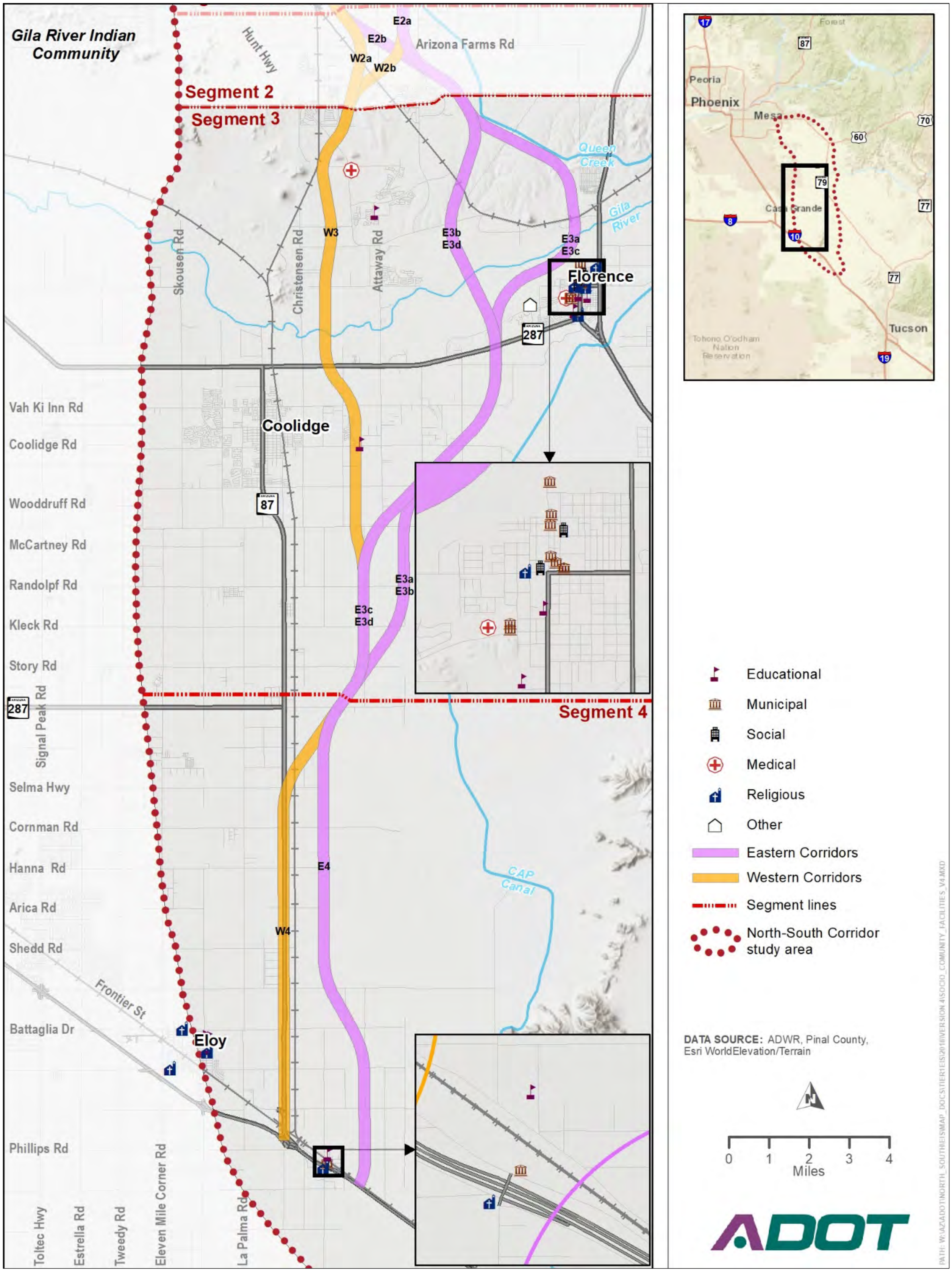


Figure 3.3-2. Community facilities and services, Segments 3 and 4



3.3.4 Environmental Consequences

The action corridor alternatives' anticipated impacts on social conditions, particularly as they pertain to community character and cohesion, are discussed below. The analysis assumed that land use conversions would occur by 2040 for both the action corridor alternatives and the No-Action Alternative, as described in Section 3.2, *Land Use*.

3.3.4.1 No-Action Alternative

Because of their proximity to Phoenix and Tucson, Pinal County and the study area have become focal points for future development and economic growth in the Sun Corridor. Table 3.3-13 summarizes existing and projected population and employment for geographies in the approximately 900-square-mile study area described in Section 3.2, *Land Use*. Under existing conditions, population and employment data are based on currently incorporated municipal boundaries. Future conditions are based on currently identified MPA boundaries. High population and employment projections are attributable to new growth and, in some cases, annexation of already developed land in Pinal County.

Table 3.3-13 shows the population is projected to increase by almost 118 percent by 2040. The table also shows that employment growth is anticipated to be substantial, growing by 347 percent by 2040 through the creation of over 160,000 new jobs.

Table 3.3-13. Existing and projected population and employment for geographies in study area, 2015 to 2040

Geographic area	2015 population[a]	2040 population[a]	Percentage change	2015 employment[a]	2040 employment[a]	Percentage change
Pinal County	163,972	377,964	131	16,838	92,115	447
Maricopa County	111,685	223,089	100	19,578	70,570	260
Total	**275,657**	**601,053**	**118**	**36,416**	**162,685**	**347**

Source: 2015 and 2040 population and employment estimates and projections, second-generation Arizona statewide travel demand model (AZTDM2).

[a] Population and employment projections are reported for traffic analysis zones in the approximately 900-square-mile study area identified in Section 3.2, *Land Use*, as compared with the full extent of county boundaries.

The large increase in population and employment in the study area demonstrates a substantial shift from agricultural and undeveloped land uses to primarily residential and commercial land uses. In these areas, the social fabric has historically centered on agricultural activities. While agricultural activities align with low population density, agricultural neighborhoods generally have community cohesion as a result of a common lifestyle.

Under the No-Action Alternative, new low-capacity roadways would be introduced to help support planned development. The No-Action Alternative also includes improvements to regionally significant routes (see Chapter 2, *Alternatives*). However, congestion levels on existing roadways and the lack of connectivity in the study area to existing and planned community facilities have the potential to adversely affect the quality of life of area residents and the ability to attract new economic activity. The No-Action Alternative has the potential to reduce the attractiveness of the study area as a place to live, work, and play because of increased congestion associated with projected development.

3.3.4.2 Action Corridor Alternatives

The proposed action corridor alternatives have the potential to adversely affect social conditions through changes in community character and accessibility, fragmentation of communities, and alteration of community cohesion. Although the exact nature of impacts related to social conditions that could result from implementing the proposed action would vary (depending on whether an action corridor alternative becomes the preferred alternative), all action corridor alternatives have the potential to affect social conditions (Figures 3.3-1 and 3.3-2). While much of the study area is undeveloped or farmland, implementing the proposed action could directly and indirectly affect established resources such as neighborhoods, schools, religious institutions, and businesses. However, all action corridor alternatives would also provide community benefits in the form of improved mobility and access for residents across the region. Improved mobility would reduce travel times, which would improve emergency vehicle access times, access to jobs, and access to community facilities and services.

This evaluation considered how the action corridor alternatives could enhance or reduce access to community facilities and organizations, both public and private, that fulfill a social function or provide services to the community, including schools, colleges, and libraries; hospitals, health care facilities, and nursing homes; police, fire, and emergency medical services; municipal services and other civic institutions; religious institutions; and parks and recreational facilities. Because the study area is mostly undeveloped, impacts on social conditions would be limited to specific locations where existing communities or facilities are located and would be directly affected by one of the action corridor alternatives. These locations include the following:

- In Segment 1, the W1a Alternative would reduce access to existing schools with the introduction of the access-controlled transportation facility and system traffic interchange with US 60 that has the potential to divide communities and affect local access. The E1a, W1a, and W1b Alternatives would reduce access to an existing airfield.
- In Segment 2, no community facilities would be affected by or benefit from the E2a, E2b, W2a, or W2b Alternatives.
- In Segment 3, the E3a and E3c Alternatives would enhance access to community facilities in Florence for areas to the north and for other neighboring communities by providing a direct north-to-south travel option without dividng existing communities; however, most community facility use in this segment would originate in Florence. The W3 Alternative would either directly affect an existing church located within the 1,500-foot corridor or potentially reduce access to the church if the Corridor were to avoid the church and be located between the majority of the local population and the church. The E3b or E3d Alternatives would not divide existing communities; however, no community facilities would be affected by or benefit from either alternative.
- In Segment 4, community facilities are located in the likely footprint of a system traffic interchange with I-10 for both the E4 and W4 Alternatives.

3.3.5 Potential Avoidance, Minimization, and Mitigation Strategies

Potential measures to mitigate adverse impacts on social conditions include:

- ADOT would coordinate with municipal and County partners and affected communities to address concerns regarding the internal roadway network, connectivity with the freeway, and potential grade separations at non-interchange locations to improve local and regional connectivity.
- ADOT would coordinate with municipal and County partners as development occurs to fully integrate the freeway into the regional transportation network.

- ADOT would build upon public involvement efforts undertaken for the NSCS to engage study area residents in the EIS process to help understand community access, connectivity, and circulation concerns and opportunities.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.3.6 Subsequent Tier 2 Analysis

No issues related to social conditions have been identified that would preclude constructing the proposed action in any of the action corridor alternatives. However, social conditions need to be considered in the Tier 2 phase and in final design, should an action corridor alternative become the preferred alternative.

The Tier 2 analysis should include updated documentation (based on the most recent U.S. Census data) of the region's existing demographic characteristics and study area populations, including population trends, race and ethnicity, age, employment, income, and housing. Subsequent analyses should also include updated documentation of existing community facilities and services in the study area, followed by a detailed assessment of the anticipated effects on these resources as a result of the proposed action.

3.3.6.1 Conclusion

Because the study area is mostly undeveloped, effects on social conditions in the study area would be limited to specific locations where existing communities or facilities would be directly affected by one of the action corridor alternatives. For Segment 1, the W1a Alternative has the potential to reduce access to existing schools, and the E1a, W1a, and W1b Alternatives would reduce access to an existing airfield. For Segment 2, no community facilities would be affected by or benefit from the E2a, E2b, W2a, or W2b Alternatives. For Segment 3, the E3a and E3c Alternatives would enhance access to community facilities in Florence for areas to the north and for other neighboring communities, the W3 Alternative would either directly affect or reduce access to an existing church, and no community facilities would be affected by or benefit from the E3b or E3d Alternatives. For Segment 4, community facilities are located in the likely footprint of a system traffic interchange with I-10 for both the E4 and W4 Alternatives.

All segments would benefit from implementing any of the action corridor alternatives because each would improve regional connectivity, reduce travel times, and provide enhanced access to jobs, community resources, and other destinations for both existing and future populations.

3.4 Economics

The study area is part of a single megaregion connecting Phoenix and Tucson (as described in Chapter 1, *Purpose and Need*). Section 3.2, *Land Use*, documents the future land use for the study area. Since the majority of the land potentially affected by the action corridor alternatives is ultimately identified for development, the analysis considers the impacts the action corridor alternatives and the No-Action Alternative could have on tax revenues. This analysis did not attempt to quantify the economic impact on business revenue, wages, and jobs. At the corridor level, these results would be speculative.

For this analysis, the 1,500-foot-wide action corridor alternatives were considered (in terms of overall acres affected, an actual alignment would be determined in subsequent Tier 2 studies).

If the proposed action were built, some properties that are currently taxable would be converted to a nontaxable transportation use. As a result, property taxes would no longer be collected from those properties. The economic impacts study also considered potential loss of tax revenues associated with the conversion of productive agricultural land in the Corridor to a transportation use. Few nonagricultural businesses exist in the corridor, and information related to specific retail sales for those entities is limited. As a result, retail sales tax revenues for those businesses were not included in the analysis. The limited amount of existing commercial activity indicates a low likelihood of any adverse impacts on local nonagricultural businesses in the area.

3.4.1 Regulatory Context

Potential impacts on property and sales tax revenues were evaluated to comply with Title I, Section 101(a), of NEPA to “fulfill the social, economic and other requirements of present and future generations of Americans.” The evaluation considers the change in available tax-generating land and the impacts on the overall economy. Specific details regarding parcel-level and land use impacts are discussed in Section 3.2, *Land Use*.

3.4.2 Methodology

Property and sales tax revenue losses would most likely occur in the municipalities of Apache Junction, Queen Creek, Florence, Coolidge, and Eloy, and in unincorporated portions of Pinal County. Sales tax revenue would be lost when taxable agricultural production land is converted to nontaxable transportation use land under the action corridor alternatives. To evaluate potential adverse tax revenue impacts, the market value for the land that would be converted to highway use was applied to current property tax rates in the specified area. Taxable land uses in the study area include residential, commercial, industrial, and agricultural land.

3.4.2.1 Fiscal Economic Impact Assumptions

Tax generation data used in the analysis were extracted from the Pinal County Assessor’s database. The analysis examined the full cash values and limited cash values that are used to calculate property tax; these values are readily available from the County Assessor. The full and limited cash values are calculated based on market value using complex formulas.

The average full and limited cash values were determined by examining the averages of parcels with available Assessor data in the 1,500-foot-wide action corridor alternatives. These property values were converted to a per-acre average and were then used to calculate the probable economic impacts of each action corridor alternative. The average of all available parcel values for the potentially affected land was calculated for each land use type under consideration.

The 2017 assessment ratio for each land use type was considered (Table 3.4-1). The assessment ratio for commercial and industrial land was updated to the long-term value of 18 percent, in effect as of December 31, 2015. Vacant or undeveloped land was valued to reflect its zoning.

The tax rate applied to calculate property tax impacts was updated using the 2017 levies and was separated into primary and secondary rates. Because each action corridor alternative overlaps multiple tax districts, the weighted average levy for each action corridor alternative was used to determine the average primary and secondary rates to be applied to calculate the primary and secondary taxes per acre by jurisdiction. The calculations in Table 3.4-1 reflect the expected average per-acre tax rate for representative properties affected by the action corridor alternatives.

Table 3.4-1. Land valuation assumptions and tax rates used to estimate action corridor alternatives' property tax impacts

Area	Land use				
	Agricultural	Commercial	Industrial	Residential	Vacant/ Undeveloped
Market value					
Full cash value for tax purposes (80% of market value, $)	546	80,027	15,167	19,928	1,723
Limited value (95% of full cash value, $)	518	76,026	14,408	18,932	1,637
Assessment ratio	0.15	0.18	0.18	0.10	0.15
Assessed valuation for primary tax levies ($)	78	13,685	2,593	1,893	246
Assessed valuation for secondary tax levies ($)	82	14,405	2,730	1,993	259
Primary tax rate ($ per $100 of assessed value)					
Apache Junction	10.47	10.47	10.47	10.47	10.47
Queen Creek	—[a]	—	—	—	—
Florence	11.32	11.32	11.32	11.32	11.32
Coolidge	13.30	13.30	13.30	13.30	13.30
Eloy	11.46	11.46	11.46	11.46	11.46
Unincorporated	10.73	10.73	10.73	10.73	10.73
Secondary tax rate ($ per $100 of assessed value)					
Apache Junction	5.42	5.42	5.42	5.42	5.42
Queen Creek	—	—	—	—	—
Florence	2.43	2.43	2.43	2.43	2.43
Coolidge	1.94	1.94	1.94	1.94	1.94
Eloy	4.70	4.70	4.70	4.70	4.70
Unincorporated	2.32	2.32	2.32	2.32	2.32

Table 3.4-1. Land valuation assumptions and tax rates used to estimate action corridor alternatives' property tax impacts

Area	Land use				
	Agricultural	Commercial	Industrial	Residential	Vacant/ Undeveloped
Primary taxes per acre ($)					
Apache Junction	8.14	1,432.26	271.44	198.14	25.70
Queen Creek	—	—	—	—	—
Florence	8.80	1,548.49	293.47	214.22	27.79
Coolidge	10.34	1,820.23	344.97	251.81	32.67
Eloy	8.91	1,568.63	297.28	217.01	28.15
Unincorporated	8.34	1,468.02	278.22	203.09	26.35
Secondary taxes per acre ($)					
Apache Junction	4.44	780.83	147.98	108.02	14.01
Queen Creek	—	—	—	—	—
Florence	1.99	350.72	66.47	48.52	6.29
Coolidge	1.59	279.51	52.97	38.67	5.02
Eloy	3.85	677.74	128.44	93.76	12.16
Unincorporated	1.90	333.86	63.27	46.19	5.99

Sources: Pinal County assessor data, Pinal County treasurer; note that no taxable parcels in Queen Creek are in the 1,500-foot action corridor alternatives.

[a] not applicable; representative land in the study area did not provide basis for comparison

3.4.3 Affected Environment

The study area encompasses nearly 578,000 acres, most of which is vacant or undeveloped land in areas that are unincorporated. The primary use of developed land is for agricultural purposes, which accounts for approximately 107,000 of the nearly 578,000 acres.

3.4.4 Environmental Consequences

The following sections discuss the proposed action's potential impact on property and sales tax revenues under existing and future conditions.

3.4.4.1 No-Action Alternative

The No-Action Alternative assumes that existing land uses would remain as allocated and would develop according to land uses as envisioned by the governing planning agencies in their future land use plans.

3.4.4.2 Action Corridor Alternatives

Potential property and sales tax revenue impacts under the action corridor alternatives are discussed in the following sections. These alternatives assume that land uses under the No-Action Alternative would carry forward, with sections of land removed for construction of the proposed action.

Table 3.4-2 summarizes the total acreage of available land with taxable uses on parcels in the action corridor alternatives.

Table 3.4-2. Acreage of existing taxable land uses, by action corridor alternative

Action corridor alternative	Land use					Total
	Agricultural	Commercial	Industrial	Residential	Vacant/ Undeveloped	
Segment 1						
E1a	168	0	0	20	4,584	4,772
E1b	168	0	0	20	4,263	4,451
W1a	744	3	3	69	2,676	3,494
W1b	744	0	0	40	2,824	3,608
Segment 2						
E2a	454	0	0	2	57	514
E2b	612	0	0	0	57	669
W2a	374	0	1	0	103	479
W2b	436	0	29	2	94	560
Segment 3						
E3a	2,180	0	126	74	989	3,369
E3b	1,993	0	128	56	842	3,018
E3c	2,130	0	126	35	1,098	3,389
E3d	1,943	0	128	17	951	3,038
W3	1,615	0	69	23	1,045	2,751
Segment 4						
E4	1,619	0	14	15	632	2,280
W4	1,405	0	98	136	447	2,087

Source: analysis of action corridor alternatives and existing land uses, using Pinal County Assessor data

The table highlights only taxable uses, because the assumption is that the following land uses would not generate substantial tax revenues:

- institutional or other public land – generally reserved for public purposes; not subject to property taxes and does not generate sales tax revenue
- park land and open space – typically public lands; not considered as part of the tax base
- transportation land – includes existing public ROW used as streets, roads, and highways; excluded from the tax base

Consistent with the study area's primarily rural nature, most of the taxable land in each action corridor alternative is either vacant/undeveloped or agricultural (Table 3.4-2). Note that the action corridor alternatives each encompass more land than would be directly affected by a Tier 2 alignment.

Absent the proposed action, this land would generate tax revenues under its existing use type, but would transition to nontaxable transportation land under the noted action corridor alternative. Because not all land in the action corridor alternative would be acquired, the impacts of the action corridor alternatives are greater than the likely impacts of a Tier 2 alignment.

Property Tax Impacts, Existing Conditions

Table 3.4-3 presents the estimated property tax reductions that could be expected for each land use type by each action corridor alternative. This provides an estimate of the likely change in property tax income caused by converting taxable land uses to nontaxable transportation uses (however, an alignment may be located anywhere in the action corridor alternative). The estimates are based on existing land uses, land values, and tax rates, and are presented in 2016 dollars.

Table 3.4-3. Detailed property tax impacts ($) of 1,500-foot action corridor alternatives, existing land uses

Action corridor alternative	Land use					Total
	Agricultural	Commercial	Industrial	Residential	Vacant/ Undeveloped	
Segment 1						
E1a	0	0	0	5,072	148,246	153,319
E1b	0	0	0	5,072	137,860	142,932
W1a	0	4,696	1,030	17,222	86,715	109,663
W1b	0	0	0	9,953	91,493	101,447
Segment 2						
E2a	0	0	0	637	1,847	2,483
E2b	0	0	0	58	1,847	1,905
W2a	0	0	441	0	3,344	3,786
W2b	0	0	10,266	637	3,040	13,943
Segment 3						
E3a	0	0	43,140	18,568	32,211	93,918
E3b	0	0	43,677	13,871	27,444	84,992
E3c	0	0	43,140	8,863	36,316	88,319
E3d	0	0	43,677	4,166	31,549	79,393
W3	0	0	23,393	6,206	34,589	64,188
Segment 4						
E4	123	0	5,919	3,753	24,667	34,462
W4	0	0	40,693	35,597	17,270	93,560

Source: analysis of action corridor alternatives and existing land uses

Table 3.4-3 reflects the affected land identified in Table 3.4-2 valued and assessed at the rates shown in Table 3.4-1 to calculate the loss in tax revenues associated with the removal of taxable land acquired for ROW for each action corridor alternative in the Corridor.

Property tax impacts for Segment 1 are consistent with expectations based on the total acreage. The land in the area is primarily vacant or undeveloped, and the E1a Alternative would result in the largest reduction in potential future revenue. The ultimate impacts would depend on the Tier 2 alignment.

In Segment 2, the W2b Alternative would have the highest tax impact, despite not having the highest land impact. This is because industrial land, which generates high revenue per acre, would be converted to transportation, which generates no revenue.

Impacts on tax revenue in the Segment 3 range by nearly 50 percent, with the W3 Alternative resulting in the smallest impact. Each action corridor alternative would primarily affect unincorporated areas, with some modest impacts on Coolidge.

The W4 Alternative would have larger tax impacts than the E4 Alternative, with most of the impacts on land in Eloy and residential land in unincorporated areas of Pinal County. The tax impacts would differ depending on the final Tier 2 alignment.

Sales Tax and Farm Revenue Impacts, Existing Conditions

In many locations, retail sales are from businesses on commercial or industrial land, with commercial land experiencing greater impacts than industrial land. There are 722 acres of industrially zoned land in the action corridor alternatives that would be potentially affected. The maximum impact of any single action corridor alternative would be 35 acres. Given the small impact, the overall impact on sales tax would be negligible.

The losses associated with losing agricultural land are a consideration. Two primary agriculture uses exist in the study area—field crop production and land used for livestock. In the study area, approximately 78 percent of the potentially affected agricultural land is used for grazing or ranchland and the remaining 22 percent is used for crop production.

According to the 2012 Census of Agriculture (U.S. Department of Agriculture 2014), the primary crops grown in Pinal County are cotton, hay, wheat, corn, and barley. These commodities accounted for nearly 229,000 of the almost 241,000 acres of field crops harvested in the county. The exact nature of the crops in the action corridor alternatives is unknown, so a weighted average of expected yields and sale prices was calculated to estimate the expected lost value from farm production attributable to the loss of cropland for ROW acquisition. Average yield per acre was generated using average yield per acre in Pinal County from 2012 to 2016, based on the Census of Agriculture. (Note that not all commodities were available for every year during this time period.) Table 3.4-4 shows the assumed mix of field crops, their yields, and sale prices.

Table 3.4-4. Field crops, yields, and prices

Crop	Yield per acre	Units	Average price per unit ($)	Assumed share of study area (%)
Barley	119.2	Bushels	4.71	10.74
Corn – grain	201.4	Bushels	5.74	1.42
Corn – silage	29.6	Tons	4.83	8.57
Cotton – Pima	982.2	Pounds	1.20	1.86
Cotton – upland	1,507.6	Pounds	0.72	38.76
Alfalfa hay	8.4	Tons	191.40	28.31
Wheat – spring durum	101.4	Bushels	7.92	9.65
Wheat – winter	100.5	Bushels	8.49	0.68

Sources: U.S. Department of Agriculture National Agricultural Statistics Service 2016 State Agriculture Overview for Arizona; National Agricultural Statistics Service Pinal County Data, U.S. averages for wheat, Pima cotton, and silage corn attributable to suppression in Arizona data

To approximate the agricultural losses associated with land takings, the information in Table 3.4-4 was applied to relevant parcel data for each action corridor alternative. Given a lack of additional detail, it is assumed that the general mix of agricultural uses in Pinal County applies to the study area. To determine the overall mix of use in the action corridor alternatives and the anticipated overall value of production, the analysis examined the impacts if every parcel were fully taken. Table 3.4-5 shows the analysis results.

Table 3.4-5. Lost crop production revenues, by action corridor alternative, existing land uses

Action corridor alternative	Full acreage of field crops	Total impact ($000s)
Segment 1		
E1a	558	597.5
E1b	558	597.5
W1a	222	237.8
W1b	425	454.3
Segment 2		
E2a	1,059	1,133.1
E2b	1,857	1,987.1
W2a	767	820.9
W2b	655	701.4

Table 3.4-5. Lost crop production revenues, by action corridor alternative, existing land uses

Action corridor alternative	Full acreage of field crops	Total impact ($000s)
Segment 3		
E3a	6,157	6,588.3
E3b	6,507	6,962.6
E3c	5,229	5,595.7
E3d	5,489	5,873.8
W3	2,348	2,512.3
Segment 4		
E4	968	1,035.5
W4	1,642	1,756.7

Future Land Use

Table 3.4-6 shows the future land use estimates for the action corridor alternatives. These estimates are based on land use data provided by the local planning agency, although no build-out date is projected for this information. Note that determining reductions in future property tax revenues for the action corridor alternatives based on land use plans is speculative, given the uncertainty associated with the timing of development.

The planned future land uses largely indicate a shift away from agricultural uses and toward primarily residential uses. The share of commercial land would increase, reflecting a shift from a rural environment to a more suburban environment.

The shift to developed and more intense land uses causes greater overall tax revenue impacts. The conversion of commercial and industrial land from taxable uses to transportation purposes also removes the possibility of earning sales and use taxes on those parcels. That could be offset by greater accessibility to the remaining parcels if an alternative were built, and any assessment of the potential loss in sales tax is purely speculative.

Property Tax Impacts, Future Conditions

The property tax impacts would be much greater than under the existing land uses, and any annexation of unincorporated areas may further increase the impacts if additional tax levies are enacted on those annexed properties.

Table 3.4-6. Future land use, by study area segment, 1,500-foot action corridor alternative, acres

Action corridor alternative	Land use					Total
	Agricultural	Commercial	Industrial	Residential	Public	
Segment 1						
E1a	0	1,138	79	3,401	265	4,883
E1b	0	983	79	3,190	199	4,451
W1a	9	961	208	2,316	120	3,614
W1b	0	958	208	2,385	114	3,664
Segment 2						
E2a	0	38	5	471	0	514
E2b	0	25	15	629	0	669
W2a	0	0	189	290	0	479
W2b	0	18	150	393	0	560
Segment 3						
E3a	293	1,107	137	1,488	343	3,369
E3b	293	1,026	58	1,507	134	3,018
E3c	426	495	137	1,987	343	3,389
E3d	426	414	58	2,006	134	3,038
W3	55	130	52	2,523	0	2,760
Segment 4						
E4	0	97	443	1,741	0	2,280
W4	0	471	640	820	129	2,060

Source: analysis of action corridor alternatives and future land uses

Sales Tax and Farm Revenue Impacts, Future Conditions

Similar to property taxes, larger impacts on retail sales would occur under future land use conditions than under existing land uses. Future land uses indicate a shift in land use, away from agriculture and toward residential, commercial, and industrial uses. These changes would cause a shift in area revenue sources, reducing agricultural-related revenues and increasing sales tax revenues associated with more retail and commercial activity. The development of commercial and industrial land would depend on demand, which may be impeded by congestion without the proposed action, possibly delaying the realization of sales tax revenues for the affected areas.

The agricultural impacts are greater under existing land uses than under planned future uses, where most agricultural land would be repurposed. Under future land uses, only Segment 3 would be affected by the loss of agricultural lands. According to its planning documents, the City of Coolidge intends to continue agricultural uses, which would be affected by the Eastern Alternatives.

Other Types of Fiscal Impacts

Other types of fiscal impacts were considered in this analysis, but were not estimated because they represent a relatively small portion of total revenues for the communities compared with the tax base, which was evaluated. Not considered, for example, were ecotourism impacts. In 2012, Pinal County, in partnership with The Trust for Public Land, prepared an analysis of the economic benefits of parks, trails, and open space in Pinal County. While the analysis quantified the benefits that parks, trails, and protected open space contribute to the local economy, these features would not be directly affected by the action corridor alternatives being evaluated (trails may be crossed by the facility, but these impacts could be avoided, minimized, and/or mitigated at the Tier 2 phase when the alignment is determined).

3.4.5 Potential Avoidance, Minimization, and Mitigation Strategies

The impact of land acquisition on property and sales taxes in the area could be mitigated as follows:

- Select action corridor alternatives that minimize full parcel takes.
- Position the freeway in the action corridor alternative in a manner that minimizes takes of taxable land.
- Select action corridor alternatives that minimize takes of land that is currently taxable.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.4.5.1 Local Agency Mitigation Strategies

The following describes potential mitigation measures for local planning agencies to consider as future commitments to avoid, minimize, or mitigate adverse impacts on economic conditions that may result from implementing the proposed action:

- Rezone existing undeveloped land for other taxable uses that may compensate for lost tax revenue associated with the necessary takes.

3.4.6 Subsequent Tier 2 Analysis

The economic impacts of the selected alternative would be further analyzed in Tier 2 studies. This analysis would involve completing more detailed environmental investigations, including field studies and corresponding updates to impacts on social, economic, and environmental resources. Economic effects associated with business displacements and related economic effects would be addressed in Tier 2 analyses. At the Tier 2 level, potential mitigation strategies would be identified when the specifics of an alignment are known.

3.4.6.1 Conclusion

Recent growth rates indicate that much of the currently vacant land in the study area will convert to residential or commercial uses in the future, although the timing and location of these changes are uncertain. Coordination with local planning agencies regarding planned development and zoning can help alleviate some of the potential revenue losses associated with the proposed action. While land would need to be converted to a transportation use for construction of the proposed action, many of the impacts would likely affect currently undeveloped land. Over time, as the region continues to grow, it is expected that new development may actually increase overall property and sales tax revenues in the region as compared with today’s revenues.

3.5 Parkland and Recreational Facilities

This section provides an overview of the study area's parkland and recreational facilities and preliminary information concerning such facilities in the action corridor alternatives.

Parkland is generally defined as land that has been officially designated as a national, state, or local park by a federal, state, or local agency. Recreational facilities, such as trails or sports fields, may be located within parkland or may be independently located. For this Tier 1 DEIS, federal, state, local, and private parkland and recreational facilities in the study area were identified and assessed for potential impacts that would result from implementation of the proposed action.

3.5.1 Regulatory Context

Potential impacts on parkland and recreational facilities were evaluated in accordance with CEQ and FHWA regulations for NEPA implementation, as well as Section 4(f) of the Department of Transportation Act of 1966. Section 4(f) serves to preserve and protect public parks and recreational lands, wildlife and waterfowl refuges, and historic sites. Under Section 6(f) of the Land and Water Conservation Fund Act, conversions of park land that was developed using money from the Land and Water Conservation Fund to uses other than park or recreational uses would require that replacement lands of equivalent value and utility be provided. Section 3.19 of this Tier 1 DEIS provides additional information on Section 4(f) and Section 6(f), and an overview of potential impacts with the action corridor alternatives.

3.5.2 Methodology

The evaluation presented in this section was based on available information regarding existing and planned parks and recreational facilities in the study area. Data sources used to inventory parkland and recreational facilities in the study area included federal, state, and local websites and associated GIS data, where available.

Potential impacts on parks and recreational resources were assessed based on the quantity and type of resources included in the 1,500-foot-wide action corridor alternatives.

3.5.3 Affected Environment

3.5.3.1 Existing and Planned Parks and Recreational Facilities

Almost 50 existing and planned federal, county, municipal, and private parks, open space, recreation areas, and trails were found in the study area. Figures 3.5-1 and 3.5-2 show existing and planned parks and recreational facilities in the study area. Table 3.5-1 lists the parks and recreational facilities and their corresponding map numbers.

If the specific location of a planned park or recreational facility was identified, it was included on Figures 3.5-1 and 3.5-2. However, for some planned parks or recreational facilities, a specific location has not yet been identified. As a result, these facilities are noted with "none" in the map number column in Table 3.5-1. As shown on the figures, several existing multiuse trail corridors intersect the action corridor alternatives in all segments and may not be noted with a corresponding map number.

Any of these resources may be considered Section 4(f) resources for evaluation in subsequent Tier 2 studies. Refer to Section 3.19, *Section 4(f) and Section 6(f) Resources,* for further discussion.

Figure 3.5-1. Parks and trails, Segments 1 and 2

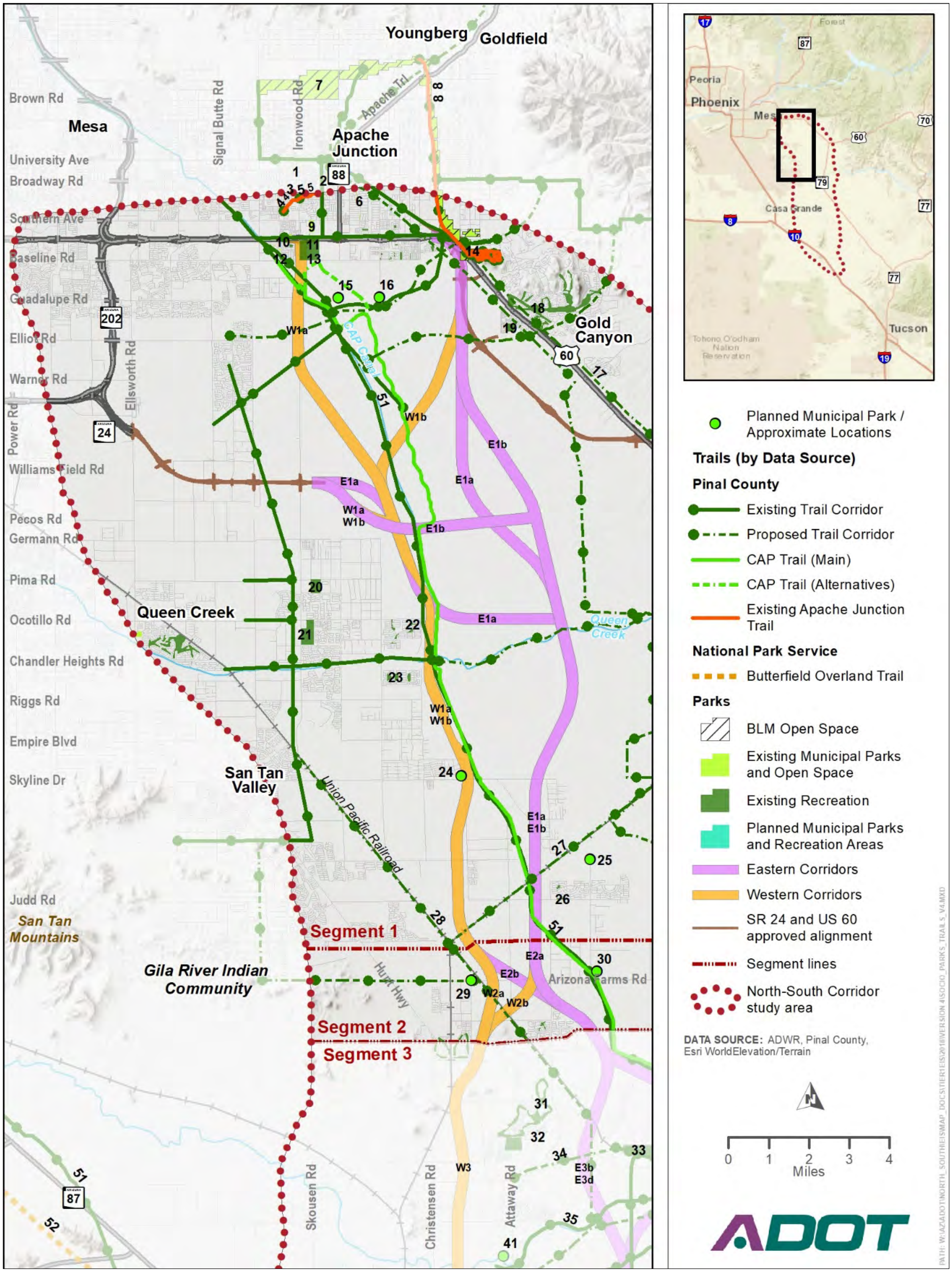


Figure 3.5-2. Parks and trails, Segments 3 and 4

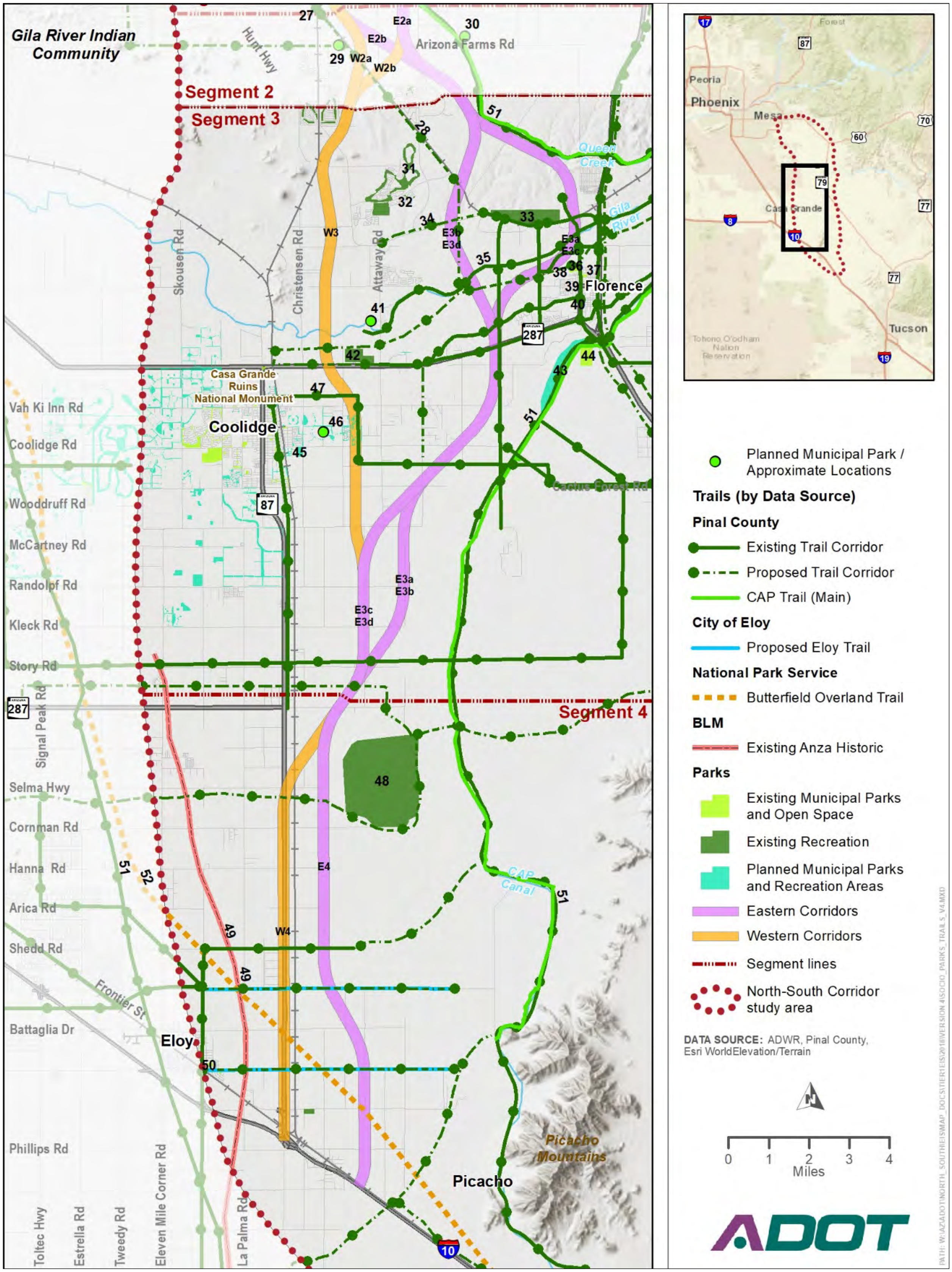


Table 3.5-1. Park and trails map identification guide

Map no.	Facility name	Segment	Status
1	Little League Park	1	Existing
2	Phelps Drive Open Space	1	Existing
3	Ironwood Cove Retention Basin Open Space	1	Existing
4	Renaissance Point Trail and Open Space	1	Existing
5	Arroyo Verde Trail and Open Space	1	Existing
6	Royal Palm Road Open Space	1	Existing
7	Sheep Drive Multiuse Trail	1	Existing
8	Goldfield to Florence Historic Trail	1	Existing
9	Superstition Shadows Park	1	Existing
10	Palmas del Sol East Neighborhood Parks	1	Existing
11	Apache Creek Golf Course	1	Existing
12	La Casa Blanca Neighborhood Parks	1	Existing
13	Desert Harbor Neighborhood Parks	1	Existing
14	Silly Mountain Park and Trails	1	Existing/Planned
15	Apache Junction Community Parks	1	Planned
16	Apache Junction Community Parks	1	Planned
17	Crest Trail	1	Planned
18	Mountain Brook Golf Club	1	Existing
19	Gold Canyon RV & Golf Resort	1	Existing
20	Apache Sun Golf Club	1	Existing
21	Links at Queen Creek	1	Existing
22	Castlegate Neighborhood Parks	1	Existing
23	Laredo Ranch Neighborhood Parks	1	Existing
24	Florence Community Park #8	1	Planned
25	Florence Magma Dam Basin Community Park and Open Space	1	Planned
26	Magma Ranch Neighborhood Parks	1	Existing
27	Magma Arizona Railroad Trail	1, 2	Planned
28	Copper Basin Railroad Trail	1, 2, 3	Planned
None	City of Apache Junction, Proposed Future Trail Link	1	Planned
29	Florence Dobson Farms Community Park	2	Planned
30	Florence Skyview Farms Community Park	2	Planned
31	Poston Butte Golf Club	3	Existing
32	Anthem at Merrill Ranch Neighborhood Parks	3	Existing

Table 3.5-1. Park and trails map identification guide

Map no.	Facility name	Segment	Status
33	Poston Butte Trail and Open Space	3	Existing
34	Florence Power Line Corridor Trail	3	Planned
35	Gila River Trail	3	Existing
36	Heritage Park/McFarland State Historic Park	3	Existing
37	Little League Park/Dorothy Noland Senior Center	3	Existing
38	Jacques Square	3	Existing
39	Arriola Square	3	Existing
40	Main Street Park	3	Existing
41	Florence Gila River North Side Community Park	3	Planned
42	Hohokam Country Club (approximate)	3	Existing
43	Florence Municipal Park, Proposed Between Canals Open Space	3	Planned
44	Florence Memorial Park (Cemetery)	3	Existing
45	Kenilworth Sports Complex	3	Existing
46	Coolidge Parks	3	Planned
47	Pima Lateral Canal Trail	3	Existing
48	Picacho Reservoir	4	Existing
49	Anza Historic Trail	4	Existing
50	Jones Park	4	Existing
51	Florence/Casa Grande Canal Corridors	1, 2, 3, 4	Existing
52	National Park Service, Butterfield Overland Trail	4	Planned
None	Pinal County, Other Proposed Multiuse Trail Corridors	1, 3, 4	Planned
None	City of Eloy, Proposed Trail	4	Planned

3.5.4 Environmental Consequences

The following sections discuss the potential impacts of the No-Action Alternative and action corridor alternatives. With implementation of the proposed action, the anticipated parks and recreational facilities impacts would be (1) direct, where recreational land is permanently incorporated into the transportation facility or is no longer available for recreational activities, or (2) indirect, where adjacent recreational land uses are altered by the presence of the new transportation facility, such as increased noise or diminished aesthetic character and quality.

3.5.4.1 No-Action Alternative

With the No-Action Alternative, the parks and recreational facilities summarized above would continue to be used by and/or built to serve the growing communities in the study area, and no recreational land would be incorporated into a transportation facility. The proposed action would not be implemented;

therefore, any improvements to access and connectivity to the parks and recreational facilities provided by the proposed action would not be available to study area residents.

3.5.4.2 Action Corridor Alternatives

Direct impacts would occur if all or a portion of the park or recreational facility were permanently incorporated into the proposed transportation facility. Direct impacts may also occur if access to the facility or the intended use of the facility were altered in some way. However, depending on the specific characteristics of the park or recreational facility, such as proximity to the action corridor alternative and sensitivity of the use, impacts could also be indirect if construction or operation of the proposed action would affect the park and/or recreational facility user experience, such as by construction-generated noise and dust or by operational noise and aesthetic impacts.

As shown on Figures 3.5-1 and 3.5-2, all of the action corridor alternatives could potentially directly or indirectly affect existing and planned parks and recreational facilities. Based on the extensive presence of parks and recreational facilities throughout the study area, it is unlikely that all of these resources within the 1,500-foot-wide corridors would be entirely avoided with a Tier 2 alignment. Although the exact number and acreage of parks and/or recreational facilities that would be affected by implementation of the proposed action would vary (depending on the alignment developed during Tier 2 studies), impacts would generally be direct conversion of parks or recreational facilities to a nonrecreational use.

Indirect construction impacts on parks or recreational facilities would also occur if the resource were located near or within the construction area. Impacts of this type might include increases in dust from ground disturbance, noise from construction equipment, views of construction activities, access restrictions, and the presence of construction staging areas. These impacts would be short-term and temporary because they would occur during construction or until ground disturbance activities were completed. Construction impacts would be more likely around urban and more densely populated areas where parks or recreational resources are concentrated. Permanent indirect impacts on parks or recreational facilities may occur if operational aspects of the transportation facility affect the recreational features or value of the park or recreational facility. Indirect operational impacts on parks or recreational facilities could consist of permanent changes in access to the resource, increased noise, and changes to the visual character or quality as a result of the presence of the new transportation facility. The parks or recreational resources within 0.5 mile of the action corridor alternatives, and which have the potential to be directly or indirectly affected, are shown in Table 3.5-2. The action corridor alternatives with the potential to directly affect the most recreational resources are: for Segment 1, the W1a or W1b Alternatives; for Segment 2, the W2a or W2b Alternatives; for Segment 3, the E3b, E3d, or W3 Alternatives; and for Segment 4, the E4 or W4 Alternatives. Additional details for these potential direct impacts are described below.

- In Segment 1, the E1a, E1b, and W1b Alternatives may directly affect the planned portion of Silly Mountain Park and Trails, an existing public recreation facility on the northeastern side of US 60 with plans for expansion within the 1,500-foot-wide corridors. However, the actual impacts of a Tier 2 alignment may avoid impacts on the planned portions of the park, and the City of Apache Junction has indicated that it would be open to consultation during Tier 2 studies for the project. Moreover, planning documents for the park identify a future transportation facility through Silly Mountain Park. The W1a Alternative would directly affect the Apache Creek Golf Course, an existing private recreational facility. Avoiding this direct impact during Tier 2 studies would require shifting the alignment farther west, encroaching further into residential development and potentially affecting the Palmas Del Sol East Neighborhood Parks. It is likely that the W1a Alternative system traffic interchange with US 60 that would be developed in the Tier 2 phase could be designed to avoid direct impacts on recreational facilities associated with Apache Junction High School, immediately north of US 60. The W1a and W1b Alternatives would potentially affect the Florence Community Park #8, a planned public recreational facility. All other potential impacts in Segment 1 would be related to existing or planned trails, where such impacts may be avoided through local agency coordination and/or design modifications to avoid or minimize impacts. These measures would be determined during the subsequent Tier 2 analysis.

- In Segment 2, all potential direct impacts are related to existing or planned trails, where such direct impacts may be avoided through local agency coordination and/or design modifications to avoid or minimize impacts. These measures would be determined during the subsequent Tier 2 analysis.
- In Segment 3, the W3 Alternative would potentially directly affect the Coolidge Parks, which are planned recreation facilities. All other potential direct impacts in Segment 3 are related to existing or planned trails, where such direct impacts may be avoided through local agency coordination and/or design modifications to avoid or minimize impacts. These measures would be determined during the subsequent Tier 2 analysis.
- In Segment 4, all potential direct impacts are related to existing or planned trails, where such direct impacts may be avoided through local agency coordination and/or design modifications to avoid or minimize impacts. These measures would be determined during the subsequent Tier 2 analysis.

Table 3.5-2. Parks and recreation facilities within 0.5 mile of action corridor alternatives

Action corridor alternative	Parks and recreation facilities within 0.5 mile	Potential impact
	Segment 1	
E1a	Sheep Drive Multiuse Trail	Direct
	Silly Mountain Park and Trails	Direct
	Magma Ranch Neighborhood Parks	Indirect
	Goldfield to Florence Historic Trail	Indirect
	Crest Trail (planned)	Indirect
	Magma Arizona Railroad Trail (planned)	Direct
	Florence/Casa Grande Canal Corridors	Direct
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct
E1b	Sheep Drive Multiuse Trail	Direct
	Silly Mountain Park and Trails	Direct
	Magma Ranch Neighborhood Parks	Indirect
	Goldfield to Florence Historic Trail	Indirect
	Crest Trail (planned)	Indirect
	Magma Arizona Railroad Trail (planned)	Direct
	Florence/Casa Grande Canal Corridors	Direct
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct

Table 3.5-2. Parks and recreation facilities within 0.5 mile of action corridor alternatives

Action corridor alternative	Parks and recreation facilities within 0.5 mile	Potential impact
W1a	Superstition Shadows Park	Indirect
	Palmas Del Sol East Neighborhood Parks	Indirect
	Apache Creek Golf Course	Direct
	La Casa Blanca Neighborhood Parks	Indirect
	Desert Harbor Neighborhood Parks	Indirect
	Castlegate Neighborhood Parks	Indirect
	Laredo Ranch Neighborhood Parks	Indirect
	Florence Community Park #8 (planned)	Direct
	Magma Arizona Railroad Trail (planned)	Direct
	Copper Basin Railroad Trail (planned)	Indirect
	Florence/Casa Grande Canal Corridors	Direct
	Pinal County Other Existing Multi-Use Trail Corridors	Direct
W1b	Sheep Drive Multiuse Trail	Direct
	Silly Mountain Park and Trails	Direct
	Castlegate Neighborhood Parks	Indirect
	Laredo Ranch Neighborhood Parks	Indirect
	Florence Community Park #8 (planned)	Direct
	Goldfield to Florence Historic Trail	Indirect
	Crest Trail (planned)	Indirect
	Magma Arizona Railroad Trail (planned)	Direct
	Copper Basin Railroad Trail (planned)	Indirect
	Florence/Casa Grande Canal Corridors	Direct
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct
Segment 2		
E2a	Florence/Casa Grande Canal Corridors	Indirect
E2b	Magma Arizona Railroad Trail (planned)	Indirect
	Copper Basin Railroad Trail (planned)	Indirect
	Florence/Casa Grande Canal Corridors	Indirect
W2a	Florence Dobson Farms Community Park (planned)	Indirect
	Magma Arizona Railroad Trail (planned)	Indirect
	Copper Basin Railroad Trail (planned)	Direct
W2b	Copper Basin Railroad Trail (planned)	Direct
	Florence/Casa Grande Canal Corridors	Indirect

Table 3.5-2. Parks and recreation facilities within 0.5 mile of action corridor alternatives

Action corridor alternative	Parks and recreation facilities within 0.5 mile	Potential impact
Segment 3		
E3a	Poston Butte Trail and Open Space	Indirect
	Heritage Park/McFarland State Historic Park	Indirect
	Gila River Trail	Direct
	Florence/Casa Grande Canal Corridors	Indirect
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct
E3b	Copper Basin Railroad Trail (planned)	Direct
	Florence Power Line Corridor Trail	Direct
	Gila River Trail	Direct
	Florence/Casa Grande Canal Corridors	Indirect
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct
E3c	Poston Butte Trail and Open Space	Indirect
	Heritage Park/McFarland State Historic Park	Indirect
	Gila River Trail	Direct
	Florence/Casa Grande Canal Corridors	Indirect
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct
E3d	Copper Basin Railroad Trail (planned)	Direct
	Florence Power Line Corridor Trail (planned)	Direct
	Gila River Trail	Direct
	Florence/Casa Grande Canal Corridors	Indirect
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct
W3	Hohokam Country Club	Indirect
	Pima Lateral Canal Trail	Direct
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct
	Coolidge Parks (planned)	Direct
Segment 4		
E4	Butterfield Overland Trail (planned)	Direct
	Picacho Reservoir	Indirect
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct
W4	Butterfield Overland Trail (planned)	Direct
	Pinal County Other Existing and Proposed Multi-Use Trail Corridors	Direct

3.5.5 Potential Avoidance, Minimization, and Mitigation Strategies

During the Tier 2 design for the proposed action, ADOT would avoid impacts on parks and recreational facilities to the extent possible. ADOT would coordinate with the local jurisdictions regarding the affected parks and/or recreational facilities to maintain access to the resources potentially affected to the extent feasible. Where access cannot be maintained or where implementation of the proposed action would require full or partial acquisition of existing parks or recreational facilities, potential mitigation measures would be developed in consultation with the local agencies. Specific mitigation measures may include minimizing the acreage of acquisition of these areas during the Tier 2 design, selecting alternatives that avoid parks and recreational facilities, strategically locating construction equipment to suitable locations within existing parks and recreational facilities, and designing landscaping to offset vegetation removal or to establish screening for noise and visual disturbances.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.5.6 Subsequent Tier 2 Analysis

Parkland and recreational facilities would require consideration in the Tier 2 phase and in final design, should an action corridor alternative become the preferred alternative. Subsequent analysis related to parkland and recreational resources for the Tier 2 analysis should involve a detailed description of existing and planned parks and recreational facilities that are within 0.5 mile of the study area, along with their distance from the preferred alternative.

As Tier 2 alignments within the selected corridor are developed, all efforts would be made during preliminary design to avoid impacts of any type on parks or recreational facilities.

3.5.6.1 Conclusion

As shown on Figures 3.5-1 and 3.5-2, existing and planned parks and recreational facilities are located adjacent to or intersect the action corridor alternatives in all segments. Therefore, all action corridor alternatives would affect these resources. The action corridor alternatives with the potential to directly affect the most recreational resources are: for Segment 1, the W1a or W1b Alternatives; for Segment 2, the W2a or W2b Alternatives; for Segment 3, the E3b, E3d, or W3 Alternatives; and for Segment 4, the E4 or W4 Alternatives.

In Segment 1, the E1a, E1b, and W1b Alternatives may directly affect the planned portion of Silly Mountain Park and Trails; however, the actual impacts of a Tier 2 alignment may avoid impacts on the park since planning documents for the park identify a future transportation facility through the park. The W1a Alternative would directly affect the existing Apache Creek Golf Course, a private facility, and the recreational facilities associated with Apache Junction High School. Also in Segment 1, the W1a and W1b Alternatives may directly affect the planned Florence Community Park #8. In Segment 3, the W3 Alternative may directly affect the planned Coolidge Parks. All other potential direct impacts are related to existing or planned trails, where such direct impacts may be avoided or minimized through local agency coordination and/or design modifications during subsequent Tier 2 analysis.

3.6 Prime and Unique Farmland

This section provides an overview of the study area's prime and unique farmland setting and preliminary information concerning prime and unique farmlands in the action corridor alternatives.

3.6.1 Regulatory Context

Land in the study area could be subject to regulation under the Farmland Protection Policy Act (FPPA) (7 CFR Part 658).

The FPPA was established in 1981 and is administered by the Natural Resources Conservation Service (NRCS) (2016a). According to NRCS, the purpose of the FPPA is to:

1. Minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.
2. Encourage alternative actions, if appropriate, that could lessen the adverse effects on farmland; and
3. Ensure that federal programs are operated in a manner that, to the extent practicable, will be compatible with state, local government, and private programs that protect farmland.

According to NRCS, under the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. However, farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but water or urban built-up land is not included. NRCS defines prime and unique farmland as:

- Prime farmland – Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods of time, and is either not flooded frequently or is protected from flooding.

  Prime farmland soils are further defined by the following qualifiers:

  - prime farmland if irrigated
  - prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

- Unique farmland – Land other than prime farmland that is used for production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high-quality or high yields of specific crops.

3.6.2 Methodology

The evaluation presented in this section was based on available information on prime and unique farmland in the study area, which was identified using NRCS data (2016b). NRCS soil surveys were used to identify the soil types that are best able to support cultivation and farming of common crops, when irrigated, in the study area. Further, indicators of prime farmland (such as water supply, lack of flooding, growing season length) were applied and prime farmland areas located. Areas able to support high-value food and fiber crops were identified as unique farmland. The acreages of these areas were tabulated and then analyzed as a percentage of the total study area.

3.6.3 Affected Environment

To accurately depict the farmland setting of the study area, descriptions of existing and planned agricultural land uses and characteristics in the study area jurisdictions were reviewed and are summarized below.

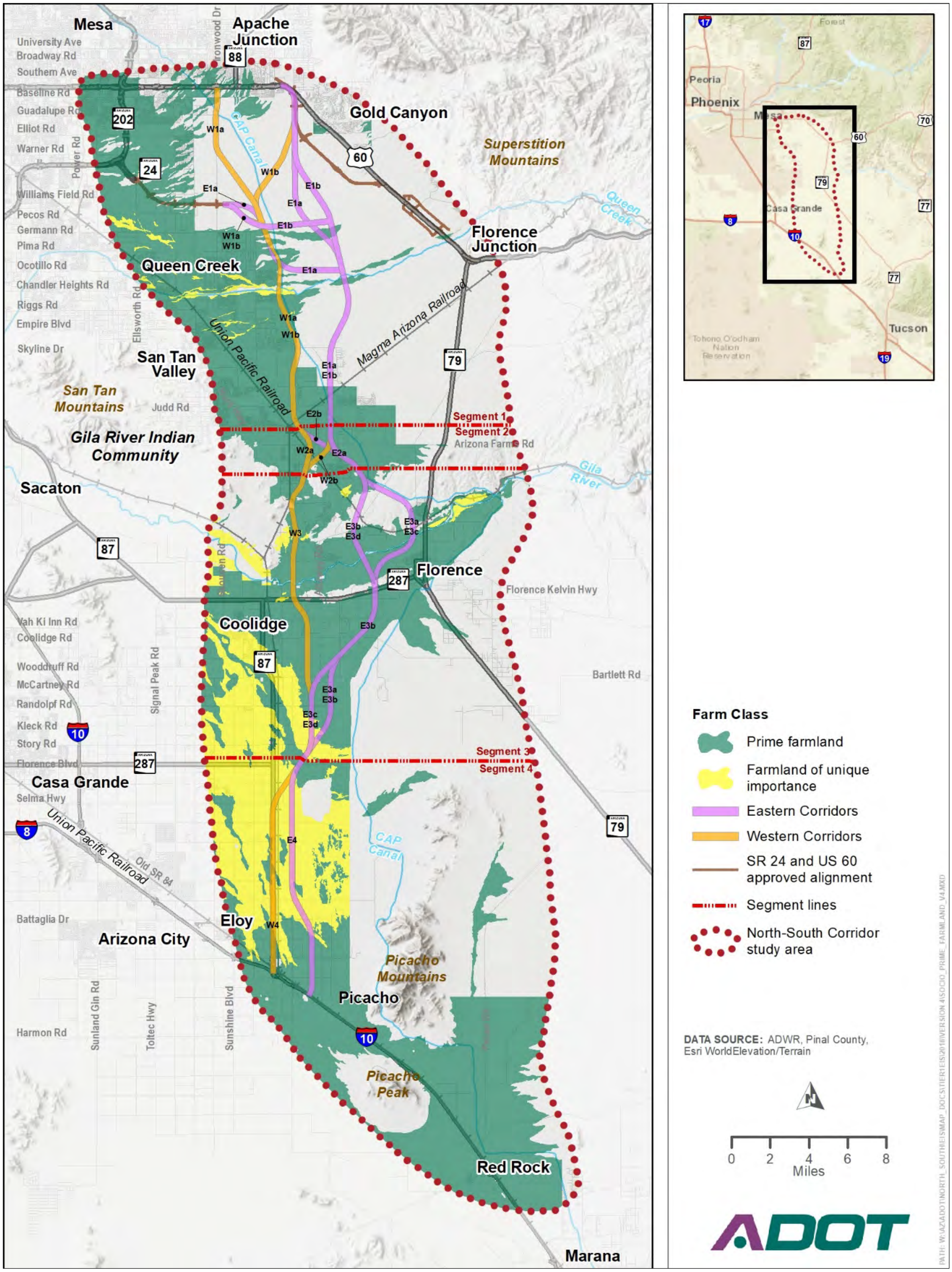
- Pinal County – According to the *Pinal County Comprehensive Plan*, the County has had, and continues to experience, rapid growth. The County has seen a reduction in agricultural activities because of increasing costs, federal regulations, development encroachment, and the changing global market. At the same time, Native American communities in the County are increasing the number of acres in agricultural production (Pinal County 2015). The Gila River Indian Community has major agricultural operations.

  Historically, farming has been a valued part of the County's heritage, with thousands of acres still in agricultural production. However, the County is experiencing a transition away from agricultural production as farmland is sold for residential development. The *Comprehensive Plan* indicates that agricultural land uses will be supported as long as they are economically feasible.

- Mesa – According to the *Mesa 2040 General Plan*, several small pockets of agricultural land are scattered throughout the city's urbanized areas, with larger concentrations around the Lehi area, Falcon Field Airport, and Phoenix-Mesa Gateway Airport (City of Mesa 2014).
- Queen Creek – According to the Queen Creek *North Specific Area Plan*, the town was originally developed as a rural residential and agricultural community. It prioritizes the preservation of its unique agricultural and rural character while planning for the use of the remaining agricultural land and managing growth (Town of Queen Creek 2016).
- Florence – According to the *Town of Florence 2020 General Plan*, the town has historically been an agricultural community because of good soils and the presence of the Gila River (Town of Florence 2008a). The planning area encompasses 196 square miles, of which about 10 percent is currently developed. The remainder is undeveloped or in agricultural production. The Town of Florence predicts that the agricultural and natural areas north of the Gila River will experience the most development in the planning area, as agricultural land transitions into master-planned communities and employment centers to accommodate future growth.
- Coolidge – According to the City of Coolidge *2025 General Plan*, the city continues to be a major agricultural center (City of Coolidge 2014). The *General Plan* recognizes the importance of agriculture in the planning area, and agricultural land uses account for more than 10 percent of the area.
- Eloy – According to the City of Eloy *2010 General Plan Update*, the city is located in the Santa Cruz Basin, which is one of Arizona's most fertile soil and agricultural areas (City of Eloy 2011). Historically, the city's economy has largely depended on agriculture; however, more recently, the economy has diversified to encompass industrial, wholesale/retail trade, and service sectors. Although most land is designated for residential purposes, the predominant current land use is agriculture.

As noted previously, prime and unique farmland in the study area was identified using NRCS data. The amount of prime and unique farmland varies by action corridor alternative, but generally encompasses large portions of the study area, as shown on Figure 3.6-1. Prime and unique farmland is present in all the study area segments, but predominantly in the southern segments of the study area (Segments 2, 3, and 4).

Figure 3.6-1. Prime and unique farmland



3.6.4 Environmental Consequences

With implementation of the proposed action, the anticipated farmland impacts would be (1) direct, where land is taken out of agricultural production or is no longer farmable or (2) indirect, where adjacent land is taken out of agricultural production. Farmland impacts could also be cumulative, where agricultural land is bisected, resulting in isolated parcels that can no longer be economically or feasibly farmed.

3.6.4.1 No-Action Alternative

Under the No-Action Alternative, the proposed action would not be built and would not convert farmland to a transportation use. However, planned land development in the future would convert farmland to other uses. Land use plans prepared by study area jurisdictions identify how, where, and to what extent individual jurisdictions envision future build-out and the relationship between the natural and built environments. County and municipal plans, which describe existing and future land use patterns based on projected population and employment growth, and transportation needs as they relate to the proposed action, are discussed in Section 3.2, *Land Use*. As discussed in Section 3.2, given the study area’s central location between Phoenix and Tucson and within the Sun Corridor, new development by 2040 is anticipated to be substantial even without the proposed action, and is expected to convert farmland to nonagricultural uses.

3.6.4.2 Action Corridor Alternatives

As shown in Figure 3.6-1, all the action corridor alternatives contain prime and unique farmland. Based on the extensive presence of prime and unique farmland throughout the study area, farmland could not be entirely avoided. Although the exact acreage of prime and unique farmland that would be affected by implementation of the proposed action would vary based on the selection of a preferred alternative, impacts would generally be direct conversion of prime and unique farmland to a nonagricultural use.

Acreages of prime and unique farmland potentially affected by the action corridor alternatives are shown in Table 3.6-1, which also shows the percentage of land under each action corridor alternative that is considered prime and unique farmland. Acreages were determined by overlaying the alternatives on the existing prime and unique farmlands in the study area. Table 3.6-1 shows that the action corridor alternatives with the potential to directly affect the most prime and unique farmland are: in Segment 1, the W1a Alternative; in Segment 2, the E2b Alternative; in Segment 3, the E3c Alternative; and in Segment 4, the E4 Alternative. In the case of Segment 1, the next closest alternative in impact (W1b Alternative) is only 4 acres less than the W1a Alternative, so they are very similar in impact. In Segment 2, the difference between the top two is a tenth of a percent, so they are almost identical. In Segment 4, the difference is less than one-half percent between the two. Depending on the Tier 2 alignments, impacts would vary from what is reported in Table 3.6-1.

Depending on parcel characteristics such as size and ownership, impacts could also be indirect or cumulative if, during the ROW acquisition process, it is determined that certain farmland areas could become too small or fragmented to economically or feasibly continue farming activities.

Table 3.6-1. Prime and unique farmland resources, by action corridor alternative

Action corridor alternative	Acres of prime and unique farmland	Percentage of total corridor that is prime and unique farmland (%)
Segment 1		
E1a	2,660	17.86
E1b	1,887	13.88
W1a	5,164	43.96
W1b	4,623	39.79
Segment 2		
E2a	1,809	99.50
E2b	2,274	99.60
W2a	1,627	95.56
W2b	1,849	94.93
Segment 3		
E3a	8,528	82.11
E3b	8,026	86.00
E3c	8,587	82.21
E3d	8,085	86.09
W3	8,185	95.75
Segment 4		
E4	7,063	99.37
W4	6,463	98.98

Source: Natural Resources Conservation Service (2016b)

3.6.5 Potential Avoidance, Minimization, and Mitigation Strategies

During the Tier 2 design, ADOT would coordinate with affected property owners to maintain access to farmland to the extent feasible. Where access cannot be maintained, or where property acquisition is required, acquisition would be undertaken in accordance with the Uniform Act (49 CFR Part 24).

Additional mitigation measures may be implemented following consultation with NRCS during Tier 2 analysis.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.6.6 Subsequent Tier 2 Analysis

The presence of prime and unique farmlands would not preclude construction of the proposed action within any of the proposed action corridor alternatives. However, as described below, prime and unique farmlands within the action corridor alternatives would require further consideration in the Tier 2 phase and in final design, should an action corridor alternative become the preferred alternative.

During subsequent Tier 2 analysis, the acreage of prime and unique farmland by action corridor alternative that would be directly converted to nonagricultural uses should be calculated, and a comparative analysis should be prepared to determine which action corridor alternatives would have the greatest or least potential for direct conversion of prime and unique farmland to nonagricultural use.

The Farmland Conservation Impact Rating process is used to determine the impact of a proposed action on land regulated by the FPPA. Under the FPPA, the Land Evaluation and Site Assessment scoring system is used to measure the quality of farmland based on land evaluation and corridor assessment criteria (NRCS 2016c), the results of which are documented on the NRCS-CPA-106 form, “Farmland Conversion Impact Rating for Corridor Type Projects.”

This form is typically completed by both the proposed action sponsor agency and NRCS. Information about the acreage of prime and unique farmland that would be converted to nonagricultural uses is entered into Part III of the NRCS-CPA-106 form. The land evaluation criterion outlined on Part V of the form is used to assign a score of between 0 and 100 to groups of soil types based on their productivity and capability to support crops. In Part VI, the corridor assessment criteria are used to assign a score of between 0 and 160 to farmland in the study area based on the suitability of each action corridor alternative for protecting farmland (7 CFR § 658.5). Land that receives a combined score of 160 points or greater is typically given increased levels of consideration for protection under the FPPA (7 CFR § 658.4). When making decisions on proposed actions for sites receiving scores totaling 160 or more, NRCS considers use of land that is not farmland or use of existing structures; alternative sites, locations, and designs that would serve the proposed purpose but convert either fewer acres of farmland or other farmland that has a lower relative value; and special siting requirements of the proposed project and the extent to which an alternative site fails to satisfy the special siting requirements as well as the originally selected site. Land receiving a score of less than 160 points is not typically given further consideration for protection.

During Tier 2 analysis, ADOT, in conjunction with NRCS, would determine the Land Evaluation and Site Assessment score for the alignments by completing the NRCS-CPA-106 form. Where the score is determined to be 160 points or greater, ADOT would consult with NRCS for alternatives to avoid farmland impacts where feasible. Following this consultation, ADOT would consider the NRCS recommendations for minimizing the adverse effects and alternative actions to lessen the conversion’s adverse effects on protected farmland. Where farmland impacts are determined to be unavoidable, measures to minimize or reduce the impacts would be evaluated and implemented to the extent possible. Finally, ADOT would report the possible alternative actions and the final project decision to NRCS.

3.6.6.1 Conclusion

All action corridor alternatives would affect prime and unique farmland, with the acreage impacts generally increasing from north to south through the study area. The action corridor alternatives with the greatest potential to directly affect prime and unique farmland are: in Segment 1, the W1a Alternative; in Segment 2, the E2b Alternative; in Segment 3, the E3c Alternative; and in Segment 4, the E4 Alternative.

3.7 Air Quality

This section provides an overview of the study area's air quality setting and information regarding potential air quality impacts of the action corridor alternatives.

3.7.1 Regulatory Context

3.7.1.1 National Ambient Air Quality Standards

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. These standards include both primary and secondary standards. Primary standards protect public health, while secondary standards protect public welfare (such as protecting property and vegetation from the effects of air pollution).

These national standards have been adopted by the State of Arizona as the ambient air quality standards in the state and are shown in Table 3.7-1. If an area meets the NAAQS for a given air pollutant, the area is called an *attainment area* for that pollutant (because the NAAQS have been attained). If an area does not meet the NAAQS for a given air pollutant, the area is called a *nonattainment area*. A *maintenance area* is an area previously designated as a nonattainment area but is currently attaining the standard. A maintenance plan outlining steps for continued attainment over the maintenance period is required for all maintenance areas.

Maricopa County is currently designated as a nonattainment area for the 8-hour ozone (O_3) and particulate matter with a diameter of ten microns or less (PM_{10}) NAAQS and as a maintenance area for carbon monoxide (CO). A portion of Pinal County is designated as a nonattainment area for PM_{10}.

Ozone

O_3 is the primary component of photochemical smog. It occurs naturally in the stratosphere and reduces the amount of ultraviolet radiation reaching the earth's surface. O_3 is not emitted directly into the air but is formed by nitrogen oxides and volatile organic compounds that react in the presence of heat and sunlight to form O_3. Ground-level O_3 forms readily in the atmosphere, usually during hot weather, and can affect people's respiratory systems and plant growth.

Nitrogen oxides are emitted from motor vehicles, power plants, and other combustion sources. Volatile organic compounds are emitted from a variety of sources including motor vehicles, chemical plants, refineries, factories, and other industrial sources.

Particulate Matter

Particulate matter (PM) includes both solid particles and liquid droplets in the air. Many anthropogenic (human-caused) and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. PM can be inhaled and accumulate in the respiratory system. Sources of PM include crushing or grinding operations and dust from paved or unpaved roads. Fugitive dust is PM suspended in the air primarily from soil that has been disturbed by wind or other activities.

Carbon Monoxide

CO, which is emitted by engines, is a colorless, odorless, poisonous gas that reduces the amount of oxygen carried in the bloodstream by forming carboxy-hemoglobin, which prevents oxygenation of the blood. CO is emitted directly into the atmosphere from automobiles. Other sources of CO emissions include industrial processes such as non-transportation fuel combustion and natural sources such as wildfires.

Table 3.7-1. National Ambient Air Quality Standards

Pollutant	Primary/ Secondary	Averaging time	Level	Form
Carbon monoxide (CO)	Primary	8-hour average	9 ppm	Not to be exceeded more than once per year
		1-hour average	35 ppm	
Lead (Pb)	Primary and secondary	Rolling 3-month average	0.15 µg/m^{3}[a]	Not to be exceeded
Nitrogen dioxide (NO_2)	Primary	1-hour average	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and secondary	Annual average	53 ppb[b]	Annual mean
Ozone (O_3)	Primary and secondary	8-hour average	0.070 ppm[c]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate matter ($PM_{2.5}$)	Primary	Annual average	12 µg/m^3	Annual mean, averaged over 3 years
	Secondary	Annual average	15 µg/m^3	Annual mean, averaged over 3 years
	Primary and secondary	24-hour average	35 µg/m^3	98th percentile, averaged over 3 years
Particulate matter (PM_{10})	Primary and secondary	24-hour average	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide (SO_2)	Primary	1-hour average	75 ppb[d]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour average	0.5 ppm	Not to be exceeded more than once per year

Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table

Notes: PM_{10} = particulate matter 10 microns in diameter or less, $PM_{2.5}$ = particulate matter 2.5 microns in diameter or less, ppb = parts per billion, ppm = parts per million, µg/m^3 = micrograms per cubic meter

[a] Final rule signed October 15, 2008. The 1978 lead standard (0.15 µg/m^3 as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[b] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

[c] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

[d] Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

High concentrations of CO generally occur along roadways and near intersections with congested traffic. Calm winds during the late fall and winter, combined with nighttime and early morning temperature inversions, can cause a buildup of CO in urban areas.

3.7.1.2 Mobile Source Air Toxics

In addition to the NAAQS, EPA has developed a list of 21 mobile source air toxics (MSATs) that result from industrial activities and motor vehicle emissions. Research has shown that people exposed to MSATs at sufficiently high concentrations or for extended periods of time may have an increased risk of certain health effects, including cancer, compromised immune systems, or neurological problems.

To date, no federal standards have been adopted for MSAT emissions.

3.7.1.3 Greenhouse Gases

Climate change is an important national and global concern, and there is general agreement that the earth's climate is changing at an accelerated rate and will continue to do so for the foreseeable future. Human-caused greenhouse gas (GHG) emissions contribute to this rapid change, with carbon dioxide being the largest component of GHG emissions. The transportation sector is the largest source of total GHGs in the United States and the largest source of carbon dioxide emissions, the predominant GHG. In 2016, the transportation sector was responsible for 27 percent of all carbon dioxide emissions produced in the United States (EPA 2018a).

To date, no national standards have been established for GHGs. Because climate change is a global issue and the emission changes attributable to the proposed action would be very small compared with global totals, in this study, GHG emissions were not estimated for the action corridor alternatives or the No-Action Alternative. Instead, the discussion focuses on VMT for the action corridor alternatives and how the differences between the alternatives are likely to affect GHG emissions, both locally and globally.

As part of ADOT's Resilience Program, and in conjunction with FHWA's Extreme Weather and Climate Resilience Pilot Program, a study was conducted to assess the vulnerability of ADOT-managed transportation infrastructure to Arizona-specific extreme weather and measurable future climate trends. In the long term, ADOT seeks to develop a multistakeholder decision-making framework—including planning, asset management, design, construction, maintenance, and operations—to cost-effectively enhance the resilience of Arizona's transportation system to extreme weather and climate risk.

For the study, ADOT focused on the Interstate corridors connecting Nogales, Tucson, Phoenix, and Flagstaff (Interstate 19, I-10, and Interstate 17). This corridor includes a variety of urban areas, landscapes, biotic communities, and climate zones, which present a range of weather conditions applicable to much of Arizona. The study team examined climate-related stressors including extreme heat, freeze-thaw, extreme precipitation, and wildfire, considering the potential change in these risk factors as the century progresses.

The study leveraged a vulnerability assessment framework, customizing it to fit the study's needs. The study team gathered information on potential extreme weather and climate impacts and collected datasets for transportation facilities and land cover characteristics (for example, watersheds, vegetation), and integrated these datasets to perform a high-level assessment of potential infrastructure vulnerabilities. Each step of the process drew heavily on internal and external stakeholder input and feedback. The assessment qualitatively addressed the complex, often uncertain interactions between climate and extreme weather, land cover types, and transportation facilities—with an ultimate focus on potential risks to infrastructure. The study results will help ADOT integrate climate-resilient features into future projects.

3.7.1.4 Transportation Conformity Requirements

All state governments are required to develop a State Implementation Plan (SIP) that explains how the State will comply with requirements of the federal Clean Air Act of 1990, as amended. The Clean Air Act requires that transportation plans, programs, and projects that are developed, funded, or approved by FHWA must demonstrate that such activities conform to the SIP. Transportation conformity requirements apply to any transportation-related criteria pollutants (for example, CO or PM) for which the project area has been designated a nonattainment or maintenance area.

Under Section 176(c) of the Clean Air Act, a transportation project is said to "conform" to the provisions and purposes of the SIP if the project, both alone and in combination with other planned projects, does not:

- Cause or contribute to new air quality violations of the NAAQS,

- Worsen existing violations of the NAAQS, or
- Delay timely attainment of the NAAQS or required interim milestones.

The transportation conformity rule (40 CFR Part 93, Subpart A) establishes the criteria and procedures for determining whether projects conform to the SIP (EPA 2012).

3.7.2 Methodology

This evaluation was based on available information at this stage of development, including regional nonattainment area data and existing environmental conditions. Additionally, VMT and LOS information from the *Traffic Report, North-South Corridor Study* (Appendix B, *Traffic Information*) were studied to determine whether one or more of the alternatives would result in substantially greater vehicle emissions than the others.

3.7.3 Affected Environment

Table 3.7-2 shows the air quality attainment status for motor vehicle-related pollutants in Maricopa and Pinal Counties for the study area. For each area, the table also shows the years of nonattainment or the date the area was redesignated to maintenance.

As shown in the table, Maricopa County is classified as a nonattainment area for PM_{10} and O_3 and a maintenance area for CO. Pinal County is a nonattainment area for PM_{10}. The major sources of PM_{10} throughout the study area include wind-blown dust and particulates from exposed soils and agricultural tilling practices and from vehicle traffic on unpaved roads. These emission sources account for 80 to 90 percent of PM_{10} emissions in Pinal County, while emissions associated with paved road sources account for less than 1 percent of the county's annual emissions (Arizona Department of Environmental Quality [ADEQ] 2013). Relative to other sources of PM_{10} in the study area, mobile source emissions are not substantial emission sources.

Table 3.7-2. Areas with nonattainment and maintenance status in the study area[a]

Nonattainment area	Pollutant	Status	Classification
Maricopa County, Phoenix	1-hour ozone	Maintenance (redesignation on June 14, 2005)	Serious
Maricopa County, Phoenix/Mesa	8-hour ozone	Nonattainment (2012 through 2018)	Moderate
Maricopa County, Phoenix	Carbon monoxide	Maintenance (redesignation on April 8, 2005)	Serious
Maricopa County, Phoenix	PM_{10}	Nonattainment (1992 through 2018)	Serious
Pinal County, Phoenix/Mesa	8-hour ozone	Nonattainment (2012 through 2018)	Moderate
Pinal County, Phoenix	PM_{10}	Nonattainment (1992 through 2018)	Serious
Pinal County, West Pinal	PM_{10}	Nonattainment (2012 through 2018)	Moderate

Source: U.S. Environmental Protection Agency (2018b)
Note: PM_{10} = particulate matter 10 microns in diameter or less
[a] Appendix F, *Air Quality Information*, contains maps from the Arizona Department of Environmental Quality showing areas of PM_{10} nonattainment, ozone nonattainment, and carbon monoxide maintenance (2018) that overlap the study area.

ADEQ maintains a network of air quality monitoring stations throughout the state. In general, these monitoring stations are in areas with known air quality problems, so they are usually in or near urban areas or close to specific emission sources. Other stations are in suburban locations or remote areas to provide an indication of regional pollutant levels.

Table 3.7-3 shows the monitoring results for PM_{10} from 2014 through 2017 at the monitoring stations in Maricopa and Pinal Counties that are closest to the action corridor alternatives.

Table 3.7-3. PM_{10} monitoring results for stations near the action corridor alternatives

Monitoring station (site ID)	Parameter (µg/m³)	2014	2015	2016	2017
Maricopa County					
Higley (04-013-4006)	Peak 24-hour value[a] Days above standard	137 0	137 0	137 0	113 0
Pinal County					
Apache Junction Fire Station (04-021-3002)	Peak 24-hour value Days above standard	131 0	131 0	131 0	86 0
Combs School (04-021-3009)	Peak 24-hour value Days above standard	80 0	80 0	80 0	143 0
Eloy County Complex (04-021-3014)	Peak 24-hour value Days above standard	137 0	137 0	137 0	51 0

Source: U.S Environmental Protection Agency (2017)
Notes: Exceptional events (that is, high winds) were excluded for all years.
µg/m³ = micrograms per cubic meter
[a] 24-hour PM_{10} standard = 150 µg/m³ (not to be exceeded more than once per year on average over 3 years)

The PM_{10} standard was exceeded in Pinal County at the Combs School station in 2015 and 2016 and at the Eloy County Complex station in 2016. Under certain conditions, such as high winds that result in large amounts of windblown dust, the 24-hour PM_{10} standard can be exceeded. These exceptional events are not included in Table 3.7-3.

3.7.4 Environmental Consequences

3.7.4.1 No-Action Alternative

Under the No-Action Alternative, the proposed action would not be constructed and there would be no freeway-related vehicle emissions. Emissions from other sources such as fugitive dust from agricultural tilling and wind-blown dust (the primary sources of particulates in Pinal County) would continue.

3.7.4.2 Action Corridor Alternatives

As discussed in Chapter 2, *Alternatives*, the action corridor alternatives evaluated in this Tier 1 DEIS include a Western Alternative, an Eastern Alternative, and combinations of both to avoid and minimize environmental impacts. In a few locations, two options are under consideration. In total, eight full-length action corridor alternatives are evaluated in this Tier 1 DEIS.

The traffic report prepared for the proposed action included an analysis of traffic performance, where performance measures were used to gauge the efficiency of the entire study area transportation network (see Appendix B, *Traffic Information*). The performance measures were VMT and VHT.

As summarized in the traffic report, an increase in overall study area VMT was measured with each alternative, compared with the 2040 No-Action Alternative. An increase in study area VMT indicated that travelers would be attracted to the proposed Corridor. Additionally, a decrease in total VHT is anticipated with each alternative, indicating that travelers would reach their desired destinations more quickly and efficiently.

The number of congested roads is also anticipated to decrease—by 6 to 17 percent as compared with the 2040 No-Action Alternative. Area-wide congestion is projected to decrease with implementation of the proposed action, benefiting the future study area transportation network.

Table 3.7-4 shows the daily VMT in the study area for alternative analyzed in the traffic report. As the table shows, the annual VMT would increase by 8 to 16 percent compared with the 2040 No-Action Alternative, depending on the alternative. The range of daily VMT is a function of the different options selected (for example, Alternative 2 includes the W1a and W1b options in Segment 1, and the E3a, E3b, E3c, and E3d options in Segment 3). From an air quality perspective, the difference in VMT between the action corridor alternatives is not considered to be substantial.

In addition to the VMT associated with each alternative, a second measure of performance is the LOS throughout the study area. In general, roadways operating with better LOS (that is, under free-flow conditions of LOS A, B, or C) generally have lower emissions than more congested roadways. For the proposed action, the projected LOS in 2040 is LOS C, or better, throughout the study area. Forecast ADT volumes vary throughout the study area, but range from a high of approximately 70,000 to a low of approximately 2,500, with traffic volumes generally decreasing from north to south.

Table 3.7-4. Area-wide traffic performance summary

Scenario	Total vehicle miles traveled (millions)	% change from No-Action Alternative
2015 existing conditions	5.00	—
2040 No-Action Alternative	12.63	—
Alternative 1	14.11–14.15	12
Alternative 2	13.66–14.60	8–16
Alternative 3	13.60–14.60	8–16
Alternative 4	14.09–14.14	12
Alternative 5	13.86–13.99	10–11
Alternative 6	13.65–14.69	8–16
Alternative 7	13.65–13.66	8
Alternative 8	14.14	12

Source: *Traffic Report, North-South Corridor Study* (see Appendix B)

Potential Impacts for Criteria Pollutants (Particulate Matter and Carbon Monoxide)

As noted previously, very little difference exists in the VMT associated with the action corridor alternatives. The proposed action would operate at an acceptable LOS (A, B, or C) in 2040. As a result, little difference would exist in the overall vehicle emissions among the action corridor alternatives.

The study area is in a nonattainment area for PM_{10} and is subject to transportation conformity requirements. Transportation conformity applies to projects funded or approved by FHWA in nonattainment and maintenance areas for transportation-related criteria pollutants. To meet the project-level conformity requirements, a project must come from a conforming metropolitan transportation plan and Transportation Improvement Program; its design concept and scope cannot be substantially different from what was modeled as part of the regional emissions analysis associated with the conformity determination for the metropolitan transportation plan and Transportation Improvement Program; it must include hot-spot analyses in CO and PM areas; and it must demonstrate compliance with any control measures in a PM SIP.

The *Regional Transportation Plan* for Pinal County was approved in November 2017. However, the project has not been identified in the ADOT construction program, and no project activities have been included in the regional Transportation Improvement Program. As a result, transportation conformity cannot be determined at this time. In addition, no determination has been made regarding the proposed action's air quality status (that is, whether it is a project of air quality concern and warrants quantitative modeling to meet conformity requirements).

Nonetheless, potential air quality impacts can be qualitatively assessed by describing the types of projects that could be of air quality concern and potentially require quantitative analysis and by comparing the proposed action corridor alternatives with those thresholds.

EPA guidelines describe the types of projects that could require a quantitative PM_{10} hot-spot analysis (EPA 2010):

- Projects on a new highway or expressway that serve a significant volume of diesel truck traffic, such as facilities with more than 125,000 annual ADT where 8 percent or more of such traffic is diesel truck traffic;
- New exit ramps and other highway facility improvements that connect a highway or expressway with a major freight, bus, or intermodal terminal;
- Expansion of an existing highway or other facility that affects a congested intersection (operating at LOS D, E, or F) by significantly increasing the number of diesel trucks; or
- Similar highway projects that involve a significant increase in the number of diesel transit buses and/or diesel trucks.

The proposed action would serve a maximum of approximately 70,000 vehicles per day in the most heavily traveled segment of the study area—less than the 125,000 vehicles per day guideline suggested by EPA when quantitative modeling could be warranted. The projected percentage of diesel truck traffic could exceed the 8 percent guideline suggested by EPA; however, the number of trucks would be less than EPA's 10,000-vehicle guideline.

The proposed action is located in a maintenance area for federal CO standards. Therefore, a hot-spot analysis would be required for local conformity.

In addition to the relatively low volume of traffic on the proposed action, the LOS in all segments would be acceptable (LOS A, B, or C). Under these conditions—low traffic volumes and acceptable LOS—it is unlikely that the proposed action would be considered a project of air quality concern or that the vehicle emissions would be substantial.

In addition to the relatively low traffic volumes and the acceptable LOS expected in 2040, future trends in vehicle emissions will reduce the likelihood of substantial air quality impacts associated with the proposed action. Future trends include reformulated gasoline, low-emission vehicles, implementation of Tier 3 motor vehicle emissions standards, gasoline sulfur control, heavy-duty diesel engine programs, and on-highway diesel sulfur control programs. Programs intended to reduce vehicle emissions also include the strategies, standards, and procedures described below.

In December 2000, EPA issued its final rule in a two-part strategy to reduce diesel emissions from heavy-duty trucks and buses. The standards pertain to diesel engines found in vehicles weighing over 8,500 pounds beginning in model year 2004.

Additional standards and procedures were implemented in 2007. EPA required diesel fuel refiners to produce diesel fuels (for highway vehicle use) with a sulfur content of no more than 15 parts per million, a 97 percent reduction from the previous level of 500 parts per million.

In April 2014, EPA finalized its Tier 3 motor vehicle emission and fuel standards. The program considers the vehicle and its fuel as an integrated system, setting new vehicle emissions standards and lowering the sulfur content of gasoline beginning in 2017. The vehicle standards will reduce both tailpipe and evaporative emissions from passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles. The gasoline sulfur standard will enable more stringent and more effective control systems, which will reduce criteria pollutants and also reduce MSATs, discussed in the next section.

Mobile Source Air Toxics

FHWA has developed a tiered approach to analyzing MSATs in environmental documents (FHWA 2012a). Under FHWA's approach, three levels of analysis are identified, depending on the project circumstances and other considerations:

- No analysis is required for projects with no potential for meaningful MSAT effects.
- Qualitative analysis is required for projects with low potential MSAT effects.
- Quantitative analysis is required to differentiate alternatives for projects with higher potential MSAT effects.

As noted in the guidance, FHWA expects most projects to have a low potential for MSAT effects. Projects with low potential MSAT effects include those that are intended to improve the operations of highway, transit, or freight facilities without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions. Examples of projects with low potential MSAT effects include highway widening projects, new traffic interchanges, and projects for which the design-year traffic volume is projected to be less than 140,000 to 150,000 vehicles per day.

The maximum traffic volume on the proposed action in 2040 is expected to be about 70,000 vehicles per day—below FHWA's suggested guideline of 140,000 to 150,000 vehicles per day (at which point a more quantitative analysis of MSAT effects might warrant consideration).

The amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each action corridor alternative. As shown in Table 3.7-4, the VMT estimated for each action corridor alternative is slightly higher than for the No-Action Alternative. The increase in VMT would lead to slightly higher MSAT emissions; however, the emissions increase would be offset by lower MSAT emission rates attributable to increased speeds (the freeway would operate at LOS A, B, or C). According to EPA's MOVES2014 model, emissions for all of the priority MSATs decrease as speed increases. Because the estimated VMT for each action corridor alternative is nearly the same, varying by less than 5 percent among the alternatives, no appreciable difference in overall MSAT emissions among the action corridor alternatives is expected.

Also, regardless of the alternative chosen, MSAT emissions will be lower in the future as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures; however, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Greenhouse Gas Emissions

To date, no national standards have been established regarding GHGs, nor has EPA established criteria or thresholds for ambient GHG emissions. From a quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad-scale actions such as those involving an entire industry sector or very large geographic areas, it is difficult to isolate and understand the climate impacts of GHG emissions for a particular transportation project. Furthermore, at present, no scientific methodology is available for attributing specific climatological changes to a particular transportation project's emissions.

Under NEPA, detailed environmental analysis should focus on issues that are significant and meaningful to decision making. Based on the nature of GHG emissions and the small potential GHG impacts associated with the proposed action, GHG emissions would not result in significant adverse impacts.

The GHG emissions from the action corridor alternatives would be insignificant and would not play a meaningful role in determining an environmentally preferable alternative. For these reasons, no project-level GHG analysis has been performed for this proposed action.

3.7.5 Potential Avoidance, Minimization, and Mitigation Strategies

Because the proposed action would not cause violations of existing air quality standards, and would cause small increases for other pollutants such as MSATs and GHGs, no mitigation measures are proposed.

To avoid and minimize air quality impacts during construction, best management practices would be recommended, such as minimizing wind-blown dust from blasting, particularly near community areas; control and/or avoidance of blasting on days with high winds; and/or the development of a traffic control plan to minimize traffic flow interference from construction equipment movement and activities. Specific measures would be determined during Tier 2 studies.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.7.6 Subsequent Tier 2 Analysis

The Tier 2 analysis would be required to demonstrate that the proposed project has been modeled with a conforming regional transportation plan. In addition, the analysis would need to demonstrate that the project is consistent with local conformity requirements. The need for quantitative hot-spot modeling, if necessary, will be determined through interagency consultation for Tier 2 alternatives (that is, a determination of whether the proposed action is a project of air quality concern under ADOT guidelines).

Subsequent analyses related to air quality for the Tier 2 environmental evaluation should involve a review of current air quality attainment status in the study area and a review of the most recently available air quality monitoring data to document existing air quality conditions in the study area. This review should be followed by an updated analysis of the proposed action's contributions to future regional air quality conditions and a review of transportation conformity requirements, if applicable, at the time of the Tier 2 evaluation. GHG emissions could be quantitatively assessed in the Tier 2 NEPA analysis using EPA's Motor Vehicles Emissions Simulator model. During Tier 2 studies, specific measures to avoid or minimize construction-related air quality impacts and GHG emissions would be identified.

3.7.6.1 Conclusion

No issues related to air quality have been identified that would preclude construction of the proposed action within any of the proposed action corridor alternatives. Based on available information such as expected traffic volumes in 2040, the LOS throughout the study area, and a comparison of the action corridor alternatives with FHWA and EPA guidance, implementation of the proposed action would not result in substantial vehicle-related air emissions and, therefore, would not likely cause an exceedance of the applicable transportation-related criteria pollutants for which NAAQS have been established. Given EPA’s ongoing programs to control hazardous air pollutants from mobile sources, MSAT emissions are expected to decrease in the future. The VMT with any of the action corridor alternatives would be similar, therefore, no appreciable difference in overall MSAT emissions among the various alternatives is expected. Further, the proposed action would reduce congestion on the local transportation network and would remove pass-through traffic from key local roadways in the study area, resulting in decreased travel times in the study area.

3.8 Noise

This section describes potential traffic noise impacts resulting from the proposed action between US 60 and I-10, a distance of approximately 45 miles. Table 3.8-1 summarizes potential noise levels associated with various types of sound sources. Appendix G, *Noise Information*, has additional information regarding the noise analysis.

Table 3.8-1. Common outdoor and indoor noise levels

Common outdoor noise levels	Noise level (dBA[a])	Common indoor noise levels
—	110	Rock band
Jet flyover at 350 meters	100	—
Gas lawn mower at 1 meter, diesel truck at 15 meters	90	Food blender at 1 meter
Noisy urban daytime	80	Garbage disposal at 1 meter
Gas lawn mower at 30 meters	70	Shouting at 1 meter, vacuum cleaner at 3 meters
Commercial area	60	Normal speech at 1 meter
Quiet urban daytime	50	Large business office, dishwasher next door
Quiet urban nighttime	40	Small theater; large conference room (background)
Quiet suburban nighttime	30	Library
Quiet rural nighttime	20	Concert hall (background)
—	10	Broadcast and recording studio
—	0	Threshold of hearing

Source: American Association of State Highway and Transportation Officials (1993)
[a] A-weighted decibel

Traffic noise is generated by vehicles passing by and includes noise from tires on the pavement, engines, and exhaust (additional vehicle components that can affect overall traffic noise include engine fans and other auxiliary equipment). Factors that affect the potential noise impacts of a transportation project include the following:

- traffic volume (for example, 2,000 vehicles per hour sounds twice as loud as 200 vehicles per hour)
- number of trucks in the traffic flow (for example, one truck at 55 mph sounds as loud as 10 cars at 55 mph)
- traffic speed (for example, traffic at 65 mph sounds twice as loud as traffic at 30 mph)

In addition, the distance between the noise source and sensitive receptors is important when considering impacts of the proposed action.

3.8.1 Regulatory Context

If federal funding is associated with construction of a highway on a new location, potential noise impacts must be evaluated. FHWA developed noise regulations as required by the Federal-Aid Highway Act of 1970 (Public Law 91-605, 84 Stat. 1713). The regulation, 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, applies to highway construction projects where a state department of transportation has requested federal funding for participation in the project.

The noise evaluation conducted for the proposed action was performed consistent with FHWA guidelines for assessing highway traffic noise (FHWA 2011b) and the most current version of the ADOT *Noise Abatement Requirements* (NAR).

3.8.2 Methodology

FHWA's Noise Abatement Criteria (NAC), as implemented by the State of Arizona, define the noise levels considered to have an adverse effect on various land use categories (for example, residential or commercial land uses). The evaluation represents a corridor-level assessment based on limited design information and traffic information and other related assumptions available at the time of the analysis. The procedure used to evaluate noise impacts included the following steps:

- Identify noise-sensitive land uses in the Corridor.
- Determine existing noise levels by taking peak-hour traffic noise measurements.
- Predict future noise levels using available traffic information and the Traffic Noise Model, Version 2.5.
- Determine traffic noise impacts at noise-sensitive receivers by comparing predicted noise levels in the planning year (current year plus 20 years) with the appropriate NAC.
- Qualitatively describe noise impacts from project construction activities.
- Evaluate potential noise mitigation measures, if warranted.
- Provide information to local land-use planning agencies regarding future year noise levels for their use in making land use decisions regarding undeveloped or unpermitted areas in the corridor.

The worst-case traffic noise volumes in each segment of the Corridor were used to model expected noise impacts. If future noise levels approach or exceed the NAC, they are considered noise impacts under ADOT's NAR. The NAR are listed in Table 3.8-2. As defined by ADOT, the "approach" criteria is 1 A-weighted decibel (dBA) below the FHWA NAC shown in Table 3.8-2.

The methodology used to evaluate potential noise impacts included a screening-level assessment of the potential for noise impacts based on existing noise levels and proximity of the action corridor alternatives to sensitive noise receptors in the study area. As part of the Tier 1 qualitative approach to noise impact analysis, existing ambient noise levels were determined at a number of undeveloped and developed locations in the study area to provide a context for the Corridor's noise environment. The screening-level assessment identified the potential for noise-sensitive land uses to experience future noise conditions associated with the action corridor alternatives that exceed the NAC impact criteria.

ADOT's NAR has specific requirements for analyzing the feasibility, reasonableness, and cost-effectiveness of noise abatement measures such as noise barriers and earthen berms. The abatement evaluation requires specific design details that are not available for this Tier 1 study. As a result, a detailed noise abatement evaluation is not possible at this preliminary stage.

Table 3.8-2. Noise Abatement Criteria

Activity category	dBA $L_{eq}(h)^{a,\,b}$	Activity description
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (exterior)	Residential
C	67 (exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio structures, recording studios, schools, and television studios
E	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in categories A to D or F
F	—	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	—	Undeveloped lands that are not permitted

Sources: Federal Highway Administration (2011b); 23 Code of Federal Regulations Part 772
Note: Activity Categories B, C, and E include undeveloped lands permitted for each activity category.
[a] The 1-hour equivalent sound level in A-weighted decibels, which is the logarithmic average of noise over a 1-hour period.
[b] The $L_{eq}(h)$ activity criteria values are for impact determination only, and are not design standards for noise abatement measures.

3.8.3 Affected Environment

Existing noise level measurements were recorded at 23 locations in the study area between July 27 and July 28, 2015, and are shown in Table 3.8-3 (FHWA 1996b).

Table 3.8-3. Existing noise level measurements

Location	L_{eq}^{a}	Notes	Type of location
Segment 1			
Apache Golf Course	65	Local traffic on Baseline Road; aircraft	Near development
38th/Winchester Road	51	Local traffic on Winchester Road; cannot hear traffic on US 60	Near development
Baseline Road/Goldfield Road	53	Passby traffic on Baseline and Goldfield Roads	Near development
Race car track on Ironwood Drive	60	Traffic on Ironwood Drive	Near development
Germann Road east of Coyote Road	60	Local traffic on Germann Road	Near development
Eastern end of Ocotillo Road	42	No traffic; very quiet	Near development
Combs Road/Sierra Vista Drive	51	Slight breeze; no traffic	Nearly undeveloped
Skyline Drive (east of Quail Run Lane)	47	Local traffic	Undeveloped area
Corner of Skyline Drive/Felix Road	48	Light breeze; aircraft	Undeveloped area
East Judd Road/Felix Road	45	Local residential traffic; two aircrafts	Near development

Table 3.8-3. Existing noise level measurements

Location	L_{eq}[a]	Notes	Type of location
Segment 2			
Heritage Road/Felix Road (Crestview Manor)	43	Light traffic on Felix Road; aircraft; birds	Near development
Segment 3			
Hunt Highway/West of Largo Road	55	Traffic on Hunt Highway	Undeveloped area
Hunt Highway/Poston Butte Road	54	Traffic on Hunt Highway	Undeveloped area
Florence’s Heritage Park	44	Operating pump at aquatic center	Near development
Adamsville Road – west of Florence	53	Light traffic on Adamsville Road	Nearly undeveloped
Valley Farms Road/Vah Ki Inn Road	40	Plowing in adjacent field	Nearly undeveloped
Clemans Road/Martin Road	47	Dirt farm roads, no traffic; aircraft	Nearly undeveloped
Randolph Road/Vail Road	47	Farm road; no traffic	Nearly undeveloped
Segment 4			
Steele Road/Fast Track Road	46	Farm roads; no traffic	Undeveloped area
SR 87/Selma Road (east of railroad)	40	Dirt road, no traffic; aircraft; birds	Undeveloped area
Shedd Road at railroad tracks	40	Dirt road, no traffic; cannot hear SR 87	Nearly undeveloped
SR 87/Battaglia Road (east of railroad)	37	Dirt farm road; no traffic	Undeveloped area
Milligan Road/Vail Road (east of railroad)	42	Local road, no traffic	Undeveloped area

Notes: SR = State Route, US 60 = U.S. Route 60
[a] equivalent sound level

Segment 1, which is the segment closest to US 60, has the highest traffic volumes in the study area and includes the Palmas del Sol East and Desert Harbor residential developments to the west and other commercial land uses on Ironwood Drive and Baseline Road. Measurements at locations in Segment 1, north of Baseline Road, consisted of three 15-minute-long measurements that were then averaged and rounded to the nearest whole dBA. South of Baseline Road and throughout the rest of the study area, the noise receiver locations were generally in undeveloped or agricultural areas with few nearby sources of noise, such as passby traffic or industrial activities. At these locations, a single noise measurement was taken for a 15-minute period.

The results of the noise measurements indicate that the noise levels throughout the study area near developed areas range from a low of 42 dBA to a high of 65 dBA, and have an average of 51 dBA. In undeveloped areas, where no existing noise-sensitive receptors are located, noise levels range from a low of 35 dBA to a high of 55 dBA, with an average of 46 dBA. Areas that are nearly undeveloped—that is, where very few sensitive receptors could be affected by traffic noise—noise levels range from a low of 40 dBA to a high of 53 dBA, and have an average of 47 dBA. In general, measured noise levels were consistent with the prevailing land uses, with higher noise levels in the more urban areas and lower noise levels elsewhere.

3.8.4 Environmental Consequences

A qualitative assessment of potential noise impacts is presented below based on existing land uses within and near the action corridor alternatives.

3.8.4.1 No-Action Alternative

Under the No-Action Alternative, the proposed action would not be constructed. Land uses would remain undeveloped or agricultural until development occurs as planned by local jurisdictions. Under the No-Action Alternative, no traffic noise would be associated with the proposed action. Noise levels throughout the study area would be similar to those shown in Table 3.8-3.

3.8.4.2 Action Corridor Alternatives

Noise impacts would vary depending on the distances between the freeway alignment determined in subsequent Tier 2 studies and noise-sensitive receptors in the study area.

Sample modeling of potential traffic noise in the study area was performed for two land use categories: Activity Categories B (residential) and G (undeveloped land). As discussed in ADOT's NAR, no highway noise analysis is required for agricultural land uses (Activity Category F), the third type of land use category near the action corridor alternatives in the study area.

Residential Developments (Activity Category B Modeling)

For Activity Category B, the noise evaluation focused on areas of active, permitted residential developments. Under the ADOT NAR, permitted developments are those locations with a definite commitment to develop land with an approved specific design of land use activities as evidenced by the issuance of a building permit.

The action corridor alternatives are very close to three subdivisions in Segment 1: Dolce Vita, east of Goldfield Road, and Palmas del Sol East and Desert Harbor, west of Ironwood Drive.

Because of the proximity of these residential developments to the action corridor alternatives, preliminary noise modeling was conducted at these locations.

RESIDENTIAL DEVELOPMENT EAST OF GOLDFIELD ROAD

The E1a, E1b, and W1b Alternatives connect with US 60 near the homes in the Dolce Vita subdivision, located east of Goldfield Road. Ten receptors were modeled in the Dolce Vita development based on potential distances of 300 or more feet from the edge of the action corridor alternative. Modeled noise levels in the residential development ranged from 49 dBA to 62 dBA; therefore, the residential NAC would not be exceeded.

RESIDENTIAL DEVELOPMENTS WEST OF IRONWOOD DRIVE

Two residential developments (Palmas del Sol East and Desert Harbor) are just south of US 60, along Ironwood Drive, close to the W1a Alternative. A Tier 2 alignment may require the acquisition of property from either the homes to the west or the adjacent Apache Golf Course to the east, or both. Given the potential risk of property acquisitions in the Palmas del Sol East development to accommodate the proposed action, noise impacts would likely affect nearby homes not acquired.

Eleven receptors were modeled in this location, and the existing privacy wall adjacent to Ironwood Drive was included in the model as a 5-foot-tall barrier. In addition, rows of homes were included in the noise model to account for additional noise attenuation resulting from intervening rows of homes. A background noise level of 65 dBA was used in the model to reflect the short-term noise measurement taken at the Apache Golf Course monitoring location. The modeled noise levels ranged from 55 dBA to 69 dBA at a distance of at least 300 feet from the potential edge of the corridor. The residential NAC was approached at two receptors and was exceeded at one receptor. Therefore, there is a high potential risk of noise impacts at sensitive receptors associated with the W1a Alternative.

Undeveloped Areas (Activity Category G Modeling)

For unpermitted, undeveloped land uses (Activity Category G), the ADOT NAR recommends modeling at two receiver locations: one at the edge of the ROW line (in this evaluation, the edge of the corridor) and a second approximately 300 feet from the first location to determine the degree of noise attenuation over distance from the action corridor alternatives. For this Tier 1-level analysis, where action corridor alternatives are considered and no ROW is delineated, this approach was modified and 12 locations were identified in undeveloped areas in the study area, generally 6 near the Eastern Alternatives and 6 near the Western Alternatives. These undeveloped areas span all four segments of the study area and exclude the predominantly residential developments previously described and evaluated under Activity Category B. Noise modeling for the Activity Category G land use areas was conducted using the peak-hour traffic volume in 2040 and accounted for minor elevation differences between the locations. Table 3.8-4 shows results of the Activity Category G evaluation.

With the Eastern Alternatives, noise levels would range from 71 dBA to 76 dBA adjacent to the alignment, decreasing to 60 dBA or lower as the distance increases between the alignment and the receptor. Noise levels adjacent to an alignment within the Western Alternatives would be slightly higher across the board: as high as 79 dBA in Segment 1 and decreasing to 74 dBA in Segment 4. As the distance increases between the alignment and the sensitive noise receptor, noise levels would decrease accordingly. The small difference in noise levels between the action corridor alternatives would not be perceptible to the human ear. Modeled noise levels decrease slightly from Segment 1 to Segment 4 because of lower traffic volumes as the proposed action goes from north to south. Based on this assessment, the residential NAC (67 dBA) would not be approached at locations 300 feet or farther from a potential edge of corridor with any of the action corridor alternatives.

Table 3.8-4. Activity Category G modeling (unpermitted, undeveloped land uses)

Segment	Eastern Alternatives' noise levels (dBA)		Western Alternatives' noise levels (dBA)	
	At potential corridor edge	300 feet from potential corridor edge	At potential corridor edge	300 feet from potential corridor edge
Segment 1	76	60	79	62
Segment 2	75	60	76	61
Segment 3	74	58	76	60
Segment 4	71	55	74	57

Note: dBA = A-weighted decibel

However, a Tier 2 alignment that is closer than 300 feet from a sensitive noise receptor may approach or exceed the residential NAC (67 dBA) depending on distance. For portions of the action corridor alternatives that overlay homes, a Tier 2 alignment developed and evaluated in more detailed Tier 2 noise analyses has the potential to be within 300 feet of one or more receptors.

In Segment 1, both the W1a and W1b Alternatives overlay up to 20 homes between Rolling Ridge Road and Skyline Drive west of Quail Run Road, several of which are close to the center of the action corridor alternatives. Both the E1a and E1b Alternatives overlay up to 12 homes between Roberts and Asbury Roads, west of Felix Road; however, these homes are closer to the eastern corridor edge of the action corridor alternatives. Therefore, in Segment 1, the potential for noise impacts attributable to a Tier 2 alignment located closer than 300 feet to the receptors is greater with the W1a and W1b Alternatives than with the E1a and E1b Alternatives.

In Segment 3, the W3 Alternative is close to multiple noise-sensitive receptors in the residential development between Heritage Road and Hunt Highway, and a Tier 2 alignment could be located more than 300 feet from the receptors. However, the W3 Alternative overlays a few isolated developed properties along its length, and there is a low potential risk for a Tier 2 alignment to be developed within 300 feet of these receptors, resulting in less potential for the residential NAC to be approached or exceeded. Similarly, the E3c and E3d Alternatives overlay isolated homes, resulting in a low potential risk for a Tier 2 alignment to be developed within 300 feet of receptors. The E3a and E3b Alternatives between Randolph and Kleck Roads overlay 17 developed properties, and there is a moderate potential risk for a Tier 2 alignment to be located within 300 feet of the properties, resulting in a greater potential for the residential NAC to be approached or exceeded.

In Segment 4, the E4 Alternative overlays very few isolated homes, and a Tier 2 alignment could likely avoid locations within 300 feet of these receptors. Moreover, the modeled noise level of the proposed freeway adjacent to sensitive receptors in this segment is 71 dBA, much lower than in other segments. Therefore, there is a minimal potential for the residential NAC to be approached or exceeded with the E4 Alternative. On the other hand, the W4 Alternative corridor overlays multiple homes west of SR 87 between Shedd and Houser Roads and other isolated properties along SR 87. It is unlikely that a Tier 2 alignment would avoid all of these properties and be located more than 300 feet from the receptors; therefore, there is a greater potential for the residential NAC to be approached or exceeded with the W4 Alternative.

3.8.5 Potential Avoidance, Minimization, and Mitigation Strategies

As a general matter, new freeway alignments constructed in otherwise quiet noise environments often result in a substantial noise increase at nearby homes (that is, 15-dBA or greater increases over existing noise levels). Under such circumstances and depending on the number of homes affected, detailed consideration of noise barriers would be warranted. Depending on the alignment selected in subsequent Tier 2 studies, expected noise impacts identified at homes may warrant noise abatement measures.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.8.6 Subsequent Tier 2 Analysis

During Tier 2 studies for one or more well-defined projects, noise analyses would involve detailed noise modeling with FHWA's Traffic Noise Model, quantification of noise impacts by individual receptors and activity category, and examination of the feasibility and reasonableness of noise abatement for all affected receptors.

The noise study would include the following steps:

1. Identify noise-sensitive land uses in the study area, including approved developments.
2. Determine existing noise levels by taking peak-hour traffic noise measurements at representative locations.
3. Predict future noise levels using available traffic information and modeling with FHWA's Traffic Noise Model.
4. Determine traffic noise impacts at noise-sensitive receptors by comparing predicted noise levels in the planning year (current year plus 20 years) with the appropriate NAC.

5. Identify noise mitigation measures that are feasible and reasonable and meet the cost-effectiveness requirements of ADOT's NAR that are in place at the time of the Tier 2 analysis.

3.8.6.1 Conclusion

Based on the screening-level assessment of the study area and the potential effects of the proposed action on noise-sensitive receptors within and near the action corridor alternatives, there is a high risk of potential noise impacts in Segment 1 with the W1a Alternative because of its proximity to existing homes along Ironwood Drive. Residential areas more than 300 feet from a Tier 2 alignment with the W1b, E1a, and E1b Alternatives are not expected to experience exceedances of the residential NAC (67 dBA). However, there is a low potential risk that isolated properties may be located within 300 feet of a Tier 2 alignment and, therefore, experience noise impacts.

In Segments 2, 3, and 4, the residential NAC would not be approached or exceeded within 300 feet from a Tier 2 alignment in any of the action corridor alternatives. In some locations where an action corridor alternative overlays homes, there is a potential risk that the Tier 2 alignment may be located within 300 feet of the receptors, resulting in potential noise impacts. This potential risk is higher with the E3a, E3b, and W4 Alternatives.

3.9 Visual Resources

This section provides an overview of the study area’s visual resource setting and preliminary information concerning visual resource conditions in the action corridor alternatives.

3.9.1 Regulatory Context

The assessment of aesthetic impacts of proposed actions is grounded in federal law, policy, and agency regulations. NEPA (42 USC §§ 4331 to 4332) requires the federal government to use all practicable means to “assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings …” [Section 101(b)(2)]. To this end, federal agencies are directed to identify and develop methods and procedures “which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations …” [Section 102(2)(B)].

Title 23 of the USC, which governs FHWA, also calls for balancing the costs of minimizing or eliminating “the destruction or disruption of manmade and natural resources,” specifically including “esthetic values.”

The FHWA Technical Advisory, Guidance for Preparing and Processing Environmental and Section 4(f) Documents (1987), specifically calls for an assessment of the relationship of the impacts to potential viewers of and from the project, as well as measures to avoid, minimize, or reduce the adverse impacts.

3.9.1.1 National Environmental Policy Act

The proposed action would mostly be funded using federal monies and thus is subject to federal NEPA regulations. NEPA requires that proposed federal actions consider potential likely effects on the environment, and visual resources are considered an integral part of that environment.

3.9.1.2 Federal Highway Administration Visual Impact Assessment

FHWA has two assessment guidance documents, the 1981 *Visual Impact Assessment for Highway Projects* and the more recent 2015 *Guidelines for the Visual Impact Assessment of Highway Projects*. The latter document was the primary methodology guide for this study, with support from the former.

3.9.1.3 Bureau of Land Management Visual Resource Management

BLM manages several parcels in the study area. The scenic values of these parcels (depicted later in this section in Figure 3.9-1), based on BLM data, are considered either Class III or IV, out of a four-class system. The objective for managing Class III land is to partially retain the landscape’s existing character. The Class IV objective is to provide management activities for major modifications of the landscape’s existing character.

3.9.2 Methodology

The evaluation presented in this section was based on a preliminary field review (2015) that was conducted to document existing conditions in the study area. The evaluation was also based on guidance outlined in the FHWA 2015 *Guidelines for the Visual Impact Assessment of Highway Projects*. The study phases consisted of establishing a study area based on landscape constraints and human sight, inventorying the existing visual quality, analyzing the impacts of the proposed action on visual quality, and, in the final stages, defining mitigation and enhancement efforts. The level of analysis for this visual resources assessment provides a broad overview of existing conditions and potential impacts, given the lack of detailed facility design at the Tier 1 level.

3.9.3 Affected Environment

The visual aesthetic quality of a community is an integral component of community identity. Visual aesthetics concern both the character of the visual experience and the effect on the viewer. Assessing visual quality is subjective; however, federal, state, and local policies and guidelines provide advice as to what the general public considers a desirable visual environment.

The regional landscape establishes the general visual environment of a project. The existing visual landscape in the study area encompasses features of both the natural (geography, ecology, etc.) and built (buildings, roads) environments, as described below. Areas that are generally recognized as sensitive include homes, parks, water bodies, historic or culturally important resources, and public facilities.

3.9.3.1 Natural Environment

Topography

The study area is in the western United States in the Basin and Range Province, which has a characteristic topography familiar to anyone fortunate enough to come across it—steep climbs up long mountain ranges, alternating with long expanses of flat, dry deserts, in a repeating fashion. Within this province, the Earth's crust was stretched, resulting in a thinned and cracked crust that pulled apart, creating large, roughly north-to-south faults. Along these faults, mountains were uplifted and valleys were dropped down, producing the distinctive alternating pattern of linear mountain ranges and valleys (U.S. Geological Survey [USGS] 2000). The flat desert floor provides the ability to see great distances.

Northeast of the northern end of the study area are the Superstition Mountains, at an elevation of 5,000 feet. The Superstition Mountains are recognized by their distinctive light-colored escarpment. Midway in the study area, between Florence and Queen Creek, are the San Tan Mountains, with an elevation of 3,100 feet. Due south of the southern end of the study area is Picacho Peak, a distinctive landmark at 3,300 feet high. Also at the southern end and to the east are the Picacho Mountains, with an elevation of 4,400 feet.

Water

The proposed action corridor alternatives would cross the Gila River about halfway through the study area. The Gila River begins in New Mexico, crosses Arizona from east to west, and contributes to the Colorado River. The Gila River has been dammed upstream, and now flows only intermittently. Its typical appearance in the study area is a dry, sandy riverbed with not enough water to support much riparian habitat.

The CAP Canal parallels and intersects the action corridor alternatives. It carries water from the Colorado River to Phoenix and Tucson and always has water. Other smaller canals crisscross the study area.

Picacho Reservoir is near the southern end of the study area. The water level is highly variable, and the reservoir is sometimes completely dry. When it has enough moisture to create a shallow lake, it becomes a local recreation destination.

Weather

Central Arizona has sparse precipitation (less than 8 inches per year) that comes mostly in the summer monsoons and winter rains. It is almost always sunny and clear. Occasional dust storms, which can completely obscure visibility for short periods, accompany the summer monsoons.

Vegetation

The biome is the Lower Colorado River Subdivision-Sonoran Desertscrub. Desertscrub is a shrub-dominated community. Characteristic plant species include creosote bush, white bursage, ocotillo, brittlebush, foothill paloverde, fourwing saltbush, and ironwood. In desert washes, xeroriparian habitat—which includes mesquite, ironwood, catclaw acacia, foothills and blue paloverde, desert willow, and smoketree—can be found. Mesquite bosques also are characteristic along ephemeral washes dominated by xeroriparian communities on terraces above perennial riparian zones within the arid Southwest. Numerous washes cross the action corridor alternatives; however, many have been truncated by agricultural activities and canals, and many terminate at retention basins.

Plant density within the study area generally is open and simple, with concentrations along rivers and washes. Trees are only about 25 feet high; shrubs are generally short (under 8 feet). Trees and shrubs have an open, sparse structure. Vegetation appearance is generally the same year round, although it can be sparser in the summer. Colorful wildflowers appear in the spring, but the amount and density depends on the winter rains. Over half of the study area, generally to the east, is undeveloped desert where this biome can be observed.

The western third of the study area is under agricultural production, and any natural desert biome has been completely removed. The agricultural production is generally laid out in a mile grid, creating a geometric pattern of changing shades of green. Clusters of vertical, often nonnative, trees exist at rural residential locations. For further discussion of plant communities in the study area, see Section 3.11.3.1.

Wildlife

Wildlife in the study area includes mammals (mule deer, javelina, foxes, squirrels, rabbits, and mice), birds (doves, thrashers, sparrows, cactus wrens, quail, owls, and hawks), amphibians (toads), and reptiles (lizards, snakes, and tortoises). Agricultural areas within the study area could provide breeding habitat for nesting birds and forage for numerous species (see Section 3.11.3.1 for further information).

3.9.3.2 Built Environment

Most of the study area consists of native desert or rural agriculture with very low-density housing. Houses and accessory buildings are low. Most of the roads are two lanes wide, paved or unpaved, structured in a grid pattern with power lines paralleling the major roads. The predominant types of human-made structures are houses, farm accessory buildings, and commercial buildings. Historical buildings and structures in the study area are described in Section 3.14, *Cultural Resources*.

The towns of Queen Creek, Florence, Coolidge, and Eloy are located along or adjacent to the action corridor alternatives. Eastern Queen Creek is developing into a suburban community typical of the Phoenix metropolitan area, where residential subdivisions of one- to two-story stucco houses are interspersed with shopping centers. Florence, Coolidge, and Eloy are rural communities with typically one main thoroughfare of businesses surrounded by low-density, low-building-height homes.

3.9.3.3 Assessment Methodology

According to FHWA guidelines, the visual impacts of a project are determined by assessing the visual resource change that would occur as the result of the project, and by predicting viewer response to those changes, as described in further detail below.

Visual Resource Change

Visual resource change is the sum of the change in visual character and the change in visual quality. This change can be determined by assessing the compatibility of the project with the visual character of the existing landscape and then comparing the visual quality of the existing resources with the projected visual quality after implementing the project. Visual character and visual quality are described in further detail below.

VISUAL CHARACTER

Visual character describes the basic visual components of the proposed action and was used to assess impacts. The description does not reference the affected environment or affected population or how the proposed action may affect them.

- Scale – The proposed freeway would range from approximately 50 to 61 miles long, depending on the action corridor alternative. Based on projected 2040 traffic volumes, it would be a six-lane facility, with shoulders and a median.
- Form – In plan view, the freeway would be curvilinear in form. Service traffic interchanges would occur at approximately 2-mile intervals, connecting the new freeway with east-to-west roads with vertical overpasses and associated built-up ramps. Toward its northern end, the freeway would intersect with SR 24, which would connect the Santan Freeway with the Corridor; the two possible connection points would be system traffic interchanges. System traffic interchanges would also be built at the freeway’s connections with US 60 and I-10.
- Materials – Materials are not known at this time. Typical ADOT overpasses are a combination of mechanically stabilized earth walls and cast-in-place concrete. Most ADOT freeways have an associated artistic theme, with elements of the theme reflected on vertical elements such as walls and sometimes in landscaped graphics. The main line freeway paving would likely be asphalt or concrete.
- Visual Attributes – The visual attributes of major structures and common structures are not known at this time. Typical of other ADOT freeways, the proposed freeway would have vertical light fixtures and signs.

VISUAL QUALITY

Visual quality describes the visual relationship between elements in the landscape. Visual quality also serves as the baseline for determining the degree of visual impacts—that is, if visual impacts are adverse, beneficial, or neutral. The evaluation criteria applied to this analysis include:

- Vividness – The memorability of landscape components as they combine in striking and distinctive visual patterns. Vividness is assessed using landform and land cover. Landform vividness is frequently determined by the pattern elements of form or line, such as the strongly defined skyline of a mountain landscape. Land cover consists of water, surface geology, vegetation, and human-made development. Areas with high vividness, for example, often contain water, which creates a vivid landscape component as a result of linear visual effects (such as a shoreline or the sharp edge of a waterfall) and color.
- Intactness – The visual order of the natural and built landscape of the immediate environs and its freedom from encroaching visual elements. Intactness can be assessed in terms of the quality of an area’s natural visual appearance. Low intactness occurs when an unsightly human-made element (“eyesore”) encroaches into an undisturbed natural area. High intactness is attributable to the natural visual order of an untouched landscape.
- Unity – The visual coherence and compositional harmony of the viewshed. The viewshed entails all natural and built features found within the normal view range. In built landscapes, it frequently attests to the careful design or fit of individual components in the landscape. Unity is generally used as a measure of how human-made and natural elements work together within the same visual unit. Human-made environments with no visual relation to natural landform or landcover patterns are usually considered to lack visual unity.

Viewer Response

The population affected by a project is referred to as viewers and includes those people who live in or regularly travel through the study area or who may have sensitivity to visual changes in the environment. Viewer types were considered in the evaluation because they respond to change differently. Viewer types can be defined by their location, their sensitivity to change, and their duration of exposure. These defining elements combine to form the anticipated viewer response to changes resulting from a project, and are described in further detail below:

- Viewer location dictates whether the views are to the facility or from the facility.
- Viewer sensitivity is defined both as the viewers' concern for scenic quality and the viewers' response to change in the visual resources that make up the view. Viewer sensitivity to visual change can be affected by distance between the viewer and visual resource, visibility of the resource within the landscape unit (which consists of areas with similar visual characteristics), and viewer expectation. Low viewer sensitivity results when there are few viewers who experience a defined view, or when they may be less focused on the view. High viewer sensitivity results when there are many viewers who have views of frequent or long duration. Sensitivity is usually higher for those viewers who live or work in a study area or who are driving or walking through for pleasure versus those who are commuting through the area. Residential viewers typically have the highest sensitivity because they have an extended viewing period and may be concerned about changes in the views from their homes.
- Viewer exposure is influenced by how people perceive change. Exposure is determined by assessing the number of viewers, their location, and the duration of their view. Residents living near the proposed facility have a view that is constant and long term, whereas a traveling viewer has limited-duration exposure.

Three viewer types were identified in the study area: residents, business owners/employees/clientele, and motorists (Table 3.9-1).

Table 3.9-1. Viewer types

Viewer	Description	Sensitivity to change
Residents	Residents are the most sensitive viewers. They spend the most time near the facility elements and most views are of the facility.	High
Business owners/ employees/clientele	People working in or visiting businesses spend typical business hours in the area or make frequent but short buying trips. Their views are both from and to the facility.	Low to moderate
Motorists	Motorists generally travel parallel to the facility; their exposure is short term and their views are from the facility.	Low

In the study area, residents and business owners/employees/clientele are the primary existing viewers. Many of these residents are rural homeowners who moved to or stay in the area for the rural, small-town ambience. Residents are likely to be the predominant users of the trails and parks in the study area and their sensitivity to change will be high. Existing motorists use the two- and four-lane roads in the area. Some of these motorists are local, using the roads to work the fields and drive to and from the towns, although they may also use them to travel to Phoenix or Tucson. These motorists may be more sensitive to an urban element in the landscape. Other motorists may use the local roads as a way to travel between Tucson and eastern Maricopa County, bypassing the longer trip by way of I-10. They are less likely to be sensitive to change, desiring a quick trip over surroundings.

3.9.3.4 Area of Visual Effect

The area of project visibility is referred to as the area of visual effect, which is determined by the physical constraints of the environment and the physiological limits of human sight. To define the area of visual effect, it is necessary to understand the types of viewsheds (static and dynamic) and the landscape units, as described in further detail below.

For most of the study area, little landform or land cover exists to fully obstruct fore-, middle-, or background views. Additionally, for most of the year, atmospheric conditions are clear and sunny. Static viewsheds for neighbors would depend on how close they are to the proposed action overpasses and system traffic interchanges. Dynamic viewsheds for travelers would also depend on their views from the at-grade freeway main line versus an elevated location on an overpass or system traffic interchange.

Landscape units are a portion of the regional landscape or study area, and are commonly used to divide long linear projects into logical geographic entities for assessment purposes. Landscape units generally are made up of areas with similar visual characteristics, although smaller locations within each landscape unit may differ from the overall unit's character. For the purposes of this Tier 1 analysis, the study area was divided into two major landscape units: Unit 1 in the north that includes all of Segments 1 and 2 and the northern portion of Segment 3 and Unit 2 in the south that includes the southern portion of Segment 3 and all of Segment 4 (Figure 3.9-1). Additional descriptions of the visual characteristics of the study area landscape units are provided below.

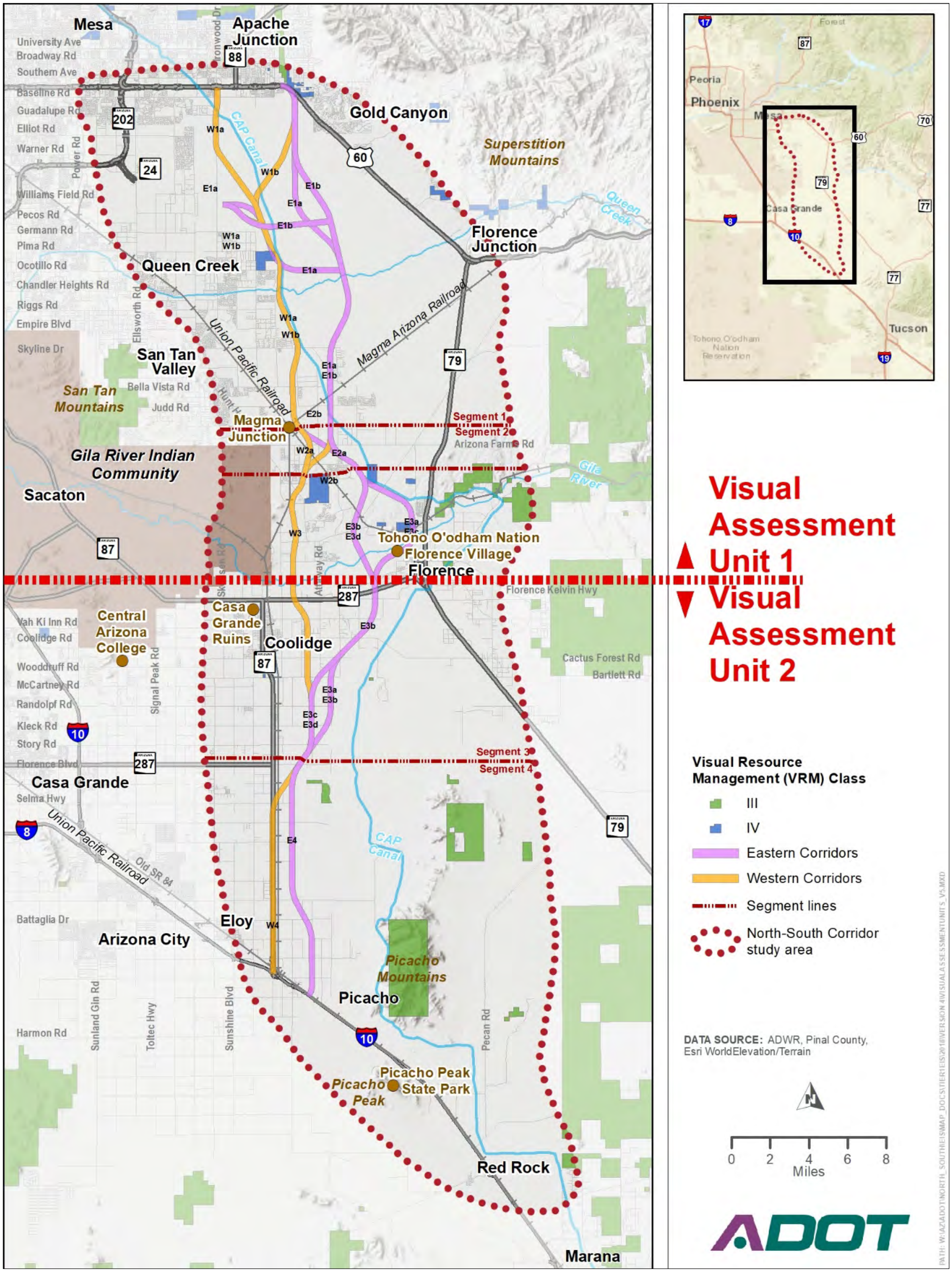
Unit 1

Unit 1 extends from US 60, in eastern Mesa/Apache Junction, to the southern side of the Gila River. The action corridor alternatives in this unit traverse mostly undeveloped desert. Developments are planned for much of this desert area, but at this time it is still natural desert, the openness of which provides nearby residents with distant views of surrounding mountains. Queen Creek, the largest community in this unit, is transforming from a rural, equestrian community into a bedroom community to the Phoenix metropolitan area. Florence, the second-largest community in the unit, is known for its downtown National Historic District and nine correctional facilities. This unit also encompasses the Gila River crossing. The riverbed in this area is wide, shallow, and braided, with little riparian vegetation to distinguish the riverine area from the surrounding desert. Table 3.9-2 describes the characteristics of Unit 1.

Table 3.9-2. Characteristics of Unit 1

Visual factor	Description
Land use	Undeveloped; some agricultural production; some rural very low-density residential
Building height	One story
Parking	Accessory to residential
Streets	Two-lane, paved and unpaved
Vegetation	Predominantly natural desert; ornamental at residences
Utilities	Power lines both small and large; traffic signals at some intersections
Viewers	Residents, motorists
Views	Background views to north and east of Superstition Mountains and to south and west of San Tan Mountains; middle and foreground views mostly desert, in some locations residential

Figure 3.9-1. Visual assessment units



Unit 2

Unit 2 extends between Florence and I-10 near Eloy. In Unit 2, the action corridor alternatives traverse primarily agricultural land. Eloy is the largest community in Unit 2, followed by Coolidge. Eloy has several correctional facilities and a large agricultural base; Coolidge has Casa Grande Ruins National Monument, although the ruins would not be visible from the freeway. Table 3.9-3 describes the characteristics of Unit 2.

Table 3.9-3. Characteristics of Unit 2

Visual factor	Description
Land use	Undeveloped; some agricultural production; some rural very low-density residential
Building height	One story
Parking	Accessory to residential
Streets	Two-lane, paved and unpaved
Vegetation	Predominantly rural agriculture; natural desert; ornamental at residences
Utilities	Power lines both small and large; traffic signals at some intersections
Viewers	Residents, motorists
Views	Background views to north and east of Superstition Mountains, to south and west of San Tan Mountains, and to south and east of Picacho Peak and Picacho Mountains; middle and foreground views of desert, agriculture, and in some locations residential

3.9.4 Environmental Consequences

To evaluate a project's impacts on visual quality, the visual resource change and viewer response are used to characterize the potential overall impact. Changes to the degree of visual quality are then assessed as beneficial, adverse, or neutral to the viewers' relationship with the visual environment.

3.9.4.1 No-Action Alternative

Under the No-Action Alternative, no visual impacts related to the proposed action would occur; however, continuing urban development in the region and study area would replace the desert and agricultural settings with urban forms, lines, and colors.

3.9.4.2 Action Corridor Alternatives

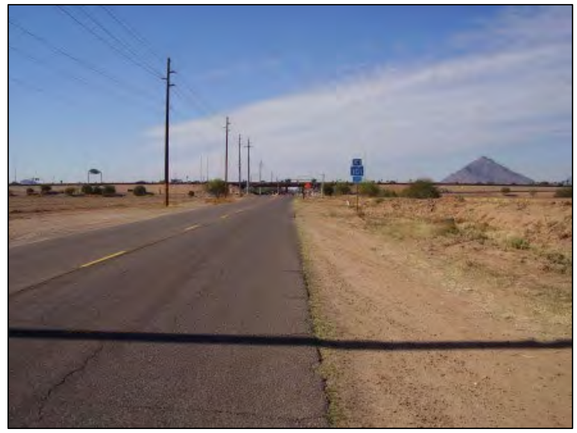
Impacts Common to All Action Corridor Alternatives

All action corridor alternatives would introduce new visual elements in the study area, including permanent and temporary project elements that would alter the study area's visual character. New permanent visual elements could include system traffic interchanges, cross street overpasses, the freeway main line, cut and fill areas, retaining walls, noise barriers, screening walls, and possibly lights, as described below:

- System traffic interchanges – New system traffic interchanges at US 60, SR 24, and I-10, with bridges and associated ramps, would change views from at-grade desert or agriculture to views of an elevated facility with vegetated or graveled slopes. The bridges and ramps would partially obstruct the views of motorists and other viewers in the vicinity.

- Overpasses – Should overpasses be the design solution, overpasses with bridges and associated ramps would change views from at-grade desert or agriculture to views of an elevated overpass with vegetated or graveled slopes. The overpasses would partially obstruct views of motorists on the cross streets. Generally, background views of mountains would not be obstructed except when close to the interchange structures (less than 0.25 mile). Views from the overpasses would improve views of the surrounding mountains for traveling motorists. If the freeway is depressed, at-grade views would be maintained.

Typical ADOT overpass (0.25 mile away)



Typical ADOT overpass (0.25 mile away)

- Main line – New main line pavement would add a linear, human-made element of either black asphalt or gray concrete to the landscape.
- Cut and fill – Cut and fill areas may occur with action corridor alternatives. Mitigation in the form of revegetation would make the visual change indiscernible from about 2 miles away and beyond. If the freeway is depressed, the visual change would be indiscernible much closer than 2 miles.
- Retaining walls – Retaining walls may be built with action corridor alternatives. Views may be obstructed by these walls; however, the exact locations are not known at this time.
- Noise barriers – Action corridor alternatives may include noise barriers. Distant views could be obstructed; however, the exact locations are not known at this time.
- Screening walls – Screening walls may be used to mitigate visual impacts caused by the proposed improvements. These walls would create a visual change and distant views could be obstructed; however, the exact locations are not known at this time.
- Lights – Lights, if used, could potentially increase nighttime glare and light pollution through the introduction of new sources of nighttime light in the study area, which include permanent, fixed sources that would be directed toward the Corridor (that is, lighting of the roadway, signs, and overpasses). New light poles would be an additional human-made vertical intrusion in the landscape. However, ADOT has a policy to limit light spillover from its projects; this would be true for the proposed action as well. New sources of nighttime light in the study area would also include vehicles traveling through the Corridor.

The BLM parcels that are valued as Class III are in Segments 3 and 4, and are 1 mile or greater distance from the Corridor. The Class III parcels nearest the Corridor are along the Gila River in Segment 2, and adjacent to Picacho Reservoir in Segment 4. BLM’s Class IV parcels in the study area are located in Segments 1, 2, and 3, some near an action corridor alternative, and others crossed by an alternative. Because Class IV is the least restrictive of the BLM classes, the class rating should not need to be changed. Because the Class III parcels would not be directly affected by the action corridor alternatives, their ratings also should not need to be changed.

All action corridor alternatives would result in temporary visual impacts from construction activities such as temporary vegetation removal, disturbed soil, construction equipment, and construction equipment operation. These temporary disruptions and activities would be typical of any major roadway improvement project and are not considered substantial.

All action corridor alternatives have the potential to alter the study area's visual character through the removal of existing elements of the built environment. Although the exact nature of impacts related to the built environment would vary, all action corridor alternatives could affect established resources such as neighborhoods, schools, religious institutions, and businesses (see Section 3.3, *Social Conditions*) and result in acquisitions and displacements (see Section 3.2, *Land Use*); however, acquisitions and displacements cannot be determined until a specific alignment is identified.

Potential Impacts by Segment

As noted previously, static viewsheds, such as for residents, would depend on the nearness of the viewer to the proposed action, while dynamic viewsheds, such as for travelers, would depend on the location of the viewer along the proposed action and the corresponding view of the surrounding landscape from that location. Views would also vary by action corridor alternative, depending on whether the viewshed includes an at-grade freeway main line, depressed freeway main line, or elevated features, such as an overpass or system traffic interchange, as described previously, or an elevated railroad or canal crossing. Table 3.9-4 summarizes locations where elevated features may be included if the proposed action is not a depressed freeway. As shown in Table 3.9-4, all action corridor alternatives have the potential to introduce new features to the study area. Table 3.9-4 is followed by a discussion of the potential impacts by landscape unit.

Table 3.9-4. Potential locations of features in the study area[a]

Action corridor alternative	Potential location of feature
Segment 1	
E1a	• system traffic interchanges at U.S. Route 60, U.S. Route 60 bypass, State Route 24 • service traffic interchanges at Elliot Road, Ocotillo Road, Riggs/Combs Road, Skyline Drive, Bella Vista Road • crossing at Magma Arizona Railroad • crossing at Central Arizona Project Canal
E1b	• system traffic interchanges at U.S. Route 60, U.S. Route 60 bypass, State Route 24 • service traffic interchanges at Elliot Road, Riggs/Combs Road, Skyline Drive, Bella Vista Road • crossing at Magma Arizona Railroad • crossing at Central Arizona Project Canal
W1a	• system traffic interchange at U.S. Route 60 • service traffic interchanges at Riggs/Combs Road, Skyline Drive, Bella Vista Road • crossing at Magma Arizona Railroad • crossing at Central Arizona Project Canal
W1b	• system traffic interchanges at U.S. Route 60 and U.S. Route 60 bypass • service traffic interchanges at Elliot Road, Riggs/Combs Road, Skyline Drive, Bella Vista Road • crossing at Magma Arizona Railroad • crossing at Central Arizona Project Canal

Table 3.9-4. Potential locations of features in the study area[a]

Action corridor alternative	Potential location of feature
Segment 2	
E2a, E2b	• service traffic interchange at Arizona Farms Road
W2a, W2b	• service traffic interchange at Arizona Farms Road • crossing at Copper Basin Railway
Segment 3	
E3a, E3b, E3c, E3d	• service traffic interchanges at Hunt Highway, State Route 287, Martin Road, Bartlett Road, Kleck Road • crossing at Copper Basin Railway
W3	• service traffic interchanges at Hunt Highway, State Route 287, Martin Road, Bartlett Road, Kleck Road • crossing at Union Pacific Railroad
Segment 4	
E4, W4	• service traffic interchanges at Steele Road, Selma Highway, Hanna Road, Houser Road • crossing at Union Pacific Railroad • system traffic interchange at Interstate 10

[a] potential locations of features if the freeway is not depressed

UNIT 1

Visual resource change in Unit 1 would result from the visual character shifting from predominantly desert, with some agriculture and residential, to predominantly desert bisected by an element with urban-based form, line, and color. A linear and concrete form, in colors of black and concrete gray, would be a visual change from the natural, organic character of the desert, with its shades of tan and olive green. The freeway's presence would be "evident." However, because of the flat terrain, the visual intrusion would be most evident to those within about 0.5 mile of the freeway, if the freeway is not depressed. Unit 1 contains the system traffic interchange between the Corridor and SR 24. If this system traffic interchange is above grade, either a Western or Eastern Alternative would cause similar view obstructions.

Visual resource change in Unit 1 would also result from the proposed action's degradation or slight degradation of the overall "moderate" visual quality of views toward the facility, because a human-made highway structure is not harmonious with a natural/rural landscape. In particular, residents living closest to the proposed interchanges would have their distant views blocked or reduced, depending on proximity to the structure. Traveling viewers would still see desert and agricultural areas and, atop overpasses, if included, would have improved views of the surrounding background mountains.

Viewer response in Unit 1 was analyzed based on the overall moderate viewer sensitivity and exposure. Viewer sensitivity is classified as "moderate" since change to the existing visual setting is anticipated to be moderate, with some viewers having high sensitivity and some low sensitivity. Most existing viewers in the area are residents who would have constant exposure to the proposed facility, and residents tend to have a high sensitivity to change. Traveling viewers, who now use existing roads to make their way north or south, would have a low sensitivity to change. Their views would be essentially the same but with lower duration of exposure because they would travel more quickly and continuously north or south.

Viewer exposure is “moderate” in Unit 1. The number of viewers is relatively low, their location ranges from close (less than 0.25 mile) to far away (2+ miles), and duration would be either continuous for those living nearby or short for those driving through.

UNIT 2

Visual resource change in Unit 2 would result from the visual character shifting from predominantly agriculture/rural, with some residential, to predominantly agriculture bisected by an element with urban-based form, line, and color. A linear and concrete form, in colors of black and concrete gray, would be a visual change from the green shades of agricultural production. The linear form of the proposed facility, however, would not vary greatly from the already existing grid of agricultural roads.

Visual resource change in Unit 2 would also result from the proposed action’s degradation or slight degradation of the visual quality of views toward the facility, because a human-made highway structure is not harmonious with an agricultural/rural landscape. In particular, residents living closest to the proposed interchanges would have their distant views blocked or reduced, depending on closeness to the structure, if the freeway is not depressed. Traveling viewers on any of the action corridor alternatives would still see agricultural areas and, atop overpasses, if included, would have improved views of the surrounding background mountains.

Viewer response in Unit 2 was analyzed based on the overall moderate viewer sensitivity and exposure. Viewer sensitivity is classified as “moderate” since change to the existing visual setting is anticipated to be moderate, with some viewers having high sensitivity and some low sensitivity. Most existing viewers in the area are residents who would have constant exposure to the proposed facility, and residents tend to have a high sensitivity to change. Traveling viewers, who now use existing roads to make their way north or south, would have a low sensitivity to change. Their views would be essentially the same but with lower duration of exposure as they travel more quickly and continuously north or south.

Viewer exposure is “moderate” in Unit 2. The number of viewers is relatively low, their location ranges from close (less than 0.25 mile) to far away (2+ miles), and duration would be either continuous for those living nearby or short for those driving through.

Summary of Impacts

Based on the analyses in the previous sections, Table 3.9-5 summarizes the combined visual resource change and viewer response to characterize the potential overall visual impact of the proposed action in the study area. The proposed action would degrade or slightly degrade the overall “moderate” visual quality of views toward the facility, if overpasses are used, or would be neutral if the freeway is depressed. However, viewer sensitivity and the resulting visual impacts may be higher in areas that are generally recognized as sensitive, such as residential areas. Sensitive areas may also include areas with recreational, historic, or culturally important resources, which are described in Section 3.5, *Parkland and Recreational Facilities*, and in Section 3.14, *Cultural Resources*. The resulting potential impact would vary by location, depending on the characteristics of the built, cultural, and project environments, but would generally range from neutral to adverse.

Table 3.9-5. Summary of potential impacts

Landscape unit	Resource change		Viewer response		Potential impact
	Visual character	Visual quality	Viewer sensitivity	Viewer exposure	
Unit 1	Desert with urban influence	Moderate	Moderate	Moderate	Neutral to adverse
Unit 2	Agriculture with urban influence	Moderate	Moderate	Moderate	Neutral to adverse

3.9.5 Potential Avoidance, Minimization, and Mitigation Strategies

ADOT would use conventional practices to blend the proposed freeway's features into the existing setting in all segments. These conventional practices would apply equally to all action corridor alternatives and may include:

- Depress the freeway to eliminate visual intrusion in sensitive areas.
- Eliminate highway lighting when not required or if it causes superfluous light pollution.
- Minimize the height of facilities to the extent possible to reduce their visibility.
- Install screening walls to screen views of the freeway.
- Design walls to blend into the character of the community through careful selection of colors, materials, and textures.
- Use plants to provide screening for sensitive visual resources and viewers.
- Design new lighting to direct light to focus where it is needed, minimize light intruding onto adjacent properties, and reduce light pollution of the night sky.
- Minimize cut and fill areas by blending them with the surrounding environment.
- Use grading designs that create natural-looking slopes, surfaces, and transitions.
- Include landscape treatments that blend stormwater channels and basins into their surroundings and create new visual resources in the landscape.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.9.6 Subsequent Tier 2 Analysis

No visual resource issues have been identified that would preclude constructing the proposed action in any of the action corridor alternatives. However, visual resource conditions could require more detailed consideration in the Tier 2 phase and in final design, where the context-sensitive solutions process would be considered for visual resources. FHWA defines context-sensitive solutions as "… a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility."

The Tier 2 phase could also include preparing landscape conceptual design plans. Subsequent analysis related to visual resources for the Tier 2 environmental evaluation may involve additional field review and photographic documentation. Following the field review and photographic documentation effort, additional visual assessment units may be determined, or key views within each visual assessment unit selected. If desired, key views would be selected to cover a range of views to and from the proposed freeway and to collectively represent the overall landscape of each unit. By assessing the area's visual resources, subsequent studies will gain an essential understanding of the landscape and community that is needed to then discuss and apply appropriate context-sensitive solutions.

3.9.6.1 Conclusion

Implementing any of the action corridor alternatives would result in impacts on the visual environment that range from neutral to adverse. The differences among the action corridor alternatives would be minor and would be typical of impacts experienced when new transportation facilities are introduced. The proposed action would degrade or slightly degrade the overall "moderate" visual quality of views toward the facility, if overpasses are used, or be neutral if the freeway is depressed. However, viewer sensitivity and the resulting visual impacts may be higher in sensitive areas, such as residential areas and areas with recreational, historical, or culturally important resources. Impacts would be mitigated through ADOT's conventional practice of blending freeway features into the character of the community.

3.10 Topography, Geology, and Soils

This section provides an overview of the study area's geologic setting and preliminary information concerning geotechnical and geologic conditions in the action corridor alternatives.

3.10.1 Regulatory Context

NEPA directs federal agencies to assess impacts, adverse and otherwise, on the environment. Because the proposed action would avoid major landforms and unique geologic features, the analysis focused on geological conditions that may pose challenges to constructing the proposed action. See Section 3.6, *Prime and Unique Farmland*, for information regarding soils that support high-value farmland.

3.10.2 Methodology

The evaluation presented in this section is based on available information on regional and local geology, seismicity, subsidence, and earth fissuring. It relied on existing data sources and previous reports and did not include field reconnaissance or subsurface investigation.

The existing information included a previous geotechnical assessment memorandum for the Corridor (NCS Consultants, LLC 2011, provided in Appendix H, *Geotechnical Information*). Data were also obtained from governmental agencies in the Corridor, including the U.S. Bureau of Reclamation, ADOT, Pinal County, Pinal County Flood Control District, and the Flood Control District of Maricopa County. Online databases from USGS, Arizona Geological Survey (AZGS), Arizona Department of Water Resources (ADWR), and NRCS were accessed, as were published geologic maps, current and historical topographic maps, NRCS soil survey maps, and groundwater well databases. The research encompassed the study area, with a focus on the proposed action corridor alternatives.

3.10.3 Affected Environment

3.10.3.1 Geologic Conditions

The proposed action traverses the Basin and Range physiographic province of the southwestern United States. The Basin and Range physiographic province topography is the result of tectonic extension in the middle and late Cenozoic era (approximately 15 million to 17 million years before present), and is characterized by a northwest-to-southeast trending system of rugged mountains with intervening, broad, and extensive alluvial valleys. The valley portions dropped down and mountains were up-thrown, followed by subsequent erosion that degraded the mountain ranges and partially filled the basins with sediment, creating the present landforms (AZGS 2000).

The topography in the study area is relatively flat. Surface elevation at the northern end of the study area ranges from approximately 1,640 to 1,680 feet. Ground elevation decreases toward the south to a low point at the Gila River crossing, at approximately 1,480 feet. Surface elevation then increases toward the southern end of the study area to approximately 1,600 feet.

Geologic units in the study area consist predominantly of Quaternary-age (up to 2 million years before present) soil deposits without significant geologic variation of the surficial soils. The surficial soil deposits of the Gila River and to the north of the study area were generally deposited within the last 10,000 years, with some older deposits within the last 750,000 years. South of the Gila River, the surficial soil deposits were deposited in the last 10,000 years, with some as old as 2 million years.

Surface soils alternate in the study area between primarily granular sandy soils and fine-grained clay soils. Coarse-grained soils, such as granular sandy soils, provide better subgrade support than fine-grained soils, but can be susceptible to hydro-collapse and settlement if the soils are loose in place. Fine-grained soils, such as clay soils, provide poor subgrade support and are more susceptible to volume change from both expansion (swell) and hydro-collapse and settlement. Near-surface soils for over half of the study area consist of fine-grained, primarily sandy, clay soils with a lesser fraction of sand and gravelly soils. Conditions are not appreciably different among the action corridor alternatives.

In general, bedrock in the study area is located at a great depth below existing ground, and ranges from less than 400 feet to more than 9,000 feet below the ground surface. The depth to bedrock is less than 400 feet at the northern end of Segment 1. Moving to the south, depth to bedrock increases and reaches a depth of more than 3,000 feet at the middle portion of Segment 1. Depth to bedrock then decreases to approximately 400 to 800 feet in the northern end of Segment 3, where the E3a and E3c Alternatives may intersect surface bedrock exposures for a short distance. From the northern portion of Segment 3 and moving south, the depth to bedrock increases to a maximum depth of approximately 9,600 feet at the southern end of Segment 4.

3.10.3.2 Groundwater

Depth-to-groundwater information was obtained from ADWR. The average depth to groundwater in all segments is greater than 90 feet, and estimated depth to groundwater is the greatest at the northern and southern ends of the study area, with shallower groundwater in the middle segments where the action corridor alternatives pass through irrigated agricultural lands. With the exception of the southern portion of Segment 1, where CAP Canal surface water deliveries have replaced groundwater supplies and groundwater levels are rising, the remainder of the study area is experiencing either stable or declining groundwater levels.

Two areas, or groupings, of groundwater wells in the study area may have shallow groundwater. The first group is in the northern portion of Segment 3 near the Gila River, and the second group is in the southern portion of Segment 3. It should be acknowledged that ADWR depth-to-groundwater data have not been field verified, and there is a possibility that areas of high groundwater may be data anomalies. It is likely that groundwater depths near Queen Creek, the Gila River, and flood control structures fluctuate substantially in response to flows in the drainages, and shallow groundwater could be encountered in these areas after significant flow events.

3.10.3.3 Land Subsidence and Earth Fissuring

Land subsidence in the southwestern and western United States has resulted from long-term groundwater withdrawals. Declining groundwater levels increase effective stress in the subsurface soils by removing the effect of buoyancy within the previously saturated soil. This results in an increased vertical stress on lower soil layers without adding any surface loads. The increase in vertical stress triggers land subsidence. Associated with land subsidence, earth fissures and potential earth fissure features have appeared in Arizona since the late 1980s. Earth fissures are tension cracks that form in deep alluvium-filled basins in response to land subsidence. There is a strong correlation between groundwater decline, land subsidence, earth fissures, and bedrock contours.

Most of the mapped earth fissures in the study area are defined as “reported, unconfirmed earth fissure.” It is possible that some of these features are not correctly identified as fissures; additionally, it is possible that unidentified earth fissures exist in the area and will continue to form and progress if land subsidence continues.

Land subsidence data published by ADWR indicate two subsidence zones in the study area: Hawk Rock in Segment 1 and Picacho-Eloy in Segments 3 and 4 (AZGS 2016a). Both subsidence areas correspond strongly to areas of deep groundwater caused by historical overdraft by overpumping.

Groundwater levels at the Hawk Rock subsidence zone are approximately 435 feet deep and have stabilized over time as CAP Canal surface water has replaced groundwater pumping for supply.

Subsidence in the Hawk Rock subsidence zone is approximately 0.25 inch per year. Data obtained from ADWR show areas of confirmed and unconfirmed earth fissures within the Hawk Rock subsidence zone along the W1a Alternative.

The Picacho-Eloy subsidence zone is much larger than the Hawk Rock subsidence zone and extends from south of I-10 north to Florence. Subsidence is more severe in this zone, especially in the overpumped groundwater areas along I-10 near SR 87, where depth to groundwater is as much as 500 feet in some locations. In this area, the subsidence rate is approximately 1 inch per year. Subsidence of approximately 1 inch per year has been recorded along the E4 Alternative between I-10 and Arica Road in Eloy. Data obtained from ADWR indicate areas of earth fissures within the Picacho-Eloy subsidence zone along all of the action corridor alternatives in Segments 3 and 4.

3.10.3.4 Mining

Sand and gravel mines are located throughout the study area. These facilities have largely developed to support the growth occurring in the area. The Florence Copper project, an in-situ recovery copper mine, is located on the northern side of the Gila River in Florence (this mine is discussed in greater detail in Section 3.2, *Land Use*). Additional BLM mining claims and subsurface estate held by BLM may be present on BLM lands in the study area.

Sand and gravel mining, or aggregate mining, is an important part of the region's economy. Regional sand and gravel deposits support local road building and construction. Most aggregates in the study area are unconsolidated alluvial deposits found in and along the Gila River and Queen Creek.

Gila River deposits cover a broad swath from east of Florence to the confluence of the Gila and Salt Rivers (located west of the study area in the Phoenix area). In response to state legislation, the Town of Florence amended its *General Plan* to include sources of currently identified aggregates in the Town's MPA to preserve these aggregates for future development and to avoid incompatible land uses. Most of these Aggregate Resources Overlays are near the Gila River.

Queen Creek deposits form a large, elongate fan complex in the southeastern Phoenix metropolitan area between Queen Valley, east of the study area, and the town of Queen Creek, at the study area's western edge. The Queen Creek alluvial fan complex widens to a maximum of approximately 5 miles just upslope from the CAP Canal. The extent of the Queen Creek deposits downslope from the CAP Canal is poorly defined because this area has been substantially altered by agricultural activity and urban development (AZGS 2016b).

3.10.3.5 Regional Seismicity and Local Faulting

Seismic hazard information for the study area was obtained from USGS (2015). The study area's surface topography is characterized by low, pedimented, deeply embayed mountain fronts that are indicative of long-term tectonic stability.

No Quaternary-age active faults are within the study area. Quaternary faults outside the study area occur in the Carefree, Sugarloaf, Whitlock Wash, Little Rincon Mountains, and Santa Rita Fault Zones (USGS 2015).

USGS data were used to determine peak ground acceleration at the northern, midpoint, and southern ends of the study area (peak ground acceleration is a measure of the maximum force experienced by the ground surface during an earthquake). Peak ground acceleration at the northern end was 0.062 percent of gravity, 0.067 percent of gravity at the approximate midpoint, and 0.063 percent of gravity at the southern end.

Seismic event-induced liquefaction primarily occurs in loose sands with low clay and silt content where groundwater is relatively shallow or near the ground surface. In the study area, groundwater depths are generally more than 90 feet below the ground surface. Shallow groundwater may be expected seasonally at Queen Creek and the Gila River and in response to flow events. The subsurface soil profile close to these drainages consists of sands and gravels that are resistant to liquefaction.

3.10.4 Environmental Consequences

3.10.4.1 No-Action Alternative

Under the No-Action Alternative, only ongoing development and construction activities would affect the geologic and geotechnical conditions in the study area.

3.10.4.2 Action Corridor Alternatives

Land subsidence and earth fissures are identified as geotechnical issues for the proposed action. Both of these geological processes pose a potential risk to the proposed action and associated structures and improvements. Hazards associated with earth fissures include damage to homes and buildings, roads, dams and embankments, canals and channels, and sewer, water, and other utility lines.

Known areas of subsidence that would affect action corridor alternatives include the Hawk Rock and Picacho-Eloy subsidence zones. The Hawk Rock subsidence zone would primarily affect the W1a and W1b Alternatives. The Picacho-Eloy subsidence zone would primarily affect I-10 connection points for both the E4 and W4 Alternatives. As subsidence continues in these areas, environmental consequences caused by subsidence, groundwater decline, or earth fissures could affect action corridor alternatives.

The absence of detectable earth fissures at the ground surface in a subsiding area provides no assurance that fissures are not present in the shallow subsurface or will not form in the future. As long as overdraft groundwater extraction continues, land subsidence and earth fissures will present long-term hazards to infrastructure.

Depth to groundwater can affect surface construction projects and geotechnical design of foundations and roadway subgrade. Shallow groundwater may require dewatering during construction and may affect geotechnical design of foundations and roadway subgrade. Deeper groundwater has a less tangible effect on design and construction, but deep groundwater levels coupled with ongoing overdraft and decline of the groundwater table may indicate ongoing land subsidence. Average depth to groundwater in all segments is greater than 90 feet, which generally suggests that shallow groundwater is not likely to pose construction or design challenges except from the standpoint of ongoing and future land subsidence and earth fissuring.

In Segment 1, the Eastern Alternatives would cross Queen Creek upstream of the CAP Canal, with no noticeable distinction between the E1a and E1b Alternatives when considering the anticipated ground conditions that would be encountered. In Segment 3, all of the action corridor alternatives would cross the Gila River.

The W3 Alternative would cross through an active, privately owned sand and gravel mine, although the area through which the corridor passes is not actively mined. The E3b and E3d Alternatives would pass through an active, privately owned sand and gravel mine. The E3a and E3b Alternatives would pass through a privately owned sand and gravel mine, although the area through which the corridors would pass is not actively mined.

The subsurface soil profile close to drainages consists of sands and gravels that are resistant to liquefaction. Given the relatively great depth to groundwater and the relatively low peak ground acceleration, liquefaction is considered to be a low risk with no significant difference between the Eastern and Western Alternatives. Faults are not considered to represent a seismic hazard to the study area.

3.10.5 Potential Avoidance, Minimization, and Mitigation Strategies

The combined efforts of the geoscience and engineering communities have led to extensive study and development of successful mitigation practices for many geologic hazards (swelling and collapsing soils, faults, and earthquakes). Engineers, designers, and builders have studied the associated hazards and engineered solutions that, for the most part, successfully mitigate their impacts.

Unfortunately, geologists and engineers lack adequate field tools or analytical methods to determine where a narrow earth fissure crack will present itself, or when that fissure will erode and enlarge, perhaps overnight, into a dangerous gully or chasm. It is difficult to mitigate and engineer a solution to a problem when the problem itself is not well-understood.

The state of the practice for fissure mitigation is restricted to a handful of designs by local engineers and geologists using experience and judgment to design and construct informal solutions. Generally accepted mitigation methods are lacking, and studies of mitigation failures are wholly lacking, hindering efforts to develop better and surer mitigation methods.

In Arizona, AZGS has adopted guidelines for investigating land subsidence and earth fissures. Under these guidelines, potential land subsidence and earth-fissure hazards should be investigated for proposed projects in areas of known or suspected land subsidence. Research should include reviewing existing data and reports, analyzing remote sensing data, conducting surface and subsurface investigations, conducting a geophysical investigation, and completing other more intensive investigative methods as appropriate when special conditions exist. Siting of critical structures or facilities—where long-term monitoring is crucial—warrants more intensive investigative methods. These more intensive methods include, but are not limited to, conducting aerial reconnaissance overflights, installing and monitoring piezometers, taking high-precision survey or geodetic measurements (including comparison surveys and a program of repeat surveys), measuring strain (displacement) at the surface and in borings as part of a long-term monitoring program, and age dating (AZGS 2011).

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.10.6 Subsequent Tier 2 Analysis

No geological or geotechnical issues have been identified that would preclude constructing any of the action corridor alternatives. However, geological and geotechnical conditions would require consideration in the Tier 2 phase and in final design, should an action corridor alternative become the preferred alternative.

Subsequent analysis related to topography, geology, and soils for the Tier 2 environmental evaluation should involve preparing a geotechnical report that provides updated information about geologic conditions, groundwater levels, land subsidence, earth fissuring, mining, and regional seismicity. During Tier 2 studies, additional coordination would occur with BLM regarding potential mining claims and subsurface estate held by BLM.

3.10.6.1 Conclusion

The predominant geotechnical and geological issues for the study area are land subsidence caused by compaction of deep subsurface alluvial soil strata in response to declining groundwater levels and the resulting development of earth fissures. Both of these geological processes pose a potential risk to the proposed freeway and associated structures. The selection of the preferred alternative should consider the proximity and potential effect of earth fissures. From the existing information, the W1a and W1b Alternatives may be affected more by earth fissures when compared with the E1a and E1b Alternatives; however, unmapped fissures may cross all action corridor alternatives through the

Hawk Rock subsidence zone. There is likely no substantial difference between the Eastern and Western Alternatives in Segments 3 and 4; however, the Eastern Alternatives are closer to known fissures and shallower bedrock and may have a higher potential for fissures. Additional investigation of the subsidence zones and earth fissures is recommended for future studies and design.

No visual site or invasive subsurface investigation was performed, and no new engineering analyses or evaluations were completed for this high-level characterization. Actual site conditions, both surface and subsurface, may vary from the conditions described in this report because geotechnical conditions can be determined only by performing a geotechnical field investigation.

3.11 Biological Resources

This section describes the existing environment for biological resources and the proposed action's potential impacts on wildlife, vegetation, and protected species or their habitats.

3.11.1 Regulatory Context

Roadway construction and operations activities that have a potential to affect wildlife, vegetation, and protected species or their habitats are required to consider biological resources regulated by various federal and state agencies. Table 3.11-1 summarizes relevant laws, regulations, and guidance that relate to biological resources and apply to the proposed action. These regulations and guidance provide the framework for regulatory agencies to offer direction that may influence the design, construction, and operations to ensure regulations and protected biological resources are addressed.

Table 3.11-1. Applicable federal and state laws, regulations, and guidance

Agency	Authority	Description
Federal		
U.S. Fish and Wildlife Service	Endangered Species Act	Provides for the protection of species designated as threatened, endangered, candidate, or proposed. When applicable, under Section 7 of the Act, lead federal agencies are required to consult with the U.S. Fish and Wildlife Service to ensure that their actions do not jeopardize the continued existence of threatened or endangered species or result in the destruction of any designated critical habitat upon which the species depend.
	Bald and Golden Eagle Protection Act	Prohibits any form of possession or take of bald or golden eagles, including any body part, nest, or egg, unless allowed by permit. The Act defines "take" as "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."
	Migratory Bird Treaty Act	Provides protection for birds that migrate between the United States and Canada, Mexico, Japan, or Russia.
Federal Highway Administration	Executive Order 13112, Invasive Species	Addresses preventing the introduction and spread of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that invasive species cause.
State		
Arizona Game and Fish Department	Species of Greatest Conservation Need	Based on the Arizona Game and Fish Department State Wildlife Action Plan, which outlines a vision for addressing all wildlife and habitats through partnerships and coordination with stakeholders, focusing on identifying and managing wildlife and habitats that are in greatest need of conservation.
Arizona Department of Agriculture	Arizona Native Plant Law	Provides protection for special status plants that are considered unusual or rare, have high value for landscaping, or are long-lived and not easily replaced. These include plants that are assigned to the following categories: highly safeguarded, salvage restricted, export restricted, salvage assessed, and harvest restricted.

3.11.2 Methodology

This evaluation used existing natural resource data, web-based environmental review tools from AGFD and the U.S. Fish and Wildlife Service (USFWS), a preliminary site-specific evaluation conducted by AGFD, and general field investigations (see Appendix A, *Agency Coordination*, for AGFD's *Preliminary Evaluation for the Arizona Department of Transportation's North-South Corridor Study Analysis*).

3.11.3 Affected Environment

The landscape encompassing the action corridor alternatives consists of agricultural fields, development, native desertscrub, natural and engineered hydrologic networks, and roadway networks (Figure 3.11-1). The region is characterized by climatic extremes such as low rainfall, high temperatures, very high evaporation rates, and strong winds. The action corridor alternatives fall within the Gila/Salt Intermediate Basin and Middle Gila/Salt River Floodplains ecoregions. The Gila/Salt Intermediate Basin ecoregion contains most of the state's human population and has permanently altered ecological features and processes. The region is the urban and agricultural core of south-central Arizona, dominated by urban, suburban, and cropland land cover types and highly engineered hydrologic networks (Griffith et al. 2014). The Middle Gila/Salt River Floodplains ecoregion includes the middle reaches of these rivers, consisting of basin-floor deposits with clay, silt, or gravel soils and river terraces. Parts of this ecoregion are in agriculture with crops of barley, hay and alfalfa, and cotton. Riparian and wetland habitats have been extensively altered. Invasive plants such as tamarisk now cover riverbanks that were once covered by cottonwoods, willows, and mesquite. Agricultural return flows and municipal sewage discharges now feed many of the rivers (Griffith et al. 2014).

3.11.3.1 Vegetation and Wildlife Resources

The following 14 vegetation types, as mapped for the Arizona Gap Analysis Program (USGS 2004), are present in the action corridor alternatives:

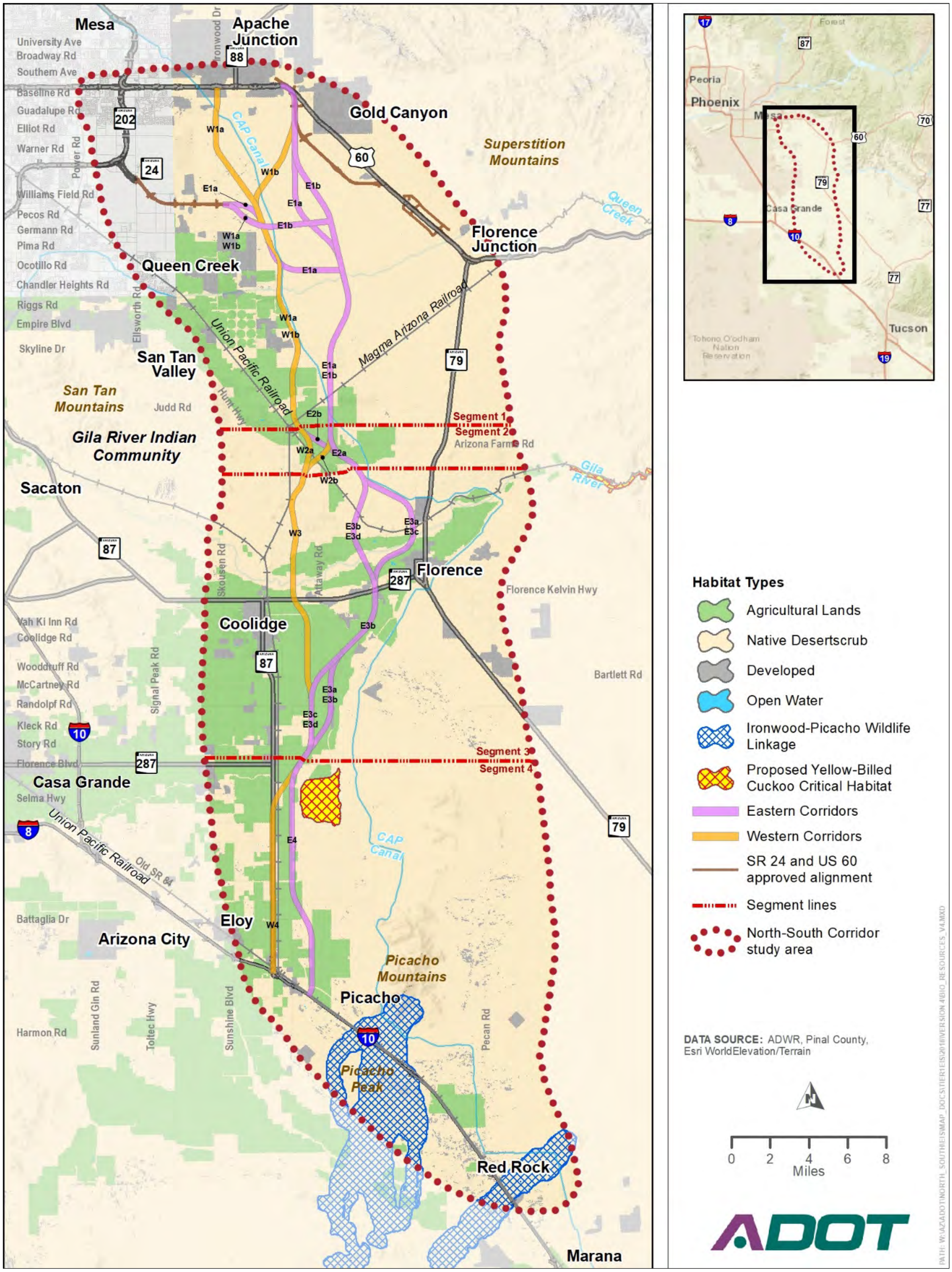
- creosote bush-white bursage desertscrub
- paloverde-mixed cacti desertscrub
- mixed salt desertscrub
- mesquite upland scrub
- invasive southwest riparian woodland and shrubland
- warm desert riparian woodland and shrubland
- warm desert riparian mesquite bosque
- warm desert wash
- mid-elevation desertscrub
- agriculture
- developed, medium – high intensity
- developed, open space – low intensity
- barren lands, non-specific
- open water

The three predominant landscape-level habitats represented in the action corridor alternatives are Sonoran desertscrub, agricultural lands, and developed areas (Figure 3.11-1).

Sonoran Desertscrub Habitat

Native desertscrub habitat covers approximately 60 percent of the area defined by the action corridor alternatives and is primarily represented in the northern half. Common plant species include creosote bush (*Larrea tridentata*), foothill paloverde (*Parkinsonia microphylla*), mesquite (*Prosopis* sp.), ironwood (*Olneya tesota*), saltbush (*Atriplex* spp.), brittlebush (*Encelia farinosa*), prickly pear cactus (*Opuntia* spp.), and barrel cacti (*Ferocactus* spp.). Desertscrub habitat is common across the region and—depending on factors such as landform position, plant composition and density, water availability, and proximity to human disturbance—can vary widely in its capacity to support wildlife. A 2013 report by AGFD documented wildlife linkages—areas used by wildlife for movement within and/or between portions of unfragmented habitat—within the study area (based on stakeholder input), and identified a portion of the study area as a Landscape Movement Area (modeled) (AGFD 2013).

Figure 3.11-1. Biological resources



Many species of wildlife occupy variations of this native habitat, particularly in xeroriparian habitats along desert washes. Xeroriparian habitats, which feature vegetation associated with desert washes, have high value for wildlife not only because of the vegetation density and composition but also as movement corridors. Numerous washes cross the action corridor alternatives; however, many have been truncated by agricultural activities and canals and many terminate at retention basins. AGFD identified Queen Creek as a known Riparian Movement Area, based on stakeholder input received at a workshop in 2010 (AGFD 2013).

Stock tanks, created by excavation and damming along washes, occur in many scattered locations across native desertscrub habitats in and near the action corridor alternatives. These sources of semipermanent water in otherwise waterless areas and their adjoining scrub vegetation are important habitats for amphibians, migratory and resident birds, mammals, and reptiles. Additional information regarding the influence of ephemeral and intermittent streams on ecological and hydrological processes may be found in Section 3.12.3.1, *Surface Water*.

Mammalian species found in desertscrub habitat include the black-tailed (*Lepus californicus*) and antelope (*Lepus alleni*) jackrabbit, cottontail rabbit (*Sylvilagus audubonii*), ground squirrel (*Spermophilus* sp.), ringtail cat (*Bassariscus astutus*), coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), skunk (*Mephitis* spp.), javelina (*Dicotyles tajacu*), mule deer (*Odocoileus hemionus*), and various species of bats and small rodents.

Common birds include the Gila woodpecker (*Melanerpes uropygialis*), Gambel's quail (*Callipepla gambelii*), curve-billed thrasher (*Toxostoma curvirostre*), Abert's towhee (*Pipilo aberti*), black-throated sparrow (*Amphispiza bilineata*), phainopepla (*Phainopepla nitens*), blue-gray gnatcatcher (*Polioptila caerulea*), cactus wren (*Campylorhynchus brunneicapillus*), gnatcatcher (*Polioptila* spp.), lesser nighthawk (*Chordeiles acutipennis*), mourning (*Zenaida macroura*) and white-winged (*Zenaida asiatica*) doves, greater roadrunner (*Geococcyx californianus*), turkey vulture (*Cathartes aura*), and western burrowing owl (*Athene cunicularia hypugaea*), and other species of raptors including owls, falcons, and hawks.

Reptiles include many snake species, Gila monsters (*Heloderma suspectum*), lizards (*Phrynosoma* spp.), whiptails (*Aspidoscelis spp.*), desert iguanas (*Dipsosaurus dorsalis*), and Sonoran desert tortoises (*Gopherus morafkai*). Amphibians may include the Sonoran Desert toad (*Bufo alvarius*) and Couch's spadefoot toad (*Scaphiopus couchii*).

Agricultural Lands

Agricultural land includes rangeland and irrigated cropland. The Sonoran desertscrub habitat located primarily in the northern half of the action corridor alternatives and described previously is also used as rangeland. Years of drought and cattle grazing have thinned the desertscrub vegetation. Where water is found at stock tanks and depressions along the CAP Canal, cattle congregating and frequenting these areas has created areas devoid of most vegetation other than mesquite trees.

Irrigated agricultural land, mostly found in the southern half of the action corridor alternatives, attracts a wide variety of wildlife. Major crops include cotton, small grain, grain sorghum, and alfalfa hay. Other important crops are sugar beets, broccoli, lettuce, melons, citrus fruit, and pecans (NRCS 1991). These fields are more likely used for foraging, particularly when water is present. Mammalian species using agricultural land include coyotes, gray foxes, bobcats, raccoons, skunks, javelinas, mule deer, bats, and small rodents.

Agricultural croplands provide habitat for western burrowing owls, which are frequently found nesting and hunting on the perimeter of the fields and irrigation dikes. Other bird species likely to be found foraging and possibly nesting include Gambel's quail, black-necked stilt (*Himantopus mexicanus*), killdeer (*Charadrius vociferus*), white-winged dove, mourning dove, Inca dove (*Columbina inca*), great-tailed grackle (*Quiscalus mexicanus*), red-winged (*Agelaius phoeniceus*) and yellow-headed (*Xanthocephalus xanthocephalus*) blackbirds, cowbirds (*Molothrus* spp.), greater roadrunner, cattle egret (*Bubulcus ibis*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), lesser nighthawk, black phoebe (*Sayornis nigricans*), Say's phoebe (*Sayornis saya*), Lucy's warbler (*Oreothlypis luciae*), yellow warbler (*Dendroica petechia*), vireos (*Vireo* spp.), turkey vulture, Harris's hawk (*Parabuteo unicinctus*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), and other species of foraging raptors.

Agricultural areas include various features that may be used as habitat including stock ponds, canals, irrigation ditches, and associated embankments, dikes, and levees. Many of these features are part of the San Carlos Irrigation Project and allow for a controlled application of water to farmed fields. The smaller, human-made aquatic habitats are often used by wildlife. Habitat surrounding the open water is generally degraded and associated with rural roads and nonnative vegetation.

Developed Areas

Developed areas feature impervious surfaces covered by roadways, single-family homes, apartment complexes, and commercial and industrial developments. Low-intensity developments include lawns, large-lot single-family homes, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes (NatureServe 2015). To a lesser extent, developed areas support a variety of wildlife including small rodents, lizards, and birds such as curve-billed thrasher, northern mockingbird (*Mimus polyglottos*), Gambel's quail, white-winged dove, mourning dove, Inca dove, great-tailed grackle, cowbirds, and various other species that are tolerant of human activity and disturbance.

Wildlife Connectivity

In 2006, the CAP Canal was identified in *Arizona's Wildlife Linkages Assessment* (Arizona Wildlife Linkages Workgroup 2006) as a potential wildlife linkage corridor. Canals are known to have both positive and negative impacts on desert wildlife. Some species may use canals as a water source, but the steep banks make it impossible or dangerous for most animals to do so (Beier et al. 2006). Large mammals, such as desert mule deer, are known to drown in canals (Rautenstrauch and Krausman 1989). Canals often pose major barriers to species by preventing movement to viable habitat on the other side of the canal, by drowning, and by rerouting natural movement patterns. In the study area, the CAP Canal is approximately 40 to 50 feet wide and is typically fenced on both sides to keep animals out; it is a barrier to wildlife movement though the area. While the CAP Canal is a barrier to mammal movement, the washes that are truncated by the canal (and FRSs constructed adjacent to the canal) collect water on the upstream side in constructed basins and channels that develop dense habitat consisting mainly of mesquite trees. Many of these basins are intended to provide mesquite bosque habitat as habitat improvement to address impacts from flood control projects in the study area (personal communication, Flood Control District of Maricopa County with HDR, on March 17, 2016). Although such features occur along the CAP Canal in the action corridor alternatives and can provide a movement corridor for many mammals, the barriers and land use such as roads, development, and agriculture prevent directed movement along the greater extents of the canal system. The exception is for bats and birds that may use the CAP as a corridor along its entire extent.

The Ironwood-Picacho wildlife linkage corridor constitutes the only mapped AGFD wildlife corridor in the study area. The Ironwood-Picacho Linkage consists of two strands that together provide habitat for movement and dispersal of wildlife between the Ironwood, Picacho, and the Durham-Coronado Plain (Beier et al. 2006). The linkage boundary is approximately 2 miles southeast of the E4 Alternative's southern terminus at I-10 and would not be crossed by the action corridor alternatives (Figure 3.11-1).

3.11.3.2 Protected Species

Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973, as amended, provides for the listing and protection of species designated as threatened, endangered, candidate, or proposed. Under Section 7 of the ESA, lead federal agencies are required to consult with USFWS to ensure that their actions do not jeopardize the continued existence of threatened or endangered species or result in the adverse modification of any designated critical habitat upon which they depend. As defined under Section 9 of the ESA, it is unlawful for any person to "take" a threatened or endangered species without a special permit. A "take" is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

An Official Species List of federally protected species and habitats that should be considered in an effects analysis for the proposed action was obtained from USFWS on November 15, 2017 (Appendix I, *Biological Resources Information*). That list included seven species and/or their habitat (USFWS 2017); however, one of those species, the lesser long-nosed bat, was delisted in April 2018 and therefore is excluded from further evaluation. The remaining six federally protected species are presented in Table 3.11-2. Of these species, two listed as endangered were evaluated as having the potential to occur in or adjacent to the action corridor alternatives and are described below. Designated or proposed critical habitat does not occur in the Corridor; however, proposed critical habitat for the yellow-billed cuckoo (*Coccyzus americanus*) does occur approximately 0.25 mile from the E4 Alternative (Figure 3.11-1). One additional species, the southwestern willow flycatcher (*Empidonax trailii extimus*), is known to occur in or near the Corridor study area and, therefore, is also included in Table 3.11-2.

Four federally protected species identified on the USFWS Official Species List, including California least tern (*Sterna antillarun browni*), Sonoran pronghorn (*Antilocarpa americana sonoriensis*), Northern Mexican gartersnake (*Thamnophis eques megalops*), and roundtail chub (*Gila robusta*), were excluded from further evaluation because no suitable habitats for these species were identified within 1 mile of the action corridor alternatives.

Table 3.11-2. Federally protected species evaluated for potential occurrence in the North-South Corridor

Common name	Scientific name	Habitat	Status
Southwestern willow flycatcher	*Empidonax trailii extimus*	Dense riparian habitats dominated by native cottonwoods and willows or by nonnative tamarisk	Endangered; present along the Gila River in suitable habitat
Yellow-billed cuckoo (Western distinct population segment)	*Coccyzus americanus*	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries)	Threatened; documented within 3 miles of project vicinity near Picacho Reservoir; proposed critical habitat at Picacho Reservoir (AGFD)
Yuma Ridgway's rail (formerly Yuma clapper rail)	*Rallus obsoletus yumanensis*	Fresh and brackish marsh habitat with dense vegetation next to the water's edge	Endangered; documented within 3 miles of project vicinity near Picacho Reservoir (AGFD)
California least tern	*Sterna antillarun browni*	Sandy beaches, sand bars, gravel pits or exposed flats along large lakes, recharge basin and wetlands	Endangered; no suitable sandy habitat near large water features in or adjacent to the action corridor alternatives
Sonoran pronghorn	*Antilocarpa americana sonoriensis*	Alluvial valleys with creosote bush-bursage and paloverde-mixed cacti/ creosote bush-bursage associations	Endangered; suitable habitat exists in the action corridor alternatives; species does not occur in the project vicinity
Northern Mexican gartersnake	*Thamnophis eques megalops*	Dense vegetation along wetlands, cienegas, stock tanks, and streamside riparian woodlands	Threatened; no suitable aquatic habitat with dense ground vegetation or streamside riparian habitat occurs in or adjacent to the action corridor alternatives
Roundtail chub	*Gila robusta*	Cool to warm waters of rivers and streams; often occupy deepest pools and eddies of large streams	Proposed threatened; no suitable aquatic habitat occurs in or adjacent to the action corridor alternatives

Source: U.S. Fish and Wildlife Service, November 15, 2017, IPaC Official Species List, Consultation Code: 02EAAZ00-2016-SLI-0401
Note: AGFD = Arizona Game and Fish Department

SOUTHWESTERN WILLOW FLYCATCHER

The southwestern willow flycatcher was federally listed as an endangered species in 1995 (60 *Federal Register* 10694). Critical habitat was initially designated for the southwestern willow flycatcher in 1997 and was later modified in 2005 (70 *Federal Register* 60886) and 2014 (78 *Federal Register* 344). Critical habitat is not designated within or near the Corridor. Southwestern willow flycatchers are neotropical migrants that breed during the late spring through summer throughout the southwestern United States. Breeding habitat for the species presently includes southern California, southern Nevada, southern Utah, Arizona, New Mexico, and southwestern Colorado; historically, western Texas and extreme northwestern Mexico were also included. Southwestern willow flycatchers migrate south by the end of September to winter in Mexico, Central America, and northern South America (Lower Colorado River Multi-Species Conservation Program 2008). An estimated 1,300 pairs remain; few populations include more than 50 pairs (USFWS 2002).

Dense riparian habitats dominated by native cottonwoods and willows or by nonnative tamarisk, with microclimatic conditions dictated by the local surroundings, are required for nesting. Other plant species closely associated with suitable nesting habitat include seepwillow (also known as mulefat; *Baccharis* spp.), boxelder (*Acer negundo*), stinging nettle (*Urtica* spp.), blackberry (*Rubus* spp.), cottonwood (*Populus* spp.), arrowweed (*Tessaria sericea*), and Russian olive (*Eleagnus angustifolia*) (USFWS 2002). Conditions such as saturated soils, standing water, or nearby streams, pools, or cienegas influence the microclimate and vegetation density component and, therefore, are important components of suitable nesting habitat (McClure et al. 2016; USFWS 2002). Height of vegetation within the patch is most often between 2 and 30 meters; however, an understory of dense vegetation that occurs between 2 and 4 meters appears to be especially important for nesting (USFWS 2002). Habitat not suitable for nesting may be used for migration and foraging. The dense riparian vegetation required for breeding historically was rare and sparsely distributed, and is even rarer today (68 *Federal Register* 10485).

Threats to the southwestern willow flycatcher include habitat loss, degradation, fragmentation, and alteration; predation; brood parasitism by brown-headed cowbirds (*Molothrus ater*); disease; and environmental toxins. Historically, water developments that altered flows in the rivers and streams used by the species were the primary threat. However, with riparian areas presently limited, and with regrowth difficult due to changes in flows, fire has become a significant risk to remaining habitats. In addition, human disturbances at nesting sites may result in nest abandonment (USFWS 2002).

YELLOW-BILLED CUCKOO

The yellow-billed cuckoo's western distinct population segment was listed as a threatened species effective November 3, 2014, and critical habitat for the yellow-billed cuckoo was proposed on August 15, 2014 (USFWS 2014). In Arizona, the yellow-billed cuckoo was historically widespread and described as locally common (Corman and Magill 2000). Studies along the lower Colorado River system indicated rapid declines in populations between 1975 and 1983 (AGFD 2011). Major declines are likely attributable to loss and fragmentation of riparian habitat from inundation by reservoirs and flood control activities, conversion of suitable habitat to agricultural land and urban development, and the continued degradation and loss of breeding habitat (Laymon and Halterman 1987).

Breeding habitat in Arizona includes large blocks of riparian communities consisting of dense cottonwood-willow groves and mesquite bosques. The yellow-billed cuckoo prefers habitat patches greater than 42 acres in size, with a minimum of 7.4 acres of closed canopy broad-leaf vegetation (Ehrlich et al. 1988).

In Arizona, nesting activities for this migrant begin in mid- to late May, with breeding usually beginning in mid-June and ending in August (Hughes 1999). Yellow-billed cuckoos are known to occur at Picacho Reservoir, near the southeastern edge of the E4 Alternative, and where critical habitat is proposed for this species. The reservoir is surrounded by a tall, steep earthen dam. No additional suitable yellow-billed cuckoo habitat was identified in or near the action corridor alternatives.

YUMA RIDGWAY'S RAIL (FORMERLY YUMA CLAPPER RAIL)

The Yuma Ridgway's rail (*Rallus obsoletus yumanensis*), a marsh bird, was listed as endangered in March 1967, and in 2010 a *Draft Recovery Plan* was released. Typically, the Yuma Ridgway's rail is a migratory species that appears in Arizona from February to mid-September (USFWS 2009), with its current range in Arizona encompassing several major river drainages in central and southwestern Arizona, including the lower Salt and Gila Rivers. The Yuma Ridgway's rail inhabits freshwater or brackish marshes and streams. Shallow waters near uplands consisting of dense stands of cattails, sedges, bulrushes, and other wetland vegetation are preferred habitats (Haynes and Schuetze 1997; USFWS 2009). Habitat requirements include wet substructures such as mudflats, sandbars, or slough bottoms. Threats to the species include destruction and modification of marsh and wetland habitat through river channelization, dredging, and flooding and drying of marshes; diversion of water sources; wildfires; toxic levels of heavy metals, primarily selenium (AGFD 2006); and predation.

Yuma Ridgway's rails have been known to occur at Picacho Reservoir during periods with higher water levels. Currently, the volume of water directed into the reservoir does not create the habitat to support the Yuma Ridgway's rail. Suitable habitat for the Yuma Ridgway's rail habitat may occur if waters are redirected into the reservoir. No additional suitable habitat for the Yuma Ridgway's rail was identified in or near the action corridor alternatives.

Bald and Golden Eagle Protection Act

Habitat suitable for foraging bald (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) occurs across the region; however, suitable breeding habitat does not occur for either species in or adjacent to the action corridor alternatives.

Bald eagles typically build nests and occupy large trees or cliffs near water (reservoirs, rivers, and streams) with abundant prey; however, the bald eagle will forage across native desertscrub habitats and agricultural areas. The absence of trees for perching near water sources that would provide forage species generally makes the habitat in or near the action corridor alternatives a low-quality habitat for bald eagle foraging.

In Arizona, golden eagles are typically found in mountainous regions between 4,000 and 10,000 feet above mean sea level (AGFD 2002). Golden eagles build nests in steep, rugged terrain, often on sites with overhanging ledges, cliffs, or trees as cover. The golden eagle is a wide-ranging predator and, in desert habitats, the eagle usually leaves the area after the nesting season when there is no need to return to tend eggs or feed fledglings in the nest.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918, as amended, was implemented for the protection of migratory birds and is administered by USFWS. Specific provisions of the statute include establishment of a federal prohibition, unless permitted by regulations, to

> pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to 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 … for the protection of migratory birds … or any part, nest, or egg of any such bird (16 USC § 703).

Habitat destruction and alteration do not qualify as a “take” as long as these activities involve no loss of birds, eggs, or nests (FHWA 2001). Birds protected under the MBTA include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves, swifts, martins, swallows, and others, including their body parts (feathers, plumes, etc.), nests, and eggs (50 CFR § 10.13).

Many bird species protected under the MBTA occur in the Corridor. Federal-aid highway projects with the potential to result in take of birds protected under the MBTA would require avoidance or the issuance of special permits from the local USFWS jurisdiction.

Special Status Species

The AGFD On-Line Environmental Review Tool was accessed to identify known Special Status Species in AGFD’s Heritage Data Management System that have been documented within 3 miles of the project vicinity (Appendix I, *Biological Resources Information*). The AGFD information also identified predicted State of Arizona Species of Greatest Conservation Need (SGCN) and Species of Economic and Recreation Importance (SERI) that could occur in the action corridor alternatives. Special Status Species documented in the project vicinity include USFWS species of concern (SC), federally listed threatened (LT) and endangered species (LE), USFWS candidate conservation agreement species (CCA), and Arizona Native Plant Law salvage-restricted plants.

These designations include birds, mammals, fish, reptiles, amphibians, and plants. The list was reviewed to determine the potential for these species and/or suitable habitat to occur in the action corridor alternatives. Special Status Species, SGCN, and SERI, and their potential to occur in the action corridor alternatives, are listed in Table 3.11-3.

Table 3.11-3. Special Status Species, Arizona Species of Greatest Conservation Need, and Arizona Species of Economic and Recreation Importance known or predicted to occur in the action corridor alternatives

Scientific name	Common name	Habitat	Status	Occurrence: known or potential
		Birds		
Aix sponsa	Wood duck	Open water in wooded areas	SGCN	Not likely
Ammodramus savannarum perpallidus	Western grasshopper sparrow	Open fields and grasslands	SGCN	Not likely
Anthus spragueii	Sprague's pipit	Native grasslands with vegetation of intermediate height and lacking woody shrubs	SC, SGCN	Not likely
Aquila chrysaetos	Golden eagle	Open country; nest on rock ledges, cliffs, or in large trees	SGCN	Likely
Athene cunicularia hypugaea	Western burrowing owl	Variable in open, well-drained grasslands, steppes, deserts, prairies, and agricultural lands, often associated with burrowing mammals	SC, SGCN	Known
Botaurus lentiginosus	American bittern	Marshlands and very wet meadows	SGCN	Not likely
Buteo regalis	Ferruginous hawk	Open scrublands and woodlands, grasslands, semidesert grassland; during winter they will use agricultural areas	SC, SGCN	Likely
Callipepla gambelii	Gambel's quail	Dry, semidesert with tall shrubs; adjacent agricultural areas; residential areas with tall shrubs adjacent to water	SERI	Known
Charadrius montanus	Mountain plover	Flat dry terrain with short grass or bare ground, plowed fields, sandy deserts; breeds in high plains or shortgrass prairie	SC, SGCN	Not likely
Coccyzus americanus	Yellow-billed cuckoo (Western distinct population segment)	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries)	LT, SGCN	Known (past records)
Colaptes chrysoides	Gilded flicker	Riparian woods and saguaro deserts	SGCN	Known
Cynanthus latirostris	Broad-billed hummingbird	Riparian woods, low-elevation wooded canyons	SGCN	Likely
Empidonax traillii extimus	Southwestern willow flycatcher	Dense cottonwood/willow and tamarisk vegetation along rivers, streams, and wetlands	LE, SGCN	Known
Falco peregrinus anatum	American peregrine falcon	Near cliffs that support sufficient abundance of prey	SC, SGCN	Not likely
Glaucidium brasilianum cactorum	Cactus ferruginous pygmy-owl	Mature cottonwood and willow galleries, mesquite bosques, and Sonoran desertscrub	SC, SGCN	Not likely
Haliaeetus leucocephalus	Bald eagle	Large trees or cliffs near water (reservoirs, rivers, and streams) with abundant prey	SC, SGCN	Likely

Table 3.11-3. Special Status Species, Arizona Species of Greatest Conservation Need, and Arizona Species of Economic and Recreation Importance known or predicted to occur in the action corridor alternatives

Scientific name	Common name	Habitat	Status	Occurrence: known or potential
Melanerpes uropygialis	Gila woodpecker	Low-elevation deserts with woody plants large enough to provide nest sites, including areas with saguaro cactus and cottonwoods	SGCN	Known
Melospiza lincolnii	Lincoln's sparrow	Nests in damp, dense brushy areas in sunny clearings; winters in grassy patches around brush/trees, often near water	SGCN	Likely
Melozone aberti	Abert's towhee	Dense riparian brush	SGCN	Known
Passerculus sandwichensis	Savannah sparrow	Open grassy or weedy habitats	SGCN	Likely
Peucaea carpalis	Rufus-winged sparrow	Desert grasslands and sandy washes with thorn scrub	SGCN	Not likely
Progne subis Hesperia	Desert purple martin	Nests in tree cavities and saguaro cactus during spring and summer months	SGCN	Likely
Rallus obsoletus yumanensis	Yuma Ridgway's rail	Inhabits freshwater or brackish marshes with dense stands of cattails, sedges, bulrushes, and other wetland vegetation	LE, SGCN	Known (past records)
Setophaga petechia	Yellow warbler	Wet, brushy areas such as willow thickets, field edges	SGCN	Likely
Toxostoma lecontei	Le Conte's thrasher	Extremely arid and sparsely vegetated plains with saltbush, creosote bush, and lots of bare sandy ground	SGCN	Likely
Troglodytes pacificus	Pacific wren	Damp, shaded areas	SGCN	Not likely
Vireo bellii arizonae	Arizona Bell's vireo	Lowland riparian areas with dense, low, shrubby vegetation	SGCN	Likely
Zenaida asiatica	White-winged dove	Brushlands and suburban areas with trees	SERI	Known
Zenaida macroura	Mourning dove	Urban areas, agriculture fields, and open desertscrub habitats	SERI	Known
Mammals				
Ammospermophilus harrisii	Harris' antelope squirrel	Rocky desert with cactus and shrubs	SGCN	Likely
Corynorhinus townsendii pallescens	Pale Townsend's big-eared bat	Day roosts found in mines and caves from desertscrub up to woodland and coniferous forests; night roosts may be in abandoned buildings; hibernate in cold caves, lava tubes, and mines mostly in uplands and mountains	SC, SGCN	Likely
Dipodomys spectabilis	Banner-tailed kangaroo rat	Desert grasslands with scattered shrubs	SGCN	Likely
Euderma maculatum	Spotted bat	Varied; most captured in dry, rough desertscrub; few captured/heard in Ponderosa pine forest	SC, SGCN	Likely

Table 3.11-3. Special Status Species, Arizona Species of Greatest Conservation Need, and Arizona Species of Economic and Recreation Importance known or predicted to occur in the action corridor alternatives

Scientific name	Common name	Habitat	Status	Occurrence: known or potential
Eumops perotis californicus	Greater Western bonneted bat	Lower/upper Sonoran desertscrub near cliffs; prefers rugged/rocky canyons with abundant crevices	SC, SGCN	Likely
Lasiurus blossevillii	Western red bat	Riparian and wooded areas	SGCN	Not likely
Lasiurus xanthinus	Western yellow bat	Not clearly understood: may be associated with Washington fan palm trees, other palms, or other leafy vegetation such as sycamores, hackberries, and cottonwoods	SGCN	Likely
Leopardus pardalis	Ocelot	Variable, including thorn scrub, semiarid woodland, tropical deciduous and semideciduous forest, subtropical forest, lowland rainforest, palm savanna, and seasonally flooded savanna woodland	LE, SGCN	Not likely
Leptonycteris curasoae yerbabuenae	Lesser long-nosed bat	Desertscrub habitat with agave and columnar cacti present as food plants	SGCN	Likely
Lepus alleni	Antelope jackrabbit	Grassy slopes at moderate elevations; most common where grass grows well under desert shrubs	SGCN	Likely
Macrotus californicus	California leaf-nosed bat	Sonoran desertscrub; primarily roosts in mines, caves, and rock shelters	SC, SGCN	Likely
Myotis occultus	Arizona myotis	Summer: near water in ponderosa pine and oak-pine woodland; along permanent water in riparian areas in some desert areas	SC, SGCN	Not likely
Myotis velifer	Cave myotis	Desertscrub of creosote, brittlebush, paloverde, and cacti; roosts in caves, tunnels, mineshafts, under bridges, and sometimes in buildings within a few miles of water	SC, SGCN	Likely
Myotis yumanensis	Yuma myotis	Varied upland and lowland habitats, including riparian, desertscrub, moist woodlands, and forests; prefer cliffs/rocky walls near water	SC, SGCN	Not likely
Nyctinomops femorosaccus	Pocketed free-tailed bat	Desertscrub and arid lowland; roosts in high crevices in rugged canyons; may roost in buildings or under roof tiles	SGCN	Likely
Odocoileus hemionus	Mule deer	Wide-ranging: grasslands, semideserts, scrublands, forests	SERI	Known
Odocoileus virginianus	White-tailed deer	Woodlands of chaparral, oak, and pine with interspersed clearings	SGCN	Not likely
Ovis canadensis mexicana	Mexican desert bighorn sheep	Desert mountain ledges and grassy basins	SGCN, SERI	Not likely
Panthera onca	Jaguar	Found in Sonoran desertscrub up through subalpine conifer forest	LE, SGCN	Not likely
Pecari tajacu	Javelina	Desert, chaparral, oak, grasslands	SERI	Known

Table 3.11-3. Special Status Species, Arizona Species of Greatest Conservation Need, and Arizona Species of Economic and Recreation Importance known or predicted to occur in the action corridor alternatives

Scientific name	Common name	Habitat	Status	Occurrence: known or potential
Perognathus amplus	Arizona pocket mouse	Flat areas with varying desertscrub vegetation or bunch grasses	SGCN	Likely
Perognathus longimembris	Little pocket mouse	Desert and open grasslands	SGCN	Likely
Puma concolor	Mountain lion	Desert mountains with broken terrain and steep slopes, along with dense vegetation, caves, rocky crevices that provide shelter	SERI	Likely
Tadarida brasiliensis	Brazilian free-tailed bat	Desertscrub, coniferous forest, and coniferous woodlands	SGCN	Likely
Vulpes macrotis	Kit fox	Desertscrub, chaparral, and grasslands	SGCN	Known
Fish				
Agosia chrysogaster	Gila longfin dace	Wide-ranging from intermittent, hot, low-desert streams to clear, cool brooks at higher elevations	SC, SGCN	Known
Catostomus clarkii	Desert sucker	Rapids/flowing pools of streams/ rivers primarily over bottoms of gravel-rubble with sandy-silt in the interstices	SC, SGCN	Known
Catostomus insignis	Sonora sucker	Varied: warm-water rivers to trout streams	SC, SGCN	Known
Cyprinodon macularius	Desert pupfish	Shallow waters of springs, small streams, and marshes	LE, SGCN	Not likely
Reptiles				
Chilomeniscus stramineus	Variable sandsnake	Upland desertscrub; washes or drainages with fine to coarse sand and leaf litter; can be above or below upland elevation	SGCN	Likely
Chionactis occipitalis klauberi	Tucson shovel-nosed snake	Creosote bush-mesquite floodplain habitats with soft, sandy loams, sparse gravel; scattered sand hammocks crowned with mesquite or other desert shrubs	SC, SGCN	Known
Coluber bilineatus	Sonoran whipsnake	Upland desertscrub foothills and mountains, semidesert grassland, interior chaparral, Madrean evergreen woodland, Great Basin conifer woodland	SGCN	Likely
Crotalus tigris	Tiger rattlesnake	Upland desertscrub foothills/mountains, interior chaparral, Madrean evergreen woodland	SGCN	Not likely
Crotaphytus nebrius	Sonoran collared lizard	Sonoran desertscrub on hillsides, canyons, mountain slopes, and rocky bajadas	SGCN	Not likely
Gopherus morafkai	Sonoran desert tortoise	Primarily rocky (often steep) hillsides and bajadas of Sonoran desertscrub but may encroach into desert grassland, juniper woodland, interior chaparral habitats, and even pine communities; washes and valley bottoms may be used in dispersal	CCA, SGCN	Known

Table 3.11-3. Special Status Species, Arizona Species of Greatest Conservation Need, and Arizona Species of Economic and Recreation Importance known or predicted to occur in the action corridor alternatives

Scientific name	Common name	Habitat	Status	Occurrence: known or potential
Heloderma suspectum	Gila monster	Sonoran desert; undulating rocky foothills, bajadas, canyons	SGCN	Known
Kinosternon sonoriense sonoriense	Desert mud turtle	Springs, creeks, ponds, waterholes of intermittent streams	SGCN	Likely
Micruroides euryxanthus	Sonoran coralsnake	Above flats in or near rocky or gravelly drainages, mesquite-lined washes, and canyons; upland desert/bajadas with diverse soil types	SGCN	Likely
Phrynosoma goodei	Goode's horned lizard	Sonoran desertscrub in the Lower Colorado River Valley; flat, open areas with sandy or loamy soils	SGCN	Likely
Phrynosoma solare	Regal horned lizard	Valleys and on rocky bajadas within Arizona upland desertscrub, Chihuahuan desertscrub, and semidesert grassland	SGCN	Likely
Phyllorhynchus browni	Saddled leaf-nosed snake	Upland desertscrub in association with alluvial soils and bajadas, sometimes Lower Colorado River desertscrub flats	SGCN	Not likely
Xantusia bezyi	Bezy's night lizard	Crevice dweller of large rock outcroppings, cliff faces, and boulder fields, Arizona upland desertscrub, interior chaparral, and woodland communities	SGCN	Not likely
Amphibians				
Anaxyrus retiformis	Sonoran green toad	Washes and near water in mesquite-grassland, creosotebush desert, and upland saguaro-paloverde desertscrub	SGCN	Not likely
Incilius alvarius	Sonoran desert toad	Sonoran/Chihuahuan Desertscrub, Semidesert Grassland, Madrean Evergreen Woodland; breeds in temporary pools formed by monsoon rains	SGCN	Likely
Lithobates yavapaiensis	Lowland leopard frog	Sonoran Desertscrub, Great Basin Conifer Woodland, Madrean Evergreen Woodland; permanent/semipermanent water; riparian areas, ponds, cienegas, springs, cattle tanks, wetlands, and ditches	SC, SGCN	Likely
Plants				
Abutilon parishii	Pima Indian mallow	Rocky hillsides, cliff bases, canyon bottoms, lower side slopes, ledges of canyons among rocks and boulders; mesic habitat with full sun in higher Sonoran desertscrub	SC, salvage-restricted	Known
Ferocactus cylindraceus	Desert barrel cactus	Gravelly or rocky hillsides, canyon walls, alluvial fans, wash margins on igneous and limestone substrates	Salvage-restricted	Known

Source: Arizona Game and Fish Department, November 16, 2017, On-Line Environmental Review Tool, Project ID: HGIS-02473

Notes: CCA = U.S. Fish and Wildlife Service candidate conservation agreement species, LE = federally listed endangered species, LT = federally listed threatened species, SC = species of concern, SERI = State of Arizona Species of Economic and Recreation Importance, SGCN = State of Arizona Species of Greatest Conservation Need

Arizona Native Plant Act

Many plants that occur in the action corridor alternatives fall into one of five groups that are protected by the Arizona Native Plant Act (A.R.S. §§ 3-901 et seq.). Plants protected by the Act are often unusual or rare, have high value for landscaping, or are long-lived and not easily replaced. They are, therefore, susceptible to theft, vandalism, or unnecessary destruction resulting from development (Arizona Department of Agriculture 2009). The greatest density and variety of protected plant species that occur in the action corridor alternatives are in previously undeveloped areas; however, protected native plants are located throughout the area. Commonly recognized protected native plants in the action corridor alternatives include, but are not limited to, saguaro, cholla (*Cylindropuntia* spp.), bundle hedgehog cactus (*Echinocereus fasiculatus* var. *fasiculatus*), barrel cactus (*Ferocactus* sp.), ocotillo (*Fouquieria splendens*), ironwood (*Olneya tesota*), paloverde (*Parkinsonia* sp.), and mesquite.

Invasive Species

Invasive species surveys have not been conducted in the study area; however, invasive species including Tamarisk (*Tamarix ramosissima*), Russian-thistle (*Salsola kali*), Sahara mustard (*Brassica tournefortii*), foxtail brome (*Bromus rubens*), Bermuda grass (*Cynodon dactylon*), and buffelgrass (*Pennisetum ciliare*) were observed in the study area. Based on Executive Order 13112, Invasive Species, dated February 3, 1999, all projects will "… subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: i) prevent the introduction of invasive species; ii) detect and respond rapidly to, and control, populations of such species in a cost-effective and environmentally sound manner; iii) monitor invasive species populations accurately and reliably; and iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded."

3.11.4 Environmental Consequences

This section evaluates the potential impacts on vegetation and wildlife resources by the action corridor alternatives, as well as the No-Action Alternative.

3.11.4.1 No-Action Alternative

No direct impacts on biological resources would occur in the Corridor under the No-Action Alternative. Disturbance and displacement of habitats adjacent to existing roadways and vehicle collisions with wildlife could increase as future traffic volumes rise and as development continues.

3.11.4.2 Action Corridor Alternatives

Impacts Common to All Action Corridor Alternatives

All action corridor alternatives would result in the permanent loss of mixed native desertscrub habitat, agricultural lands, and developed areas, resulting in increased habitat fragmentation across the length of the Corridor. The overall effect of increased fragmentation would be lessened because existing agricultural fields, urban and rural development, roadways, railroads, and engineered hydrologic networks already bisect and cover widespread portions of the Corridor and vicinity (Figure 3.11-1). The westernmost action corridor alternatives would result in fewer impacts on wildlife, habitat, and wildlife resources than the action corridor alternatives to the east as a result of the extent of development associated with the westernmost action corridor alternatives. The CAP Canal is an existing constraint to east-to-west wildlife movement, and action corridor alternatives west of the CAP Canal would result in fewer impacts on terrestrial wildlife movement through the area and less overall habitat fragmentation as a result of the already isolated habitat on the western side of the canal. Existing drainage structures and roads cross the CAP Canal and, although not constructed for use by wildlife, may be used to a limited extent by some species. Depending on development and the ability for terrestrial species to access habitat, wildlife-friendly crossings along the action corridor alternatives may be considered at locations that match suitable crossings occurring along the CAP Canal.

All action corridor alternatives would result in impacts on mammals and reptiles, including permanent loss of habitat from within the new freeway footprint, habitat fragmentation, and displacement of animals from habitat adjacent to the new roadway. These impacts could result in lower population sizes, reduced resources and increased competition, impediments to movement, and direct mortality resulting from vehicle collisions. For many of these species, the CAP Canal, existing roads, and irrigation channels represent existing barriers to wildlife movement. Larger mammals could move across the CAP Canal at discrete locations where road bridges and uncovered drainage structures occur and along the Gila River, but their movement is severely altered by the canal. For smaller mammals and reptiles, the CAP Canal, existing road infrastructure, and irrigation network represent a reflective boundary. Various segments of each action corridor alternative built on a new alignment would add another semipermeable barrier. This may cause different and marginally greater impacts on wildlife movement and mortality.

Impacts on birds would include a permanent loss of habitat, disturbance from human activity along the roadway, and direct mortality from collisions with vehicles. Vegetation clearing and road construction would result in a loss of bird habitat used for some or all of the following activities: foraging, resting, breeding, perching, and nesting for resident birds and resting and foraging for migrating birds. This could result in decreased reproduction, behavior modification, increased mortality, and displacement to other habitat, increasing competition. Habitat quality adjacent to the new roadway may also be reduced because of increased disturbance from human activity and invasive species. Construction of the proposed action is not anticipated to affect either bald or golden eagles.

Temporary construction impacts would occur during and after construction because disturbed areas would have reduced habitat quantity and quality. During construction, artificial lighting and noise and dust generated by equipment and human activity could temporarily displace birds from foraging, resting, and nesting habitat. Disturbance-related displacement from favored breeding habitats could result in birds competing with other birds for suitable replacement habitats. This could result in nesting in less-favored areas where nests may be damaged or accessed more easily by predators, which could limit survival of offspring or adults. Other animal species also could be affected by temporary construction impacts such as reduced air quality attributable to dust, reduced water quality as a result of incidental discharge, and noise.

Once construction is complete, disturbed native desertscrub habitats immediately adjacent to the new road embankment would be addressed according to a revegetation plan. Following construction, habitat quality adjacent to the roadway may be reduced because of increased disturbance from human activity, noise, and reduced air quality attributable to vehicular emissions. Operation of the roadway would cause a long-term increase in human activity and noise levels that can create avoidance zones that extend well beyond the road for certain bird species (Reijnen and Foppen 2006). Use of the roadway would vary by time of day, and species active during daylight may be affected more than species active at night when traffic volumes and noise levels would be less.

Impacts by Segment

SEGMENT 1

All Segment 1 action corridor alternatives would remove large, homogenous areas of creosote desertscrub habitat (Figure 3.11-1). The E1a and E1b Alternatives would remove similar amounts of desertscrub habitat. Likewise, the W1a and W1b Alternatives would remove similar amounts of desertscrub habitat; however, the E1a and E1b Alternatives would remove a larger amount compared with the W1a and W1b Alternatives. The E1a and E1b Alternatives would remove the same amount of agricultural land and the W1a and W1b Alternatives would remove the same amount of agricultural land;

however, the W1a and W1b Alternatives would remove a larger amount compared with the E1a and E1b Alternatives.

The E1b and W1b Alternatives would cross the CAP Canal and flood control structures, resulting in potential impacts on mesquite/shrub habitat along these structures. The mesquite habitat is east of the CAP Canal and was planted along the flood control structures as replacement habitat for habitat losses resulting from flood control projects in that area. The E1a Alternative would also cross the CAP Canal, but in a location that avoids flood control structures and planted habitat. The E1a and E1b Alternatives would generally have a greater impact on biological resources compared with the W1a and W1b Alternatives because they would cross less-disturbed desertscrub habitat with numerous ephemeral washes and stock ponds that provide better-quality habitat for species.

Although all habitat in the area is currently fragmented to some degree by transportation and other facilities—such as US 60, SR 24, arterial streets, UPRR, Magma Arizona Railroad, and the CAP Canal—the E1a and E1b Alternatives would increase habitat fragmentation compared with the W1a and W1b Alternatives because the W1a Alternative and most of the W1b Alternative are located between more intensely developed lands and the CAP Canal and, therefore, would be built in a more highly fragmented habitat. The E1a and E1b Alternatives would be similar in their impact on east-to-west wildlife connectivity and, likewise, the W1a and W1b Alternatives would be similar. However, the E1a and E1b Alternatives would have a greater impact on east-to-west wildlife connectivity than the W1a and W1b Alternatives because of their location in larger homogenous and contiguous areas of creosote desertscrub east of the CAP Canal. The E1a and E1b Alternatives would be similar in their impact on north-to-south wildlife connectivity and would have a greater impact than the W1a and W1b Alternatives because of their much longer east-to-west SR 24 connections. The W1b Alternative would have a greater impact on north-to-south wildlife connectivity than the W1a Alternative because a segment of that alternative is located on the eastern side of the CAP Canal and would cross to the western side.

SEGMENT 2

All Segment 2 action corridor alternatives would remove greater amounts of agricultural land than creosote desertscrub habitat (Figure 3.11-1). The E2a and E2b Alternatives would remove the same amount of desertscrub habitat and the W2a and W2b Alternatives would remove similar amounts of desertscrub habitat; however, the W2a and W2b Alternatives would remove a larger amount compared with the E2a and E2b Alternatives. All Segment 2 action corridor alternatives would affect mesquite habitat associated with a minor drainage feature within the desertscrub habitat. The E2a and E2b Alternatives would affect a greater amount of the mesquite habitat than the W2a and W2b Alternatives, although the differences are minor. Generally, all Segment 2 action corridor alternatives would be similar in their impacts on biological resources.

All habitat in Segment 2 is currently fragmented by transportation facilities, canals, and development of various types. All Segment 2 action corridor alternatives would have a similar, low impact on habitat fragmentation. All Segment 2 action corridor alternatives would be similar in their impact on wildlife connectivity because of the lack of defined movement corridors in this area.

SEGMENT 3

All Segment 3 action corridor alternatives would remove greater amounts of agricultural land than desertscrub habitat (Figure 3.11-1), and all Segment 3 action corridor alternatives would remove a similar acreage of desertscrub habitat. The E3a and E3c Alternatives would remove a similar amount of agricultural land but more than the E3b and E3d Alternatives. The W3 Alternative would remove the least agricultural land. The desertscrub in Segment 3 represents the least degraded, intact, large areas of habitat associated with the Corridor. From the north, each action corridor alternative would cross creosote desertscrub that transitions into Mixed Paloverde-Cacti Desertscrub before crossing Hunt Highway. South of Hunt Highway, each action corridor alternative would cross agricultural land that abuts the Gila River and then cross the Gila River before reentering agricultural land. The action corridor alternatives then continue across agricultural land interspersed with developed land and remnant parcels of desertscrub habitat.

Suitable Sonoran desert tortoise habitat would be removed by all Segment 3 action corridor alternatives in the Mixed Paloverde-Cacti Desertscrub habitat. Construction of any of the action corridor alternatives would not affect Sonoran desert tortoise populations or viability because the area where suitable habitat occurs is highly fragmented and isolated.

Segment 3 action corridor alternatives would increase habitat fragmentation in the most unaltered but isolated Mixed Paloverde-Cacti Desertscrub habitat identified in the Corridor, an area bounded by the CAP Canal, Hunt Highway, UPRR, agricultural land, and development. All Segment 3 action corridor alternatives would potentially add to the existing negative effects on east-to-west wildlife connectivity along the Gila River that currently result from gravel mining and development; however, any action corridor alternative crossing the Gila River would be bridged and would not present a barrier to wildlife. All action corridor alternatives would also add to the impacts on east-to-west wildlife connectivity that currently result from the existing CAP and Florence-Casa Grande Canals that are barriers east of the action corridor alternatives.

SEGMENT 4

All action corridor alternatives in Segment 4 would remove degraded desertscrub, agricultural land, and developed areas. The W4 Alternative would remove less desertscrub habitat and remove more agricultural land than the E4 Alternative. Although Segment 4 action corridor alternatives would remove degraded desertscrub habitat, there would be minimal impacts on habitat fragmentation because this habitat is located within or along the periphery of agricultural land that is currently highly fragmented. The Segment 4 action corridor alternatives would add to the existing impacts on east-to-west wildlife connectivity that currently result from the CAP and Florence-Casa Grande Canals, which are existing barriers east of the Segment 4 action corridor alternatives.

The Segment 4 action corridor alternatives are not likely to affect the yellow-billed cuckoo or Yuma Ridgway’s rail because an 1,800-foot separation exists between the nearest potential suitable habitat for these species at Picacho Reservoir and the E4 Alternative, the closest Segment 4 action corridor alternative. The Segment 4 action corridor alternatives would not affect proposed yellow-billed cuckoo critical habitat identified at Picacho Reservoir.

3.11.5 Potential Avoidance, Minimization, and Mitigation Strategies

Mitigation strategies for all action corridor alternatives include avoidance, minimization, and mitigation. The following mitigation measures are examples of measures that could be implemented to avoid, minimize, and mitigate impacts on protected species; to comply with state and federal regulations; and to reduce habitat fragmentation, wildlife displacement, impediments to movements, and collisions.

- During the design phase, ADOT would coordinate with federal and state wildlife agencies, as required, to determine whether any species-specific mitigation measures would be required.
- Invasive species in the project footprint would be treated according to an invasive species management plan prior to construction. ADOT would continue standard practices for addressing noxious and invasive species during operation and maintenance of the facility.
- To comply with the Arizona Native Plant Act, ADOT would salvage plants on site and/or notify the Arizona Department of Agriculture so that it could determine the disposition of those plants.

- ADOT would conduct preconstruction surveys for species such as burrowing owls prior to construction in all suitable habitats that would be disturbed. If the species are located during construction, the contractor would stop work at that location and the species would be relocated from the project area, as appropriate.
- ADOT would have a permitted avian biologist, approved by USFWS and AGFD, conduct protocol surveys for southwestern willow flycatchers, yellow-billed cuckoos, and Yuma Ridgway's rails in suitable habitats within the study area and 500 feet of disturbance areas to determine their presence or absence prior to initiation of the Tier 2 process. The surveys would be of adequate duration to verify potential nest sites.
- If any Sonoran Desert tortoises are encountered during construction, the contractor would adhere to AGFD's *Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects*, revised September 22, 2014.
- To avoid the introduction of noxious and invasive species seeds, and to avoid noxious and invasive species seeds from entering/leaving the sites, all construction equipment should be washed and free of all attached plant/vegetation and soil/mud debris prior to entering/leaving the construction sites.
- ADOT would coordinate with AGFD and other stakeholders to determine wildlife connectivity data needs and study design. ADOT would facilitate implementation of identified studies prior to the initiation of the Tier 2 process, given the timeline required (likely 2 to 4 years) to collect and analyze sufficient data before draft design plans begin to limit the possible mitigations. ADOT and the stakeholders would identify potential crossing structures, design features, and supporting mitigation or conservation necessary to facilitate the movement of wildlife through the roadway barrier, and would incorporate the solutions into subsequent Tier 2 studies.
- Active nest surveys may be conducted if clearing, grubbing, or tree/limb removal would take place during the bird breeding season (February 1 to August 31). Such surveys would be conducted prior to removal of the trees/limbs.
- ADOT would continue to honor its commitments within the Candidate Conservation Agreement for the Sonoran desert tortoise in Arizona (USFWS 2015).
- Any future North-South Freeway segments selected for construction that are located within Sonoran desert tortoise habitat would follow ADOT's existing mitigation strategies. ADOT has developed comprehensive Sonoran desert tortoise mitigation that includes, but is not limited to, education of contractors and ADOT staff regarding tortoise awareness, preconstruction surveys, relocation of tortoises, on-site monitoring of construction activities, and best management practices designed to reduce potential tortoise mortalities during construction.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts. Chapter 4, *Indirect and Cumulative Impacts*, contains further discussion of potential impacts on biological resources and strategies to address such impacts.

3.11.6 Subsequent Tier 2 Analysis

Once funding has been initiated, the subsequent analysis of biological resources during the Tier 2 study would involve the preparation of a biological evaluation that would address potential impacts on the southwestern willow flycatcher, yellow-billed cuckoo and its proposed critical habitat, and the Yuma Ridgway's rail. ADOT would have a permitted avian biologist conduct protocol surveys for southwestern willow flycatchers, yellow-billed cuckoos, and Yuma Ridgway's rails to determine occupancy of suitable habitat prior to initiation of the Tier 2 process. Accordingly, Section 7 consultation would be initiated with USFWS prior to approval of the Tier 2 NEPA decision document, should it be determined that the proposed action may affect the southwestern willow flycatcher, yellow-billed cuckoo, Yuma Ridgway's rail, or proposed critical habitat for the yellow-billed cuckoo. Prior to and during the Tier 2 analysis, ADOT would coordinate with AGFD to develop mitigation strategies. Mitigation strategies may include design features and applicant proposed measures, best management practices, mitigation measures required by USFWS in response to potential environmental impacts identified during the Tier 2 study, and avoidance of occupied habitat and/or compensation for impacts on habitat deemed suitable for habitation by southwestern willow flycatchers, yellow-billed cuckoos, and Yuma Ridgway's rails. In addition, if it is determined project-related activities would occur in suitable habitat during the breeding season, ADOT would have a qualified avian biologist, permitted by USFWS and AGFD, conduct protocol surveys for southwestern willow flycatchers, yellow-billed cuckoos, and Yuma Ridgway's rails in suitable habitat within the project area and within 500 feet of disturbance areas. The surveys would be of adequate duration to verify potential nest sites. In addition, future coordination with AGFD and USFWS regarding wildlife connectivity would be conducted early in the Tier 2 studies.

3.11.6.1 Conclusion

All action corridor alternatives would result in permanent loss of habitat in the new freeway footprint, habitat fragmentation, displacement of wildlife from habitat adjacent to the new freeway, and direct mortality from collisions with vehicles. These impacts could result in decreased reproduction, behavior modification, increased mortality, and increased competition. The CAP Canal, existing roads, and irrigation channels represent existing barriers to wildlife movement. Various segments of each action corridor alternative built on a new alignment would add another semipermeable barrier. This may cause different and marginally greater impacts on wildlife movement and mortality.

Development of the proposed action is not expected to greatly affect or imperil the populations of any species. Actual impacts of the action corridor alternatives on wildlife species would be reduced by avoidance and minimization measures for design and construction. Specific mitigation or commitments would be developed during preparation of the biological evaluation and in coordination with AGFD.

3.12 Hydrology, Floodplains, and Water Resources

This section describes the hydrology, floodplains, and water resources in the study area and potential impacts on those resources as a result of the proposed action. Several topics related to water resources are included: surface water hydrology, water quality, groundwater, and floodplains. Additional information about issues related to water resources is in Section 3.13, *Waters of the United States*.

3.12.1 Regulatory Context

Executive Order 11988 (dated May 24, 1977) and Federal Emergency Management Agency (FEMA) regulations require that floodplain encroachments avoid adverse impacts and minimize development of floodplains where there is a practicable alternative.

Section 404 of the Clean Water Act (CWA) requires that a permit be obtained from the U.S. Army Corps of Engineers (USACE) for the discharge of fill material into waters of the United States (Waters). Section 401 of the CWA requires that a water quality certificate be obtained from ADEQ. See Section 3.13, *Waters of the United States*, for further information regarding CWA requirements.

The existing FRSs in the study area are considered dams under A.R.S. § 45-1201, and all but one are subject to regulation by ADWR. Improvements that affect the structures would require ADWR approval.

Arizona’s Groundwater Management Code was enacted in 1980. It provides a comprehensive management framework for groundwater that is administered by ADWR. Six key provisions of this code are: (1) groundwater rights, (2) prohibition of irrigating new agricultural land within a designated Active Management Area (AMA), (3) management plans and conservation targets for the AMAs, (4) 100-year assured water supply for new developments, (5) metering at all large wells, and (6) annual water withdrawal and use reporting.

Under Section 1424(e) of the Safe Drinking Water Act, EPA designated the Upper Santa Cruz and Avra Valley Basin, which underlies the southern portion of the study area, as a sole source aquifer. The aquifer is the sole or principal drinking water source for the area and, if contaminated, would create a hazard to public health. As a result of this designation, proposed projects receiving federal financial assistance with the potential to contaminate the designated sole source aquifer are subject to EPA review.

3.12.2 Methodology

The watersheds contributing runoff to the Corridor were delineated on USGS topographic maps to identify flow patterns, estimate the magnitude of runoff on the action corridor alternatives, and identify major watercourses and features that may be affected by the action corridor alternatives. Existing data and reports were reviewed to further identify drainage patterns and features that may be affected by the action corridor alternatives. FEMA Flood Insurance Rate Maps were reviewed to identify the locations and extent of floodplains in the study area to determine the relationship of the proposed action to 100-year floodplain boundaries.

The groundwater evaluation presented in this section was based on available information on local groundwater resources, including data from ADWR. The evaluation relied on existing data sources and did not include field investigation.

3.12.3 Affected Environment

3.12.3.1 Surface Water

Surface flow crosses the study area flowing west along the length of the proposed action. The study area’s surface waters are shown on Figures 3.12-1 and 3.12-2.

Figure 3.12-1. Surface waters, Segments 1 and 2

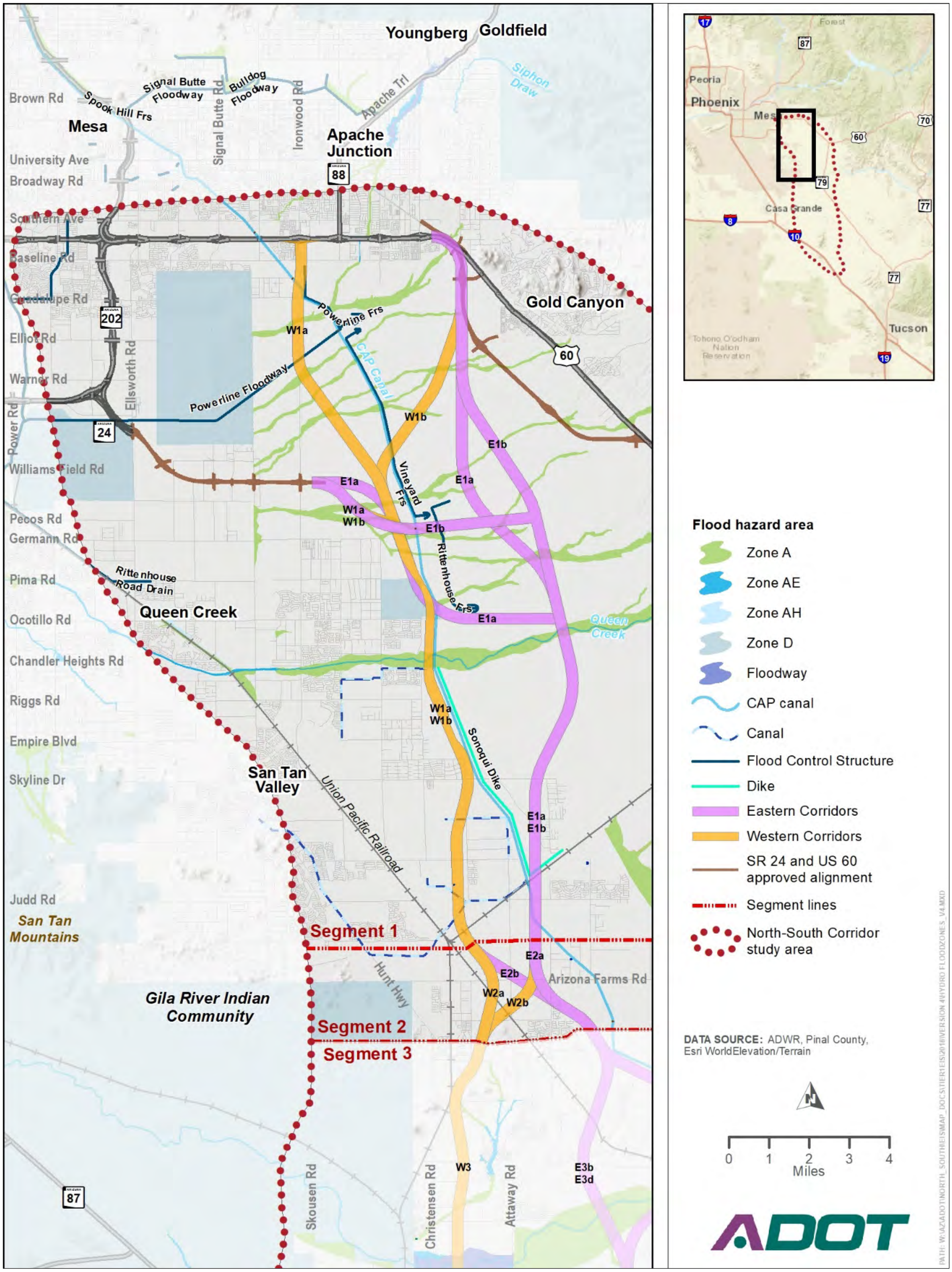
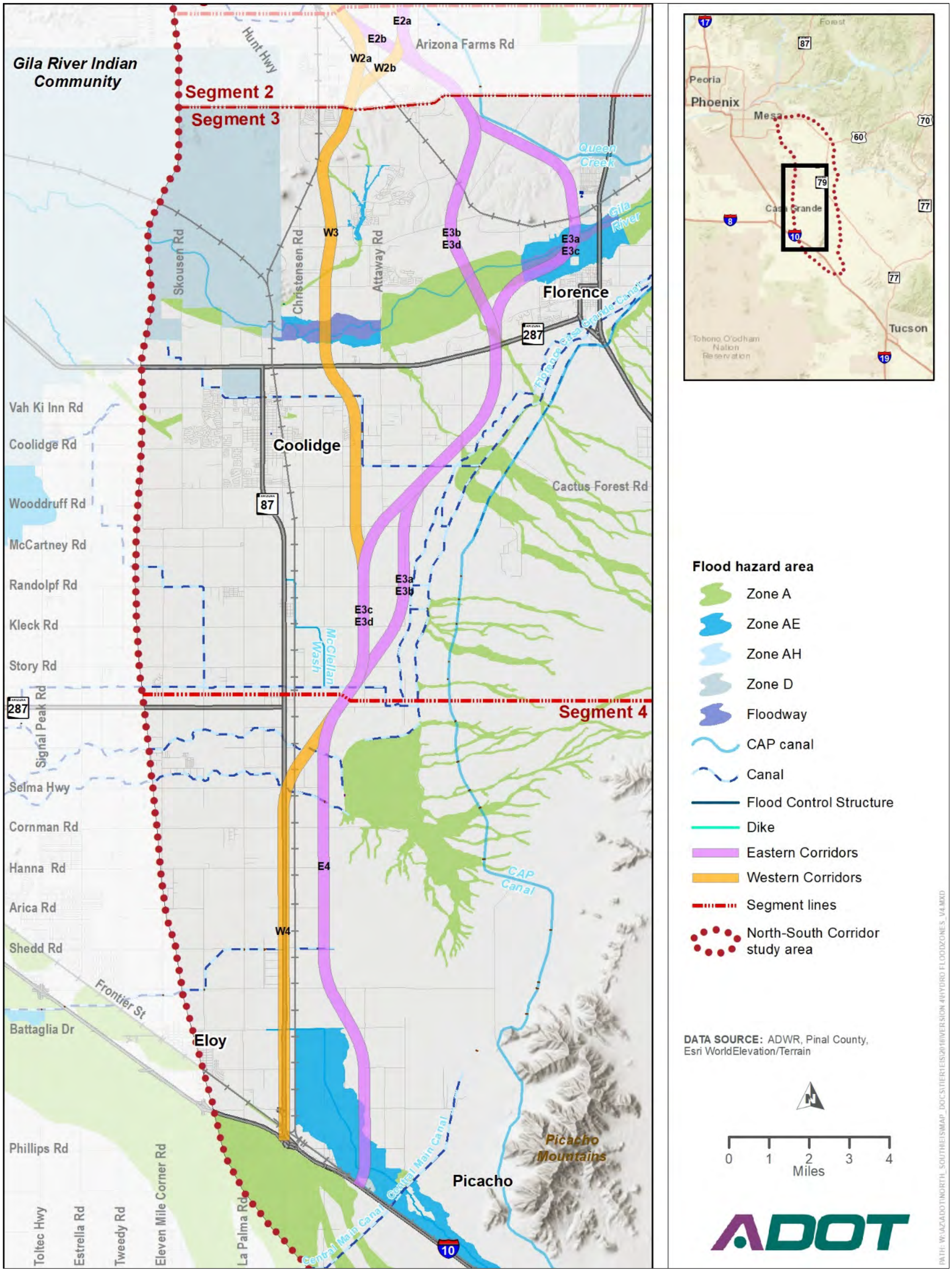


Figure 3.12-2. Surface waters, Segments 3 and 4



All of the washes are *ephemeral*—normally dry but flowing in response to precipitation. The most notable single water source is the Gila River, which crosses through Florence in the middle of the study area.

Significance of Ephemeral and Intermittent Streams

Because ephemeral and intermittent stream channels support higher moisture content and an increased abundance of vegetation, microenvironments supporting both unique microclimates and microhabitats are created in and around these areas and provide important refuge sites for wildlife that could not otherwise escape from the harsh desert climate. The Sonoran Desert is characterized by low, highly variable levels of annual precipitation. Riparian ecosystems occupy just a small portion of the overall landscape. Those riparian ecosystems support significant biological diversity and influence numerous processes including hydrology, geomorphology, and other ecological processes. In addition, riparian habitats are important for many species and are essential for their survival. Previous studies indicate that for more than 80 percent of terrestrial vertebrates and over 50 percent of all nesting birds in the arid Southwest, riparian habitat is critical (Johnson et al. 1977; Krueper 1993; Levick et al. 2008).

Ongoing development of watersheds in the arid Southwest indicates that widespread effects on downstream water quality and ecosystem health may be a direct result of impacts on ephemeral and intermittent stream channels (headwaters). Sediment transport, which includes a wide range of particle types and sizes, is a major function of arid ephemeral stream networks. Removal or fill of headwaters or small upstream channels of a drainage network ultimately increases downstream sedimentation and thus negatively affects aquatic species, channel stability, and overall stream productivity (Levick et al. 2008). Conversely, small upstream channels or headwaters replaced with paved or lined floodways could decrease sediment production and increase downstream erosion. Streamflows of ephemeral and intermittent desert streams that are affected by development have been shown to diminish the vibrancy of riparian biological communities and transform floodplains into dry terraces. Although difficult to precisely measure because of a number of variables, groundwater recharge in the arid Southwest may also be affected by ephemeral streams.

In arid environments such as the Sonoran Desert in Arizona, cryptobiotic soil crusts consisting of mosses, algae, microfungi, lichen, and cyanobacteria on and below the soil help stabilize the soil, hold moisture, stimulate plant growth, and fix carbon and nitrogen (Levick et al. 2008). Vegetation occurring in ephemeral stream channels assists with resource retention and ecological processes.

Major Washes and Streams in the Study Area

Washes and streams in the study area generally flow to the southwest and originate from the mountains east and northeast of the study area. Major named washes and streams in the study area include:

- Siphon Draw – Approximately 9 linear miles of Siphon Draw are within the study area. Siphon Draw originates in the Superstition Mountains east of the study area and flows southwest to Roosevelt Canal outside the study area, eventually joining the Gila River. Siphon Draw is approximately 10 to 90 feet wide in the study area.
- Weekes Wash – Approximately 3 linear miles of Weekes Wash are within the study area. Weekes Wash originates in the Goldfield Mountains north of the study area and flows south into Siphon Draw just east of the CAP Canal. Weekes Wash is approximately 15 to 20 feet wide in the study area.
- Queen Creek – Approximately 18 linear miles of Queen Creek are within the study area. Queen Creek originates in the Superstition Mountains east of the study area. Queen Creek flows southwest across the northern portion of the study area, crosses the CAP Canal in the central portion of the study area, and flows into the Gila River approximately 20 miles west of the study area. Sand and gravel mines operate in portions of the Queen Creek streambed. Queen Creek is approximately 50 to 3,300 feet wide in the study area.

- McClellan Wash – Approximately 26 linear miles of McClellan Wash are within the study area. McClellan Wash originates east of the Picacho Mountains, crosses the southern portion of the study area, and flows south toward I-10. It is then diverted northwest along I-10 where the wash spreads into many smaller channels and sheet flow as it meanders through the flat lands of the Eloy area. Constructed diversions direct flows around agricultural fields, but the wash generally flows to the northwest along I-10 to the Santa Rosa Canal. McClellan Wash is approximately 10 to 60 feet wide in the study area.
- Gila River – The Gila River is a 650-mile-long tributary of the Colorado River, to which the other drainage crossings are tributary. Flow in the Gila River is seasonal and intermittent, influenced by upstream diversions for irrigation. Approximately 19 linear miles of the Gila River channel are within the study area.

  The Gila River is the largest linear drainage feature in the study area. The major tributaries include Queen Creek and Siphon Draw, which cross the northern portion of the study area, and McClellan Wash, which crosses the southern portion. Queen Creek and Siphon Draw originate in the Superstition Mountains east of the Phoenix metropolitan area, flow west through the study area, and eventually join the Gila River approximately 20 miles west of the study area. Flow in McClellan Wash originates in the mountains east of the Picacho Mountains, flows along the northern side of I-10, and joins the Gila River just downstream of the study area, although the confluence is not well-defined because of flow dispersion through agricultural areas around Coolidge and Eloy.

  Many sand and gravel mines operate in the Gila River corridor. The locations and extents of potential future mines are unknown at this time. The Gila River flows west across the central portion of the study area and eventually flows into the Colorado River. The Gila River is approximately 300 to 3,500 feet wide in the study area.

The study area is affected by dispersed flows from local subbasins originating in the mountains east of the Phoenix metropolitan area, a number of large FRSs, and impoundment behind embankments at irrigation canals and railroad tracks.

A number of federally mapped floodplains cross the study area: Siphon Draw, four unnamed watercourses north of Queen Creek, Queen Creek, the Gila River, an unnamed watercourse in Florence, Bogart Wash, and McClellan Wash. Impoundments behind the FRSs and irrigation canals are generally mapped by FEMA; however, the embankments are not certified levees or dams and most of the structures have safety or stability issues.

Watershed Descriptions and Flow Characteristics

The proposed action lies in the central portion of the Gila River watershed. The watershed is in the Basin and Range Province, which is characterized by broad, gently sloping alluvial valleys between north-to-south trending mountain ranges. The Gila River is the primary drainage for southern Arizona and the largest tributary to the lower Colorado River. It drains a 57,900-square-mile watershed that extends across Arizona and into New Mexico. Geographic features range from low-elevation desert range land on the west to mountain ranges with peaks over 9,000 feet on the east.

The proposed action crosses the Gila River near Florence, approximately 70 miles downstream of the Coolidge Dam near Globe. Florence is at approximately the center of the middle reach of the Gila River, which extends from the Coolidge Dam to the Salt River confluence west of Phoenix, a 150-mile alluvial reach. Flow from the Upper Gila River into this reach is regulated by the Coolidge Dam, which reduces the effects of frequent floods but does not eliminate the effects of larger floods. The study area is subject to localized flooding and runoff from storms centered over the watershed downstream of Coolidge Dam.

Runoff from the mountains along the eastern side of the Phoenix metropolitan area flows west, crossing the study area all along its length, generally as dispersed or sheet flow. The terrain is typical of an alluvial valley with little relief along the contours and poorly defined drainage ways. A number of large FRSs, irrigation canals, and railroad embankments impede direct runoff. The FRSs include the Powerline FRS, Vineyard FRS, Rittenhouse FRS, Sonoqui Dike, Magma Dam, Florence Dam, and Picacho Reservoir. The canals include the CAP Canal (a 336-mile-long system of aqueducts, pumping plants, and pipes) and various smaller local canals.

The study area is largely downstream of and roughly parallel to the CAP Canal. The canal collects runoff and provides drainage structures for surface flow crossing the canal. The railroad embankments and irrigation canals generally impede the movement of floodwaters from the east, resulting in ponding and shallow flooding along the embankments. The canals are typically oriented nearly parallel to ground contours across portions of the action corridor alternatives. Local canals include the Florence-Casa Grande, Florence, Santa Rosa, and Central Main Canals.

3.12.3.2 Floodplains

A base flood, commonly referred to as a 100-year flood, is caused by a flood with a 1 percent chance of occurring in any given year. The area where it occurs is referred to as the 100-year floodplain.

An encroachment is an action within the limits of the 100-year floodplain. The regulatory floodway is the portion of the floodplain area reserved by federal, state, and/or local requirements in an unconfined and unobstructed manner to provide for discharge of a base flood so that the overall increase in water surface elevation is no more than 1 foot (not a significant increase), as established by FEMA. Development in the floodway is allowed if it can be demonstrated that no rise in the base flood elevation would occur (44 CFR Chapter 1 Part 9.11 [10-1-02 Edition]).

The FEMA Flood Insurance Rate Maps include Special Flood Hazard Areas, which are the 100-year floodplains. These are areas where the National Flood Insurance Program floodplain management regulations must be enforced and where the mandatory purchase of flood insurance applies. Special Flood Hazard Areas applicable to the proposed action are:

- Zone A – Areas inundated by 100-year flood, generally determined using approximate methodologies. Detailed hydraulic analyses have not been performed; therefore, no base flood elevations or depths are shown.
- Zone AE – Areas inundated by 100-year flood that are determined by detailed methodologies. Base flood elevations are shown.

Moderate and minimal flood hazard areas are shown on the Flood Insurance Rate Maps as Zone X shaded and unshaded. Zone X shaded areas are between the limits of the base flood and the 500-year (0.2 percent chance) floodplain. Zone X unshaded areas are outside the Special Flood Hazard Area, higher than the elevation of the 500-year floodplain. Areas in which flood hazards are undetermined, but possible, are shown as Zone D.

The study area crosses ten FEMA 100-year floodplains, including the Gila River and its tributaries. The watercourses include: Siphon Draw, four unnamed watercourses north of Queen Creek, Queen Creek, the Gila River, an unnamed watercourse in Florence, Bogart Wash, and McClellan Wash. All are mapped as Zone A, except McClellan Wash and a 1.5-mile section of the Gila River that are designated as Zone AE with some Zone X shaded areas. FEMA floodways are designated only on the Gila River at the Zone AE mapped area, which extends through the existing SR 79 bridge in Florence.

The areas between the Zone A areas are all Zone X unshaded, except scattered Zone D areas at military property and some Zone X shaded areas near McClellan Wash south of Coolidge. The Zone D areas include the Rittenhouse Air Force Auxiliary Field near Queen Creek and the Florence Military Reservation near the Gila River.

Watercourse Descriptions

GILA RIVER

The Gila River is the largest tributary to the lower Colorado River, with the confluence near Yuma, Arizona. It is approximately 650 miles long. The headwaters are in southwestern New Mexico. The study area is in the central portion of the Gila River watershed, just upstream (east) of the Phoenix metropolitan area. Flow in the Gila River is affected by upstream dams and reservoirs that impound and divert flow for agricultural uses. The main flood control structure is Coolidge Dam, completed in 1928. It is approximately 65 miles east of Florence. The dam impounds flow in the Gila River, forming the San Carlos Reservoir near Globe. The other major structure on the Gila River is the Ashurst-Hayden Diversion structure, 12 miles east of Florence. The structure, completed in 1922, diverts most of the flow from the Gila River to the San Carlos Irrigation and Drainage District canal system that distributes water to users throughout the Phoenix Valley.

The other structure that affects flow in the Gila River through the study area is the SR 79 bridge that crosses the Gila River in Florence. The 1,500-foot-long bridge, just upstream of the proposed action, constricts flow and creates a backwater condition upstream of the bridge. The 100-year discharge in the Gila River at Florence is 66,300 cubic feet per second, according to the Flood Insurance Study. The floodplain width is approximately 1 mile.

POWERLINE FLOODWAY

The Powerline Floodway is the outfall channel for runoff collected by a series of three FRSs in northwestern Pinal County. The Powerline, Vineyard, and Rittenhouse FRSs are earthen dams constructed by the Soil Conservation Service (now NRCS) in the 1960s to protect downstream areas from flooding. The structures, just upstream of the CAP Canal, significantly reduce downstream discharges by impounding runoff. They collect runoff from a 145-square-mile area that originates in the Superstition Mountains. The drainageways include Weekes Wash, Siphon Draw, and several unnamed drainages. Upstream of the study area, the wash alignments are controlled by drainage structures that cross US 60. Downstream of US 60, the drainages spread out on the natural alluvial slopes to where they are collected behind the FRSs approximately 5 miles downstream.

Although located in Pinal County, the three FRSs are owned and operated by the Flood Control District of Maricopa County. The principal outlets from the FRSs discharge to the Powerline Floodway, where they are conveyed to the East Maricopa Floodway and then to the Gila River. The emergency spillways for the FRSs typically discharge to different locations than the primary outlets. The structures are known to have structural and functional deficiencies; the Flood Control District of Maricopa County is proposing improvements to alleviate the hazard posed by the structures.

QUEEN CREEK

Queen Creek is a major drainageway that crosses the study area just south of the Rittenhouse FRS in northwestern Pinal County. Flow in Queen Creek collects behind the Sonoqui Detention Dike just upstream of the CAP Canal. The dike was constructed in 1983 by the Bureau of Reclamation as a part of the CAP Canal to protect the canal from flows in Queen Creek. The dike is owned and operated by CAP.

MCCLELLAN WASH

McClellan Wash is at the southern end of the study area in southwestern Pinal County. It has a watershed area of approximately 420 square miles. This ephemeral wash originates on the eastern side of the Picacho Mountains where it flows south toward I-10. It is then diverted northwest along I-10. West of the Picacho Mountains, McClellan Wash spreads out across flat agricultural fields and is diverted north by the UPRR tracks. A 100-year discharge of 12,960 cubic feet per second is identified in the Flood Insurance Study for McClellan Wash at the CAP Canal. The floodplain width through the study area is approximately 1.5 miles.

Summary of Flooding Risk and Flooding History

Flooding risk is based on the potential for damage during a 100-year or lesser flood. Several factors unrelated to the proposed action may affect flooding risk. These include operation of upstream dams and diversion structures on the Gila River, existing FRSs and embankments along the study area length, and sand and gravel mining activities.

Major flooding may occur along the Gila River when water is released from Coolidge Dam. These releases occur when runoff from the watershed is expected to exceed the capacity of the reservoirs. Flooding may occur as a result of storms in the watershed downstream of the dam.

The *Pinal County Flood Insurance Study* indicates that “the principal flood hazard results from overflow of major rivers during large flood events. This overflow results in inundation of generally wide, flat floodplains, encompassing any residential, commercial, or agricultural development located within them. In addition, the region is subject to intense, short-duration rainfall, resulting in ‘flash floods,’ which rise quickly and cause high-velocity flood flows carrying large amounts of debris and sediment. Erosion of natural and newly created earthen drainage channels adds to the potential hazard from flooding.”

Risk of flooding caused by the potential failure of existing FRSs, dams, and embankments occurs throughout the study area. All of the structures are old, constructed prior to current levee and dam requirements. None of the structures are certified levees or dams and all have features that put them at risk for failure. Some of the structures have had relatively recent evaluations and breach analyses. Some have plans or recommendations to enhance safety and/or function. The major structures are:

- Powerline, Vineyard, and Rittenhouse FRSs, owned and operated by the Flood Control District of Maricopa County
- Sonoqui Diversion Dike and impoundment behind the CAP Canal at various locations, owned and operated by CAP
- Magma Dam, owned and operated by the Magma Flood Control District
- Florence FRS, owned and operated by the Florence Area Watershed Flood Control District
- Picacho Reservoir, owned and operated by the Bureau of Indian Affairs, managed by the San Carlos Irrigation and Drainage District

Canals in the study area typically impound runoff but are not constructed to current levee standards. They may be susceptible to failure that may cause downstream flooding and erosion. The CAP and Santa Rosa Canals were designed as embankments to prevent runoff and sediment from entering the canals. The CAP Canal was designed to collect, impound, and convey flow over the structure. The Santa Rosa Canal is similar, but lacks drainage crossings. Changes in the watershed, including those attributable to subsidence fissures, erosion, and sedimentation, make the canal systems susceptible to failure, which may cause flooding.

3.12.3.3 Groundwater

Groundwater remains a significant component of the overall water supply portfolio throughout Arizona—approximately 43 percent of the total supply. Agriculture accounts for the largest water use throughout the state, or approximately 70 percent of total water use.

Rapid population growth has resulted in the retirement of agricultural land and the conversion of agricultural groundwater supplies to urban supply. Issues created by groundwater overdraft include decreased water levels in aquifers and increased well drilling and pumping costs and, in some areas of severe groundwater depletion, land subsidence. Areas in Maricopa and Pinal Counties have subsided more than 18 feet since the early 1990s. Land subsidence can result in cracks and fissures that can damage roads, building foundations, and underground infrastructure.

To more sustainably manage groundwater in urban areas, ADWR created AMAs to regulate groundwater pumping, including regulating drilling, installation, and abandonment of groundwater wells. ADWR administers groundwater use through implementation of five successive management plan periods that will result in a safe yield by 2025. The AMAs are in their Fourth Management Period (2010 to 2020).

Groundwater Setting and Development

The study area is primarily in two AMAs. The northern half of the study area is in the Phoenix AMA; the southern half is in the Pinal AMA (see Figure 3.12-3 for the boundaries). The far southeastern portion of the study area is in the Tucson AMA, but the proposed action would not cross this AMA.

PHOENIX ACTIVE MANAGEMENT AREA

The study area is within the East Salt River Valley subbasin of the Phoenix AMA. Since 1990, recharge volumes have exceeded withdrawals, primarily because of the cessation of farming (and associated reductions in pumping) and direct use and recharge of CAP Canal water (ADWR 2014a, 2016). Groundwater level trends vary widely across the East Salt River Valley, but portions have seen an excess of a 60-foot rise in groundwater levels, some near the study area.

PINAL ACTIVE MANAGEMENT AREA

The study area is in the Eloy subbasin of the Pinal AMA. Similar to the East Salt River Valley subbasin in the Phoenix AMA, declining agricultural water demands in conjunction with higher use of CAP Canal water have resulted in rising groundwater levels in the central and western portions of the Eloy subbasin (ADWR 2014a, 2014b). However, in the eastern and northern portions of the basin, along the study area, groundwater levels are declining.

Irrigation Districts

Irrigation districts in the study area use groundwater wells and have both surface (canals) and subsurface conveyance (pipes) infrastructure associated with their operations. Irrigation districts directly affect groundwater levels and quality. In districts where groundwater is the primary source of irrigation water, groundwater levels typically drop over time as total withdrawals exceed the net recharge rates. In districts where surface water is imported and used as the primary source of irrigation water, groundwater levels typically rise. Groundwater in agricultural areas is prone to nitrate contamination and salt buildup. The irrigation district boundaries are shown in Figure 3.12-3.

Irrigation districts in the study area are:

- Queen Creek Irrigation and Drainage District has approximately 16,000 acres under irrigation, fed primarily with groundwater and supplemented with CAP Canal supply. The district is in Segment 1 of the study area.

- New Magma Irrigation and Drainage District has approximately 27,000 acres under irrigation, fed primarily with CAP Canal supply and supplemented with groundwater wells. The district is in Segments 1 and 2 of the study area.
- San Carlos Irrigation and Drainage District has approximately 50,000 acres under irrigation, fed primarily with CAP Canal supply and supplemented with groundwater wells. The district is in Segments 3 and 4 of the study area.
- Hohokam Irrigation and Drainage District includes approximately 28,000 acres under irrigation, fed primarily with CAP Canal supply and supplemented with groundwater wells. The district is in Segments 3 and 4 of the study area.
- Central Arizona Irrigation and Drainage District is the largest district in the study area, with approximately 87,600 acres under irrigation, fed primarily with CAP Canal supply and supplemented with groundwater wells. The district is in Segment 4 of the study area.

Groundwater Well Locations

ADWR maintains a database containing annually updated well information. This information was used to identify 831 active groundwater wells in the study area. Figure 3.12-3 shows wells within 0.5 mile of the action corridor alternatives.

Groundwater Recharge Facilities

Groundwater recharge facilities allow providers to store water, typically surface water or wastewater effluent, in the aquifer where it may be recovered for later use. Two primary types of groundwater recharge facilities exist:

1. Underground storage facility (USF) – allows the service provider to directly recharge water, either through percolation basins or injection wells, into the aquifer where it can be banked.
2. Groundwater savings facility (GSF) – allows the service provider to deliver renewable water supply (that is, surface water or wastewater effluent) to a recipient who agrees to stop pumping the corresponding volume of groundwater. This allows service providers to allow groundwater levels to recover while providing previous groundwater customers with renewable supplies.

USFs and GSFs affect groundwater levels and quality differently. USFs tend to create localized groundwater mounds that, over time, take on the water quality characteristics of the water being recharged. In other words, the groundwater would begin to resemble the surface water or effluent. GSFs tend to result in smaller but more widespread increases in water surface elevation that typically retain the water quality signature of the in-situ groundwater. Several USFs and GSFs exist in the study area (Figure 3.12-4).

The influence of the GSF locations on the action corridor alternatives is primarily a surface infrastructure dilemma, that is, irrigation canals that have been installed to replace wells. From a groundwater perspective, it is anticipated that groundwater levels would rise within the GSF areas over time as surface water is imported for irrigation.

Figure 3.12-3. Wells, Active Management Areas, and irrigation districts

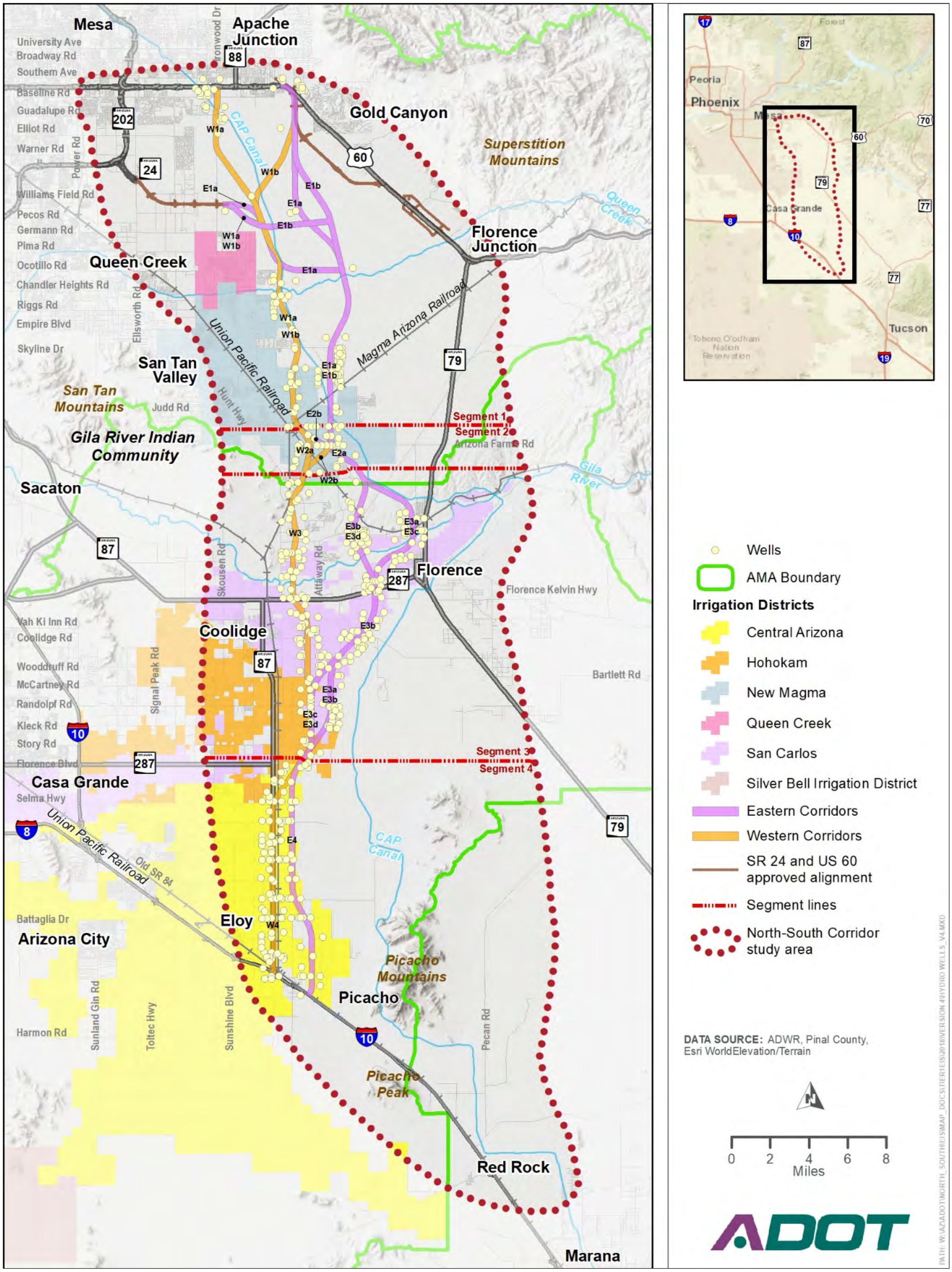
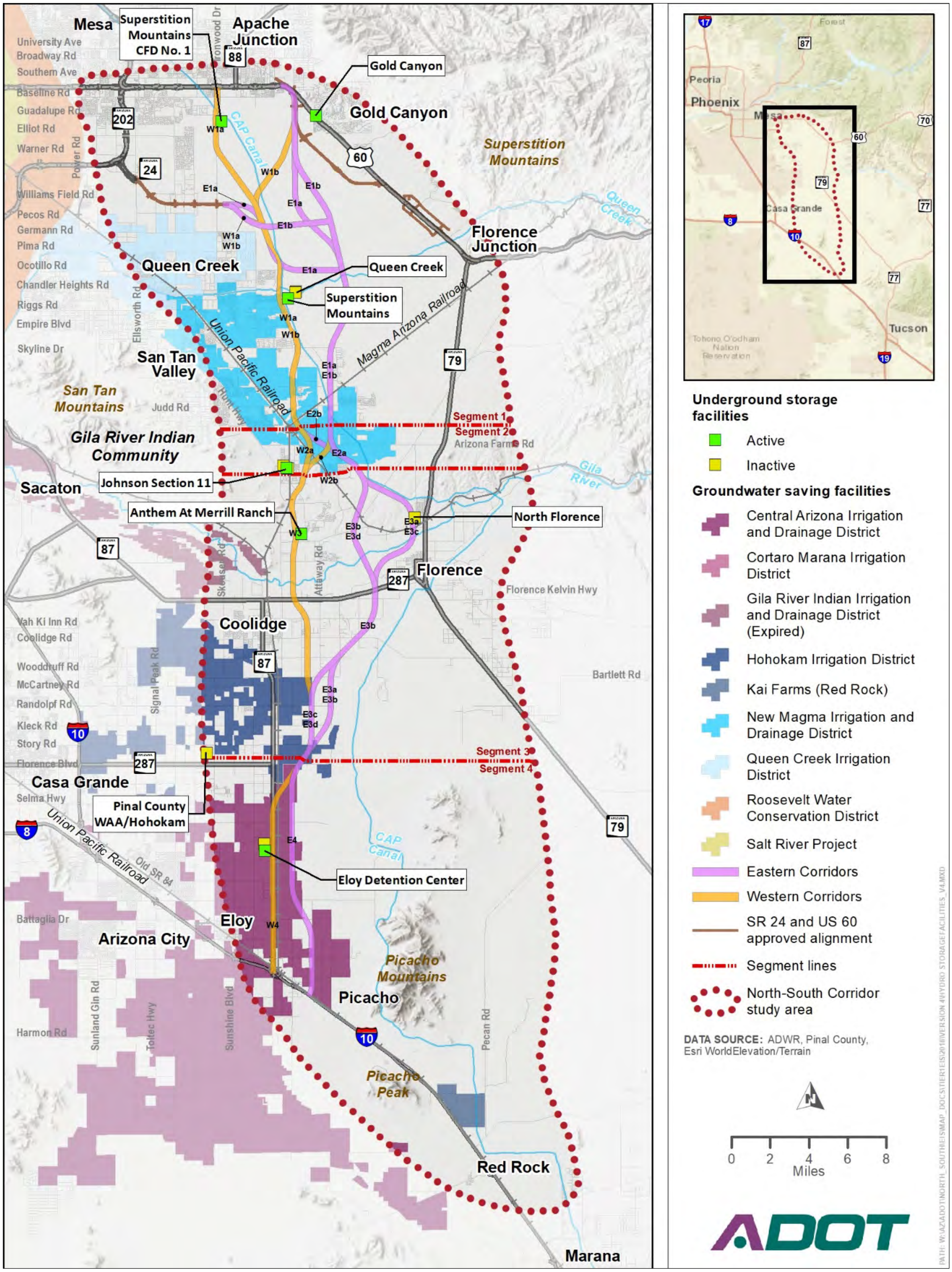


Figure 3.12-4. Underground storage facilities and groundwater saving facilities



Groundwater Quality

The following describes the general groundwater quality in the Phoenix and Pinal AMAs:

- Phoenix AMA – ADWR published water quality data for the Phoenix AMA in April 2010. The water quality data include five sample locations in the study area where ADWR found drinking water standard, or health-based, primary maximum contaminant level exceedances for mercury, lead, cadmium, beryllium, arsenic, and nitrate.
- Pinal AMA – Similar to the Phoenix AMA, ADWR published groundwater quality data for the Pinal AMA. The water quality data included 12 sample locations in the study area where ADWR found health-based primary maximum contaminant level exceedances—mostly for nitrate, but other contaminants included lead, cadmium, arsenic, and fluoride.
- A groundwater quality study for the Pinal AMA was conducted by ADEQ in 2005 to 2006, sampling water from 86 wells (ADEQ 2008). The groundwater quality study revealed that health-based primary maximum contaminant levels were exceeded at 60 of 86 sites, with the most common contaminants being arsenic, fluoride, and nitrate. Aesthetics-based secondary maximum contaminant levels were exceeded at 59 of 86 sites, with the most common contaminants being chloride, sulfate, and total dissolved solids.

Groundwater Levels

Depth to groundwater can affect surface construction projects. Shallow groundwater may require dewatering during construction and may affect the geotechnical design for foundations and the roadway subgrade. Deep groundwater has a less tangible effect on design and construction, but deep groundwater levels coupled with continued declines may indicate ongoing subsidence issues.

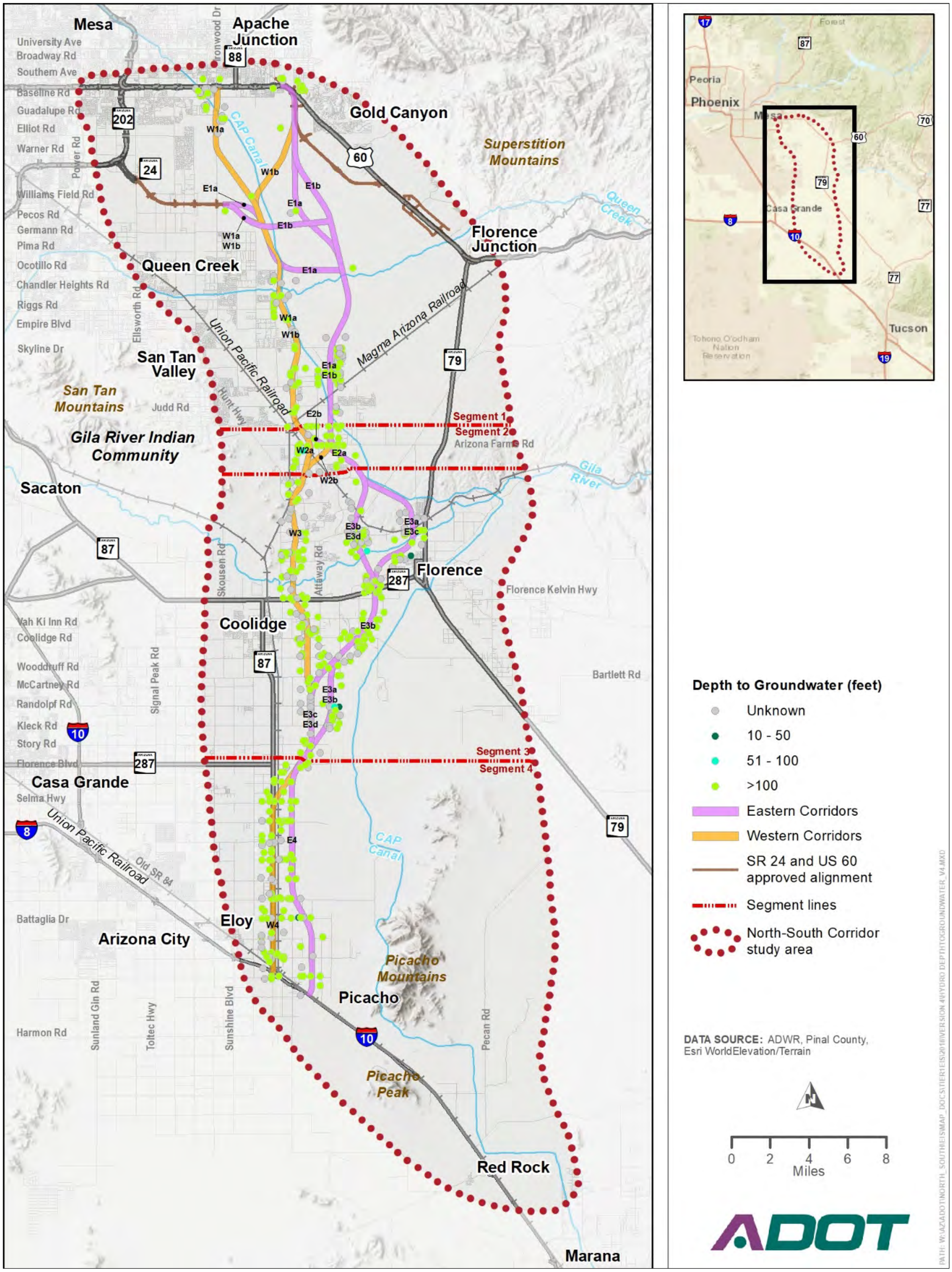
Depth to groundwater data were obtained from the *Arizona Water Atlas Volume 8, Active Management Area Planning Area*, produced by ADWR in April 2010. Depth to groundwater data from active wells in the study area are shown in Figure 3.12-5, and Table 3.12-1 summarizes the depth to groundwater levels for each segment. Additionally, groundwater elevation trends in each of the subbasins were estimated based on information in the *Arizona Water Atlas* (see Volume 8, Figures 8.1-6A and 8.2-6B).

Depth to groundwater is the greatest at the northern and southern ends of the study area, with shallower groundwater in the middle segments where the action corridor alternatives pass through irrigated lands. With the exception of Segment 1, where CAP Canal surface water deliveries have replaced groundwater supplies and groundwater levels are rising, the remainder of the study area is either experiencing stable or declining groundwater levels. Average depth to groundwater in all segments is greater than 200 feet, generally suggesting that shallow groundwater is not likely to pose construction or design challenges.

Table 3.12-1. Summary of depth to groundwater

Segment	Range (feet)	Average (feet)	Average annual change in groundwater elevation in feet per year
1	160–670	435	–3 to +6 (minor decrease northern end of Segment 1, rest of segment experiencing increasing groundwater levels)
2	410–480	440	–3 (declining)
3	90–350	200	–3 to +3 (varies, generally declining in most of segment)
4	160–500	320	–3 to 0 (declining)

Figure 3.12-5. Depth to groundwater



High Groundwater Risks

As shown in Figure 3.12-5, shallow groundwater may be present in two small areas, or groupings of wells, in the study area—both are located in Segment 3, with the first group located near the center of the segment and the second group located farther to the south.

- In the first group near the center of Segment 3, two wells have depth to groundwater of less than 30 feet, and three wells have groundwater levels between 85 and 90 feet deep. The two shallowest wells suggest that groundwater levels in this area may require dewatering and/or enhanced foundation or roadway subgrade design.
- In the second group at the southern end of Segment 3, one well has a depth to groundwater of 50 feet, and two wells have groundwater levels 80 and 85 feet deep. Groundwater levels in this area are generally declining and, while these wells indicate localized high groundwater conditions, no notable impact on the proposed action is likely.

It should be acknowledged that the ADWR depth to groundwater data have not been field verified, and it is possible that the areas of high groundwater may be data anomalies. This is a real possibility because the adjacent wells have depths to groundwater greater than 100 feet. It is recommended that depth to groundwater in these high groundwater risk areas be field verified.

Declining Groundwater Levels and Subsidence Risks

Land subsidence data published by ADWR indicate two subsidence zones are in the study area: Hawk Rock (in Segment 1) and Picacho-Eloy (in Segments 3 and 4). Both areas of subsidence correspond strongly to areas of deep groundwater caused by historical over-pumping. Further discussion is provided in Section 3.10, *Topography, Geology, and Soils*.

Sole Source Aquifer

The southern portion of the study area overlaps the northwestern portion of the Upper Santa Cruz and Avra Basin Sole Source Aquifer designated area (EPA 2018c). The aquifer’s northwestern boundary is generally defined by the eastern side of the Picacho Mountains.

3.12.4 Environmental Consequences

This section describes water resource-related impacts that could result from the proposed action, including increases in sediment loading into receiving watercourses, release of pollutants generated by traffic, and erosion of unprotected banks. It also discusses impacts on floodplains: flooding risks, impacts on natural and beneficial floodplain values, probable incompatible floodplain development, mitigation measures, and alternatives to encroachment.

3.12.4.1 No-Action Alternative

Proposed action-related water quality impacts would not result from the No-Action Alternative. There would be no construction that could create erosion or sediment deposits in existing watercourses or that could alter the existing groundwater. As urban growth continues, traffic volumes would, however, likely increase on existing roadways. As a result, pollutants would continue to be generated by increased traffic on the surrounding road system and be dispersed over a larger area. Storms may cause erosion of exposed soil surfaces and subsequent runoff of sediment-laden water.

The No-Action Alternative would have no impact on floodplains or groundwater in the study area.

3.12.4.2 Action Corridor Alternatives

Potential impacts of the action corridor alternatives are discussed below, with impacts common to all action corridor alternatives discussed first, followed by impacts specific to only certain alternatives.

Surface Water

ACTION CORRIDOR ALTERNATIVES, EASTERN AND WESTERN ALTERNATIVES

The action corridor alternatives are similar with regard to drainage considerations because they would have a similar effect on local runoff and because they would cross the same floodplains, although the locations and configurations differ.

Regardless of the action corridor alternative, pavement for the new freeway would increase the amount of impervious surface area, thereby increasing runoff quantities and peak flows during storms. Because the surface would be impermeable, precipitation on the freeway would run off the pavement to roadside ditches or nearby natural channels. The increased runoff from the new impervious surfaces would increase the transport of pollutants generated by vehicles using the roadway. The pollutants would be transported from the road surface by the initial runoff generated during a storm. The most common impact would be an increase in pollutant loading into receiving waters. The action corridor alternatives would concentrate vehicular traffic and the associated accumulation of pollutants throughout the freeway.

Regardless of the action corridor alternative, the proposed action would cross the Gila River and tributaries, encroaching into several federally mapped floodplains. Runoff would be directed to drainage facilities that ultimately discharge to the Gila River. This runoff could temporarily increase contaminant concentrations in the river or its tributaries during periods of seasonal runoff. The effect of pollutant discharges on water quality would be directly proportional to traffic volumes on the proposed action.

Impacts on surface water (that is, the Gila River or tributaries) would depend on time of year and associated flows. The ephemeral drainageways are dry most of the year. Several FRSs, irrigation district conveyance canals, ditches, and pipelines would be crossed by the action corridor alternatives.

Construction activities such as clearing, grading, trenching, and excavating would disturb soils and sediment. If not managed properly, disturbed soils and sediments can easily be washed into nearby water bodies during storms, where water quality is then reduced.

ACTION CORRIDOR ALTERNATIVES, EASTERN ALTERNATIVES

In addition to the impacts identified as common to all action corridor alternatives, the E1a and E1b Alternatives could affect water quality impounded behind the regional FRSs downstream of the Eastern Alternative. Discharge of pollutants to the ephemeral washes tributary to the structures could result from storms.

The E1a and E1b Alternatives would cross the CAP Canal. The E1b Alternative would cross a regional FRS and encroach on the structure’s storage area.

ACTION CORRIDOR ALTERNATIVES, WESTERN ALTERNATIVES

In addition to the impacts identified as common to all action corridor alternatives, the W1a and W1b Alternatives would cross the CAP Canal and several drainage outfall channels.

Floodplains

ACTION CORRIDOR ALTERNATIVES, EASTERN AND WESTERN ALTERNATIVES

All action corridor alternatives would affect floodplains. Fourteen mapped 100-year floodplains would be affected by the Eastern Alternatives and 11 would be affected by the Western Alternatives. FHWA policies and procedures for locating and designing hydraulic encroachments on floodplains are set forth in 23 CFR Part 650. This section summarizes the evaluation of the action corridor alternatives relative to applicable provisions of those regulations, including flooding risks, impacts on natural and beneficial floodplain values, probable incompatible floodplain development, measures to minimize floodplain impacts, alternatives to encroachment, and the potential for significant encroachment.

All action corridor alternatives would laterally cross the floodplains, except at these locations:

- SR 24 connections for the E1b, W1a, and W1b Alternatives
- Gila River crossings for the E3a and E3c Alternatives
- an unnamed wash crossing on the southern side of the Gila River for the E3a, E3b, E3c, and E3d Alternatives

The above-listed locations would have action corridor alternatives crossing floodplains in a nearly parallel manner, rather than perpendicularly. Otherwise, encroachments are minimized and there would be no longitudinal encroachments. The Gila River has an associated federally mapped floodplain and regulatory floodway through the existing SR 79 bridge. The other floodplains are federally mapped, but, unlike the Gila River, are not associated with a regulatory floodway. There is no alternative to crossing the Gila River or the other floodplains because they form continuous east-to-west features across the study area. All action corridor alternatives would encroach on the floodplains and result in limited flooding risk.

Table 3.12-2 lists estimates of encroachment on FEMA-mapped floodplains for the action corridor alternatives. The estimates assume encroachment on the full width of the 1,500-foot-wide corridor. The encroachment includes all of the mapped floodplain within each action corridor alternative; thus, substantially more area than what the Tier 2 alignment would require (that area occupied by freeway structures and fill needed to create or stabilize these structures) is included. The acreage estimates provide a relative extent of encroachment for each of the action corridor alternatives. The extent of encroachment would be less than that shown in Table 3.12-2, further reducing flooding risk in the study area.

The Gila River floodplain crossings would be on bridges designed for the base flood to minimize impacts. The other encroachments would be either bridges or culverts designed for the base flood. Design modifications that could further mitigate floodplain impacts, if warranted, are typically considered during the design process.

North of the Gila River, the E1a Alternative would have the least overall floodplain encroachment potential, and the W1a Alternative would have the greatest. The difference is largely attributable to the connections with SR 24, which would cross floodplains associated with unnamed washes north of Germann Road. The connection for the E1a Alternative is oriented to cross the floodplains at a perpendicular angle, thereby minimizing the encroachment. The connection for the E1b Alternative would cross parallel to a floodplain, causing a large impact at a single crossing. The floodplain width is, however, considerably narrower than the corridor. The freeway would be located within the corridor outside of the floodplain, with bridge or culvert crossings to minimize encroachments.

None of the action corridor alternatives for Segment 2 would have an appreciable impact on mapped floodplains. South of the Gila River, the Western Alternatives (the W3 and W4 Alternatives) would have the least overall floodplain encroachment potential. The E3b and E3d Alternatives and W3 Alternative have the same overall floodplain encroachment potential associated with the Gila River, although the total floodplain encroachment for the E3b and E3d Alternatives would be greater than the W3 Alternative. The E3a and E3c Alternatives would not cross the Gila River at a perpendicular angle, but rather are oriented parallel with the river in the floodplain and thus would have a major encroachment on the Gila River.

Table 3.12-2. Comparative acreage of floodplain encroachments, action corridor alternatives

Action corridor alternative	Gila River encroachment (acres)	Tributary encroachments (each)	Tributary encroachments (acres)	Total floodplain encroachment (acres)
North-South Corridor at Gila River				
E3a	409	2	58	467
E3b	202	2	62	264
E3c	409	2	58	467
E3d	202	2	62	264
W3	202	2	13	215
North-South Corridor at tributaries				
E1a	—	15	240	240
E1b	—	11	295	295
E2a	—	—	—	—
E2b	—	—	—	—
E4	—	1	257	257
W1a	—	11	301	301
W1b	—	11	248	248
W2a	—	—	—	—
W2b	—	—	—	—
W4	—	—	—	—

RISKS ASSOCIATED WITH ACTION CORRIDOR ALTERNATIVES

Risks are the consequences associated with the probability of flooding attributable to encroachment. This includes potential property loss or hazard to life. The floodplain risks would be minimized for all the action corridor alternatives by minimizing or mitigating the floodplain impacts. The floodplain impacts would be minimized by the freeway alignment that is essentially perpendicular to flow for all crossings except for the following:

- SR 24 connections for the E1b, W1a, and W1b Alternatives
- Gila River crossings for the E3a and E3c Alternatives
- unnamed wash crossing on the southern side of the Gila River for the E3a, E3b, E3c, and E3d Alternatives

The necessary floodplain encroachments would be mitigated by providing drainage structures designed to accommodate the flow. The measures further discussed in Section 3.12.5, *Potential Avoidance, Minimization, and Mitigation Strategies*, would minimize the risks.

IMPACTS ON NATURAL AND BENEFICIAL FLOODPLAIN VALUES

Natural and beneficial floodplain values associated with floodplains include:

- open space
- wildlife habitat and connectivity
- scientific research opportunities
- outdoor recreation
- agriculture
- natural flood control
- mining and industry (building material source)
- water quality maintenance
- groundwater recharge
- natural flood control

The action corridor alternatives would minimize impacts on natural and beneficial floodplain values by minimizing impacts on floodplains. The floodplain impacts would be minimized by the freeway alignment that is essentially perpendicular to flow for all crossings except for the following:

- SR 24 connections for the E1b, W1a, and W1b Alternatives
- Gila River crossings for the E3a and E3c Alternatives
- unnamed wash crossing on the southern side of the Gila River for the E3a, E3b, E3c, and E3d Alternatives

The necessary floodplain encroachments would be mitigated by providing drainage structures designed to accommodate the flow, generally spanning a large portion of the floodplain. The mapped floodplains typically have the largest discharges and would, therefore, have the largest drainage structures, likely bridges or large culverts. The drainage structures would allow wildlife to move freely within the drainages and maximize open space and the other beneficial aspects of floodplains.

SUPPORT OF INCOMPATIBLE FLOODPLAIN DEVELOPMENT

Agriculture, mining, and undeveloped open space dominate the 100-year floodplains. All of the action corridor alternatives would be controlled-access facilities and would cross the 100-year floodplain with structures above the 100-year water surface elevation. The Pinal County Flood Control District enforces floodplain management regulations, with statutory authority as prescribed under A.R.S. §§ 48-3603 and 48-3609. The proposed action would provide improved access to future development, which would be consistent with floodplain regulations. The action corridor alternatives would not contribute to incompatible floodplain development.

MEASURES TO MINIMIZE FLOODPLAIN IMPACTS

The measures described in Section 3.12.5, *Potential Avoidance, Minimization, and Mitigation Strategies*, would be effective in minimizing impacts associated with encroachments into 100-year floodplains.

ALTERNATIVES TO ENCROACHMENT

Potential encroachments into 100-year floodplains are quantified in Table 3.12-2. Encroachment in the floodplains by any of the action corridor alternatives was determined to be unavoidable. Both the Eastern and Western Alternatives would cross the affected floodplains, essentially perpendicular to the floodplains, thereby minimizing encroachments. The exceptions are:

- SR 24 connections for the E1b, W1a, and W1b Alternatives
- Gila River crossings for the E3a and E3c Alternatives

- unnamed wash crossing on the southern side of the Gila River for the E3a, E3b, E3c, and E3d Alternatives

POTENTIAL FOR SIGNIFICANT ENCROACHMENT

Significant encroachment, as defined in 23 CFR 650.105(q), Subpart A, would occur when freeway encroachment and any base floodplain development would involve one or more of the following construction or flood-related impacts:

- interruption or termination of a transportation facility needed for emergency vehicles or one that provides a community’s only evacuation route
- significant risk
- significant adverse effect on natural and beneficial floodplain values

Regardless of action corridor alternative, the proposed action would not have the potential to interrupt or terminate transportation facilities needed for emergency vehicles or emergency evacuation routes. The proposed action would neither create a substantial risk nor adversely affect natural or beneficial floodplain values. Therefore, the proposed action would not have a significant encroachment on floodplains.

ACTION CORRIDOR ALTERNATIVES, EASTERN ALTERNATIVES

In addition to the impacts identified as common to all action corridor alternatives, the E1a Alternative would have the least overall floodplain encroachment potential for the segment north of the Gila River. No mapped floodplains cross the study area in Segment 2; therefore, none of the action corridor alternatives in Segment 2 would affect mapped floodplains. South of the Gila River, the E3b and E3d Alternatives would have the greatest overall floodplain encroachment potential; however, they would have the least potential for encroachment on the floodplain associated with the Gila River. For SR 24, the E1a Alternative would have the least overall floodplain encroachment potential.

ACTION CORRIDOR ALTERNATIVES, WESTERN ALTERNATIVES

In addition to the impacts identified as common to all action corridor alternatives, the W1a and W1b Alternatives would have greater overall floodplain encroachment potential than the E1a Alternative, but less than the E1b Alternative for the segment north of the Gila River. However, it should be noted that these FEMA-mapped floodplains may not reflect the actual area potentially subject to flooding. The mapping does not appear to consider the existing FRSs or outfall structures nor consider proposed improvements to the structures. The impacts for these segments may change in the future if structure improvements planned by the Flood Control District of Maricopa County are made and the floodplains are remapped.

No mapped floodplains cross the study area in Segment 2; therefore, none of the action corridor alternatives in Segment 2 would affect mapped floodplains.

The W3 Alternative would encroach on the floodplain associated with the Gila River, slightly more so than the least impactful E3b and E3d Alternatives. South of the Gila River, the W3 and W4 Alternatives would have the least potential floodplain encroachment. However, the encroachment in the W4 Alternative may be underestimated because the McClellan Wash FEMA mapping ends short of the W4 Alternative and is, therefore, not included in Table 3.12-2. The McClellan Wash flow does cross the E4 Alternative in a poorly defined fashion, and McClellan Wash flow would be affected by the E4 Alternative.

Groundwater

ACTION CORRIDOR ALTERNATIVES, EASTERN AND WESTERN ALTERNATIVES

A substantial portion of the action corridor alternatives is in active agricultural areas where groundwater wells are prevalent. This study has identified 147 wells along the entire length of the Eastern and Western Alternatives that are directly within the 1,500-foot action corridor alternatives. Figure 3.12-6 shows the potentially affected wells, and Table 3.12-3 summarizes affected wells for each action corridor alternative.

Any groundwater well falling within the footprint of the proposed freeway would likely require abandonment of the existing well and drilling/equipping/piping of a new replacement well. It is possible that some groundwater wells within the footprint may be purchased outright without replacement. Well-documented groundwater quality issues in both the Phoenix and Pinal AMAs are primarily related to past agricultural and industrial activities. Given these water quality impacts, prior to drilling replacement wells, it is recommended that historical groundwater quality in those specific areas be reviewed to increase the chances of locating groundwater that meets the water quality standards for which it is intended.

Table 3.12-3. Potentially affected wells

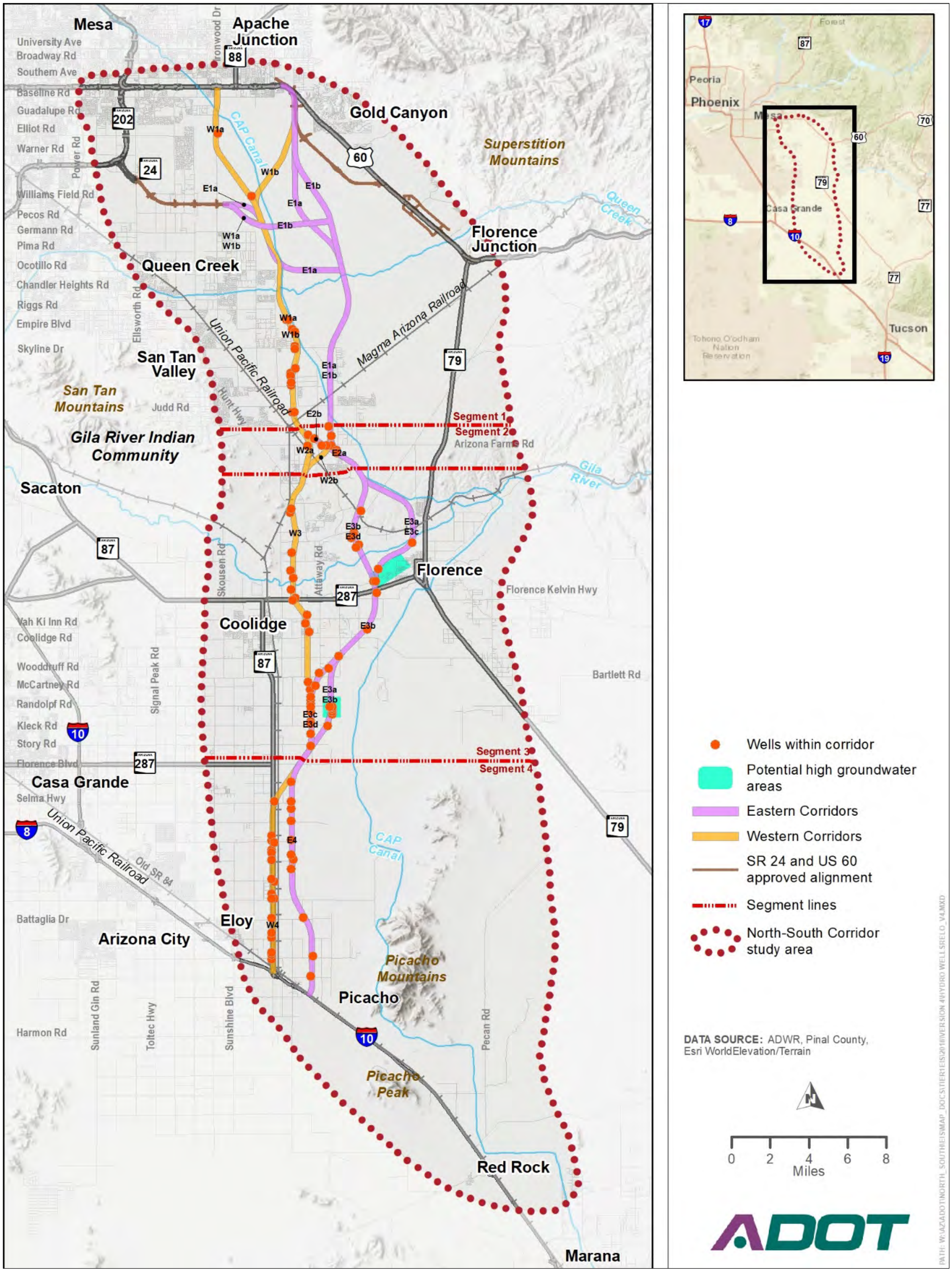
Action corridor alternative	Affected wells	Action corridor alternative	Affected wells
Segment 1		***Segment 3***	
E1a	0	E3a	14
E1b	0	E3b	18
W1a	15	E3c	19
W1b	13	E3d	24
Segment 2		W3	22
E2a	5	***Segment 3***	
E2b	6	E4	11
W2a	2	W4	18
W2b	4		

Other than the direct impact on groundwater wells and widespread agricultural contamination at many locations, no groundwater issues would affect the action corridor alternatives. Groundwater throughout the study area is typically deeper than 200 feet and poses little impact on surface construction. Isolated areas of potential impact are shown in Figure 3.12-6, and those impacts are discussed for each action corridor alternative.

As shown in Figure 3.12-4, Segments 2 and 4 are the most affected by GSFs, both of which have been over-pumped historically and where the average depth to groundwater is now greater than 300 feet. Given the depth of groundwater in these areas, gradual increases in groundwater levels attributable to GSF activities are not anticipated to directly affect any of the action corridor alternatives.

Six active USF sites are in the study area (Figure 3.12-4). Five of the sites—Superstition Mountains Community Facilities District No. 1, Superstition Mountains, Johnson Section 11, Anthem at Merrill Ranch, and the Eloy Detention Center—are near the action corridor alternatives. These facilities are sufficiently far enough away from any action corridor alternative that they fall outside the ROW limits and would not be directly affected.

Figure 3.12-6. Wells with the potential to be relocated and potential high groundwater areas



Regarding the Upper Santa Cruz and Avra Valley Basin sole source aquifer, the action corridor alternatives would not affect the aquifer because the nearest alternatives are approximately 4 miles (E4) and 7 miles (W4) west of the aquifer's northwestern boundary. All action corridor alternatives are located west of the Picacho Mountains, outside of the drainage basin that contributes to the Upper Santa Cruz and Avra Valley Basin sole source aquifer.

ACTION CORRIDOR ALTERNATIVES, EASTERN ALTERNATIVES

Areas of impact along the Eastern Alternatives include:

- Sixty-eight wells fall within the Eastern Alternatives.
- Potential areas of shallow groundwater are along the E3a and E3c Alternatives near Florence and the E3a and E3c Alternatives southeast of Coolidge. It is possible that the groundwater elevation data at these locations are incorrect, and it is recommended that the groundwater depth be field verified during Tier 2 studies.
- In the Picacho-Eloy subsidence zone, the subsidence rate is approximately 1 inch per year, affecting the I-10 connection for the E4 Alternative. There is recorded subsidence of approximately 1 inch per year along the E4 Alternative between I-10 and Arica Road. ADWR data showed areas of fissures in the Picacho-Eloy subsidence zone along the E4 Alternative. Refer to Section 3.10, *Topography, Geology, and Soils*.

ACTION CORRIDOR ALTERNATIVES, WESTERN ALTERNATIVES

Areas of impact along the Western Alternatives include:

- Thirty-five wells fall within the Western Alternatives, mostly along the W3 and W4 Alternatives.
- Subsidence in the Hawk Rock subsidence zone is approximately 0.25 inch per year and primarily affects the W1a and W1b Alternatives. ADWR data showed areas of fissures in the subsidence zone along the W1a Alternative.
- In the Picacho-Eloy subsidence zone, the subsidence rate is approximately 1 inch per year, affecting the I-10 connection for the W4 Alternative. ADWR data showed areas of fissures in the Picacho-Eloy subsidence zone along W3 and W4 Alternatives. Refer to Section 3.10, *Topography, Geology, and Soils*.

3.12.5 Potential Avoidance, Minimization, and Mitigation Strategies

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts. Such strategies for potential impacts on surface water, floodplains, and groundwater are provided in the following sections.

3.12.5.1 Surface Water

None of the action corridor alternatives would completely avoid impacts on water resources because any roadway east of the Phoenix metropolitan area that connects US 60 with I-10 would cross the Gila River and ephemeral washes.

Mitigation strategies for all alternatives include avoidance, minimization, and mitigation. Avoidance can be accomplished by shifting the future construction footprint away from sensitive resources to the extent possible. Impact minimization could be accomplished through temporary best management practices during construction, permanent best management practices after construction, and adherence to federal and state water quality requirements.

Mitigation would be identified to:

- Reduce the quantity of pollutants reaching the Gila and Salt Rivers, if necessary after further investigations during Tier 2 studies.
- Minimize erosion from cut and fill slopes.
- Prevent erosion along conveyance features.
- Provide settling basins to reduce the potential impact of contaminants.
- Obtain an Arizona Pollutant Discharge Elimination System (AZPDES) Construction General Permit.
- In compliance with the Construction General Permit, develop a Stormwater Pollution Prevention Plan that includes best management practices for erosion and sediment control.
- Obtain CWA Section 401 certification by ADEQ.
- Coordinate with governmental agencies, including flood control districts, and the community regarding the design of drainage features.
- Relocate irrigation district canals as necessary to allow conveyance of irrigation water from one side of the freeway to the other.
- Obtain CWA Section 402 permit authorization.
- Comply with State of Arizona Surface Water Quality Standard Rules (18 Arizona Administrative Code 11).
- Coordinate with municipal separate storm sewer system agencies.
- Improve surface water quality when the freeway would be open to operation by properly maintaining retention, detention, and stormwater runoff facilities, if necessary after further investigations during Tier 2 studies.

3.12.5.2 Floodplains

The proposed action would affect floodplains. The Gila River and tributary floodplains extend across the entire width of the study area. None of the action corridor alternatives would completely avoid causing adverse effects because any freeway east of the Phoenix metropolitan area connecting US 60 with I-10 would necessarily encroach into floodplains.

Mitigating 100-year floodplain encroachments would be accomplished by constructing bridge and culvert structures, where appropriate, to accommodate 100-year floodwaters.

Mitigation measures would minimize the potential for property loss or hazard to life. The following measures would minimize impacts on floodplains as a result of the proposed action:

- Design bridges to cross floodplains so that their support piers and abutments do not contribute to a rise in floodwater elevation by more than 1 foot.
- Minimize floodplain impacts by implementing transverse crossings of the floodplains and avoiding longitudinal encroachments.
- Conduct comprehensive analyses of hydrology, hydraulics, sediment transport, and erosion to minimize the impacts of encroachment.
- Provide the Pinal County Floodplain Manager with an opportunity to review and comment on the design plans.
- Base design criteria for on- and off-site drainage on current ADOT guidance.

- Complete comprehensive hydrologic, hydraulic, sediment transport, and erosion-related assessments regarding potential 100-year flood effects associated with ephemeral washes.

3.12.5.3 Groundwater

The proposed action would affect groundwater resources. The following measures would minimize impacts on groundwater as a result of the proposed action:

- Field-verify depth to groundwater in high groundwater risk areas.
- Abandon or replace existing groundwater wells within the proposed ROW, as necessary.
- Prior to drilling replacement wells (for those wells that fall directly in the freeway ROW), review historical groundwater quality data in those specific areas to increase the chances of locating groundwater that meets the water quality standards for which it is intended.

3.12.6 Subsequent Tier 2 Analysis

Surface water, floodplain, and groundwater conditions would be analyzed in the Tier 2 phase. These subsequent analyses would involve investigating the more refined alternatives identified within the boundaries of the action corridor alternatives discussed in this Tier 1 DEIS.

3.12.6.1 Conclusion

Runoff from any implemented action corridor alternative would temporarily increase pollutant loading in surface water drainage during seasonal runoff. The differences in pollutant loading among action corridor alternatives would be minor, and the impacts from pollutant loading would be typical of such impacts experienced throughout the Phoenix metropolitan region's freeway system. Impacts would be effectively mitigated through the AZPDES Construction General Permit, which requires the implementation of a Stormwater Pollution Prevention Plan.

All of the action corridor alternatives cross the Gila River and tributary floodplains, with the W1a (301 acres), E3a/E3c (467 acres), and E4 (257 acres) Alternatives having substantially greater effect on floodplain acreage than would the E1a (240 acres), W3 (215 acres), and W4 (0 acres) Alternatives. Floodplain impacts would be mitigated through elevated crossings of the floodplain, using appropriate bridge and culvert design. Under the No-Action Alternative, continued urbanization in the foreseeable future would likely lead to further encroachment into federally mapped floodplains.

Other than physically relocating wells directly in the proposed freeway's ROW, or purchasing and abandoning such wells, the anticipated impacts on groundwater are minimal. The Western Alternatives pass through a longer section of irrigation districts, which increases the number of groundwater wells (79) affected as compared with the Eastern Alternatives (68). Groundwater throughout the study area is sufficiently deep so as not be affected by surface development of any action corridor alternative. Conversely, with the exception of two potentially high groundwater areas along the Eastern Alternatives, groundwater is not likely to have a direct impact on any action corridor alternatives. It is recommended the depth to groundwater in these two areas be field-verified. The most substantial groundwater-related impacts would be subsidence and fissures that could directly affect the W1a Alternative at the northern end of the study area and the E4 and W4 Alternatives at the southern end. From strictly a groundwater perspective, the Eastern Alternatives are preferred because they would pass through less irrigation district land, would require fewer well replacements, and would experience fewer impacts from subsidence and fissures.

All action corridor alternatives are located several miles west of the Picacho Mountains, outside of the drainage basin that contributes to the Upper Santa Cruz and Avra Valley Basin sole source aquifer. No impacts on the sole source aquifer would occur.

3.13 Waters of the United States

This section describes the existing environment for Waters and potential impacts on those resources as a result of the proposed action. USACE administers Section 404 of the CWA, which regulates the discharge of dredged or fill material into Waters, including wetlands. USACE regulates impacts on Waters primarily through permitting, using nationwide and individual permits. Types of Waters that are regulated include ephemeral washes, intermittent and perennial streams, springs, riverbeds, wetlands, and other special aquatic sites. The physical attributes of a water body are a key component of the Waters determination. The types of activities and impacts on affected Waters are fundamental to the associated permitting requirements and level of appropriate mitigation measures.

Waters are defined in 33 CFR § 328.3; this section defines the term “waters of the United States” as it applies to the jurisdictional limits of the authority of USACE under the CWA. It prescribes the policy, practice, and procedures to be used in determining the extent of USACE’s jurisdiction concerning “waters of the United States.”

The 2015 Clean Water Rule modified the definition, but it is not being implemented in 26 states because of litigation. In Arizona, USACE and EPA are following the Rapanos Guidance that was issued in 2008 (EPA 2019). It is worth noting that the definition is currently under revision by EPA and USACE, and may change in the future.

Ephemeral washes are drainage features that typically convey stormwater during or after storms. The jurisdictional status of an ephemeral wash is determined on a case-by-case basis through a significant nexus determination made in an approved jurisdictional determination.

3.13.1 Regulatory Context

The CWA is the primary federal statute governing discharge of pollutants into Waters, which, in Arizona, include perennial, intermittent, and ephemeral watercourses, their tributaries, and adjacent wetlands. The CWA’s principal goal is to establish water quality standards to restore and maintain the chemical, physical, and biological integrity of Waters by preventing point (concentrated output) and nonpoint (widely scattered output) pollution sources.

Section 404 of the CWA regulates the discharge of earthen fill, concrete, and other construction materials into waterways, and authorizes USACE to issue permits regulating the discharge of dredge or fill material into Waters. The limits of Waters are defined through a preliminary jurisdictional determination or an approved jurisdictional determination accepted by USACE. A preliminary jurisdictional determination assumes all drainages identified in a given area that have the appropriate physical characteristics are subject to USACE’s jurisdiction. An approved jurisdictional determination requires that all drainages display a significant nexus to a downstream traditional navigable water.

Common types of Section 404 permits for transportation projects in Arizona are (1) Nationwide Permit 14 (Linear Transportation Projects), and (2) individual permits, which are required for projects that affect more than a certain defined area of Waters or involve impacts on wetlands. Mitigation may be required to minimize or offset the impacts on Waters with no net loss of functions and values of the water resource Note that mitigation is guided by regulations set forth at 33 CFR Part 332. In Arizona, mitigation usually occurs through the purchase of credits by the permittee from an in-lieu fee program that serves the project’s watershed or ecoregion.

According to CFR 40 Part 230(a), “no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.” This regulation mandates that the least environmentally damaging practicable alternative (LEDPA) is identified as part of the alternatives analysis if an individual permit is required. In a Tier 1 study, it is important that the potential LEDPA is not eliminated with the selection of the preferred alternative.

Section 404 permits require water quality certification as set forth in Section 401 of the CWA prior to discharging fill material into Waters. Section 401 of the CWA requires any applicant requesting a federal permit or license for activities that may result in discharge into Waters to first obtain a Section 401 certification from the state in which the discharge originates. The Section 401 certification verifies that prospective permits comply with the State's applicable effluent limitations and water quality standards. Federal permits or licenses are not issued until the Section 401 certification is obtained. Since the project would be located on non-tribal land, ADEQ would be responsible for the Section 401 certification, which is either conditional or individual. If a project meets criteria for conditional Section 401 certification, notification to ADEQ is typically not required. However, if a project does not meet criteria for conditional certification, such as projects occurring within 0.25 mile of unique or impaired waters, an individual Section 401 certification application to ADEQ is required. The CWA Section 303(d) list identifies those waters that are impaired and indicates the pollutant(s) causing impairment (ADEQ 2007, 2014). Notification to ADEQ also occurs whenever a preconstruction notification to USACE is submitted for a Nationwide Permit.

3.13.1.1 Identification of 303(d) Impaired Waters

Arizona's Integrated 305(b) Water Quality Assessment and 303(d) Listing Report (published biennially) describes the status of surface and groundwater resources in Arizona in relation to State water quality standards. The report is so named because it fulfills requirements of Section 305(b) of the CWA and is based on the requirement to identify waterbodies that do not meet water quality standards. These *water quality limited waters* are waterbodies assessed by ADEQ as having impaired quality that would require more than existing technology and permit controls to achieve or maintain water quality standards for intended uses in accordance with CWA Section 303(d) (ADEQ 2007, 2014).

Section 402 of the CWA presents the National Pollutant Discharge Elimination System (NPDES), which regulates pollutant discharges, including stormwater, into Waters. The NPDES permit sets specific discharge limits for pollutants into Waters and outlines special conditions and requirements for a particular project to reduce impacts on water quality. In 2002, EPA authorized ADEQ to administer the NPDES program at the State level, which is called the AZPDES. AZPDES permits are required for construction activities exceeding 1 acre of ground disturbance and require preparing and implementing a stormwater pollution prevention plan and implementing erosion control best management practices for the protection of Waters.

3.13.2 Methodology

The following activities and guidance documents were used to identify Waters in the study area:

- review of USGS 7.5-minute topographic quadrangles
- desktop review of aerial photography from Google Earth
- *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008a)
- 33 CFR Part 328 and 33 CFR Part 329, Definition of Waters of the United States and Navigable Waters
- *Wetlands Delineation Manual* (USACE 1987)
- USACE regulatory guidance letter (No. 08-02) for jurisdictional delineations, dated June 26, 2008 (USACE 2008b)

- *Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States* (EPA and USACE 2008), memorandum and guidance

3.13.3 Affected Environment

Potential Waters in the study area include ephemeral washes and intermittent streams (characteristic of the region's semiarid climate and landscape). The nearest traditionally navigable water is the Gila River, approximately 75 miles downstream of the study area. As mentioned earlier, ephemeral washes must have a significant nexus to a traditionally navigable water in order to be jurisdictional. When reviewing the discussion of ephemeral washes, note that some may be found to be non-jurisdictional during the Tier 2 phase.

Numerous named and unnamed ephemeral washes exist in the study area. Washes north of the Gila River originate near the Superstition or Goldfield Mountains east and north of the study area. Many of the ephemeral washes north of the Gila River are blocked by the CAP Canal, and water collects behind the canal in retention basins. Larger washes such as the Brady, Bogart, Durham, and Paisano Washes are south of the Gila River and upstream of the CAP Canal; they generally originate near the Tortilla Mountains and flow west into McClellan Wash or across the CAP Canal into the Picacho Reservoir or the Gila River. Some ephemeral channels in the study area lack connections to a downstream water.

The CAP Canal, including a segment called the Salt-Gila Aqueduct, generally runs to the southeast through most of the study area. It turns east in the central portion of the study area across SR 79, passes under the Gila River and then continues to the south, outside the study area. The CAP Canal is a 336-mile-long system of aqueducts, tunnels, pumping plants, and pipelines constructed by the Bureau of Reclamation. In the study area, it passes through undeveloped desert and agricultural fields and creates an east-to-west barrier for many of the small ephemeral washes. The CAP Canal is not a Water.

Other named canals in the study area, some of which could be potential Waters depending on their functional status and connection with Waters, include the North Side, Central Main, Florence, Pima Lateral, Hohokam Lateral, and Casa Grande Canals. These canals would be evaluated for their status as Waters through a jurisdictional delineation for the Tier 2 study.

The USFWS National Wetland Inventory database identifies freshwater emergent and freshwater forested/shrub wetlands in the study area along the Gila River. The database also identifies freshwater ponds throughout the study area. These ponds are generally livestock tanks, and many provide a connection to potential Waters (primarily ephemeral washes). These ponds and wetlands may also be considered Waters and would be evaluated during the jurisdictional delineation for the Tier 2 study. Based on the field review, however, no wetland vegetation was present.

3.13.4 Environmental Consequences

This section describes impacts on potential Waters, including ephemeral and intermittent streams, that could result from the No-Action Alternative and the action corridor alternatives. Potential Waters in the study area are based on drainages identified on USGS topographic maps and review of aerial photographs that indicate the presence of a well-defined channel.

3.13.4.1 No-Action Alternative

The No-Action Alternative would not result in direct impacts on Waters.

3.13.4.2 Action Alternatives

All action corridor alternatives would cross the Gila River, Queen Creek, and unnamed ephemeral washes. Impacts associated with all action corridor alternatives would likely include placement of fill into potential Waters. Effects on potential Waters within the action corridor alternatives may include channel realignment, placement of culverts, placement of facility structures such as piers, or runoff from the freeway, as addressed in Section 3.12, *Hydrology, Floodplains, and Water Resources*. The roadway drainage system would channel minor washes to major washes. Transverse crossings over major washes would be constructed using culverts to convey stormwater beneath the roadway or under bridges. Temporary construction zones may result in additional impacts on Waters.

The action corridor alternatives are 1,500 feet wide, and the freeway ROW would typically be narrower—located somewhere within the larger action corridor alternative. Impacts on potential Waters were evaluated based on the average widths of the potential Waters within each action corridor alternative, the width of the action corridor alternatives, and the amount of fill that is anticipated for road and bridge crossings. Figure 3.13-1 shows potential Waters, and Table 3.13-1 lists estimates of the number of jurisdictional features that each action corridor alternative would cross, by segment.

Segment 1

Segment 1 includes the CAP Canal, Weekes Wash, Siphon Draw, Queen Creek, Cottonwood Creek, their unnamed ephemeral tributaries, livestock tanks, freshwater ponds, and an unnamed canal along the Magma Arizona Railroad. All of the Segment 1 action corridor alternatives would cross Queen Creek and other potential Waters. Weekes Wash and Cottonwood Creek would not be affected by the Segment 1 action corridor alternatives. The Eastern Alternatives would cross more potential Waters than the Western Alternatives.

With regard to the SR 24 connection, the E1a Alternative would likely have less impact on Waters than the E1b, W1a, and W1b Alternatives because it would cross ephemeral washes in that area in a more perpendicular manner.

Segment 2

Segment 2 includes the CAP Canal, Magma Dam, unnamed canals, livestock tanks, freshwater ponds, and unnamed ephemeral tributaries. All of the Segment 2 action corridor alternatives would cross potential Waters. The Eastern Alternatives would cross approximately the same number of potential Waters as the Western Alternatives. The CAP Canal would not be affected by the Segment 2 action corridor alternatives.

Segment 3

Segment 3 includes the CAP Canal, North Side Canal, Pima Lateral Canal, Florence Casa Grande Canal, Hohokam Lateral, unnamed canals, livestock tanks, freshwater ponds, the Gila River, National Wetland Inventory-identified freshwater ponds along the Gila River, Little Gila River, Bogart Wash, Paisano Wash, McClellan Wash, and unnamed ephemeral washes. Any of the Segment 3 action corridor alternatives would cross the Gila River and other potential Waters, including livestock ponds. The CAP Canal and Paisano Wash would not be affected by the Segment 3 action corridor alternatives. The Eastern Alternatives would cross more potential Waters than the Western Alternatives.

With regard to the Gila River crossing, the E3b and E3d Alternatives would have the least potential impact, although the W3 Alternative's potential impact would be only minimally greater. The E3a and E3c Alternatives would cross the Gila River in a nearly parallel manner, rather than perpendicularly, and thus would potentially have greater impacts on that Water. South of the Gila River, the E3a, E3b, E3c, and E3d Alternatives would also cross an unnamed wash in a nearly parallel manner, resulting in potentially greater impacts than the W3 Alternative.

Figure 3.13-1. Potential waters of the United States

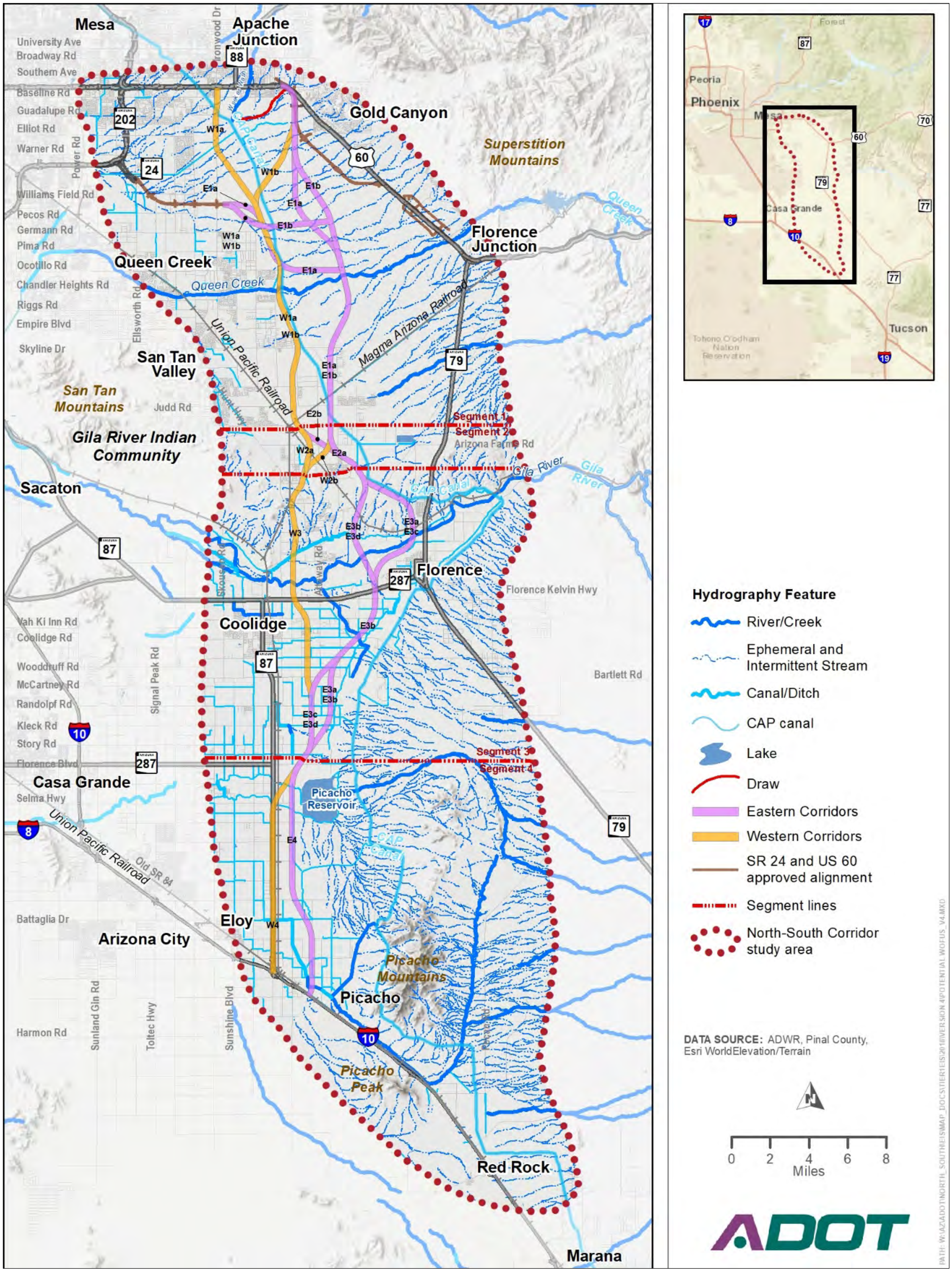


Table 3.13-1. Potential waters of the United States within the action corridor alternatives

Action corridor alternative	Potential waters of the United States (including livestock tanks)	Total drainage crossings
Segment 1		
E1a	27–29 ephemeral wash crossings, including Siphon Draw; Queen Creek; 4–6 freshwater (livestock) ponds; Central Arizona Project Canal	33–37
E1b	22–24 ephemeral wash crossings, including Siphon Draw; Queen Creek; 3–5 freshwater (livestock) ponds; Central Arizona Project Canal	27–31
W1a	16–18 ephemeral wash crossings, including Siphon Draw; Queen Creek; 4–6 freshwater (livestock) ponds; 3–4 unnamed canals; Central Arizona Project Canal	25–30
W1b	17–19 ephemeral wash crossings; Queen Creek; 3–5 freshwater (livestock) ponds; 3–4 unnamed canals; Central Arizona Project Canal	25–30
Segment 2		
E2a	1–3 ephemeral wash crossings	1–3
E2b	1–3 ephemeral wash crossings	1–3
W2a	1–3 ephemeral wash crossings	1–3
W2b	1–3 ephemeral wash crossings	1–3
Segment 3		
E3a	10–12 ephemeral wash crossings, including Bogart Wash; Gila River; 1–2 freshwater and/or livestock ponds; 18–20 unnamed canals	30–35
E3b	5–7 ephemeral wash crossings, including Bogart Wash; Gila River and 1–2 associated National Wetland Inventory ponds; North Side Canal; 17–19 unnamed canals	25–30
E3c	13–15 ephemeral wash crossings, including Bogart Wash; Gila River; 1–2 freshwater (livestock) ponds; North Side Canal; 15–17 unnamed canals	31–36
E3d	13–15 ephemeral wash crossings, including Bogart Wash; Gila River and 1–2 associated National Wetland Inventory ponds; North Side Canal; 15–17 unnamed canals	31–36
W3	9–11 ephemeral wash crossings; Gila River and 1–2 associated National Wetland Inventory ponds; North Side Canal; 11–13 unnamed canals	23–28
Segment 4		
E4	1–3 ephemeral wash crossings; McClellan Wash; 2–3 freshwater (livestock) ponds; 10–12 unnamed canals	14–19
W4	1–3 ephemeral wash crossings; McClellan Wash; 5–7 unnamed canals	7–11

Segment 4

Segment 4 includes the CAP Canal; Picacho Reservoir; Casa Grande Canal; Florence Casa Grande Canal extension; the McClellan, Brady, Tom Mix, Bogard, Durham, and Suizo Washes; freshwater ponds; and other unnamed ephemeral washes. Any of the Segment 4 action corridor alternatives would cross McClellan Wash and other potential Waters. The CAP Canal and the Brady, Bogard, Tom Mix, and Durham Washes would not be affected by the Segment 4 action corridor alternatives. The Eastern Alternative would cross approximately the same number of potential Waters as the Western Alternative.

Regarding the McClellan Wash crossing, the E4 Alternative would cross the wash at a point where it is more constrained.

3.13.5 Potential Avoidance, Minimization, and Mitigation Strategies

It is anticipated that none of the action corridor alternatives would completely avoid potential Waters because any freeway corridor would cross the Gila River, Queen Creek, and numerous ephemeral washes. Crossing potential Waters was evaluated during the alternatives analysis for the proposed action (see Chapter 2, *Alternatives*, and Chapter 6, *Evaluation of Alternatives*).

There is a risk of impacts on Waters with both the Eastern and Western Alternatives; therefore, either a Section 404 CWA Nationwide Permit 14 (Linear Transportation Projects) with preconstruction notification or an individual permit from USACE and the respective Section 401 certification from ADEQ would be required. ADOT would comply with all terms and conditions of the CWA permitting as established by USACE.

If an individual permit under Section 404 of the CWA would be required, ADOT would follow Section 404(b)(1) guidelines. Under Section 404(b)(1), ADOT is required to select the LEDPA, considering cost, existing technology, and logistics to identify practicable alternatives, as well as the environmental impacts of alternatives that would avoid the Waters, in light of overall project purposes (40 CFR Part 230). According to Section 404(b)(1), when avoidance of Waters would not be practicable, minimization of impacts would be achieved and unavoidable impacts would be mitigated to the extent reasonable and practicable.

The avoidance, minimization, and mitigation strategies identified in Section 3.12, *Hydrology, Floodplains, and Water Resources*, present the actions ADOT would take with regard to mitigating and reducing the impact of the proposed action on surface water and floodplains. In addition to these strategies, the following steps would be taken by ADOT should a Section 404 individual permit be required:

- minimize impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts
- rectify impacts by repairing, rehabilitating, or restoring the affected environment
- reduce impacts over time by preservation and maintenance operations during the life of the action
- compensate for impacts by replacing, enhancing, or providing substitute resources or environments

The general and special conditions of any Section 404 permit would be followed during construction.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.13.6 Subsequent Tier 2 Analysis

During the Tier 2 analysis, a preferred alternative would be identified with a specific alignment for the freeway that avoids Waters as much as possible and minimizes impacts where avoidance is not feasible. During this analysis, a jurisdictional delineation would be conducted and submitted to USACE to determine the extent of Waters within the preferred alternative. The jurisdictional delineation would include a desktop review followed by a site visit to document Waters within the preferred alternative alignment. In locations where the Tier 2 alignment may cross Waters perpendicularly, design options to span the crossing would be considered and prioritized to avoid the need for dredged or fill materials in the Water. If it is anticipated that there would be more than 0.5 acre of Waters affected with the preferred alignment and an individual permit is required, an alternatives analysis would be conducted to show that the preferred alternative is, in fact, the LEDPA, since an individual permit can be issued only for the LEDPA. The alternatives analysis would follow Section 404(b)(1) guidelines and would include:

- need and purpose of the action
- description of alternatives
- description and analysis of alternatives for practicability
- identification of the LEDPA
- determination of the LEDPA

During the Tier 2 study, the Selected Alternative would be evaluated for impacts on Waters and the appropriate Section 404 permit application would be prepared for the Selected Alternative. The application would be submitted to USACE for approval, and mitigation to offset impacts on Waters would be identified.

3.13.6.1 Conclusion

Under the No-Action Alternative, no impacts on Waters related to the proposed action would occur; however, continuing urban development associated with projected growth in the region and study area would continue to affect Waters.

The Western Alternatives would affect the fewest potential Waters; however, during the Tier 2 study, potential impacts on Waters would be evaluated and the LEDPA, after considering cost, existing technology, and logistics, in light of overall project purposes, would be identified within the selected corridor, should an individual permit be required. For the proposed action, permits would be required under Sections 404 and 401 of the CWA. CWA permitting would be completed during the freeway design phase. ADEQ would issue Section 401 certification for compliance with water quality prior to Section 404 permit issuance. The general and special conditions of the Section 404 permits would minimize impacts on Waters to the extent practicable.

3.14 Cultural Resources

This section describes potential impacts on cultural resources that could result from the proposed action.

A cultural resource is a definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural resources include prehistoric and historic sites; historic buildings, structures, objects, districts, and landscapes; and properties that are associated with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community. This evaluation is based on inventories of archaeological and historical resources and places of traditional cultural importance. See Section 3.19, *Section 4(f) and Section 6(f) Resources*, for a discussion of potential impacts on historic sites afforded protection under Section 4(f).

3.14.1 Regulatory Context

3.14.1.1 National Environmental Policy Act

Section 101(b)(4) of NEPA (42 USC § 4321 et seq.) stipulates that federal agencies work to preserve not only the natural environment but also historic and cultural aspects of our nation's heritage. The cultural environment includes those aspects of the physical environment that relate to human culture and society, along with the institutions that form and maintain communities and link them to their surroundings (King and Rafuse 1994). Agency and public scoping for the NSCS identified three components of the cultural environment that are of concern: (1) archaeological sites; (2) historic districts, buildings, and structures; and (3) traditional cultural resources and life ways.

3.14.1.2 National Historic Preservation Act

Section 106 of the NHPA, as amended (54 USC § 300101 et seq.), requires federal agencies to take the effects of their undertakings on historic properties into account and to afford the State Historic Preservation Office (SHPO) or Tribal Historic Preservation Officer and other consulting parties an opportunity to comment on such undertakings. Regulations for Protection of Historic Properties (36 CFR § 800) implement Section 106 of the NHPA. These regulations define a process for responsible federal agencies to consult with the SHPO or Tribal Historic Preservation Officer, Native American groups, other interested parties, and, when necessary, the Advisory Council on Historic Preservation to ensure that historic properties are duly considered as federal projects are planned and implemented. Historic properties are cultural resources that are included in or eligible for inclusion in the NRHP. ADOT is the lead agency responsible for Section 106 compliance for the NSCS.

To be determined eligible for inclusion in the NRHP, a cultural resource must meet three main standards: age, integrity, and significance. To meet the age criterion, the resource generally must be at least 50 years old, although younger properties may be considered for inclusion if they are of exceptional importance. Integrity is the ability of a cultural resource to convey its significance. To meet the integrity criterion, the resource must possess the applicable aspects of integrity, which may include location, design, setting, materials, workmanship, feeling, and association. Finally, the resource must be significant according to one or more of the following criteria:

Criterion A: be associated with events that have made a significant contribution to the broad patterns of our history

Criterion B: be associated with the lives of persons significant in our past

Criterion C: embody the distinctive characteristics of a type, period, or method of construction; or represent the work of a master; or possess high artistic values; or represent a significant distinguishable entity whose components may lack individual distinction

Criterion D: have yielded, or may be likely to yield, information important in prehistory or history.

Section 106 Consultation

Table 3.14-1 summarizes the Section 106 consultation efforts for the NSCS. Letters were sent to agencies and/or Native American tribes on the dates listed in the table, which also lists the topic of the letters. For additional details and the consultation letters, refer to Appendix J, *Section 106 Consultation*.

Table 3.14-1. Section 106 consultation

Date	Topic
2/17/2011	Initiation of Section 106 consultation
6/28/2011	Class I cultural resources overview report
9/9/2011	Class I cultural resources overview report (additional letter to Center for Desert Archaeology)
11/16/2011	Traditional cultural property inquiry
2/3/2014	Approach for addressing traditional cultural properties
4/7/2014	Follow-up correspondence (by email) regarding approach for addressing traditional cultural properties
9/3/2015	Traditional cultural property overview report and technical summary report
4/18/2016	Traditional cultural property technical summary report
6/22/2016	Revised versions of traditional cultural property overview and technical summary reports
3/15/2017	Supplemental Class I cultural resources overview and built environmental reports
3/23/2017	Class III cultural resources survey report
4/17/2017	Response to letter from Gila River Indian Community Tribal Historic Preservation Office regarding consulting parties
9/13/2017	Revised version of Class III cultural resources survey report
9/28/2017	Built environment inventory report
10/24/2017	Memorandum regarding AZ U:14:73(ASM) (Site 73)
11/2/2017	Traditional cultural property evaluation
2/26/2018	Invitation to additional agencies to participate in Section 106 consultation

Traditional Cultural Properties

Amendments to NHPA in 1980 resulted in NRHP Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (TCPs). TCPs are properties that have heritage value for contemporary communities and are eligible for the NRHP because of their association with historic cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the community's continuing cultural identity. This category of resources can encompass archaeological resources, structures, neighborhoods, prominent topographic features, habitat, plants, animals, and minerals that people consider essential for the preservation of a traditional culture. A TCP is ascribed an intangible cultural element or value that is linked to a specific geographic location.

3.14.1.3 State Preservation Laws

In addition to other federal laws (for example, Archaeological Resources Protection Act of 1979, Native American Graves Protection and Repatriation Act of 1990), a project may also need to comply with state preservation laws including the State Historic Preservation Act of 1982 (A.R.S. §§ 41-861 and 41-864) and the Arizona Antiquities Act (A.R.S. §§ 41-841 to 41-847). The State Historic Preservation Act stipulates that state agencies work to identify and preserve historic properties and states that the chief administrator of each state agency is responsible for the preservation of historic properties that are owned or controlled by the agency. It also states that each state agency shall establish a program to locate, inventory, and nominate to the Arizona Register of Historic Places all properties that are under the agency's ownership or control and that appear to meet the criteria for inclusion on the register, and shall provide the Arizona SHPO an opportunity to comment on any agency plans that affect properties listed or that may qualify for inclusion on the Arizona Register of Historic Places. The Arizona Antiquities Act prohibits excavation of historic or prehistoric sites on lands owned or controlled by the State of Arizona, any agency or institution of the state, or any county or municipal corporations in the state without obtaining the written permission of the director of the Arizona State Museum (ASM), and directs those in charge of activities on such lands to notify the ASM director of the discovery of any archaeological sites, historical resources, and human remains in coordination with the SHPO.

3.14.2 Methodology

This evaluation used cultural resource data compiled through inventories of archaeological resources (Stewart and Brodbeck 2017), built environment resources (historic buildings and structures) (Brodbeck 2018), and TCPs (Darling 2016, 2017) prepared for the action corridor alternatives. Because specific freeway alignments have not been selected within the action corridor alternatives, an area of potential effects was not defined—nor were specific effect findings made—during this Tier 1 analysis. This Tier 1 evaluation identifies the known historical properties and cultural and historical resources in the action corridor alternatives and assesses potential impacts on those resources.

3.14.3 Affected Environment

This Tier 1 DEIS is evaluating 1,500-foot-wide action corridor alternatives. The locations of the actual alignments within the action corridor alternatives are not known and would be identified during subsequent Tier 2 evaluations. ADOT would develop project-specific areas of potential effects during the Tier 2 evaluation in consultation with the consulting parties as the projects are proposed and developed.

3.14.3.1 Archaeological Resources

The Class I inventory of archaeological resources within the action corridor alternatives identified 157 previous archaeological surveys and 86 previously recorded archaeological sites (Stewart and Brodbeck 2017). The archaeological sites are distributed across the action corridor alternatives, with noticeable concentrations of sites near the Gila River, Queen Creek, and Picacho Reservoir. A wide variety of site types was identified in the inventory, representing a range of settlement, subsistence, economic, and traditional cultural uses of the landscape. Prehistoric archaeological site types documented in the action corridor alternatives include artifact scatters, artifact scatters with features, artifact scatters with rock piles, lithic scatters, habitations, canals, and rock features. Historical archaeological site types documented in the action corridor alternatives include artifact scatters/trash dumps, artifact scatters with features, irrigation canals and ditches, and abandoned roads. Multicomponent sites have overlapping combinations of prehistoric and historical archaeological site types.

No archaeological sites in the action corridor alternatives are listed on the NRHP. Thirty-eight are determined eligible with SHPO concurrence, or recommended eligible by the recorders, for listing on the

NRHP. Eighteen sites are determined ineligible or recommended ineligible for listing on the NRHP. Thirty archaeological sites need further testing or are unevaluated.

Approximately 32 percent of the action corridor alternatives was previously surveyed. The distribution of sites in the action corridor alternatives depends, in large part, on the prior survey coverage. Large swaths of many of the action corridor alternatives have yet to be surveyed for archaeological resources. Thus, the absence of cultural resources does not necessarily mean that no cultural resources would be found through future surveys.

An important factor to consider when comparing impacts on archaeological sites among the action corridor alternatives is that the number of NRHP-eligible sites present does not always equate to the level of significance. For example, one large habitation site with human burials could, and mostly likely would, have higher cultural sensitivity than multiple small, sparse artifact scatters representing limited activity areas. Furthermore, the numbers of sites and types of sites present must be balanced with the percentage of the action corridor alternatives surveyed. As an example, the W1a and W1b Alternatives have 60 percent survey coverage, whereas the other action corridor alternative segments all have less than 50 percent coverage. Thus, the full range of impacts on archaeological sites is not known at the Tier 1 level. Class III full-coverage surveys of proposed freeway alignments would be performed at the Tier 2 level. Table 3.14-2 summarizes the known archaeological sites, by action corridor alternative.

Table 3.14-2. Archaeological sites, by action corridor alternative

Action corridor alternative	Acres[a]	Survey coverage[b] (%)	# of sites	Site types[c]	NRHP eligibility[d]
Segment 1					
E1a	4,883	20	15	8 prehistoric artifact scatters 4 prehistoric artifact scatters with features 1 prehistoric habitation 2 multicomponent sites	3 NRHP-eligible 4 NRHP-ineligible 8 not evaluated
E1b	4,451	22	11	7 prehistoric artifact scatters 2 prehistoric artifact scatters with features 1 prehistoric habitation 1 multicomponent site	3 NRHP-eligible 2 NRHP-ineligible 6 not evaluated
W1a	3,614	60	12	5 prehistoric artifact scatters 2 prehistoric artifact scatters with features 1 prehistoric habitation 1 prehistoric canal 1 historic canal 2 multicomponent habitation sites	7 NRHP-eligible 2 NRHP-ineligible 3 not evaluated
W1b	3,664	60	21	10 prehistoric artifact scatters 4 prehistoric artifact scatters with features 2 habitation sites 1 prehistoric canal 1 historic ditch 3 multicomponent sites	14 NRHP-eligible 4 NRHP-ineligible 3 not evaluated
Segment 2					
E2a	514	25	0	No sites	No sites
E2b	669	20	0	No sites	No sites
W2a	479	5	0	No sites	No sites
W2b	561	5	0	No sites	No sites

Table 3.14-2. Archaeological sites, by action corridor alternative

Action corridor alternative	Acres[a]	Survey coverage[b] (%)	# of sites	Site types[c]	NRHP eligibility[d]
Segment 3					
E3a	3,369	37	23	4 prehistoric artifact scatters 1 prehistoric lithic scatter 11 prehistoric artifact scatters with rock piles 2 prehistoric habitations 2 historic artifact scatters 1 historic artifact scatter with features 2 multicomponent sites	14 NRHP-eligible 3 NRHP-ineligible 6 not evaluated
E3b	3,018	46	18	10 prehistoric artifact scatters 2 prehistoric artifact scatters with rock piles 1 prehistoric habitation 1 historic canal 1 historic artifact scatter with features 3 multicomponent sites	10 NRHP-eligible 5 NRHP-ineligible 3 not evaluated
E3c	3,389	36	23	9 prehistoric artifact scatters with rock piles 5 prehistoric artifact scatters 1 prehistoric lithic scatter 1 rock feature 2 prehistoric habitations 2 historic artifact scatters 1 historic artifact scatter with features 2 multicomponent sites	12 NRHP-eligible 5 NRHP-ineligible 6 not evaluated
E3d	3,038	46	18	10 prehistoric artifact scatters 2 prehistoric artifact scatters with rock piles 1 prehistoric habitation 1 historic artifact scatter 1 historic canal 3 multicomponent sites	10 NRHP-eligible 5 NRHP-ineligible 3 not evaluated
W3	2,760	35	8	4 prehistoric artifact scatters 1 prehistoric artifact scatter with features 1 prehistoric habitation 2 unnamed historic dirt roads	3 NRHP-eligible 2 NRHP-ineligible 3 not evaluated
Segment 4					
E4	2,280	27	5	2 prehistoric artifact scatters 1 prehistoric lithic scatter 1 Archaic-period campsite 1 multicomponent site	5 not evaluated
W4	2,088	40	7	5 prehistoric artifact scatters 1 prehistoric habitation 1 multicomponent site	5 NRHP-eligible 2 not evaluated

Note: NRHP = National Register of Historic Places
[a] total acres in action corridor alternative [b] approximate [c] Multicomponent sites have both prehistoric and historical period components.
[d] NRHP eligibility determined by the Federal Highway Administration in consultation with the State Historic Preservation Office.

3.14.3.2 Historic Built Environment Resources

The historic built environment inventory for the action corridor alternatives addressed historic buildings, structures, and districts (Brodbeck 2018). Buildings and structures constructed prior to 1975 were included in the inventory, which accounts for a 50-year window, from 1975 to 2025 (in anticipation of future Tier 2 projects). Property parcels that extend into the action corridor alternatives that contain historic built environment resources outside the corridor were included in the analysis so that indirect effects from potential ROW acquisitions could be considered. Table 3.14-3 lists the built environment properties, by action corridor alternative.

Table 3.14-3. Built environment resources, by action corridor alternative

Action corridor alternative	Property type	NRHP eligibility
Segment 1		
E1a	1 highway 1 railroad	2 NRHP eligible
E1b	1 highway 1 railroad	2 NRHP eligible
W1a	1 highway 1 railroad 1 residence	2 NRHP eligible 1 NRHP ineligible
W1b	1 highway 1 railroad 1 residence	2 NRHP eligible 1 NRHP ineligible
Segment 2		
E2a	2 residences	2 not evaluated
E2b	2 residences	2 not evaluated
W2a	1 railroad	1 NRHP eligible
W2b	1 railroad	1 NRHP eligible
Segment 3		
E3a	8 residences 5 residential farmsteads 4 utility buildings 2 canals 1 highway 1 railroad 1 residential farmstead/dairy	4 NRHP eligible 10 NRHP ineligible 8 not evaluated
E3b	6 residences 5 residential farmsteads 4 utility buildings 2 canals 1 highway 1 railroad 1 residential farmstead/dairy	4 NRHP eligible 8 NRHP ineligible 8 not evaluated
E3c	4 residential farmsteads 2 canals 2 residences 2 utility buildings 1 highway 1 railroad 1 residential farmstead/dairy	4 NRHP eligible 5 NRHP ineligible 4 not evaluated

Table 3.14-3. Built environment resources, by action corridor alternative

Action corridor alternative	Property type	NRHP eligibility
E3d	4 residential farmsteads 2 canals 2 utility buildings 1 highway 1 railroad 1 residential farmstead/dairy	4 NRHP eligible 3 NRHP ineligible 4 not evaluated
W3	2 residential farmsteads 1 airfield 1 school 1 utility building 1 highway 1 railroad 1 canal	4 NRHP eligible 4 not evaluated
Segment 4		
E4	1 barn 1 residence 2 canals 1 railroad 1 pipeline	4 NRHP eligible 2 not evaluated
W4	1 barn 1 farmstead 6 residences 1 residential farmstead 2 warehouse facilities 1 service garage 1 highway 2 railroads 2 canals 1 pipeline	6 NRHP eligible 5 NRHP ineligible 7 not evaluated

Note: NRHP = National Register of Historic Places

Thirty-eight historic-era building properties and 12 historic-era linear structures were identified within the action corridor alternatives. These properties include 18 residences, 9 residential farmsteads, 4 railroads, 4 irrigation canals, 3 state highways, 2 cotton warehouse facilities, 1 elementary school, 4 utility buildings, 1 farmstead, 1 barn, 1 service garage, 1 airfield (with auxiliary buildings), and 1 pipeline. Of these, 13 properties have been determined eligible for listing on the NRHP with SHPO concurrence, 16 properties have been determined ineligible for NRHP listing with SHPO concurrence, and 21 properties are unevaluated.

3.14.3.3 Traditional Cultural Properties

An inventory of TCPs was carried out for the entire EIS study area (Darling 2016, 2017). The TCP inventory identified and evaluated TCPs within the EIS study area, which was expansive and encompassed the action corridor alternatives. The action corridor alternatives would avoid all NRHP-eligible TCPs. Potential indirect effects on TCPs would be evaluated at the Tier 2 stage once potential freeway alignments are proposed.

During field visits in April 2016 conducted by the study team archaeologist with representatives of the Four Southern Tribes, the Four Southern Tribes raised concerns regarding the potential impacts of the alternatives on TCPs.

To address the Four Southern Tribes' concerns, a meeting was held in Casa Grande in August 2016. The meeting, coordinated by ADOT and FHWA, was attended by ADOT management, the FHWA Arizona Division Administrator, and Four Southern Tribes' representatives. At this meeting, the lead agencies committed to adjusting the alternatives to avoid sensitive sites (near the Gila River and Queen Creek). The study team agreed to prepare avoidance alternatives and to review them with the Four Southern Tribes.

On March 28, 2017, the study team presented the avoidance alternatives to the Four Southern Tribes at a workshop in Casa Grande. The alternatives were discussed at two subsequent meetings with the Four Southern Tribes on May 17 and May 31, 2017. While the tribes' general position was that they would prefer improvements to the area's existing roadway infrastructure, they did identify a preferred corridor. This information—along with the preferences of jurisdictions affected by the proposed action, the cooperating and participating agencies, and the public—is presented in the *Corridor Selection Report* evaluation criteria (see Appendix C, *Alternatives Screening*).

AZ U:14:73(ASM) is a prehistoric site within the W1a and W1b Alternatives that was identified as a TCP not eligible for NRHP listing because of integrity issues (Darling 2017). After the TCP evaluation was completed, additional information about the site was obtained through continuing consultation with the Four Southern Tribes (Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation). In a memorandum to the Four Southern Tribes dated October 24, 2017, FHWA and ADOT acknowledged that the site may be eligible as a TCP, stated that sufficient information had been obtained for the Tier 1 EIS process, and proposed to reevaluate the site's eligibility in the Tier 2 study if an action corridor alternative that partially encompasses the site is chosen as the selected corridor in the Tier 1 ROD.

3.14.4 Environmental Consequences

This section evaluates the potential effects on cultural resources from the action corridor alternatives and No-Action Alternative. An adverse effect would occur 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. 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. Impacts on cultural resources would vary depending on the future location of a freeway alignment within the selected action corridor alternative. Avoidance is the preferred way to address cultural resources, and decisions regarding avoidance methods would be reached through Section 106 consultation during the Tier 2 process when more details regarding the freeway location, design, and operation would be available.

Physical impacts on cultural resources may include direct damage to or destruction of cultural resources within the footprint of the freeway alignment, including any needed nearby staging areas.

Operational impacts on cultural resources could include permanent access restrictions, visual impacts, and noise and vibration impacts on properties close to a future freeway alignment. In addition, direct damage to or destruction of cultural resources (for example, looting) attributable to increased accessibility to previously isolated areas is possible. Permanent loss or temporary changes in the viewshed of potential TCPs and permanent loss or temporary changes to potential TCP access and use could result.

Construction impacts on cultural resources may include direct damage to or destruction of cultural resources and noise and vibration impacts on properties that are close to a future freeway alignment (including staging areas) but would not be permanently incorporated into the freeway facility. Indirect damage may be caused through vibrations from geotechnical testing, use of heavy equipment, or earthmoving activities. Construction impacts may also include unanticipated discovery of previously unknown cultural resources (including human burials), permanent loss or temporary changes in the viewshed of potential TCPs, permanent loss or temporary changes in potential TCP access and use, and increased noise and dust.

3.14.4.1 No-Action Alternative

Under the No-Action Alternative, the proposed action would not affect cultural resources.

3.14.4.2 Action Corridor Alternatives

Segment 1

The Eastern and Western Alternatives within Segment 1 contain NRHP-eligible archaeological sites and, because the corridors have not been surveyed in full, the complete distribution of sites in the corridors is not known. Impacts on archaeological sites would depend on the potential freeway alignment developed for Tier 2 projects. The Eastern Alternatives have no historic-era building properties, 1 historic-era highway, and 1 historic-era railroad. The Western Alternatives have 1 NRHP-ineligible historic-era building property, 1 NRHP-eligible historic-era highway, and 1 NRHP-eligible historic-era railroad. NRHP eligibility evaluations would be required for Tier 2 projects for any unevaluated built environment resources. Furthermore, an assessment of effects on historic-era buildings and structures would be performed for Tier 2 projects once freeway alignments have been developed. No NRHP-eligible TCPs are within the Eastern and Western Alternatives in Segment 1; however, AZ U:14:73(ASM) is located in the W1a and W1b Alternatives and would require reevaluation during the Tier 2 process as a potential TCP. Evaluation of potential indirect effects on TCPs would be performed for Tier 2 projects.

Segment 2

No NRHP-eligible archaeological sites have been identified in the Eastern and Western Alternatives within Segment 2; however, because the corridors have not been surveyed in full, the distribution of sites within the corridors is not known. Impacts on archaeological sites would depend on the potential freeway alignment developed for Tier 2 projects. The Eastern Alternatives have 2 historic-era building properties that have not been evaluated for NRHP eligibility. The Western Alternatives have 1 historic-era railroad and no historic-era building properties. NRHP eligibility evaluations would be required for Tier 2 projects for any unevaluated built environment resources. Furthermore, an assessment of effects on historic-era buildings and structures would be performed for Tier 2 projects once freeway alignments have been developed. No NRHP-eligible TCPs are found within the Eastern and Western Alternatives in Segment 2. Evaluation of potential indirect effects on TCPs would be performed for Tier 2 projects.

Segment 3

The Eastern and Western Alternatives in Segment 3 contain NRHP-eligible archaeological sites. Because the corridors have not been surveyed in full, the complete distribution of sites in the corridors is not known. Impacts on archaeological sites would depend on potential freeway alignments developed for Tier 2 projects. The Eastern Alternatives have 11 NRHP-ineligible historic-era building properties, 7 historic-era building properties unevaluated for NRHP eligibility, 1 historic-era highway, 1 historic-era railroad, and 1 historic-era canal. The Western Alternative has 1 NRHP-eligible property, 4 historic-era building properties unevaluated for NRHP eligibility, 1 historic-era highway, 1 historic-era railroad, and 1 historic-era canal. NRHP eligibility evaluations would be required for Tier 2 projects for any unevaluated built environment resources. Furthermore, an assessment of effects on historic-era buildings and structures would be performed for Tier 2 projects. No NRHP-eligible TCPs are found within the Eastern and Western Alternatives in Segment 3. Evaluation of potential indirect effects on TCPs would be performed for Tier 2 projects.

Segment 4

The Eastern and Western Alternatives in Segment 4 contain NRHP-eligible archaeological sites. Because the corridors have not been surveyed in full, the complete distribution of sites in the corridors is not known. Impacts on archaeological sites would depend on potential freeway alignments developed for Tier 2 projects. The Eastern Alternative has 2 historic-era building properties unevaluated for NRHP eligibility, 1 historic-era railroad, 2 historic-era canals, and 1 historic-era pipeline. The Western Alternative has 5 NRHP-ineligible historic-era building properties, 7 historic-era building properties unevaluated for NRHP eligibility, 1 historic-era highway, 2 historic-era railroads, 2 historic-era canals, and 1 historic-era pipeline. NRHP eligibility evaluations would be required for Tier 2 projects for any unevaluated built environment resources. Furthermore, an assessment of effects on historic-era buildings and structures would be performed for Tier 2 projects once freeway alignments have been developed. No NRHP-eligible TCPs are found within the Eastern and Western Alternatives in Segment 4. Evaluation of potential indirect effects on TCPs would be performed for Tier 2 projects.

3.14.5 Potential Avoidance, Minimization, and Mitigation Strategies

The proposed action has the potential to adversely affect historic properties between US 60 and I-10. Therefore, ADOT will develop a programmatic agreement, pursuant to Section 106 of the NHPA, to define procedures for continuing to consider effects on historic properties during the proposed phased planning and construction of Tier 2 projects. The programmatic agreement will commit to the identification and evaluation of historic properties, determination of effects, and resolution of any adverse effects on historic properties during the NEPA process and construction of the individual Tier 2 undertakings; commit to consultation with the tribes that may ascribe traditional religious and cultural significance to historic properties that may be affected by the undertaking; commit to compliance with all applicable federal and state laws and regulations in effect at the time of each undertaking; and commit to assess and evaluate site AZ U:14:73(ASM) as a potential TCP if a Western Alternative is selected.

Potential mitigation measures could include—but are not limited to—archaeological testing and data recovery, flagging of sites for avoidance, monitoring of sites during construction, a Historic American Buildings Survey, or a Historic American Engineering Record. These types of mitigation would be guided by plans that are required by the agreement document and consulted on through the Section 106 process.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.14.6 Subsequent Tier 2 Analysis

During Tier 2 evaluations, as more detailed information is gathered for review of the preferred corridor and specific freeway alignments are identified, SHPO, Native American tribes, and other consulting parties would be formally consulted throughout the study. The Section 106 process would be followed: establish the undertaking, identify consulting parties, identify the scope of work and area of potential effects, identify historic properties, make a finding of project effect, and assess and resolve adverse effects, as necessary. If any adverse effects are identified during the Tier 2 process, they would be addressed through consultation and would be in compliance with 36 CFR § 800.5 (Assessment of adverse effects) and 36 CFR § 800.6 (Resolution of adverse effects).

Specific mitigation measures, to the extent required, would be identified and discussed during the Tier 2 analysis after design details are known. Tier 2 analyses would include data gathered from other agencies including ADOT, SHPO, and ASM/AZSITE, as well as any information gathered from tribes and land-managing agencies (for example, counties, municipalities), and all previously unsurveyed areas within the footprint of the undertaking would be surveyed for cultural resources.

Mitigation measures may be developed in accordance with the terms of the programmatic agreement, pursuant to 36 CFR § 800.14, between ADOT and consulting parties, including the Advisory Council on Historic Preservation, SHPO, and other consulting parties.

3.14.6.1 Conclusion

Based on the results of the archaeological, built environment, and TCP inventories prepared for this analysis, and the provisions in place to mitigate any potential adverse effects on historic properties resulting from Tier 2 projects, the action corridor alternatives have a low risk of adverse impacts on identified cultural resources. However, it should be noted that the action corridor alternatives have not been surveyed in full for archaeological resources; therefore, the complete distribution of sites is not known. Impacts on archaeological sites would not be known until freeway alignments are developed and surveys performed for Tier 2 projects.

Given the abundance of archaeological resources identified in the portions of the action corridor alternatives previously surveyed, and the potential to identify additional resources in Tier 2 studies, it is possible that Tier 2 projects may not be able to completely avoid all sites, thereby resulting in a low to medium risk of adverse impacts on cultural resources. Any adverse impacts on NRHP-eligible archaeological resources would require mitigation. NRHP-eligibility evaluations would be required for Tier 2 projects for previously unevaluated built environment resources. An assessment of effects on historic-era buildings and structures would be performed for Tier 2 projects once freeway alignments have been developed. No NRHP-eligible TCPs are within the Eastern and Western Alternatives; however, AZ U:14:73(ASM) is located in the W1a and W1b Alternatives and would require reevaluation during the Tier 2 process as a potential TCP. Evaluation of potential indirect effects on TCPs would be performed for Tier 2 projects.

3.15 Hazardous Materials

This section provides an overview of the potential for hazardous materials in the action corridor alternatives.

3.15.1 Regulatory Context

Federal regulations governing hazardous materials and waste sites include the following:

- Toxic Substances Control Act (15 USC §§ 2601–2692)
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 USC § 9601 et seq.)
- Resource Conservation and Recovery Act (RCRA) (42 USC § 6901 et seq.)
- Superfund Amendments and Reauthorization Act (42 USC § 9601 et seq.)

EPA is the federal agency responsible for overseeing hazardous waste management. Under RCRA and Arizona state statutes and codes, ADEQ has the authority to monitor and direct industries that may generate, transport, or dispose of hazardous waste.

State programs and regulations governing hazardous materials and waste sites include:

- Arizona Administrative Code, Title 18, Environmental Quality, Chapter 8, Department of Environmental Quality – Hazardous Waste Management
- A.R.S., Title 49, The Environment, Chapter 5, Hazardous Waste Disposal
- Arizona Aboveground Storage Tank Database
- Arizona Aquifer List
- ADEQ's Dry Well Database
- ADEQ's Emergency Response for Spills
- Arizona Environmental Monitoring and Assessment Program
- Arizona Leaking Underground Storage Tank Incident Reports
- Arizona Solid Waste Facilities and Landfill Sites Inventory
- Arizona Solid Waste Tire Facilities
- Arizona Underground Storage Tank Database
- Arizona Wastewater Treatment Facility Database

3.15.2 Methodology

The evaluation presented in this section is based on preliminary research conducted for the proposed action through the preparation of an Initial Site Assessment (ISA) in 2016 (Appendix K, *Hazardous Materials Information*). The evaluation established existing conditions in the study area as an information baseline for potential site acquisition and due diligence, and identified possible locations of hazardous materials that may have been released to the surface or subsurface. The 2016 ISA included review of a regulatory database search, review of historical information regarding land use, and site reconnaissance. It should be noted that the action corridor alternatives have since been refined and currently represent different alignments than were analyzed during preliminary research. However, the research activities described above included a large buffer area surrounding the alignments, thus capturing a larger preliminary analysis area. Further, because substantial land use changes have not occurred in the study area since 2016, the 2016 ISA completed for the proposed action represents an accurate overview of existing conditions in the study area. The 2016 ISA would be refined and expanded to accurately reflect the action corridor alternatives during subsequent analysis, as described in Section 3.15.6, *Subsequent Tier 2 Analysis*.

3.15.3 Affected Environment

The study area has potential contamination issues from point-source locations and nonpoint-source areas. Point-source locations include specific, listed sites, such as gas stations and landfills, with an identifiable source of contamination. Nonpoint-source areas include agricultural properties, urban areas, and areas where wildcat dumping may include hazardous wastes.

3.15.3.1 Regulatory Database Search

A regulatory database search was performed by Environmental Data Resources Inc. (EDR) on May 28, 2015, as documented in the 2016 ISA. Regulatory databases and resources that were researched to document hazardous materials in the study area included federal, state, local, and tribal environmental records and EDR's proprietary databases.

Based on a review of the regulatory database search conducted in 2015, 84 records were identified by EDR in the search area; however, only 37 listings were linked to sites of potential concern. These 37 listings represented 12 potential sites of concern, with some sites listed in multiple databases. Table 3.15-1 shows the number of listings and listings of concern from the regulatory database search. Table 3.15-1 includes only those databases that returned results.

Table 3.15-1. Listings of concern from the regulatory database search

Database	Description	Number of listings	Listings of concern
RCRA-TSDF	Resource Conservation and Recovery Act (RCRA) Transporters are individuals or entities that move hazardous waste from the generator off site to a facility that can recycle, treat, store, or dispose of the waste. Treatment, Storage, and Disposal Facilities (TSDF) treat, store, or dispose of the waste.	1	1
RCRA NonGen	RCRA Non-Generators do not presently generate hazardous waste.	3	2
FINDS	The Facility Index System (FINDS) contains both facility information and "pointers" to other sources of information that contain more detail.	17	5
US AIRS	The Air Facility System, a subsystem of Aerometric Information Retrieval System (AIRS), contains compliance data on air pollution point sources regulated by EPA and/or state and local air regulatory agencies.	1	1
FUDS	The listing includes locations of Formerly Used Defense Sites (FUDS) properties where the U.S. Army Corps of Engineers is actively working or will take necessary cleanup actions.	1	0
ICIS	The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program and the unique needs of the National Pollutant Discharge Elimination System program.	1	0
AZ SWF/LF	The Solid Waste Facilities/Landfill (SWF/LF) Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from ADEQ's Municipal Solid Waste Landfills/Closed Solid Waste Landfills database.	2	2

Table 3.15-1. Listings of concern from the regulatory database search

Database	Description	Number of listings	Listings of concern
AZ LUST	The Leaking Underground Storage Tank (LUST) Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from ADEQ's LUST file listing by ZIP Code.	3	3
AZ UST	The Underground Storage Tank (UST) database contains registered USTs. USTs are regulated under Subtitle I of RCRA. The data come from ADEQ's UST-DMS facility and tank data listing by city database.	16	10
AZ AST	The Aboveground Storage Tank (AST) database contains registered ASTs. The data come from ADEQ's UST-DMS facility and tank data listing by city database.	2	0
AZ SWTIRE	A waste tire "facility" means a solid waste tire (SWTIRE) facility where tires are stored outdoors on any day.	1	1
AZ Spills	The ADEQ Emergency Response Unit documents chemical spills and incidents that are referred to the Unit.	2	2
AZ Dry Well	A dry well is a bored, drilled, or driven shaft or hole whose depth is greater than its width and is designed and constructed specifically for the disposal of stormwater. The source is ADEQ.	1	0
CA HAZNET	The data are extracted from copies of hazardous waste manifests received each year by the California Department of Toxic Substances Control.	1	1
AZ WWFAC	Statewide list of wastewater treatment facilities (WWFAC).	7	1
AZ Aquifer List	The aquifer protection permitted facilities database comes from ADEQ.	3	0
AZ EMAP	An online interactive map (EMAP) listing places of interest to ADEQ, including air, waste, and water sites.	20	7
Indian ODI	Location of open dumps on Indian land (ODI).	1	1
US Hist Cleaners	EDR has searched selected national collections of business directories and has created lists of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments.	1	0
	Total	**84**	**37**

Source: Environmental Data Resources Inc., May 28, 2015
Notes: ADEQ = Arizona Department of Environmental Quality, AZ = Arizona, CA = California, EDR = Environmental Data Resources Inc., EPA = U.S. Environmental Protection Agency, US = United States

3.15.3.2 Historical Resources

A review of historical resources, including historical aerial photographs, provided a history of previous land uses in the study area and facilitated assessing these uses for potential hazardous materials that may affect the proposed action. Data from fire insurance maps and city directories were not available for the study area because these resources are produced for urbanized areas, and the study area is primarily rural. The study team reviewed historical aerial photographs for 1937 to 2013. The photographs were provided by:

- Maricopa County, Office of Enterprise
- Historical Aerials by Nationwide Environmental Title Research, LLC (NETROnline) (www.historicaerials.com)

Based on the review of the photographs, historical conditions in each segment of the study area have mainly consisted of undeveloped desert, farmland and cattle farms, and dwellings. Other major developments noted in the historical aerial photograph review include, for Segment 1, the alignment of US 60 as early as 1937, the CAP Canal by 1992, and high-voltage power transmission lines, a wastewater facility, and a golf course by 2000. For Segment 3, major developments noted include a landfill by 1992. Segments 2 and 4 did not show any major developments.

3.15.3.3 Site Reconnaissance

Site reconnaissance for the proposed action was performed, including ground reconnaissance on several days between June and August 2015 and a helicopter overflight conducted on June 10, 2015. Land use in the study area primarily consisted of undeveloped desert, agricultural land, and urbanized property.

Undeveloped Desert

In general, undeveloped desert land has the lowest potential for hazardous materials and hazardous waste releases. The main exception is "wildcat dumping," or the illegal dumping of trash or waste in remote areas. Numerous wildcat dumps were present in the northern portions of the study area, primarily near roads, or near roads along washes. Most wildcat dumps contained fairly benign materials such as household trash, building materials, landscaping waste, and appliances. A small number of dumps contained drums or barrels. It is not possible to ascertain whether these drums contained anything (especially hazardous wastes) without individual assessment and sampling. ADOT should be aware that these wildcat dumps exist, and this issue should be addressed should a preferred alternative be selected.

Agricultural Land

Agricultural chemicals (pesticides and herbicides) can result in an aggregate effect of residual chemicals in soil, particularly in tailwater ditches (which drain excess surface water from fields under cultivation) or drainageways. Of particular concern are areas where Pima cotton has been farmed in the past. Highly toxic agricultural chemicals were used on Pima cotton crops from the 1950s to 1970s, and some of these chemicals are long-lived in the environment. It is impossible to determine whether farmers used agricultural chemicals appropriately. Even the chemicals with less toxicity could create a long-term issue in soils if they were misapplied.

Another issue on agricultural property is the location of batch plants, or places on a farm where agricultural chemicals were stored, mixed, or loaded onto distribution equipment (spreaders, sprayers, etc.). These facilities were and are operated by local farmers or a cooperative of farmers, and spill prevention techniques can be lacking, particularly in operations that have been in use for decades. The aggregation and/or concentrations of chemicals in the soil can be an issue at such batch plants. The study team noted many batch plants and fertilizer storage tanks on agricultural properties in the study area. Some were located near barns or sheds that apparently store the farm's distribution equipment. Others were aboveground storage tanks near irrigation ditches—these were most likely used for storing liquid fertilizer that can be released into the irrigation ditches for passive distribution.

Urbanized Property

Urbanized property has the highest potential for containing actionable hazardous waste and/or hazardous materials in the subsurface. Hazardous materials and hazardous wastes associated with urbanized property include releases from gas stations, dry cleaners, and other business operations, and from storm runoff that transports lawn chemicals, automotive residue from roads, and other chemicals. Several facilities in this category were noted during the site reconnaissance. Although the action corridor alternatives are generally located outside of urban development in the study area, the termini of the proposed freeway (northern and southern ends), as well as the Eastern Alternatives (near Florence), could cross locations where urban site types could adversely affect the subsurface. Notably, one of the transition sections near Florence crosses a landfill. Landfills may or may not contain hazardous wastes, but this possibility should be considered when planning a freeway through or over a landfill.

3.15.4 Environmental Consequences

3.15.4.1 No-Action Alternative

Environmental consequences caused by the No-Action Alternative would include continued wildcat dumping in undeveloped desert until enforcement is enacted, the continued presence of hazardous materials and hazardous waste from agricultural practices in the study area, and the continued presence and increase in hazardous materials and hazardous waste associated with urbanized property, especially as population growth occurs in communities in the study area.

Numerous leaking underground storage tanks, underground storage tanks, landfills, open dump sites, a wastewater treatment facility, and other sites that are listed as sites of concern in the regulatory database search would continue to be present in the study area with the No-Action Alternative.

3.15.4.2 Action Corridor Alternatives

Based on results of the regulatory database search, 12 sites of concern were identified in or near the action corridor alternatives (Table 3.15-2). Some sites of concern may be applicable to more than one alternative.

Table 3.15-2. Sites of concern, by action corridor alternative

Action corridor alternative	Sites of concern	Action corridor alternative	Sites of concern
Segment 1		***Segment 3***	
E1a	0	E3a	6
E1b	0	E3b	6
W1a	2	E3c	6
W1b	1	E3d	6
Segment 2		W3	0
E2a	0	***Segment 4***	
E2b	2	E4	1
W2a	0	W4	1
W2b	0		

Environmental consequences caused by the action corridor alternatives would include increased hazardous materials and hazardous waste occurrence related to automobile and truck use near the new freeway. Wildcat dumping would likely continue to occur, as long as enforcement does not increase, and may also increase because of enhanced access to undeveloped desert from the new freeway. As population growth occurs in the study area, hazardous materials and hazardous waste occurrence related to urbanized property use would increase. Hazardous materials and hazardous waste related to agricultural practices may decrease if agricultural land is developed for commercial or residential purposes or is abandoned in the study area. However, residual agricultural chemicals may be present from earlier use of these lands.

3.15.5 Potential Avoidance, Minimization, and Mitigation Strategies

When possible, avoidance or minimization is the primary mitigation for identified hazardous materials sites. The following list describes potential mitigation measures to avoid, reduce, or otherwise mitigate environmental impacts associated with the proposed action. However, a detailed analysis of avoidance, minimization, and mitigation strategies applicable to the action corridor alternatives, including specific responsibilities of the construction contractor, would be developed during subsequent Tier 2 analysis, described in Section 3.15.6, *Subsequent Tier 2 Analysis*.

- No activity would occur in an area that potentially has lead-based substances until a Lead-Based Paint Removal and Abatement Plan is approved and implemented.
- The engineer, in association with the contractor, would complete the National Emission Standards for Hazardous Air Pollutants documentation and submit it to the ADOT Environmental Planning hazardous materials coordinator for review 5 working days prior to it being submitted to the regulatory agency or agencies.
- No activity would occur in an area that potentially has asbestos until an Asbestos Removal and Disposal Plan is approved by the ADOT Environmental Planning hazardous materials coordinator.
- Staging for construction activities near wells or dry wells would be located in areas where accidental releases of potential contaminants would be minimized and any accompanying threat to groundwater resources minimized.
- In cooperation with the contractor, ADOT's Construction District would develop and coordinate emergency response plans with local fire authorities, local hospitals, and certified emergency responders for hazardous materials releases or chemical spills.
- Asbestos- and lead-paint-containing materials identified in structures to be demolished would be properly removed and disposed of prior to demolition.
- Existing aboveground storage tanks or underground storage tanks would be removed or relocated.
- The contractor would develop an on-site health and safety plan for construction activities.
- A hazardous waste management plan would be prepared for handling hazardous materials during construction.
- If suspected hazardous materials are encountered during construction, work would cease at that location and the engineer would be notified. The engineer would contact the ADOT Environmental Planning hazardous materials coordinator immediately and make arrangements for assessment, treatment, and disposal of the materials.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.15.6 Subsequent Tier 2 Analysis

No hazardous materials issues have been identified that would preclude construction of the proposed action in any of the action corridor alternatives. However, hazardous materials conditions would require consideration in the Tier 2 study and in final design.

Subsequent analysis related to hazardous materials for the Tier 2 environmental evaluation should involve further investigation in the form of a targeted Corridor ISA (once a preferred alternative is selected), which would clear many sites without issues and would limit the number of parcels where a parcel-specific Phase I investigation would be required. The targeted Corridor ISA should include an updated regulatory database search, a detailed review of historical resources, additional site reconnaissance activities, and interviews with specific site property owners or business operators. Parcel-specific Phase I investigations should be performed at properties slated for acquisition (in accordance with ADOT Right-of-Way policies and procedures). The goal of a Phase I investigation is to provide adequate information for ADOT to move forward with property acquisition and to develop management strategies for sites with identified hazardous materials issues.

Additional studies could include Phase II drilling and sampling projects (also known as preliminary site investigations) to verify or refute the actual concentrations and locations of subsurface impacts prior to construction. A Phase II analysis involves collecting soil and possibly groundwater samples for inclusion in a targeted analytical program; it is highly customized for the issues discovered during the Phase I investigation, with the goal of supporting future construction management. If contaminated areas are identified in Phase I/ISA efforts, and preliminary site investigation work verifies that contamination is present in actionable concentrations, a process known as environmental construction monitoring may be implemented during construction as a proper method of removing and disposing of hazardous waste material and protecting construction workers.

3.15.6.1 Conclusion

The study area has potential contamination issues from point-source locations and nonpoint-source areas. Point-source locations include specific, listed sites, such as gas stations and landfills, with an identifiable source of contamination. Nonpoint-source areas include agricultural properties, urban areas, and areas where wildcat dumping may include hazardous wastes. All action corridor alternatives have the potential for contamination issues from point-source locations and nonpoint-source areas. The action corridor alternatives that include sites of concern are:

- Segment 1 – W1a and W1b Alternatives
- Segment 2 – E2b Alternative
- Segment 3 – E3a, E3b, E3c, and E3d Alternatives
- Segment 4 – E4 and W4 Alternatives

The difference between the action corridor alternatives is not substantial regarding the potential for encountering hazardous materials, and the types of materials expected are typical of highway construction projects. ADOT is well-qualified to manage such sites during construction.

3.16 Energy

This section discusses the energy that would be used in the region for the No-Action Alternative and action corridor alternatives. Primary energy use would be fossil fuel consumption (gasoline and diesel fuel) by vehicles traveling in and around the study area. Other energy use would be associated with construction, maintenance, and development activities. Fuel would be consumed during the planned construction of new arterial streets and freeways identified in the applicable regional transportation plan and regional transportation programs. Also, fuel would be consumed during construction of commercial developments, industrial buildings, and homes throughout the study area and surrounding region.

3.16.1 Regulatory Context

Regulations for implementing the procedural provisions of NEPA require that the energy requirements and conservation potential of various alternatives and mitigation measures be evaluated as part of the environmental consequences of the proposed action [40 CFR § 1502.16(e)].

3.16.2 Methodology

Operational energy use was calculated using VMT and VHT projections, which were developed using travel demand modeling to forecast 2040 conditions. This included developing a base highway network for use by the AZTDM2 model, along with population and employment projections from the State Office of Employment and Population Statistics, MPOs, councils of governments, and other local agencies. The stakeholders—MAG, SCMPO, and CAG—also provided input from their transportation networks and long-range transportation plans.

3.16.3 Affected Environment

The average fuel economy of the nation's vehicles, measured in miles per gallon (mpg), has consistently improved over the past 40 years, and this trend is expected to continue during the next 20 years. However, the improved fuel economy is not likely to be dramatic. Barring a technological breakthrough in the engines providing power to the vehicles of 2040, a substantial change in fuel economy is difficult to predict, and, therefore, not assumed in the analysis. Even with such a breakthrough, penetration of a new technology across the country's vehicle fleet can take decades. The average fuel economy of a passenger car operated in the United States in 1990 was 20.2 mpg and, 20 years later in 2010,[2] it was 23.5 mpg (Energy Information Administration 2012).

Automobiles are most efficient when operating at steady speeds between 35 and 45 mph with no stops (Oak Ridge National Laboratory 2002; USDOT 1983). Fuel consumption increases by approximately 17 percent as speeds increase from 55 to 70 mph.

Total fuel consumption in the United States has consistently risen from year to year. From 2010 to 2015, motor vehicle fuel consumption increased from 170 to 173 billion gallons per year in the United States, and the state of Arizona consumed 3.4 billion gallons per year, or 2 percent of the 2010 total (USDOT Bureau of Transportation Statistics 2013). Increased congestion on freeways and arterial streets has become a major contributor to increased fuel consumption. The 2011 *Annual Urban Mobility Report* (Texas Transportation Institute 2011) reported that vehicles in the Phoenix urban area consumed approximately 47 million gallons of fuel in 2010 because of congestion.

[2] As of December 8, 2017, 2010 remains the most recent year for which fuel economy is published (Energy Information Administration 2012).

3.16.4 Environmental Consequences

3.16.4.1 No-Action Alternative

While the No-Action Alternative would not need fuel for construction, other road projects and improvements would need to be developed in the study area to accommodate the region's growth. The No-Action Alternative would not entail energy consumption associated with use of the proposed action because the proposed action would not be built.

Although the No-Action Alternative shows the smallest VMT of all the alternatives, more fuel use is projected compared with Alternatives 4, 5, 7, and 8 because of the higher VHT. Compared with all of the action corridor alternatives, the No-Action Alternative would result in overall lower speeds and, therefore, lower fuel economy.

3.16.4.2 Action Corridor Alternatives

Construction activities for any of the action corridor alternatives would have comparable fuel commitments. Construction energy use is, however, not addressed in further detail because the total fuel needed for construction of the action corridor alternatives is assumed to be essentially the same as the total fuel needed for construction of other road projects under the No-Action Alternative.

Operational energy use for the action corridor alternatives was calculated by dividing the yearly VMT projections for each alternative (and for the No-Action Alternative, as a point of comparison) by the fuel economy of the different classes of vehicles. The analysis included light-duty cars, light-duty trucks, and heavy-duty trucks and buses, which have average fuel economies of 23.5 mpg, 17.2 mpg, and 6.4 mpg, respectively. Fuel economies were adjusted for each alternative based on the projected average speed (mph), and were calculated by dividing the VMT by the VHT.

Operational energy use was considered for the entire region, and was evaluated for the continuous action corridor alternatives (see Chapter 2, *Alternatives*). Table 3.16-1 shows that among eight of the possible combinations of alternatives that produce continuous full-length action corridor alternatives, operational energy use for the action corridor alternatives may be greater or less than the No-Action Alternative. Alternative 5 would result in the greatest energy savings, with minimum annual energy savings of 8 percent, followed by Alternative 7, which would result in a minimum annual energy savings of 2 percent. Alternatives 4 and 8 would have no net difference in minimum annual energy savings, while Alternative 6 would have the greatest minimum annual energy increase of 5 percent, followed by Alternatives 2 and 3 (4 percent) and Alternative 1 (1 percent).

Table 3.16-1. Annual regional energy consumption, 2040

Travel and energy use	2015 existing	2040 No-Action Alternative	Continuous full-length action corridor alternative							
			1	2	3	4	5	6	7	8
Vehicle miles traveled per year[a] (millions)	1,561	3,939	4,257–4,271	4,189–4,205	4,171–4,194	4,254–4,268	4,194–4,235	4,188–4,253	4,183–4,189	4,185–4,273
Average speed (miles per hour)	45.9	33.9	40.2–40.1	39.7–39.5	39.6–39.4	40.1	38.7–38.9	38.8–39.0	38.8–38.6	39.7–40.0
Operational energy use[b] (millions of gallons of fuel per year)	51.0	135.8	142.6–143.0	140.3–140.8	139.7–140.5	142.5–142.9	140.5–141.8	140.3–142.4	140.1–140.3	140.2–143.1

[a] Vehicle miles traveled (VMT) per year were calculated from daily VMT estimates provided by the travel demand model. Daily estimates were converted to annual estimates by assuming 6 days per week (the equivalent of 1 day of traffic for Saturday and Sunday combined) and 52 weeks per year.

[b] Gallons per year data were determined by dividing the VMT for each category by an assumed fuel economy factor for all motor vehicles, adjusted by miles per gallon according to speed (VMT/vehicle hours traveled). Base factors were obtained by running the U.S. Environmental Protection Agency's Motor Vehicle Emission Simulator (MOVES) model at the Pinal County level.

[c] Vehicle mix data were derived from Maricopa County vehicle registrations as reported by the Arizona Department of Transportation 2017 Vehicle Registrations for Maricopa County. Gasoline and diesel vehicles for all classes were combined. Buses were added to the heavy-duty trucks category. Motorcycles and alternative fuel and electric vehicles were assumed to have an insignificant contribution.

3.16.5 Potential Avoidance, Minimization, and Mitigation Strategies

No mitigation is proposed for energy use associated with the proposed action.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts (for other resources).

3.16.6 Subsequent Tier 2 Analysis

If an action corridor alternative is advanced, the energy use of individual projects would be examined as necessary during the Tier 2 studies.

3.16.6.1 Conclusion

The No-Action Alternative would involve more energy consumption then several of the action corridor alternatives. Alternative 5 would result in the greatest reduction in energy consumption, with a savings of 14 to 16 million gallons of fuel per year, followed by Alternative 7, which would result in a savings of 4 million gallons per year. Alternative 6 would potentially result in fuel savings of 4 million gallons per year, or an increase of 9 million gallons per year, depending on the segment options selected.

3.17 Environmental Justice and Title VI

This section describes the study's compliance with applicable federal regulations for environmental justice (EJ) and Title VI of the Civil Rights Act of 1964 (Title VI, 42 USC § 2000d). This section includes a review of the regulatory context and methodology, identification of minority and/or low-income populations, and an assessment of potential impacts and benefits that would affect these populations.

3.17.1 Regulatory Context

ADOT is a recipient of federal financial assistance and, therefore, is required to comply with regulations related to Title VI, EJ, and limited English proficiency (LEP). The analyses presented in this section were prepared in compliance with:

- Title VI
- Presidential Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994)
- Presidential Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency (August 11, 2000)
- USDOT Order to Address Environmental Justice in Minority Populations and Low-Income Populations [USDOT Order 5610.2(a), May 2, 2012]
- FHWA's Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (FHWA Order 6640.23A, June 14, 2012)
- FHWA *Environmental Justice Reference Guide* (April 1, 2015)

Title VI is the federal law that protects individuals and groups from discrimination on the basis of their race, color, and national origin. Under Title VI and USDOT regulations, recipients of federal financial assistance are prohibited from, among other things, using "criteria or methods of administering its program which have the effect of subjecting individuals to discrimination based on their race, color, or national origin." Protection of LEP populations falls under the "national origin" basis of Title VI.

As outlined in the FHWA *Environmental Justice Reference Guide*, USDOT and FHWA are required to make EJ part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of programs, policies, and activities on minority populations and/or low-income populations to achieve an equitable distribution of benefits and burdens. FHWA incorporates EJ and nondiscrimination principles into all phases of project development including planning, environmental review, design, ROW acquisition, construction, and maintenance and operations.

Furthermore, USDOT Order 5610.2(a) sets forth the USDOT policy to consider EJ principles in all its programs, policies, and activities. It describes how EJ objectives are integrated into planning and programming, rulemaking, and policy formulation. This chapter addresses only effects on minority and low-income populations that would be caused by the action corridor alternatives, because the No-Action Alternative would not directly or indirectly change existing conditions of the surrounding environment.

3.17.2 Methodology

The EJ evaluation framework is based on the FHWA *Environmental Justice Reference Guide*. The reference guide outlines a methodology that addresses Executive Order 12898 and includes a public participation process and an analytical process. The analytical process includes three basic steps:

1. Determine whether the proposed action would potentially affect minority and low-income populations.

2. If minority and low-income populations are present, consider the potential effects of the proposed action on those populations, including any disproportionately high and adverse effects.
3. Determine whether adverse effects can be avoided, minimized, or mitigated.

This section presents this three-step analysis, modified as necessary for a Tier 1 study since many direct impacts cannot be determined at this time.

3.17.2.1 Study Area and Data Sources

A GIS platform was used to identify a 0.5-mile buffer around the action corridor alternatives. This buffer was consistent with corridor demographic measurements used throughout this Tier 1 DEIS. U.S. Census Bureau American Community Survey 2011 to 2015 data were used to map and quantify minority and low-income populations at the block group level. For the analyses, each block group that intersected or was completely in the 0.5-mile buffer was included in the study area. Block groups that spanned multiple segments were assigned to one segment only to avoid duplicative totals.

3.17.2.2 Identifying Minority, Low-income, and Limited English Proficiency Populations

As defined in USDOT Order 5610.2(a) and FHWA Order 6640.23A, persons of minority status include those who are:

- Black – a person having origins in any of the black racial groups of Africa;
- Hispanic or Latino – a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race;
- Asian American – a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent;
- American Indian and Alaskan Native – a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through tribal affiliation or community recognition; or
- Native Hawaiian and Other Pacific Islander – a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

As defined in USDOT Order 5610.2(a) and FHWA Order 6640.23A, a low-income person is one whose household income is at or below the U.S. Department of Health and Human Services' poverty guidelines (U.S. Department of Health and Human Services 2014). Poverty levels are defined at the national level and vary by the number of persons in a family and the age of the family members.

Households identified as having LEP are those for which the residents either do not speak English at all or speak English less than well. Households that speak languages other than English were also identified.

For the analysis presented in this section, locations with appreciably greater percentages of minority, low-income, and LEP populations than in a region of comparison were identified. The region of comparison for this analysis consisted of Pinal County and portions of Queen Creek and Mesa in Maricopa County. This defined region presents a close representation of the study area for the proposed action.

3.17.2.3 Determining Effects on Minority and Low-income Populations

An EJ evaluation determines whether a proposed action would result in disproportionately high and adverse effects on minority and low-income populations. Based on the FHWA *Environmental Justice Reference Guide*, the analysis for this study considered the following questions:

- Would the action corridor alternatives' adverse effects be predominantly borne by minority and low-income populations?
- Would adverse effects on minority and low-income populations be appreciably more severe or greater in magnitude than those suffered by non-minority and non-low-income populations?
- What would be the effect of the action corridor alternatives' offsetting benefits?
- What would be the effect of mitigation measures that would be incorporated into the action corridor alternatives, and any other enhancements or betterments that would be provided in lieu of mitigation?

Determining the potential disparate effects on populations protected by Title VI was based on a methodology similar to that used for minority and low-income populations. Potential adverse effects on and benefits to the protected populations were identified.

3.17.3 Affected Environment

This section describes the minority, low-income, and LEP populations identified in the study area.

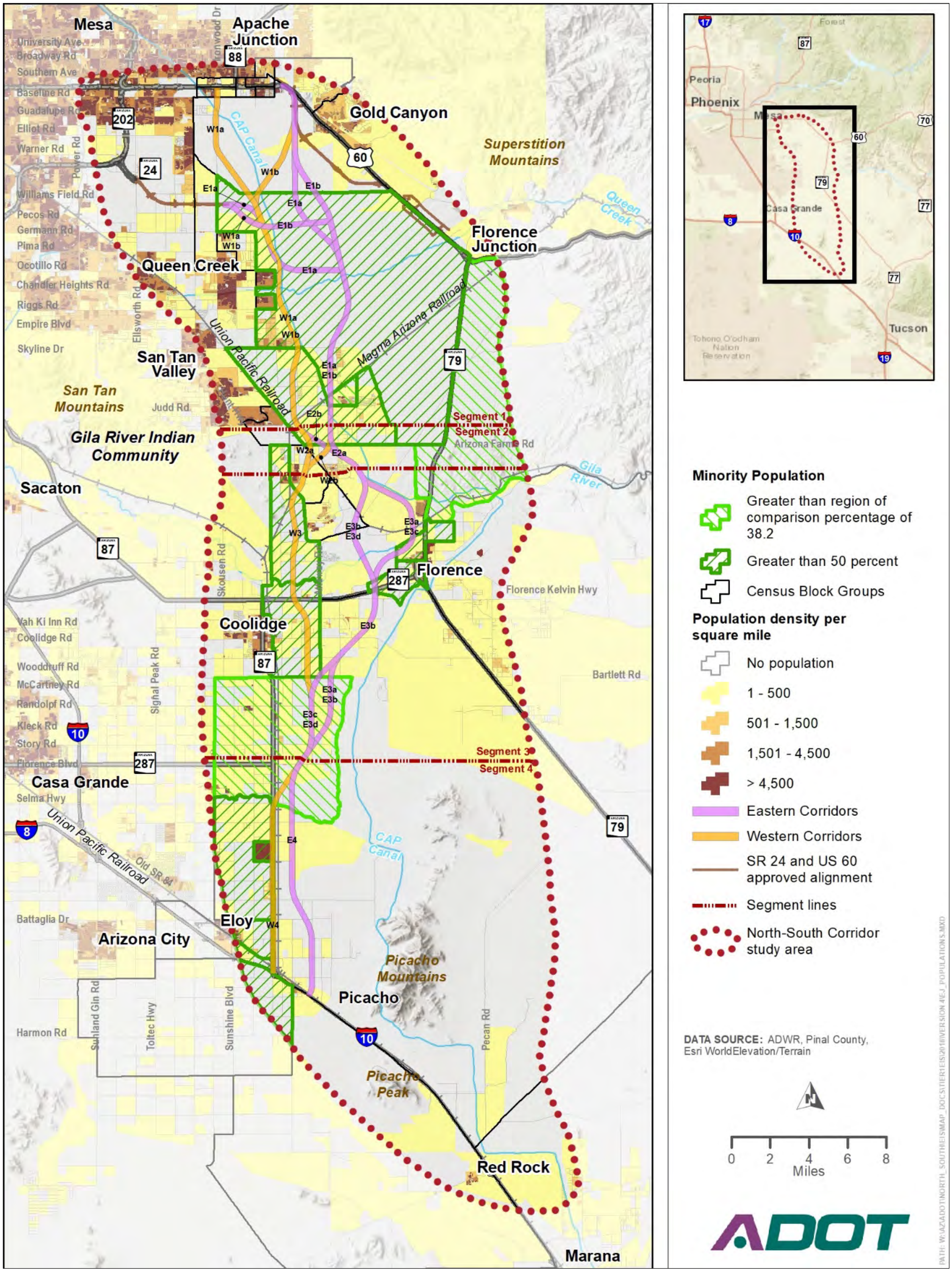
3.17.3.1 Minority Populations

Table 3.3-2 shows the racial composition of Arizona, Pinal County, Maricopa County, and various jurisdictions in the study area (see Section 3.3, *Social Conditions*). Minorities consist of populations that identify as Hispanic or Latino, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, some other race, or two or more races. While minorities account for 43.5 percent of the state population, there are slightly lower percentages in Maricopa and Pinal Counties (42.7 percent and 42 percent, respectively) and an even lower percentage in Mesa (36 percent), Queen Creek (24 percent), and Apache Junction (20.3 percent). However, in Florence, Coolidge, and Eloy, there are greater percentages of minorities than statewide, with 49.2 percent, 54.8 percent, and 77.2 percent, respectively. Appendix E, *Social Conditions Information*, lists the detailed racial composition of each block group in the study area.

The same block groups within 0.5 mile of the action corridor alternatives were used to describe the racial composition at the block-group level to identify the locations of populations with appreciably greater percentages of minority populations. Table E-1 in Appendix E provides the data by block group.

Figure 3.17-1 shows the block groups with minority populations that exceed the threshold of 38.2 percent (the percentage in the defined region of comparison) and 50 percent (a typical threshold used in EJ analyses). Block groups with a higher percentage of minority populations than the region of comparison are considered high-minority block groups.

Figure 3.17-1. Minority populations in the study area



Block groups with minority percentages that exceed 50 percent are located in each segment of the study area. In the north, these block groups are concentrated in the south-central portion of Segment 1, and all four Segment 1 action corridor alternatives cross these block groups; however, the W1a and W1b Alternatives are closer to the populated areas from which the demographic data are drawn. In Segment 3, the E3a, E3c, and W3 Alternatives cross block groups with minority percentages that exceed 50 percent. In the southern part of Segment 3 and northern part of Segment 4, all action corridor alternatives go through block groups with minority percentages that exceed that of the region of comparison. In Segment 4 south of Selma Highway, the W4 Alternative is adjacent to block groups with minority percentages greater than 50 percent, while the E4 Alternative goes through block groups with lower minority percentages. Appendix E, *Social Conditions Information*, includes maps showing the percentages of specific minority groups by block group: Hispanic or Latino, Black or African American, American Indian or Alaska Native, Asian, and other (which includes Native Hawaiian or other Pacific Islander, some other race, and two or more races).

3.17.3.2 Low-income Households

Table 3.3-8 in Section 3.3, *Social Conditions*, shows the percentages of low-income individuals (that is, those with household income below the federally established poverty level based on household size) in Arizona, Pinal County, Maricopa County, and the various jurisdictions in the study area (see Section 3.3, *Social Conditions*). The table indicates that both Maricopa and Pinal Counties have about 17 percent of their populations living below the federally established poverty level. The cities and towns in the study area have poverty percentages that range between 8.6 percent in Queen Creek and 36.2 percent in Eloy.

Figure 3.17-2 shows the concentrations of low-income residents in the study area by census tract block group. Similar to determining categories for minorities, categories of low-income status are based on the low-income percentage of the region of comparison (that is, Pinal County, Mesa, and Queen Creek) which is 16.6 percent. Appendix E provides the detailed low-income composition of each block group in the study area. Block groups with a lower percentage of low-income populations than the region of comparison are considered non-low-income block groups and the ones with a higher percentage of low-income populations are considered low-income block groups.

As the figure shows, low-income populations are located throughout the study area. Large concentrations of block groups with high percentages of low-income populations are located in central and southern Segment 1 (all alternatives), along the W3 Alternative, in Florence near the E3a and E3c Alternatives, in the southern portion of Segment 3 (all alternatives), and west of the W4 Alternative.

3.17.3.3 Limited English Proficiency Households

Table 3.17-1 and Figure 3.17-3 show the percentages of LEP households in Arizona, Maricopa County, Pinal County, and the various jurisdictions in the study area. As the table indicates, several of the study area's jurisdictions have low percentages of LEP households, with the exception of Mesa (4.6 percent) and Coolidge (4.8 percent), with percentages of LEP households more closely in line with those of Arizona in general.

An October 2017 memorandum identified the languages primarily spoken by LEP populations in the study area, in accordance with the ADOT Civil Rights Office's *Title VI Nondiscrimination Program: 2016 Limited English Proficiency Plan* and "Safe Harbor" stipulation to comply with its obligations to provide written translations in languages other than English (see Appendix E, *Social Conditions Information*).

Table 3.17-1. Limited English proficiency households in the region

Geographic area	Total households	Language other than English spoken in household		Limited English proficiency household	
		Total	Percentage (%)	Total	Percentage (%)
Maricopa County	1,442,518	373,600	25.9	67,554	4.7
Pinal County	127,599	28,356	22.2	3,109	2.4
Apache Junction	15,933	1,974	12.4	354	2.2
Mesa	168,914	36,567	21.6	7,766	4.6
Queen Creek	8,758	1,173	13.4	54	0.6
Florence	6,832	1,172	17.2	157	2.3
Coolidge	3,806	1,355	35.6	183	4.8
Eloy	3,241	1,812	55.9	444	13.7

Source: U.S. Census Bureau, American Community Survey 2011 to 2015 5-year estimates, Table B16002

The memorandum indicates that 5.43 percent of the total population in the study area speaks English less than “very well,” according to the U.S. Census Bureau’s 2015 American Community Survey, and approximately 87 percent of those individuals speak Spanish or Spanish Creole (4.71 percent of the total population). In 20 of the 61 census tracts in the study area, more than 5 percent of the population speaks English less than “very well”—the threshold for providing written translations in languages other than English. In 14 of these 20 census tracts, more than 5 percent of the population speak Spanish or Spanish Creole. Within the study area, the next most prevalent spoken languages are Laotian (0.10 percent), Chinese (0.09 percent), and Tagalog (0.09 percent). Given these findings, it is recommended that NSCS informational materials be translated to Spanish to comply with Title VI, Executive Order 13166, and the ADOT *Title VI Nondiscrimination Program: 2016 Limited English Proficiency Plan*.

Figure 3.17-3 shows the locations of block groups with percentages of households that speak a language other than English that is greater than the region of comparison (21.7 percent) and those with percentages of LEP households greater than the region of comparison (3.6 percent). Appendix E lists the detailed LEP household data for each block group in the study area. The figure illustrates that high LEP household block groups occur throughout the study area in areas that also have higher percentages of minority and/or low-income populations. All action corridor alternatives cross block groups with larger percentages of LEP households than the region of comparison, with the E3a, E3c, and E4 Alternatives having the shortest stretches in these areas.

Figure 3.17-2. Low-income households in the study area

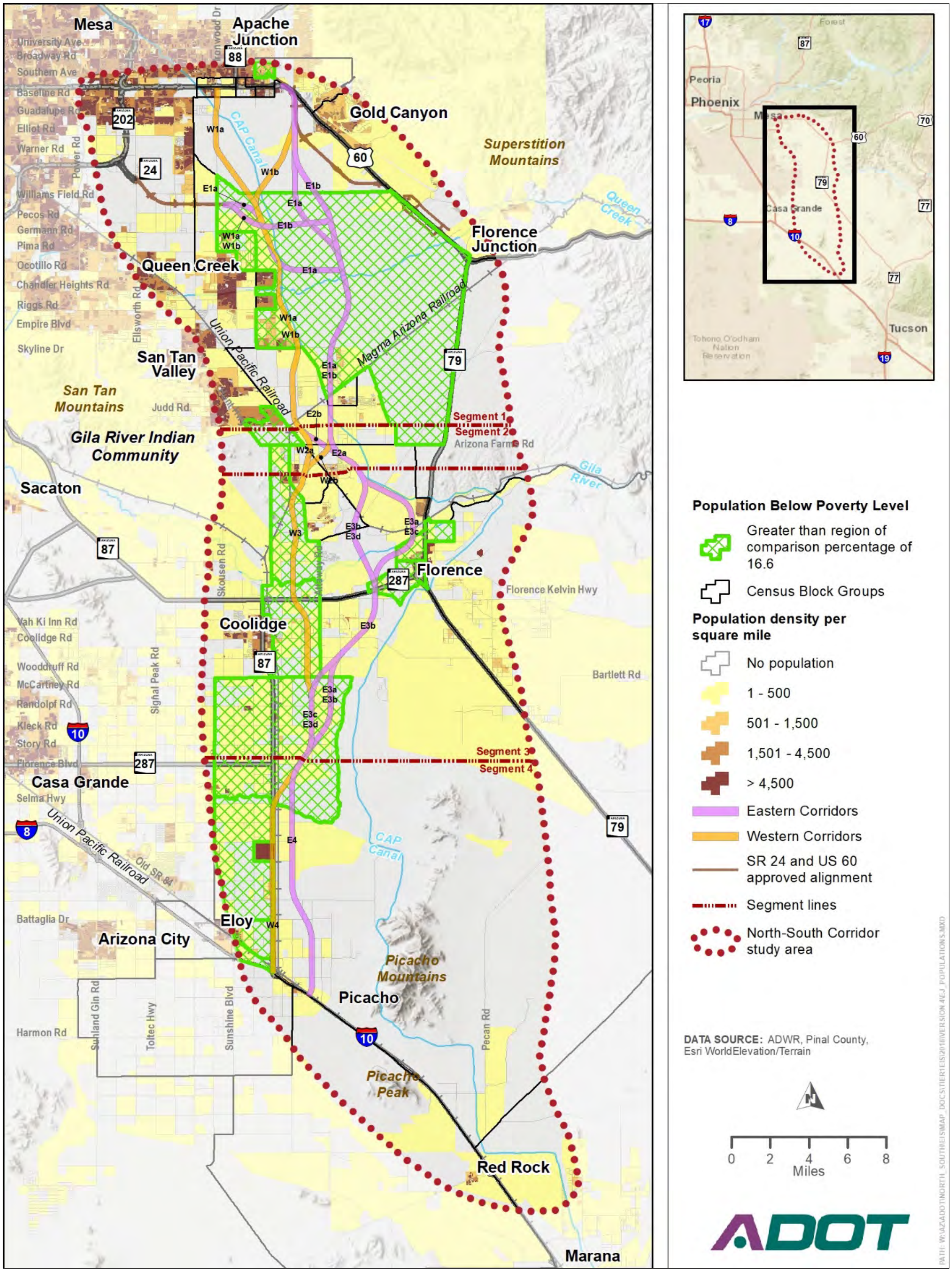
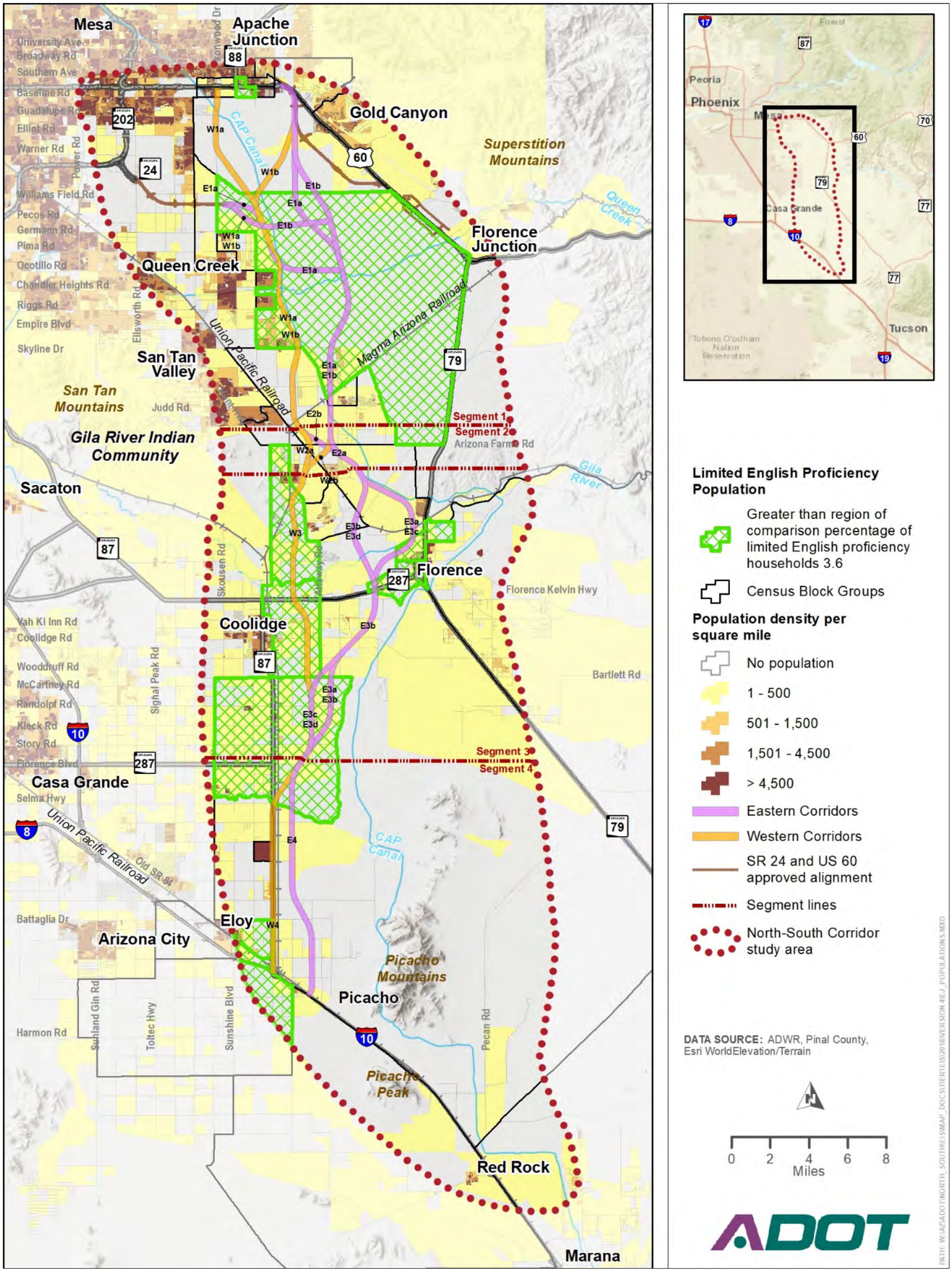


Figure 3.17-3. Limited English proficiency households in the study area



3.17.3.4 Environmental Justice and Title VI Populations by Action Corridor Alternative

Based on the EJ definitions previously discussed and on the locations of these populations as shown in previous figures, Table 3.17-2 summarizes the EJ status for each action corridor alternative by segment using the demographic data from Section 3.3, *Social Conditions*. An entry of "no" in the table indicates that the percentage of minorities, low-income, and/or LEP populations for the action corridor alternative is comparatively lower than the region of comparison. Inversely, an entry of "yes" indicates that the percentage of minorities, low-income, and/or LEP populations for the action corridor alternative is comparatively higher than the region of comparison. Locations in the action corridor alternatives for which the demographic data are higher than the region of comparison are identified as EJ areas and are evaluated in the following sections for potential disproportionately high and adverse effects.

Table 3.17-2. Summary of study area locations with minority, low-income, and limited English proficiency populations

Action corridor alternative	Comparison of minority percentage with that of region of comparison	Comparison of low-income percentage with that of region of comparison	Comparison of LEP household percentage with that of region of comparison
Segment 1			
E1a	Yes – south of Pecos Road	Yes – between Pecos and Judd Roads	Yes – between Pecos and Judd Roads
E1b	Yes – south of Pecos Road	Yes – between Pecos and Judd Roads	Yes – between Pecos and Judd Roads
W1a	Yes – south of Pecos Road	Yes – between Pecos Road and Skyline Drive	Yes – between Pecos Road and Skyline Drive
W1b	Yes – south of Pecos Road	Yes – between Pecos Road and Skyline Drive	Yes – between Pecos Road and Skyline Drive
***Segment 2*[a]**			
E2a	Yes – north of Arizona Farms Road	No	No
E2b	Yes – north of Arizona Farms Road	No	No
W2a	Yes – north of Arizona Farms Road	No	No
W2b	Yes – north of Arizona Farms Road	No	No
Segment 3			
E3a, E3c	Yes – between Hunt Highway and Butte Avenue; south of Bartlett Road	Yes – between Hunt Highway and Butte Avenue; south of Bartlett Road	Yes – between Hunt Highway and Butte Avenue; south of Bartlett Road
E3b, E3d	Yes – south of Bartlett Road	Yes – south of Bartlett Road	Yes – south of Bartlett Road
W3	Yes – all[b]	Yes – all[b]	Yes – all[b]

Table 3.17-2. Summary of study area locations with minority, low-income, and limited English proficiency populations

Action corridor alternative	Comparison of minority percentage with that of region of comparison	Comparison of low-income percentage with that of region of comparison	Comparison of LEP household percentage with that of region of comparison
Segment 4			
E4	Yes – north of Selma Highway	Yes – north of Selma Highway	Yes – north of Selma Highway
W4	Yes – all	Yes – all[b]	Yes – north of Selma Highway; south of Battaglia Drive

Note: LEP = limited English proficiency

[a] Segment 2 contains block groups that overlap other segments, and demographics are accounted for in Segments 1 and 3; however, the assessment of locations of high concentrations of minority and low-income populations is considered for Segment 2.

[b] In these areas, only a small portion of the block groups is not considered high-minority or low-income.

3.17.4 Environmental Consequences

3.17.4.1 Environmental Justice Evaluation Overview

Both USDOT Order 5610.2(a) and FHWA Order 6640.23A define a disproportionately high and adverse effect on human health or the environment to include an adverse effect that:

1. Is predominantly borne by a minority population and/or a low-income population.
2. Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

Projects cause positive and negative effects, or benefits and burdens, which may occur in the short, medium, or long term. If an effect is disproportionately high and adverse on minority and low-income populations, mitigation measures and offsetting benefits to the affected minority and low-income populations are considered.

All environmental resource areas described in this chapter were reviewed to identify those that may be adversely affected by the action corridor alternatives. The environmental resource areas with no adverse effects or with adverse effects that would be effectively mitigated during the construction and operation phases were not considered for additional analysis because they involved no potential for disproportionately high and adverse effects on minority and low-income populations. Environmental resource areas where adverse effects would likely occur were examined to determine whether the adverse effects have the potential to be disproportionately high and predominantly borne by minority and low-income populations. Project benefits to these resources were also considered. Table 3.17-3 lists the resource areas and identifies those that required additional EJ analysis as part of this Tier 1 DEIS (see discussion in Section 3.17.4.2, *Adverse Effects on Minority and Low-income Populations*). The rationale for the selection of these categories is also provided.

The following sections describe the EJ analyses for the environmental resource areas that may affect minority and low-income populations, as previously described. The EJ analyses assessed whether the anticipated effects would likely result in disproportionately high and adverse effects on the minority and low-income populations, consider mitigation measures and offsetting benefits, and determine whether the benefits of the proposed action would be equitably distributed to the minority and low-income populations.

Table 3.17-3. Environmental resource areas considered in environmental justice analysis

Environmental resource area	Environmental justice analysis required?	Rationale
Traffic and transportation	Yes	Effects on local access and benefits in terms of travel time savings, improved access, and congestion reductions may disproportionately affect minority and low-income populations.
Land use	Yes	Potential property acquisitions and displacements may disproportionately affect minority and low-income populations.
Social conditions	Yes	Potential effects on community cohesion and public services and utilities may disproportionately affect minority and low-income populations.
Economics	No	Tax revenue effects on local jurisdictions may affect the social services provided to local residents; however, these effects would be distributed widely in the study area.
Parklands and recreational facilities	Yes	Effects on accessibility to parklands and recreational facilities may disproportionately affect minority and low-income populations.
Prime and unique farmland	Yes	Direct and indirect effects on prime and unique farmland may disproportionately affect minority and low-income populations.
Air quality	No	No adverse effects.
Noise	Yes	Noise impacts are anticipated in residential development areas, which may disproportionately affect minority and low-income populations.
Visual resources	No	No adverse effects with mitigation.
Topography, geology, and soils	No	No adverse effects with mitigation.
Biological resources	No	No adverse effects.
Hydrology, floodplains, and water resources	No	No adverse effects with mitigation.
Wetlands and waters of the United States	No	No adverse effects with mitigation.
Cultural resources	No	To the extent feasible, all potential impacts on cultural resources would be avoided with the alternatives under consideration.
Hazardous materials	No	No adverse effects with mitigation.
Energy	No	No adverse effects.

3.17.4.2 Adverse Effects on Minority and Low-income Populations

Traffic and Transportation

The Eastern or Western Alternatives would improve regional mobility by providing a continuous north-to-south access-controlled route, connecting US 60 with I-10. The benefits to minority and low-income populations are discussed in Section 3.17.4.3, *Benefits to Minority and Low-income Populations*.

All the action corridor alternatives would change local circulation and affect local access by blocking cross streets that would not have direct traffic interchange access with the action corridor alternatives. In EJ areas in Segments 1, 3, and 4, the action corridor alternatives have potential interchange access at the same crossing streets, which means there would not be notable differences in the effects on local access in these segments regardless of which action corridor alternatives are selected.

ADOT would coordinate with municipalities, affected communities, local schools, large employers, medical facilities, and all appropriate emergency services to address and resolve effects on local road networks during the design and construction phases.

Land Use and Property Acquisitions

With the conversion of land uses to transportation use, full and partial property acquisitions would result from implementing any of the action corridor alternatives. In most cases, these property acquisitions would not displace residents or businesses. In Segment 1, potential property acquisitions resulting in unavoidable displacements may occur along the W1a and W1b Alternatives in an area characterized as an EJ area. Property acquisitions may also occur with all action corridor alternatives in the northern portion of Segment 1, particularly with the W1a Alternative, in areas characterized as non-minority and/or non-low-income areas. Therefore, in Segment 1, there is the potential that the W1a and W1b Alternatives would result in disproportionately high and adverse impacts on minority and low-income populations with respect to land use and property acquisitions.

In Segment 2, none of the action corridor alternatives would displace residents or businesses. In Segment 3, the W3 Alternative would possibly result in the property acquisition and displacement of one or more isolated properties. The E3a and E3c Alternatives may affect one home outside of downtown Florence, and the E3a and E3b Alternatives may result in the acquisition and displacement of one or more isolated properties. The E3d Alternative may result in no displacements; however, it is mostly in non-minority and/or non-low-income areas. Since the W3 Alternative and the potentially affected parts of the E3a, E3b, and E3c Alternatives are all in EJ areas, all action corridor alternatives except the E3d Alternative in Segment 3 may potentially result in disproportionately high and adverse effects on minority and low-income populations.

The locations of potential property acquisitions and displacements in Segment 4 are along SR 87; therefore, the W4 Alternative may result in property impacts while the E4 Alternative would not. Since the W4 Alternative is characterized as an EJ area, and most of the E4 Alternative is considered non-minority and/or non-low-income, the W4 Alternative may potentially result in disproportionately high and adverse effects on minority and low-income populations.

ADOT has a well-developed relocation program to assist residents and business owners who may be displaced by the proposed action. All displaced persons, regardless of their EJ status, would be given assistance on an individual basis in accordance with ADOT policy, Arizona statutes, and the Uniform Act. Section 3.2, *Land Use*, has information on the Uniform Act and the mitigation measures to be implemented with the proposed action.

Social Conditions

Because the study area is mostly undeveloped, effects on social conditions in the study area are limited to specific locations where existing communities or facilities are located and would be affected either directly or indirectly (such as, effects on access) by one of the action corridor alternatives.

In Segment 1, in the EJ areas south of Pecos Road, the W1a, W1b, and E1a Alternatives would potentially reduce access to an existing airfield. No other adverse effects on community facilities are anticipated in EJ areas. In non-minority and/or non-low-income areas in the northern portion of Segment 1, the W1a Alternative may affect access to an existing school. The airfield impact may be avoided or minimized; however, the school impact may not be avoided. Therefore, in Segment 1, none of the alternatives would result in disproportionately high and adverse effects on minority and low-income populations.

In Segment 3, there are several community facilities in downtown Florence that would not be adversely affected with the Eastern Alternatives. On the other hand, the W3 Alternative would possibly reduce access to an existing church located within the 1,500-foot-wide corridor. During Tier 2 studies, direct impacts on the church may be avoided; however, if it is determined that access to and from the church by minority and low-income populations would be reduced, additional mitigation measures would be identified. Therefore, the W3 Alternative may potentially result in disproportionately high and adverse effects on minority and low-income populations.

In Segment 4, a post office and a Southern Baptist Church are located in the potential footprint of a system traffic interchange at I-10 with both the W4 and E4 Alternatives. The I-10 system interchange would be designed during Tier 2 studies, at which time exact impacts would be identified and avoided to the extent possible; however, the access to church, which may have minority and low-income populations in its congregation, may be affected. If impacts are identified, appropriate mitigation measures would be incorporated during Tier 2 studies to maintain access to and from this community resource. Therefore, since the potential of this impact would result with both alternatives, neither alternative in Segment 4 would have a higher likelihood of resulting in disproportionately high and adverse effects on minority and low-income populations.

In general, residents in all segments would benefit from the implementation of the action corridor alternatives because each would improve regional connectivity, reduce travel times, and provide enhanced access to jobs, community resources, and other destinations. More detailed EJ analysis regarding the potential social benefits is discussed in Section 3.17.4.3, *Benefits to Minority and Low-income Populations*.

Parklands and Recreational Facilities

All the action corridor alternatives have the potential to affect existing and/or planned parks and recreational facilities in some way because each action corridor alternative has one or more facilities located within 0.5 mile. Direct impacts would occur if all or part of the facility is converted to a nonrecreational use. Indirect impacts would occur if access or use of the facility is affected or if construction activities affect the facility. In Segment 1, there would be potential direct impacts on parks and trails in areas with and without minority and non-low-income populations with all alternatives. At US 60, the W1a Alternative would likely affect a private golf course and recreational areas associated with a high school, while the E1a, E1b, and W1b Alternatives would likely affect planned areas of Silly Mountain Park and Trails; however, the actual impacts of a Tier 2 alignment may avoid impacts on the park since planning documents for the park identify a future transportation facility through the park (see Section 3.5, *Parkland and Recreational Facilities*). Farther south in Segment 1, all action corridor alternatives would affect both existing and planned trails. These impacts would be avoided or minimized during Tier 2 studies with the design of the facility. Therefore, in Segment 1, any impacts on parks and recreational facilities would not be borne disproportionately by minority and low-income populations since both direct and indirect impacts would be avoided or minimized to the extent practicable, regardless of location.

In Segment 3, the Eastern Alternatives have the potential to directly affect the Gila River Trail; however, the portion of the trail crossed by the E3a and E3c Alternatives is in a minority and low-income area while the portion of the trail crossed by the E3b and E3d Alternatives is in a non-minority and/or non-low-income area. In addition, the E3b and E3d Alternatives may directly affect two other planned trails in non-minority and/or non-low-income areas. The W3 Alternative may directly affect Coolidge parks in minority and low-income areas. As with Segment 1, both direct and indirect impacts would be avoided or minimized to the extent practicable, regardless of location. However, implementing the W3 Alternative may potentially result in disproportionately high and adverse effects on minority and low-income populations regarding parks and recreational facilities.

One resource in Segment 4, the planned Butterfield Overland trail, may be directly affected by the Eastern and Western Alternatives. This impact, as well as the potential indirect impact on the Picacho Reservoir with the E4 Alternative, would be avoided or minimized to the extent practicable. Therefore, neither alternative in Segment 4 would result in disproportionately high and adverse effects on minority and low-income populations regarding parks and recreational facilities.

Prime and Unique Farmland

The action corridor alternatives would result in effects on prime and unique farmland, as described in Section 3.6, *Prime and Unique Farmland*. Effects on farmland of all types would adversely affect minority and low-income populations if the farmland is owned and operated by minority and/or low-income persons that could lose their livelihood if the land is converted.

In Segment 1, more prime farmland and farmland of unique importance exists along the W1a and W1b Alternatives (in EJ areas) than along the Eastern Alternatives. While more EJ areas may experience greater farmlands impacts with the Western Alternatives, since both the Eastern and Western Alternatives in Segment 1 have minority and low-income populations, these impacts would not be disproportionately high and adverse. Nearly all of the Segment 2, 3, and 4 alternatives are located completely in areas identified as prime farmland or farmland of unique importance; therefore, the farmland impacts in Segments 2, 3, and 4 with any of the action corridor alternatives would not be disproportionately high and adverse. With all action corridor alternatives, direct effects on the use of farmlands would be avoided or minimized, and access to adjacent farmland properties would be maintained to the extent practicable.

Noise

With the action corridor alternatives, modeled noise levels are slightly lower for the Eastern Alternatives than for the Western Alternatives because of slightly lower traffic volumes with the Eastern Alternatives. The small difference in noise levels between the two alternatives would not be perceptible to the human ear. In Segment 1, the W1a Alternative may potentially cause noise impacts along Ironwood Drive, a non-minority and/or non-low-income area. In the southern EJ areas of Segment 1, adverse noise levels may be greater with the W1a and W1b Alternatives than with the E1a and E1b Alternatives. Therefore, in Segment 1, it is possible that the Western Alternatives would result in disproportionately high and adverse noise effects on EJ populations.

In Segments 3 and 4, in some locations where a 1,500-foot-wide action corridor alternative overlays homes, there is a risk that the Tier 2 alignment may cause adverse noise impacts. This risk is higher for EJ areas with the E3a, E3b, and W4 Alternatives; therefore, these alternatives have the potential to result in disproportionately high and advserse noise impacts on minority and low-income populations.

Noise barriers would likely be warranted to mitigate potential noise impacts on the affected residential development areas.

3.17.4.3 Benefits to Minority and Low-income Populations

Travel Time Savings

The action corridor alternatives would provide substantial benefits to the local and regional transportation network. The proposed action would remove pass through traffic from key study area roadways, resulting in reduced congestion and decreased travel times because the proposed action corridor alternatives would provide a more direct route between I-10 and US 60 in Pinal County and an alternative travel route that provides increased capacity and network redundancy to improve system efficiency.

Traffic is projected to increase throughout the study area, with the greatest increases expected in the area south of Arizona Farms Road, where most of the EJ areas are located. In 2015, a peak period trip between San Tan Valley and downtown Florence would have taken less than a half hour; by 2040, with the No-Action Alternative, that same trip is anticipated to take twice the time. With any of the action corridor alternatives, it is anticipated that the same trip in 2040 would take 34 minutes, a substantial improvement over the No-Action Alternative.

The reduction in travel time is a benefit for all populations, particularly for minority and low-income populations who may have more hourly paid jobs than non-minority and non-low-income populations, and who may be more sensitive to fuel costs for longer commutes. The time savings may increase productivity, enable families to spend more time together, or have other quality-of-life or health benefits.

Regional Access and Connectivity

Both the Eastern and Western Alternatives would provide a direct route between US 60 in Apache Junction and I-10 near Eloy, particularly in 2040 when local roads would be more congested and direct north-to-south access would otherwise be limited. Study area residents and residents of the greater Sun Corridor would benefit from this continuous, nonfragmented, north-to-south connection to access regional employment, education, and recreation opportunities.

By 2040, the Phoenix metropolitan region workforce is projected to be distributed among downtown Phoenix, Tempe, Chandler, Mesa, Apache Junction, Queen Creek, Florence, Coolidge, Eloy, Tucson, and a number of other employment centers (Figure 3.17-4).

The greatest density of employment opportunities (that is, areas with greater than 1.5 jobs per 2 acres, as shown in the figure) is located in the Phoenix metropolitan area northwest of the study area; however, these dense employment centers are also located within the study area. Regardless of the selected action corridor alternative, the proposed action would improve the connectivity for residents in the Corridor, including the large number of minority and/or low-income populations commuting to the locations with the greatest employment opportunities.

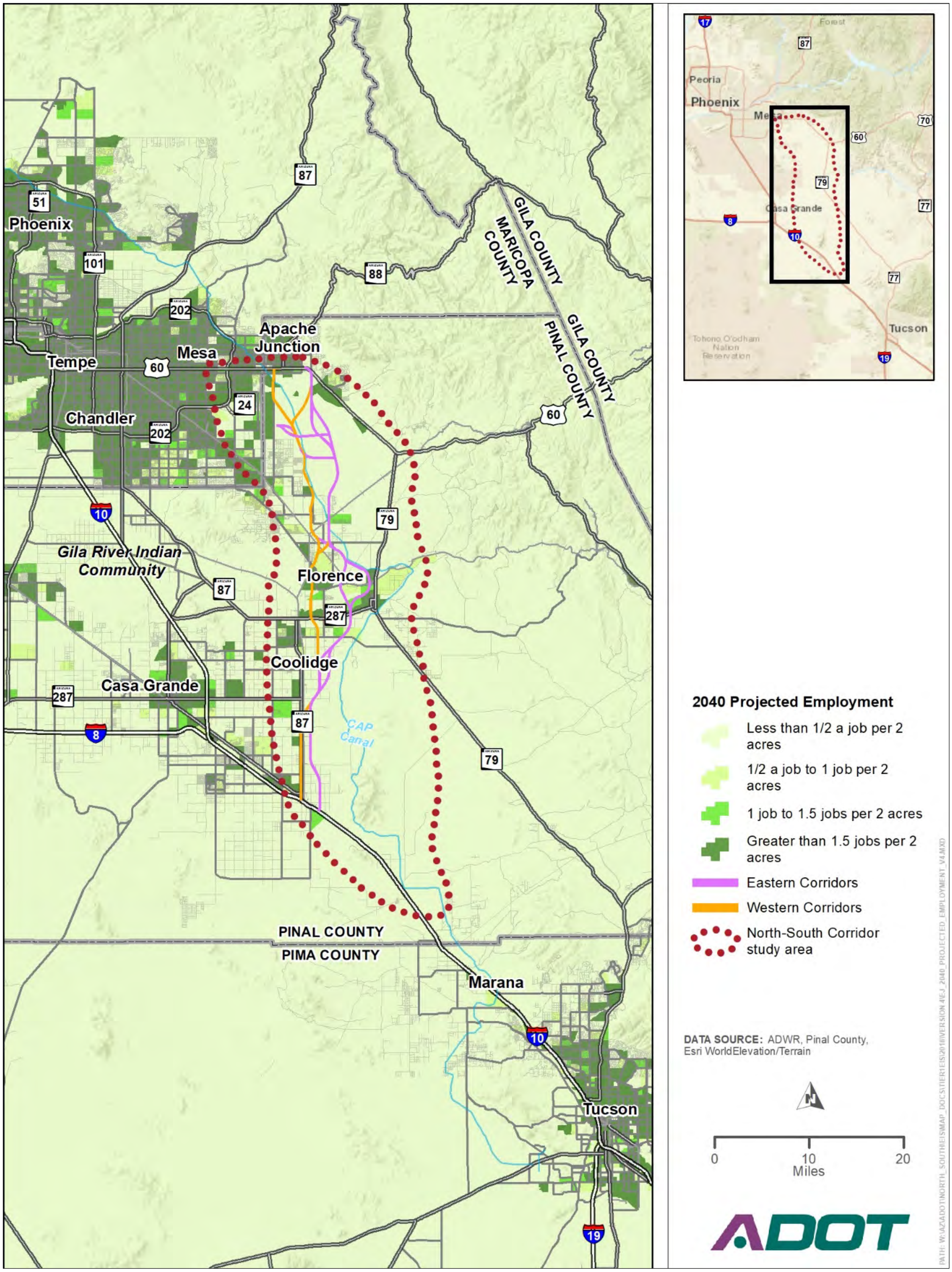
The action corridor alternatives would provide the local residents with improved connectivity and access to other key destinations in the region, such as recreation centers, universities and colleges, shopping centers, medical centers, and other public and community facilities.

Because study area residents and residents of the greater Sun Corridor would all have access to the proposed action, the benefit in terms of improved regional access and connectivity would be equitably distributed to all populations in the study area.

Economic Benefits

The action corridor alternatives would result in local and regional economic benefits. As a result of travel time reductions, there is potential cost savings on gas and vehicle maintenance for people who regularly commute through the area. As the region continues to grow, it is expected that new development, together with the improved regional access and connectivity, may actually increase overall property tax and sales tax revenues in the region as compared with today’s tax revenues. In addition, the construction of a new freeway would increase job opportunities in the local market, benefitting local residents as a whole.

Figure 3.17-4. 2040 projected regional employment, by traffic analysis zone



3.17.4.4 Environmental Justice and Title VI Conclusions

Environmental Justice Conclusion

While potential adverse effects would be related to the action corridor alternatives, all populations in the study area would likely receive the benefits listed below from the proposed action. It is anticipated that during Tier 2 studies, as the actual alignments are developed, impacts on minority and low-income populations would be evaluated and feasible measures to avoid, minimize, or mitigate adverse effects would be put in place. However, as the analyses also show, some segment alternatives have the potential to result in disproportionately high and adverse effects on minority and low-income populations. Generally, the Western Alternatives would more likely cause disproportionately high and adverse effects on minority and low-income populations than the Eastern Alternatives. While these effects would be further evaluated in Tier 2 studies, for the purposes of this high-level Tier 1 analysis, these potential disproportionately high and adverse effects are listed in Table 3.17-4.

Table 3.17-4. Potential environmental justice impacts

Resource	Potential disproportionately high and adverse effects
Land use	Segment 1 – W1a, W1b Segment 3 – E3a, E3b, E3c, W3 Segment 4 – W4
Social conditions	Segment 3 – W3
Parks and recreation	Segment 3 – W3
Noise	Segment 1 – W1a, W1b Segment 3 – E3a, E3b Segment 4 – W4

While potential adverse effects would be related to the action corridor alternatives, all populations in the study area would receive the following benefits from the proposed action:

- a continuous, nonfragmented, north-to-south connection between US 60 in Apache Junction and I-10 near Eloy
- reduced congestion on the existing transportation network
- faster travel times along the proposed Corridor
- improved access to employment, educational, recreational, shopping, and cultural opportunities
- reduced gas and vehicle maintenance costs attributable to reduced congestion and faster travel times
- increased local job opportunities owing to constructing a new freeway
- improved air quality

An equity evaluation would be included in the Tier 2 phase to identify the extent to which minority and low-income populations, as well as populations as a whole, in different locations would receive these benefits, to provide a comprehensive EJ analysis once the actual alignments are developed.

Title VI Conclusion

Individuals protected by Title VI include minority and LEP populations. As shown in Figures 3.17-1 and 3.17-3, minority and LEP populations, respectively, reside throughout the study area and would be affected by any of the action corridor alternatives. The discussion in Section 3.17.4.2 regarding potential adverse effects on minority and low-income populations applies to the Title VI evaluation. In addition, the potential benefits listed in Section 3.17.4.3, such as improved travel time, reduced congestion, and improved regional access and connectivity, are among the benefits that can be anticipated by all study area residents. During Tier 2 analysis, impacts would be analyzed and mitigated.

3.17.5 Potential Avoidance, Minimization, and Mitigation Strategies

For each resource area considered, specific avoidance, minimization, and mitigation measures may be implemented to reduce the adverse effects of the proposed action and to not result in disproportionately high and adverse effects on minority and low-income populations. These specific measures would be developed during Tier 2 studies once actual alignments are developed and their impacts are evaluated in greater detail. Targeted community outreach would be conducted during Tier 2 studies to identify minimization and mitigation measures. Possible strategies could include:

- specifying commitments in terms of time frame or performance standards so that expectations are clear
- providing ongoing commitment and monitoring reports to minority and low-income populations
- conducting additional outreach to minority and low-income populations
- assigning a dedicated point-of-contact to be available for EJ-related concerns and issues during the Tier 2 process
- including monitoring requirements, and sharing the results, to alleviate concerns
- providing appropriate compensation through replacement or substitute resources
- rectifying an impact through repair, rehabilitation, or restoration

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.17.6 Subsequent Tier 2 Analysis

During Tier 2 studies, detailed analyses for all alignments under consideration shall identify:

- adverse impacts (specific burdens) that would be borne by minority and low-income populations versus those borne by non-minority and non-low-income populations to determine:
    - whether any adverse impacts would be predominantly borne by minority and low-income populations, and
    - whether any adverse impacts suffered by minority and low-income populations would be appreciably more severe or greater in magnitude than those suffered by non-minority and non-low-income populations
- benefits received by minority and low-income populations to ensure there is no denial of, reduction in, or significant delay in benefits received from the proposed action
- all public outreach efforts to engage minority and low-income populations in the transportation planning process

Once specific project impacts are determined during Tier 2 studies, the effects on pockets of minority and low-income populations not necessarily identified through census data would be included to fully assess the potential for disproportionately high and adverse effects on minority and low-income populations.

3.18 Temporary Construction Impacts

Implementing the proposed action would cause temporary construction-related impacts on a number of resources evaluated in this Tier 1 DEIS, should an action corridor alternative proceed to the Tier 2 study and be identified as a preferred alternative for construction. Those resource areas for which no construction-related impacts are anticipated are not included in the following discussion. Moreover, for some resource areas, such as cultural resources and acquisitions and displacements, impacts are expected to be permanent.

Because the action corridor alternatives discussed in this Tier 1 DEIS are relatively wide corridors, potential construction impacts are described in a general way. As the transportation decision-making process advances into the Tier 2 study, design would be further refined and detailed construction activities, traffic control, and public involvement plans would be prepared to avoid and minimize adverse effects to the extent practicable and to inform the public of ongoing activities. Specific temporary construction impacts and mitigation measures would be developed during the Tier 2 study.

With the No-Action Alternative, a new freeway would not be constructed; therefore, no temporary construction-related impacts would result.

3.18.1 Short-term Environmental Consequences

Short-term impacts associated with construction would affect the following resource areas:

- social conditions
- parkland and recreational facilities
- traffic and transportation
- air quality
- noise
- visual resources
- biological resources
- waters of the United States
- hydrology, floodplains, and water resources
- minority and low-income populations
- utilities

Table 3.18-1 discusses these impacts and potential mitigation measures to address such impacts.

Table 3.18-1. Short-term construction impacts, by resource

Resource	Impacts	Potential mitigation
Social conditions	• Detours, lane closures, and the movement of construction-related vehicles would temporarily affect access to residential areas and businesses. Construction-related activities have the potential to affect access to community facilities and services, and the delivery of emergency services. • Construction of the proposed action would generate employment opportunities throughout the construction period.	• ADOT’s traffic control management procedures would be implemented to avoid, minimize, or mitigate potentially adverse construction-related access impacts on affected neighborhoods, businesses, and community facilities and services. • Construction action and traffic control plans would identify temporary transportation impacts and the locations of potential temporary detours. The plans would help ensure that local access to homes and businesses, and access for emergency services providers, is maintained. Plans would specify time frames for temporary detours and identify the process for notifying affected parties of the construction period and changes in access. • ADOT would work with local contractors to employ workers who reside in Pinal County and/or across the larger region.

Table 3.18-1. Short-term construction impacts, by resource

Resource	Impacts	Potential mitigation
Parkland and recreational facilities	• Construction impacts on parks or recreational facilities would occur if resources are located near or in the construction area. Temporary impacts might include increased dust from ground disturbance, noise from construction equipment, views of construction activities, access restrictions, and the presence of construction staging areas.	• To minimize potential construction-related impacts, mitigation measures may include strategically locating construction equipment to suitable locations near existing parkland and recreational facilities and establishing screening for noise disturbances.
Traffic and transportation	• Construction activities would temporarily affect vehicular movements, on-street parking, and access to adjacent properties along existing streets. The number of lanes along existing arterial streets adjacent to construction activities may be reduced periodically during construction, and detours may be necessary at some locations. • The movement of construction vehicles would create temporary traffic impacts in areas close to the construction zone, the extent of which would depend on which alternative is selected as the preferred alternative, and on the amount of new development at the time of construction. In addition, the magnitude of these impacts would depend on the location of sources of fill material and of disposition sites for surplus material, land uses adjacent to the Corridor and along haul routes, duration of hauling operations, staging locations, and construction phasing.	• Traffic would be managed by detailed traffic control plans and by procedures and guidelines specified in Part VI of FHWA's *Manual on Uniform Traffic Control Devices* (FHWA 2009) and by the *Arizona Supplement to Part VI of the Manual on Uniform Traffic Control Devices* (ADOT 2012b). In planning traffic control measures, the contractor would coordinate with potentially affected public services. Access would be maintained during construction, and construction activities that may substantially disrupt traffic would not occur during peak travel times. • ADOT would coordinate with local jurisdictions regarding traffic control and construction activities during special events. Requirements for using construction notices and bulletins would be identified. The effectiveness of traffic control measures would be monitored during construction and necessary adjustments would be made. • To identify acceptable routes and times of operation for hauling operations, ADOT would prepare an agreement with local agencies regarding hauling of construction materials on public streets.
Air quality	• Air quality impacts associated with construction would be limited to short-term increased fugitive dust and mobile source emissions. Fugitive dust would be generated by haul trucks, concrete trucks, delivery trucks, and other earthmoving vehicles. Increased dust levels would be attributable primarily to particulate matter resuspended by vehicle movement over paved and unpaved roads and other surfaces, dirt tracked onto paved surfaces from unpaved areas at access points, and material blown from uncovered haul trucks. Most fugitive dust is made up of relatively large particles (that is, greater than 100 microns in diameter) that are responsible for the reduced visibility often associated with this type of construction. Given their relatively large size, these particles tend to settle within 20 to 30 feet of their source.	• To reduce the amount of construction dust generated, particulate control measures related to construction activities would be followed. Measures to avoid, minimize, or mitigate adverse effects would be implemented in accordance with the most recent version of ADOT's *Standard Specifications for Road and Bridge Construction* (ADOT 2008b). The measures would address three phases of construction: site preparation, construction, and postconstruction.

Table 3.18-1. Short-term construction impacts, by resource

Resource	Impacts	Potential mitigation
Noise	• Roadway construction generates a substantial amount of temporary noise in localized areas. As a result, noise generated by construction activities has the potential to be a nuisance to nearby residents and businesses. • The most common noise source in construction areas would be from engine-powered machinery such as earth-moving equipment (bulldozers), material-handling equipment (cranes), and stationary equipment (generators). Mobile equipment (such as trucks and excavators) operates in a sporadic manner while stationary equipment (generators and compressors) generates noise at fairly constant levels. • Typical noise levels from construction equipment range from 69 to 106 dBA at 50 feet from the source; however, most typical construction activities fall within the 75 to 85 dBA range at 50 feet.	• ADOT's *Standard Specifications for Highway and Bridge Construction* (2008b) stipulate that all exhaust systems on equipment should be in good working order, and properly designed engine enclosures and intake silencers should be used where appropriate. • Stationary equipment would be located as far from sensitive receptors as possible. • On-site generators would be shielded from sensitive noise receptors by using temporary noise enclosures. • Construction alerts would be distributed to inform the public of ongoing construction activities near noise-sensitive locations.
Visual resources	• Temporary visual impacts would result from construction activities, such as temporary vegetation removal, disturbed soil, construction equipment, and construction equipment operation. Such impacts would occur where the proposed freeway is adjacent to existing homes and where the proposed traffic interchanges would be built. These temporary disruptions and activities would be typical of any major roadway project and are not considered adverse.	• No mitigation would be needed for temporary construction impacts on visual resources.
Biological resources	• Temporary construction impacts would occur during and for a period after construction because of reduced habitat quantity and quality in disturbed areas. • During construction, artificial lighting and noise and dust in the air generated by equipment and human activity could temporarily displace birds from foraging, resting, and nesting habitat. Disturbance-related displacement from favored breeding habitats could result in birds competing with other birds for suitable replacement habitats. This could result in nesting in less-favored areas where nests may be damaged or accessed more easily by predators, which could limit survival of offspring or adults.	• Once construction activities are complete, disturbed native desertscrub habitats adjacent to the new roadway embankment would be addressed according to a revegetation plan. • Measures to avoid, minimize, and mitigate impacts on protected species, comply with state and federal regulations, and reduce habitat fragmentation, wildlife displacement, impediments to movements, collisions, and spread of invasive species would be developed for a preferred alternative during the Tier 2 study.
Waters of the United States	• Temporary construction zones may result in additional impacts on waters of the United States beyond the permanent impacts associated with road and bridge crossings for the proposed action.	• During the Tier 2 study, the preferred alternative would be evaluated for specific impacts on waters of the United States, the appropriate level of Section 404 permitting would be identified, and mitigation measures would be developed.

Table 3.18-1. Short-term construction impacts, by resource

Resource	Impacts	Potential mitigation
Hydrology, floodplains, and water resources	• Construction activities such as clearing, grading, trenching, and excavating would disturb soils and sediment. If not managed properly, disturbed soils and sediment could be washed into nearby water bodies during storms, thereby reducing water quality. • Potential areas of shallow groundwater were identified in the study area. If groundwater is determined to be shallow at locations near the proposed action, it may affect the facility's foundation and subgrade design, and could require dewatering during construction activities.	• Measures to avoid, minimize, or mitigate impacts on hydrology, floodplains, and other water resources would be implemented to address temporary construction impacts. • Ground-disturbing activities exceeding 1 acre would require an AZPDES permit from the Arizona Department of Environmental Quality. The permit must be consistent with discharge limitations and water quality standards established for the receiving water. • Construction-related activities regulated under the AZPDES permit are required to have a Stormwater Pollution Prevention Plan, which would be prepared by the contractor. • Implementing best management practices would reduce water quality impacts on the receiving waters of the Gila River and its tributaries. Both construction and operational impacts may be mitigated by using best management practices. • During design, the depth to groundwater in areas with potentially shallow groundwater would be field-verified.
Minority and low-income populations	• Construction-related impacts may disproportionately affect minority and low-income populations in the study area. These construction-related impacts include adverse effects on social conditions, parkland and recreational facilities, traffic and transportation, air quality, noise, visual resources, and utility service. These construction-related impacts would be short-term and temporary because they would occur during construction or until ground-disturbing activities are completed.	• Mitigation measures presented in this table would address construction-related impacts for both minority and low-income populations and the general population.
Utilities	• Construction may temporarily disrupt the delivery of utility services to customers near the proposed action. Table 3.18-2 identifies the number the existing public utilities that may be in conflict with the proposed action. • Potential permanent impacts, such as required utility relocations resulting from conflicts with the proposed action, may also result and would be evaluated during the Tier 2 study once a preferred alternative is selected and the specific conflicts are identified.	• Disruptions to utility services would be restricted to being short-term and localized. Advanced planning would be accomplished during the design phase so that interruption of the delivery of utility services would not occur or would be minimized. • ADOT and its contractors would coordinate with utility service providers during the design phase and throughout construction to identify potential problems and/or conflicts and to provide opportunities for their resolution before construction begins. • Utility interruptions would be scheduled and prior notification would be provided to affected parties. • Emergency response procedures would be outlined by ADOT in consultation with utility providers to ensure quick and effective repair of any inadvertent or accidental disruptions in service.

Notes: ADOT = Arizona Department of Transportation, AZPDES = Arizona Pollutant Discharge Elimination System, Corridor = North-South Corridor, dBA = A-weighted decibel, FHWA = Federal Highway Administration

The proposed action would affect utilities belonging to the following entities:

- Canals: Central Arizona Irrigation and Drainage District, CAP, Hohokam Irrigation and Drainage District, New Magma Irrigation and Drainage District, and San Carlos Irrigation Project
- Communication lines: AT&T, COX, Level 3, Media Com, MCI (Verizon), and Sprint Nextel Corp.
- Electrical transmission lines: Arizona Public Service, Electrical District No. 2, Electrical District No. 4, Salt River Project, San Carlos Irrigation Project, Tucson Electric Power, and Western Area Power Administration
- Natural gas and petroleum pipelines: City of Mesa, El Paso Natural Gas, Kinder-Morgan, and Southwest Gas
- Railroads: Copper Basin Railway, Magma Arizona Railroad, and UPRR
- Sewer lines: City of Coolidge, Superstition Mountain Community Facilities District No. 1, and Town of Florence
- Water lines: Arizona Water Company, Diversified Water Utility, Queen Creek Irrigation District, and Town of Gilbert

Table 3.18-2 lists the number of existing public utilities that may be in conflict with the proposed action. Additional details regarding the potential conflicts are in Appendix L, *Utility Information*. Subsequent analysis as part of the Tier 2 study would identify the location and extent of specific conflicts. Relocations of utilities such as pipelines and communication lines would be permanent impacts, but such relocations would be accomplished with minimal service disruptions to utility customers and would maintain previous levels of service.

Table 3.18-2. Potential utility impacts

Utility type	Segment 1				Segment 2				Segment 3					Segment 4	
	E1a	E1b	W1a	W1b	E2a	E2b	W2a	W2b	E3a	E3b	E3c	E3d	W3	E4	W4
Canals	2	2	2	2	1	1	0	0	2	2	2	2	3	3	2
Communication lines	3	3	3	4	4	4	2	3	5	5	5	5	5	2	5
Electrical transmission lines	3	3	5	5	1	1	3	3	21	18	19	16	14	11	10
Natural gas and petroleum pipelines	0	0	2	2	1	1	1	1	5	5	5	5	4	3	4
Railroads	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1
Sewer main	0	0	1	0	0	0	0	0	2	1	3	2	3	0	0
Water main	1	1	4	4	0	0	0	0	0	0	0	0	1	1	1
Total	**10**	**10**	**18**	**18**	**7**	**7**	**7**	**8**	**36**	**32**	**35**	**31**	**30**	**20**	**23**

Source: research by Kimley-Horn and Associates, Inc., 2018

In Segment 1, fewer impacts would be associated with the E1a and E1b Alternatives, which would each involve 10 potential utility conflicts, versus 18 potential conflicts with the W1a and W1b Alternatives.

In Segment 2, all action corridor alternatives would have similar impacts. The E2a, E2b, and W2a Alternatives would each have 7 potential utility conflicts, and the W2b Alternative would have 8 potential utility conflicts.

In Segment 3, the E3a Alternative would have the most impacts, with 36 potential utility conflicts, followed by the E3c Alternative, with 35 potential conflicts. The E3b Alternative would have 32 potential conflicts, the E3d Alternative would have 31 potential conflicts, and the W3 Alternative would have 30 potential conflicts.

In Segment 4, the action corridor alternatives would have similar utility impacts, with the E4 Alternative potentially affecting 20 utilities and the W4 Alternative potentially affecting 23 utilities.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.18.2 Subsequent Tier 2 Analysis

As the transportation decision-making process advances into the Tier 2 study, design would be further refined and detailed construction activities, traffic control, and public involvement plans would be prepared to avoid and minimize adverse effects to the extent practicable and to inform the public of ongoing activities. Specific temporary construction-phase impacts and mitigation measures would be further refined during the Tier 2 study.

3.18.2.1 Conclusion

Short-term construction impacts on most of the resource areas discussed in this section would be similar regardless of whether an Eastern or Western Alternative were chosen to advance into the Tier 2 study. Such temporary construction impacts would be typical of a major roadway project, and mitigation measures would be implemented to minimize such impacts.

In terms of utility impacts, the Western Alternatives in Segment 1 would have almost twice as many utility conflicts as the Eastern Alternatives. In Segments 2, 3, and 4, the potential utility conflicts associated with the Eastern and Western Alternatives are generally similar in magnitude. The potential utility conflicts associated with each action corridor alternative are routine in nature, and ADOT is well-qualified to manage such issues during construction.

3.19 Section 4(f) and Section 6(f) Resources

This section provides an overview of the Section 4(f) and Section 6(f) resources that may be affected by the action corridor alternatives.

3.19.1 Regulatory Context

The following sections describe the regulatory context for Section 4(f) and Section 6(f) resources.

3.19.1.1 Section 4(f) of the Department of Transportation Act

Section 4(f) of the Department of Transportation Act of 1966, codified at 49 USC § 303, declares that “it is the policy of the U.S. Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.”

Section 4(f) specifies that the Secretary of Transportation 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 significance, or land of a historic site of national, state, or local significance (as determined by the federal, state, or local officials having jurisdiction over the park, area, refuge, or site) only if a determination is made that:

- There is no feasible and prudent alternative to the use of the land from the property;
- The action includes all possible planning to minimize harm to the property resulting from such use; or,
- The use of the Section 4(f) property will have a *de minimis* impact on the property.

A property protected by Section 4(f) is “used” when land is permanently incorporated into a transportation facility, when the property is temporarily occupied during construction, or when the proximity impacts of the project are so severe that they substantially impair the activities, features, or attributes that qualify the property for Section 4(f) protection. Coordination with and concurrence on the use of the property from the official with jurisdiction over the Section 4(f) property—for example, a city parks department for recreational resources or the SHPO or Tribal Historic Preservation Officer for historic resources, is required.

For parks and recreational facilities, a *de minimis* impact is one that would not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f). Public review and subsequent concurrence from the official with jurisdiction on a *de minimis* finding is required. A determination of *de minimis* impact on a historic property may be made when a finding of “no adverse effect” or “no historic properties affected” is made by the SHPO and/or Tribal Historic Preservation Officer through the Section 106 consultation process. In this case, the SHPO/Tribal Historic Preservation Officer must be informed of the intent to use the Section 106 finding as the basis of the *de minimis* finding.

For tiered environmental documents, the Tier 1 DEIS includes a broad assessment of potential Section 4(f) properties and impacts, followed by a more site-specific evaluation and formal determination in subsequent Tier 2 studies. According to FHWA’s 2012 *Section 4(f) Policy Paper*, “if sufficient information is available, a preliminary Section 4(f) approval may be made at the first-tier stage as to whether the impacts resulting from the use of a Section 4(f) property are *de minimis* or whether there are feasible and prudent avoidance alternatives.” Alternatively, “if sufficient information is unavailable during the first-tier stage, then the EIS may be completed without any preliminary Section 4(f) approvals.” In this scenario, the documentation should include the following:

- statement of reason or reasons no preliminary approval is possible during the first-tier stage
- explanation of the process that would be followed to complete Section 4(f) evaluations during subsequent tiers

- discussion of any effects of the subsequent tier Section 4(f) approval (preliminary or final) on any decision made during the first-tier stage

3.19.1.2 Section 6(f) of the Land and Water Conservation Fund Act

Section 6(f) resources are parklands subject to the conditions of the Land and Water Conservation Fund (LWCF) Program, established by the LWCF Act of 1965 and administered by the National Park Service. Section 6(f) resources are acquired with LWCF grants for a public recreational use. 36 CFR Part 59, Section 6(f)(3), of the LWCF Act is the basis of federal compliance efforts to ensure LWCF investments are maintained in public outdoor recreation use. Once an area has been funded with LWCF assistance:

> No property acquired or developed with assistance under this section shall, without the approval of the Secretary, be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreation plan and only upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location. [36 CFR Part 59, Section 6(f)(3)]

Projects that result in private and/or nonrecreation activities on Section 6(f) property, or that affect its public recreation use, would trigger a "conversion." If a conversion of parkland developed with LWCF assistance occurs, the project sponsor is required to provide replacement recreational property.

3.19.2 Methodology

This section presents an overview of the resources that presently exist or are planned or programmed within the action corridor alternatives that may be considered Section 4(f) properties and may be affected by the action alternatives. Section 4(f) properties include the following:

- parks and recreational areas of national, state, or local significance that are both publicly owned and open to the public
- publicly owned wildlife and waterfowl refuges of national, state, or local significance that are open to the public to the extent that public access does not interfere with the primary purpose of the refuge
- historic sites of national, state, or local significance and listed in or determined eligible for listing in the NRHP, as determined by the Section 106 process regardless of whether they are open to the public [23 USC § 138(a) and 49 USC § 303(a)]

As described in Section 3.19.1, the Section 4(f) regulations allow for a preliminary Section 4(f) approval to be made at the time of a Tier 1 EIS [23 CFR § 774.7(e)(1)]; however, the project detail at the corridor level in this Section 4(f) overview is not sufficient to address the specific criteria for determining a Section 4(f) use. In particular, it cannot be determined if or how future design elements (for example, roadway features) would have an effect on parks or on historic properties under 36 CFR Part 800, or if and how those elements would affect the features, attributes, or activities that qualify a park, recreation area, or wildlife and waterfowl refuge for protection under Section 4(f). Moreover, there are several identified unevaluated potential historic properties that would be evaluated in subsequent Tier 2 studies; therefore, it is unknown at this time whether they would be considered Section 4(f) properties and to what extent, if at all, they would be affected by the Tier 2 alignments. For these reasons, although the regulations allow that a Tier 1 EIS may include a preliminary Section 4(f) approval, such an approval will not be made in this case for the NSCS Tier 1 EIS.

3.19.2.1 Parks and Recreational Areas

The identification of public parks and recreational resources was based on available information regarding existing and planned parks, recreational facilities (including schools with public recreation facilities), and trails in the study area. Data sources used to inventory resources included federal, state, and local websites and associated GIS data, where available. Resources within 0.5 mile of the action corridor alternatives were inventoried and assessed for potential Section 4(f) impacts.

Recreational facilities encumbered by Section 6(f) of the LWCF Act were researched, and it was determined that no such facilities are within 0.5 mile of the action corridor alternatives. Therefore, this Tier 1 DEIS does not include an assessment of risks to Section 6(f) resources.

3.19.2.2 Wildlife and Waterfowl Refuges

This overview used existing natural resource data, web-based environmental review tools from AGFD and USFWS, a preliminary site-specific evaluation conducted by AGFD, and general field investigations. This research concluded that no waterfowl or wildlife refuges are located in the study area.

3.19.2.3 Historic Sites

This overview used cultural resource data compiled through inventories of archaeological resources (Stewart and Brodbeck 2017), built environment resources (historic buildings and structures) (Brodbeck 2018), and TCPs (Darling 2016, 2017) prepared for the action corridor alternatives.

3.19.3 Affected Environment

This section describes Section 4(f) resources identified in the study area, including parks and recreational areas and historic sites.

3.19.3.1 Parks and Recreational Areas

Table 3.19-1 lists existing and planned parks, recreational facilities, and trails with the potential to be affected by the action corridor alternatives and that are considered Section 4(f) properties (that is, they are public recreational facilities). Any of these resources may be considered Section 4(f) resources for evaluation in subsequent Tier 2 studies. Refer to Table 3.5-2 in Section 3.5, *Parkland and Recreational Facilities*, for a full list of parks and recreational facilities in the study area that are within 0.5 mile of the action corridor alternatives.

Table 3.19-1. Potentially affected Section 4(f) resources: parks and recreational facilities

Potentially affected resource	Action corridor alternative
Existing facilities	
Silly Mountain Park and Trails	E1a, E1b, W1b
Sheep Drive Multiuse Trail	E1a, E1b, W1b
Pinal County Existing Municipal Trails (multiple segments)	E1a, E1b, W1a, W1b, E3a, E3b, E3c, E3d, E4, W4
Pinal County Existing Multiuse Trail Corridor	E3a, E3b, E3c, E3d, W3
Poston Butte Trail and Open Space	E3a, E3c
Proposed parks	
Florence Community Park #8	W1a, W1b
Proposed trails	
Central Arizona Project Trail	E1a, E1b, W1a, W1b
Pinal County Proposed Multiuse Trail Corridor (multiple sections): Magma Arizona Railroad Trail (segment 1), Copper Basin Railroad Trail (segments 2, 3), other unnamed trails	E1a, E1b, W1a, W1b, W2a, W2b, E3a, E3b, E3c, E3d, W3, E4, W4
Pinal County Proposed Drainage Trail (multiple segments)	E1a, E1b, W1a, W1b
Pinal County Proposed Off-highway Vehicle Trail	E1a, E1b, W1b
Pinal County Adopted Trail Corridor – Florence/Casa Grande Canal Corridors	E1a, E1b, W1a, W1b
Pinal County Florence Planned Power Line Corridor Trail	E3b, E3d
National Park Service Butterfield Overland Trail	E4, W4
Eloy Planned Municipal Trail	E4, W4

3.19.3.2 Wildlife and Waterfowl Refuges

No wildlife and/or waterfowl refuges are located within any of the action corridor alternatives.

3.19.3.3 Historic Sites

Table 3.19-2 lists historic properties with the potential to be affected by the action corridor alternatives and that are considered Section 4(f) properties.

Table 3.19-2. Potentially affected Section 4(f) resources: historic sites

Potentially affected resource	Action corridor alternative
Kenilworth Elementary School	W3
Southern Pacific Railroad Main Line – Sunset Route	E4, W4
Southern Pacific Railroad – Wellton-Phoenix-Eloy Line	W3, W4
Southern Pacific Railroad – Mesa-Winkelman Line	E3a, E3b, E3c, E3d, W2a, W2b
Magma Arizona Railroad	E1a, E1b, W1a, W1b
North Side Canal	E3a, E3b, E3c, E3d
Pima Lateral Canal	E3a, E3b, E3c, E3d, W3
Casa Grande Canal	E4, W4
Florence-Casa Grande Canal Extension	E4, W4
El Paso Natural Gas Pipeline No. 1007	E4, W4
AZ U:14:73(ASM)[a]	W1a, W1b

[a] AZ U:14:73(ASM) was previously determined not eligible for listing in the National Register of Historic Places but requires reevaluation as a traditional cultural property, potentially eligible under Criterion A.

Twenty-one properties within the action corridor alternatives with historic-age buildings, as shown in Table 3.19-3, have not been evaluated for NRHP eligibility at this Tier 1 level. NRHP evaluations of these properties would be carried out in Tier 2 studies if they are located within the preferred corridor. If determined eligible for NRHP listing, the properties would be considered Section 4(f) historic properties.

Table 3.19-3. National Register of Historic Places unevaluated historic sites

#	Parcel	Address	Use	Date	Action corridor alternative
1	200-70-001D	4125 W. Arizona Farms Rd., Florence, AZ 85132	Residence	1954	E2a, E2b
2	202-24-006M	12464 E. Vah Ki Inn Rd., Coolidge, AZ 85128	Residential farmstead/dairy	1950s	E3a, E3b, E3c, E3d
3	202-36-002A	8405 N. Clemans Rd., Coolidge, AZ 85128	Residential farmstead	1955	E3a, E3b, E3c, E3d
4	209-11-0050	6704 E. Highway 287, Coolidge, AZ 85128	Residential farmstead	1939	W3
5	209-16-0020	1101 E. Highway 287, Coolidge, AZ 85128	Residential farmstead	1939	W3
6	209-36-0050	7534 N. Attaway Rd., Coolidge, AZ 85128	Farmstead	Pre-1961	W4
7	210-46-002A	9865 N. Attaway Rd., Florence, AZ 85132	Residence	1969	E2a, E2b
8	400-36-014B	4163 N. Wheeler Rd., Coolidge, AZ 85128	Residence	1950s	E3a, E3b
9	400-37-001A	3951 N. Wheeler Rd., Coolidge, AZ 85128	Residence	1948	E3a, E3b
10	400-37-003A	3817 N. Wheeler Rd., Coolidge, AZ 85128	Utility buildings	1960s/ 1970s	E3a, E3b

Table 3.19-3. National Register of Historic Places unevaluated historic sites

#	Parcel	Address	Use	Date	Action corridor alternative
11	401-21-0040	2680 E. Randolph Rd., Coolidge, AZ 85128	Residential farmstead	1947	E3a, E3b, E3c, E3d
12	401-21-006A	3360 S. Fast Track Rd., Coolidge, AZ 85128	Landing strip	1950	W3
13	401-34-0030	2797 E. Kleck Rd., Coolidge, AZ 85128	Utility building	1950s	E3a, E3b
14	401-34-0060	2162 E. Storey Rd., Coolidge, AZ 85128	Utility building	1960s/ 1970s	E3a, E3b, E3c, E3d, W3
15	401-40-001C	1577 S. Christensen Rd., Coolidge, AZ 85128	Barn	1950s	E4, W4
16	401-48-0010	300 W. Grogan Ave., Coolidge, AZ 85194	Residential farmstead	1950s	W4
17	401-55-003F	12727 S. Edgedale Rd., Eloy, AZ 85131	Residence	Pre-1961	E4
18	401-62-0310	4826 E. Stallion Drive, Eloy, AZ 85131	Residence	1974	W4
19	401-62-0320	4780 E. Stallion Drive, Eloy, AZ 85131	Residence	1974	W4
20	401-62-0330	4730 E. Stallion Drive, Eloy, AZ 85131	Residence	1974	W4
21	411-03-0010	15790 S. Highway 87, Eloy, AZ 85131	Service garage	1952	W4

3.19.4 Environmental Consequences

A transportation project may have three general types of impacts on Section 4(f) resources:

- Permanent incorporation – Land is considered permanently incorporated into a transportation project when it has been purchased as ROW or sufficient property interests have otherwise been acquired for the purpose of project implementation.
- Temporary occupancy – Examples of temporary occupancy of Section 4(f) land include right-of-entry, project construction, a temporary easement, or other short-term arrangement involving a Section 4(f) property.
- Constructive use – Constructive use occurs when the proximity impacts of a project on an adjacent or nearby Section 4(f) property, after incorporation of impact mitigation, are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired.

The risk of use based on the location of known Section 4(f) properties is identified in this this Tier 1-level evaluation. Preliminary Section 4(f) determinations are not made since permanent incorporation, temporary occupancy, or constructive uses cannot be identified at this time without the specific location of the project footprint. Moreover, several unevaluated potential historic properties may be affected with the action corridor alternatives. The full evaluation of cultural resources, for compliance with the Section 106 process, would be completed with Tier 2 studies, at which time it would be determined whether the properties are eligible for listing in the NRHP and whether they would be affected by the Tier 2 projects.

This section does identify known Section 4(f) properties that are located within the action corridor alternatives and, therefore, may be affected by either a permanent acquisition or permanent easement. The risk of use of these properties by Tier 2 projects is assessed in the following sections based on the location within the action corridor alternatives and the potential for avoidance through design in Tier 2 studies.

3.19.4.1 Parks and Recreational Areas

The following discussion provides an overview of the risks of use of Section 4(f) parks and recreational properties with the action corridor alternatives.

Silly Mountain Park and Trails: Silly Mountain Park and Trails, at 5203 East 36th Avenue in Apache Junction, is a 200-acre park that includes an existing network of over 3.5 miles of easy to difficult trails located just east of Silly Mountain Road and US 60. The park is under the jurisdiction of Apache Junction, and the City plans to expand the park. The E1a, E1b, and W1b Alternatives would all overlap the City's planned expansion area. The City of Apache Junction has indicated that it would be open to coordinating joint planning of the park expansion and highway project. Therefore, there is a low risk of impacts on the planned Silly Mountain Park and Trails Section 4(f) property with the E1a, E1b, and W1b Alternatives.

Sheep Drive Multiuse Trail: The 1,628-acre Sheep Drive Multiuse Trail surrounds the city of Apache Junction to the north and east of Lost Dutchman Boulevard and Goldfield Road with a meandering system of trails for equestrian and hiking use and natural areas for animals and animal observers. The southernmost portion of the trail is just within the outer boundary of the 1,500-foot-wide E1a, E1b, and W1b Alternatives. However, the proposed freeway in this area would be co-located with the existing US 60, and Sheep Drive Trail is located northeast of US 60 to tie into the existing Silly Mountain Park. Therefore, there is a very low risk of impacts on the Sheep Drive Multiuse Trail Section 4(f) property with the E1a, E1b, and W1b Alternatives.

Pinal County Municipal Trails: The Pinal County *Open Space and Trails Master Plan* (2007) identifies a number of existing and planned municipal trails, many of which cross the action corridor alternatives in Segment 1 (all alternatives), Segment 3 (Eastern Alternatives), and Segment 4 (both alternatives). The study team would endeavor to avoid use of these facilities by providing grade separations and/or realignment of the affected trails; however, these design details would be determined during Tier 2 studies. In a worst-case scenario for these existing trails, some ROW may be required, but the recreational features would be retained. Therefore, there is a medium risk of impacts on the Pinal County Existing Municipal Trails Section 4(f) properties with the W1a, W1b, E1a, E1b, E3a, E3b, E3c, E3d, W4, and E4 Alternatives.

Pinal County Existing Multiuse Trail Corridor: The Pinal County *Open Space and Trails Master Plan* (2007) identifies a number of existing and planned multiuse trail corridors, one of which crosses all of the action corridor alternatives in Segment 3. This trail is partially existing and partially planned, and its alignment adjacent to the existing Pima Lateral Canal crosses the W3 Alternative perpendicularly just north of Vah Ki Inn Road, follows a north-to-south alignment within a portion of the W3 Alternative between Vah Ki Inn Road and Starview Avenue, continues in an east-to-west direction across the E3a, E3b, E3c, and E3d Alternatives, and then continues east. The study team would endeavor to avoid use of this trail by providing grade separations and/or realignment of the affected trail; however, these design details would be determined during Tier 2 studies. In a worst-case scenario, some ROW may be required, but the recreational features would be retained. Therefore, there is a medium risk of impacts to the Pinal County Existing Multiuse Trail Corridor Section 4(f) property with the W3, E3a, E3b, E3c, and E3d Alternatives.

Poston Butte Trail and Open Space: The Town of Florence's Poston Butte Trail and Open Space is a 160-acre site north of Hunt Highway and west of Herseth Road, with both existing and planned components. The existing portion of the site contains Poston Butte, where Charles Poston is buried at its summit. Planned expansions east and west would include additional open space areas, paved and unpaved trails, and trailheads for connectivity to the park. Based on the location of the eastern expansion as noted in the 2008 Town of Florence *Parks, Trails, and Open Space Master Plan*, the E3a and E3c Alternatives would overlap a portion of the planned area. However, through coordination with the Town, the boundary of the planned portions of the Poston Butte Trail and Open Space was adjusted to avoid encroachment by the proposed action. Therefore, there is a very low risk of impacts on the Poston Butte Trail and Open Space Section 4(f) property with the E3a and E3c Alternatives.

Proposed Florence Community Park #8: The Town of Florence's proposed 124-acre Community Park #8 would be located amidst a medium-density residential community west of the CAP Canal and north of Skyline Drive. The proposed park would include athletic fields, a swimming pool, playground areas, a skate park, a community center, and other amenities to serve a growing neighborhood. The W1a and W1b Alternatives would be east of the proposed park, potentially affecting some existing homes at the eastern end of the community. Because these residential impacts would be avoided or minimized to the extent possible during Tier 2 studies by shifting the alignment closer to the CAP Canal, there is less risk of impacts on the park farther west. Therefore, there is a very low risk of impacts to the proposed Community Park #8 Section 4(f) property with the W1a and W1b Alternatives.

Proposed Trails: Pinal County and local jurisdictions have proposed a comprehensive trail network in the study area. As Table 3.19-1 indicates, every action corridor alternative could potentially affect one or more proposed trails, with the exception of the E2a and E2b Alternatives. The study team would endeavor to avoid use of property designated for future trails through coordination with the officials with jurisdiction over the proposed facilities and by considering grade separations and/or realignment of the affected trails through joint planning during Tier 2 studies. Therefore, there is a low risk of impacts on the planned trails throughout the study area with all action corridor alternatives except E2a and E2b.

3.19.4.2 Wildlife and Waterfowl Refuges

Because no wildlife and/or waterfowl refuges are located within any of the action corridor alternatives, there is no risk of use of these resources by the proposed action.

3.19.4.3 Historic Sites

The following discussion provides an overview of the risks of use of Section 4(f) historic properties with the action alternative corridors.

Kenilworth Elementary School: Kenilworth Elementary School, at 2060 East Coolidge Avenue, is approximately 1 mile east of Coolidge. The school property is completely in the W3 Alternative. The school was built in the 1920s to serve the rural community east of Coolidge. Today, the property is no longer used as a public school, although it is still owned by Pinal County School District 21. The school was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], October 13, 2017), for listing on the NRHP under Criteria A and C for its historical associations with the early development of the Coolidge area and the rural education system in the middle Gila Valley and for its architectural design. The school could potentially be avoided in Tier 2 studies; therefore, there is a medium risk of impacts on the Kenilworth Elementary School Section 4(f) property with the W3 Alternative.

Southern Pacific Railroad Main Line – Sunset Route: Southern Pacific Railroad's original transcontinental main line, known as the Sunset Route, intersects the E4 and W4 Alternatives at the southern end of the study area as it runs parallel to I-10. The railroad was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], April 2, 2018), for listing on the NRHP under Criteria A and D in Arizona at the state and national levels for its many important historical associations with the construction of America's first transcontinental railroads, the development of Arizona's railroad network, and as a driver of settlement and economic growth in Arizona. Because the railroad can be clear spanned, there is a low risk of impacts on the Southern Pacific Railroad Main Line – Sunset Route Section 4(f) property with the E4 and W4 Alternatives.

Southern Pacific Railroad – Wellton-Phoenix-Eloy Line: Segments of Southern Pacific Railroad's Wellton-Phoenix-Eloy railroad line intersect with the W3 and W4 Alternatives. The railroad was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], April 2, 2018), for listing on the NRHP under Criterion A for its important historical associations with the development of Arizona's railroad network. Because the railroad can be clear spanned, there is a low risk of impacts on the Southern Pacific Railroad – Wellton-Phoenix-Eloy Line Section 4(f) property with the W3 and W4 Alternatives.

Southern Pacific Railroad – Mesa-Winkelman Line: The Mesa-Winkelman Line of the Southern Pacific Railroad crosses the W2a, W2b, E3a, E3b, E3c, and E3d Alternatives. The railroad was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], April 2, 2018), for listing on the NRHP under Criterion A for its associations with the development of Arizona's railroad network and mining economy. Because the railroad can be clear spanned, there is a low risk of impacts to the Southern Pacific Railroad – Mesa-Winkelman Line Section 4(f) property with the W2a, W2b, E3a, E3b, E3c, and E3d Alternatives.

Magma Arizona Railroad: The Magma Arizona Railroad crosses the E1a, E1b, W1a, and W1b Alternatives. The railroad line extends for 30 miles from Magma Junction, where it connects with the Wellton-Phoenix-Eloy and Mesa-Winkelman lines, to Superior. The railroad was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], April 2, 2018), for listing on the NRHP under Criteria A and D for its associations with the development of Arizona's railroad network and mining economy. Because the railroad can be clear spanned, there is a low risk of impacts on the Magma Arizona Railroad Section 4(f) property with the E1a, E1b, W1a, and W1b Alternatives.

North Side Canal: The North Side Canal intersects with the E3a, E3b, E3c, and E3d Alternatives. The canal was constructed in 1930 as part of the San Carlos Irrigation Project. It extends for approximately 19 miles, delivering water to land north of the Gila River. The North Side Canal was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], April 2, 2018), for listing on the NRHP under Criteria A and C for its associations with the San Carlos Irrigation Project and the development of irrigation systems in the middle Gila River Valley. Because the canal can be clear spanned, there is a low risk of impacts on the North Side Canal Section 4(f) property with the E3a, E3b, E3c, and E3d Alternatives.

Pima Lateral Canal: The Pima Lateral Canal intersects with the E3a, E3b, E3c, E3d, and W3 Alternatives. The 23-mile-long canal was constructed in 1928 as a component of the San Carlos Irrigation Project. The Pima Lateral Canal was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], April 2, 2018), for listing on the NRHP under Criteria A and C as an integral component of the San Carlos Irrigation Project. Because the canal can be clear spanned, there is a low risk of impacts on the Pima Lateral Canal Section 4(f) property with the E3a, E3b, E3c, E3d, and W3 Alternatives.

Casa Grande Canal: The Casa Grande Canal intersects the E4 and W4 Alternatives. The Florence Canal Company constructed the canal between 1886 and 1889 to irrigate land south of the Gila River. The property was acquired by the federal government in 1920 and subsequently was integrated into the San Carlos Irrigation Project. The Casa Grande Canal was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], April 2, 2018), for listing on the NRHP under Criteria A and D for its associations with the San Carlos Irrigation Project. Because the canal can be clear spanned, there is a low risk of impacts on the Casa Grande Canal Section 4(f) property with the E4 and W4 Alternatives.

Florence-Casa Grande Canal Extension: The Florence-Casa Grande Canal intersects the E4 and W4 Alternatives. The canal was built between 1923 and 1928 as an extension of the Florence-Casa Grande Canal and as part of the San Carlos Irrigation Project. The Florence-Casa Grande Canal Extension was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], April 2, 2018), for listing on the NRHP under Criterion A for its associations with the San Carlos Irrigation Project. Because the canal can be clear spanned, there is a low risk of impacts on the Florence-Casa Grande Canal Extension Section 4(f) property with the E4 and W4 Alternatives.

El Paso Natural Gas Pipeline No. 1007: The El Paso Natural Gas Pipeline No. 1007 intersects with the E4 and W4 Alternatives. The property is an underground pipeline constructed in the early 1930s to extend natural gas service from copper mines in Douglas to Tucson and Phoenix. The El Paso Natural Gas Pipeline No. 1007 was determined eligible, with SHPO concurrence (Jacobs [SHPO] to Petty [FHWA], April 2, 2018), for listing on the NRHP under Criteria C and D primarily for its associations with the development of Arizona's pipeline infrastructure. Because the pipeline is buried and can be crossed over, there is a very low risk of impacts on the El Paso Natural Gas Pipeline No. 1007 Section 4(f) property with the E4 and W4 Alternatives.

3.19.5 Potential Avoidance, Minimization, and Mitigation Strategies

During Tier 2 studies, ADOT would coordinate with owners with jurisdiction over the Section 4(f) properties to identify further avoidance or minimization measures to reduce impacts on affected parks and recreational facilities (that is, city or regional parks departments, or other specific agencies) and historic properties (that is, SHPO). Efforts would be made to maintain access to the resources potentially affected to the extent feasible. ADOT would also coordinate with local agencies on planned park and recreational resources and the potential for joint development. Where access cannot be maintained or where implementation of the proposed action would require full or partial acquisition of existing parks or recreational facilities, potential mitigation measures would be developed in consultation with the local agencies. Specific mitigation measures may include minimizing the acreage of acquisition of these areas during the design phase, selecting alternatives that avoid parks and recreational facilities, strategically locating construction equipment to suitable locations within existing parks and recreational facilities, and designing landscaping to offset vegetation removal or to establish screening for noise and visual disturbances.

If the North-South Corridor advances into Tier 2 design and NEPA analysis, ADOT would examine ways to avoid or minimize impacts on Section 6(f) properties. Potential strategies ADOT could consider include, but are not limited to, defining alignments that do not use park properties and incorporating refinement details—such as using retaining walls to minimize the proposed freeway's footprint.

As part of that effort, ADOT would continue coordinating with the agencies having jurisdiction over the potentially affected properties. If land from one or more properties cannot be avoided, Section 6(f) requires replacement of park land that is converted to a transportation use. The land must be equal to or greater in value than the affected land in terms of its ability to serve as park land. To achieve this requirement, if park land cannot be avoided, ADOT would assist in identifying replacement land.

During the Tier 2 studies, if a preferred alignment would adversely affect a property or properties that are listed on or eligible for listing on the NRHP or are unevaluated (requiring more research or archaeological testing to determine their NRHP eligibility), a document such as a memorandum of agreement or a programmatic agreement would be developed through the Section 106 process. This agreement document would detail the measures ADOT would take to mitigate any adverse effects on these properties. Potential mitigation measures could include—but are not limited to—archaeological testing and data recovery, a Historic American Buildings Survey, or a Historic American Engineering Record. These types of mitigation would be guided by plans that are required by the agreement document and consulted on through the Section 106 process.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

3.19.6 Subsequent Tier 2 Analysis

During Tier 2 studies, at the time that specific alignments are identified and evaluated, a comprehensive Section 4(f) evaluation would be required. Tier 1 analysis has identified resources subject to the provisions of Section 4(f) that have a risk of use by an action corridor alternative. This Tier 1 analysis does not include a preliminary determination of Section 4(f) use; therefore, a full analysis would be required for NEPA clearance in subsequent tiers.

With the development of action corridor alternatives studied in this Tier 1 DEIS, efforts to avoid or minimize encroachment by the corridors into Section 4(f) properties were made as described in Section 2.2.4.1, *Modifications to Avoid Environmentally Sensitive Resources*. Considering these avoidance actions and the potential for avoidance or minimization of impacts in Tier studies, the risks of use of Section 4(f) properties are identified in Section 3.19.4. During Tier 2 studies, with the development of specific alignments, additional efforts may allow for further avoidance or minimization of impacts.

Subsequent Tier 2 studies will include the following analyses of Section 4(f) properties as part of the Section 4(f) Evaluation required for Tier 2 NEPA clearance:

- Identification of Section 4(f) properties:
  - identification of all potential Section 4(f) properties within an established radius from the selected corridor to evaluate potential direct permanent uses, temporary construction uses, and indirect constructive uses of each property by the proposed project
  - consideration of existing properties identified in this Tier 1 DEIS and any additional properties not yet identified
  - identification performed in coordination with officials with jurisdiction over the Section 4(f) properties to confirm the primary purpose and significance of the property and to identify planned and programmed projects that may be subject to Section 4(f)
- Evaluation of uses of Section 4(f) properties:
  - assessment of uses of Section 4(f) properties by project elements, including property acquisition, permanent easements, temporary construction easements, and indirect effects on activities, attributes, or features that qualify each Section 4(f) property for protection
  - consideration of design modifications to avoid or minimize impacts and preliminary mitigation measures, as appropriate
  - preparation of preliminary determinations of use of each property
  - evaluation of uses performed in coordination with officials with jurisdiction over the Section 4(f) properties to discuss and gain concurrence on the degree of impact, avoidance and minimization measures, potential mitigation strategies, and preliminary use determinations

If permanent use of Section 4(f) properties occurs, and the impact does not qualify as a *de minimis* use, a thorough evaluation of all possible feasible and prudent alternatives to completely avoid the use of the Section 4(f) property and all possible planning to minimize harm to the Section 4(f) property is required. If it is determined that there is no feasible and prudent avoidance alternative and there are two or more alternatives that use Section 4(f) property, a least overall harm analysis would be necessary pursuant to 23 CFR 774.3(c). The least overall harm analysis would include the following elements: an assessment of the feasibility and prudence of avoidance alternatives; incorporation of appropriate mitigation measures into the project; evaluation of relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection; and the consideration of views of the officials with jurisdiction over the Section 4(f) properties used by the project.

For any uses of Section 4(f) properties that are determined to be *de minimis* impacts, all avoidance, minimization, mitigation, or enhancement measures are included as part of the determination. The *de minimis* finding does not require an analysis of feasible and prudent avoidance alternatives. The official or officials with jurisdiction must be informed of the intent to make a *de minimis* finding and must concur in writing.

Tier 2 analyses should also include a current assessment of impacts on park properties encumbered by Section 6(f) of the LWCF Act. Depending on the timing of the Tier 2 studies and specific alignments studied, there is the potential that Section 6(f) resources may be located in the Tier 2 study area if new LWCF Act-funded parks are developed in the preferred corridor. If it is determined that property would be acquired from a Section 6(f) resource and a conversion from parkland to a transportation use would occur, ADOT would be required to follow the conversion provisions of Section 6(f)(3) of the LWCF Act, according to the LWCF Act Federal Financial Assistance Manual.

3.19.7 Conclusion

The following sections summarize the preliminary overview of Section 4(f) properties and the risk of use of these resources by each action corridor alternative.

3.19.7.1 Segment 1

In Segment 1, all action corridor alternatives have Section 4(f) properties with very low to medium risk of impact by the proposed action. It is anticipated that there would be opportunities during Tier 2 studies to avoid or minimize any potential impacts. In Segment 1, there are no identified unevaluated historic properties; therefore, the likelihood of identifying additional Section 4(f) properties in the Tier 2 phase would be low.

3.19.7.2 Segment 2

In Segment 2, the Western Alternatives each have one Section 4(f) property with a low risk of impact and the Eastern Alternatives each have two unevaluated historic sites within their corridors.

3.19.7.3 Segment 3

In Segment 3, all action corridor alternatives have Section 4(f) properties with a very low to medium risk of impact by the proposed action; however, it is anticipated that there would be opportunities during Tier 2 studies to avoid or minimize any potential impacts. There is a medium risk of the W3 Alternative affecting the Kenilworth School located within the corridor. In Segment 1, there are four identified unevaluated historic properties within each of the corridors of the W3, E3c, and E3d Alternatives, and eight within each of the corridors of the E3a and E3b Alternatives; therefore, there is a potential of identifying additional Section 4(f) properties with any of the Segment 3 alternatives.

3.19.7.4 Segment 4

In Segment 4, both action corridor alternatives have Section 4(f) properties with a low to medium risk of impact by the proposed action. It is anticipated that there would be opportunities during Tier 2 studies to avoid or minimize any potential impacts. In Segment 4, there are two and seven identified unevaluated historic properties within the E4 and W4 Alternatives, respectively; therefore, there is a greater potential of identifying additional Section 4(f) properties in the Tier 2 phase with the W4 Alternative.

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4 Indirect and Cumulative Impacts

This chapter identifies and assesses the potential indirect and cumulative impacts the action corridor alternatives would have on the surrounding human, built, and natural environments.

4.1 Regulatory Context

CEQ regulations require consideration of indirect and cumulative impacts in an EIS. The regulations define indirect impacts as effects "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" [40 CFR § 1508.8(b)].

CEQ regulations define cumulative impacts 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).

4.2 Methodology

The evaluation presented in this chapter for indirect and cumulative impacts considered past, present, and reasonably foreseeable future actions. For this assessment, existing conditions in the study area reflect the collective impacts of all past actions, such as growth and development in the study area. Present impacts include those caused by current, ongoing construction of any public or private projects in the study area. Reasonably foreseeable future conditions include those caused by implementation of the proposed action, other planned and programmed transportation projects, and other planned development that is likely to occur in the study area.

The methodology used in the assessment of indirect and cumulative impacts is based on FHWA's *Secondary and Cumulative Impact Assessment in the Highway Project Development Process* (1992) and the American Association of State Highway and Transportation Officials' *Assessing Indirect and Cumulative Impacts Under NEPA* (2016), both adapted to a Tier 1 EIS level of analysis. Detail on the methodology used to identify and assess potential indirect and cumulative impacts associated with the action corridor alternatives is provided below.

4.2.1 Indirect Impacts

The assessment of indirect impacts broadly considered growth-inducing impacts that could result from the proposed action, including secondary development that could generate additional traffic, population and/or job growth, economic benefits, or other impacts. The growth assessment qualitatively identified the areas that may experience indirect effects (areas of influence) by reviewing land use plans. Other indirect effects of the proposed action for each resource area, as applicable, are presented in Chapter 3, *Affected Environment and Environmental Consequences*.

4.2.2 Cumulative Impacts

Cumulative impacts of the proposed action were qualitatively assessed by reviewing long-range transportation plans developed by ADOT, MAG, SCMPO, CAG, Pinal County, and Maricopa County.[1] In

[1] The regional transportation plans used in the analysis have horizon years of 2040; however, other plans such as Pinal County's 2008 *Regionally Significant Routes for Safety and Mobility Final Report* and 2017 map update have no identified horizon year.

addition, through stakeholder outreach to support this Tier 1 DEIS, ADOT met with Pinal County and the cities and towns traversed by the action corridor alternatives to confirm the status of recent developments (past and present actions) and proposed and planned projects (foreseeable actions). As data were collected and mapped, the jurisdictions confirmed the information prior to the analyses in this Tier 1 DEIS. A qualitative assessment of cumulative impacts focused on trends for the environmental resources' health and viability and how the proposed action may or may not contribute to such trends.

4.3 Affected Environment

This section describes conditions in the study area relevant to indirect effects and cumulative impacts, including land use, population and employment, and transportation facilities.

4.3.1 Land Use

The study area has a mix of incorporated municipal and unincorporated county land, including land owned by ASLD. As discussed in Section 3.2, *Land Use*, the study area encompasses approximately 577,500 acres, and primary existing land uses in the study area consist of undeveloped (69 percent) and agricultural (19 percent) land uses. The remaining land uses are as follows: residential (8 percent), industrial (2 percent), commercial (1 percent), public/quasi-public (1 percent), and open space (1 percent). Most undeveloped and agricultural land in the study area is in Pinal County, and most Native American land in the study area (approximately 12,600 acres) is undeveloped.

4.3.2 Population and Employment

Based on 2015 population estimates from the Arizona Department of Administration Office of Employment and Population Statistics, the population and employment of Pinal County, in which most of the study area is located, are 406,463 residents and 68,364 jobs. In 2010, according to AZTDM2, the population and employment in the study area were 284,199 and 50,032, respectively. The concentrations of people and jobs in the study area are primarily near the Phoenix-Mesa Gateway Airport, Apache Junction, Queen Creek, San Tan Valley, Florence, Coolidge, and Eloy. In addition, jobs are located along UPRR rail lines and along freeways and highways such as US 60, SR 202L, SR 24, SR 79, SR 287, SR 87, and I-10.

4.3.3 Transportation Facilities

The road network in the Coolidge area has developed over time as a grid system that extends to Eloy. Through Florence and areas north, the grid system is interrupted by the Gila River, UPRR, Copper Basin Railway, Magma Arizona Railroad, CAP Canal, and other geographic constraints that have hindered the development of a robust transportation network. Currently, travelers heading north from Tucson on westbound I-10, who wish to reach areas east of central Phoenix while continuing to travel on a high-capacity roadway, must go through central Phoenix to access SR 202L or US 60 to head east. SR 79 provides access along the eastern edge of the study area north of Florence; south of Florence, SR 79 extends southeast toward Oracle Junction, where it ends at its junction with SR 77, approximately 25 miles north of Tucson. SR 79 is not a high-capacity route, operating as a local route through Florence with numerous access points and businesses along the route.

Roads that connect with the freeways and highways are: Hunt Highway, Ellsworth Road, Ironwood Drive/Gantzel Road, Bella Vista Road, Arizona Farms Road, Attaway Road, and Cactus Forest Road. Public transit service in Pinal County is limited. Current public transit options include the Central Arizona Regional Transit bus line that connects Florence, Coolidge, Central Arizona College, and Casa Grande, and the Cotton Express bus system that provides deviated fixed-route bus service and on-demand service throughout Coolidge.

UPRR has two lines in the study area—the Sunset Route and the Phoenix Subdivision. The Sunset Route crosses the entire state of Arizona east-to-west, passing through Cochise, Benson, Tucson, Picacho, Eloy, Casa Grande, Maricopa, Gila Bend, Wellton, and Yuma. Amtrak also provides passenger service on the Sunset Route, but does not currently have stops in the study area. The Phoenix Subdivision runs north from the Sunset Route along SR 87 into Coolidge, where it turns to the northwest toward the Phoenix metropolitan area. The Phoenix Subdivision connects the Sunset Route with Phoenix and intersects with the Copper Basin Railway at Magma Junction, the dormant Magma Arizona Railroad at Magma Junction, and BNSF Railway at Phoenix.

4.4 Environmental Consequences

The following sections discuss the potential indirect and cumulative impacts of the No-Action Alternative and the action corridor alternatives.

4.4.1 No-Action Alternative

Under the No-Action Alternative, the proposed action would not be built, and no new indirect or cumulative impacts are anticipated beyond those that could result from other projects. However, implementation of planned and programmed transportation projects would not adequately handle future land use development and population and employment growth in the study area. Planned land development projects and planned and programmed transportation projects that would occur with the No-Action Alternative are discussed in the following sections.

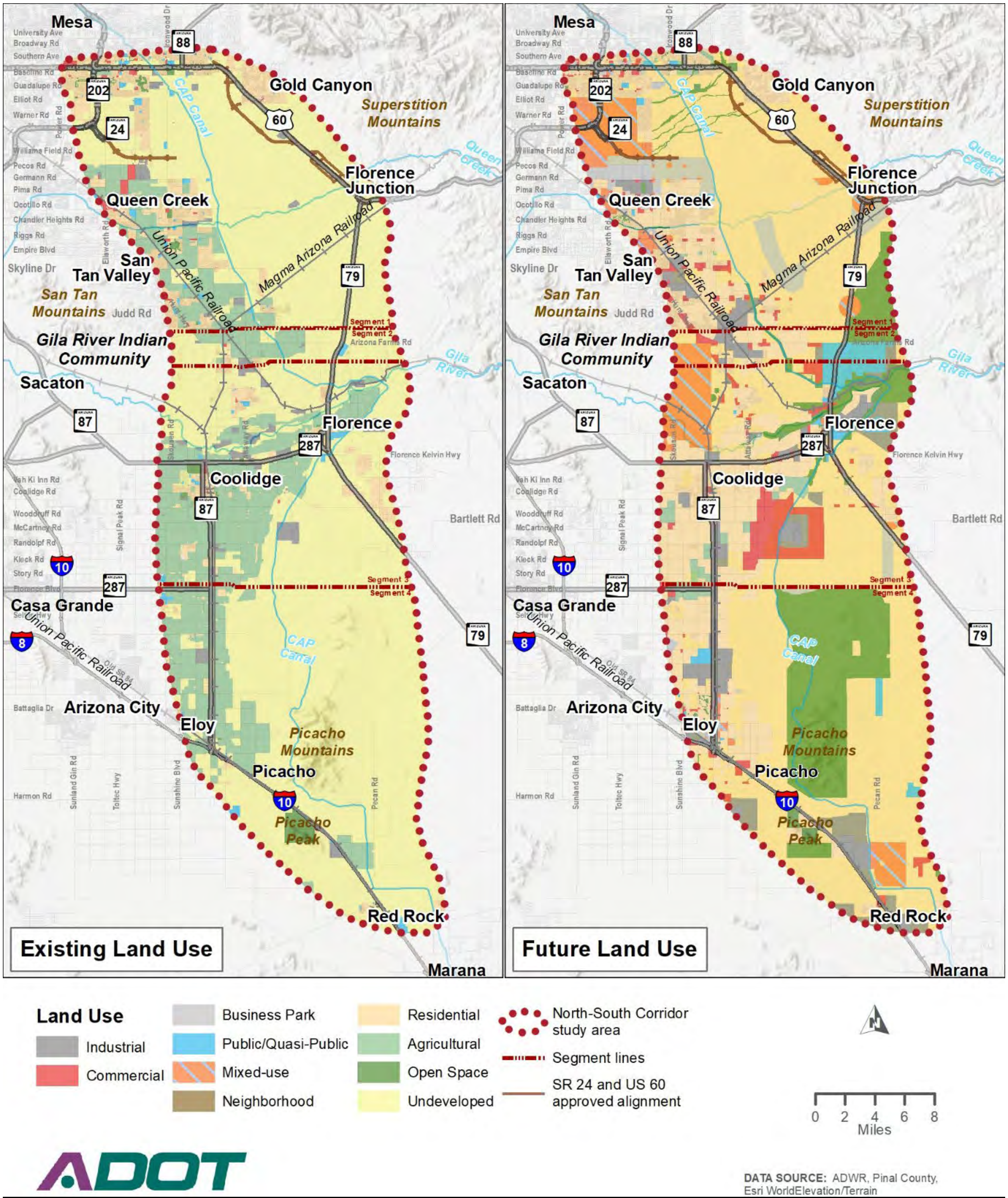
4.4.2 Future Land Uses

According to municipal and county land use plans, nearly 500,000 acres today classified as agricultural or undeveloped would be converted to residential and commercial development at build-out. According to these plans, future land uses would be 56 percent residential and 4 percent commercial—representing 60 percent of the study area. Over 100 planned or proposed residential developments (subdivisions or master-planned communities) and several economic activity centers that may be constructed by 2040 would be located throughout the study area. Much of the commercial development would be concentrated along Hunt Highway and in Coolidge where the Westcor Shopping Mall, a new regional shopping area, is planned. Table 4.4-1 describes some of the larger planned developments in the study area (these locations are shown in Figure 3.2-5). Figure 4.4-1 compares existing and future land uses in the study area, based on current land use plans. It is important to note that the actual time frames for the development identified in the map showing the future land uses are unknown at this time.

Table 4.4-1. Current and planned major land development projects

Project	Description	Status
Lost Dutchman Heights	The proposed project entails developing 7,700 acres of Arizona State Land Department land into 40,000 housing units, 6 to 8 million square feet of commercial space, and approximately 250 acres of light industrial business park. The proposed project is east and west of the Central Arizona Project Canal, extending from Meridian Road to Mountain View Road, and south of U.S. Route 60, from Baseline Road to Elliot Road.	The proposed project is incorporated in the Apache Junction *General Plan* (2010) and *Comprehensive Transportation Study* (2012).
Superstition Vistas	The proposed project entails developing 275 square miles of Arizona State Land Department land into a residential development with up to 1 million residents, and commercial and open space land uses. The proposed project extends from Apache Junction to Florence.	A comprehensive plan for the proposed project area was completed in 2012. Construction of the project is anticipated to take place over several decades.
Mesa Gateway Employment Center	The proposed project entails developing a regional employment center that would attract up to 100,000 jobs in the area surrounding the Phoenix-Mesa Gateway Airport.	The proposed project is included in a 2008 strategic plan.
Anthem at Merrill Ranch	The proposed project entails developing a large master-planned community (3,100 acres) of 8,500 housing units in the Florence portion of the study area.	At this time, approximately 2,500 single-family homes have been built.
Florence Copper	The proposed project entails developing an active 1,342-acre copper mining site into commercial production.	The site currently operates in-situ copper recovery production test facilities including injection, recovery, and monitoring wells; solution storage tanks; and a water impoundment.
Westcor Shopping Mall	The proposed project entails developing a large regional commercial center at the southwestern corner of Bartlett and Wheeler Roads, southeast of downtown Coolidge.	Not available
Inland Port Arizona and Pinal Logistics Park	The proposed project entails developing an inland port and industrial site on approximately 1,500 acres east of State Route 87 between Hanna and Houser Roads in Coolidge.	Not available

Figure 4.4-1. Existing and future land uses, 2015 and 2040



4.4.3 Future Population and Employment Growth

Population and employment in the study area are expected to grow substantially by 2040. Table 4.4-2 presents existing and projected population and employment in Maricopa, Pinal, and Pima Counties (including those areas outside the study area). Substantial population and employment growth is forecast, particularly in Pinal County, where the 2040 population is expected to double and employment is expected to increase more than 1.75 times.

Table 4.4-2. Population and employment in Maricopa, Pinal, and Pima Counties, 2015–2040

Geographical area[a]	2015	2040	Percentage change
Population			
Maricopa County	4,076,438	6,031,000	47.9
Pinal County	406,468	800,700	97.0
Pima County	1,009,371	1,276,700	26.5
Employment			
Maricopa County	1,923,012	2,863,967	48.9
Pinal County	68,364	189,682	177.5
Pima County	465,594	495,569	6.4

Sources: Arizona Department of Administration (2015a), Arizona Department of Transportation (2018)
[a] includes all of Maricopa, Pinal, and Pima Counties

Table 4.4-3 summarizes population and employment growth in the study area. For the study area, existing population and employment numbers are available only from the current MPO projection series that reports figures in 10-year increments. Population in the study area is projected to more than double and employment is expected to increase by almost 350 percent by 2040. Much of this growth will occur outside existing incorporated municipal limits but in identified MPAs.

Table 4.4-3. Study area population and employment, 2015–2040

Demographic	2015	2040	Percentage change
Population	275,657	601,053	118
Employment	36,416	162,685	347

Source: 2015 and 2040 population and employment estimates and projections from the second-generation Arizona statewide travel demand model (AZTDM2)

Figures 4.4-2 and 4.4-3 provide graphical comparisons of existing and future population and employment for the study area, respectively. In 2040, population and employment growth are projected to occur primarily near the Phoenix-Mesa Gateway Airport, Apache Junction, Queen Creek, and the Gila River Indian Community.

Figure 4.4-2. Existing and future population, 2015 and 2040

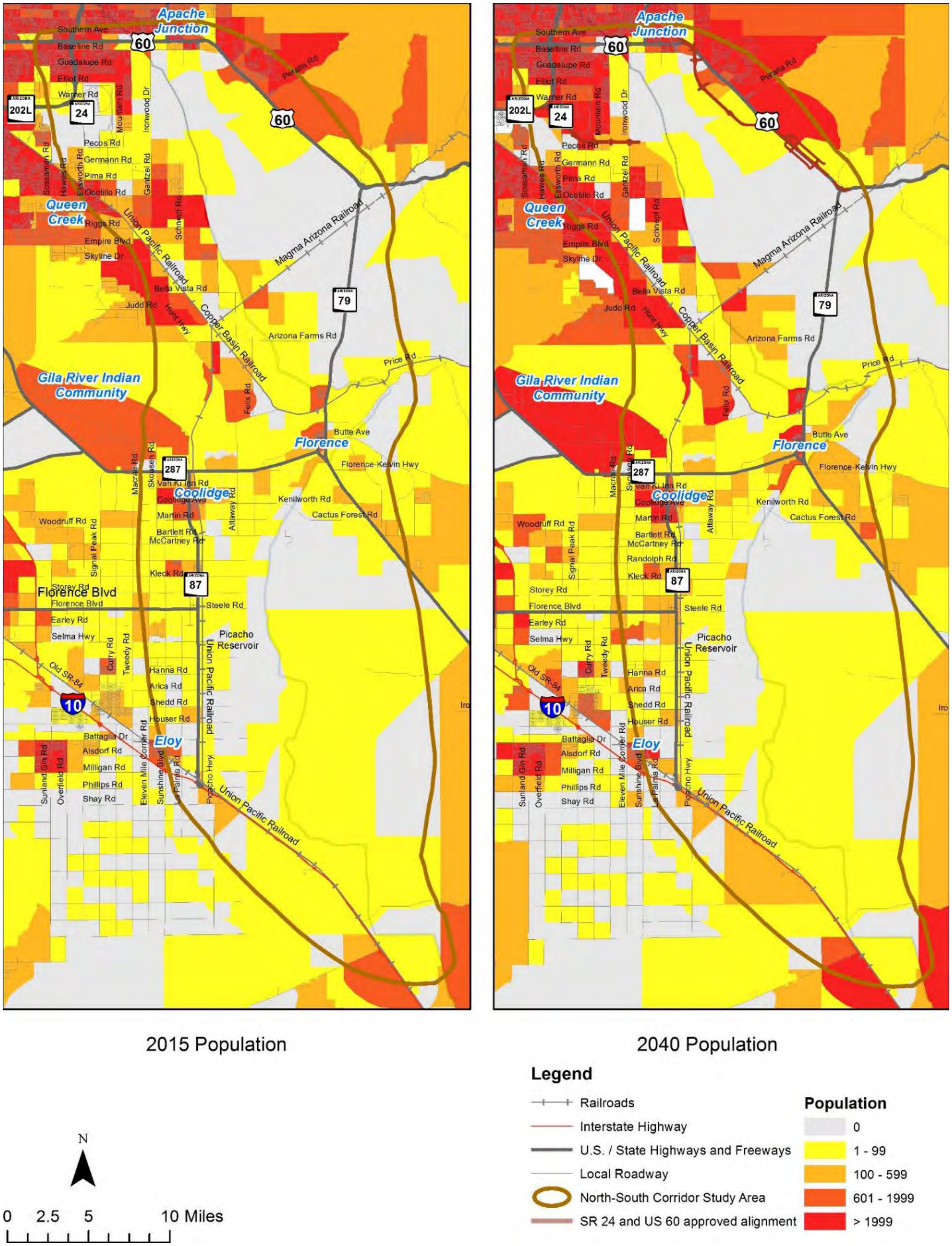
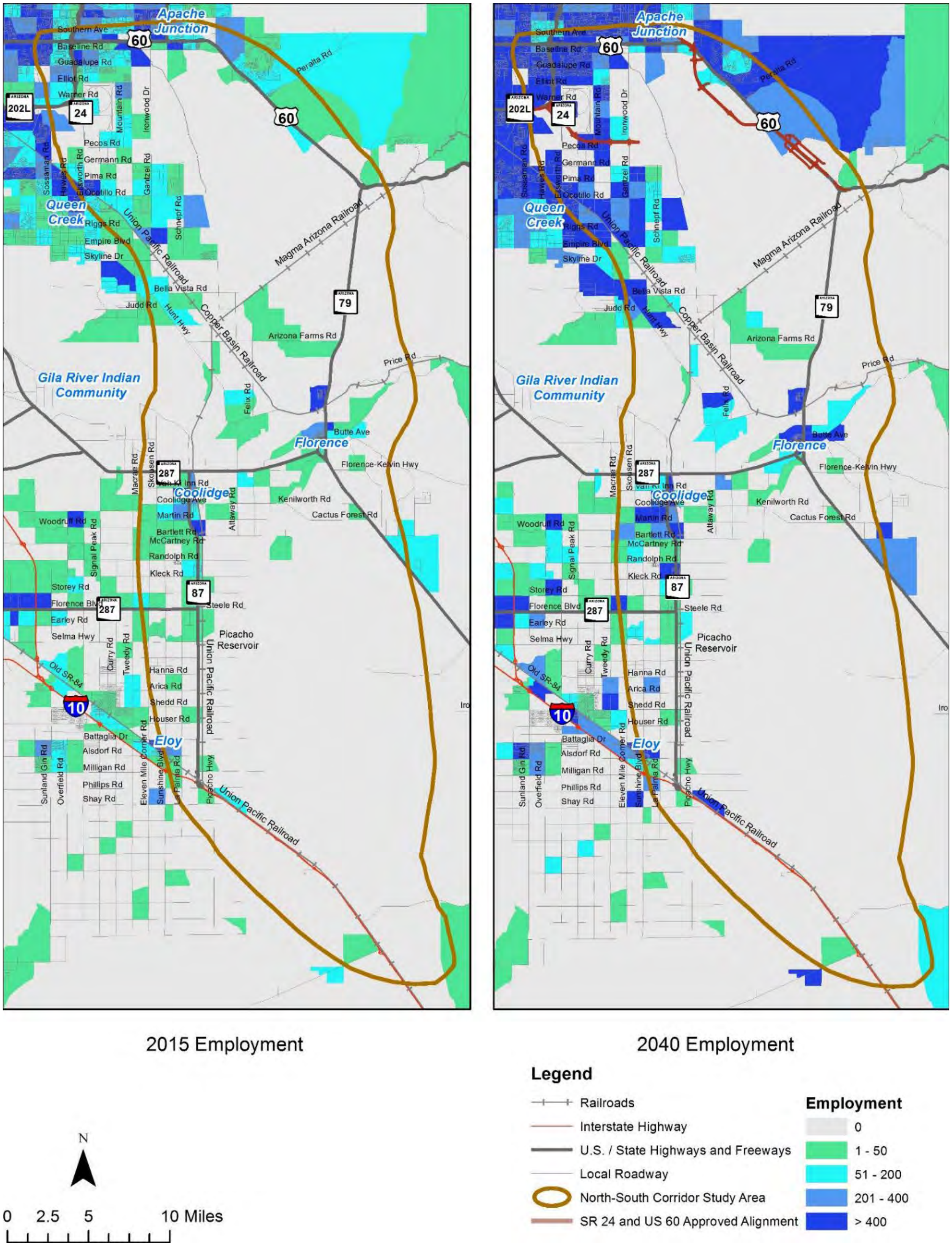


Figure 4.4-3. Existing and future employment, 2015 and 2040



4.4.4 Planned and Programmed Transportation Projects

Adopted transportation improvement plans developed by ADOT, MAG, SCMPO, CAG, Pinal County, and Maricopa County were reviewed to identify other major transportation projects in and surrounding the action corridor alternatives that may involve capacity improvements. Table 4.4-4 lists the identified transportation projects that are programmed in the respective agency's transportation improvement plan.

Table 4.4-4. Other programmed transportation projects

No.	Project	Description	Segment
1	Queen Creek Road widening[a]	Widen Queen Creek Road from Ellsworth to Meridian Roads	1
2	Crismon Road extension[a]	Crismon Road continuity from Guadalupe to Ocotillo Roads	1
3	Hawes Road widening[a]	Widen Hawes Road from Elliot to Baseline Roads	1
4	Hunt Highway widening[a]	Widen Hunt Highway from Gary Road to State Route 79	1, 2, 3
5	Meridian Road extension/ widening[a]	Widen and complete Meridian Road from U.S. Route 60 to Hunt Highway	1
6	Elliot Road widening[a]	Widen Elliot Road from Power to Meridian Roads	1
7	Germann Road extension/ widening[a]	Construct/widen Germann Road from Meridian Road to Ironwood Drive	1
8	Interstate 10 widening[b]	Widen Interstate 10 from Earley Road to Interstate 8	4
9	Interstate 10 widening[b]	Widen Interstate 10 from State Route 87 to Picacho	4
10	Kortsen/Kleck Road extension[c]	Extend Kortsen/Kleck Road from North-South Corridor alignment (approximately Wheeler Road) to Interstate 10	3
11	Ocotillo Road widening[a]	Widen Ocotillo Road from Gantzel to Kenworthy Roads	1
12	Pecos Road widening[a]	Widen Pecos Road from Ellsworth to Meridian Roads	1
13	Ray Road widening[a]	Extend Ray Road from Signal Butte to Meridian Roads	1
14	Selma Highway widening[c]	Widen Selma Highway from State Route 87 to Eleven Mile Corner Road	4
15	Signal Butte Road widening[a]	Widen Signal Butte Road from Elliot to Ray Roads	1
16	Riggs Road extension[d]	Construct new three-lane road from Ellsworth to Meridian Roads	1

[a] Maricopa Association of Governments (2017) [b] Arizona Department of Transportation (2017c) [c] Pinal County (2017b)
[d] Maricopa County Department of Transportation (2017)

4.4.5 Action Corridor Alternatives

4.4.5.1 Indirect Effects

With the proposed action, the future land use, population, and employment conditions described for the No-Action Alternative would occur; however, the North-South Freeway would be built and operate in the study area.

Growth Effects

Land development and population and employment growth are projected to occur in the study area by 2040, regardless of whether the proposed action is implemented. In their general plans, study area municipalities have identified how and to what extent land would be converted to support new development. These land use plans, with the exception of Apache Junction and Mesa, reference the North-South Freeway. By acknowledging the proposed freeway in their land use plans, study area municipalities expect the proposed action to support and facilitate this development to some degree and are planning accordingly. Therefore, the proposed action has the potential to result in growth-inducing impacts—in particular, secondary development that could generate additional traffic, population and employment growth, economic benefits, or other impacts.

The traffic interchanges along the North-South Freeway would substantially improve access between the local communities and the larger region, which may spur additional or faster development at these locations. Residential communities near these traffic interchange locations would have better access to jobs, schools, shopping, and services, while commercial developments near the interchanges would have good access to suppliers and customers.

The types of indirect environmental impacts that could potentially result from induced development or changes are described below:

- Traffic and transportation – Increased traffic volumes and congestion may occur if secondary development were induced by the proposed action.
- Land use – Changes in land uses or land use patterns may arise if currently unanticipated secondary development occurs as a result of the proposed action, potentially causing increases in property values or greater intensity of land development.
- Population and employment – Secondary development resulting from the proposed action may potentially change socioeconomic conditions in the study area, such as increasing or changing population and employment, and may positively affect business sales and revenues.
- EJ and community facilities – Secondary development has the potential to affect communities and EJ populations through changes in development patterns, traffic, or property values specific to their neighborhoods. Benefits to these communities may also result with improved access to housing, employment, and educational opportunities.
- Hydrology, floodplains, and water resources – Secondary development has the potential to affect surface waters, aquifers, floodplains, and wetlands, and may introduce runoff, segmentation, and changes in hydrology. The project may influence the design and construction of new structures, which may affect erosion and sedimentation. Secondary development will likely increase the amount of impervious surfaces within the watershed, which would increase surface flows entering Waters. Resulting stream flow and velocity changes during storms may result in increased flooding and stream degradation. In addition, these changes may affect the quality and quantity of water available for uses including recreation, habitat, drinking, or agricultural purposes.
- Biological resources – Secondary development has the potential to affect vegetation and wildlife habitat, resources, and corridors. Secondary development may cause or increase gradual changes in species composition, diversity, genetic makeup, and/or health because of impacts on habitat, habitat fragmentation, or genetic isolation. In addition, secondary development may introduce additional invasive species to the study area.
- Cultural resources – Secondary development may potentially affect historical or archaeological sites.
- Farmland – Secondary development has the potential to affect active farmland (including prime and unique farmland), which may include the loss, impairment, and subdivision of agricultural parcels.
- Air quality/noise/energy/climate change – Increased traffic from secondary development has the potential to increase localized noise levels and emissions of air pollutants. It may also affect energy use and climate change.
- Hazardous waste/materials – Secondary development has the potential to affect existing contaminated or hazardous material sites or result in the generation of hazardous waste or potential spills.

The areas with the greatest potential for growth effects are those that are currently the least developed in the study area. With the addition of a new freeway, particularly in areas where a service traffic interchange is proposed, the improved access to and from these locations could support its attractiveness for development. In all segments, the proposed action corridor alternatives are located in mostly undeveloped areas to avoid or minimize impacts on residents, businesses, community facilities, cultural resources, and other natural and built environment resources. In Segment 1, the Eastern Alternatives pass through areas south of US 60 that are predominantly undeveloped; therefore, the Eastern Alternatives may potentially result in unanticipated development or expedite planned development along the Corridor more so than the Western Alternatives.

The Segment 2 action corridor alternatives are located in largely undeveloped areas near one another. With the Arizona Farms Road crossing the center of Segment 2, a new freeway and traffic interchange may expedite development of this area.

In Segment 3, the action corridor alternatives are near existing and planned development, with the W3 Alternative closer to Coolidge and the E3a, E3b, E3c, and E3d Alternatives closer to Florence. Each action corridor alternative would be just as likely as another to result in unanticipated development or expedite planned development along the Corridor.

In Segment 4, the E4 Alternative generally follows a route that is predominantly undeveloped, although it is within 2 miles of the W4 Alternative, which is coincident with SR 87 in Eloy. SR 87 and the W4 Alternative cross a largely undeveloped portion of Eloy, and the nearness of the E4 Alternative to the W4 Alternative results in a negligible likelihood of either Segment 4 action corridor alternative promoting more growth than the other.

Other Potential Indirect Effects

The action corridor alternatives have the potential to result in indirect effects other than those spurred by additional growth in the study area. These potential effects are summarized below. Further evaluation of potential indirect effects would be conducted during Tier 2 studies when more details of the freeway design and operation are known.

- Economic effects – Improved access to employment, retail, and tourist attractions may promote business and tourism.
- Parks and recreational resources effects – Improved access to recreational features and facilities may increase their use and improve the population’s health. Proximity of the proposed transportation facility may alter the visitor experience at recreational destinations.
- Cultural resources effects – Increased access to unknown culturally sensitive properties may degrade the sites.
- Hazardous/contaminated materials effects – Increased goods movement and other traffic through the study area may increase the potential for spills or releases to land not currently affected by hazardous materials.
- Biological resources effects – Introduction of contaminants, increased noise, and/or increased light may change the quantity and quality of habitat and the resources that species rely on for food, hunting/scavenging, and breeding. There is a potential for increased wildlife mortality attributable to wildlife-vehicle collisions on the new transportation facility.

4.4.5.2 Cumulative Impacts

The proposed action, combined with reasonably foreseeable planned or programmed transportation projects described for the No-Action Alternative, would result in a more efficient and enhanced transportation system, which would lead to better mobility, air quality, and safety. In addition, the proposed action would provide a regional connector that would meet existing and projected travel demand. In particular, the proposed action would enhance traffic circulation and provide access to planned growth areas.

Although implementation of the proposed action would result in some cumulative benefits, it may also result in cumulative adverse impacts. Implementing the proposed action, combined with reasonably foreseeable planned and programmed transportation projects, would convert more undeveloped and agricultural land to a transportation use. Converting undeveloped land to a transportation use may affect natural resources (for example, plant and wildlife species, habitats, and corridors) and cultural resources (for example, historical and archaeological sites). In addition, converting agricultural land may result in a greater loss of active farmland (including prime and unique farmland), impairment of agricultural productivity, and subdivision of agricultural parcels.

In Segment 1, all action corridor alternatives would go through large planned developments in the region—Superstition Vistas and Lost Dutchman Heights. Most impacts in Segment 1 would occur on ASLD land. With either the Eastern or Western Alternatives, ADOT would coordinate with developers as their projects advance through planning, design, and construction. Several existing roadways are planned for extension and/or widening, including Baseline Road, Guadalupe Road, Elliott Road, Bella Vista Road, Ironwood Drive, Ray Road, Pecos Road, Ocotillo Road, and Skyline Drive. These roadway improvements and the proposed US 60 bypass were considered in developing the action corridor alternatives and evaluating transportation mobility, as presented in Chapter 2, *Alternatives*.

In Segment 2, there are no large-scale developments that may result in cumulative impacts if constructed or operated at the same time as the proposed action.

In Segment 3, the E3b, E3d, and W3 Alternatives would be located on either side of the Anthem at Merrill Ranch development, which is planned for expansion. The E3a, E3b, E3c, and E3d Alternatives would be located east of the Florence Copper project, and all action corridor alternatives would be near the proposed Westcor Shopping Mall in Coolidge.

In Segment 4, the Inland Port Arizona and Pinal Logistics Park development is planned between the Eastern and Western Alternatives. As with the planned developments in Segment 1, ADOT would coordinate with the developers as their projects advance through planning, design, and construction. Roadways with planned extensions and widenings in Segments 3 and 4 include Hunt Highway, SR 287, McCartney Road, Selma Highway, Kortsen Road, Kleck Road, and I-10. These roadways were considered in evaluating transportation mobility, as presented in Chapter 2, *Alternatives*.

Potential cumulative impacts would be further evaluated during the Tier 2 phase when more details of the freeway design and operation are known. Specific cumulative environmental impacts related to construction activities would be assessed based on the timing of the anticipated construction of the North-South Freeway and the construction of other land development and/or transportation facility projects within a similar timeframe. Long-term effects of the North-South Freeway in conjunction with other improvements would be assessed based on the anticipated years of operation of related developments and/or transportation facilities.

4.4.6 Potential Avoidance, Minimization, and Mitigation Strategies

To avoid, minimize, or mitigate any potential indirect effects and cumulative impacts, ADOT would collaborate with local jurisdictions, resource agencies, and private stakeholders to participate in discussions regarding development in the North-South Corridor. These efforts would coordinate local land use planning, local and regional connectivity, and context-sensitive design, while preserving and enhancing wildlife habitat and connectivity. Specific mitigation measures, to the extent required, would be identified as part of Tier 2 studies when more details of the freeway design and operation are known and project-specific indirect and cumulative impacts are identified. All mitigation strategies to address direct impacts on resources in the study area would also mitigate cumulative impacts.

Appendix D, *Summary of Avoidance, Minimization, and Mitigation Strategies*, contains a consolidated list of strategies to address environmental impacts.

4.4.7 Subsequent Tier 2 Analysis

As part of Tier 2 studies, indirect and cumulative impacts would be analyzed in more detail, focusing on a specific project area. The status of planned transportation projects in the study area, particularly those near the alignments developed in Tier 2 studies, would be reevaluated to assess cumulative impacts. In addition, up-to-date land use plans, zoning regulations, and development plans would be reviewed.

4.4.7.1 Conclusion

The purpose of this Tier 1-level indirect and cumulative impacts analysis was to evaluate the effect of the action corridor alternatives on community and environmental resources. Land development and population and employment growth are projected to continue to occur without the proposed action because the study area has readily available land and close proximity to the urbanized areas of metropolitan Phoenix. This close proximity is one of the reasons why the area has changed substantially, and will continue to change from agricultural uses to suburban development. However, the proposed action would have the potential to result in growth-inducing impacts from secondary development and in cumulative impacts from converting undeveloped land to a transportation use. As part of Tier 2 studies, indirect and cumulative impacts would be analyzed in more detail, focusing on a specific project area.

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5 Comments, Coordination, and Public Involvement

This chapter describes how agencies and members of the public have been involved in the NSCS. It describes agency and public outreach efforts from 2010 to the present (Section 5.1); coordination with cooperating and participating agencies, tribes, and key stakeholders (Section 5.2); and public review of the EIS (Section 5.3). Additional information, including summary reports of the study's outreach efforts, is provided in Appendix M, *Public Involvement*.

5.1 Agency and Public Involvement

CEQ regulations for implementing NEPA require agencies to involve the public in preparing their NEPA documents (40 CFR Part 1506). Community outreach has been an integral part of the NSCS since its inception. A comprehensive coordination plan was developed in 2010 (updated in February 2017) and posted on the study website. The coordination plan was implemented to coordinate with and obtain input from the cooperating and participating agencies, stakeholders, and the public for developing alternatives and completing this Tier 1 DEIS. Public and agency coordination and outreach would continue during Tier 2 studies and during the subsequent design and construction of the proposed freeway, should an action alternative be selected. Table 5.1-1 shows the outreach program objectives.

Table 5.1-1. North-South Corridor Study outreach objectives

Major objectives
Educate the public, agencies, tribes, and other stakeholder groups about the existence, purpose, and scope of the study.
Encourage and provide opportunities for public participation throughout the study process.
Report findings of technical analyses at key study milestones.
Comply with Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, including requirements for agency and public involvement.
Document how public suggestions and concerns were considered and incorporated into the study's planning process.
Provide public involvement opportunities and meaningful access to public information in accordance with requirements of Executive Order 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations" and FHWA Order 6640.23A, "FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."
Comply with Title VI of the Civil Rights Act of 1964, 42 United States Code § 2000d et seq., which prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal financial assistance, and with Executive Order 13166, signed in August 2000, which improves access to services for persons with limited English proficiency.
Comply with the Arizona Department of Transportation's *Public Involvement Plan*, which provides a framework to create and maintain a transportation system developed from a diversity of voices and viewpoints from across the state that provide valuable insight to help inform the decision-making process.

ADOT has provided opportunities for agency and public involvement throughout the course of the study. Approximately 100 public stakeholder and 90 agency meetings were held between 2009 and 2017, and interested parties had several opportunities to provide input through the study telephone hotline, website, email, traditional mail, and other means. Specific opportunities to provide input included:

- agency and public scoping meetings
- presentations at city council/local agency meetings
- presentations at industry association meetings
- individual agency and stakeholder coordination meetings

- feedback on newsletters
- public information workshops and meetings
- stakeholder agency progress meetings
- workshop and meetings with Native American tribes
- public comment period for action corridor alternatives

ADOT and the study team implemented an extensive public involvement program, meeting with numerous agencies, tribes, special interest groups, civic organizations, and businesses to discuss the study and to answer questions about the corridor and the Tier 1 EIS environmental review process.

Agency and public involvement coordination efforts began with the publication of a Notice of Intent in 2010, which was followed by another Notice of Intent published in 2016 when the study became a Tier 1 EIS effort (Section 5.1.1). The study's scoping phase (conducted in 2010) and early agency and public involvement (conducted from 2010 to 2012) are discussed in Sections 5.1.2 and 5.1.3, respectively. The agency and public outreach conducted after publication of the ASR in 2014 is documented in Section 5.1.4, and Section 5.1.5 discusses outreach conducted when the study changed to a tiered environmental process. The most recent round of agency and public involvement, held in 2017, presented the action corridor alternatives that are analyzed in this Tier 1 DEIS (Section 5.1.6).

Throughout the study process, news releases, social media, newsletters, brochures, questionnaires, a study website, and public meetings were used to disseminate information about the NSCS and to gather input from the public and other interested parties.

Individuals contacting ADOT about the study were referred to the study website for further information (https://www.azdot.gov/planning/transportation-studies/north-south-corridor-study) and were encouraged to subscribe to receive email updates on the study and to participate in public meetings and online comment opportunities. In addition, members of the study team answered individual questions from some of the people who provided comments by phone or email, depending on the nature of the comment.

5.1.1 Notices of Intent (2010 and 2016)

A Notice of Intent to prepare an EIS was published in the *Federal Register* on September 20, 2010. On October 3, 2016, a second Notice of Intent was published in the *Federal Register* to inform the public that the NSCS had been converted from a project-level EIS to a Tier 1 EIS.

5.1.2 Scoping Phase (2010)

Scoping is an early step in the NEPA process, the results of which are summarized in the *North-South Corridor Study Draft Agency and Public Scoping Summary*, dated February 2011 (Appendix M). The scoping process allowed agencies and the public to identify the range of issues to be addressed during the development of the engineering, planning, and environmental studies. Table 5.1-2 summarizes the scoping meetings conducted. The official scoping comment period ended on November 11, 2010; however, comments received after the comment period were accepted and documented.

Table 5.1-2. Agency and public scoping meetings

Date	Meeting type and location	Number of participants
10/5/2010	Agency scoping meeting – Florence Town Hall, Florence	56[a]
10/19/2010	Public scoping meeting – Union Center at Merrill Ranch, Florence	52
10/21/2010	Public scoping meeting – Picacho Elementary School, Picacho	14
10/26/2010	Public scoping meeting – Apache Junction High School, Apache Junction	55
10/28/2010	Public scoping meeting – Skyline Ranch K-8 School, San Tan Valley	29

Source: Arizona Department of Transportation (2014a)
[a] representing 28 agencies

5.1.2.1 Agency Scoping (October 2010)

Notification

The study team prepared and distributed a scoping letter inviting agency representatives to participate in the scoping phase of the study. These letters were mailed on September 20, 2010, to 43 agencies. The agency scoping letter and list of invited agencies is included in Appendix M.

Meeting Description

ADOT held an agency scoping meeting on October 5, 2010, at Florence Town Hall in Florence. The purpose of the meeting was to provide agency representatives with preliminary study information, present the study area, and receive input on issues to be addressed. The meeting was also designed for agency stakeholders to identify any issues, concerns, and opportunities they felt needed to be addressed over the course of the study. Fifty-six individuals representing 28 agencies attended the meeting. A list of attendees and a meeting summary is provided in Appendix M.

Following a presentation, each agency representative was given the opportunity to comment on the study and the information presented. Twenty-five verbal comments were documented during the agency scoping meeting. Written and verbal comments and responses are included in Appendix M.

Summary of Participation

Comments received during the agency scoping meeting led to further study area refinements. The refined study area reflects comments related to the extremely low development potential of the study area east of the Picacho Mountains and the importance of avoiding adverse impacts on the planned UPRR rail yard at Red Rock, southeast of Picacho.

5.1.2.2 Public Scoping (October 2010)

The four public scoping meetings provided an overview of the study process, discussed the environmental and engineering processes and schedule, presented the study area, and provided the public with the opportunity to ask questions and offer feedback.

Notification

The study team prepared and distributed an informational notification flier inviting recipients to four public scoping meetings hosted at the locations listed in Table 5.1-2. The notification included information about the study and an invitation for recipients to attend any of the four scoping meetings. The flier was mailed on October 5, 2010, to approximately 4,600 residents, businesses, government officials, and other key stakeholders and interested parties in the study area. It was emailed to approximately 1,950 stakeholders on October 6, 2010.

Four newspaper advertisements announcing the public scoping meetings were published, as noted in Table 5.1-3. Newspaper advertisements can be found in Appendix M.

Table 5.1-3. Public scoping meeting newspaper advertisements

Publication date	Newspaper
10/6/2010	*Tri-Valley Dispatch*
10/21/2010	*East Valley Tribune*
10/26/2010	*Apache Junction/Gold Canyon Independent*
10/28/2010	*Queen Creek/San Tan Valley Independent*

Source: Arizona Department of Transportation (2014a)

Meeting Description

Each meeting was held from 6 to 8 p.m. and was identical in presentation content. At each meeting, attendees signed in and were given packets of information, including an agenda, fact sheet with study area information, frequently asked questions, comment form, and question card.

Each meeting included a formal presentation at 6:15 p.m., followed by a question-and-answer session. Maps and displays were available for review and comment. A copy of the presentation and display boards are in Appendix M. A total of 150 people signed in at the meetings. Attendance at each meeting location is documented in Table 5.1-2.

Summary of Participation

Fifty-six comments were received during the public scoping period through comment surveys, letters, emails, and at the public scoping meetings. Responses were prepared using the communication method in which the comments were received (for example, emailed comments were responded to by email). In addition to the comment surveys that allowed commenters to prioritize issues, comments were submitted at, or following, the public scoping meetings.

A comment survey was distributed at the public meetings where the public could rank environmental and engineering issues by importance, list preferences for evaluating future corridor locations, and write questions and comments to be submitted to the study team. The top three environmental issues identified from the comment survey were: economic development, air quality, and threatened and endangered species. Additional issues of concern listed included: aesthetics/visual resources, water resources, employment, noise, land use, hazardous materials contamination, and community cohesion.

The comment survey also asked respondents to provide feedback regarding issues to be considered as the study team identifies corridor alternatives. Of the comments forms submitted, the following issues received the most responses:

- improving access to US 60 and I-10
- maintaining existing local roads and highways
- improving public transportation services (for example bus, rail)
- improving local traffic and circulation

The comment survey also asked whether respondents agreed with the study's purpose and need, as presented. The following purpose and need elements received the most responses:

- accommodating projected traffic to relieve anticipated congestion
- relieving I-10 traffic
- providing a direct connection to the eastern portion of the Phoenix metropolitan area

A summary of all comments (comment survey, question-and-answer card, letter, email, etc.) by issue is provided in Appendix M.

5.1.3 Early Outreach Activities (2010 to 2012)

Comments received through agency and public involvement activities conducted prior to the 2014 public meetings were instrumental in developing and screening the alternatives presented. Table 5.1-4 lists the major agency and public involvement activities.

Table 5.1-4. Early agency and public involvement activities

Type	Dates	Number of participants
Three meetings of Four Southern Tribes Cultural Resources Subcommittee	2010–2012	~10 per meeting
Eight agency progress meetings	2011–2012	37–49 per meeting
Twelve individual agency meetings	January 2011	<15 per meeting
Four mayor/council briefings	2010–2011	Not available
Individual public stakeholder meetings	2010–2012	<10 per meeting
Newsletter distribution	2011	55,000 residents total
Four public workshop meetings	2011	269 total

Source: Arizona Department of Transportation (2014a)

The following discussion provides more detail regarding agency and public meetings held in late 2011 to gather input on potential route alternatives.

5.1.3.1 Agency Progress Meeting (November 2011)

Notification

ADOT and FHWA met with agencies during the regularly scheduled agency progress meeting in November 2011 to discuss the study's progress and to obtain feedback on potential route alternatives. Agency feedback is documented in the *Summary of Stakeholder and Public Outreach and Preferences on Possible Route Alternatives, North-South Corridor Study*, dated March 2012 (see Appendix M).

Meeting Description

The agency progress meeting was held on November 1, 2011. During the meeting, the study team gave an overview of the screening process and the potential route alternatives. The study team requested feedback from the agency representatives on the route alternatives using an eight-page form. The form included each segment of the route alternatives and asked whether that particular segment was "favorable" or "unfavorable," and why. Only one form was accepted per agency. Completed forms were due by December 12, 2011, and 17 forms were received.

Summary of Participation

The study team noted that local agencies (representing towns and cities in the study area) had different preferences than regional, state, and federal agencies, as described below:

- In general, local agencies favored:
    - a northern terminus on US 60 near Goldfield Road
    - route alternative segments paralleling the CAP Canal in the central portion of the study area
    - the farthest eastern route alternative segments in the southern portion of the study area
    - a southern terminus on I-10 located 2 miles east of the existing SR 87 traffic interchange
- In general, local agencies did not favor:
    - western route alternative segments
    - the farthest eastern route alternative segments in the northern portion of the study area
- In general, regional, state, and federal agencies favored:
    - a northern terminus on US 60 near Ironwood Drive
    - a southern terminus on I-10 at the existing SR 87 traffic interchange
    - use of existing routes such as Ironwood Road, Hunt Highway, and SR 87 over all other route alternative segments
- In general, regional, state, and federal agencies did not favor:
    - the far eastern route alternative segments in the central portion of the study area

5.1.3.2 Public Workshop Meetings (December 2011)

Four public workshop meetings were held in December 2011 (Table 5.1-5). The objective of the public workshop meetings was to provide an update regarding the study's progress and timeline and to present the possible route alternative segments for public review and feedback.

Table 5.1-5. Public workshop meetings

Date	Meeting location	Number of participants
12/6/2011	Santa Cruz Valley Union High School, Eloy	19
12/7/2011	Moose Lodge, Apache Junction	75
12/8/2011	Coolidge-Florence Elks Lodge, Coolidge	106
12/12/2011	Walker Butte Elementary School, San Tan Valley	69

Notification

During the week of November 14, 2011, a public workshop meeting notification was emailed to government officials, an internal memorandum was sent to ADOT management, and a notification was posted on the study website. Advertisements were published in local newspapers within the study area (see Table 5.1-6). Additionally, a public workshop meeting invitation/announcement was sent by U.S. mail to approximately 51,500 residents, businesses, and stakeholders in the study area, and a news release was issued to local media in the study area.

Table 5.1-6. Public workshop meeting newspaper advertisements

Publication date	Newspaper
11/16/2011	*East Valley Tribune*
11/16/2011	*Tri-Valley Dispatch*
11/16/2011	*Apache Junction/Gold Canyon Independent*
11/16/2011	*Queen Creek/San Tan Valley Independent*

Meeting Description

All meetings were held from 6 to 8 p.m. and were identical in content. Each meeting began with an open house format. Displays were available for attendees to view, and take-home information was available regarding the study's purpose and need, engineering and environmental elements, schedule, and process. Attendees received a packet of information that included a comment form, agenda, fact sheet, frequently asked questions, and glossary of terms. Attendees were seated randomly in groups at tables, where detailed aerial maps of the study were available for reference.

A presentation was given at 6:15 p.m. to provide an overview of the action corridor alternatives. After the presentation, study team members circulated throughout the room to answer questions as attendees filled out their comment forms.

Most workshop participants chose to take the comment forms with them after the workshop to complete at a later time. The comment form was also available online. The study team requested that comment forms be returned by January 12, 2012, and 205 comment forms were received by that deadline.

Summary of Participation

The top five factors that influenced people's preferences for route alternative segments were:

- has least impact on existing development (103 responses)
- best connects to other major routes (94 responses)
- best relieves traffic on local streets (62 responses)
- best connects to cities/towns (55 responses)
- best relieves traffic on other highways/freeways (51 responses)

Public preferences for route alternative segments were not as clear-cut as those of the agencies, particularly when considering route alternative segments in the southern portion of the study area. The public preferences that did emerge are discussed below:

- In general, public respondents favored:
  - a northern terminus on US 60 near Goldfield Road
- In general, public respondents did not favor:
  - the farthest eastern route alternative segments in the northern portion of the study area

In response to a question about whether they would support and/or use the proposed corridor as a tolled facility, 77 respondents expressed support, and 102 respondents expressed opposition.

5.1.4 *Alternatives Selection Report* Phase (2014)

The ASR public meetings were held to provide information about the recently completed ASR, which identified reasonable route alternatives to be carried forward for detailed assessment (see Section 2.2.2, *Alternatives Selection Report*, for more information). The public was invited to attend the meetings and learn more about the recently completed ASR, which identified reasonable route alternatives to be carried forward, and to give comments. Seven route alternatives that included 36 segments and the No-Action Alternative were presented at the meetings.

5.1.4.1 Public Meetings (November 2014)

The four ASR public meetings are summarized in Table 5.1-7.

Table 5.1-7. *Alternatives Selection Report* public meetings

Date	Meeting location	Number of participants
11/17/2014	Walker Butte Elementary School, Queen Creek	Total attendance was 361
11/18/2014	Santa Cruz High School, Eloy	
11/19/2014	Apache Junction High School, Apache Junction	
11/20/2014	Coolidge-Florence Elks Lodge, Coolidge	

Notification

The study team published five newspaper advertisements inviting the public to attend any one of four public meetings (Table 5.1-8).

Table 5.1-8. *Alternatives Selection Report* public meeting newspaper advertisements

Publication date	Publication
11/4/2014	*Casa Grande Dispatch*
11/5/2014	*Coolidge Examiner*
11/6/2014	*Eloy Enterprise*
11/6/2014	*Florence Reminder and Blade-Tribune*
11/7/2014	*Gila River Indian News*

Source: Arizona Department of Transportation (2014a)

ADOT issued a news release on November 6, 2014, providing public meeting details and the methods to provide comments. A copy of the news release is included in Appendix M. The news release was distributed to more than 4,000 people, news organizations, professional journalists, and others subscribed to ADOT’s GovDelivery system. Additionally, the study website provided details regarding the meetings, and the web address was published on all informational materials.

Meeting Description

Each meeting was held from 6 to 8 p.m. and was identical in presentation content. At each meeting, attendees signed in and were given a handout. A formal presentation was given at 6:15 p.m. Study information, maps, copies of the ASR, and other resources were provided. The ASR public meeting summary can be found in Appendix M.

Summary of Participation

For each outreach technique for the ASR public meetings, the number of participants was tracked using sign-in sheets, visual counts, tallies, and computer reports. Table 5.1-9 shows the number of participants during the 30-day comment period, organized by participation method. It should be noted that the cumulative total does not represent “unique” participants (for example, a single person could be counted in multiple categories—for attending one of the public meetings, providing public testimony, and submitting written comments).

Table 5.1-9. *Alternatives Selection Report* outreach participation

Participation method	Number of participants
Email	41
Website comments	64
Telephone comments	0
Written comments	11
Public meeting attendance	361
Total	**475**

Source: *North-South Corridor Study Alternative Selection Report Public Meeting Summary Report*, dated July 2015 (Appendix M)

Over 100 comments were received in response to the outreach efforts. Responses were grouped into general categories (for example, “Objections to proposed alternative and/or alternative segment”). Comments may have been related to more than one issue (for example, noting objections to a proposed alternative and/or alternative segment, while also specifying an alternative preference). More than one-third of respondents (37 percent) offered general support for roadway infrastructure improvements to improve the region’s transportation network. A similar number expressed their interest for an alternative or alternatives (34 percent), while a smaller number of respondents voiced opposition to one or more of the alternatives (26 percent). The alternative segments receiving the most preference included O3, V, X, and AO (the eastern alternative segments in the Florence area). The alternative segments receiving the most opposition included E2, G, Q, and AB (the western alternative segments in the Queen Creek/Florence area).

Following the ASR public meetings, the study team presented the same information from the public meetings to the Gila River Indian Community at community meetings in District 1 (January 5, 2015), District 2 (February 2, 2015), and District 3 (January 6, 2015), and to the Tohono O’odham Nation Agricultural/Natural Resources Committee (February 5, 2015).

5.1.5 Conversion to a Tiered Environmental Process (2016)

In November 2016, the study team issued a news release and a GovDelivery notice regarding the decision to convert the study from a project-level EIS to a Tier 1 EIS. The study website was updated with information regarding the transition to a tiered environmental process, which could be completed over a longer period of time while pursuing funding for further studies and construction of the Corridor.

5.1.6 Alternatives Update (2017)

As the NSCS progressed, changes were made to the proposed alternatives subsequent to agency and public outreach and publication of the ASR. As a result, ADOT, in coordination with FHWA, opened a comment period to solicit input on the new action corridor alternatives. The comment period was open from November 14 to December 14, 2017.

Since the ASR was presented in late 2014, some of the proposed alternatives were modified to avoid sensitive resources. In the fall of 2017, those modified action corridor alternatives were presented for public review through an online mapping and comment tool, accessed from the study website: https://www.azdot.gov/planning/transportation-studies/north-south-corridor-study. Cooperating and participating agencies—which include federal, state, and local agencies and Native American tribes—were invited to fill out a corridor preference form to provide input on their preferences regarding the revised alternatives.

During the 30-day comment period (November 14 to December 14, 2017), the online mapping tool allowed users to drop a pin and comment on a specific area, or to provide general comments on the action corridor alternatives. All comments received by December 14, 2017, were considered during preparation of the *Corridor Selection Report*, which is included in Appendix C, *Alternatives Screening*, of this DEIS (see Appendix A, *Agency and Public Comments*, of the report) to incorporate this phase of the public outreach effort into the study.

Comments are accepted at any time during all phases of this study. The website mapping tool is still available, and comments can be provided by email, letter, or telephone using the contact information noted on the study website.

5.1.6.1 Notification

In addition to the study website, which included the online mapping tool, an email blast was sent to stakeholders listed in ADOT's GovDelivery system, and a press release was sent to statewide news organizations on November 14, 2017. Members of the study team answered individual questions from some of the people who provided comments by phone or email, depending on the nature of the comment.

5.1.6.2 Summary of Participation

The number of participants was tracked based on the participation method used. The online mapping and comment tool used an automated spreadsheet to record website comments received. Emailed comments were received at the study email address (northsouth@azdot.gov), and completed comment forms were submitted to ADOT by U.S. mail.

At the cooperating and participating agency meeting held on December 14, 2017, agencies were invited to provide feedback on their preferred alternative through a survey form. A total of 14 agency replies were received, included survey forms and emailed comments (see Appendix C, *Alternatives Screening*, for more detail regarding the agency preferences).

Table 5.1-10 shows the number of participants during the 30-day comment period, organized by participation method. Note that the cumulative total does not represent "unique" participants (for example, a single person could comment multiple times and use multiple methods).

Table 5.1-10. Alternatives update public participation

Participation method	Number of participants
Email	25
Online map tool comments	203
Online comment form	74
Written comments	3
Total	**305**

Public Comments

Members of the public provided comments related to the following issues:

- general comments on the action corridor alternatives, including perceived benefits or disadvantages (133 comments)
- property impacts (91 comments)
- connectivity (41 comments)
- traffic congestion (22 comments)
- environment (20 comments)
- economic development (18 comments)
- roadway design (10 comments)

5.2 Agency Coordination

5.2.1 Cooperating Agencies

At the study's onset in 2010, FHWA asked cooperating agencies to participate during the study's environmental evaluation process. NEPA regulations—codified at 23 CFR § 771.111(d)—require those federal agencies with jurisdiction by law (with permitting or land transfer authority), or with special expertise regarding any potential project-related environmental impact, be invited to serve as cooperating agencies for an EIS. A state or local agency with similar qualifications may also become a cooperating agency. When the potential impacts occur on land of tribal interest, a Native American tribe may become a cooperating agency.

If a federal agency chose to decline cooperating agency status, that agency would automatically be considered a participating agency, whether a written response is provided or not. If a federal agency choses to decline both cooperating and participating status, that agency must submit a written response stating that it (1) has no jurisdiction or authority with respect to the project, (2) has no expertise or information relevant to the project, and (3) does not intend to submit comments on the project.

Cooperating agencies have a higher degree of authority, responsibility, and involvement in the environmental review process. A distinguishing feature of a cooperating agency is that the CEQ regulations (40 CFR § 1501.6) permit a cooperating agency to "assume on request of the lead agency responsibility for developing information and preparing environmental analyses including portions of the environmental impact statement concerning which the cooperating agency has special expertise."

5.2.2 Participating Agencies

Section 6002 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users created a new category of agencies to participate in the EIS environmental review process: federal, state, tribal, regional, and local governmental agencies with an interest in the project. Agencies invited to participate in the environmental review process shall be designated as participating agencies, unless the invited agency informs the lead agency, in writing by the deadline specified in the invitation, that it (1) has no jurisdiction or authority with respect to the project, (2) has no expertise or information relevant to the project, and (3) does not intend to submit comments on the project. Nongovernmental organizations and private entities cannot serve as participating agencies.

State, tribal, and local agencies were asked to respond affirmatively to the invitation to be designated as a participating agency. If an agency failed to respond by the stated deadline or declined the invitation, the agency would be considered a stakeholder and would continue to receive periodic study information.

Tribal governments that were invited to be participating agencies, but chose not to respond, continued to receive invitations to participating agency meetings throughout the duration of the study.

Participating agencies with expertise or jurisdiction relevant to the project may be invited by the lead agency (pursuant to 23 USC § 139) to respond to requests for technical assistance, attend scoping and coordination meetings, attend joint field reviews, provide substantive and early input on issues of concern, review agreements for issues and required technical studies, and review lead agency-approved draft and final environmental documents. (Designation as a participating agency does not indicate project support and does not provide an agency with increased oversight or approval authority above its statutory limits.)

In 2016, with the conversion of the study to a Tier 1 EIS, FHWA sent a letter to the cooperating and participating agencies asking them to reaffirm their role with the study. Table 5.2-1 identities the current lead, cooperating, and participating agencies involved with the Tier 1 EIS. More information regarding the lead, cooperating, and participating agency meetings is in Appendix M.

Table 5.2-1. Lead, cooperating, and participating agencies

Lead agency	
Arizona Department of Transportation	
Cooperating agencies	
Federal Railroad Administration	U.S. Environmental Protection Agency
U.S. Army Corps of Engineers	U.S. Fish and Wildlife Service
U.S. Bureau of Indian Affairs – San Carlos Irrigation Project	Western Area Power Administration
U.S. Bureau of Land Management	Arizona Game and Fish Department
Participating agencies	
Arizona Department of Public Safety	Maricopa County Department of Transportation
Arizona State Historic Preservation Office	National Park Service
Arizona State Land Department	Phoenix-Mesa Gateway Airport Authority
Arizona State Parks	Pinal County
Central Arizona Governments	Salt River Project
City of Apache Junction	San Carlos Apache Tribe
City of Casa Grande	Sun Corridor Metropolitan Planning Organization
City of Coolidge	Town of Florence
City of Eloy	U.S. Bureau of Indian Affairs – Western Regional Office
Flood Control District of Maricopa County	U.S. Bureau of Reclamation
Hopi Tribe	

Source: Arizona Department of Transportation (2017a), agency correspondence

Throughout the study process, ADOT met regularly with NSCS agency stakeholders to discuss the study's progress and obtain feedback. Cooperating and participating agencies were responsible for:

- participating in the scoping process
- providing comments on the purpose and need, study methodologies and criteria, and alternatives

- identifying issues of concern regarding the proposed corridor's impacts on the natural and human environments
- providing timely input on unresolved issues

5.2.3 Tribal Coordination

5.2.3.1 Participating Agency Invitations

The sovereign nations invited to be participating agencies included the Ak-Chin Indian Community, Gila River Indian Community, Hopi Tribe, Pascua Yaqui Tribe, Salt River Pima-Maricopa Indian Community, San Carlos Apache Nation, Tohono O'odham Nation, Tonto Apache Tribe, White Mountain Apache Tribe, and Yavapai-Apache Nation.

5.2.3.2 Outreach

In addition to consultation—which is a process of seeking, discussing, and considering the views of other participants and, where feasible, seeking agreement with them regarding matters arising in the Section 106 process (Protection of Historic Properties, 36 CFR Part 800)—FHWA and ADOT regularly reported on the study's progress at the Four Southern Tribes Cultural Working Group meetings (see Appendix M). Additional information on consultation with the tribes is found in Section 3.14, *Cultural Resources*.

During the outreach associated with the ASR public meetings, the study team reached out to the Four Southern Tribes and offered to conduct the same presentation and provide the opportunity for questions and comments. At the request of the tribes, presentations were made to three of the Gila River Indian Community Districts and to the Tohono O'odham Nation Agricultural/Natural Resources Committee.

State, tribal,[1] and local agencies that were invited to serve as participating agencies, but did not respond to the invitation, and members of the public who expressed an interest in the study and provided contact information, are included in the list of stakeholders and receive email updates and other notifications as the study progresses. Anyone can subscribe to receive email updates at any time by logging on to www.azdot.gov and clicking on the "Subscribe for updates" button on the home page.

5.2.4 Summary of Agency Coordination

Between October 2010 and early 2016, the NEPA EIS phase of the NSCS progressed with developing and evaluating alternatives as documented in the October 2014 ASR; advancing environmental technical studies for the alternatives to the project-level EIS; and preparing conceptual designs to support the EIS. Throughout this time, ADOT and FHWA held regular meetings with cooperating agencies, participating agencies, and key stakeholders, and conducted public meetings, along with individual stakeholder meetings.

In October 2016, at the time the study converted to a Tier 1 EIS, FHWA contacted the cooperating and participating agencies to reaffirm their interest in being engaged in the study process. Since that time, the meetings have been referred to as cooperating and participating agency meetings.

Tables 5.2-2 summarizes the meetings held with the lead agencies, cooperating and participating agencies, and stakeholders. Complete lists of the specific meetings are in Appendix M.

[1] Tribal governments that were invited to be participating agencies but did not respond continued to receive invitations to cooperating and participating agency meetings throughout the duration of the study.

Table 5.2-2. Coordination meetings

Cooperating and participating agencies		Stakeholders	
Year	**Number of meetings**	**Year**	**Number of meetings**
2009	3	2009	1
2010	4	2010	8
2011	4	2011	19
2012	5	2012	19
2013	2	2013	3
2014	2	2014	2
2015	1	2015	17
2016	1	2016	15
2017	3	2017	14
Total	**25**	**Total**	**98**

Cooperating and participating agency meetings were held to communicate information and to solicit input. These meetings were originally referred to as "progress meetings."

5.3 Public Review of the Environmental Impact Statement

5.3.1 Draft Environmental Impact Statement

This Tier 1 DEIS will be released for a public comment period on September 6, 2019. During the comment period, which will run from September 6 to October 29, 2019, three public hearings will be held on the following dates:

Tuesday, October 1, 2019
5:30 to 7:30 p.m.
Florence High School
1000 South Main Street
Florence, Arizona 85132

Thursday, October 10, 2019
5:30 to 7:30 p.m.
Eloy City Hall
595 North C Street, Suite 104
Eloy, Arizona 85131

Tuesday, October 15, 2019
5:30 to 7:30 p.m.
Poston Butte High School
32375 North Gantzel Road
San Tan Valley, Arizona 85143

The document will be available for download from the study website at https://www.azdot.gov/planning/transportation-studies/north-south-corridor-study.

Printed copies of this Tier 1 DEIS will be available for review only and at no charge at:

Eloy Santa Cruz Library
1000 North Main Street
Eloy, Arizona 85131
520.466.3814

Apache Junction Public Library
1177 North Idaho Road
Apache Junction, Arizona 85119
480.474.8558

Coolidge Public Library
160 West Central Avenue
Coolidge, Arizona 85128
520.723.6030

Queen Creek Library
21802 South Ellsworth Road
Queen Creek, Arizona 85142
602.652.3000

Florence Community Library
778 North Main Street
Florence, AZ 85132
520.868.7500

This Tier 1 DEIS will be sent to cooperating and participating agencies, and notification for review of the DEIS will be advertised in local newspapers, including:

- *Arizona Republic*
- *Gila River Indian News*
- *Prensa Arizona* (Spanish-language)
- *Tri-Valley Dispatch*

The publication and comment period for this Tier 1 DEIS, along with the public hearings, will also be announced through news releases, email updates, social media, website updates, mailers, etc.

5.3.2 Final Environmental Impact Statement/Record of Decision

After the comment period for this Tier 1 DEIS, the study team will review the comments received, conduct additional analyses as needed, and revise the DEIS to address the comments. An FEIS will be prepared and issued in combination with a ROD. The ROD will represent ADOT's final decision on the project. Transcripts of the public hearings and comments gathered on this Tier 1 DEIS will be included in the combined FEIS/ROD, along with responses to the comments received.

A Notice of Availability for the FEIS/ROD will be published in the *Federal Register*. This information will also be published in local newspapers, and will be posted on the study website. Email notification will be sent to cooperating and participating agencies, stakeholders, and those on the study distribution list. The FEIS/ROD will be available for review at several locations and on the study website at https://www.azdot.gov/planning/transportation-studies/north-south-corridor-study. There is no comment period associated with the release of the combined FEIS/ROD.

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6 Evaluation of Alternatives

Chapter 3, *Affected Environment and Environmental Consequences*, discusses the existing environmental conditions in the study area and the potential effects of the action corridor alternatives under consideration on the environment. Based on the results presented in Chapter 3 and in Chapter 4, *Indirect and Cumulative Impacts*, across all resource areas and based on stakeholder input, this chapter discusses how the study team screened the action corridor alternatives to identify a preferred corridor.

6.1 Evaluation Criteria and Performance Measures

Transportation and environmental effects of the No-Action Alternative and the action corridor alternatives were assessed in each segment of the Corridor at a level of detail sufficient to inform a decision regarding a preferred corridor from US 60 to I-10. The criteria used to evaluate the No-Action Alternative and the action corridor alternatives were based on the information developed in Chapters 3 and 4, with the addition of stakeholder input. The criteria were divided into six categories (Table 6.1-1). This information is summarized in the *Corridor Selection Report* (in Appendix C, *Alternatives Screening*). The *Corridor Selection Report* provides details regarding the various performance measures evaluated and the specific evaluation scale applied. Both the criteria and the initial evaluation results were reviewed with the cooperating and participating agencies; the evaluation criteria were finalized with their input.

6.1.1 Risk Approach to Evaluation

At this Tier 1 EIS level, with the exact location of the Tier 2 study alignment and project footprint unknown, the environmental impact assessment was based largely on qualitative analyses. Therefore, a risk-assessment approach was used to determine the likelihood of adverse impacts in the 1,500 foot-wide corridors.

Generally speaking, a five-value evaluation scale was applied to each performance measure that was individually defined for each measure, depending on the type of impact under consideration, as described below:

1. High degree of benefit to or no risk of impacts; resource is not present in the Corridor
2. Some benefit to or minimal risk of impacts; resource may be present but impacts are not likely
3. No effect or low risk of impacts; resource may be present but impacts likely avoided
4. Some adverse impact or moderate risk of impacts; resource present and impacts may occur
5. Substantial adverse impact or high risk of impacts; resource present and impacts are likely unavoidable

6.1.2 Evaluation Categories

For each action corridor alternative, the *Corridor Selection Report* considered six evaluation categories: (1) transportation and traffic operations, (2) land use planning, (3) human environment, (4) built environment, (5) natural environment, and (6) stakeholder input. The first five categories, described in Table 6.1-1, are related to the transportation and environmental analyses discussed in Chapters 3 and 4 and are primarily qualitative in nature. A quantitative approach was taken for resources where sufficient data were found to support a robust comparison of action corridor alternatives.

Table 6.1-1. Evaluation categories and performance measures used to compare action corridor alternatives

Evaluation category	Performance measures
Transportation and traffic operations	• average weekday traffic volumes on each action corridor alternative in 2040 • level of service on each action corridor alternative in 2040 • service traffic interchange access to regionally significant routes in 2040 • local access issues • Corridor length • travel times between regional origin and destination locations • reduced travel time through the Corridor compared with No-Action Alternative • arterial street congestion relief, measured by fewer miles of congested arterial streets, compared with No-Action Alternative
Land use planning	• existing land use impacts • compatibility with general and comprehensive plans • impacts on development plans and conceptual plans • impacts associated with property acquisitions • 2040 population, employment, and activity centers within 2 miles of action corridor alternative
Human environment	• impacts on community facilities • impacts on low-income and minority populations • risk of residential, business, and other displacements • risk of change in visual setting • risk of conversion of prime or unique farmlands to transportation use
Built environment	• risk of impacts on existing and planned parks and recreation facilities, including trails • risk of impacts on noise-sensitive receptors • risk of impacts on or from environmental listings of concern • risk of adverse impacts on National Register of Historic Places-eligible archaeological sites or historical districts, buildings, or structures • risk of impacts on existing linear utilities (that is, canals, railroads, transmission lines, pipelines)
Natural environment	• risk of impacts on air quality • risk of land subsidence or earth fissure impacts • risk of impacts on wildlife, wildlife habitat, conservation and wildlife management land, and protected native plants • number of ephemeral drainage crossings • risk of floodplain encroachment and groundwater well relocation • consideration of the potentially least environmentally damaging practicable alternative
Stakeholder input	• preference of Four Southern Tribes (Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation) • preference of cooperating and participating agencies • preference of public, obtained through website and other outreach methods

Note: Corridor = North-South Corridor

The sixth category of the evaluation criteria is the stated preferences of the Native American tribes, cooperating agencies, participating agencies, and other stakeholders, including the public. Throughout the NSCS planning process, these stakeholders have been actively engaged in the study and have provided input at multiple decision points, starting at scoping and continuing through the ASR, and most recently during the development of this Tier 1 DEIS. Jurisdictions and landowners anticipate the projected growth in the study area and have been planning accordingly, including adopting plans for their preferred corridor alignment. The input and stated preferences of these stakeholders are an important consideration in evaluating alternatives and selecting a preferred corridor.

6.2 Comparison of Alternatives

This section compares the No-Action Alternative and the action corridor alternatives, discussed by segment of the study area.

6.2.1 No-Action Alternative

As a baseline for comparison, consistent with NEPA requirements, the study team defined and evaluated a No-Action Alternative that includes all reasonably foreseeable transportation and development projects in the study area.

While the No-Action Alternative would not result in impacts that would be associated with any of the action corridor alternatives, as discussed in Chapters 3 and 4, it would result in adverse impacts because the need for a high-capacity transportation corridor would be unmet. Between 2015 and 2040, the daily total VMT in the study area would increase from 5 million to 12.6 million, and the daily total VHT would increase from approximately 110,000 to over 370,000. These increases would result in more miles of congested roadways in the study area, from 47 in 2015 to 185 in 2040. Without the proposed action, numerous regionally significant routes in the study area would operate at an unacceptable LOS, with many routes operating at LOS F. Moreover, the absence of the proposed action would limit circulation and access in the study area as land uses are converted from undeveloped and low-density agriculture and a rural development pattern to higher-density residential neighborhoods, commercial centers with new job opportunities, and additional community and public facilities to serve the new neighborhoods.

The No-Action Alternative would not meet the proposed action’s purpose and need because it would not provide the necessary transportation mobility, circulation, and access needs to accommodate the projected population and employment growth in the study area.

6.2.2 Action Corridor Alternatives

The results of the analyses presented in Chapters 3 and 4, the evaluation matrix included in the *Corridor Selection Report* (Appendix C, *Alternatives Screening*), and additional input from stakeholders are summarized in the subsections below for the action corridor alternatives, by segment.

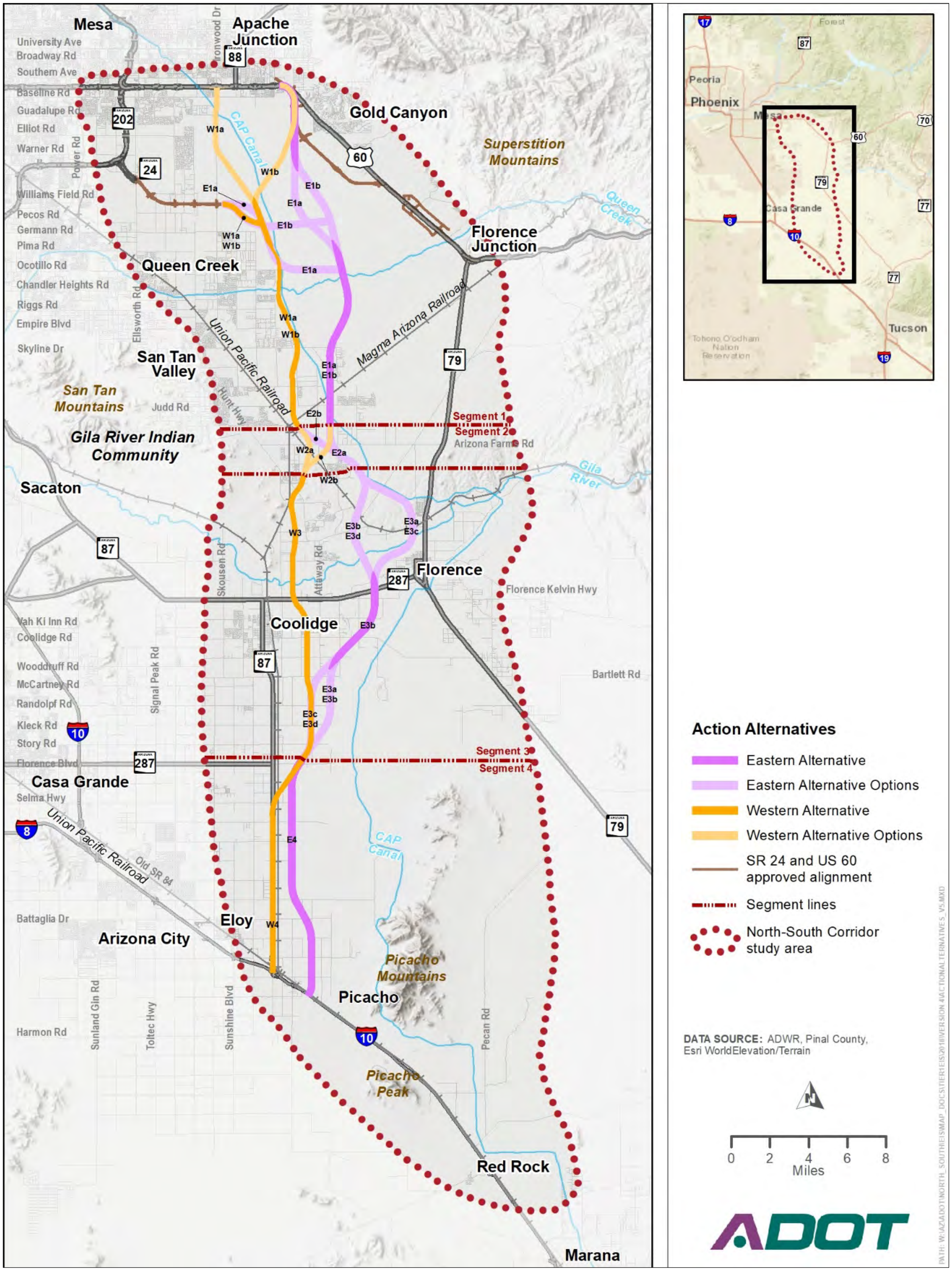
Focusing on performance measures helped determine to what degree each action corridor alternative would meet the proposed action’s purpose and need, as described in Chapter 1.

In addition, Section 3.19, *Section 4(f) and Section 6(f) Resources*, contains sufficient data to inform an assessment of the risk of using Section 4(f) resources. Data collected through the planning process, including information in cultural resource reports prepared for the study for review and concurrence by SHPO for compliance with Section 106 of the NHPA, have informed the development and refinement of action corridor alternatives in this Tier 1 phase.

Similarly, Section 3.13, *Waters of the United States*, contains sufficient information regarding potential impacts on jurisdictional Waters to assess the risk of significant impacts that may trigger the need for an individual permit under Section 404 of the CWA and, consequently, the requirement that ADOT select the LEDPA.

Figure 6.2-1 shows the action corridor alternatives, and the following sections summarize the evaluation of the action corridor alternatives based on the criteria for each performance area, by segment.

Figure 6.2-1. Action corridor alternatives, by segment



6.2.2.1 Segment 1

Four action corridor alternatives (E1a, E1b, W1a, and W1b) are under consideration in Segment 1, and a summary of how the alternatives perform in comparison with each other is presented below for each of the six evaluation categories.

Transportation and Traffic Operations

As modeled, average weekday traffic volumes would be greatest with the W1a Alternative, and less with the eastern connection with US 60 (that is, with E1a, E1b, and W1b). While each of the action corridor alternatives would have a positive effect by reducing regional traffic congestion, the W1a Alternative would result in the greatest reduction in regional congestion, followed by W1b and E1a/E1b (no discernable difference exists between E1a and E1b). The W1a Alternative would require constructing collector and distributor roads to carry local traffic on Ironwood Drive, resulting in a wider freeway footprint to maintain freeway, local road, and traffic interchange operations. This would create a substantial barrier to east-to-west traffic through the area. The E1a, E1b, and W1b Alternatives would necessitate the development of Elliot Road to facilitate local access to the facility (currently, no plans exist to extend Elliot Road east of the CAP Canal), adding to the cost of these alternatives.

Excluding the SR 24 connection, the E1a, E1b, W1a, and W1b Alternatives are similar in length (19, 18.7, 18.8, and 19.1 miles, respectively). The SR 24 connections vary substantially between alternatives, with the W1a and W1b Alternatives being the shortest (at 2.35 and 2.36 miles, respectively), followed by the E1b Alternative at 5.93 miles, and the E1a Alternative being the longest at 8 miles. Shorter alternatives provide faster travel times for through Corridor drivers (although, the number of through-trips for the Corridor is relatively small).

Land Use Planning

Segment 1 jurisdictions' general plans are supportive of a North-South Freeway facility, which is referenced without identifying a preferred alternative.

All action corridor alternatives would be compatible with future land uses because they all cross areas planned for residential or business land uses. Of the alternatives, the W1a Alternative provides access to the largest existing and anticipated population, employment, and activity centers. Most land east of the CAP Canal is owned by ASLD, which has developed conceptual plans for this area, known as Superstition Vistas. Projections for the area are not reflected in the 2040 planning horizon as documented in the State Demographer's projections; however, the Superstition Vistas Conceptual Plan notes that anywhere from 250,000 to 1 million people may live there in the future. The Rittenhouse Army Heliport (an active military training facility) would be affected by the E1a, W1a, and W1b Alternatives.

Human Environment

The W1a Alternative would have the greatest potential impact on residential properties. The W1b Alternative would avoid many of the potential W1a Alternative residential impacts at US 60; however, it would have the same potential impacts on single-family homes as the E1a and E1b Alternatives at the US 60 juncture, with additional potential impacts south of the SR 24 connection. The E1a and E1b Alternatives would have the fewest potential residential impacts. A Tier 2 alignment, developed to avoid impacts to the extent possible, would affect fewer properties. A system traffic interchange at Ironwood Drive with the W1a Alternative would likely require the acquisition of nonresidential property as well, whereas the connection with the E1a, E1b, and W1b Alternatives east of Goldfield Road may have less of a potential impact on nonresidential properties.

Regarding social conditions, the E1a, E1b, and W1b Alternatives have the potential to affect substantially fewer community facilities than the W1a Alternative. However, the E1a, W1a, and W1b Alternatives risk affecting access to and use of the Rittenhouse Army Heliport, while the E1b Alternative would not. The E1a and E1b Alternatives would have little effect on identified low-income and minority populations. The W1a and W1b Alternatives both would result in potential disproportionately high and adverse effects on minority and low-income populations. The E1a and E1b Alternatives would result in a moderate risk of impacts on farmland, while the W1a and W1b Alternatives would result in a high risk of farmland impacts.

Built Environment

In Segment 1, all of the action corridor alternatives would have a high risk of impacts on existing or planned parks and recreational facilities. The E1a, E1b, and W1b Alternatives would affect the planned expansion area of Silly Mountain Park; however, the actual impacts of a Tier 2 alignment may avoid impacts on the park since planning documents for the park identify a future transportation facility through the park (see Section 3.5, *Parkland and Recreational Facilities*). The W1a Alternative would directly affect a golf course along Ironwood Drive at the system traffic interchange with US 60, and trails that cross the alternative. All the action corridor alternatives have a moderate risk of impacts on trails; however, potential impacts may be avoided or minimized during Tier 2 studies.

The W1a Alternative would result in a high risk of noise impacts based on existing land uses; a low risk of noise impacts is associated with the E1a, E1b, and W1b Alternatives.

Regarding cultural resources, the W1a and W1b Alternatives would result in a high risk of impacts on archaeological sites and no risk of impacts on historical districts, buildings, or structures. The E1a and E1b Alternatives would result in a minimal risk of impacts on known archaeological sites and no risk of impacts on historical districts, buildings, or structures.

Natural Environment

The W1a and W1b Alternatives have a high risk of land subsidence or earth fissure impacts, while the E1a and E1b Alternatives have a moderate risk of these impacts. Regarding biological resources, the E1a and E1b Alternatives would affect wildlife slightly more than the W1a and W1b Alternatives (moderate versus low risk, respectively); however, a moderate risk of impacts on wildlife habitat is associated with all alternatives. The E1b and W1b Alternatives would cross flood control structures, resulting in potential impacts on mesquite/shrub habitat that is not unique and that could be mitigated. Therefore, between the E1a and E1b Alternatives, virtually no difference exists in potential adverse impacts on biological resources. The E1b and W1b Alternatives would result in moderate risks of impacts on conservation and wildlife management land, while the other two alternatives would present no risk to these resources. All the action corridor alternatives have a high risk of impacts on protected native plants.

The E1b and W1a Alternatives would have a moderate risk of floodplain encroachment, and the E1a and W1b Alternatives would have a low risk. The W1a and W1b Alternatives would result in a moderate risk of groundwater impacts, while the E1a and E1b Alternatives would have no groundwater impact risk. All action corridor alternatives cross ephemeral washes, freshwater (livestock) ponds, Queen Creek, and the CAP Canal, some of which may be considered jurisdictional Waters during Tier 2 studies. The W1a and W1b Alternatives each cross several unnamed canals.

Stakeholder Input

In 2017, the Four Southern Tribes (Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O’odham Nation) noted that they were not supportive of the Corridor; however, if an action corridor alternative were selected, their preference among the alternatives was identified during a series of meetings held in May 2017. In Segment 1, the Four Southern Tribes preferred the E1a Alternative.

Additional input was solicited from the public and the cooperating and participating agencies as part of the public outreach conducted in November and December of 2017. Of the 10 agencies that submitted preferences in Segment 1, 6 identified the W1a Alternative as preferred, 3 identified the E1b Alternative as preferred, and 1 identified the W1b Alternative as preferred. The public input provided no consensus regarding the Segment 1 alternatives, with the greatest preference for the W1a Alternative (40 positive comments), followed closely by E1b (39 positive comments). Opposition was greatest for the W1b Alternative (42 negative comments), followed by W1a (35 negative comments).

6.2.2.2 Segment 2

Four action corridor alternatives (E2a, E2b, W2a, and W2b) are under consideration in Segment 2, and a summary of how the alternatives perform in comparison with each other is presented below for each of the six evaluation categories.

Transportation and Traffic Operations

The alternatives in Segment 2 primarily serve as connectors between the Eastern and Western Alternatives, with the E2a and E2b Alternatives providing the eastern connections to Segment 3 and the W2a and W2b Alternatives providing the western connections to Segment 3. The W2a Alternative, at 2.6 miles, is the shortest alternative. The E2b Alternative is the longest alternative, at 3.7 miles.

Land Use Planning

The Town of Florence *2020 General Plan* future land use map identifies the Town's preferred alternative for the proposed action in Segment 2 as the E2a Alternative; this was later reaffirmed in the Town of Florence Resolution 1490-14 (December 2014, see Appendix A, *Agency Coordination*).

In Segment 2, the alternatives are close to each other, with few variations in existing land uses within 2 miles. The E2b Alternative is closest to the most employment centers. None of the alternatives is close to many homes or activity centers. All the alternatives would affect planned and conceptual development plans in Segment 2, although the E2a and W2a Alternatives would minimize such impacts by following a more north-to-south alignment through the area as opposed to the E2b and W2b Alternatives, which cross east-to-west through the area.

Human Environment

In Segment 2, the risk of impacts on community facilities is low because no community facilities would be affected; however, the action corridor alternatives may affect populations with minority concentrations (note that the census geographies do not allow differentiation of the alternatives in Segment 2). No homes or businesses are at risk of displacement in Segment 2. A moderate risk of farmland impacts is associated with all the alternatives.

Built Environment

The W2a and W2b Alternatives would result in a moderate risk of impacts on existing or planned parks and trails because they cross the proposed Copper Basin Railroad Trail and may trigger Section 4(f) impacts, whereas the E2a and E2b Alternatives would result in a low risk to these facilities. No noise impacts on sensitive receptors are associated with any of the Segment 2 alternatives. No known cultural resources would be affected in Segment 2.

Natural Environment

All alternatives in Segment 2 would have a minimal risk of land subsidence or earth fissure impacts. All alternatives have a low risk of impacts on wildlife and wildlife habitat, a minimal risk of impacts on protected native plants, a minimal number of ephemeral drainage crossings, and no risk of floodplain encroachment.

Stakeholder Input

Of the six agencies that submitted preferences in Segment 2, the E2a Alternative was preferred by three, the W2a Alternative was preferred by two, and the E2b Alternative was preferred by one. In Segment 2, the Four Southern Tribes preferred the W2b Alternative. The public input provided no consensus regarding the Segment 2 alternatives, with the E2a Alternative receiving the most support (12 positive comments) and the most opposition (7 negative comments).

6.2.2.3 Segment 3

Five action corridor alternatives (E3a, E3b, E3c, E3d, and W3) are under consideration in Segment 3, and a summary of how the alternatives perform in comparison with each other is presented below for each of the six evaluation categories.

Transportation and Traffic Operations

As modeled, average weekday traffic volumes with the action corridor alternatives in Segment 3 are greatest with the W3 Alternative and less with the E3a, E3b, E3c, and E3d Alternatives. While any of the alternatives would reduce regional congestion, the W3 Alternative would result in the greatest reduction, followed by, in order, the E3b, E3d, E3a, and E3c Alternatives. The W3 Alternative is the shortest (15 miles), while the Eastern Alternatives range from nearly 10 percent longer (E3b and E3d) to 23 percent longer (E3a and E3c), resulting in longer travel times for through Corridor drivers (when evaluating the Corridor length, it is worth noting that the number of through-trips for the Corridor is estimated to be a small percentage of all trips along the Corridor).

Land Use Planning

The City of Coolidge *General Plan* identifies the E3a or E3b Alternative (with modifications) as the City's preferred alternative. The Town of Florence *2020 General Plan* identifies the E3a Alternative (with modifications) as the Town's preferred alternative. Land use planning in the area is most consistent with the E3a Alternative, which is generally consistent with the Town of Florence's *2020 General Plan*. The Town has worked with landowners in the area to plan around a conceptual corridor, and the Town Council has passed a resolution supporting the E3a Alternative (December 2014, see Appendix A, *Agency Coordination*).

The W3 Alternative is closest to the biggest existing population and a high number of activity centers within 2 miles. Given their proximity to Florence, the E3a and E3c Alternatives are closest to a substantially high number of existing activity centers, and the E3c Alternative captures the most existing employment in the segment. The City of Coolidge has submitted agency stakeholder comments opposing the W3 Alternative, which is described as inconsistent with the City's adopted general plan and development plans that are planned throughout the alternative. While all alternatives cross areas planned for residential growth, the E3a, E3b, E3c, and E3d Alternatives would provide the most direct access to large planned commercial and industrial centers in the study area.

Human Environment

In Segment 3, the E3c and E3d Alternatives would perform best with regard to social conditions—with either benefits to or no effects on community facilities and minority and low-income populations. The E3a and E3c Alternatives would enhance access to community facilities in Florence for areas to the north and for other neighboring communities, whereas no community facilities would be affected by or benefit directly from the E3b or E3d Alternatives. The W3 Alternative would reduce access to an existing community church and would result in the greatest potential adverse impacts on minority and low-income populations. The E3a and E3b Alternatives have the potential to affect the greatest number of homes in Segment 3, whereas the E3c Alternative, E3d Alternative, and the W3 Alternative have a lower risk of impacts on residences.

Each of the Segment 3 alternatives would affect active or anticipated sand and gravel mining operations near the Gila River, with the E3b and E3d Alternatives also affecting the western end of the Florence Copper mine. All alternatives have a high risk of impacts on farmland.

Built Environment

In Segment 3, the Eastern Alternatives would have a moderate risk of impacts on existing and planned parks and recreational facilities, and the Western Alternative would have a higher risk of impacts on these facilities. The W3 Alternative would likely affect a portion of the Pinal County Existing Multiuse Trail Corridor that runs adjacent to the Pima Lateral Canal in Coolidge.

The E3a and E3b Alternatives would have a moderate risk of noise impacts, whereas the E3c, E3d, and W3 Alternatives would have a low risk of noise impacts.

All alternatives in Segment 3 have a moderate risk of impacts on archaeological resources, while the W3 Alternative would have a low risk of impacts on known historic districts, buildings, or structures. The Southern Pacific Railroad Wellton-Phoenix-Eloy Line intersects the W3 Alternative. The Southern Pacific Railroad Mesa-Winkelman Line intersects the E3a, E3b, E3c, and E3d Alternatives. The North Side Canal intersects the E3a, E3b, E3c, and E3d Alternatives. The Pima Lateral Canal intersects the E3a, E3b, E3c, E3d, and W3 Alternatives. The Kenilworth Elementary School, a historic property, extends 400 feet into the W3 Alternative.

Natural Environment

All alternatives in Segment 3 have a high risk of land subsidence or earth fissure impacts. Regarding biological resources, the impacts are mostly the same for all Segment 3 alternatives: a moderate risk of impacts on wildlife, wildlife habitat, and protected native plants, and no risk of impacts on conservation and wildlife management land. The E3a and E3c Alternatives have a high risk of floodplain encroachment, while the E3b and E3d Alternatives have a moderate risk and the W3 Alternative has a low risk.

The E3a, E3c, E3d, and W3 Alternatives would result in a moderate number of ephemeral drainage crossings, whereas the E3b Alternative would result in a low number of crossings. All action corridor alternatives also cross the Gila River and several unnamed canals and either freshwater, livestock, or other ponds.

Stakeholder Input

Of the eight agencies that provided preferences in Segment 3, the E3a Alternative was preferred by four agencies, the E3b Alternative was preferred by three agencies, the W3 and E3c Alternatives were each supported by two agencies, and the E3d Alternative was preferred by one agency (note that several agencies identified multiple preferred alternatives in the same segment). In Segment 3, the Four Southern Tribes preferred the W3 Alternative. The public input on the Segment 3 alternatives resulted in the E3a Alternative receiving the most support (23 positive comments), followed by E3c (17 positive comments). Opposition was consistent across all Segment 3 alternatives (3 negative comments for each).

6.2.2.4 Segment 4

Two action corridor alternatives (E4 and W4) are under consideration in Segment 4, and a summary of how the alternatives perform in comparison with each other is presented below for each of the six evaluation categories.

Transportation and Traffic Operations

As modeled, average weekday traffic volumes on the Segment 4 alternatives are greatest with the W4 Alternative, the difference being a function of whether the Corridor is east or west in Segment 1 (the W1a Alternative would generate the most traffic in Segment 4, while the E1a and E1b Alternatives would generate the least traffic in Segment 4). The W4 Alternative is 11.7 miles long, while the E4 Alternative is 12.8 miles long. Where the W4 Alternative is coincident with SR 87, access would need to be provided to properties along the route.

Land Use Planning

The City of Coolidge has identified a preferred alternative in its *2025 General Plan* that is similar to the E4 Alternative. The Eloy *2010 General Plan Update* Circulation Element map shows the City's preferred alternative as the W4 Alternative.

In Segment 4, both alternatives are within 2 miles of moderate population and employment; however, the W4 Alternative is near more activity centers because it is closer to the developed parts of Eloy. The City of Coolidge anticipates the development of the Inland Port Arizona and Pinal Logistics Park east of SR 87 in its incorporated area.

Human Environment

Both Segment 4 alternatives would adversely affect community facilities, but the W4 Alternative would also adversely affect low-income and minority populations. The W4 Alternative would have a moderate risk of both residential and business displacements, with 57 homes and 7 businesses located in the corridor. The E4 Alternative would have a minimal and low risk of residential and business displacements, with 3 homes and 1 business in the corridor. The number of affected properties would likely be less with the actual alignment developed during Tier 2 studies. Both alternatives have a high risk of farmland impacts.

Built Environment

In Segment 4, both alternatives would have a moderate risk of impacts on existing and planned parks and recreational facilities. The W4 Alternative would have a moderate risk of noise impacts, whereas the E4 Alternative would have a minimal risk of noise impacts. Both alternatives would have a moderate risk of impacts on archaeological resources. However, the W4 Alternative would have a moderate risk of impacts on known historic districts, buildings, or structures, while the E4 Alternative would have no risk. The Southern Pacific Railroad Main Line Sunset Route intersects the E4 and W4 Alternatives. The Southern Pacific Railroad Wellton-Phoenix-Eloy Line intersects the W4 Alternative. The Casa Grande Canal intersects the E4 and W4 Alternatives. The Florence-Casa Grande Canal Extension intersects the E4 and W4 Alternatives. The El Paso Natural Gas Pipeline No. 1007 intersects the E4 and W4 Alternatives.

Natural Environment

Both alternatives in Segment 4 would have a high risk of land subsidence or earth fissure impacts. The biological conditions are about the same, with both alternatives having a low risk of impacts on wildlife, wildlife habitat, conservation and wildlife management land, and protected plant species. Also, both

Segment 4 alternatives would have a minimal number of ephemeral drainage and other crossings of potentially jurisdictional Waters. The E4 Alternative would have a moderate risk of floodplain encroachment, while the W4 Alternative would have no risk of floodplain encroachment.

Stakeholder Input

Of the five agencies that provided preferences in Segment 4, the E4 Alternative was preferred by three agencies and the W4 Alternative was preferred by two agencies. The Four Southern Tribes did not identify a preferred alternative in Segment 4. In Segment 4, the greatest public preference and opposition was registered for the W4 Alternative (12 positive comments and 2 negative comments), compared with the E4 Alternative, which received 7 positive comments and 1 negative comment.

6.2.2.5 Summary

Table 6.2-1 provides a summary comparison of the action corridor alternatives, by segment.

Table 6.2-1. Summary comparison of land use and environmental impacts of the action corridor alternatives, by segment

Segment	Action corridor alternative	Discussion
Land use planning		
Segment 1	E1a	• Positive: compatible with future land uses because it would cross areas planned for residential or business development • Positive: would provide access to large proposed developments, such as Superstition Vistas • Negative: would affect operations of Rittenhouse Army Heliport
	E1b	• Positive: compatible with future land uses because it would cross areas planned for residential or business development • Positive: would provide access to large proposed developments, such as Superstition Vistas
	W1a	• Positive: compatible with future land uses because it would cross areas planned for residential or business development • Positive: would provide access to the largest existing and anticipated population, employment, and activity centers • Negative: would affect operations of Rittenhouse Army Heliport
	W1b	• Positive: compatible with future land uses because it would cross areas planned for residential or business development • Negative: would affect operations of Rittenhouse Army Heliport
Segment 2	E2a	• Positive: most closely aligns with Town of Florence *General Plan* and with Resolution 1490-14 • Positive: minimal impact on planned development by following a more north-to-south alignment
	E2b	• Positive: would be closest to the most employment centers • Negative: larger impact on planned development by following a diagonal alignment through area
	W2a	• Positive: minimal impact on planned development by following a more north-to-south alignment
	W2b	• Negative: larger impact on planned development by following a diagonal alignment through area

Table 6.2-1. Summary comparison of land use and environmental impacts of the action corridor alternatives, by segment

Segment	Action corridor alternative	Discussion
Land use planning (continued)		
Segment 3	E3a	• Positive: most consistent with City of Coolidge and Town of Florence *General Plans* • Positive: most consistent with land use planning in the area • Positive: closest to a substantially high number of existing activity centers • Positive: would provide access to large planned commercial and industrial centers in the area
	E3b	• Positive: consistent with City of Coolidge *General Plan* • Positive: would provide access to large planned commercial and industrial centers in the area
	E3c	• Positive: closest to a substantially high number of existing activity centers • Positive: would capture the most existing employment in the segment • Positive: would provide access to large planned commercial and industrial centers in the area
	E3d	• Positive: would provide access to large planned commercial and industrial centers in the area
	W3	• Positive: would be closest to the biggest existing population and the most activity centers • Negative: inconsistent with City of Coolidge and Town of Florence *General Plans*
Segment 4	E4	• Positive: most consistent with City of Coolidge *General Plan* • Positive: would be closest to planned Inland Port Arizona and Pinal Logistics Park
	W4	• Positive: most consistent with City of Eloy *General Plan* • Positive: near more activity centers close to the developed parts of Eloy
Human environment		
Segment 1	E1a	• Positive: would affect fewest existing residential properties • Negative: risk of affecting access to and use of the Rittenhouse Army Heliport • Positive: little effect on identified low-income and minority populations • Negative: moderate risk of farmland impacts
	E1b	• Positive: would affect fewest existing residential properties • Positive: little effect on identified low-income and minority populations • Negative: moderate risk of farmland impacts
	W1a	• Negative: greatest potential impact on residential and nonresidential properties • Negative: would affect the most community facilities • Negative: risk of affecting access to and use of the Rittenhouse Army Heliport • Negative: potential disproportionately high and adverse effects on minority and low-income populations • Negative: high risk of farmland impacts
	W1b	• Negative: would affect more existing residential properties than Eastern Alternatives • Negative: risk of affecting access to and use of the Rittenhouse Army Heliport • Negative: potential disproportionately high and adverse effects on minority and low-income populations • Negative: high risk of farmland impacts
Segment 2	E2a E2b W2a W2b	• Positive: for all alternatives, no risk of impacts on community facilities • Positive: for all alternatives, no risk of impacts on existing residential or commercial properties • Negative: for all alternatives, may affect populations with minority concentrations • Negative: for all alternatives, moderate risk of farmland impacts

Table 6.2-1. Summary comparison of land use and environmental impacts of the action corridor alternatives, by segment

Segment	Action corridor alternative	Discussion
Human environment (continued)		
Segment 3	E3a	• Positive: would enhance access to community facilities in Florence • Negative: would affect the most residential properties • Negative: would affect active or anticipated sand and gravel mines near the Gila River • Negative: high risk of farmland impacts
	E3b	• Positive: would have no effects on access to community facilities • Negative: would affect the most residential properties • Negative: would affect active or anticipated sand and gravel mines near the Gila River • Negative: would affect Florence Copper mine • Negative: high risk of farmland impacts
	E3c	• Positive: would enhance access to community facilities in Florence • Positive: low risk of disproportionately high and adverse impacts on minority and low-income populations • Positive: lower risk of impacts on residential properties • Negative: would affect active or anticipated sand and gravel mines near the Gila River • Negative: high risk of farmland impacts
	E3d	• Positive: would have no effects on access to community facilities • Positive: low risk of disproportionately high and adverse impacts on minority and low-income populations • Positive: lower risk of impacts on residential properties • Negative: would affect active or anticipated sand and gravel mines near the Gila River • Negative: would affect Florence Copper mine • Negative: high risk of farmland impacts
	W3	• Positive: lower risk of impacts on residential properties • Negative: would reduce access to an existing community church • Negative: greatest potential for disproportionately high and adverse impacts on minority and low-income populations • Negative: would affect active or anticipated sand and gravel mines near the Gila River • Negative: high risk of farmland impacts
Segment 4	E4	• Positive: minimal and low risk of residential and business displacements • Negative: would adversely affect community facilities • Negative: high risk of farmland impacts
	W4	• Negative: would adversely affect community facilities • Negative: potential for disproportionately high and adverse impacts on minority and low-income populations • Negative: moderate risk of both residential and business displacements • Negative: high risk of farmland impacts

Table 6.2-1. Summary comparison of land use and environmental impacts of the action corridor alternatives, by segment

Segment	Action corridor alternative	Discussion
Built environment		
Segment 1	E1a	• Positive: low risk of noise impacts • Positive: no risk of impacts on historical districts, buildings, or structures • Positive: minimal risk of impacts on known archaeological sites • Negative: high risk of impacts on existing or planned parks and recreational facilities, including expansion area of Silly Mountain Park[a] • Negative: moderate risk of impacts on trails[b]
	E1b	• Positive: low risk of noise impacts • Positive: no risk of impacts on historical districts, buildings, or structures • Positive: minimal risk of impacts on known archaeological sites • Negative: high risk of impacts on existing or planned parks and recreational facilities, including expansion area of Silly Mountain Park[a] • Negative: moderate risk of impacts on trails[b]
	W1a	• Positive: no risk of impacts on historical districts, buildings, or structures • Negative: high risk of impacts on existing or planned parks and recreational facilities, including a golf course • Negative: moderate risk of impacts on trails[b] • Negative: high risk of noise impacts on existing land uses • Negative: high risk of impacts on archaeological sites
	W1b	• Positive: low risk of noise impacts • Positive: no risk of impacts on historical districts, buildings, or structures • Negative: high risk of impacts on existing or planned parks and recreational facilities, including expansion area of Silly Mountain Park[a] • Negative: moderate risk of impacts on trails[b] • Negative: high risk of impacts on archaeological sites
Segment 2	E2a	• Positive: low risk of impacts on existing or planned parks and trails • Positive: no risk of noise impacts • Positive: no risk of impacts on known cultural resources
	E2b	• Positive: low risk of impacts on existing or planned parks and trails • Positive: no risk of noise impacts • Positive: no risk of impacts on known cultural resources
	W2a	• Positive: no risk of noise impacts • Positive: no risk of impacts on known cultural resources • Negative: moderate risk of impacts on existing or planned parks and trails[b]
	W2b	• Positive: no risk of noise impacts • Positive: no risk of impacts on known cultural resources • Negative: moderate risk of impacts on existing or planned parks and trails[b]

Table 6.2-1. Summary comparison of land use and environmental impacts of the action corridor alternatives, by segment

Segment	Action corridor alternative	Discussion
Built environment (continued)		
Segment 3	E3a	• Negative: moderate risk of impacts on existing and planned parks and recreational facilities • Negative: moderate risk of noise impacts • Negative: moderate risk of impacts on archaeological resources • Negative: intersected by the Southern Pacific Railroad Mesa-Winkelman Line, North Side Canal, and Pima Lateral Canal
	E3b	• Negative: moderate risk of impacts on existing and planned parks and recreational facilities • Negative: moderate risk of noise impacts • Negative: moderate risk of impacts on archaeological resources • Negative: intersected by the Southern Pacific Railroad Mesa-Winkelman Line, North Side Canal, and Pima Lateral Canal
	E3c	• Positive: low risk of noise impacts • Negative: moderate risk of impacts on existing and planned parks and recreational facilities • Negative: moderate risk of impacts on archaeological resources • Negative: intersected by the Southern Pacific Railroad Mesa-Winkelman Line, North Side Canal, and Pima Lateral Canal
	E3d	• Positive: low risk of noise impacts • Negative: moderate risk of impacts on existing and planned parks and recreational facilities • Negative: moderate risk of impacts on archaeological resources • Negative: intersected by the Southern Pacific Railroad Mesa-Winkelman Line, North Side Canal, and Pima Lateral Canal
	W3	• Positive: low risk of noise impacts • Positive: low risk of impacts on known historic districts, buildings, or structures • Negative: higher risk of impacts on existing and planned parks and recreational facilities • Negative: moderate risk of impacts on archaeological resources • Negative: intersected by the Southern Pacific Railroad Wellton-Phoenix-Eloy Line and Pima Lateral Canal
Segment 4	E4	• Positive: minimal risk of noise impacts • Positive: no risk of impacts on known historic districts, buildings, or structures • Negative: moderate risk of impacts on existing and planned parks and recreational facilities • Negative: moderate risk of impacts on archaeological resources • Negative: intersected by the Southern Pacific Railroad Main Line Sunset Route, Casa Grande Canal, Florence-Casa Grande Canal Extension, and El Paso Natural Gas Pipeline No. 1007
	W4	• Negative: moderate risk of noise impacts • Negative: moderate risk of impacts on existing and planned parks and recreational facilities • Negative: moderate risk of impacts on archaeological resources • Negative: moderate risk of impacts on known historic districts, buildings, or structures • Negative: intersected by the Southern Pacific Railroad Main Line Sunset Route and Wellton-Phoenix Eloy Line, Casa Grande Canal, Florence-Casa Grande Canal Extension, and El Paso Natural Gas Pipeline No. 1007

Table 6.2-1. Summary comparison of land use and environmental impacts of the action corridor alternatives, by segment

Segment	Action corridor alternative	Discussion
Natural environment		
Segment 1	E1a	• Positive: low risk of floodplain encroachment • Positive: no risk of groundwater impacts • Negative: moderate risk of land subsidence or earth fissure impacts • Negative: moderate risk of impacts on wildlife and wildlife habitat • Negative: high risk of impacts on protected native plants • Negative: would cross ephemeral washes, livestock ponds, Queen Creek, and the Central Arizona Project Canal, which may be considered waters of the United States
	E1b	• Negative: moderate risk of land subsidence or earth fissure impacts • Negative: moderate risk of impacts on wildlife and wildlife habitat • Negative: would cross flood control structures, resulting in potential impacts on mesquite/shrub habitat • Negative: moderate risk of impacts on conservation and wildlife management land • Negative: high risk of impacts on protected native plants • Negative: moderate risk of floodplain encroachment • Negative: would cross ephemeral washes, livestock ponds, Queen Creek, and the Central Arizona Project Canal, which may be considered waters of the United States
	W1a	• Positive: low risk of impacts on wildlife • Negative: high risk of land subsidence or earth fissure impacts • Negative: moderate risk of impacts on wildlife habitat • Negative: high risk of impacts on protected native plants • Negative: moderate risk of floodplain encroachment • Negative: moderate risk of groundwater impacts • Negative: would cross ephemeral washes, livestock ponds, Queen Creek, and the Central Arizona Project Canal, which may be considered waters of the United States • Negative: would cross several unnamed canals
	W1b	• Positive: low risk of impacts on wildlife • Positive: low risk of floodplain encroachment • Negative: high risk of land subsidence or earth fissure impacts • Negative: moderate risk of impacts on wildlife habitat • Negative: would cross flood control structures, resulting in potential impacts on mesquite/shrub habitat • Negative: moderate risk of impacts on conservation and wildlife management land • Negative: high risk of impacts on protected native plants • Negative: moderate risk of groundwater impacts • Negative: would cross ephemeral washes, livestock ponds, Queen Creek, and the Central Arizona Project Canal, which may be considered waters of the United States • Negative: would cross several unnamed canals
Segment 2	E2a	• Positive: for all alternatives, minimal risk of land subsidence or earth fissure impacts • Positive: for all alternatives, low risk of impacts on wildlife and wildlife habitat • Positive: for all alternatives, minimal risk of impacts on protected native plants • Positive: for all alternatives, minimal number of ephemeral drainage crossings
	E2b	
	W2a	
	W2b	

Table 6.2-1. Summary comparison of land use and environmental impacts of the action corridor alternatives, by segment

Segment	Action corridor alternative	Discussion
Natural environment (continued)		
Segment 3	E3a	• Negative: high risk of land subsidence or earth fissure impacts • Negative: moderate risk of impacts on wildlife, wildlife habitat, and protected native plants • Negative: high risk of floodplain encroachment • Negative: moderate number of ephemeral drainage crossings • Negative: would cross Gila River, several unnamed canals, and freshwater/livestock/other ponds
	E3b	• Positive: low number of ephemeral drainage crossings • Negative: high risk of land subsidence or earth fissure impacts • Negative: moderate risk of impacts on wildlife, wildlife habitat, and protected native plants • Negative: moderate risk of floodplain encroachment • Negative: would cross Gila River, several unnamed canals, and freshwater/livestock/other ponds
	E3c	• Negative: high risk of land subsidence or earth fissure impacts • Negative: moderate risk of impacts on wildlife, wildlife habitat, and protected native plants • Negative: high risk of floodplain encroachment • Negative: moderate number of ephemeral drainage crossings • Negative: would cross Gila River, several unnamed canals, and freshwater/livestock/other ponds
	E3d	• Negative: high risk of land subsidence or earth fissure impacts • Negative: moderate risk of impacts on wildlife, wildlife habitat, and protected native plants • Negative: moderate risk of floodplain encroachment • Negative: moderate number of ephemeral drainage crossings • Negative: would cross Gila River, several unnamed canals, and freshwater/livestock/other ponds
	W3	• Positive: low risk of floodplain encroachment • Negative: high risk of land subsidence or earth fissure impacts • Negative: moderate risk of impacts on wildlife, wildlife habitat, and protected native plants • Negative: moderate number of ephemeral drainage crossings • Negative: would cross Gila River, several unnamed canals, and freshwater/livestock/other ponds
Segment 4	E4	• Positive: low risk of impacts on wildlife, wildlife habitat, conservation and wildlife management land, and protected plant species • Positive: minimal number of ephemeral drainage and other crossings of potential waters of the United States • Negative: high risk of land subsidence or earth fissure impacts • Negative: moderate risk of floodplain encroachment
	W4	• Positive: low risk of impacts on wildlife, wildlife habitat, conservation and wildlife management land, and protected plant species • Positive: minimal number of ephemeral drainage and other crossings of potential waters of the United States • Positive: no risk of floodplain encroachment • Negative: high risk of land subsidence or earth fissure impacts

[a] A Tier 2 alignment may avoid impacts on Silly Mountain Park since planning documents for the park identify a future transportation facility through the park (see Section 3.5, *Parkland and Recreational Facilities*).

[b] Impacts on trails may be avoided through local agency coordination and/or design modifications to avoid or minimize impacts.

6.3 Preferred Alternative

This section describes how the study team identified a preferred action corridor alternative in each segment, and how the alternatives from each segment combine to create the preferred corridor alternative.

The identification of a preferred alternative was based on how well each action corridor alternative met the proposed action's purpose and need and to what degree other desirable outcomes would be achieved. To address transportation needs in the study area and the purpose of the proposed action (described in Section 1.5, *Purpose of the Proposed Action*), the preferred alternative should meet the following objectives:

- Enhance the transportation network to accommodate existing and future populations – Consistent with state, regional, and municipal planning initiatives, the new corridor would accommodate anticipated growth in the study area and across the larger region.
- Improve access to future activity centers – The new corridor would benefit the study area's new activity and population centers and undeveloped lands identified for conversion that are in various stages of the local or regional planning processes.
- Improve regional mobility – The new corridor would provide additional roadway capacity ahead of full development build-out to avoid congestion associated with anticipated growth.
- Provide an alternative to avoid congestion on I-10 – The new corridor would provide an unfragmented alternative to I-10 to reduce traffic delays at full development build-out.
- Improve north-to-south connectivity – The new corridor would connect eastern portions of the Phoenix metropolitan area with Pinal County and destinations to the south, including Tucson.
- Integrate the region's transportation network – The new corridor would provide a critical link, currently missing, in the transportation network to provide regional connectivity.

These objectives address the need for a continuous, unfragmented north-to-south transportation facility in the study area to facilitate regional mobility, to improve access to a growing population and activity centers, and to improve connectivity between Phoenix, southeastern Maricopa County, Pinal County, and Tucson. However, the benefits of a new transportation facility must be balanced with potential impacts on the environment and other likely effects. Other desired outcomes of the proposed action to balance likely effects (described in Section 1.6, *Other Desired Outcomes of the Proposed Action*) are as follows:

- protect and enhance the natural environment along the Corridor
- support local and regional land use plans and preservation goals
- support equitable economic opportunities
- complement other planned transportation improvements along new and established corridors in the study area

Finally, the identification of a preferred alternative was informed by a qualitative LEDPA consistency analysis performed for each segment. As described in Section 3.13, *Waters of the United States*, at the Tier 2 phase, if an individual permit is needed, USACE requires that the preferred alternative be the LEDPA with regard to impacts on Waters, in accordance with Section 404(b)(1) of the CWA (33 USC § 1344). At this Tier 1 level, given the unavailability of exact quantities of potential fill, dredging, or other impacts on Waters protected under Section 404 of the CWA, an assessment of the *risks* of impacts on protected Waters has been presented in this draft Tier 1 EIS. Accordingly, a qualitative LEDPA consistency analysis regarding the risk of impacts on protected Waters and other elements of the

Section 404(b)(1) guidelines is presented in the following subsections. Based on the risks identified in this qualitative LEDPA consistency analysis, a preliminary LEDPA determination was made for each segment. Future Tier 2 studies will provide the quantitative analysis necessary to support a final LEDPA determination.

The qualitative LEDPA consistency analysis discussed here is based on the USACE requirement to evaluate alternatives that are practicable and reasonable, outlined in the Section 404(b)(1) guidelines,[1] with consideration of each of the following:

- There must be no practicable alternative to the proposed discharge that would have a less adverse impact on the aquatic ecosystem, so long as the alternative does not have any other significant adverse environmental consequences;
- The project must not cause or contribute to a violation of state water quality standards or toxic effluent standards and must not jeopardize the continued existence of federally listed endangered and threatened species or their critical habitats;
- The project must not cause or contribute to a significant degradation of the Waters; and
- The project must include appropriate and practicable steps to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

6.3.1 Identification of Action Corridor Alternatives in Each Segment

The following sections compare the action corridor alternatives in each segment to identify which is the preferred alternative based on how well it meets the proposed action's objectives (purpose and need) and how it fared after the study team's evaluation, as presented in Section 6.2, *Comparison of Alternatives,* regarding the degree to which each action corridor alternative achieves other desirable outcomes. The following sections also describe the qualitative LEDPA consistency analysis conducted to help inform the identification of a preferred corridor in each segment.

6.3.1.1 Segment 1

Ability to Meet the Project Objectives

Each of the action corridor alternatives would reduce regional congestion, although the W1a Alternative performed better in modeling because it is close to population and employment centers. All the alternatives would meet the purpose and need to improve regional mobility and provide improved connectivity; however, the E1b Alternative would best improve access to future activity centers and ASLD's planned development areas of Lost Dutchman Heights and Superstition Vistas.

Ability to Achieve Other Desired Outcomes of the Project

In Segment 1, the E1b Alternative is the most compatible with land use planning in the area and would result in the lowest risk of impacts on the human environment. Considering the built environment in Segment 1, the E1a and E1b Alternatives would result in fewer impacts than the W1a and W1b Alternatives. Overall, the E1a Alternative would have the lowest potential for impacts on natural resources, considering all potential geological, hydrological, biological, and jurisdictional Waters impacts, although both the E1a and E1b Alternatives would result in a greater risk of impacts on wildlife.

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[1] 40 CFR Part 230 – Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material, Subpart B – Compliance with the Guidelines, § 230.10 – Restrictions on discharge

In Segment 1, the risk of Section 4(f) impacts associated with the W1a and W1b Alternatives is greater than the risk of Section 4(f) impacts associated with the E1a and E1b Alternatives, which have either no impacts on Section 4(f) resources or impacts that may be avoided or minimized during Tier 2 studies.

In considering the other desirable outcomes of the proposed action, the W1a Alternative may better protect the natural environment, with mitigation, compared with the E1a, E1b, and W1b Alternatives. However, the E1a and E1b Alternatives better support regional land use plans and better complement other planned transportation improvements in the study area, with direct access to the US 60 bypass (also provided by the W1b Alternative) and the ability to expand the transportation network to the east as development occurs. All the alternatives support equitable economic opportunities with access to employment and activity centers.

LEDPA Consistency

All action corridor alternatives in Segment 1 would cross potential Waters. Most impacts on the smaller crossings may be avoided or minimized with any of the alternatives, and all alternatives would face similar challenges crossing Queen Creek and the CAP Canal. Applying the four LEDPA considerations described in the introduction to Section 6.3, the following consistency analysis supports the identification of the Segment 1 preliminary LEDPA at this Tier 1 phase as the E1b Alternative:

- The preliminary analysis presented in this Tier 1 EIS and summarized in Section 6.2 shows that there is no practicable alternative with a less adverse impact on the aquatic ecosystem that does not have any other significant adverse environmental consequences. All alternatives would cross multiple drainages as well as Queen Creek and the CAP Canal; however, the E1b Alternative would have a slightly lower risk of impacts on land use planning, the human environment, and the built environment, compared with other alternatives.
- The E1b Alternative would not cause or contribute to violation of state water quality standards or toxic effluent standards and would not jeopardize the continued existence of federally listed endangered and threatened species or their critical habitats. There is a risk to protected native plants that is common among all alternatives.
- With avoidance and minimization measures identified and applied during Tier 2 studies, such as design features to avoid fill or dredging in Waters, the E1b Alternative would not cause or contribute to a significant degradation of Waters.
- The Tier 2 studies will include appropriate and practicable steps to minimize potential adverse impacts of discharge on the aquatic ecosystem.

Preferred Segment Corridor

Considering the proposed action’s objectives, the analysis of potential impacts and the other desirable outcomes, and the LEDPA consistency analysis, the E1b Alternative is the preferred action corridor alternative in Segment 1.

6.3.1.2 Segment 2

Ability to Meet the Project Objectives

Each of the action corridor alternatives in Segment 2 serve as connections between Segments 1 and 3 and would reduce regional congestion. All of the alternatives would meet the project objectives.

Ability to Achieve Other Desired Outcomes of the Project

In Segment 2, the E2a and E2b Alternatives would result in less risk of impacts on environmental resources than the W2a and W2b Alternatives; however, neither the E2a nor E2b Alternative would perform better than the other.

LEDPA Consistency

Since all the action corridor alternatives pose a minimal risk to potential Waters, the better-performing alternatives in Segments 1 and 3 guided the selection of the E2a Alternative to connect the preferred action corridor alternatives in Segments 1 and 3.

Applying the four LEDPA considerations described in the introduction to Section 6.3, the following consistency analysis supports the identification of the Segment 2 preliminary LEDPA at this Tier 1 phase as the E2a Alternative:

- The preliminary analysis presented in this Tier 1 EIS and summarized in Section 6.2 shows that there is no practicable alternative with a less adverse impact on the aquatic ecosystem that does not have any other significant adverse environmental consequences.
- The E2a Alternative would not cause or contribute to violation of state water quality standards or toxic effluent standards and would not jeopardize the continued existence of federally listed endangered and threatened species or their critical habitats. There is a risk to protected native plants that is common among all alternatives.
- The E2a Alternative would not cause or contribute to a significant degradation of Waters.
- The Tier 2 studies will include appropriate and practicable steps to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

Preferred Segment Corridor

Considering the proposed action's objectives, the analysis of potential impacts and the other desirable outcomes, and the LEDPA consistency analysis, the E2a Alternative is the preferred action corridor alternative in Segment 2.

6.3.1.3 Segment 3

Ability to Meet the Project Objectives

Each of the action corridor alternatives in Segment 3 would reduce regional congestion; however, the W3 Alternative would perform better because it is close to population and activity centers, followed by the E3b and E3d Alternatives. All the alternatives would meet the proposed action's purpose and need to improve regional mobility, connectivity, and access to future activity centers.

Ability to Achieve Other Desired Outcomes of the Project

The E3a Alternative is the most compatible with local land use planning, followed closely by the E3c Alternative. The E3b and E3d Alternatives would result in the least risk of impacts on the human environment, while the W3 Alternative would result in somewhat greater impacts. In addition, the risk of Section 4(f) impacts in Segment 3 with the W3 Alternative is higher than with any of the Eastern Alternatives. With regard to impacts on the built environment, each alternative would result in some impacts. Regarding the natural environment, the W3 Alternative would result in fewer impacts than the other alternatives. The adopted general plans of the local jurisdictions directly affected by the alternatives in Segment 3—the City of Coolidge and Town of Florence—support the E3a Alternative.

In considering the other desirable outcomes of the proposed action, all of the Segment 3 alternatives would result in comparable impacts on the natural environment. However, the Eastern Alternatives better support regional land use plans, with better access for planned developments and better support of equitable economic opportunities with access to employment and activity centers in Florence. The Eastern Alternatives complement other planned transportation improvements slightly better with the ability to expand the transportation network to the east as planned development occurs.

LEDPA Consistency

All action corridor alternatives in Segment 3 would cross potentially jurisdictional Waters, including the Gila River, and most impacts at smaller crossings may be avoided or minimized with any of the alternatives. The E3b and E3d Alternatives would have a more direct crossing of the Gila River, resulting in potentially fewer impacts on Waters, and the E3b Alternative would have the fewest drainage crossings. Applying the four LEDPA considerations described in the introduction to Section 6.3, the following consistency analysis supports the identification of the Segment 3 preliminary LEDPA at this Tier 1 phase as the E3b Alternative:

- The preliminary analysis presented in this Tier 1 EIS and summarized in Section 6.2 shows that there is no practicable alternative with less adverse impact on the aquatic ecosystem that does not have any other significant adverse environmental consequences. All alternatives would cross the Gila River; however, the E3b Alternative would have a more direct crossing of the river and fewer crossings of other drainage features.
- The E3b Alternative would not cause nor contribute to violation of state water quality standards or toxic effluent standards and would not jeopardize the continued existence of federally listed endangered and threatened species or their critical habitats. There is a risk to protected native plants that is common among all alternatives.
- With avoidance and minimization measures identified and applied during Tier 2 studies, such as design features to avoid fill or dredging in Waters, the E3b Alternative would not cause or contribute to significant degradation of Waters.
- The Tier 2 studies will includes appropriate and practicable steps to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

Preferred Segment Corridor

Considering the proposed action’s objectives, the analysis of potential impacts and the other desirable outcomes, and the LEDPA consistency analysis, the E3b Alternative is the preferred action corridor alternative in Segment 3.

6.3.1.4 Segment 4

Ability to Meet the Project Objectives

Both alternatives in Segment 4 would meet the proposed action’s purpose and need to improve regional mobility, connectivity, and access to future activity centers.

Ability to Achieve Other Desired Outcomes of the Project

In Segment 4, the E4 Alternative would result in a lower risk of impacts on the human and built environments. Considering the natural environment, neither Segment 4 alternative outperforms the other across all performance measures. The risk of impacts on Section 4(f) properties is higher with the W4 Alternative than with the E4 Alternative.

In considering the other desirable outcomes of the proposed action, both alternatives would similarly protect the natural environment, support equitable economic opportunities, and complement other planned transportation improvements in the study area. However, the E4 Alternative would better support regional land use plans and the preservation of historic structures.

LEDPA Consistency

With regard to jurisdictional Waters, since both action corridor alternatives would have minimal crossings, the LEDPA at this Tier 1 phase may be located within either of Segment 4 alternatives. However, there is higher risk of displacements, as well as impacts on minority and/or low-income populations and historic properties, with the W4 Alternative.

Applying the four LEDPA considerations described in the introduction to Section 6.3, the following consistency analysis supports the identification of the Segment 4 preliminary LEDPA at this Tier 1 phase as the E4 Alternative:

- The preliminary analysis presented in this Tier 1 EIS and summarized in Section 6.2 shows that there is no practicable alternative with less adverse impact on the aquatic ecosystem that does not have any other significant adverse environmental consequences. Both Segment 4 alternatives would have similar impacts on Waters; however, the E4 Alternative has a much lower risk of adverse impacts on the human and built environment.
- The E4 Alternative would not cause nor contribute to violation of state water quality standards or toxic effluent standards and would not jeopardize the continued existence of federally listed endangered and threatened species or their critical habitats, nor protected native plants.
- With avoidance and minimization measures identified and applied during Tier 2 studies, such as design features to avoid fill or dredging in Waters, the E4 Alternative would not cause or contribute to significant degradation of Waters.
- The Tier 2 studies will include appropriate and practicable steps to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

Preferred Segment Corridor

Considering the proposed action's objectives, the analysis of potential impacts and the other desirable outcomes, and the LEDPA consistency analysis, the E4 Alternative is the preferred action corridor alternative in Segment 4.

6.3.2 Identification of Full-length Action Corridor Alternatives

The preceding section provided a segment-by-segment evaluation of the action corridor alternatives, to facilitate an understanding of the environmental impacts of the action corridor alternatives at the segment level. Impacts of the eight full-length action corridor alternatives (and options) result from the combination of impacts described in the segment-by-segment evaluation.

For the eight full-length action corridor alternatives (and options), the following sections provide an end-to-end evaluation of transportation and traffic operations, land use planning, and the human, built, and natural environments. Stakeholder input is also described. The discussion compares the full-length action corridor alternatives to identify which is the preferred alternative based on how well it meets the proposed action's objectives (purpose and need) and how it fared after the study team's evaluation, as presented in Section 6.2, *Comparison of Alternatives*. Additional discussion regarding the degree to which each action corridor alternative achieves the other desirable outcomes is also included.

6.3.2.1 Transportation and Traffic Operations

All of the action corridor alternatives would meet the proposed action's purpose and need by improving transportation and traffic operations throughout the study area. The degree to which the action corridor alternatives address select evaluation criteria, however, varies by alternative. The quickest or most direct end-to-end route was a measured criterion; however, note that most trips in the Corridor are between destinations and are not through-trips. Access to activity centers, areas of existing and future population and employment, and regional connectivity were also considered when comparing the alternatives.

Corridor Length

A comparison of the action corridor alternatives' lengths is presented in Chapter 2, *Alternatives*. The full-length action corridor alternatives and their options result in a range of values. Because the Corridor is anticipated to operate at free-flow conditions (that is, LOS C or better), a shorter alternative results in a shorter travel time from one end of the Corridor to the other. Travel demand modeling of the alternatives shows that only a small number of trips are actually through-trips, with most trips originating in the study area. All of the action corridor alternatives (and options) would result in reduced travel time through the Corridor, relative to 2040 conditions with the No-Action Alternative. Alternative 1 (with W1a) would be the shortest through Corridor trip (48.1 miles north-to-south). Alternative 3 (with W1b, E2b, and E3c) would be the longest through Corridor trip (54 miles north-to-south)—approximately 12 percent longer than Alternative 1 (with W1a).

Average Weekday Traffic Volumes

Average weekday traffic volumes would vary substantially along the extent of each of the full-length action corridor alternatives. In general, the Western Alternatives would draw more traffic, given the closer proximity to existing populations in Queen Creek, Mesa, the San Tan Valley area, and Coolidge. The projected traffic volumes through the Corridor would decrease from north to south, so that in the southern end of the Corridor at I-10, the volumes would be one-tenth the volumes at the northern end. This information is further discussed in Appendix B, *Traffic Information*.

Regional Traffic Congestion

As discussed in Chapter 2, *Alternatives*, all of the full-length action corridor alternatives would improve regional congestion throughout the study area compared with the No-Action Alternative. The amount of regional congestion relief varies by the action corridor alternative (and options). The No-Action Alternative would result in congested conditions for 46 percent of the VMT. Alternative 1 (with W1a) would result in the greatest reduction in congested conditions, with 33 percent of the VMT in congested conditions—a 28 percent reduction of VMT in congested conditions compared with the No-Action Alternative. Similar reductions in congested conditions would result with Alternatives 2, 3, and 4 and their options, with a range of 34 to 35 percent of the VMT in congested conditions. Alternatives 7 and 8 (with options) would result in 39 percent of VMT in congested conditions—still an improvement of 15 percent compared with the VMT in congested conditions with the No-Action Alternative.

6.3.2.2 Land Use Planning

With the exception of Coolidge and Florence, all of the MPAs of jurisdictions affected by the full-length action corridor alternatives are contained within one segment of the study area. Jurisdictions in the northern portion of the study area have not identified a preferred alternative.[2] The Town of Florence's

[2] Any additional input received by ADOT following the *Corridor Selection Report* and public review process in 2017 will be incorporated and considered following the public review of the DEIS and will be included in the FEIS and ROD.

2020 General Plan is generally consistent with Alternatives 6 or 7 (with E3a) in Segment 3. The City of Coolidge's *2025 General Plan* is generally consistent with Alternatives 3 or 7 (with E3a) in Segment 3. In the southern portion of the study area, the City of Eloy's *General Plan* is generally consistent with Alternatives 1, 2, 5, and 6.

Pinal County's *Comprehensive Plan* does not identify a preferred alternative; however, the plan recognizes the important role ASLD will play in development of the county as a result of Superstition Vistas, a 275-square-mile area entirely in Pinal County that is managed by ASLD on behalf of the State Trust beneficiaries. At the northern end of Superstition Vistas is another large ASLD parcel, Lost Dutchman Heights, within the Apache Junction MPA. Alternatives 5 through 8 are generally consistent with the planning for the Lost Dutchman Heights area.

6.3.2.3 Human Environment

Impacts on the human environment for each of the end-to-end action corridor alternatives are discussed as a sum of the parts—meaning the segment-by-segment evaluation of environmental impacts. Alternative 7 would have the lowest risk of impacts on the human environment because it incorporates the Eastern Alternatives in Segments 1, 3, and 4, which have lower risks of impacts on the human environment. Alternative 1 would have the greatest risk of impacts on the human environment because of the inclusion of the Western Alternatives in Segments 1, 3, and 4.

6.3.2.4 Built Environment

As with impacts on the human environment, impacts on the built environment for each of the end-to-end action corridor alternatives are also discussed as a sum of the parts. Alternative 7 would have the lowest risk of impacts on the built environment because it incorporates the Eastern Alternatives in Segments 1, 3, and 4, which have lower risks of impacts on the built environment. Alternative 1 would have the greatest risk of impacts on the built environment because it includes the Western Alternatives in Segments 1, 3, and 4.

6.3.2.5 Natural Environment

For the natural environment, the types of impacts evaluated varied throughout the Corridor's length. Other than earth fissures, none of the impacts are clear differentiators among the alternatives. Earth fissures are present throughout the Corridor; however, Alternatives 5 to 8 would avoid the high risk of earth fissures posed by the alternatives that use the Western Alternative in Segment 1 (Alternatives 1 to 4). A high risk of floodplain encroachment exists with Alternatives 2, 3, 6, and 7 (with E3a and E3c); however, this risk is mitigated when these alternatives are combined with E3b or E3d.

6.3.2.6 Stakeholder Input

Public input did not provide a clear consensus regarding a full-length action corridor alternative preference. Cooperating and participating agencies were asked for their preferences as part of the public input process. The jurisdictions provided responses consistent with their adopted land use plans, but in several instances provided additional information regarding their preferences, or stated preferences regarding alternatives outside of their MPAs (as summarized in Appendix C, *Alternatives Screening*, with the full comments of stakeholders in the appendix to the report). Table 6.3-1 summarizes agency responses received as part of the outreach effort.

Table 6.3-1. Cooperating and participating agency preferences for an action corridor alternative

Agency	Full-length action corridor alternative								Stated preferences
	1	2	3	4	5	6	7	8	
Arizona Game and Fish Department	X								W1a, W2a, W3, W4
Arizona State Land Department							X		E1b, E2a, E3b, E4
City of Apache Junction						X	X		E1b, E2a, E3a; no preference in Segment 4
City of Coolidge			X				X		No preference in Segments 1 and 2; E3a or E3b; E4
City of Eloy	X	X			X	X			No preference in Segments 1, 2, and 3; W4
City of Mesa	X	X	X	X					W1a; no preference in Segments 2, 3, and 4
Flood Control District of Maricopa County									—
Phoenix-Mesa Gateway Airport Authority	X	X	X	X					W1a or W1b; no preference in Segments 2, 3, and 4
Pinal County		X	X						W1b, E2b, E3a or E3c; no preference in Segment 4
Salt River Project						X	X		E1b, E2a, E3a or E3c; no preference in Segment 4
Town of Queen Creek	X	X	X	X					W1a; no preference in Segments 2, 3, and 4
Four Southern Tribes					X			X	E1b, W2b, W3; no preference in Segment 4[a]
U.S. Army Corps of Engineers									—
U.S. Bureau of Land Management									—
U.S. Bureau of Reclamation			X						W1a or W1b; E2a, E2b, or W2a; E3b, E3d, or W3; E4
U.S. Environmental Protection Agency	X								W1a, W2a, W3, W4

Notes: "X" indicated stated preference.

In instances where an agency commented, but did not provide a preference, the cell was left blank.

When preference in Segment 2 was left blank, connecting segment was noted where preferences in Segments 1 and 3 were stated.

Any additional input received by the Arizona Department of Transportation following the *Corridor Selection Report* and public review process in 2017 will be incorporated and considered following the public review of the Draft Environmental Impact Statement and will be included in the Final Environmental Impact Statement and Record of Decision.

[a] During a series of meetings in May 2017, the Four Southern Tribes noted that they preferred the No-Action Alternative; however, if an action corridor alternative is selected, their preference among the action corridor alternatives is noted. Refer to the *Corridor Selection Report, North-South Corridor Study* (in Appendix C, *Alternatives Screening*).

6.3.3 Preferred Corridor Alternative

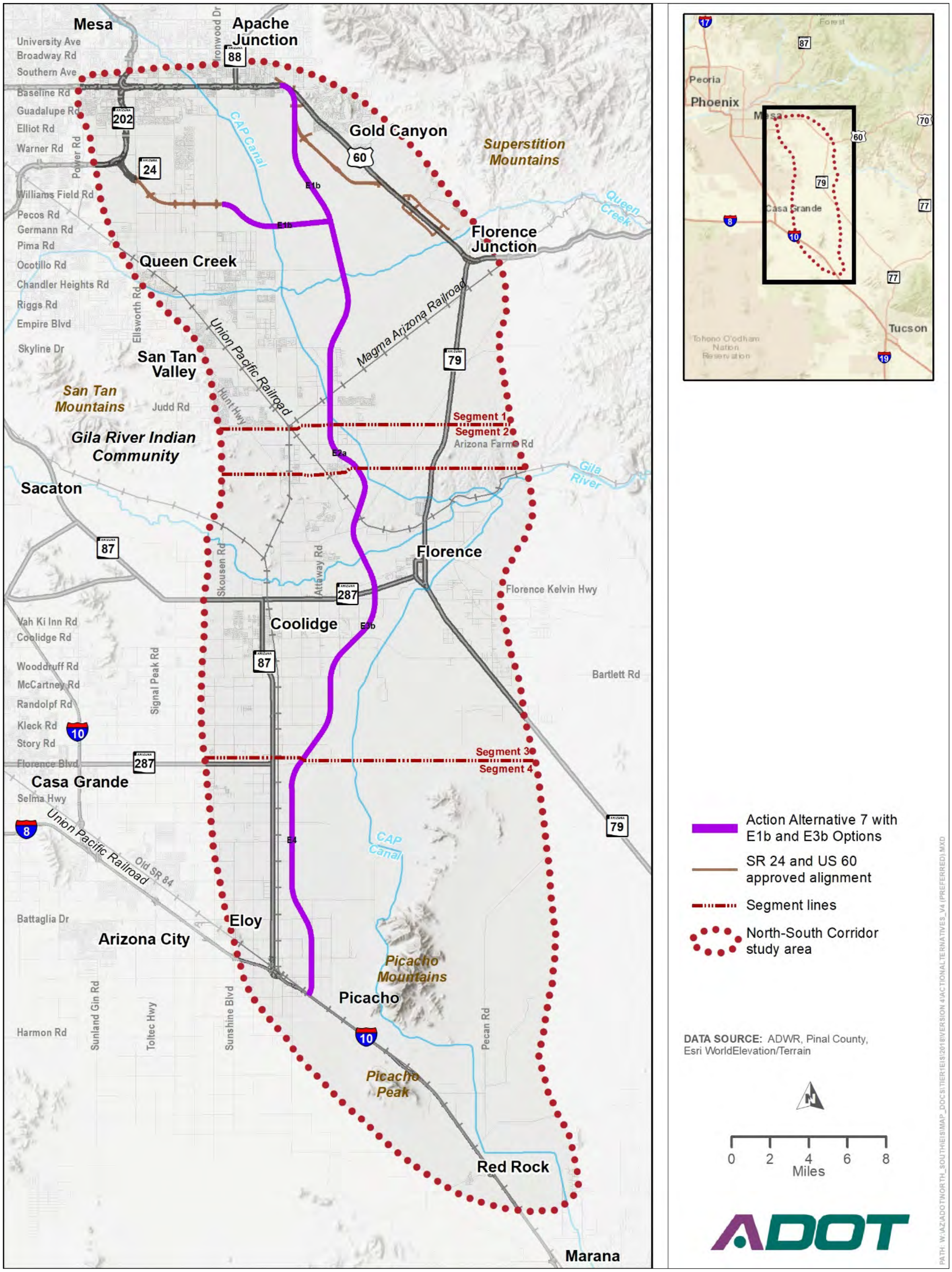
Based on the results of the analyses presented in this Tier 1 DEIS and summarized in Sections 6.2 (*Comparison of Alternatives*), 6.3.1 (*Identification of Action Corridor Alternatives in Each Segment*) by segment, and 6.3.2 (*Identification of Full-length Action Corridor Alternatives*) by full-length alternative, the following action corridor alternatives form the preferred corridor alternative:

- Segment 1 – E1b Alternative
- Segment 2 – E2a Alternative
- Segment 3 – E3b Alternative
- Segment 4 – E4 Alternative

This combination of action corridor alternatives creates Alternative 7, with the E1b and E3b options (as described in Section 2.3.2, *Full-length Action Corridor Alternatives*), and is recommended as the preferred corridor alternative (Figure 6.3-1).

Alternative 7 best meets the proposed action's purpose and need while minimizing adverse effects on the human, built, and natural environments. During Tier 2 studies, when specific alignments are developed, evaluated, and advanced in the current 1,500 foot-wide preferred corridor, all efforts to avoid, minimize, or mitigate adverse impacts would be made.

Figure 6.3-1. Preferred corridor: Alternative 7, with the E1b and E3b options



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8 Preparers

This Tier 1 DEIS was prepared and reviewed by numerous professionals belonging to the study team (Table 8.1-1).

Table 8.1-1. Document preparers

Name	Qualifications and background	Project role and responsibilities
Arizona Department of Transportation		
Asadul (Asad) Karim	MS – Civil Engineering BS – Civil Engineering 15 years of experience	Project manager
Katie Rodriguez	BS – Environmental Science 3 years of experience	Environmental planner III
Carlos Lopez	BSE – Civil Engineering 10 years of experience	Reviewer
Victor Yang	MS – Civil Engineering (Transportation) BS – Electrical and Computer Engineering 24 years of experience	Reviewer
Joshua Fife	MAS – Geographic Information Systems MS – Wildlife Ecology 7 years of experience	Biologist; lead biology reviewer
Jill Heilman	MS – Advanced Osteology, Paleopathology, Funerary Archaeology BA – Anthropology 30 years of experience	Historic preservation specialist
Ivan Racic	BTE – Highway and Urban Transportation Planning BSc – Mechanical Engineering/Motor Vehicles and Mechanics 7 years of experience	Environmental science specialist III; air and noise planner
Beverly Chenausky	MPA – Community and Land Use Planning BS – Geology 19 years of experience	Environmental planning program manager; air and noise manager
Joonwon Joo	PhD – Environmental Design and Planning MEP/MCRP – Transportation and Geographic Information Systems BA – English 10 years of experience	Transportation planner senior; air quality impact analysis
Emily Lester	BS – Conservation Biology and Ecological Sustainability 7 years of experience	Water resources coordinator
Ed Green	AA – Business 28 years of experience	Hazardous materials coordinator
Joanie Cady	MA – Urban and Environmental Planning BA – Urban and Environmental Planning 13 years of experience	Environmental planner IV; program manager
Steven Olmsted	MS – Chemistry, Hazardous Materials/Hazardous Waste 15 years of experience	Environmental planner IV; program manager
Laura Douglas	BA – Broadcast Journalism 22 years of experience	Community relations project manager
Felicia Beltran	MA – Master of Letters BA – Literature 9 years of experience	Civil rights compliance manager; civil rights program compliance

Table 8.1-1. Document preparers

Name	Qualifications and background	Project role and responsibilities
Lucy Schrader	BS – Management 13 years of experience	External civil rights programs administrator; civil rights program compliance
Federal Highway Administration		
Aryan Lirange, PE	BE – Civil Engineering 24 years of experience	Senior oversight; highway and transportation projects
Rebecca Yedlin	JD – Environmental Law 17 years of experience	Senior oversight; National Environmental Policy Act compliance, environmental planning
Tremaine Wilson	MPH – Public Health 5 years of experience	Senior oversight; National Environmental Policy Act compliance, environmental planning
Alan Hansen, PE	BS – Civil Engineering 31 years of experience	Senior oversight; highway and transportation projects
Thomas Deitering, PE	BS – Civil Engineering 20 years of experience	Senior oversight; highway and transportation projects
Ken Davis (retired)	BS – Civil Engineering 44 years of experience	Senior oversight; highway and transportation projects
Mary Frye (retired)	MA – American History 26 years of experience	Senior oversight; National Environmental Policy Act compliance, environmental planning
HDR		
Michael LaBianca	MEP – Environmental Planning BS – Geochemistry 31 years of experience	Consultant project manager; land use and transportation analyses
Cathy LaFata	MUP – Transportation/Environmental Planning BA – Psychology/Mathematics 24 years of experience	Consultant environmental project manager; environmental lead
Jon Baird	BS – Geography 20 years of experience	Senior geographic information system analyst; spatial analyses and figure production
Mark Brodbeck, RPA	MA – Anthropology BA – Anthropology 29 years of experience	Principal investigator; cultural resources
Tracy Goyak	MELP – Environmental Law and Policy BA – Environmental Studies 12 years of experience	Biologist; biological resources and hydrology, floodplains, and water resources
Kelly Kading, CPG	BS – Geology 29 years of experience	Geologist/environmental risk assessor; hazardous waste assessment/Corridor Phase I
Nick LaFronz, PE	MS – Engineering (Soil Mechanics) BS – Engineering (Civil Engineering) 34 years of experience	Geotechnical engineer; topography, geology, and soils reviewer
Gregg Mitchell, PG	BS – Environmental Science 28 years of experience	Geologist; topography, geology, and soils analysis
Ty Morton, PE	MS – Agricultural and Bioresources Engineering BS – Agricultural and Biosystems Engineering 18 years of experience	Civil engineer; groundwater analysis

Table 8.1-1. Document preparers

Name	Qualifications and background	Project role and responsibilities
Laura Paty, RLA	BS – Design Science in Landscape Architecture and Planning 32 years of experience	Landscape architect; visual resources analysis and document development
Susanna Schippers	MA – Language, Reading, and Culture BA – Creating Writing 19 years of experience	Technical editor; document development lead
Kelly Spitzley	MLIS – Masters in Library/Information Science BS – English 12 years of experience	Graphic designer; document graphics
Caitlin Stewart	BA – Anthropology 12 years of experience	Cultural resources specialist; cultural resources
Kurt Watzek	MLA – Landscape Architecture/Environmental Planning BA – Biology 27 years of experience	Biologist; biological resources analysis
Pamela Yonkin	MA – Economics BA – Mathematics 20 years of experience	Economist; economics analysis
AECOM Technical Services, Inc.		
Rodney Bragg	BS – Civil Engineering 24 years of experience	Transportation engineer; Segment 1 corridor options
Nathaniel King	BS – Civil Engineering 9 years of experience	Transportation engineer; Segment 1 corridor options
Dale Wiggins	BS – Civil Engineering 31 years of experience	Transportation engineer; Segment 1 corridor options
Cultural Resource Management Program, Gila River Indian Community		
Kyle Woodson	PhD – Anthropology MA – Anthropology BA – Anthropology 25 years of experience	Program director; traditional cultural property cultural resources
Chris Loendorf	PhD – Anthropology MA – Anthropology BA – Anthropology 25 years of experience	Assistant program director; traditional cultural property cultural resources
Lynn Simon	BS – Animal Science 30 years of experience	Cartography
Kimley-Horn and Associates, Inc.		
Brent Crowther	MS – Civil Engineering BS – Civil Engineering 17 years of experience	Transportation engineer; traffic report
David Tapia	BS – Engineering Technology (Civil) 17 years of experience	Civil engineer; utility report and roadway design
Jason Freitas	MS – Civil Engineering BS – Civil Engineering 4 years of experience	Traffic analyst; traffic report
Mary Rodin	MS – Transportation Engineering BS – Civil Engineering 41 years of experience	Transportation planner; traffic report

Table 8.1-1. Document preparers

Name	Qualifications and background	Project role and responsibilities
Southwest Heritage Research, LLC		
J. Andrew Darling	PhD – Anthropology MA – Anthropology BA – Anthropology 35 years of experience	Principal investigator; traditional cultural property cultural resources
Statistical Research, Inc.		
Eric Eugene Klucas, RPA	PhD – Anthropology 30 years of experience	Principal investigator/project manager; cultural resources
Scott Thompson	MA – History 23 years of experience	Historian and architectural historian; cultural resources
Carrie Gregory	MA – Historic Preservation BA – Anthropology 19 years of experience	Architectural historian; cultural resources
William M. Graves, RPA	PhD – Anthropology 25 years of experience	Principal investigator/project manager; cultural resources
John D. Hall, RPA	BA – Anthropology MA – Archaeology and Heritage 20 years of experience	Project director; cultural resources
Nicholas Hlatky	BA – Anthropology 7 years of experience	Archaeologist; cultural resources
Maria Molina	MFA – Creative Writing BA – Humanities 25 years of experience	Director of publications; cultural resources

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