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 selected 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.

3.1.4 Approach to Identification of the Selected Corridor Alternative

Following the public release of the Tier 1 DEIS and the close of the public comment period, ADOT reviewed all of the comments received (see Appendix N, *Public Hearing*).

Responses to all of the comments received are included in Appendix O, *Agency and Public Comments*. In addition to reviewing and responding to the comments received on the Tier 1 DEIS, information that was used to identify the preferred corridor alternative was verified. In some instances, additional outreach was conducted with commenters to clarify comments and request additional information or supporting documentation. This clarifying information and the comments received were used to inform revisions to the Tier 1 DEIS and to prepare the Tier 1 FEIS and ROD. This process also assisted in validating the basis for identification of the preferred corridor alternative and recommending the selected corridor alternative. Substantive changes to the Tier 1 DEIS are discussed in the prologue to this Tier 1 FEIS and ROD.

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.

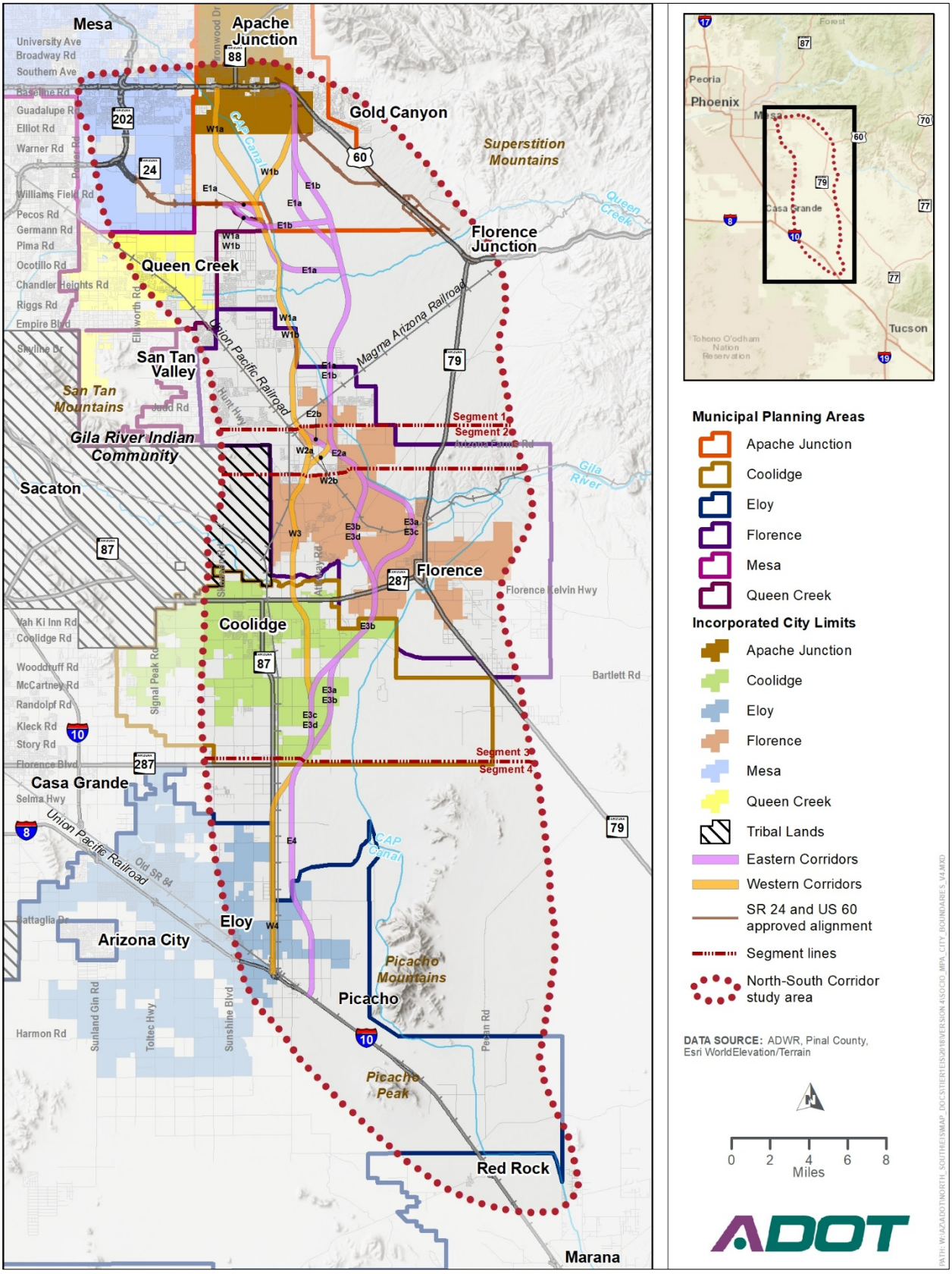
Table 3.2-1. Incorporated, municipal planning, and sovereign nation area of jurisdictions in the study area

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.

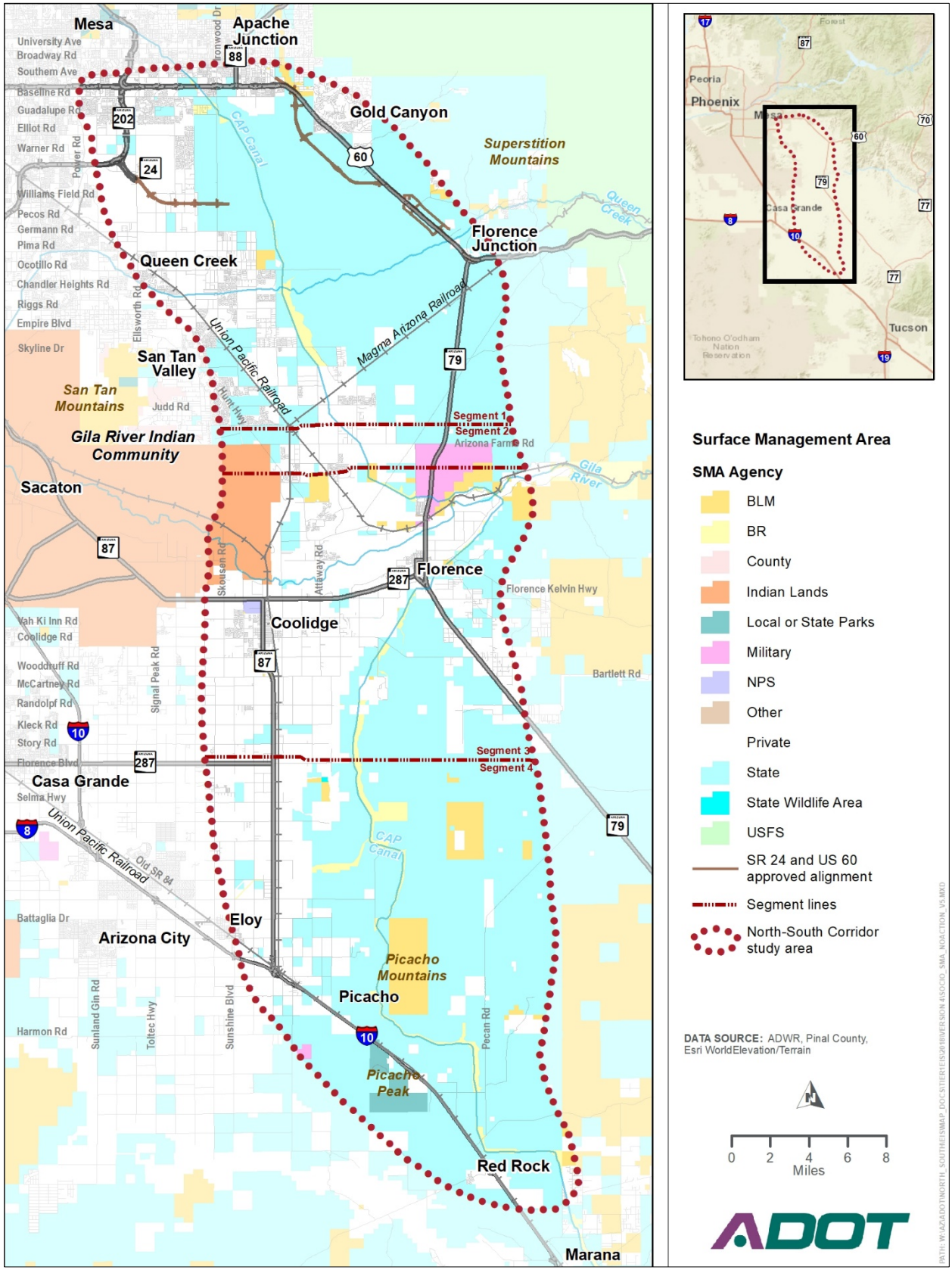
Table 3.2-2. State, federal agency, and sovereign nation existing land ownership and management in the study area, 2015

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**

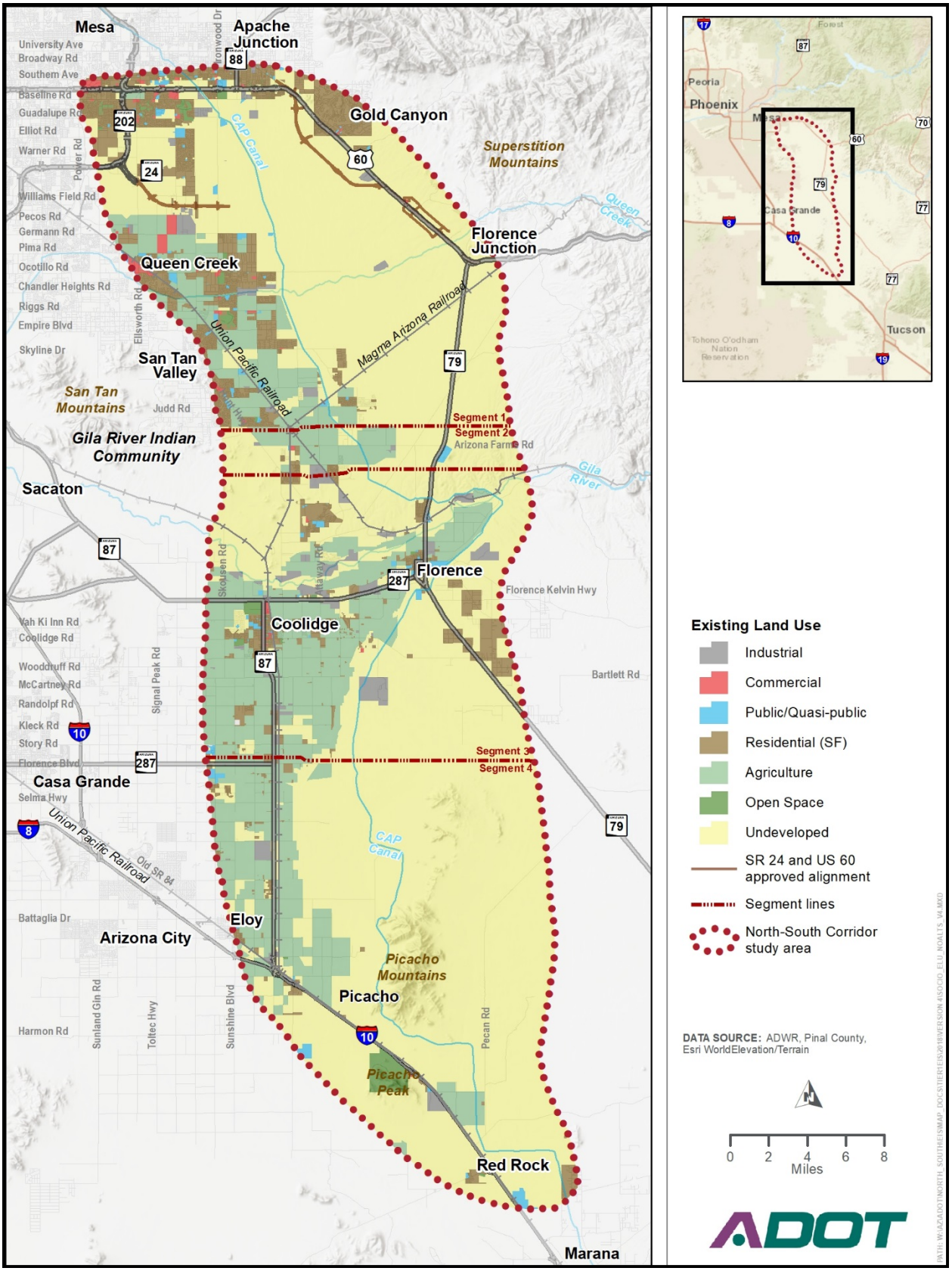
Source: compilation of data from municipal entities and remote sensing, 2016

[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

[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

Pinal County Comprehensive Plan. The vision and strategic direction for Pinal County are outlined in the *2009 Pinal County Comprehensive Plan* (as updated and adopted by the Pinal County Board of Supervisors on November 20, 2019). 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 2019).

San Tan Valley Special Area Plan. The San Tan Valley Special Area Plan (STVSAP) was adopted by the Pinal County Board of Supervisors in late 2018. At that time, the Tier 1 DEIS had been drafted and was under review by the lead agency. The Tier 1 DEIS does not reference the STVSAP, but discussion of the plan has been added here.

The STVSAP is a planning document for the San Tan Valley that focuses on land use, economic development, transportation facilities, utilities, and parks and recreational facilities. It references the same data sources that were used to develop the Tier 1 DEIS, including MAG's population and employment projections and the Pinal County RSRSM as a framework for the region's transportation system (the RSRSM document is discussed in Section 2.1.1, *Transportation Planning and Policy Guidance*).

To assess how the adopted RSRSM transportation system will handle traffic generated by future development upon build out of the San Tan Valley, the STVSAP authors analyzed expected traffic

impacts. This high-level analysis found that the RSRSM primary roadway network, as defined with future widenings and extensions, will provide sufficient capacity to support the estimated trips generated by existing and proposed land uses.

A comparison of the existing roadway network with the STVSAP Figure 6.1, *Circulation Plan*, shows that numerous routes still need to be improved before the RSRSM transportation system will accommodate the traffic generated by development build out (Figure 3.2-4).

Figure 3.2-4. Schematic map showing gaps in the roadway network's capacity, compared with the *San Tan Valley Special Area Plan* circulation map (Figure 6.1 of the plan)

Figure 3.2-4 illustrates the significant roadway improvements needed in the San Tan Valley area to accommodate the substantial, largely residential development that is existing and planned.

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. The tax is currently being challenged in the Arizona courts. Pinal County continues to levy the tax, but is not spending it, pending resolution of the court case (as of September 2020).

Future Land Use

Anticipated future land use in the study area is presented in Table 3.2-4 and Figure 3.2-5. 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.

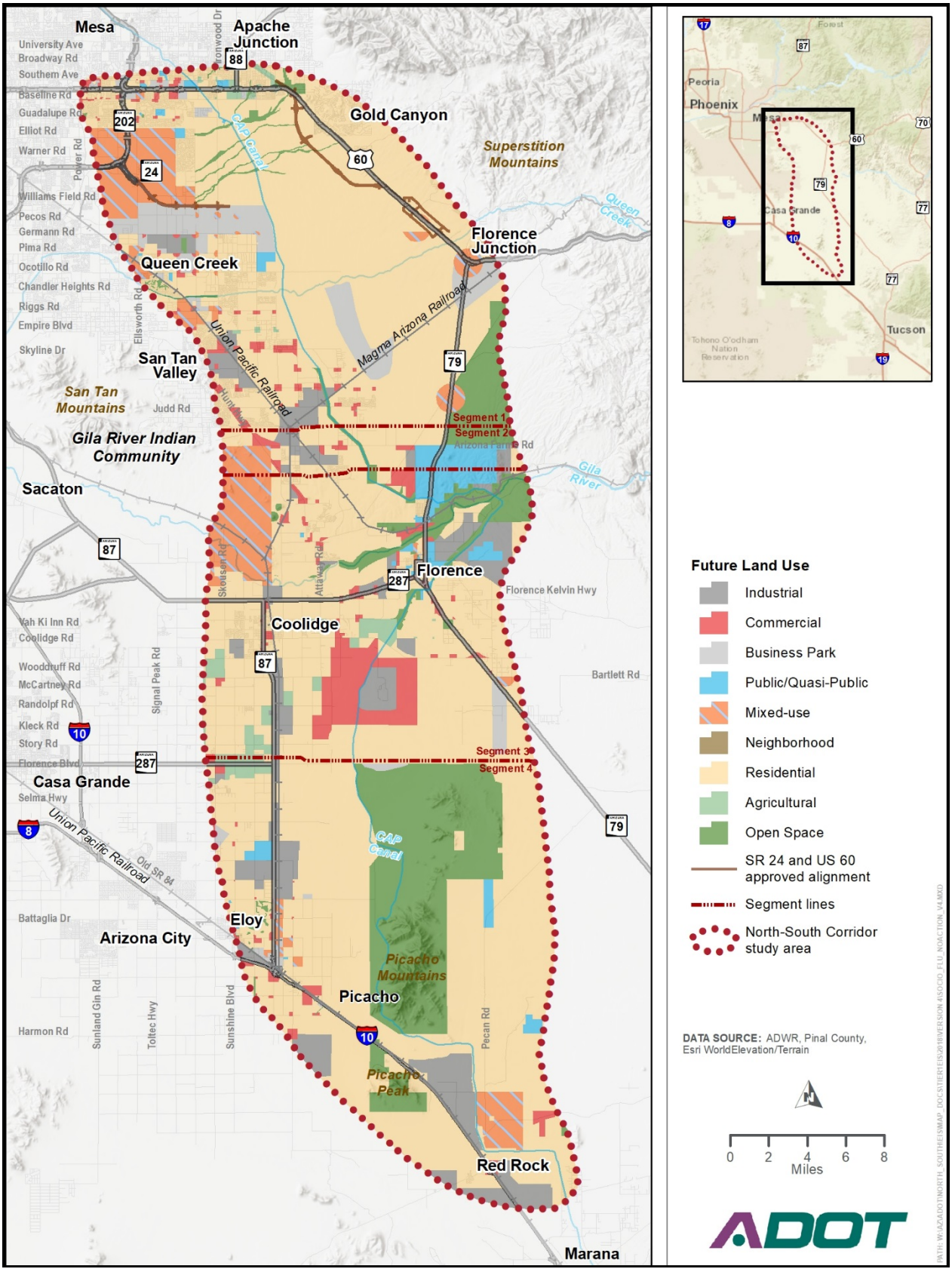
[d] Residential includes single-family and multifamily housing.

[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 3.2-5. 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 3.2-5, and the referenced larger planned developments in the study area are described below and shown in Figure 3.2-6.

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.

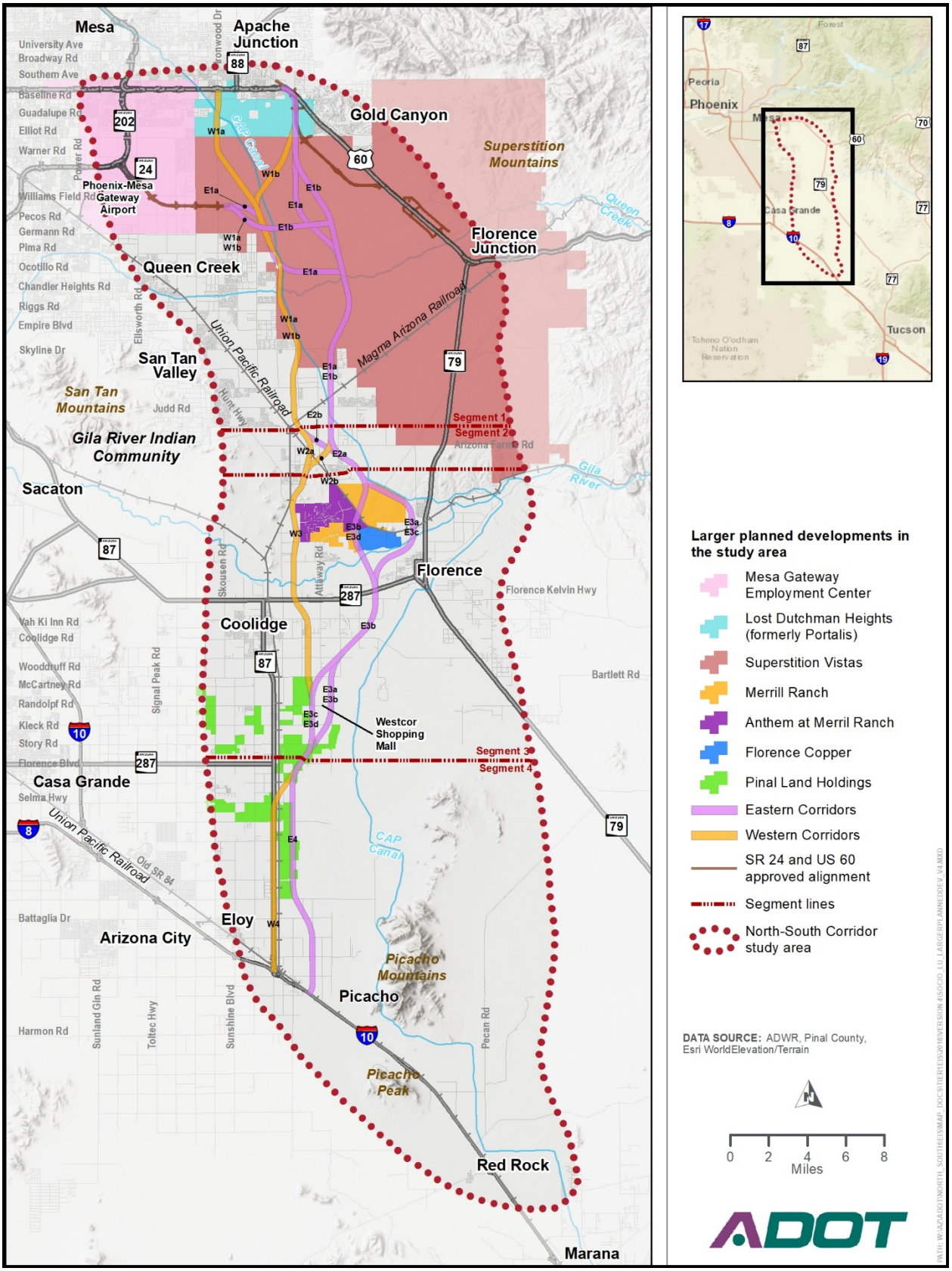
Anthem at Merrill Ranch is a large master-planned community (3,100 acres) of 8,500 housing units within the Florence portion of the study area. At this time, approximately 2,500 single-family housing units have been built.

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 3.2-6. 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 3.2-7.

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 selected alternative prior to constructing the developments.

Figure 3.2-7. Future land use under the action corridor alternatives, 2040

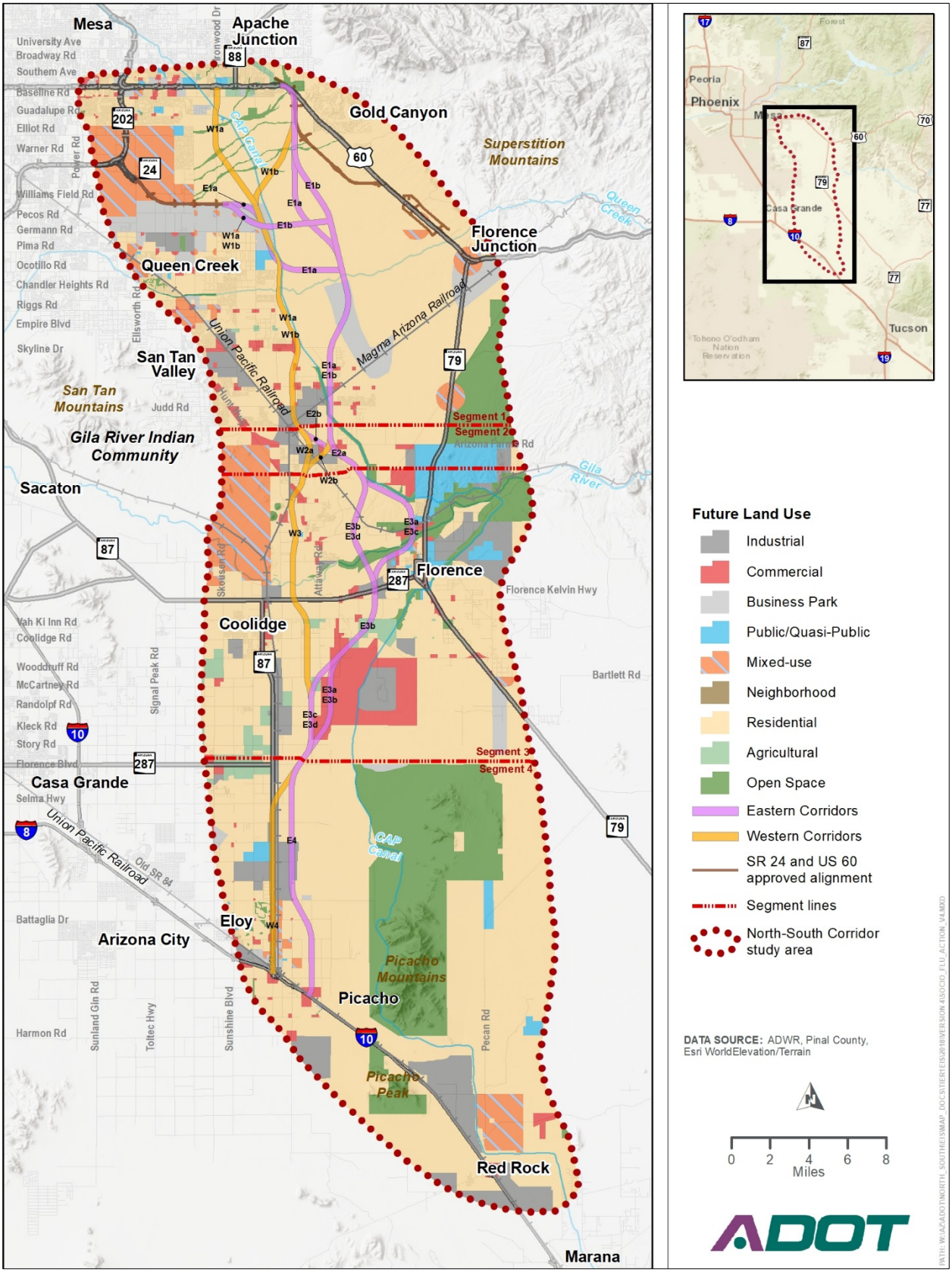


Table 3.2-6. Land use compatibility with the action corridor alternatives

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
	  ○ developing Dolce Vita residential development at US 60 (the development extends less than 400 feet into the 1,500-foot corridor).
	  ○ Rittenhouse Army Heliport.
	  ○ Sonoran Villages planned multifamily development.
	  ○ 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
	  ○ developing Dolce Vita residential development at US 60 (the development extends less than 400 feet into the 1,500-foot corridor).
	  ○ Sonoran Villages planned multifamily development.
	  ○ 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
	  ○ Rittenhouse Army Heliport.
	  ○ planned Quail Run Estates residential subdivision.
	  ○ planned Bella Vista residential subdivision.
	  ○ 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
	  ○ developing Dolce Vita residential development at US 60 (the development extends less than 400 feet into the 1,500-foot corridor).
	  ○ Rittenhouse Army Heliport.
	  ○ planned Quail Run Estates residential subdivision.
	  ○ planned Bella Vista residential subdivision.
	  ○ 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
	  ○ planned Dobson Farms residential subdivision.
	  ○ northeastern corner of the conceptual Arizona Farms residential subdivision.
	  ○ 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).
	  ○ conceptual Paloroso residential subdivision.
	  ○ planned Felix Farms residential subdivision.
	  ○ 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
	  ○ planned Dobson Farms residential subdivision.
	  ○ northeastern corner of the conceptual Arizona Farms residential subdivision.
	  ○ planned regional commercial and high-density residential land on Arizona Farms Road, a potential traffic interchange.
	  ○ conceptual Paloroso residential subdivision.
	  ○ planned Felix Farms residential subdivision.
	  ○ 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
	  ○ planned Dobson Farms residential subdivision.
	  ○ northeastern corner of the conceptual Arizona Farms residential subdivision.
	  ○ conceptual Magic Ranch residential subdivision.

W2b	• Potentially affects the
	  ○ planned Dobson Farms residential subdivision.
	  ○ conceptual Arizona Farms residential subdivision.
	  ○ conceptual Magic Ranch residential subdivision.

Segment 3	

E3a	• Potentially affects the
	  ○ planned Mesquite Trails residential subdivision.
	  ○ northeastern edge of the planned Merrill Ranch residential subdivision where it borders the CAP Canal.
	  ○ planned Heritage Creek Estates residential subdivision.
	  ○ 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.
	  ○ conceptual Dobson/Florence residential subdivision.
	  ○ conceptual Florence Industrial Park on the northern side of SR 287.
	  ○ eastern edge of the planned Urton Farms residential subdivision.
	  ○ planned Sendera residential subdivision.
	  ○ eastern edge of the planned Westcor regional shopping center at the southwestern corner of Bartlett and Wheeler Roads.

E3b	• Potentially affects the
	  ○ planned Mesquite Trails residential subdivision.
	  ○ planned Merrill Ranch residential subdivision north and south of the Hunt Highway.
	  ○ developing Anthem at Merrill Ranch residential subdivision.
	  ○ conceptual Dobson/Florence residential subdivision.
	  ○ conceptual Florence Industrial Park on the northern side of SR 287.
	  ○ eastern edge of the planned Urton Farms residential subdivision.
	  ○ planned Sendera residential subdivision.
	  ○ 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 ○ planned Mesquite Trails residential subdivision. ○ northeastern edge of the planned Merrill Ranch residential subdivision where it borders the CAP Canal. ○ planned Heritage Creek Estates residential subdivision. ○ 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. ○ conceptual Dobson/Florence residential subdivision. ○ conceptual Florence Industrial Park on the northern side of SR 287. ○ eastern edge of the planned Urton Farms residential subdivision. ○ planned Sendera residential subdivision. ○ western edge of the planned Westcor regional shopping center at the southwestern corner of Bartlett and Wheeler Roads. ○ planned Sontesta residential subdivision.
E3d	• Potentially affects the ○ planned Mesquite Trails residential subdivision. ○ planned Merrill Ranch residential subdivision north and south of the Hunt Highway. ○ developing Anthem at Merrill Ranch residential subdivision. ○ conceptual Dobson/Florence residential subdivision. ○ conceptual Florence Industrial Park on the northern side of SR 287. ○ eastern edge of the planned Urton Farms residential subdivision. ○ planned Sendera residential subdivision. ○ western edge of the planned Westcor regional shopping center at the southwestern corner of Bartlett and Wheeler Roads. ○ planned Sontesta residential subdivision.
W3	• Potentially affects the ○ edge of the developing Oasis at Magic Ranch subdivision (no homes are within the alternative corridor footprint). ○ conceptual Magic Ranch residential subdivision. ○ conceptual Twin Peaks residential subdivision. ○ portion of the planned Walker Butte residential subdivision, east of the Southern railroad. ○ developing Anthem at Merrill Ranch residential subdivision. ○ planned Patria residential subdivision. ○ planned Kachina Heights residential subdivision. ○ planned Sontesta residential subdivision.
Segment 4	
E4	• Potentially affects the ○ planned Hanna Picacho residential development. ○ 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 ○ conceptual Bool Eloy 2180 residential development. ○ planned Roberts Resort residential development. ○ planned Pamilla residential development. ○ 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 *2019 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 *2019 Pinal County Comprehensive Plan*; however, it does not specify a preferred alternative.
Pinal County *San Tan Valley Special Area Plan* (2018)[a]	Yes	No	Generally consistent with the Special Area Plan.
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.

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
Town of Florence *2020 General Plan*	Yes	E1a/E1b, E2a, E3a/E3c	Generally consistent with the general plan. 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.
City of Coolidge *2025 General Plan*	Yes	E3a/E3b, E4	Consistent with the general plan. 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	Generally consistent with the general plan. 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

[a] The *San Tan Valley Special Area Plan* was adopted by the Pinal County Board of Supervisors in late 2018. A special area plan expands on the specific elements of a comprehensive plan to be more closely associated with community goals and actions that are specific to a defined area. It effectively acts as a link between implementing the broad policies of a comprehensive plan and providing further guidance to individual development in a particular location.

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 selected 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, U.S. Bureau of Land Management [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.[2] 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.

[2] The *San Tan Valley Special Area Plan* states that the area's roadway network can accommodate traffic at build out, but many of those routes have yet to be developed to arterial standards. Modeling for the NSCS considered only those planned routes that had identified funding for construction in a jurisdiction's adopted plan.

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

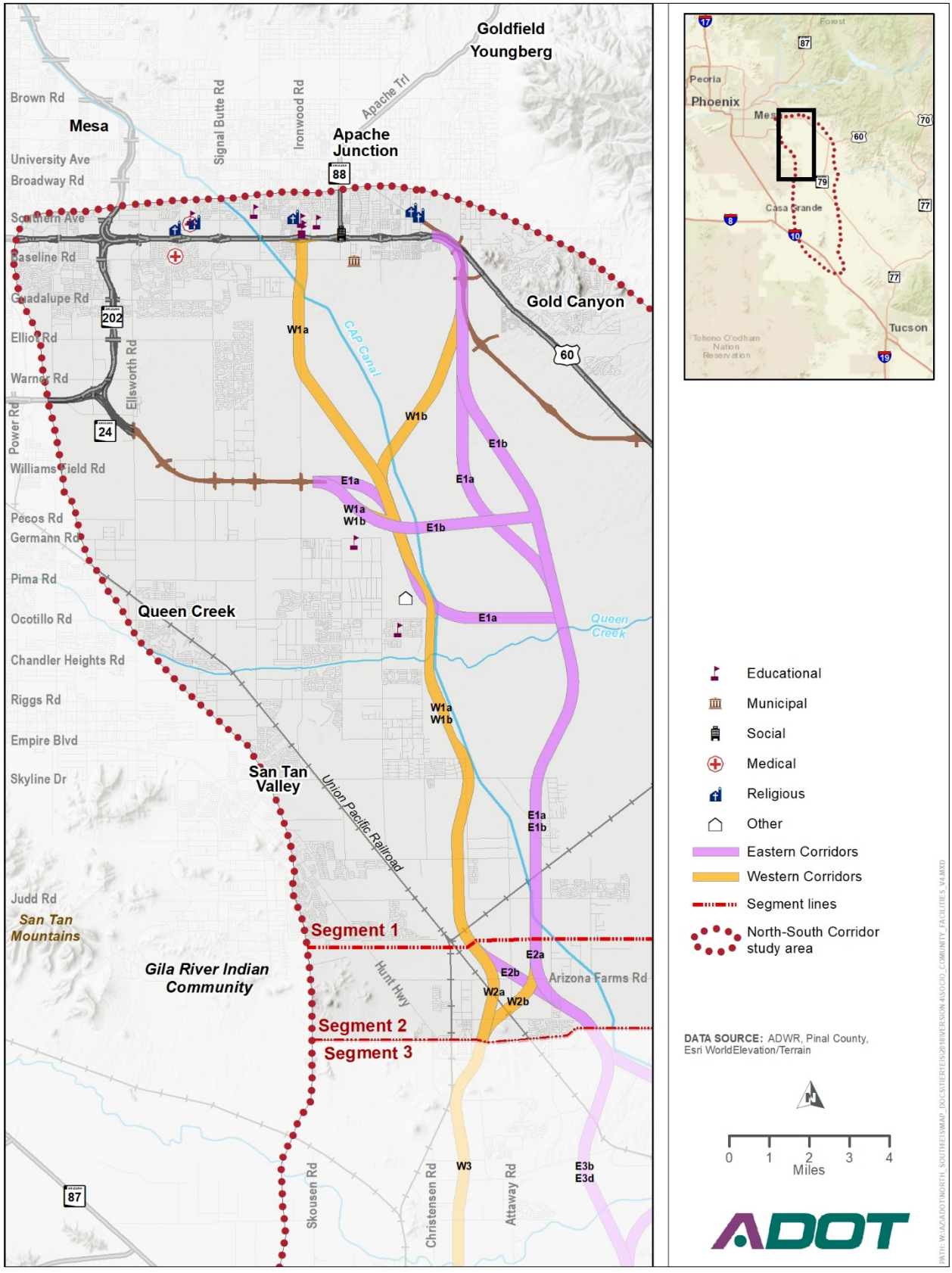
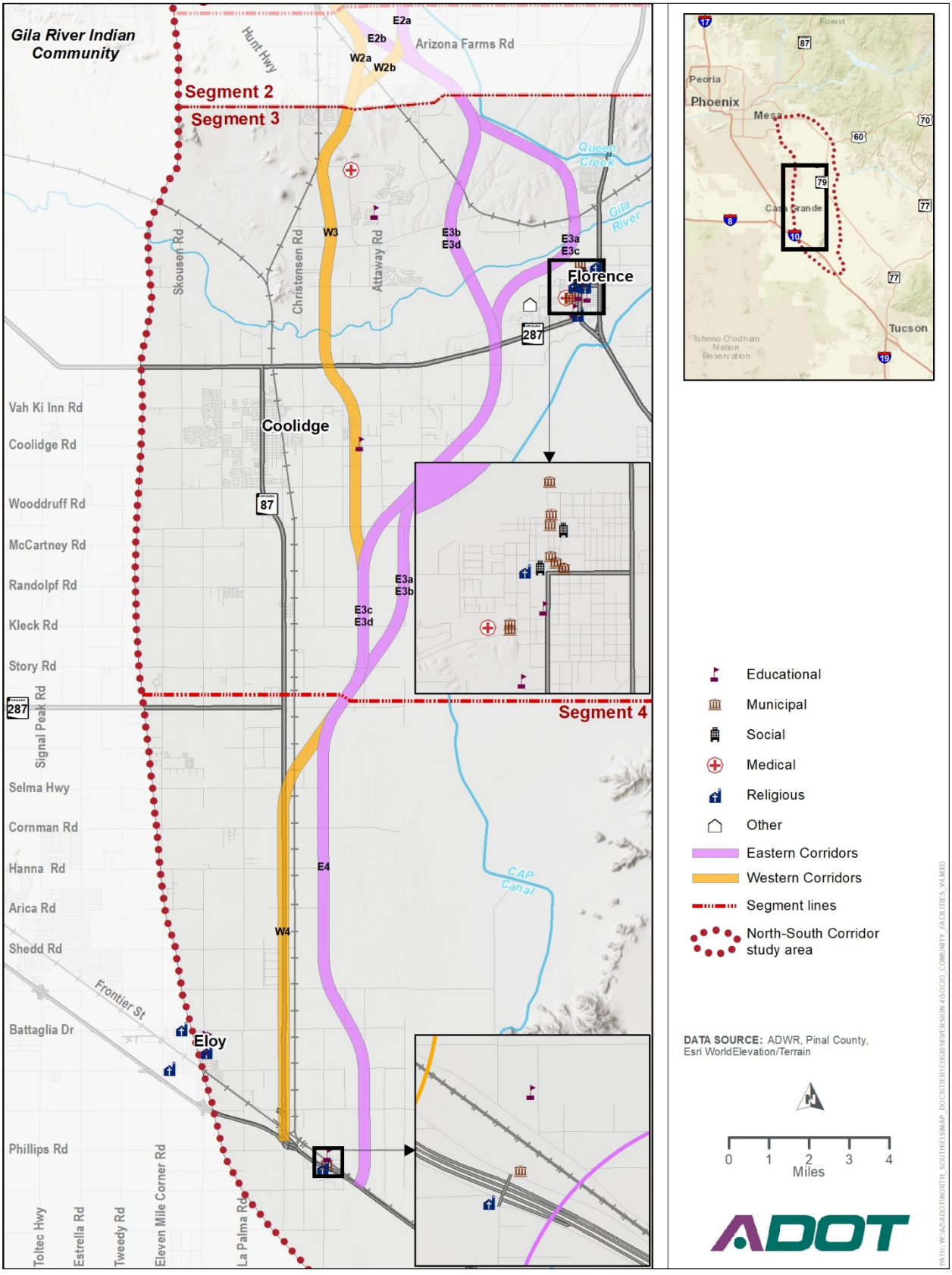


Figure 3.3-2. Community facilities and services, Segments 3 and 4



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, 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.

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 FEIS and ROD, 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 FEIS and ROD 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

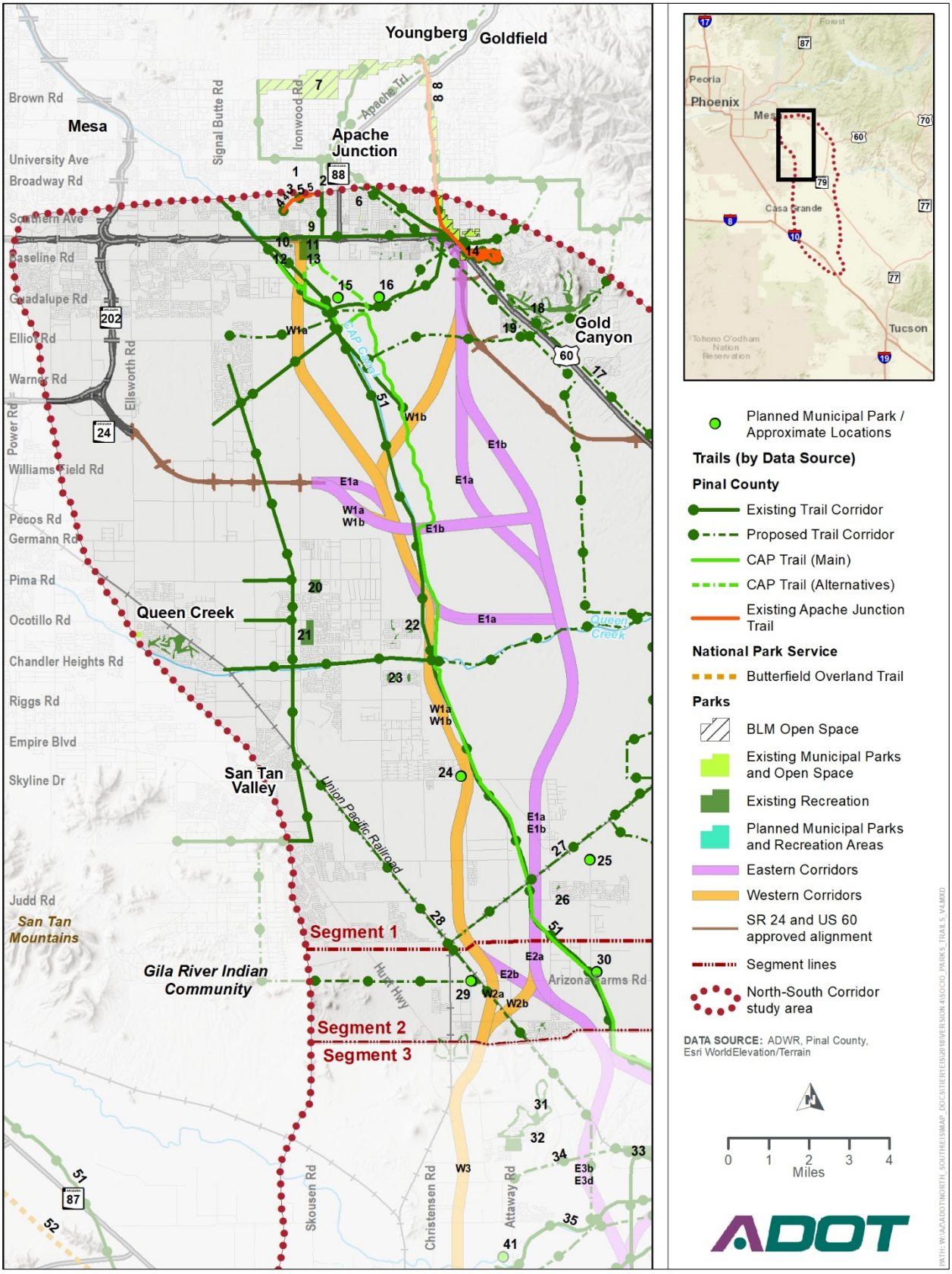


Figure 3.5-2. Parks and trails, Segments 3 and 4

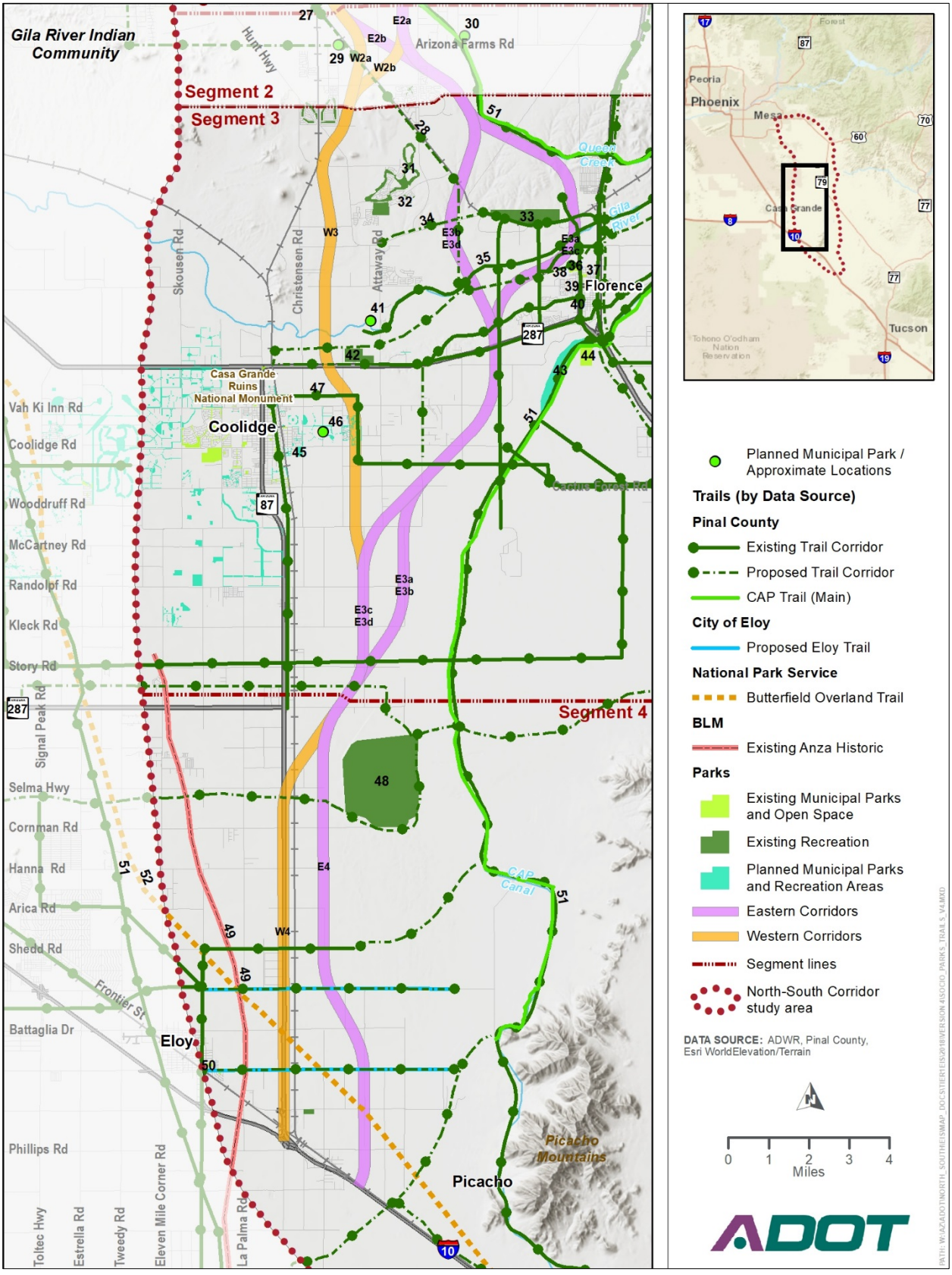


Table 3.5-1. Park and trails map identification guide

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. 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 selected 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).

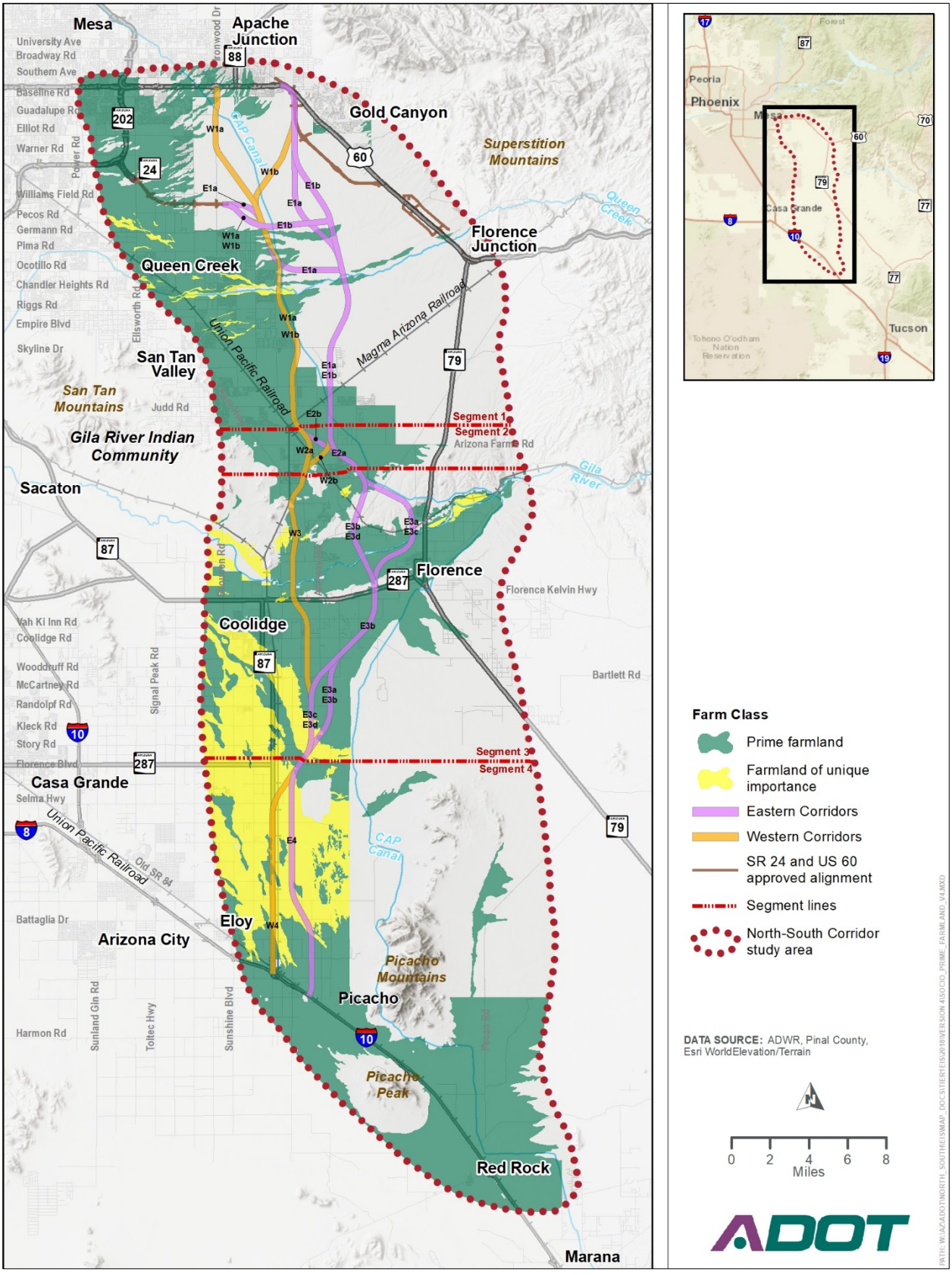
- Florence – According to the *Town of Florence 2020 General Plan*, the town has historically been an agricultural community because of good soils and the presence of the Gila River (Town of Florence 2008a). The planning area encompasses 196 square miles, of which about 10 percent is currently developed. 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 selected 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.

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 FEIS and ROD 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 FEIS and ROD.

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, no mitigation measures are proposed. At the time of Tier 2 studies, new or revised federal guidance on GHGs would be considered.

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 depend 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.

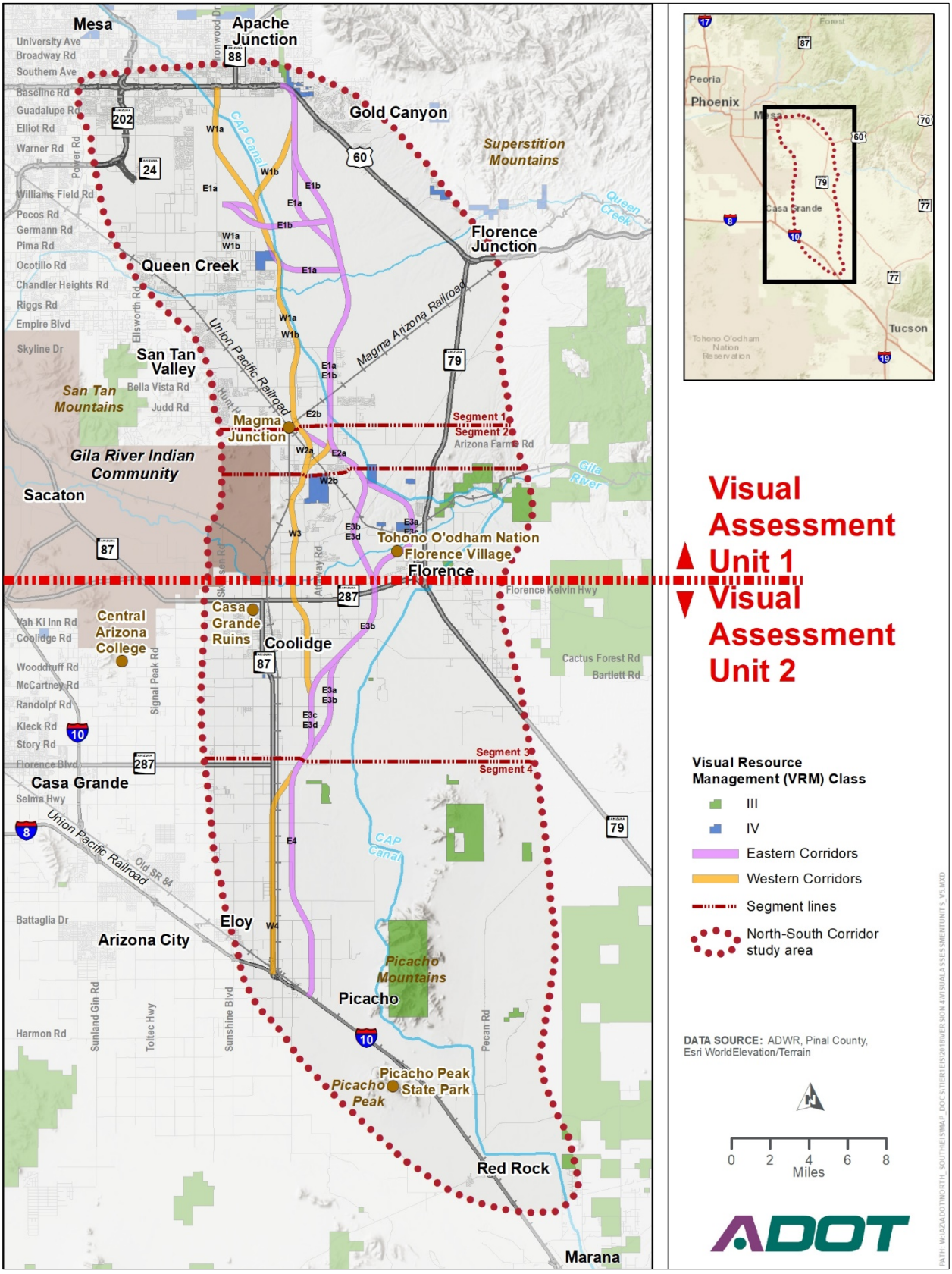
Unit 1

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.

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 identification of the selected 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:

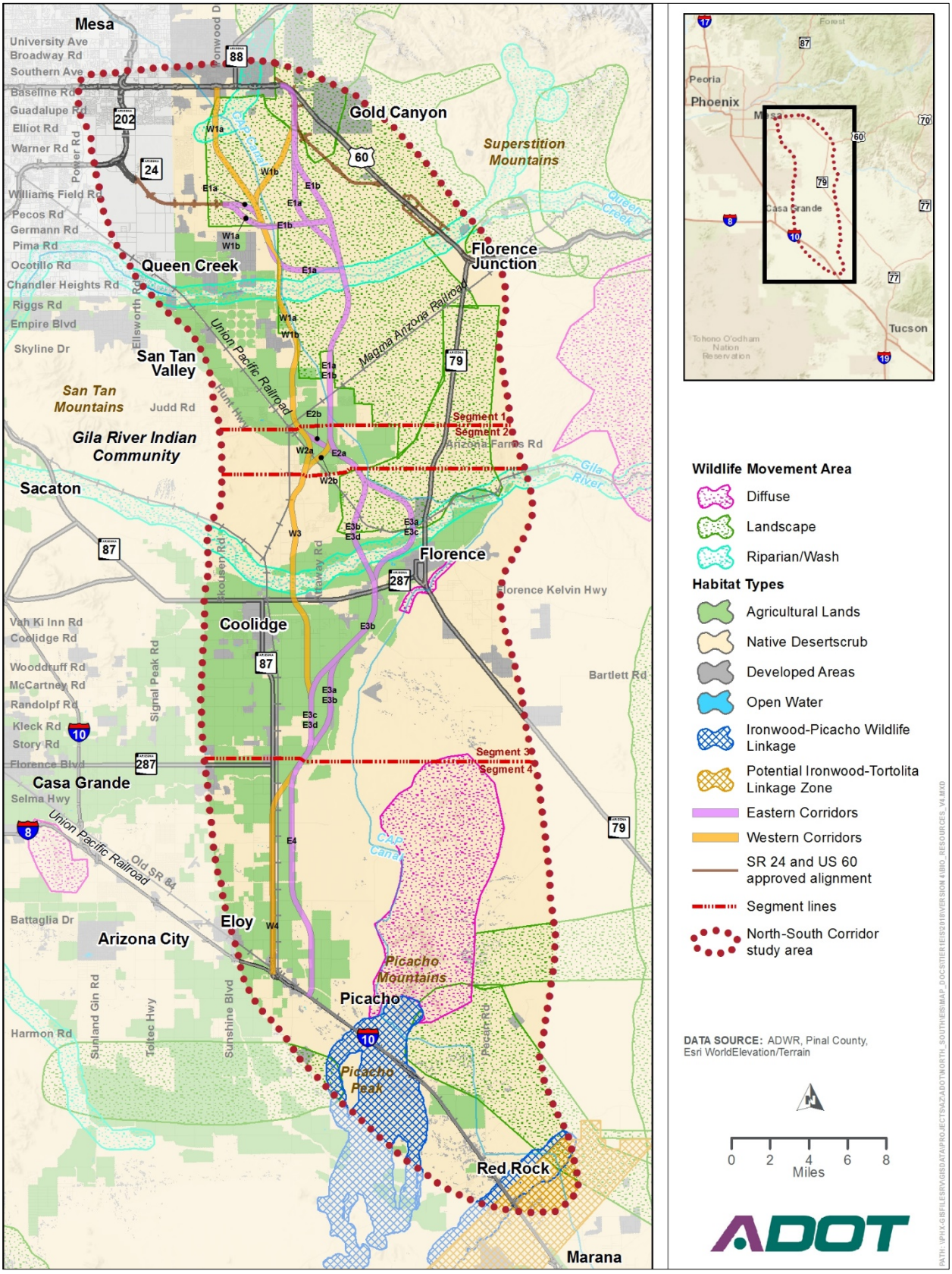
- creosote bush-white bursage desertscrub
- paloverde-mixed cacti desertscrub
- mixed salt desertscrub
- mesquite upland scrub
- invasive southwest riparian woodland and shrubland
- warm desert riparian woodland and shrubland
- warm desert riparian mesquite bosque
- warm desert wash
- mid-elevation desertscrub
- 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* spp.), 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). An effluent-fed reach of Siphon Draw near Ironwood Drive supports moderate-quality riparian and aquatic habitat.

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*), mountain lion (*Puma concolor*), desert bighorn sheep (*Ovis canadensis nelsoni*), 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 monster (*Heloderma suspectum*), horned lizards (*Phrynosoma* spp.), whiptail lizards (*Aspidoscelis* spp.), desert iguana (*Dipsosaurus dorsalis*), and Sonoran desert tortoise (*Gopherus morafkai*). Amphibians may include the Sonoran desert toad (*Incilius 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 other irrigation districts 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. While the CAP Canal is a barrier to mammal movement, there are multiple wildlife crossings along the CAP Canal. There are five crossings between I-10 and the pumping plant to the north near the Picacho Mountains; there are crossings adjacent to the Picacho Reservoir and immediately south of the Coolidge Airport; and there are two crossings above Florence and one at the CAP Canal siphon. 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.

Much of the study area includes important areas for wildlife movement between habitat blocks known as landscape movement areas (AGFD 2013). The W1a, W1b, E1a, and E1b Alternatives would cross through designated landscape movement areas in the northern portion of the study area between Queen Creek to the west, Gold Canyon to the north, and Florence Junction to the east (see Figure 3.11-1). The Ironwood-Picacho wildlife linkage corridor constitutes the only AGFD wildlife corridor currently identified within the study area, but wildlife movement and connectivity areas along much of the Corridor are not limited to the linkage corridor. 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). The potential Ironwood-Tortolita linkage zone also crosses the southeastern portion of the study area near Red Rock and borders the southern strand of the Ironwood-Picacho Linkage. That potential linkage zone would not be affected by any of the action corridor alternatives.

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. In addition, on April 7, 2017, USFWS withdrew the proposed rule to list the roundtail chub (*Gila robusta*) as threatened; therefore, that species is also excluded from further evaluation. The remaining six federally protected species are presented in Table 3.11-2. USFWS provided an updated IPaC resource list on November 12, 2019, that indicated the endangered acuña cactus (*Echinomastus erectocentrus* var. *acunensis*) and/or its habitat are known to occur within or near the vicinity of the proposed action; therefore, that species has also been included in Table 3.11-2. Of these species, four listed as threatened or 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.

Three federally protected species identified on the USFWS Official Species List, including the California least tern (*Sterna antillarun browni*), Sonoran pronghorn (*Antilocarpa americana sonoriensis*), and Northern Mexican gartersnake (*Thamnophis eques megalops*), were excluded from further evaluation because no suitable habitats for these species were identified within 1 mile of the action corridor alternatives.

In addition to the federally listed species discussed above, the Sonoran desert tortoise (*Gopherus morafkai*), although not presently listed as threatened or endangered under the ESA, is a candidate for listing and is afforded special protection under a candidate conservation agreement (CCA) between federal and state agencies in Arizona. ADOT is a signatory to this agreement. The CCA was developed

by the involved parties to implement actions to reduce or eliminate current threats to the species (USFWS 2015). Therefore, this species is described in further detail below.

Table 3.11-2. Federally protected species evaluated for potential occurrence in the North-South Corridor

Common name	Scientific name	Habitat	Status
Acuña cactus	*Echinomastus erectocentrus* var. *acunensis*	Valleys and on small knolls and gravel ridges in the paloverde-saguaro association of Sonoran desertscrub	Endangered; known to occur near Florence Junction
Southwestern willow flycatcher	*Empidonax traillii 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 (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
Sonoran desert tortoise	*Gopherus morafkai*	Rocky slopes and bajadas in various types of desertscrub	Candidate (CCA); known to occur in the study area

Source: U.S. Fish and Wildlife Service, November 15, 2017, IPaC Official Species List, Consultation Code: 02EAAZ00-2016-SLI-0401, and updated version obtained on November 12, 2019
Notes: AGFD = Arizona Game and Fish Department, CCA = candidate conservation agreement

ACUÑA CACTUS

The acuña cactus was federally listed as an endangered species on October 1, 2013 (78 *Federal Register* 60607). Critical habitat for the species was designated in Maricopa, Pinal, and Pima Counties on August 18, 2016 (81 *Federal Register* 55266). No designated critical habitat occurs within or near the study area. The acuña cactus typically is single-stemmed with two to three straight, central spines and 12 radial spines, and can reach up to 40 centimeters in height and 9 centimeters in width. The cactus produces rose to lavender flowers, generally in March. Immature plants bear little resemblance to mature plants and are spherical or disc-shaped and lack central spines. The historic range of the cactus includes southern Arizona and northern Mexico; however, the species' current range is restricted to Maricopa, Pima, and Pinal Counties in Arizona (USFWS 2016). The species occurs in the paloverde-saguaro habitat in valleys and on small knolls and gravel ridges at 365 to 1,150 meters above mean sea level (USFWS 2016), and has been documented near Florence Junction (letter from U.S. Department of the Interior, October 24, 2019).

Threats to the acuña cactus include habitat loss, degradation, and modification primarily attributable to long-term drought, climate change, and border activities. Other potential threats include urban and

industrial development, unauthorized collection, livestock grazing, and the introduction of nonnative, invasive plant species (USFWS 2016).

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 (*Pluchea 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) and revised in 2020 (85 *Federal Register* 11458). 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. 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.

SONORAN DESERT TORTOISE

The Sonoran desert tortoise was made a candidate for listing under the ESA in 2010 (75 *Federal Register* 78094). A voluntary CCA was subsequently developed to provide a cooperative conservation approach among federal and state agencies (USFWS 2015). After completion of a comprehensive biological status review in 2015, USFWS announced the tortoise was not warranted for listing at that time given the species' current distribution over a significant portion of its historical range (80 *Federal Register* 60321). On November 16, 2020, USFWS announced the Sonoran desert tortoise was returned to the candidate list as a result of a court-approved settlement agreement (85 *Federal Register* 73165).

The Sonoran desert tortoise is a terrestrial turtle with a brown, high-domed shell and stout, elephantine legs that occurs primarily on steep rocky slopes and bajadas in various types of desertscrub. In the United States, the distribution of the Sonoran desert tortoise is limited to the Sonoran Desert in Arizona (75 *Federal Register* 78094). Population densities and movements generally are correlated with the availability of shelter sites (USFWS 2015). Threats to the species include the establishment of nonnative, invasive plants and altered fire regimes; urban and agricultural development; and upper respiratory tract disease (Jacobson 1992; USFWS 2015). Low- to moderate-quality habitat for the Sonoran desert tortoise occurs throughout portions of the study area, and high-quality habitat is present along the Gila River corridor and other wash corridors.

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 CCA species, 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
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
Calypte costae	Costa's hummingbird	Dry and open habitats such as washes and streamsides in the Sonoran Desert; lower parts of dry canyons; coastal sage scrub	SGCN	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
Cistothorus palustris	Marsh wren	Cattail, bulrush, or brackish marshes	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
Empidonax wrightii	Gray flycatcher	High deserts primarily characterized by sagebrush, also occurs in pinyon and juniper habitats; birds wintering in southern Arizona use mesquite bosques and streamside groves	SGCN	Likely
Falco peregrinus anatum	American peregrine falcon	Near cliffs that support sufficient abundance of prey	SC, SGCN	Not 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
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
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
Micrathene whitneyi	Elf owl	Saguaro deserts and wooded canyons with ample cover and suitable nesting cavities	SGCN	Known
Myiarchus tyrannulus	Brown-crested flycatcher	Tall sycamores or cottonwoods along streams, in lowlands or in canyons; also common in open desert with giant saguaros	SGCN	Known
Oreoscoptes montanus	Sage thrasher	Sagebrush, brushy slopes, mesas; in winter, also found in deserts	SGCN	Likely
Oreothlypis luciae	Lucy's warbler	Mesquite along desert streams and washes; willows, cottonwoods	SGCN	Known
Passerculus sandwichensis	Savannah sparrow	Open grassy or weedy habitats	SGCN	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
Sphyrapicus nuchalis	Red-naped sapsucker	Woodlands and aspen groves; in winter, also found other trees	SGCN	Likely
Spizella breweri	Brewer's sparrow	Sagebrush and brushy plains; in winter, also found in weedy fields	SGCN	Likely
Sturnella magna	Eastern meadowlark	Open fields and pastures, meadows, prairies	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

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
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
Euderma maculatum	Spotted bat	Varied; most captured in dry, rough desertscrub; few captured/heard in Ponderosa pine forest	SC, SGCN	Likely
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

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
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
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
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
Fishes				
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

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
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
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
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
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

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
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
Cylindopuntia versicolor	Staghorn cholla	Flats, washes, rocky hillsides, and canyons in Sonoran desertscrub	Salvage-restricted	Likely
Tumamoca macdougalii	Tumamoc globeberry	Xeric Sonoran desertscrub and Sinaloan thornscrub habitats in the shade of nurse plants along gullies and sandy washes of hills and valleys	Salvage-restricted	Likely

Source: Arizona Game and Fish Department, November 16, 2017, On-Line Environmental Review Tool, Project ID: HGIS-02473, and updated version obtained on November 24, 2020

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* spp.), ocotillo (*Fouquieria splendens*), ironwood (*Olneya tesota*), paloverde (*Parkinsonia* spp.), 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 somewhat lessened west of the CAP Canal, 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 because of the extent of development associated with the westernmost action corridor alternatives. The CAP Canal poses some existing constraints 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 could potentially be linked at locations that parallel suitable crossings occurring along the CAP Canal and other locations such as trails and other crossings.

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 might also be reduced because of increased disturbance from human activity and increased spread of 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 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, lighting, runoff of roadway pollutants, 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 low- to moderate-quality creosote desertscrub (Figure 3.11-1). The E1a and E1b Alternatives would remove similar amounts of desertscrub. Likewise, the W1a and W1b Alternatives would result in the removal of comparable amounts of native desertscrub; however, the E1a and E1b Alternatives would remove a larger amount than the W1a and W1b Alternatives. Both the E1a and E1b Alternatives 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 than the E1a and E1b Alternatives.

The E1b and W1b Alternatives would cross the CAP Canal and flood control structures, and could adversely affect mesquite/shrub habitat along these structures. The mesquite habitat is east of the CAP Canal and was planted along the flood control structures as a replacement 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 than the W1a and W1b Alternatives because the E1a and E1b Alternatives would cross a larger area of contiguous low- to moderate-quality desertscrub with numerous ephemeral washes and stock ponds that generally provide better-quality habitat for species than developed areas. The W1a Alternative would affect an effluent-fed reach of Siphon Draw near Ironwood Drive that supports moderate-quality riparian and aquatic habitat.

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.

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.

Prior to Initiation of the Tier 2 Biological Analysis

- ADOT would have a qualified biologist conduct surveys for acuña cactus in the study area to determine its presence or absence.
- 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. The surveys would be of adequate duration to verify potential nest 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 initiation of the Tier 2 biological analysis, 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.
- ADOT would coordinate with AGFD to develop mitigation strategies including identification of applicant proposed measures and best management practices.

Subsequent Tier 2 Analysis

- Future coordination with AGFD and USFWS regarding wildlife connectivity would be conducted early in the Tier 2 studies.
- Potential wildlife underpass/overpass features to facilitate wildlife movement and reduce vehicular collisions identified during preliminary studies would be incorporated into the Tier 2 analysis.
- Design features and supporting mitigation or conservation measures necessary to facilitate the movement of wildlife through the roadway barrier identified by ADOT and other stakeholders would be incorporated into Tier 2 studies.
- During the design phase, ADOT would coordinate with federal and state wildlife agencies, as required, to identify any species-specific mitigation measures that may be required.

- 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.

Before and During Construction

- ADOT would continue to honor its commitments within the CCA for the Sonoran desert tortoise in Arizona (USFWS 2015).
- 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.
- Prior to construction, ADOT would have a qualified biologist conduct preconstruction surveys for burrowing owls in all suitable habitat that would be disturbed. The biologist would possess a burrowing owl survey protocol training certificate issued by AGFD. If any burrowing owls or active burrows are located during construction, the contractor would stop work at that location and notify the Engineer immediately. No construction activities would take place within 100 feet of any active burrow. If the Engineer, in cooperation with the ADOT Environmental Planning Biologist, determines that burrowing owls cannot be avoided, a qualified biologist holding a permit from USFWS would relocate burrowing owls from the project area, as appropriate.
- 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 would be washed and free of all attached plant/vegetation and soil/mud debris prior to entering/leaving the construction sites.
- 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 the removal of vegetation.

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 secured, 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 acuña cactus, southwestern willow flycatcher, yellow-billed cuckoo, and Yuma Ridgway's rail. Prior to the initiation of the Tier 2 biological analysis, ADOT would have a qualified biologist conduct surveys for the acuña cactus to determine its presence within the study area; ADOT would also 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. 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 acuña cactus, southwestern willow flycatcher, yellow-billed cuckoo, or Yuma Ridgway's rail.

Prior to and during the Tier 2 biological analysis, ADOT would coordinate with AGFD to develop mitigation strategies. Mitigation strategies may include design features and applicant proposed measures, including features to minimize Sonoran desert habitat fragmentation and vehicular mortality; 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 acuña cactus and 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.

Future coordination with AGFD and USFWS regarding wildlife connectivity would also be conducted early in the Tier 2 studies. This coordination would be designed to help identify potential solutions to improve roadway permeability and reduce impacts on wildlife movement and would be modeled after similar collaborative efforts between state and federal agencies and other natural resource managers (ADOT 2017e; National Fish and Wildlife Foundation 2019). Cost feasibility and wildlife migration patterns are key considerations that would be considered when evaluating potential wildlife crossings during the Tier 2 process.

3.11.6.1 Conclusion

All action corridor alternatives would result in the permanent loss of habitat, including mixed native desertscrub, agricultural lands, and developed areas in the new freeway footprint; habitat fragmentation; displacement of wildlife from habitat adjacent to the new freeway; and direct mortality from collisions with vehicles. However, the westernmost action corridor alternatives could result in fewer impacts on wildlife, habitat, and wildlife resources than the action corridor alternatives to the east because of the extent of development associated with the westernmost action corridor alternatives. The overall effect of increased fragmentation could be somewhat lessened west of the CAP Canal because existing agricultural fields, urban and rural development, roadways, railroads, and engineered hydrologic networks bisect and cover widespread portions of the Corridor and vicinity. Impacts on wildlife from development of a new freeway 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) regulates the discharge of dredged or fill material into waters of the United States (Waters) and requires that a permit be obtained from the U.S. Army Corps of Engineers (USACE) prior to the discharge. Under Section 401 of the CWA, a federal agency cannot issue a permit or license for any activity that could result in any discharge into Waters until the applicable certifying authority (state agency, EPA, or tribe with "Treatment as a State" status from EPA) has certified, conditionally certified, or waived the 401 Water Quality Certification. 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.

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.

Figure 3.12-1. Surface waters, Segments 1 and 2

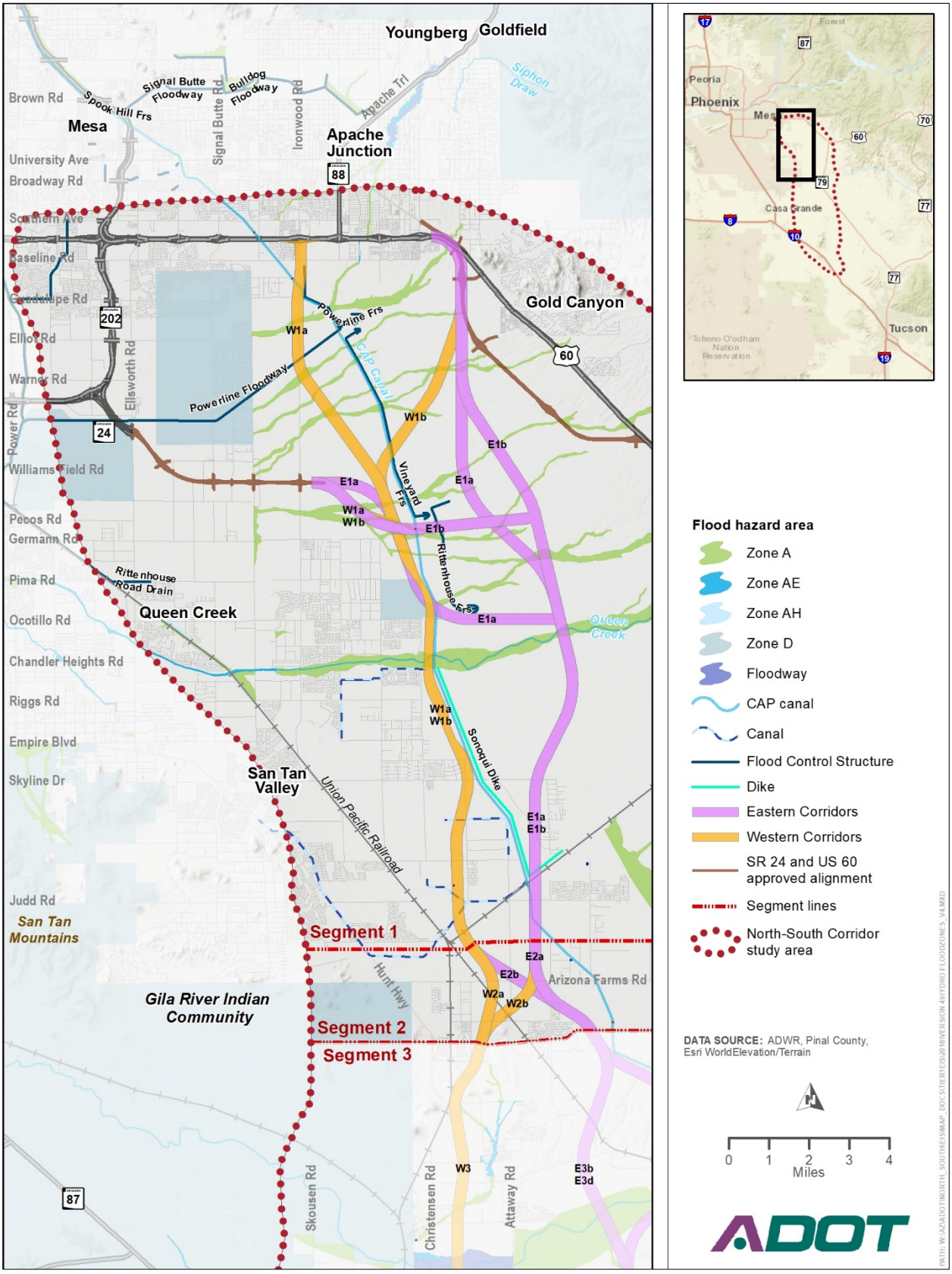
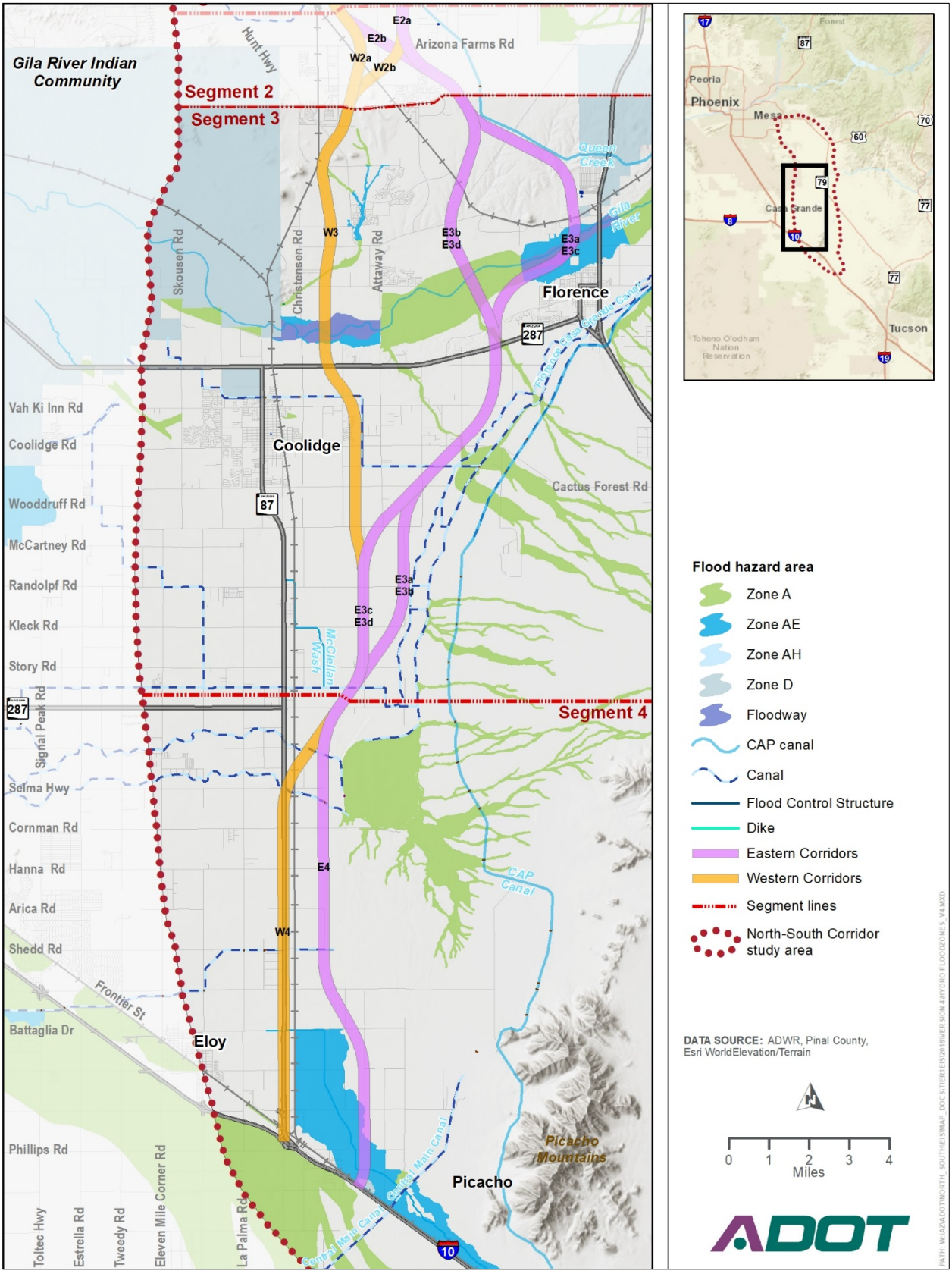


Figure 3.12-2. Surface waters, Segments 3 and 4



- 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 Detention 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 Project canal system that distributes water to users throughout the Middle Gila Valley, including reservation and non-reservation lands.

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 Detention 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 by various landowners, including the Bureau of Indian Affairs and San Carlos Irrigation Project, and managed by the San Carlos Irrigation Project

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 Gila River water and 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

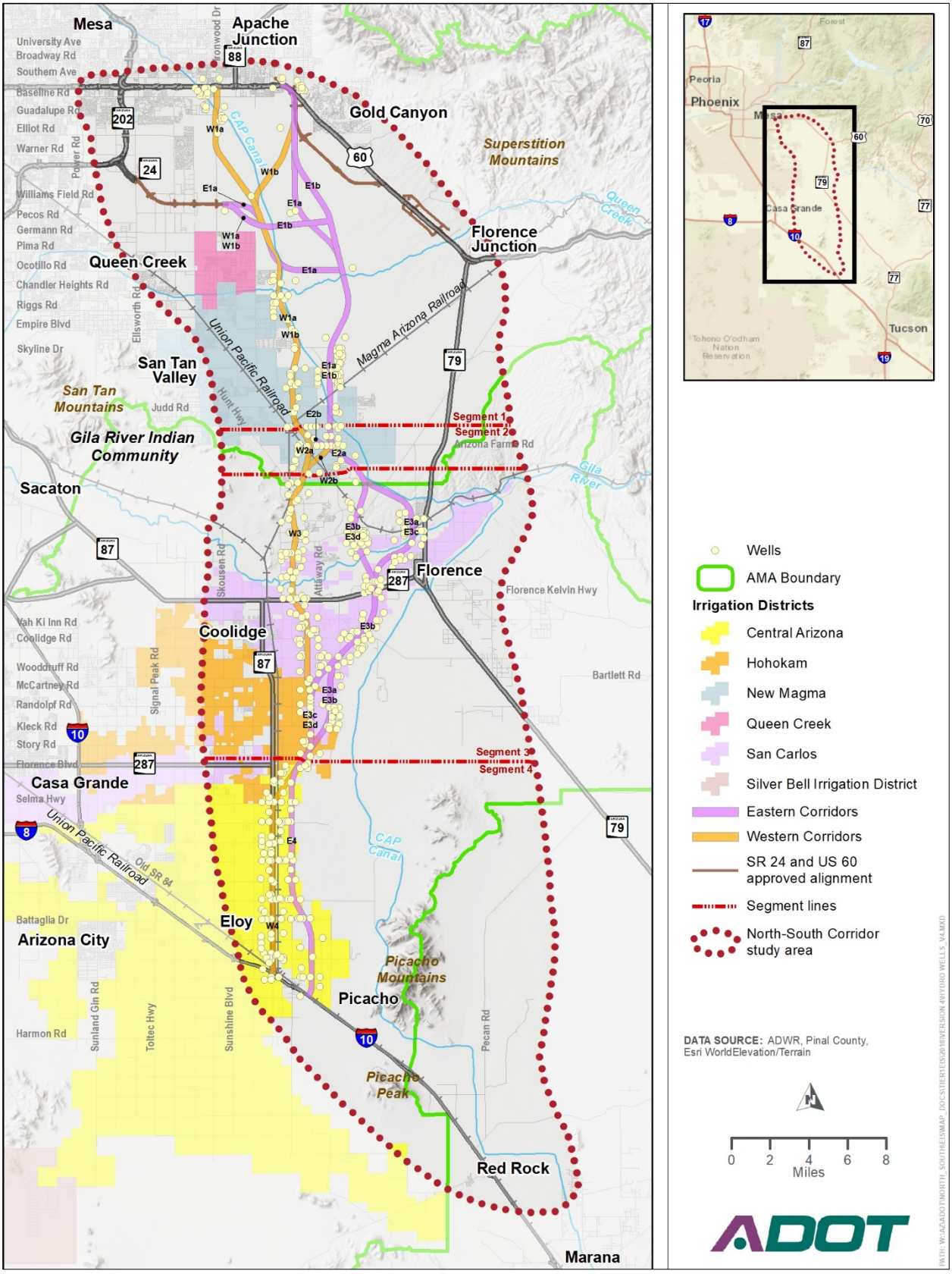
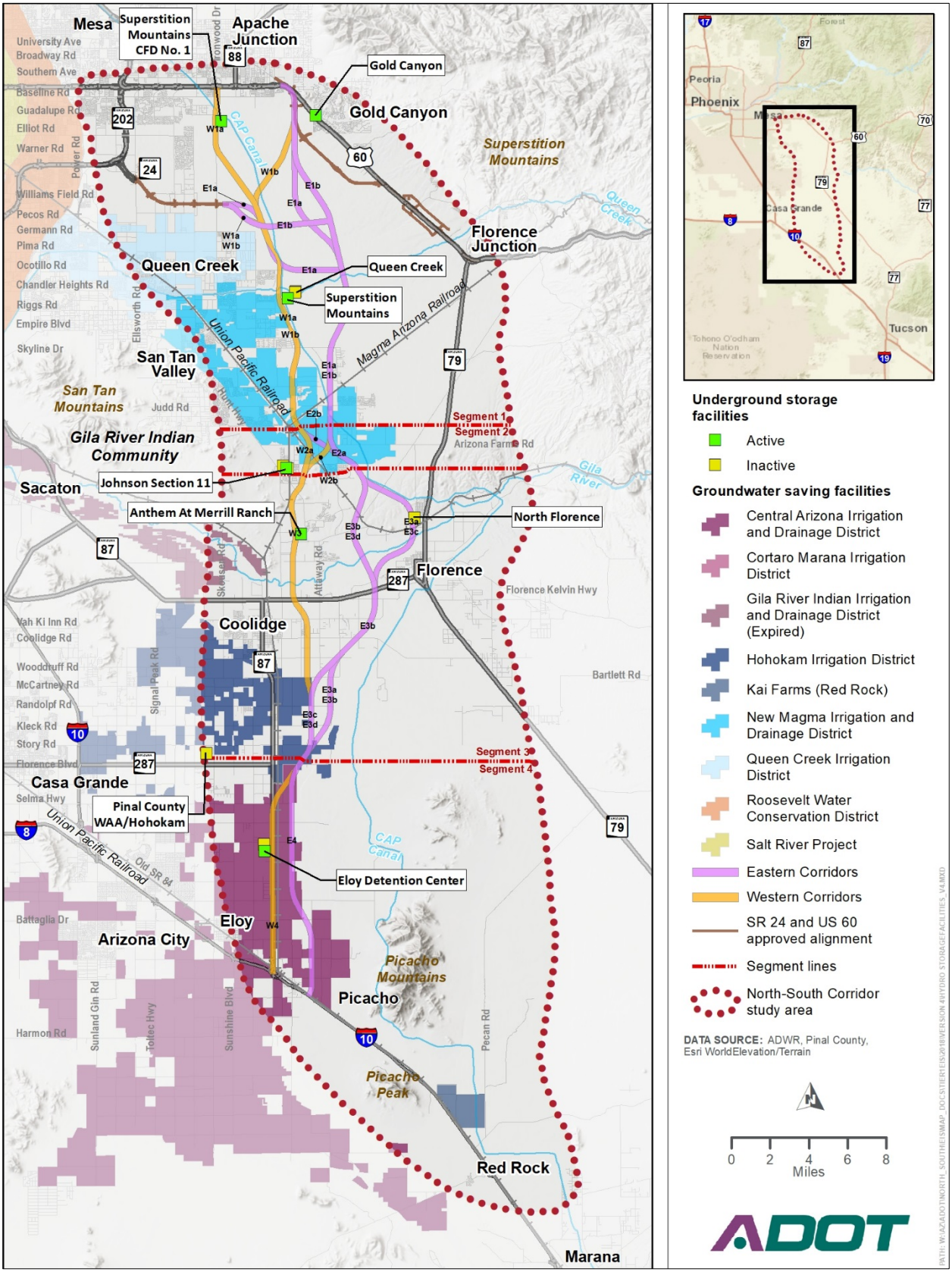


Figure 3.12-4. Underground storage facilities and groundwater saving facilities



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.

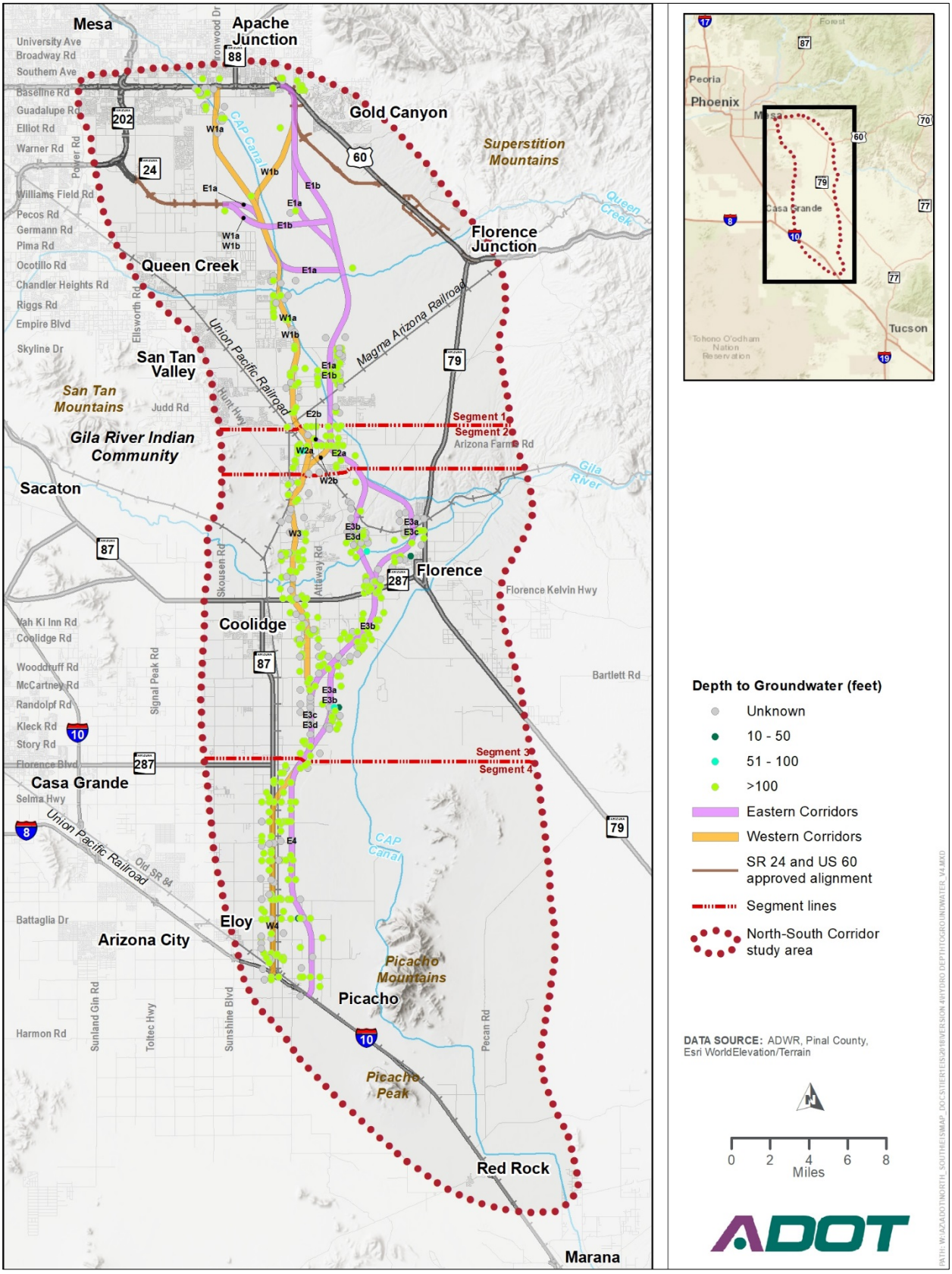
Depth to groundwater data were obtained from the *Arizona Water Atlas Volume 8, Active Management Area Planning Area*, produced by ADWR in April 2010. Depth to groundwater data from active wells in the study area are shown in Figure 3.12-5, and Table 3.12-1 summarizes the depth to groundwater levels 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 and the Sonoqui Detention Dike. 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

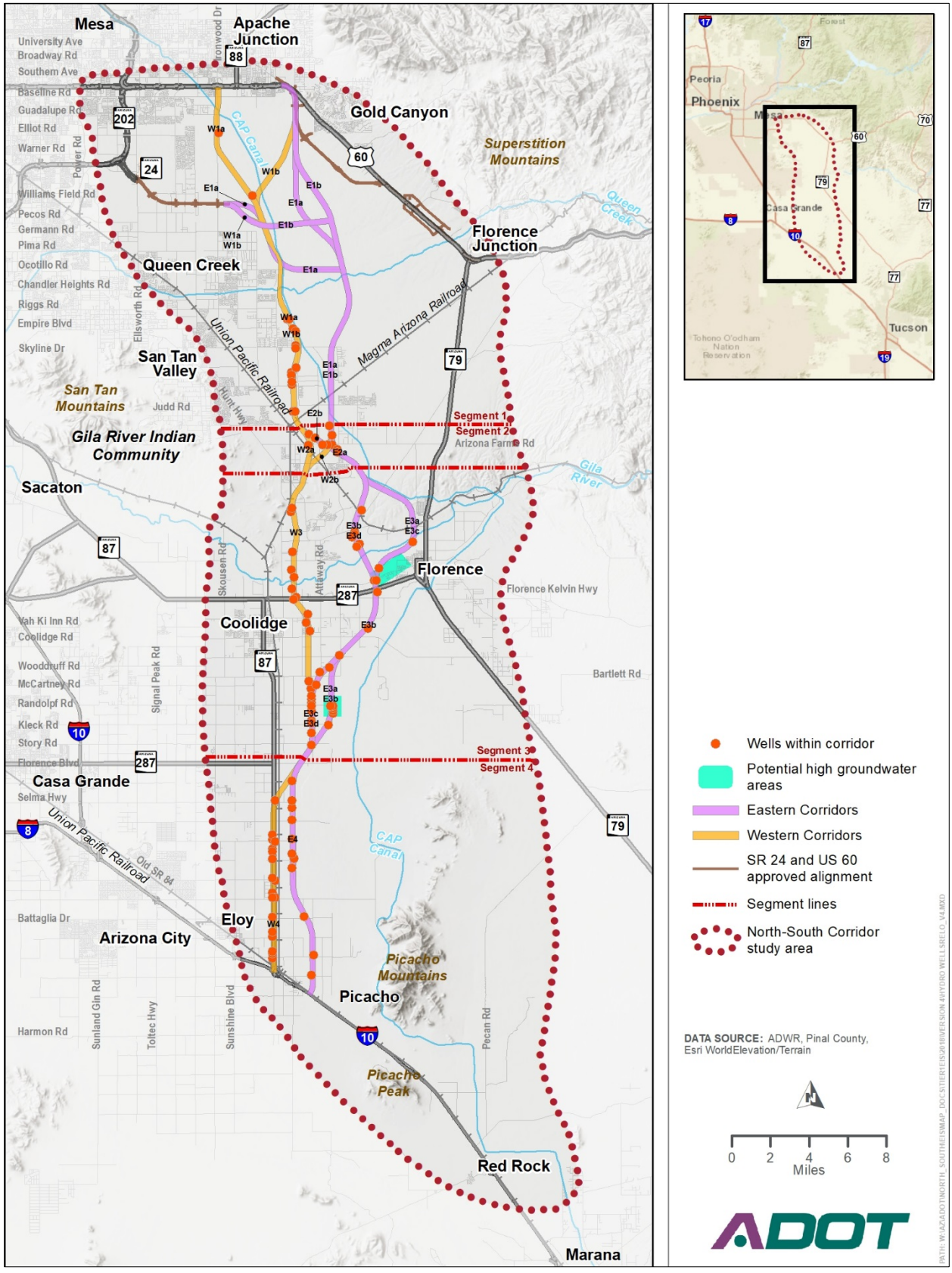
Action corridor alternative	Affected wells	Action corridor alternative	Affected wells
Segment 1		***Segment 3***	
E1a	0	E3a	14
E1b	0	E3b	18
W1a	15	E3c	19
W1b	13	E3d	24
Segment 2		W3	22
E2a	5	***Segment 3***	
E2b	6	E4	11
W2a	2	W4	18
W2b	4		

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.

Seven active USF sites are in the study area. 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 determined 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 Water Quality Certification from 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 determined 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 FEIS and ROD.

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 Department of the Army permits. Types of Waters that are regulated in Arizona include traditional navigable waters and their intermittent and perennial tributaries; lakes and ponds, and impoundments of jurisdictional waters; and wetlands adjacent to those waters. The types of activities and impacts on affected Waters are fundamental to the associated permitting requirements and level of appropriate mitigation measures.

The CWA, however, does not define Waters. Since the 1970s, the EPA and Department of the Army have defined Waters by regulation. Waters are defined under 33 CFR § 328.3; this section defines the term "waters of the United States" as it applies to the scope of federal regulatory authority under the CWA. In addition, it prescribes the policy, practice, and procedures to be used in determining the extent of federal regulatory authority concerning "waters of the United States."

The Navigable Waters Protection Rule: Definition of "Waters of the United States" became effective on June 22, 2020, following its publication in the *Federal Register* (U.S. Department of Defense and EPA 2020). The Navigable Waters Protection Rule redefines the scope of Waters federally regulated under the CWA and explicitly directs EPA and USACE to protect "navigable waters" and their core tributaries with perennial or intermittent flow (EPA 2020).

The definition of Waters under the Navigable Waters Protection Rule includes four categories of Waters and outlines exclusions for many aquatic features. These four categories are defined as:

- territorial seas and traditional navigable waters
- tributaries
- lakes and ponds, and impoundments of jurisdictional waters
- adjacent wetlands

It is worth noting that the Navigable Waters Protection Rule is currently facing a number of legal challenges and is anticipated to be overturned by the incoming Presidential administration. Accordingly, the definition of Waters is subject to change as the Tier 2 process is implemented.

3.13.1 Regulatory Context

The CWA is the primary federal statute governing discharge of pollutants into Waters, which, in Arizona, include traditional navigable watercourses, their perennial and intermittent 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.

Pursuant to Section 404 of the CWA, USACE regulates the discharge (temporary or permanent) of dredged or fill material into Waters, including wetlands. A discharge of dredged or fill material includes, but is not limited to, grading, placing riprap for erosion control, pouring concrete, and stockpiling excavated 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 is a written indication by USACE that assumes all aquatic resources identified in a specified area that are (1) territorial seas or traditional navigable waters, (2) intermittent or perennial tributaries of traditional navigable waters, and/or (3) wetlands adjacent to traditional navigable waters or tributaries and possess the required physical characteristics are subject to USACE's jurisdiction. An approved

jurisdictional determination is an official determination issued by USACE that identifies the presence or absence of Waters in a defined area. For areas that include ephemeral features that were regulated under previous definitions of Waters but are omitted from the current definition, an approved jurisdictional determination is advisable to ensure accurate jurisdictional status.

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 are likely to have more than a minimal individual or cumulative impact on aquatic resources or involve impacts on adjacent 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 compensatory mitigation for losses of aquatic resources is guided under the 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 § 230.10(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 identification of the selected alternative.

Section 404 permits require water quality certification as set forth in Section 401 of the CWA prior to discharging fill material into Waters. Under Section 401 of the CWA, a federal agency cannot issue a permit or license until or unless the appropriate certifying authority has certified, conditionally certified, or waived the 401 Water Quality Certification. A certifying authority's issuance of a Water Quality Certification ensures that the project will not violate surface water quality standards or adversely affect impaired waters (waters that do not meet water quality standards), and that the project complies with applicable water quality improvement plans (total maximum daily loads). The Water Quality Certification becomes a part of the federal permit or license and is valid for the same time period as the permit or license, often issued for 5-year terms. On non-tribal lands in Arizona, ADEQ administers the Water Quality Certification program. 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 requiring an individual permit or those 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).

Effective September 11, 2020, the CWA Section 401 Certification Rule (85 *Federal Register* 42210) was implemented nationwide. The rule, promulgated by EPA, establishes procedures promoting consistent implementation of CWA Section 401 and regulatory certainty in the federal permitting process (USACE 2020). Under this rule, project proponents with projects under jurisdiction of the USACE Los Angeles Regulatory Division must request a pre-filing meeting with the certifying authority at least 30 days prior to submitting the Water Quality Certification request. In addition, applicants are required to submit their requests for Water Quality Certification to the certifying authority and to the USACE Los Angeles District Regulatory Division concurrently. Applicants are encouraged to copy the USACE Los Angeles District Regulatory Division on Water Quality Certification requests submitted to a certifying authority for a project within the USACE Los Angeles District Regulatory Division geographic area of responsibility.

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

All surface waters considered are referred to as potential Waters, including ephemeral washes. Site-specific jurisdictional determinations would be required to accurately identify regulated Waters during the Tier 2 analysis. 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 imagery 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* (Lichvar and McColley 2008)
- Navigable Waters Protection Rule: Definition of “Waters of the United States” (33 CFR Part 328) and Definition of Navigable Waters of the United States (33 CFR Part 329)
- *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987)
- *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008)
- USACE Regulatory Guidance Letter (No. 16-01) for Jurisdictional Determinations, dated October 2016 (USACE 2016)

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. Ephemeral features are first- and second-order streams that exhibit flow solely after rain events and have a hydrological connection downstream from unconsolidated flow only immediately following precipitation. Intermittent streams are characterized by well-defined channels that contain water for only part of the year, typically during winter and spring when the aquatic bed is below the water table; however, flows in the arid West often are heavily supplemented by stormwater runoff. The jurisdictional status of an intermittent stream is determined based on the presence of intermittent flow and contribution of surface water flow to a traditional navigable water or territorial sea in a typical year. The nearest traditional navigable water is the Gila River, approximately 75 miles downstream of the study area.

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; those washes 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; however, overshot structures in some locations allow flood waters to pass over the canal and into the study area. The CAP Canal is not a jurisdictional 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 and request for a jurisdictional determination 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 aquatic resources (primarily ephemeral washes). Some of these ponds and wetlands might 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 and other aquatic resources, although many impacts on the minor washes may be avoided or minimized through design during Tier 2 studies. Effects on potential Waters and other aquatic resources 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 and other aquatic resources.

The action corridor alternatives are 1,500 feet wide; however, the freeway ROW would typically be narrower and located somewhere within the larger action corridor alternative. Impacts on potential Waters and other aquatic resources were evaluated based on the average widths of the potential Waters and

other aquatic resources 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 other aquatic resources, 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 the CAP Canal, Queen Creek, and other potential Waters and other aquatic resources. Weekes Wash and Cottonwood Creek would not be affected by the Segment 1 action corridor alternatives. The Eastern Alternatives would cross more potential Waters and other aquatic resources than the Western Alternatives, although most impacts on the smaller crossings may be avoided or minimized with any of the alternatives.

With regard to the SR 24 connection, the E1a Alternative would likely have less impact on Waters and other aquatic resources than the E1b, W1a, and W1b Alternatives because it would cross ephemeral washes in that area in a more perpendicular manner.

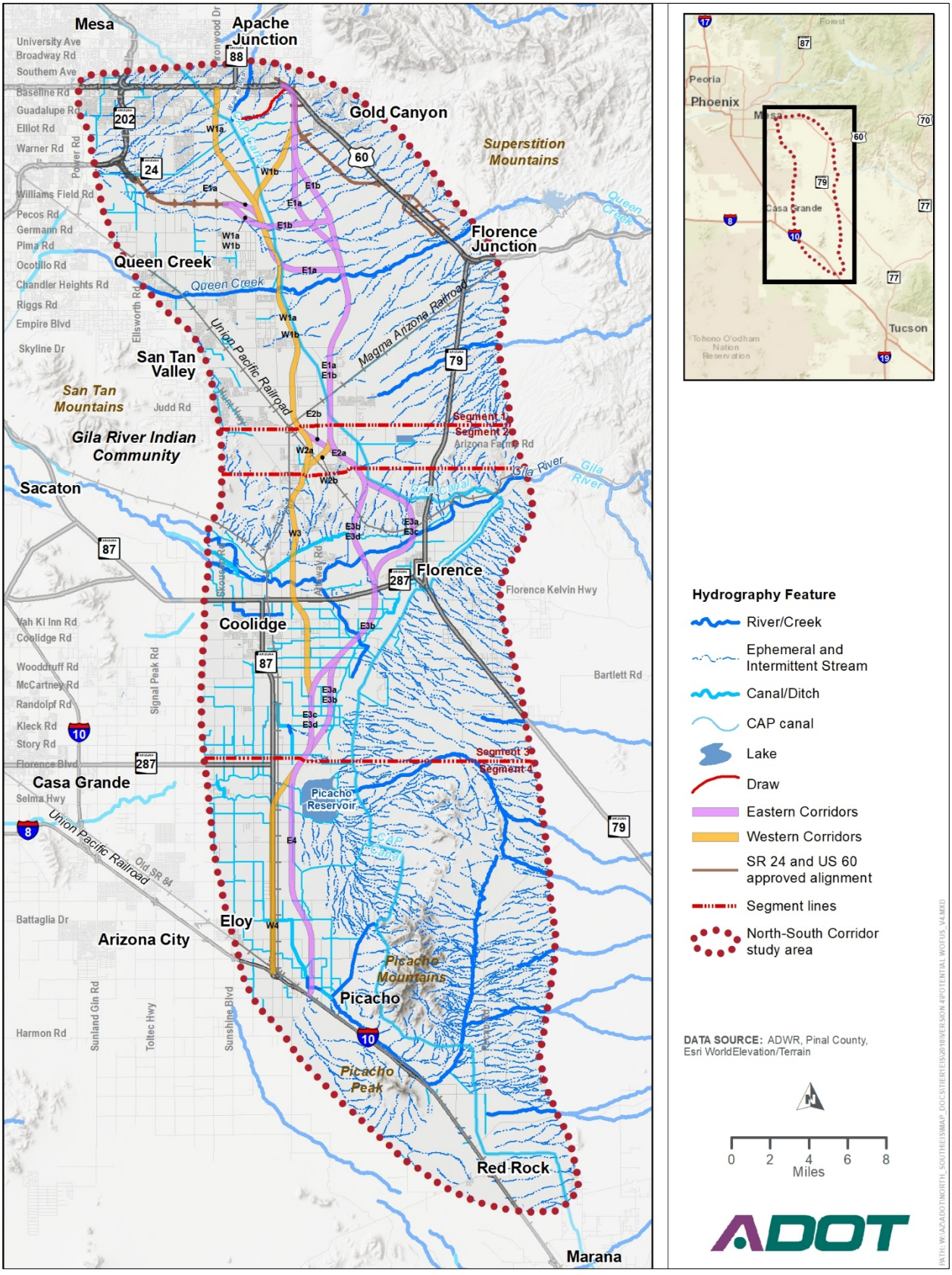
Segment 2

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 and other aquatic resources. The Eastern Alternatives would cross approximately the same number of potential Waters and other aquatic resources 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 and aquatic resources, including livestock ponds; however, most impacts on the smaller crossings may be avoided or minimized with any of the alternatives. 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 and aquatic resources than the Western Alternatives.

Figure 3.13-1. Potential waters of the United States and other aquatic resources



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.

Table 3.13-1. Potential waters of the United States and other aquatic resources within the action corridor alternatives

Action corridor alternative	Potential waters of the United States and other aquatic resources (including livestock tanks and ephemeral features)	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 and aquatic resources. 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 and other aquatic resources 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 and other aquatic resources because any freeway corridor would cross the Gila River, Queen Creek, and numerous ephemeral washes. Crossing potential Waters and other aquatic resources 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 and other aquatic resources 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 likely would be required. ADOT would comply with all terms and conditions of the CWA permitting as established by USACE and EPA.

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 to mitigate and reduce the impacts 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 to the extent practicable and minimizes impacts where avoidance is not

feasible. During this analysis, a jurisdictional delineation would be conducted and submitted to USACE with a request for jurisdictional determination 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. In addition, if an individual 401 Water Quality Certification is required, ADOT would request a meeting with ADEQ at least 30 days prior to submitting a certification request. Upon completion of that meeting, ADOT would prepare a 401 Water Quality Certification request.

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 potentially affect the fewest number of potential Waters and other aquatic resources; however, impacts on the several minor washes are likely to be avoided or minimized during the Tier 2 study. In all segments, both Eastern and Western Alternatives have the potential to affect major Waters that may trigger the need for an individual Section 404 permit and the requirement to select the LEDPA. Alignment alternatives developed in Tier 2 may avoid or minimize these impacts, allowing selection of the LEDPA. Should an individual permit be required, 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. For the proposed action, permits likely would be required under Sections 404 and 401 of the CWA. CWA permitting would be completed during the freeway design phase. As the applicable certifying authority, ADEQ would issue Section 401 Water Quality Certification prior to Section 404 permit issuance. The general and special conditions of the Section 404 permit 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 tribes, 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 consulting parties 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
3/23/2020	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
1/21/2014	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
3/23/2017	Archaeological 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 archaeological 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
3/15/2018	Supplemental Class I cultural resources overview and built environmental reports
10/31/2018	Programmatic Agreement outline
3/4/2019	Advisory Council on Historic Preservation response to Tier 1 notification
4/17/2019	Draft Programmatic Agreement
4/30/2020	Site 73 National Register of Historic Places eligibility
7/14/2020	Site 73 Final Memo

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 FEIS and ROD evaluate 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 remains 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

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]
E2b	669	20	0	No sites	No sites
W2a	479	5	0	No sites	No sites
W2b	561	5	0	No sites	No sites
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

Table 3.14-3. Built environment resources, by action corridor alternative

Action corridor alternative	Property type	NRHP eligibility
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
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.

In response to substantive comments regarding the Tier 1 DEIS, ADOT reevaluated the Preferred Alternative (E1b) in Segment 1 to ensure the decision presented in the Tier 1 FEIS and ROD had clear justification. On April 30, 2020, ADOT's Historic Preservation Team initiated consultation with the Four Southern Tribes regarding the eligibility of site AZ U:14:73(ASM), given its location within the Western Alternatives (W1a and W1b) in Segment 1, which were under reconsideration for selection as the Preferred Alternative. Consultation concluded on July 8, 2020. The clarification provided by the Four Southern Tribes eliminated AZ U:14:73(ASM) as a potential TCP within the Western Alternatives. However, the Four Southern Tribes consider site AZ U:14:73(ASM) to be eligible for the NRHP under Criterion D and asked that it be avoided.

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 historic properties, 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 earth-moving activities. Construction impacts may also include unanticipated discovery of previously unknown cultural resources or 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. 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 developed a programmatic agreement, pursuant to Section 106 of the NHPA [36 CFR § 800.14(b)(3)], 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 commits 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; commits to consultation with the tribes that may ascribe traditional religious and cultural significance to historic properties that may be affected by the undertaking; and commits to compliance with all applicable federal and state laws and regulations in effect at the time of each undertaking.

Appendix J, *Section 106 Consultation*, contains the final Tier 1 Section 106 programmatic agreement, which was distributed to consulting parties for concurrence on July 15, 2021. Consultation is ongoing, and the PA will be executed subsequently. Construction on Tier 2 projects would not proceed until appropriate Section 106 agreement documents are executed.

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 to medium risk of adverse impacts on identified historic properties. 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. 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 for the selected alternative.

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 Environmental Site Assessment 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 Environmental Site Assessments should be performed at properties slated for acquisition (in accordance with ADOT Right-of-Way policies and procedures). Where the project crosses agricultural/farmland it is recommended that soil sampling be conducted. The goal of a Phase I Environmental Site Assessment 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 Environmental Site Assessment 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 Environmental Site Assessment 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 Environmental Site Assessment, with the goal of supporting future construction management. If contaminated areas are identified in Phase I Environmental Site Assessment/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 persons 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 FEIS and ROD. 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. While these are not in and of themselves protected populations, the LEP analysis helped inform the study outreach effort.

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.

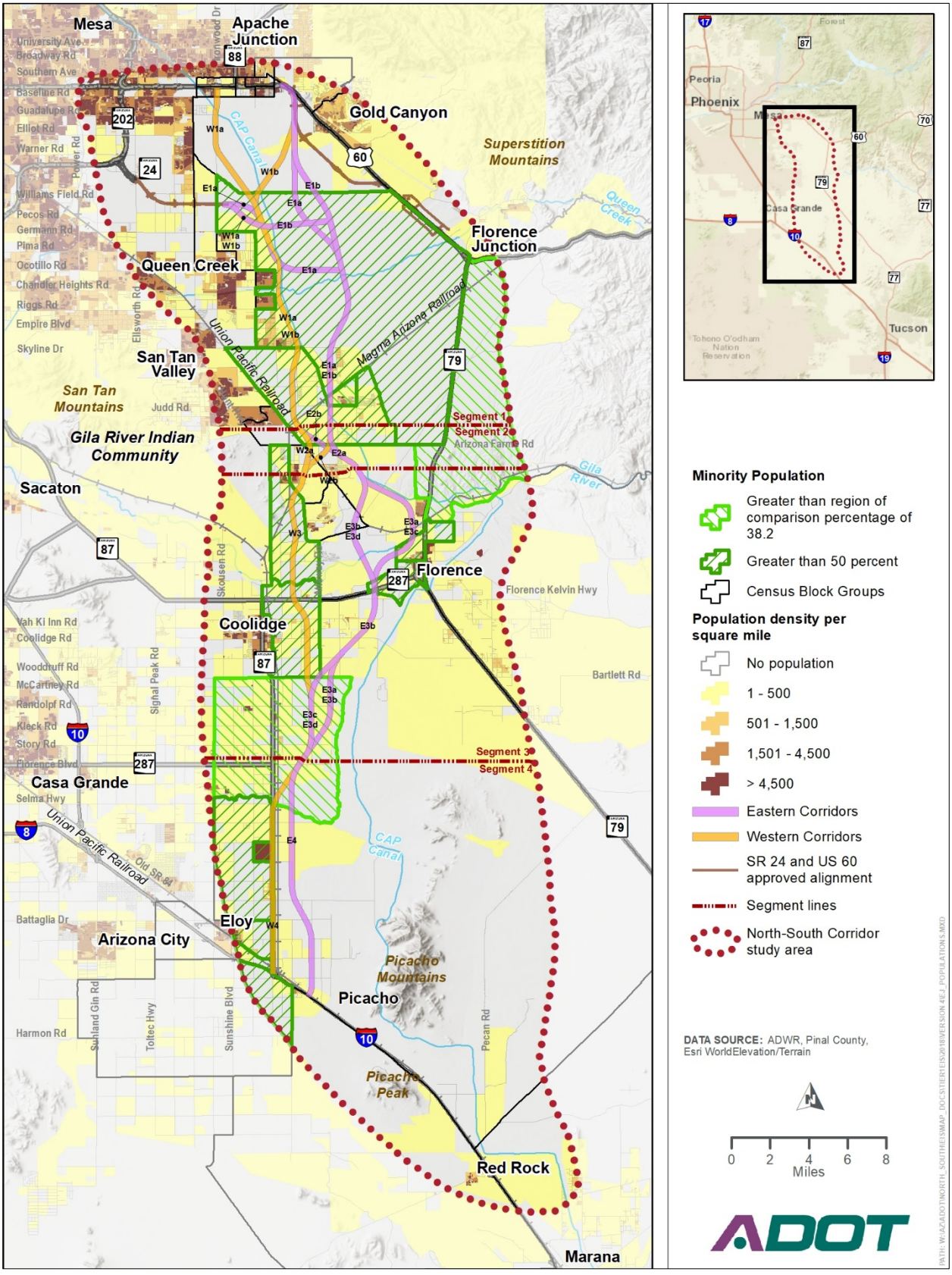
3.17.3.1 Minority Populations

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 persons 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

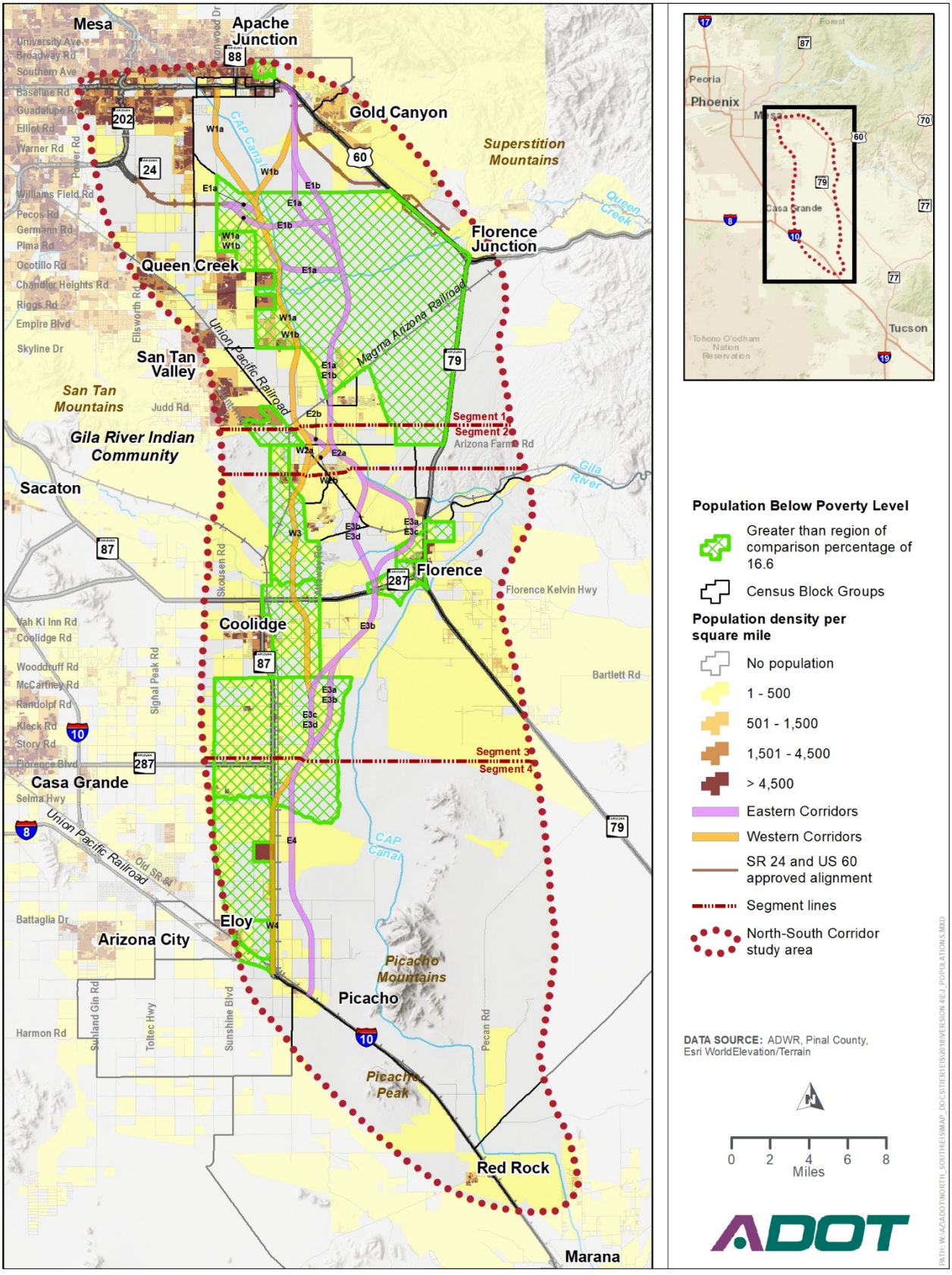
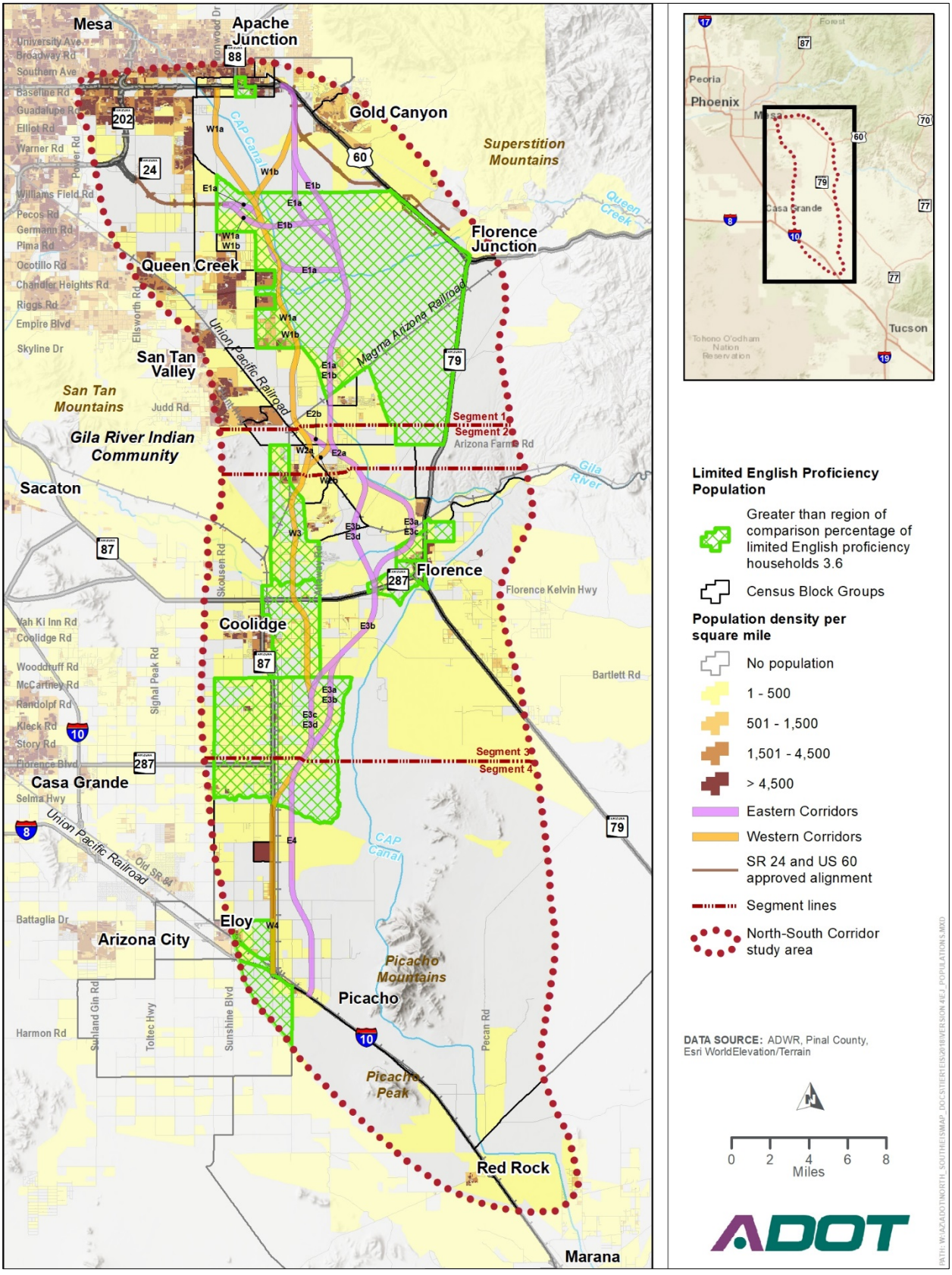


Figure 3.17-3. Limited English proficiency households in the study area



3.17.3.4 Environmental Justice and Title VI Populations by Action Corridor Alternative

Based on the minority and low-income population definitions previously discussed and on the locations of these populations as shown in previous figures, Table 3.17-2 summarizes the minority and low-income population 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 minority and low-income 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 FEIS and ROD (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 minority and low-income population 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 a minority and low-income population 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 minority and low-income population 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 a minority and low-income population 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 minority and low-income 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 minority and low-income population 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 minority and low-income population 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 minority and low-income population areas) than along the Eastern Alternatives. While more minority and low-income population 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 minority and low-income population 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 minority and low-income 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 minority and low-income population 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 minority and low-income population 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.

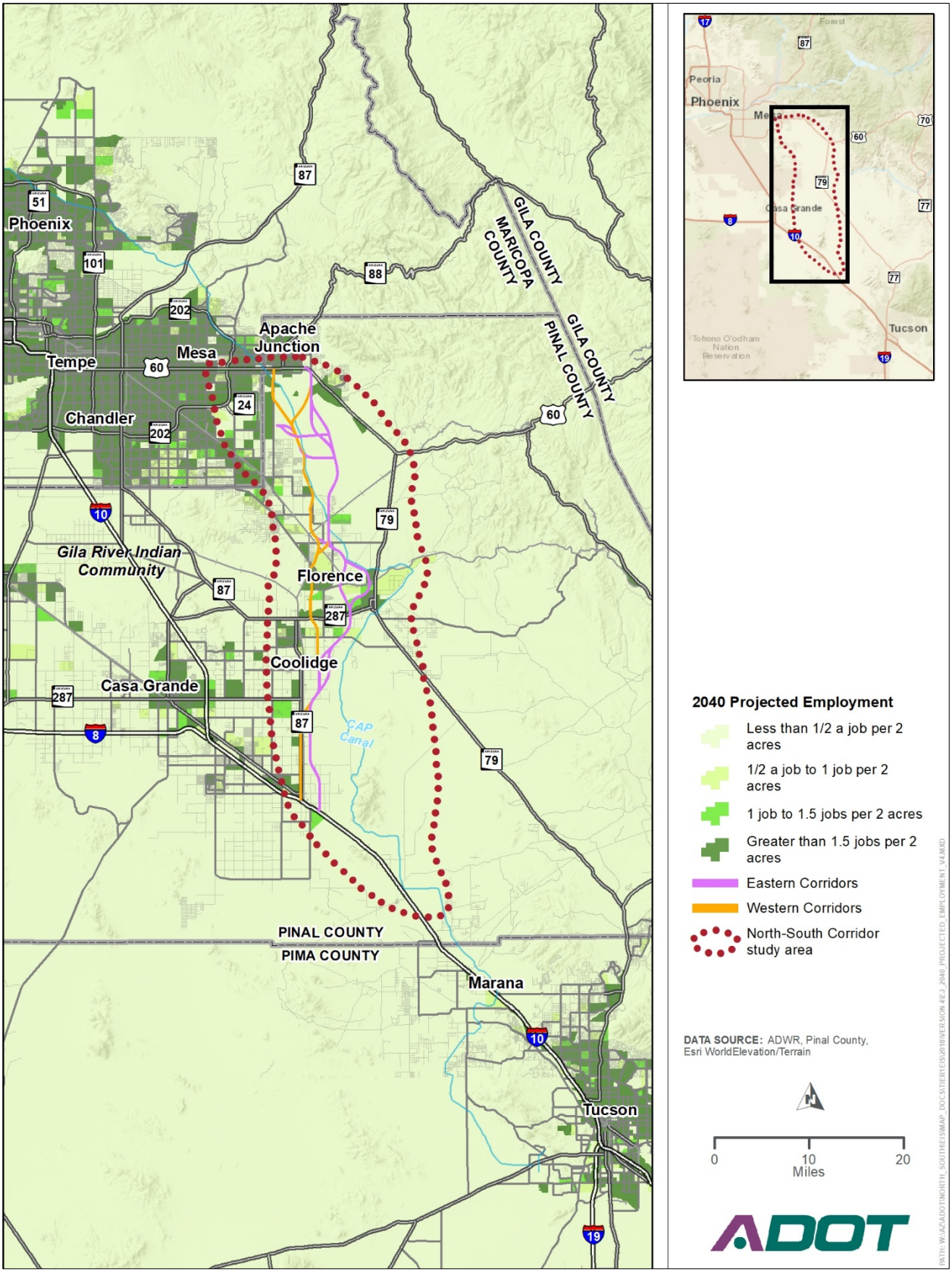
The action corridor alternatives would provide the local residents with improved connectivity and access to other key destinations in the region, such as recreation centers, universities and colleges, shopping centers, medical centers, and other public and community facilities.

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 FEIS and ROD. 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 FEIS and ROD 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 the selected 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

	Segment 1				Segment 2				Segment 3					Segment 4	
Utility type	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 FEIS 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 FEIS and ROD do 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

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 selected 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
11	401-21-0040	2680 E. Randolph Rd., Coolidge, AZ 85128	Residential farmstead	1947	E3a, E3b, E3c, E3d

Table 3.19-3. National Register of Historic Places unevaluated historic sites

#	Parcel	Address	Use	Date	Action corridor alternative
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 FEIS and ROD, 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 FEIS and ROD 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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