



Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation

Volume II – Section 3.10, Air Quality through Chapter 6, Recommended Alternative

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**Interstate 11 Corridor
Draft Tier 1 Environmental Impact Statement and
Preliminary Section 4(f) Evaluation**

Project No. M5180 01P / Federal Aid No. 999-M(161)S

Submitted pursuant to 42 U.S.C § 4332(2)(c), 49 U.S.C. § 303, and 33 U.S.C § 1251

By the

**FEDERAL HIGHWAY ADMINISTRATION and
ARIZONA DEPARTMENT OF TRANSPORTATION**

With

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Abstract

This Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS) evaluates alternatives for the Interstate 11 (I-11) Corridor in Santa Cruz, Pima, Pinal, Maricopa, and Yavapai Counties, Arizona. The purpose of I-11 is to provide a high priority, high-capacity, access-controlled transportation corridor to serve population and employment growth; support regional mobility; connect metropolitan areas and markets; enhance access to support economic vitality; and provide regional route redundancy for emergency and defense purposes. The Draft Tier 1 EIS evaluates a set of Build Corridor Alternatives and the No Build Alternative to characterize the potential effects of each on the social, economic, and natural environment. The No Build Alternative represents the existing transportation system, with committed improvement projects that are programmed for funding. A hybrid combination of the Build Corridor Alternatives has been identified as the Recommended Alternative.

The objective of this Draft Tier 1 EIS is to provide sufficient information for the public, agencies, and Tribes to comment on the analysis of the alternatives and the Recommended Alternative. Based on the analysis presented in this Draft Tier 1 EIS and after consideration of public and stakeholder input received during the public comment period, the Federal Highway Administration and the Arizona Department of Transportation (ADOT) will identify a Preferred Alternative in the Final Tier 1 EIS.

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Draft Tier 1 EIS Public Comment Period

The Arizona Department of Transportation, in conjunction with Federal Highway Administration, have made the Draft Tier 1 EIS available for public review and comment. It will be published in the Federal Register. Submit your comments on the I-11 Draft Tier 1 EIS during the public review and comment period: **April 5, 2019, through May 31, 2019**. All comments received during the comment period will be documented and responded to in the I-11 Final Tier 1 EIS. All comment methods are considered equal. After reading the Draft Tier 1 EIS, please provide specific written comments on its contents.

Comments can be provided in the following methods:

- At the public hearings
- Online: **i11study.com/Arizona**
- Phone: 1.844.544.8049 (bilingüe)
- Mail: I-11 Tier 1 EIS Study Team, c/o ADOT Communications, 1655 West Jackson Street, Mail Drop 126F, Phoenix, AZ 85007
- Email: **I-11ADOTStudy@hdrinc.com**

The Draft Tier 1 EIS is available at **i11study.com/Arizona/Documents**, and for review only and at no charge at the following locations:

Repositories for the Public Review of the Draft Tier 1 EIS

County	Repository Location and Address
Santa Cruz	Nogales-Rochlin Library, 518 N Grand Avenue, Nogales, AZ, 85621
Pima	Sahuarita Library, 725 W Via Rancho Sahuarita, Sahuarita, AZ 85629
	Joyner-Green Valley Library, 601 N La Cañada Drive, Green Valley, AZ 85614
	Mission Public Library, 3770 S Mission Road, Tucson, AZ 85713
	Joel D. Valdez Main Library, 101 N Stone Avenue, Tucson, AZ 85701
	Ellie Towne Flowing Wells Community Center, 1660 W Ruthrauff Road, Tucson, AZ 85705
	Picture Rocks Fire District, Station 121, 7341 N Sandario Road, Tucson, AZ 85743
	Town of Marana Municipal Complex, 11555 W Civic Center Drive, Marana, AZ 85653
Pinal	Casa Grande Main Library, 449 N Drylake Street, Casa Grande, AZ 85122
	Maricopa Public Library, 41600 W Smith Enke Road, Maricopa, AZ 85138
	Thunderbird Fire Station 12356 N Ralston Rd Maricopa, AZ 85139
Maricopa	Buckeye District Fire Station 326 19937 W Arlington Road Buckeye, AZ 85326
	Goodyear Library 14455 W Van Buren St C-101, Goodyear, AZ 85338
	Burton Barr Central Library, 1221 N Central Avenue, Phoenix, AZ 85004
	Gila Bend Library, 202 N Euclid Avenue, Gila Bend, AZ 85337
	Buckeye Public Library - Coyote, 21699 W Yuma Road, Buckeye, AZ 85326
	Buckeye Downtown Library, 310 N 6th St., Buckeye, AZ 85326
	Buckeye City Hall, 530 E Monroe Avenue, Buckeye, AZ 85326
	Northwest Regional Library, 16089 N Bullard Avenue, Surprise, AZ 85374
Yavapai	Wickenburg Public Library, 164 E Apache Street, Wickenburg, AZ 85390
	Wickenburg Town Hall, 155 N Tegner Street, Ste A, Wickenburg, AZ 85390

Printed copies of the Draft Tier 1 EIS also are available for purchase at:

Vendor Locations to Purchase Copies of the Draft Tier 1 EIS

County	Vendor Information
Santa Cruz	Unicom Grafix, Inc., 869 North Grand Avenue, Nogales, AZ 85621, 520-287-9434
Pima	FedEx, 8150 North Cortaro Road, Tucson, AZ 8574, 520-572-8345 *
	FedEx, 2607 East Speedway Boulevard, Tucson, AZ 85716, 520-795-7796 *
Pinal	Impressive Imaging, 44480 West Honeycutt Road, Suite 102, Maricopa, AZ 85138, 520-568-3098
	International Minute Press, 973 East Cottonwood Lane, Suite 105, Casa Grande, AZ 85122, 520-876-4607
Maricopa	AlphaGraphics, 2120 East Camelback Road, Phoenix, AZ 85016, 602-515-0270
	To The Limit Printing Solutions Inc, 108 North 4th Street, Buckeye AZ 85326, 623-374-4303
Yavapai	Wickenburg Kwikprint, 10 South Kerkes St. #3, Wickenburg, AZ 85390, 928-684-7229
* Also has option to order a copy online at FedEx.com and have it delivered at requestor expense.	

Six public hearings to provide information and accept comments on the Draft Tier 1 EIS will be held on:

Public Hearings

County	Date and Time	Location and Address
Maricopa	Monday, April 29 5 to 8 p.m.	Palo Verde Energy Education Center 600 N Airport Road, Buckeye, AZ 85326
Maricopa	Tuesday, April 30 4 to 7 p.m.	Wickenburg Community Center 155 N Tegner Street, Wickenburg, AZ 85390
Pinal	Wednesday, May 1 5 to 8 p.m.	Holiday Inn 777 N Pinal Avenue, Casa Grande, AZ 85122
Santa Cruz	Tuesday, May 7 4 to 7 p.m.	Quality Hotel Americana 639 N Grand Avenue, Nogales, AZ 85621
Pima	Wednesday, May 8 3 to 8 p.m.	Tucson Convention Center Ballrooms/Lobby 260 S Church Avenue, Tucson, AZ 85701
Pima	Saturday, May 11 11 a.m. to 4 p.m.	Marana High School Cafeteria 12000 W Emigh Road, Tucson, AZ 85743



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Acronyms and Abbreviations

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
100 MVMT	One hundred million vehicle miles of travel
4(f)	Section 4(f) of the USDOT Act of 1996 pertains to protecting public parks, recreation areas, wildlife and waterfowl refuges and historic sites.
4WD	4-wheel drive
AAC	Arizona Administrative Code
AADT	Annual Average Daily Traffic
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AGFD	Arizona Game and Fish Department
Ak-Chin	Ak-Chin Indian Community
AMA	Active Management Area
amsl	Above Mean Sea Level
AOI	Area of Influence
APE	Area of Potential Effects
AQRV	Air Quality Related Value
Arizona Model	Arizona Statewide Travel Demand Model
ARS	Arizona Revised Statute
ASLD	Arizona State Land Department
ASTM	ASTM International
AVE	Area of Visual Effect
AWLWG	Arizona Wildlife Linkages Working Group
AZ	Arizona
AZDA	Arizona Department of Agriculture
AZGS	Arizona Geological Survey
AZPDES	Arizona Pollutant Discharge Elimination System
BLM	Bureau of Land Management
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe Railroad
BUILD	Better Utilizing Investments to Leverage Development
CA	Cooperating Agency
CAA	Clean Air Act
CAG	Central Arizona Governments



CAP	Central Arizona Project
CAVSARP	Central Area Valley Storage and Recovery Project
CAWCD	Central Arizona Water Conservation District
CCA	Candidate Conservation Agreement
CDP	Census Designated Places
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Resource Conservation and Liability Act
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CT	Census Tract
CWA	Clean Water Act
dBA	a-weighted decibel
DOT	Department of Transportation
DPS	Distinct Population Segment
Draft Tier 1 EIS	Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Summary
EPA	Environmental Protection Agency
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAST Act	Fixing America's Surface Transportation Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
FR	Federal Register
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FUDS	Formerly Used Defense Site
FUP	Floodplain Use Permit
g	Standard Gravity
GHG	Greenhouse Gas
GIS	Geographic Information System
GMU	Game Management Unit
GRP	Gross Regional Product



HCP	Habitat Conservation Plan
HDMS	Heritage Data Management System
Hwy	Highway
I	Interstate
IBA	Important Birding Areas
IWCS	Intermountain West Corridor Study
KOP	Key Observation Point
LE	Listed as Endangered under the ESA
LEDPA	Least Environmentally Damaging Practicable Alternative
LEP	Limited English Proficiency
LIB	Large Intact Blocks
LOS	Level of Service
LPOE	Land Port of Entry
LT	Listed as Threatened under the ESA
LU	Landscape Unit
LUST	Leaking Underground Storage Tank
LWCFA	Land and Water Conservation Fund Act
MAG	Maricopa Association of Government
MAP-21	Moving Ahead for Progress in the 21st Century Act
MBTA	Migratory Bird Treaty Act
mi	miles
MPC	Master Planned Community
mph	miles per hour
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Stormwater Sewer System
MSAT	Mobile Source Air Toxic
MVMT	million vehicle miles of travel
MW	Megawatt
N/A	Not Applicable
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NAC	noise abatement criteria
NAR	Noise Abatement Requirements
NDOT	Nevada Department of Transportation
NEPA	National Environmental Policy Act
NF	National Forest
NHL	National Historic Landmark
NHP	National Historical Park



NHPA	National Historic Preservation Act
NHT	National Historic Trail
NM	National Monument
NO ₂	Nitrogen Dioxide
NOI	Notice of Intent
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
O&M	Operations and Maintenance
O ₃	Ozone
OAW	Outstanding Arizona Water
°C	degrees Celsius
°F	degrees Fahrenheit
OHV	Off-highway vehicle
PA	Programmatic Agreement
PAG	Pima Association of Governments
PDO	property damage only
PEL	Planning and Environmental Linkage
PGA	Peak Ground Acceleration
Pima	Listed by Pima County as Sensitive (as used in as used in Special Status Species tables)
PLO	Public Land Order
PM	Particulate Matter
PM ₁₀	Particulate Matter less than ten microns
PM _{2.5}	Particulate Matter less than 2.5 microns
ppb	parts per billion
PPC	Pima pineapple cactus
ppm	parts per million
Project Team	Federal Highway Administration, Arizona Department of Transportation, and their consultants
PWS	Public Water Systems
RCRA	Resource Conservation and Recovery Act
Reclamation	Bureau of Reclamation
REMI	Regional Economic Models, Inc.



RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
RTC	Regional Transportation Commission of Southern Nevada
RTP	Regional Transportation Plan
S	Sensitive (as used in Special Status Species tables)
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAVSARP	Southern Area Valley Storage and Recovery Project
SC	Species of Concern (as used in the Special Status Species tables)
SCIP	San Carlos Irrigation Project
SCMPO	Sun Corridor Metropolitan Planning Organization
SDCP	Sonoran Desert Conservation Plan
SDNM	Sonoran Desert National Monument
SDWA	Safe Drinking Water Act
SEAGO	South Eastern Arizona Governments Organization
Section 106	A portion of the National Historic Preservation Act
Section 6(f)	The section of the 1965 Land and Water Conservation Fund Act
SERI	Species of Economic and Recreational Importance
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SNP	Saguaro National Park
SPRR	Southern Pacific Railroad
SR	State Route
SRMA	Special Recreation Management Area
SSA	Sole Source Aquifer
STIP	State Transportation Improvement Program
STRAHNET	Strategic Highway Network
Study Area	I-11 Corridor Study Area
SWAP	Arizona State Wildlife Action Plan 2012 – 2022
TCE	temporary construction easement
TI	Traffic Interchange
TIP	Transportation Improvement Plan
TMC	Tucson Mitigation Corridor
TNM	Traffic Noise Model
TW	Tucson Water
UPRR	Union Pacific Railroad
US	United States



US Institute	US Institute for Environmental Conflict Resolution
USACE	United States Corps of Engineers
USAF	United States Air Force
USC	United States Code of Federal Regulations
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tank
VIA	Visual Impact Assessment
VMRA	Vulture Mountain Recreation Area
VMRA	Vulture Mountain Recreation Area (geographical area)
VMRMZ	Vulture Mountain Recreation Management Zone
VMT	vehicle miles traveled
VP	Viewpoint
vpd	vehicles per day
VQMP	Visual Quality Management Plan
VRI	Visual Resources Inventory
VRM	Visual Resource Management
VRP	Voluntary Remediation Program
Western	Western Area Power Administration
WQARF	Water Quality Assurance Revolving Fund
WUS	Waters of the US



3.10 Air Quality

A qualitative air quality assessment was conducted to identify potential changes in vehicle emissions as a result of implementing the Interstate 11 (I-11) Build Corridor Alternatives in comparison to the No Build Alternative. The following analysis is qualitative and does not include a detailed quantitative evaluation of air quality emissions, which is consistent with a Tier 1 study. Additional analysis would be required for a Tier 2 environmental review, as discussed in Section 3.10.2.

3.10.1 Regulatory Setting

3.10.1.1 Federal Regulations

Air quality is regulated at the national level by the Clean Air Act of 1970 (CAA) (42 United States Code 7401 et seq) as amended in 1977 and 1990. The United States (US) Environmental Protection Agency (USEPA) is responsible for establishing National Ambient Air Quality Standards (NAAQS) for the following six criteria pollutants: carbon monoxide (CO), ground-level ozone (O₃), nitrogen dioxide (NO₂), sulfur dioxide, coarse and fine particulate matter (PM) (less than or equal to 10 microns [PM₁₀] and less than or equal to 2.5 microns [PM_{2.5}], respectively), and lead. Of the six NAAQS pollutants, transportation sources contribute to CO, NO₂, PM, and ozone (USEPA 2017a). USEPA works with state and local jurisdictions to monitor ambient air levels for these pollutants. The State of Arizona adopted the NAAQS for these criteria pollutants, which are summarized in **Table 3.10-1** (National Ambient Air Quality Standards for Criteria Pollutants).

Geographic areas that violate a NAAQS for a criteria pollutant are considered “nonattainment areas” (NAA) for that pollutant. Conversely, areas that are below a criteria pollutant standard are considered “attainment” areas. Maintenance areas are defined as having previously violated the NAAQS for a criteria pollutant NAA, but are currently attaining the standard and have developed a maintenance plan outlining steps for continued attainment over the maintenance period. Specific requirements are placed on the transportation planning process in air quality NAA that do not meet the NAAQS emissions limits and in areas that were reclassified from NAAs to maintenance areas.

In addition to the NAAQS for criteria air pollutants, USEPA also regulates air toxics under Section 202 of the CAA. Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics (pollutants suspected or known to cause cancer) defined by the CAA. MSATs were identified as an issue of concern related to transportation projects (USEPA 2017b). MSATs are toxic compounds emitted from on-road mobile sources (e.g., vehicles), non-road mobile sources (such as airplanes and locomotives), and stationary sources (such as factories and refineries). In 2007, USEPA issued a Final Rule on controlling emissions of hazardous air pollutants (USEPA 2007).

3.10.1.2 Clean Air Act Conformity

Implementation of any of the Build Corridor Alternatives would require approval by USEPA under the Transportation Conformity Requirements (i.e., 40 Code of Federal Regulations 51), requiring an analysis of criteria pollutant concentrations and comparison to the NAAQS.

Table 3.10-1 National Ambient Air Quality Standards for Criteria Pollutants

Pollutant/Averaging Time	Primary Standard ⁽¹⁾	Secondary Standard ⁽¹⁾
Carbon Monoxide (CO)		
8-hour	9 ppm ⁽²⁾	--
1-hour	35 ppm	--
Lead (Pb)		
Rolling 3-Month Average	0.15 µg/m ³	0.15 µg/m ³
Nitrogen Dioxide (NO₂)		
1-hour	100 ppb	--
Annual Arithmetic Mean ⁽³⁾	53 ppb	53 ppb
Ozone (O₃)		
8-hour ⁽⁴⁾	0.070 ppm	0.070 ppm
Particulate matter less than 2.5 microns (PM_{2.5})		
Annual	12 µg/m ³	15 µg/m ³
24-hour	35 µg/m ³	35 µg/m ³
Particulate matter less than 10 microns (PM₁₀)		
24-hour	150 µg/m ³	150 µg/m ³
Sulfur Dioxide (SO₂)		
1-hour	75 ppb	--
3-hour	--	0.5 ppm

(1) Primary standards set limits to protect public health, including the health of "sensitive populations, such as asthmatics, children and the elderly. Secondary standards set limits to protect public welfare, including protection against visibility impairment and damage to animals, crops, vegetation, and buildings.

(2) Due to mathematical rounding, a measured value of 9.5 ppm or greater is necessary to exceed the standard.

(3) The official level of the annual NO₂ standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(4) Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.

NOTE: ppm= parts per million, µg/m³= micrograms per cubic meter, ppb= parts per billion.

SOURCE: USEPA 2017a.

The Federal Highway Administration (FHWA), as the lead agency, in coordination with USEPA, must make a determination that a federal action conforms to the applicable state air quality implementation plan to achieve attainment of the NAAQS. In general, conformity rules are designed to ensure that projects using federal funds or requiring federal approval would not:

- cause or contribute to any new violation of the NAAQS,
- increase the frequency or severity of any existing violation, or
- delay timely attainment of any standard, interim emission reduction, or other milestone.

The transportation conformity process is the mechanism used by the responsible transportation planning organizations, in this case the Sun Corridor Metropolitan Planning Organization, Pima Association of Governments, and Maricopa Association of Governments, to ensure that requirements of the CAA are met for planned transportation improvements within the region. The conformity rule requires all regionally significant projects be included in the appropriate



1 Regional Transportation Plan (RTP) and Transportation Improvement Plan (TIP). The fiscally
2 constrained RTP and TIP must identify all projects that are expected to receive federal funds or
3 that will require FHWA approval. For any Build Corridor Alternative to be implemented (including
4 the limited improvements under the No Build), it must be included in a regional emissions
5 analysis that demonstrates conformity to the State Implementation Plans (SIPs) to comply with
6 the CAA. To demonstrate conformity, the RTP and TIP total emissions must be consistent with
7 the established motor vehicle emissions budget, including for the applicable transportation
8 planning organization. Conformity would be established during Tier 2 studies.

9 In addition to the regional conformity determination, the project must be assessed as to whether
10 it will cause a violation of the NAAQS for criteria pollutants in localized areas, known as
11 hotspots. The NAAQS pollutants of concern for transportation hotspots are CO, PM_{2.5}, and
12 PM₁₀. The CO hotspots would most likely be a concern where traffic is very congested and slow
13 moving, such as high-volume intersections. The PM₁₀ and PM_{2.5} hotspot analyses would be
14 required if building the project would result in a high number of heavy trucks or other large
15 diesel vehicles in the corridor, which would make it a “project of air quality concern” in terms of
16 federal conformity screening criteria for PM. The conformity rule spells out criteria for when CO,
17 PM_{2.5}, and PM₁₀ hotspot analyses are required. The O₃ level is influenced by regional pollutant
18 emissions and is not typically a hotspot concern; therefore, a local analysis is not appropriate for
19 O₃. NAAQS assessment also would occur during Tier 2 studies, as appropriate.

20 3.10.1.3 Mobile Source Air Toxics

21 Controlling air toxic emissions became a national priority with the passage of the CAA
22 Amendments of 1990, whereby the US Congress mandated that the USEPA regulate 188 air
23 toxics, also known as hazardous air pollutants. The USEPA assessed this expansive list in its
24 rule on the Control of Hazardous Air Pollutants from Mobile Sources (USEPA 2007), and
25 identified a group of 93 compounds emitted from mobile sources that are part of USEPA’s
26 Integrated Risk Information System (USEPA 2017c). In addition, USEPA identified nine
27 compounds with significant contributions from MSATs that are among the national- and
28 regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the
29 2011 National Ambient Air Toxics Assessment (USEPA 2011). These are 1,3-butadiene,
30 acetaldehyde, acrolein, benzene, diesel PM, ethylbenzene, formaldehyde, naphthalene, and
31 polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the
32 list is subject to change and may be adjusted in consideration of future USEPA rules.

33 USEPA’s 2007 Final Rule on controlling air toxics emissions mentioned above requires
34 emissions controls that will dramatically decrease MSAT emissions through cleaner fuels and
35 cleaner engines. According to FHWA, analysis using USEPA’s Motor Vehicles Emissions
36 Simulator model indicates that even if vehicle miles traveled (VMT) increases by 45 percent by
37 2050, as assumed, a combined reduction of 91 percent in the total annual emissions rate for the
38 priority MSATs is projected from 2010 to 2050 (FHWA 2016). **Figure 3.10-1** (FHWA Predicted
39 National MSAT Trends 2010-2050 for Vehicles Operating on Roadways) illustrates the
40 predicted trends for MSAT levels.

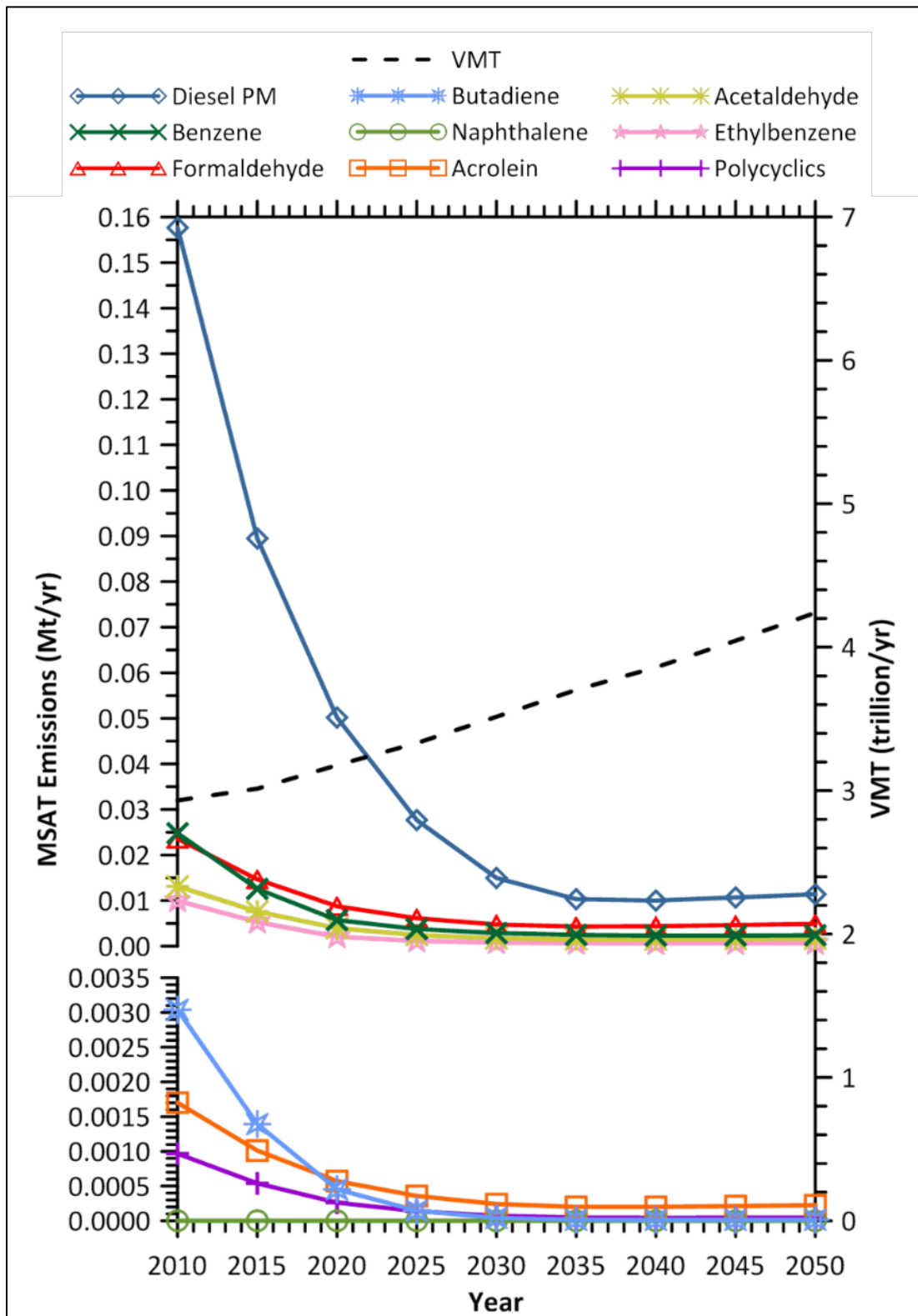


Figure 3.10-1 FHWA Predicted National MSAT Trends 2010-2050 for Vehicles Operating on Roadways



Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project-level decision-making within the context of National Environmental Policy Act (NEPA).

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, the public and other agencies expect the lead agencies to address MSAT impacts in environmental documents. FHWA, USEPA, Health Effects Institute, and others have funded and conducted research studies to try to more clearly define the potential risk from MSAT emissions associated with highway projects. FHWA will continue to monitor the developing research in this emerging field.

3.10.1.4 Greenhouse Gases

Climate change is a critical national and global concern. Human activity is changing the earth's climate by causing the buildup of heat-trapping greenhouse gas (GHG) emissions through the burning of fossil fuels and other human activities. Carbon dioxide (CO₂) is the largest component of human produced emissions; other prominent emissions include methane, nitrous oxide, and hydrofluorocarbons. These emissions are different from criteria air pollutants because their effects in the atmosphere are global rather than localized and they remain in the atmosphere for decades to centuries, depending on the species.

GHG emissions have accumulated rapidly as the world has industrialized, with concentration of atmospheric CO₂ increasing from roughly 300 ppm in 1900 to more than 400 ppm today. Over this timeframe, global average temperatures have increased by roughly 1.5 degrees Fahrenheit (°F) (1 degree Celsius [°C]), and the most rapid increases have occurred over the past 50 years. Scientists have warned that significant and potentially dangerous shifts in climate and weather are possible without substantial reductions in GHG emissions. They commonly cite 2°C (1°C beyond warming that has already occurred) as the total amount of warming the earth can tolerate without serious and potentially irreversible climate effects. For warming to be limited to this level, atmospheric concentrations of CO₂ would need to stabilize at a maximum of 450 ppm, requiring annual global emissions to be reduced 40 to 70 percent below 2010 levels by 2050 (International Panel on Climate Control [IPCC] 2014). State and national governments in many developed countries set GHG emissions reduction targets of 80 percent below current levels by 2050, recognizing that post-industrial economies are primarily responsible for GHGs already in the atmosphere. As part of a 2014 bilateral agreement with China, the US pledged to reduce GHG emissions 26-28 percent below 2005 levels by 2025; this emissions reduction pathway is intended to support economy-wide reductions of 80 percent or more by 2050 (The White House 2014).

GHG emissions from vehicles using roadways are a function of distance travelled (expressed as VMT), vehicle speed, and road grade. GHG emissions also are generated during roadway construction and maintenance activities. The I-11 Corridor is projected to handle a substantial number of heavy-duty trucks. Heavy-duty trucks have a low fuel economy; therefore, decreases in travel times would lead to a GHG emissions benefit in the region.

As with GHGs, MSAT emissions also are generally a function of distance traveled, vehicle speeds, and road grades. MSAT emissions also are generated during roadway construction and maintenance activities similar to GHGs. Decreases in travel times, which are associated with



1 improved speeds, can lead to a reduction in emissions of MSATs for all motor vehicle types
2 despite increases in distance traveled.

3 As part of FHWA's *Climate Change Resilience Pilot Program*, a study was conducted to assess
4 the vulnerability of Arizona Department of Transportation (ADOT)-managed transportation
5 infrastructure to Arizona-specific extreme weather. Long term, ADOT seeks to develop a multi-
6 stakeholder decision-making framework – including planning, asset management, design,
7 construction, maintenance, and operations – to cost-effectively enhance the resilience of
8 Arizona's transportation system to extreme weather risks.

9 For the study, ADOT elected to focus on the Interstate corridors connecting Nogales, Tucson,
10 Phoenix, and Flagstaff (I-19, I-10, and I-17). This corridor includes a variety of urban areas,
11 landscapes, biotic communities, and climate zones, which present a range of weather
12 conditions applicable to much of Arizona. The project team examined climate-related stressors
13 including extreme heat, freeze-thaw, extreme precipitation, and wildfire, considering the
14 potential change in these risk factors as the century progresses.

15 As part of the pilot program, the study leveraged the *FHWA Vulnerability Assessment*
16 *Framework*, customizing it to fit the study's needs. The project team gathered information on
17 potential extreme weather impacts, collected datasets for transportation facilities and land cover
18 characteristics (e.g., watersheds, vegetation), and integrated these datasets to perform a high-
19 level assessment of potential infrastructure vulnerabilities. Each step of the process drew
20 heavily on internal and external stakeholder input and feedback.

21 The assessment qualitatively addresses the complex, often uncertain interactions between
22 climate and extreme weather, land cover types, and transportation facilities—with an ultimate
23 focus on potential risks to infrastructure by ADOT District. Preliminary results were presented in
24 focus groups, where ADOT regional staff provided feedback on the risk hypotheses developed
25 through the desktop assessment. The results of the assessment were organized first by ADOT
26 District, then by stressor, and then further delineated by land cover types (e.g., desert), which
27 are considered qualitatively as potential factors that could either alleviate or aggravate the
28 impacts of extreme weather phenomena. The key climate stressors and impacts assessed in
29 the study were extreme temperature and precipitation events and wildfires.

30 Extreme temperatures were evaluated by assessing the potential increase in the number of
31 days when the temperature was greater than 100°F and the number of days when the
32 temperature was below freezing. Extreme heat events can lead to pavement deformation due to
33 thermal expansion, affect construction schedules and seasons, pose challenges to maintenance
34 and operations activities, and lead to unsafe conditions for workers. The study determined that
35 the number of extreme heat events is likely to increase in the Phoenix and Tucson districts,
36 which could lead to negative effects on the transportation system. The study also evaluated
37 potential changes in the number of freezing events. Freezing events can have a negative effect
38 on the transportation system by increasing operations and maintenance costs. The number of
39 freezing events is projected to decrease, which would have a positive effect in the Phoenix and
40 Tucson districts.

41 Extreme precipitation can degrade the transportation system by causing flooding/inundation and
42 mudslides. Extreme precipitation was analyzed by evaluating increases in 100-year rainfall
43 events in the districts. The study concluded that extreme precipitation events are likely to have a
44 neutral effect in the Phoenix and Tucson districts; however, it also was noted that there is a
45 lower level of confidence in these conclusions than the extreme temperature assessment.



Wildfires can disrupt the transportation system by interrupting operations and aggravating flooding or drainage failures. In the Phoenix District, there is currently a low risk for wildfire events and the study concluded that potential increases related to climate events was likely to be negligible. In the Tucson District, there is an increased risk for wildfire events, but this increase is uncertain over the long-term.

3.10.1.5 Class 1 Areas

In 1977, Congress amended the CAA to include provisions to protect the scenic vistas of the nation's national parks and wilderness areas. In these amendments, Congress declared as a national visibility goal: *The prevention of any future, and the remedying of any existing impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution (Section 169A)*. Highway transportation projects contribute to visibility concerns in NAAs and maintenance areas through primary PM_{2.5} and NO₂ emissions, which contribute to the formation of secondary PM_{2.5}. Analysis has shown that transportation impacts to visibility are minimal. Predicted 2018 emissions of nitrogen oxide vehicles contributed 23 percent of total statewide emissions, which represents a decrease of nearly 70 percent as compared to 2002 emissions (Arizona Department of Environmental Quality [ADEQ] 2011). Tailpipe emissions of coarse particulate matter were predicted to account for less than one percent of total statewide emissions in 2018 (ADEQ 2011).

Under the provisions of the CAA, USEPA designated a number of areas in the State of Arizona, including national parks and wilderness areas, as mandatory Class 1 Areas where visibility is an important value. These mandatory Class 1 Areas are listed in 40 Code of Federal Regulations 81.403. Under the USEPA Regional Haze Rule, states must establish goals to improve visibility in Class 1 Areas and develop long-term strategies to reduce emissions of pollutants that cause visibility impairment. In addition to visibility, Class I Areas have other Air Quality Related Values (AQRVs) that are indicators of potential impairment in these areas. AQRVs are distinct from the NAAQS. Goals for emissions reductions to improve visibility and other AQRVs are outlined in the SIPs.

Of the mandatory Class 1 Areas in Arizona, Saguaro National Park (SNP) is the closest to the I-11 Corridor Study Area (Study Area). SNP is located in the South Section of the Study Area and is 0.3 mile from the Build Corridor Alternative.

3.10.1.6 Fugitive Dust

Fugitive dust is PM from unstable or disturbed soil surfaces that becomes airborne due to mechanical disturbance and has the potential to adversely affect human health or the environment. About 50 percent of fugitive dust is PM₁₀ or smaller. Fugitive dust originates from agricultural, mining, construction, transportation, and manufacturing activities. This study is concerned mostly with fugitive dust generated from construction activities such as earth moving, paved-road track-out, driving on haul roads, and disturbing surface areas, since such activities would likely be required during construction of the I-11 Corridor. Re-entrained road dust also is a source of concern.

3.10.1.7 State and Local Regulations

With regard to air quality, the I-11 Corridor is under the jurisdiction of ADEQ, Sun Corridor Metropolitan Planning Organization, Pima Association of Governments, Maricopa Association of Governments, Pima County Department of Environmental Quality, Pinal County Air Quality



Control District, and Maricopa County Air Quality Control Department. These agencies regulate air pollution and operate air monitors throughout the state.

A transportation project implemented pursuant to this study would need to adhere to the following:

- ADEQ, Title 18. Environmental Quality, Chapter 2—Air Pollution Control. This rule defines ambient air quality standards, area designations and classifications, and control of hazardous air pollutants, as well as establishes controls on emissions from new and existing mobile sources and motor vehicle inspection and maintenance programs.
- Arizona Statutes, Title 49. The Environment, Chapter 3—Air Quality. This statute establishes the state air pollution control department including its powers, duties, and enforcement obligations. It also sets motor vehicle emissions standards for the state and defines the state's voluntary travel reduction program.
- Pima County, Title 17. Air Quality Control. The rules codified under Title 17 establish the county's ambient air quality standards, establish an air quality monitoring program, set limits on visible emissions, and enact a trip reduction program for major employers.
- Pinal County, Article 2. Fugitive Dust. This article enacts a variety of fugitive dust control standards including a provision that does not allow, or permit the use, repair, construction, or reconstruction of any road without taking every reasonable precaution to effectively prevent fugitive dust from becoming airborne.
- Pinal County Air Quality Control District Code of Regulations. These regulations establish ambient air quality standards and the methods and procedures for an air quality monitoring network including the methods for evaluating air quality data and interpreting the standards. It establishes attainment area designations, visibility limiting standards, controls on fugitive dust sites for construction activities, and enacts a county-level hazardous air pollutant reporting program.
- Maricopa County, Regulation III. Control of Air Contaminants. This regulation includes Rule 310 that establishes controls on fugitive dust from construction, Rule 370 on the federal hazardous air pollutants program, and Rule 372 on the Maricopa County hazardous air pollutants program.
- ADEQ and local air districts maintain a statewide network of monitoring stations that routinely measure pollutant concentrations in the ambient air. These stations provide data to assess compliance with the NAAQS and evaluate the effectiveness of pollution control strategies.

3.10.2 Methodology

The methodology for considering potential air quality impacts is focused on identifying potential NAAQS attainment implications and effects on visibility in Class 1 Areas for the Build Corridor Alternatives and the No Build Alternative in the overall Study Area. Broad comparisons are provided to address primary air quality issues in various regions. A review of Arizona SIPs was conducted to identify all NAAQS NAAs and maintenance areas in the Study Area, as well as any Build Corridor Alternatives that were located within a county that contained a Class 1 Area. The Tier 2 air quality analysis will address impacts on receptors located close to the selected improvements when Corridor Options and the associated implications of actual roadway cross sections and construction impact footprint details are available.



3.10.3 Affected Environment

The Study Area is located in portions of Santa Cruz, Pima, Pinal, Maricopa, and Yavapai counties. These counties comprise the air quality Analysis Area. The elevation of the Analysis Area ranges from approximately 4,000 feet above mean sea level near Heroica Nogales to approximately 850 feet above mean sea level near Palo Verde.

The Analysis Area is in a desert climate characterized by extremely hot summers, mild winters, and minimal precipitation. Average daily maximum temperatures in Heroica Nogales are in the low 80s (°F) and the average daily minimum temperatures are in the mid-40s (°F), with an annual average precipitation of 18 inches. Average daily maximum temperatures during the summer in Tucson and Phoenix are in the low 100s (°F). In Phoenix, the average minimum daily temperature during the winter is in the mid-40s (°F); however, Tucson experiences cooler temperatures in the winter, ranging from the high 30s to low 40s (°F). In addition, Tucson receives more precipitation than Phoenix, with an average of 10 inches compared to 6.5 inches per year, respectively. Average daily maximum temperatures in Palo Verde during the summer are in the low 100s (°F), the average minimum daily temperature in the winter is in the 40s (°F), with an average annual precipitation of 8 inches. Precipitation is in the form of rain; snowfall is rare. Precipitation is associated with afternoon showers or thunderstorms during the late summer and winter storms that originate in the Pacific Ocean and move eastward through the region.

The following discussion addresses the Analysis Area in terms of attainment status and air shed class within the Analysis Area from south to north.

In Santa Cruz County, Option A traverses the Nogales PM₁₀ NAA and the Nogales PM_{2.5} maintenance area (**Figure 3.10-2** [South Section NAAs and Maintenance Areas]). The USEPA classified Nogales as a moderate NAA for PM₁₀ on February 10, 2011, and PM_{2.5} also was classified as a moderate NAA on December 14, 2009. In Pima County, the Study Area traverses the Tucson CO limited maintenance area, the West Pinal PM₁₀ NAA, and the Rillito PM₁₀ NAA for all Options (**Figure 3.10-2** [South Section NAAs and Maintenance Areas]). The USEPA designated the Tucson area as being in attainment with the NAAQS for CO on April 25, 2000 and no violations of the NAAQS for CO have been recorded in this area for 20 years. The USEPA classified Rillito as a moderate NAA for PM₁₀ on October 6, 2006, and classified West Pinal as moderate NAA for PM₁₀ on July 2, 2012.

The Analysis Area is within close proximity to the SNP Class 1 air shed located in Pima County (**Figure 3.10-2** [South Section NAAs and Maintenance Areas]). The approximate distance from the Class 1 air shed range to the Study Area is 7,900 feet for Option A; 6,800 feet for Option B; 1,700 feet for Option C; and 1,300 feet for Option D. The variation in distance between the Corridor Options in this portion of the Analysis Area is not considered to be notable as transportation sources do not significantly contribute to visibility impairment in the Class I areas (ADEQ 2011).

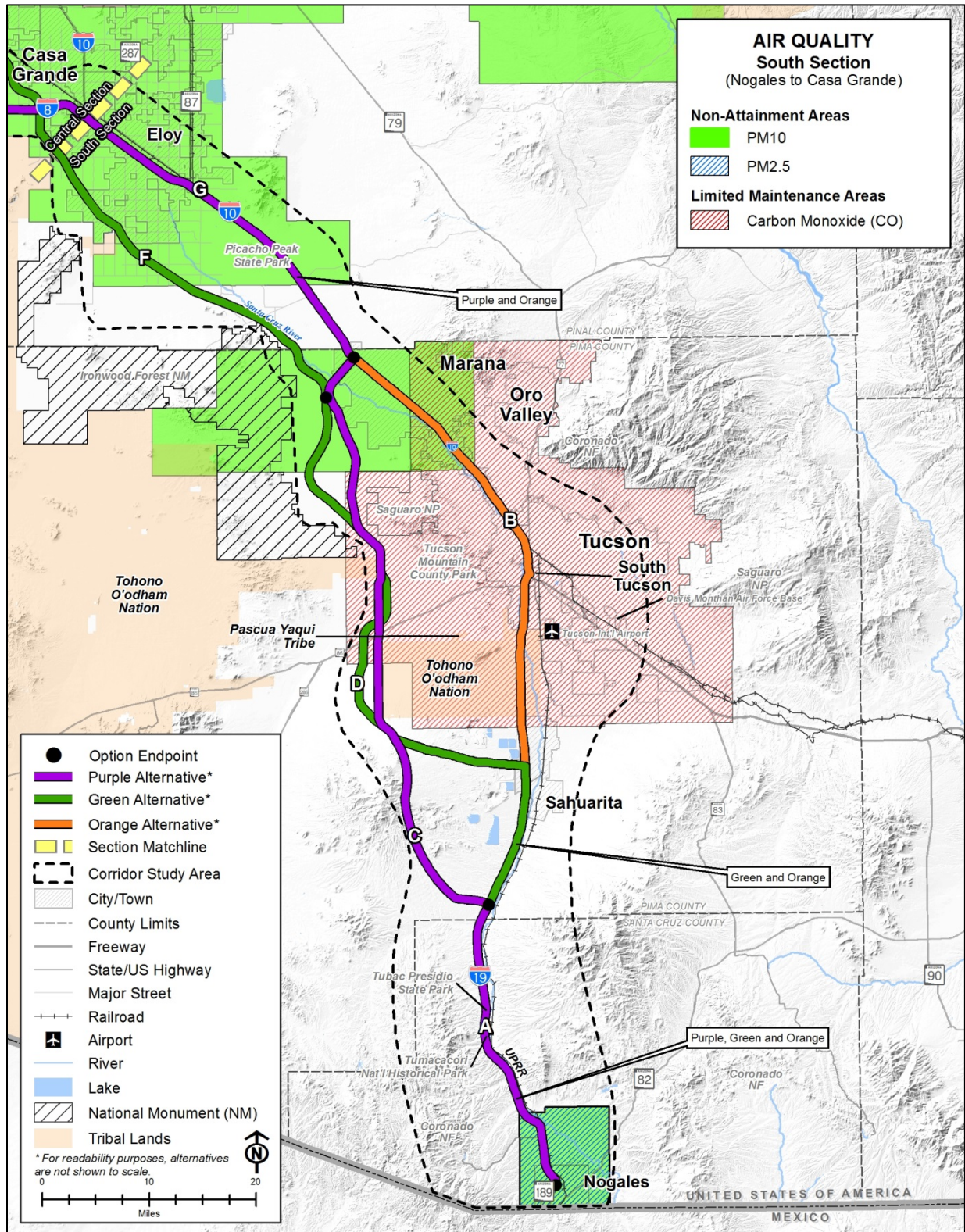


Figure 3.10-2 South Section NAAs and Maintenance Areas



1 The Study Area passes through Pinal and Maricopa counties in the Central Section. In Pinal
2 County, the Analysis Area traverses the West Pinal PM₁₀ NAA and the West Central Pinal PM_{2.5}
3 maintenance area for all Options (**Figure 3.10-3** [Central Section NAAs and Maintenance
4 Areas]). USEPA designated West Pinal as a moderate NAA for PM₁₀.

5 USEPA made the determination that the West Central Pinal area attained the NAAQS for PM_{2.5}
6 on September 4, 2013. In Maricopa County, Option L, Option M, and Option N traverse the
7 Phoenix-Mesa PM₁₀ NAA whereas Option K is located outside of this area. The Phoenix-Mesa
8 PM₁₀ NAA was classified as serious by USEPA on November 15, 2000. The Study Area is
9 located within the Phoenix-Mesa O₃ NAA, which was classified as marginal by USEPA on July
10 20, 2012.

11 The Analysis Area passes through Maricopa and Yavapai counties in the North Section. In
12 Maricopa County, the North Section of the Study Area traverses the Phoenix-Mesa O₃ NAA for
13 all Options (**Figure 3.10-4**, [North Section NAAs and Maintenance Areas]). This NAA is
14 classified as a marginal NAA by the USEPA. Yavapai County is classified as being in attainment
15 for all NAAQS and all Options traverse through this area.

16 For overall perspective, there has been a trend of decreasing total pollutant emissions in the
17 Study Area from mobile sources for several decades, even when allowing for the growing
18 number of VMT. These improving results are due to a series of successful emission control
19 regulations. On-road sources account for varying amounts of the overall emissions but tend to
20 be declining even though national VMT more than doubled over the past 30 years. Advances in
21 vehicle technology and cleaner fuels have been major reasons for the improvements. Recent
22 federal regulations on vehicle emissions are expected to continue the trend of improvement and
23 further lower vehicle emissions in the future. Air quality in the Study Area has steadily been
24 improving as demonstrated by the numerous decisions by USEPA that former nonattainment
25 areas in the Study Area are now in attainment with the NAAQS. Emissions inventory collected
26 by the USEPA indicates a downward trend in total statewide highway emissions of CO, nitrogen
27 oxide, volatile organic compounds, and particulate matter over the last 20 years (**Figure 3.10-5**
28 [South Section Class I Areas], **Figure 3.10-6** [Annual Statewide Highway Emissions of Carbon
29 Dioxide], **Figure 3.10-7** [Annual Statewide Highway Emissions of Oxides of Nitrogen and
30 Volatile Organic Compounds]), and **Figure 3.10-8** [Annual Statewide Highway Emissions of
31 Particulate Matter]) (USEPA 2018).

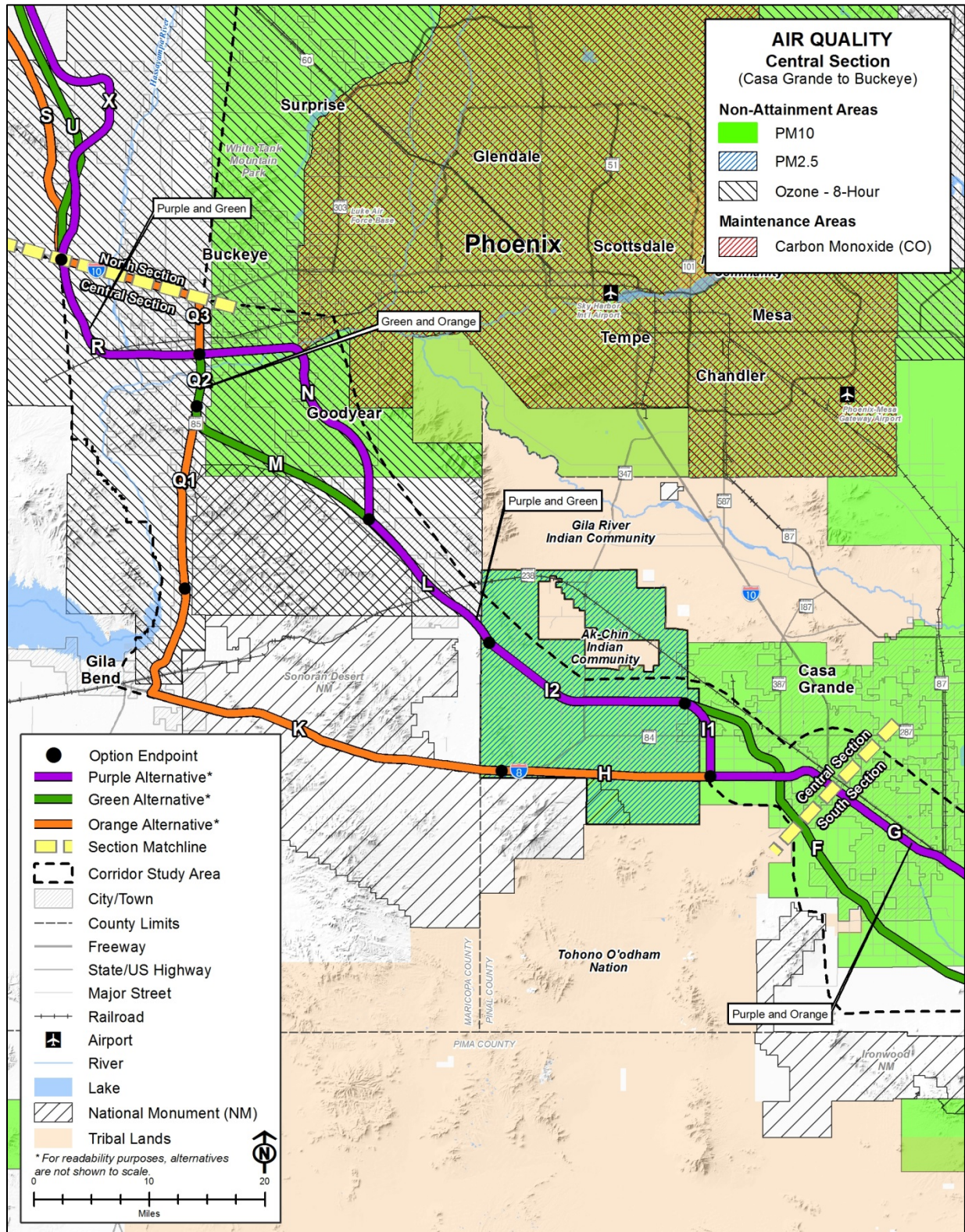


Figure 3.10-3 Central Section NAAs and Maintenance Areas

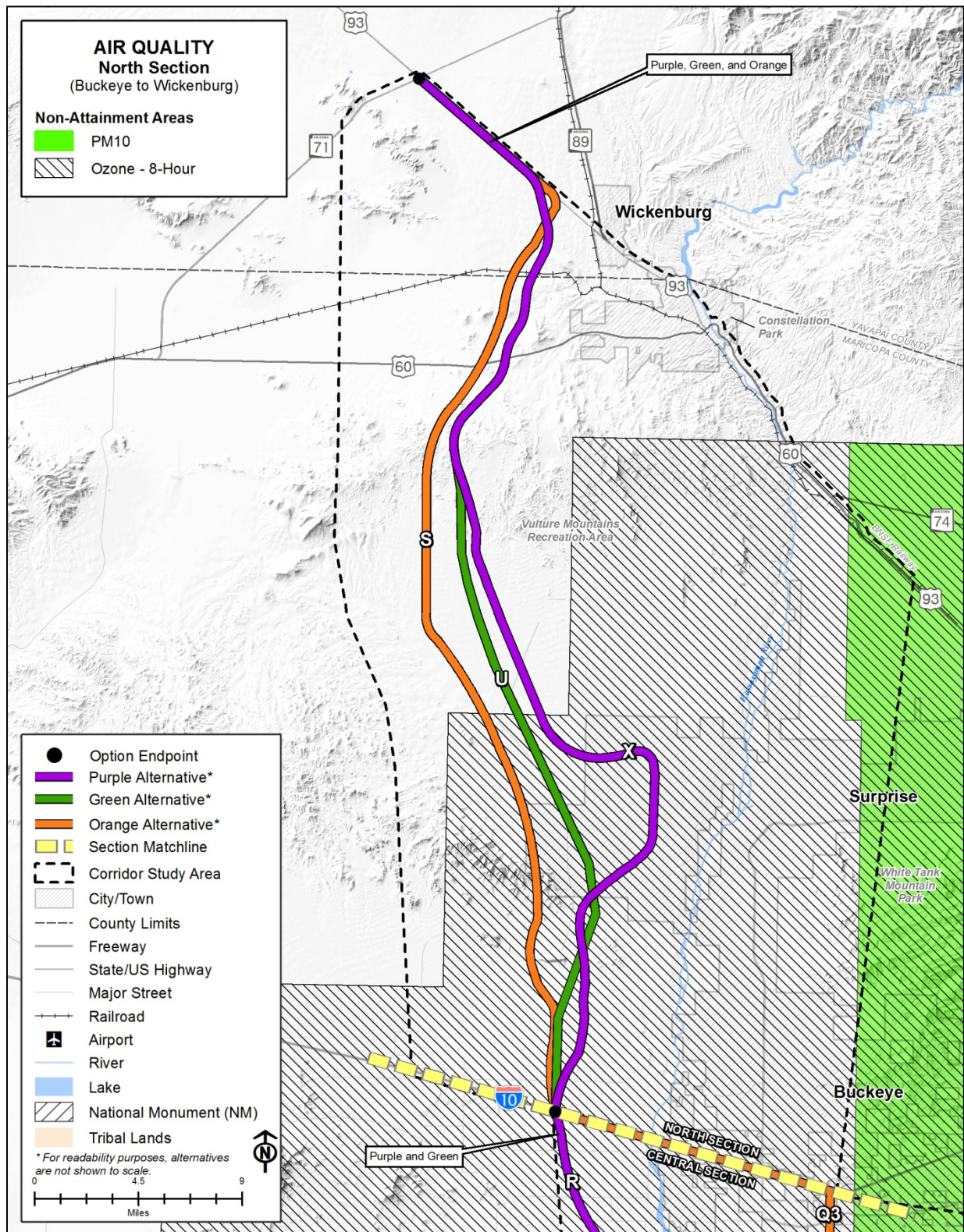


Figure 3.10-4 North Section NAAs and Maintenance Areas

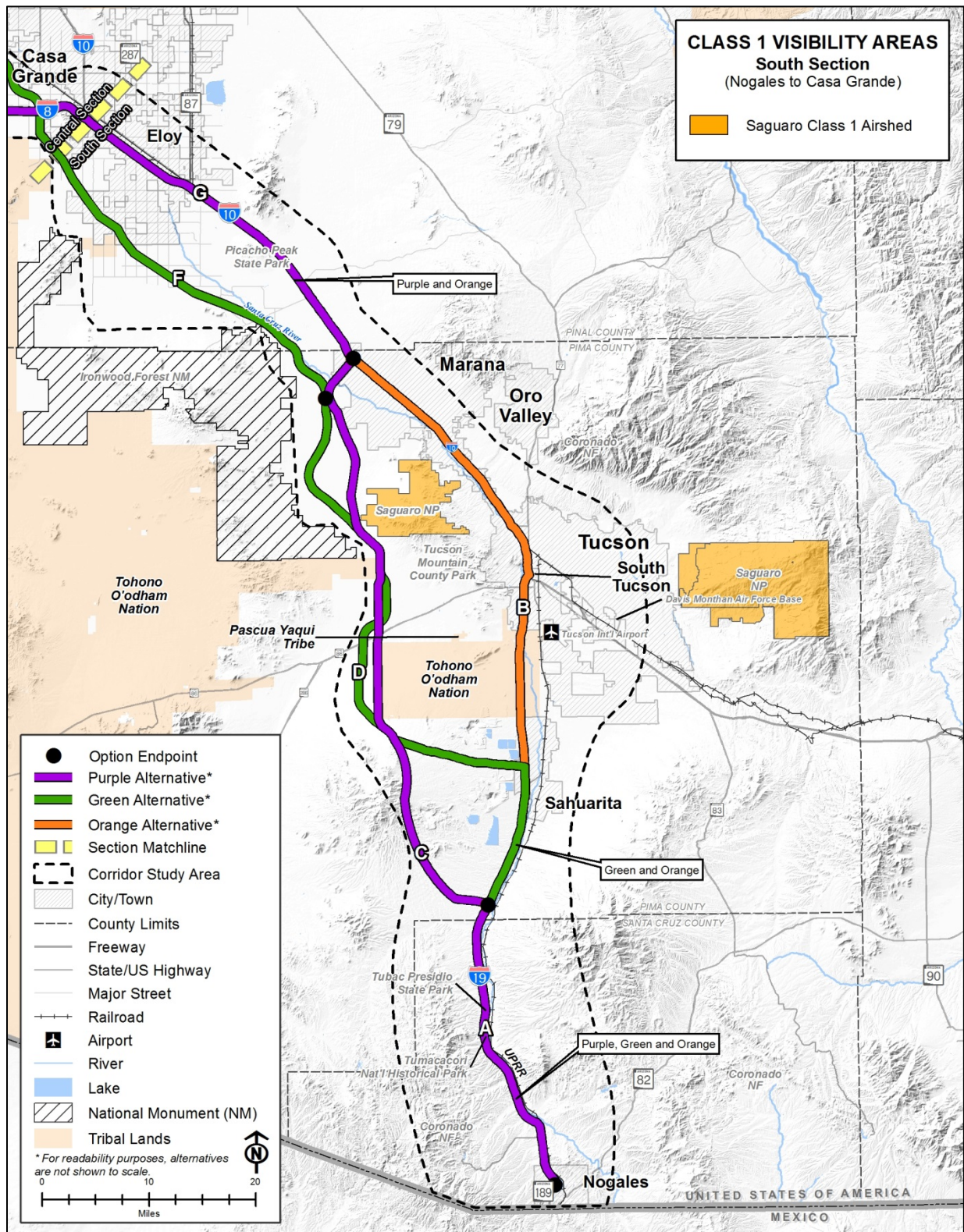


Figure 3.10-5 South Section Class I Areas

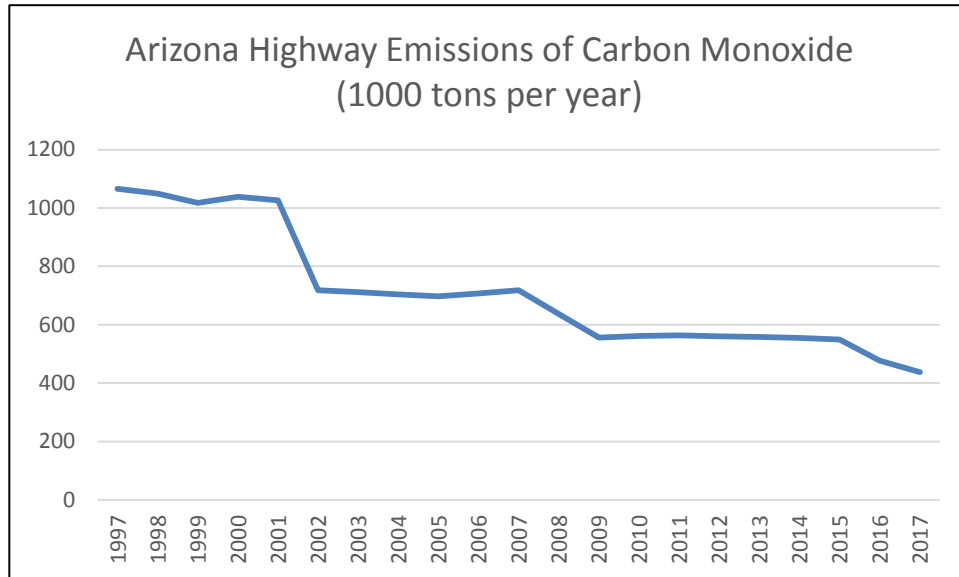


Figure 3.10-6 Annual Statewide Highway Emissions of Carbon Dioxide

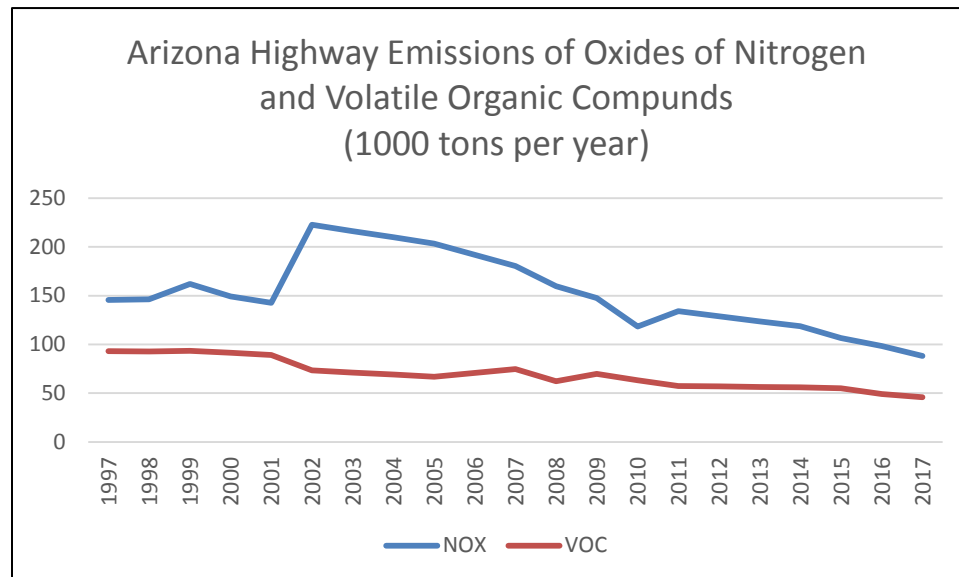


Figure 3.10-7 Annual Statewide Highway Emissions of Oxides of Nitrogen and Volatile Organic Compounds

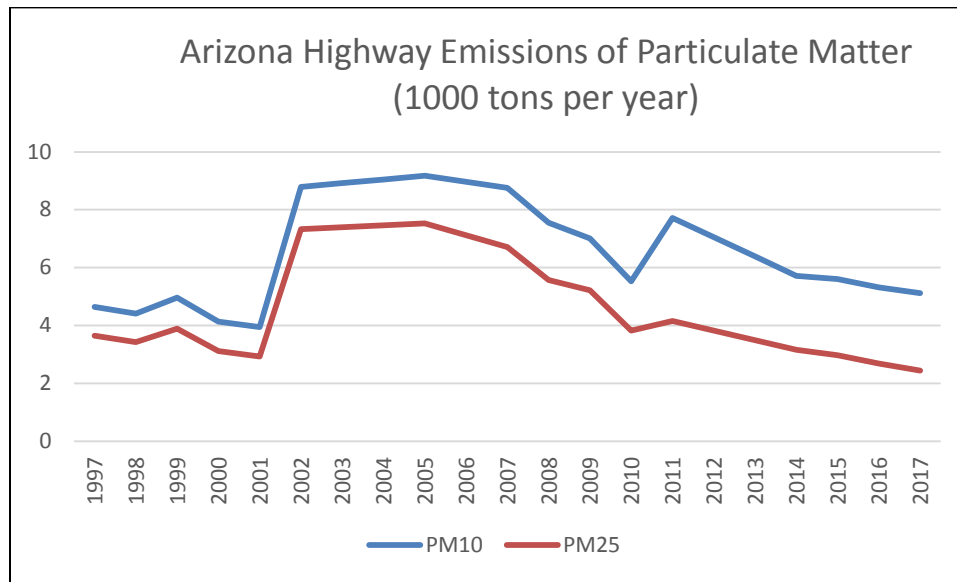


Figure 3.10-8 Annual Statewide Highway Emissions of Particulate Matter

1 From an air quality planning perspective, there is little potential difference in air quality within the
 2 Analysis Area because the NAAQS designations do not differ between Corridor Options with
 3 one exception. Option K is located outside of the Phoenix-Mesa PM₁₀ NAA, which is classified
 4 as “serious” by USEPA. All other Corridor Options are within the Phoenix-Mesa NAA.

5 **3.10.4 Environmental Consequences**

6 For all Build Corridor Alternatives, air quality effects are driven by the behavior of vehicles in the
 7 transportation network. Transportation strategies that are implemented through a Build Corridor
 8 Alternative can have positive benefits on air quality by reducing emissions. Transportation
 9 strategies associated with the Build Corridor Alternatives generally affect emissions by having
 10 one or more of the following effects:

- 11 • Reducing VMT and/or vehicle trips;
- 12 • Reducing congestion and vehicle idling; or
- 13 • Improving traffic speeds or traffic flow.

14 The critical transportation strategies associated with the Build Corridor Alternatives are reducing
 15 congestion and improving traffic speeds. Improvements in speeds generally reduce emissions
 16 of criteria pollutants and can even offset increases in VMT (**Figure 3.10-9** [FHWA PM₁₀
 17 Emissions Factors by Speed for Light-Duty Vehicles and Trucks, 2018]). Emissions of GHGs
 18 and MSATs also are generally reduced as speeds improve.

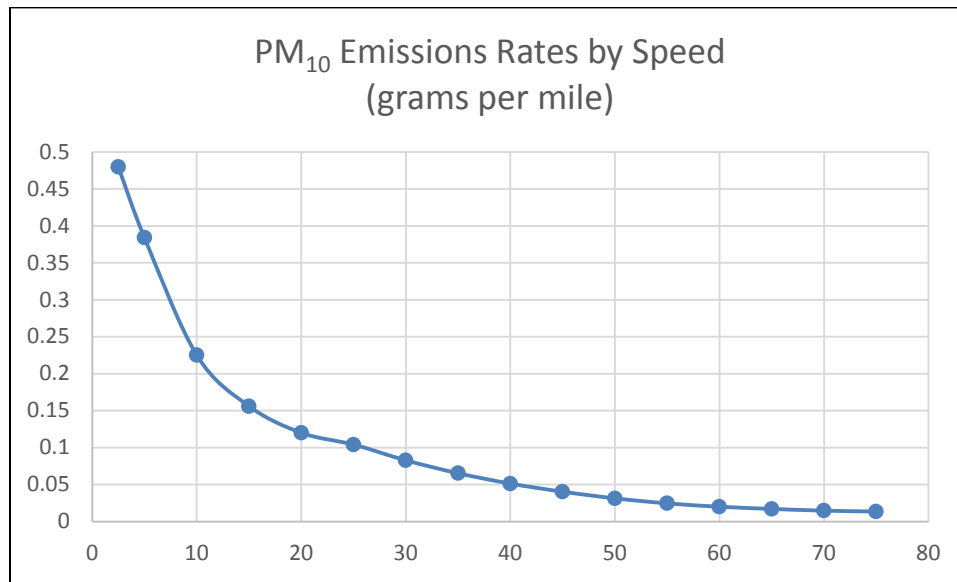


Figure 3.10-9 FHWA PM₁₀ Emissions Factors by Speed for Light-Duty Vehicles and Trucks, 2018

1 Similarly, reducing congestion and associated vehicle idling also reduces motor vehicle
2 emissions. Heavy-duty trucks are the dominant source of PM emissions for motor vehicles.
3 Therefore, improvements in freight travel patterns (i.e., improved speeds and reduced travel
4 times) can lead to a reduction in emissions of PM. In the long-term, increases in traffic and
5 freight movement are expected under all Build Corridor Alternatives. However, the Build
6 Corridor Alternatives are expected to generate improvements in daily freight travel patterns as
7 compared to the No Build Corridor Alternative (**Table 3.10-2** [Changes in Daily Freight Travel
8 Patterns Relative to the No Build]). Improvements to daily freight travel patterns are negligible in
9 the South Section for all Build Corridor Alternatives. Improvements to daily freight travel patterns
10 are moderate for the Orange Alternative for the Central Section because it does not divert a
11 substantial number of vehicles between Nogales and Phoenix off I-19 and I-10. Freight patterns
12 in the North Section are moderate in the Purple Alternative and substantial for the Green and
13 Orange Alternatives. Therefore, collocating a Build Corridor Alternative on I-10 would have the
14 greatest potential air quality benefit as collocation would minimize construction emissions and
15 other environmental impacts.

Table 3.10-2 Changes in Daily Freight Travel Patterns Relative to the No Build

Section	Changes on Daily Freight Volumes		
	Purple Alternative	Green Alternative	Orange Alternative
High Percentage of Trucks			
South	Negligible	Negligible	Negligible
Central	Substantial	Substantial	Moderate
North	Moderate	Substantial	Substantial
End-to-End	Substantial	Substantial	Moderate

NOTE: Shading shown for substantial changes in travel patterns. The changes in travel patterns are beneficial effects of the project. For more information, see Section 3.2, Transportation.



Because the I-11 Corridor is expected to carry a high percentage of trucks, improvements in daily freight travel patterns could lead to a reduction in emissions of PM as compared to the No Build Corridor Alternative.

In the South Section of the Study Area there will be an increase in freight travel from vehicles originating from Mexico. Mexico has differing vehicle emissions control regulations from the US. Emissions from Mexico are outside of this action and jurisdiction of US. However, emissions from all vehicles, including those from Mexico, are included in the SIP emissions inventories used to demonstrate attainment or progress towards attainment with the NAAQS. Emissions from Mexico are partially limited by restrictions placed on freight vehicles that travel from Mexico to the US through Nogales and the Mariposa Port of Entry on State Route (SR) 189. Commercial zones for the Nogales Port of Entry limit transportation to within four miles of the City of Nogales municipal boundary (Federal Motor Carrier Safety Administration 2018). In addition, overweight trucks passing through the Nogales Port of Entry and carrying non-divisible loads must obtain a permit issued by ADOT which restricts their travel to within 25 miles of the Port of Entry.

Reductions in emissions of criteria pollutants, GHGs, and MSATs from passenger vehicles also can occur from improved speeds and reduced travel times, which, along with reductions in congestion, are anticipated from the Build Corridor Alternatives. Section 3.2, Transportation, demonstrates that the Build Corridor Alternatives are expected to operate with an improved Level of Service (LOS) as compared to the No Build Alternative. An improvement in the LOS from implementing a Build Corridor Alternative indicates a reduction in congestion that generally corresponds to a reduction in emissions, particularly for CO, as compared to the No Build Alternative.

Reductions in emissions from improved travel times and reduced congestion for the Build Corridor Alternatives may be partially offset by the increase in VMT caused by new freight travel patterns as more trucks begin to utilize the corridor. However, as noted in Section 3.10.3, there is an overall downward trend in total emissions even as VMT increases due to federal regulations on motor vehicles that have reduced tailpipe emissions.

Sections of all three Build Corridor Alternatives would be in close proximity to the SNP Class 1 air shed in Pima County. It is possible that they may adversely impact visibility and other AQRVs from the increase in traffic and emissions.

3.10.4.1 Purple Alternative

In the South Section, the Purple Alternative would pass through Santa Cruz and Pima counties. **Table 3.10-2** (Changes in Daily Freight Travel Patterns Relative to the No Build) shows the relative changes in the travel patterns for freight trucks under the Purple Alternative as compared to the No Build Alternative. The Purple Alternative passes through the Nogales PM₁₀ NAA and the Nogales PM_{2.5} NAA, the West Pinal PM₁₀ NAA, the West Central Pinal PM_{2.5} NAA, and the Rillito PM₁₀ NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). Therefore, it is possible that portions of the Purple Alternative could result in new localized PM violations associated with additional freight truck flow if congestion would increase in these areas. However, these impacts are predicted to be negligible as compared to the No Build Alternative (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]).

In Pima County, Option C falls within the Tucson CO limited maintenance area. As discussed in Section 3.2, the amount of VMT predicted to operate at an improved LOS in the South Section



1 is improved under the Purple Alternative when compared to the No Build Alternative. This is
2 likely because a portion of the Purple Alternative between Tucson and Casa Grande would be
3 on a new corridor, which could reduce the potential for CO violations by shifting traffic away
4 from a currently congested section of I-10. Option C falls within close proximity to SNP and
5 there may be potential negative impacts to visibility and other AQRVs in the park.

6 From an air quality planning perspective, there is little difference between the Central Arizona
7 Project (CAP) Design Option and the Sandario Road Option. The CAP Design Option does not
8 traverse through any new NAAs or maintenance areas for the criteria pollutants. No changes in
9 freight travel patterns or congestion are anticipated with the CAP Design Option; therefore, the
10 benefits to air quality for PM, CO, and GHGs are predicted to be very similar. The CAP Design
11 Option is in closer proximity to the SNP Class I Area which could result in decreased visibility;
12 however, the effects are not likely to be substantial as the distance from the Class I Area
13 between the CAP Design Option and the Sandario Road Option is relatively small.

14 In the Central Section, the Purple Alternative would pass through Pinal and Maricopa counties
15 including the West Pinal PM₁₀ NAA, the West Central Pinal PM_{2.5} NAA, the Phoenix-Mesa PM₁₀
16 NAA, and the Phoenix-Mesa O₃ NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and
17 Maintenance Areas]). Although daily freight volumes are expected to substantially increase by
18 2040, the amount of congestion is not expected to rise appreciably on I-10 in Pinal County
19 compared to the No Build Alternative. LOS would not worsen under any of the alternatives.

20 Along I-8 and I-10 in the Central Section, it is unlikely that there is a greater potential for new
21 localized PM violations associated with the additional daily freight truck volumes under the
22 Purple Alternative as compared to the No Build Alternative. A portion of the Purple Alternative
23 would be located on a new corridor in the Phoenix-Mesa PM NAA and O₃ maintenance area
24 along Corridor Options I, L, N, and R. Therefore, it is possible that the Purple Alternative could
25 have a small benefit with respect to regional air quality for particulates and O₃ by shifting
26 increases in traffic away from the existing transportation network and reducing future congestion
27 on those facilities.

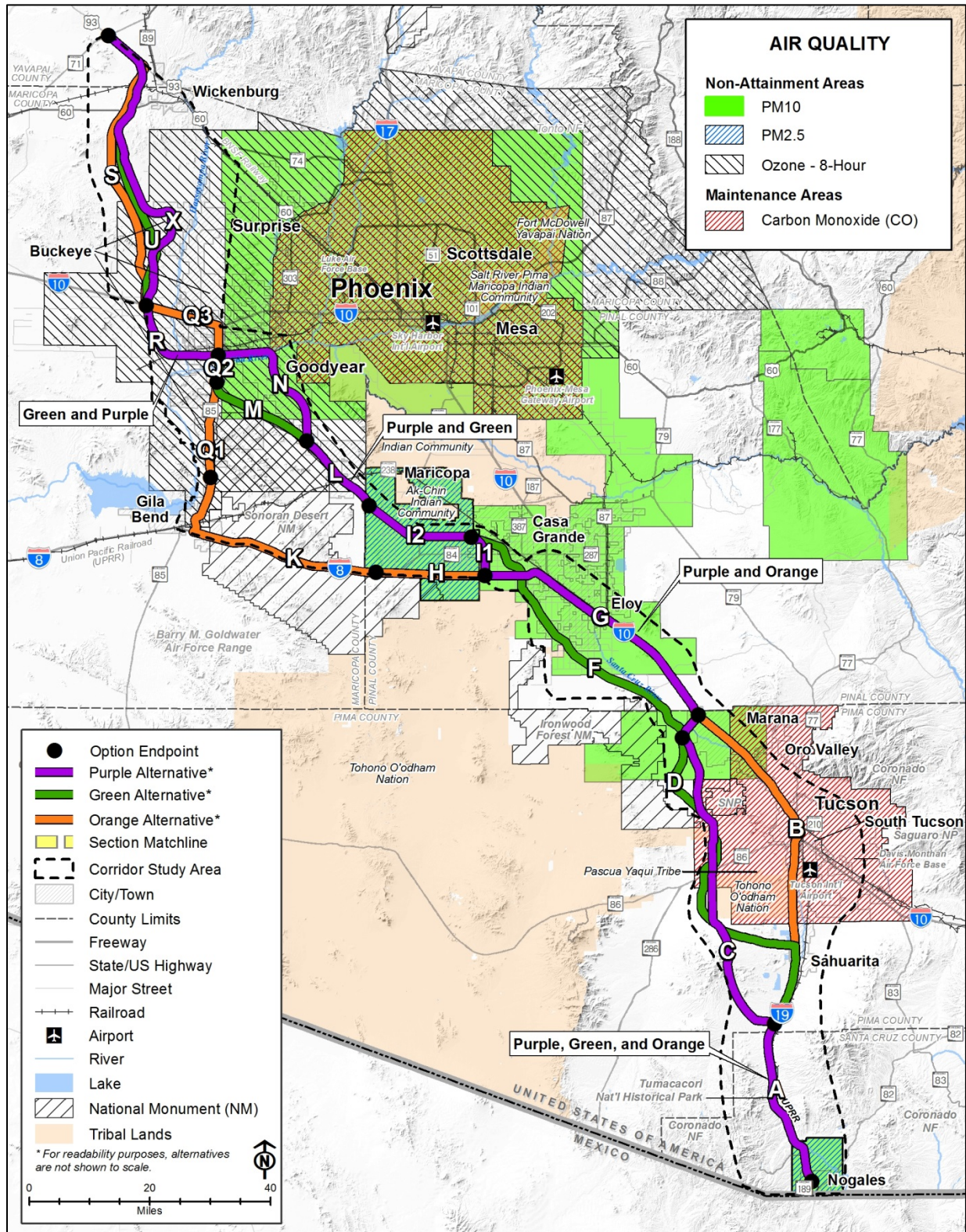


Figure 3.10-10 Corridor Alternatives and NAAs and Maintenance Areas

In the North Section, the Purple Alternative passes through Maricopa and Yavapai counties including the Phoenix-Mesa O₃ NAA (**Figure 3.10-10**). The Purple Alternative is predicted to experience moderate changes in daily freight travel patterns in the North Section as compared to the No Build Alternative (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]). In the O₃ NAA, the Purple Alternative is largely on a new corridor, which could improve air quality in the region by shifting increases in traffic away from the existing transportation network and preventing increased congestion along the existing corridor that could result in increased levels of localized emissions (**Table 3.10-3**, [Summary of the Potential Impacts on Air Quality] located at the end of this section).

The Purple Alternative passes through numerous NAAQS NAA and maintenance areas. If required, quantitative modeling would occur during Tier 2 studies to evaluate whether localized violations of the NAAQS would occur. From an air quality planning perspective, the Purple Alternative may have a small benefit for regional air quality by shifting traffic away from the existing roadways and reducing congestion and delay in the portions that are not co-located on the existing transportation network. However, there also is the potential that the Purple Alternative could result in elevated localized levels of CO, PM₁₀, and PM_{2.5}. The potential for localized violations is greatest on Corridor Options that are co-located with an existing corridor. However, the potential for localized violations of CO and PM are likely less than those for the No Build Alternative as LOS generally improves and daily freight traffic patterns change. If the projected increases in freight truck volumes along the Purple Alternative are substantial, it could result in this Corridor Option being classified as a “project of air quality concern” under the transportation conformity rule, and hotspot analysis would be required in this event. The potential for localized violations will be assessed in a future Tier 2 analysis.

Travel times from Nogales to Wickenburg are projected to decrease by 17.3 percent compared to the No Build Alternative, which indicates that the Purple Alternative would lead to a GHG and MSAT emissions benefit as compared to the No Build Alternative once construction is complete. However, construction and subsequent maintenance of the Purple Alternative will generate GHG emissions. Preparation of the roadway corridor (e.g., earth-moving activities) involves a considerable amount of energy consumption and resulting GHG emissions, and manufacture of the materials used in construction and fuel used by construction equipment also contribute to GHG emissions. Typically, construction emissions associated with a new roadway account for approximately 5 percent of the total 20-year design lifetime emissions from the roadway, although this can vary widely with the extent of construction activity and the number of vehicles that use the roadway.

The addition of new roadway miles to the Study Area also will increase the energy and GHG emissions associated with maintaining those new roadway miles in the future. The total roadway miles in the Study Area that need to be maintained on an ongoing basis would increase relative to No Build Alternative. The increase in maintenance needs due to the addition of new roadway infrastructure will be partially offset by the reduced need for maintenance on existing routes (because of lower total traffic and truck volumes on those routes).

3.10.4.2 Green Alternative

In the South Section, the Green Alternative would pass through Santa Cruz and Pima counties. The Green Alternative falls within the Tucson CO limited maintenance area and the Nogales PM₁₀ NAA, Nogales PM_{2.5} NAA, West Central Pinal PM₁₀ NAA, West Central Pinal PM_{2.5} NAA, and the Rillito PM₁₀ NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]).

The Green Alternative is predicted to have a negligible effect on daily freight travel patterns in the South Section, but it could result in new localized PM violations associated with the additional freight truck flow if congestion on I-10 and I-19 increases. The amount of VMT operating at a degraded LOS in the Tucson metropolitan area is similar to the No Build Alternative VMT because the Green Alternative is not as attractive a diversion as the Purple Alternative. Thus, most traffic is expected to behave as it would under the No Build Alternative in the South Section. On I-10 north of Tucson, VMT conditions would be similar to the No Build Alternative. Therefore, the Green Alternative is likely to have similar potential for localized PM violations as the No Build Alternative. The greatest potential for localized PM violations would be in areas where the Green Alternative is co-located with the existing roadway network as these areas would experience the greatest future demand on the existing transportation system that could result in the relatively larger increases in congestion and resultant increase in localized emissions. The Green Alternative is in the closest proximity to SNP of all the Build Corridor Alternatives and has the greatest potential to impact visibility and other AQRVs based on distance between alternatives

Like the Purple Alternative, there is little difference between the CAP Design Option and the Sandario Road Option under the Green Alternative.

In the Central Section, the Green Alternative would pass through the same counties and NAAs as the Purple Alternative. Although an increase in daily freight truck flow is anticipated, the Green Alternative is predicted to have a substantial effect on daily freight travel patterns as compared to the No Build Alternative, making it unlikely that a greater potential for new localized PM violations would arise associated with the additional daily truck volumes for this alternative as compared to the No Build Alternative.

As with the Purple Alternative, congestion is predicted to increase on SR 85 and there is an increased chance of localized PM violations in these congested areas if there also is a substantial increase in daily freight travel patterns. However, LOS would not necessarily worsen under any of the alternatives. Furthermore, the Green Alternative also is predicted to divert traffic from congested I-10 (Q3), resulting in improved LOS on I-10.

A portion of the Green Alternative would be located on a new corridor in the Phoenix-Mesa PM NAA and O₃ maintenance area, along Options F, I2, L, M, R, and U. Therefore, it is possible that the Green Alternative could have a small benefit for regional air quality for particulates and O₃ by shifting increases in traffic away from the existing transportation network and reducing congestion on those facilities.

In the North Section, the Green Alternative would pass through Maricopa and Yavapai counties including the Phoenix-Mesa O₃ NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). The Green Alternative is predicted to substantially change daily freight travel patterns, which makes the potential for localized PM violations less than the No Build Corridor Alternative (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]). Therefore, the Green Alternative could improve air quality in the region as compared to the No Build Alternative by shifting increases in traffic away from the existing transportation network and preventing increased congestion along the existing corridor that could result in increased levels of localized emissions. US 93 would continue to operate acceptably under all alternatives.

From an air quality planning perspective, it is possible that the Green Alternative could have a small benefit for regional air quality by shifting traffic away from the existing roadways and reducing congestion and delay in the portions that are not co-located on the existing



1 transportation network. From end-to-end the Green Alternative is predicted to moderately
2 improve daily freight travel patterns, so potential for localized PM violations is likely limited to the
3 newly congested section of SR 85 and I-10.

4 Overall, the potential for localized PM violations is likely less than the No Build Alternative for
5 the Green Alternative because of the corridor-wide changes in daily freight travel patterns
6 (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]). While
7 improvements are generally expected for the Green Alternative as compared to the No Build
8 Corridor Alternative, projected increases in freight truck volumes along new routes in the I-11
9 Corridor could be substantial and may result in this Corridor Option being classified as a “project
10 of air quality concern” under the transportation conformity rule, and hotspot analysis would be
11 required in this event. The potential for localized violations will be assessed in a future Tier 2
12 analysis.

13 The Green Alternative has the greatest improvement in projected travel times along the I-11
14 Corridor of the Build Alternatives with a projected decrease in travel times of 19.4 percent
15 compared to the No Build Corridor Alternative. Therefore, the Green Alternative likely has the
16 greatest potential GHG and MSAT emissions benefit of all the Build Alternatives. As with the
17 Purple Alternative, there would be increases in emissions of GHGs and MSATs during
18 construction of the Green Alternative as well as increased GHG emissions associated with
19 maintaining the new roadway miles in the I-11 corridor.

20 **3.10.4.3 Orange Alternative**

21 As with the other Build Corridor Alternatives, the Orange Alternative would serve increased
22 freight truck flows and pass through the Tucson CO limited maintenance area, the Nogales
23 PM₁₀ and PM_{2.5} NAA, the West Pinal PM₁₀ NAA, and the Rillito PM₁₀ NAA (**Figure 3.10-10**
24 [Corridor Alternatives and NAAs and Maintenance Areas]). The Orange Alternative also is
25 predicted to have a negligible effect on daily freight travel patterns since it largely follows
26 existing transportation facilities, which could result in new localized PM violations associated
27 with the additional freight truck flows if congestion in these areas increases.

28 As discussed in Section 3.2, Transportation, the amount of VMT predicted to operate at an
29 improved LOS in the South Section has the greatest improvements under the Orange
30 Alternative when compared to the other Build Corridor Alternatives. The amount of congested
31 VMT is predicted to decrease along I-10 in Tucson due to capacity improvements, which
32 indicates that the Orange Alternative would be preferable to the No Build Alternative and Green
33 Alternative in this section by reducing congestion and the potential for localized CO violations.
34 The Orange Alternative is the most co-located with the current roadway network in the South
35 Section as compared to the other alternatives. Although both the Orange and Purple
36 Alternatives would decrease congested VMT, and thus, reduce the potential for localized PM
37 violations, the Orange Alternative would more effectively decrease congested VMT. Of the Build
38 Corridor Alternatives, the Orange Alternative is the farthest distance from SNP and has the least
39 likely negative impacts to visibility and other AQRVs as compared to these alternatives based
40 on proximity to the Class I Area.

41 The Orange Alternative would pass through the same counties and NAAs as the other
42 alternatives in the Central Section and shares the same increase in county-to-county daily
43 freight truck flows. The Orange Alternative is predicted to have greater reductions in congested
44 VMT on I-10 and SR 85 than the Purple and Green Alternatives because it increases the
45 amount of capacity on I-10 between SR 85 and the new I-11 Corridor. Although the VMT on I-10
46 for the Orange Alternative is similar to the No Build Alternative, congestion is predicted to

decrease. For the Orange Alternative, SR 85 would be improved, resulting in decreased congestion as compared to the other alternatives in this area.

The Orange Alternative would be preferable to the No Build Alternative regarding the potential to reduce localized PM violations. It is likely that the greater predicted reduction in congested VMT for the Orange Alternative offsets the lesser improvements related to a change in daily freight travel patterns as compared to the Purple Alternative and Green Alternative. Thus, the Orange Alternative is likely roughly equivalent to the other Build Corridor Alternatives regarding the decreased potential for localized PM violations as compared to the No Build Alternative.

In the North Section, the Orange Alternative also passes through Maricopa and Yavapai counties, including the Phoenix-Mesa O₃ NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). As with the other Build Corridor Alternatives, the Orange Alternative is expected to change daily freight travel patterns as compared to the No Build Alternative (**Table 3.10-2** [Changes in Daily Freight Travel Patterns Relative to the No Build]). Therefore, the Orange Alternative is similar to the Green Alternative in the reduced potential for localized PM violations as compared to the No Build Alternative.

Although the Orange Alternative relies on the existing corridor to a greater extent than the other Build Alternatives, it would reduce the amount of congested VMT to a greater extent than the other Build Corridor Alternatives. Therefore, it is possible that the Orange Alternative could have a small benefit for regional air quality to a greater extent than the other Build Corridor Alternatives. As with the other Build Corridor Alternatives, the potential for localized PM violations is likely less than the No Build Corridor Alternative because of the corridor-wide improvements.

While improvements are generally expected for the Orange Alternative, projected increases in freight truck volumes along the corridor could be substantial and may result in this Corridor Option being classified as a “project of air quality concern” under the transportation conformity rule, and hotspot analysis would be required in this event. The potential for localized violations will be assessed in a future Tier 2 analysis.

As with the other Build Alternatives, the Orange Alternative also would likely decrease travel times between Nogales to Wickenburg as compared to the No Build Alternative. The Orange Alternative is projected to decrease travel times by 9.5 percent as compared to the No Build Alternative, which is the lowest decrease in travel times among the Build Alternatives. Therefore, the Orange Alternative likely has the least potential to reduce GHG and MSAT emissions as compared to the other Build Alternatives. The Orange Alternative has the least increase in new roadway miles among the three alternatives and likely has the least GHG and MSAT emissions associated with construction and roadway maintenance.

3.10.4.4 No Build Alternative

The No Build Corridor Alternative is the “do-nothing” alternative. Under the No Build Alternative, vehicles would continue to utilize the existing transportation network in the Study Area.

The county-to-county daily freight truck flows are expected to increase by 288 percent from 2013 to 2040 in the South Section, which includes the Nogales PM₁₀ and PM_{2.5} NAA, the West Pinal PM₁₀ NAA, and the Rillito PM₁₀ NAA (**Figure 3.10-10** [Corridor Alternatives and NAAs and Maintenance Areas]). Even though truck emissions are improving over time due to national emissions standards, increases in truck traffic along with increased congestion lead to a heightened risk of localized violations of the NAAQS for PM along the existing corridor.



In Pima County, the No Build Alternative falls within the Tucson CO limited maintenance area. Any reduction in LOS increases the potential for localized CO violations at locations where the predicted LOS is D, E, or F. The majority of intersections predicted to perform at LOS D or worse are located in Tucson, particularly the downtown area.

The county-to-county daily freight truck flows in the Central Section are expected to increase by 244 percent between Pinal and Santa Cruz counties from 2013 to 2040. Therefore, the No Build Alternative could result in new localized PM violations along the existing I-10 corridor associated with the additional freight truck flows and increased congestion in these areas. The potential for a localized PM violation is likely greater in areas with higher freight truck flows. More congested areas would be more susceptible to potentially adverse effects in air quality as the Central Section is projected to increase in overall VMT by 239 percent by 2040, with degraded VMT occurring primarily in the SR 85/I-10 areas in Maricopa County.

In the O₃ NAA, the No Build Alternative could degrade air quality in the North Section by increasing demand on the existing transportation network and worsening congestion that would reduce speeds and increase emissions, particularly along I-10.

The No Build Alternative could have negative effects on numerous NAAQS NAAs and maintenance areas. From an air quality planning perspective, it is possible that the No Build Alternative could result in regionally adverse effects in air quality as the result of increased levels of congestion and delay that could cause elevated localized levels of CO, PM₁₀, and PM_{2.5}.

Under the No Build Alternative travel times from Nogales to Wickenburg are projected to increase by as much as 90 minutes and speeds would decrease by as much as 17 miles per hour due to the growing congestion along existing freeways and arterials. Therefore, the No Build Alternative is likely to increase emissions of GHGs and MSATs as compared to the Build Corridor Alternatives.

The potential for localized PM violations is greatest in NAAs and maintenance areas where high levels of daily freight volumes are predicted. The largest increases in daily freight volumes are predicted to be in the South Section between Santa Cruz and Pima counties, which includes the SNP Class 1 air shed in Pima County. This distance is not considered to be extremely significant as the Class 1 air shed covers a broad geographical area. It is possible that the No Build Alternative could adversely impact visibility from the increase in traffic and emissions, which would affect congestion and increase emissions resulting in greater potential impacts to visibility as compared to the Build Corridor Alternatives.

3.10.5 Summary

The potential impacts to regional air quality from the construction of the Build Corridor Alternatives are similar. All Build Corridor Alternatives are expected to serve as an improvement to regional air quality over the No Build Alternative. No Build Alternative could result in regionally adverse effects as the result of increased levels of congestion and delay. The Build Corridor Alternatives may impact local air quality conditions differently. The detailed quantitative analysis conducted in Tier 2 will identify localized impacts to air quality.



3.10.6 Potential Mitigation Strategies

Air quality modeling may be required for the future Tier 2 NEPA documents to quantify potential emissions for alternatives studied in detail. Mitigation measures also would be identified at that time for any potential air quality effects. All Build Corridor Alternatives are likely to result in decreased travel times as compared to the No Build Alternative. Therefore, construction of a Build Corridor Alternative could be considered a GHG mitigation measure. In addition, temporary construction effects may be quantified and temporary control measures would be recommended. Typical construction mitigation measures include:

- Minimize idling time to save fuel and reduce emissions.
- Use the cleanest fuels available for construction equipment and vehicles to reduce exhaust emissions.
- Keep construction equipment well-maintained to ensure that exhaust systems are in good working order.
- Control fugitive dust through a Fugitive Dust Control Plan, including watering disturbed areas.
- To minimize wind-blown dust from blasting, particularly near community areas, control blasting and avoid blasting on days with high winds.
- Develop a traffic plan to minimize traffic flow interference from construction equipment movement and activities.
- Space interchanges to reduce local impacts of idling on sensitive areas near the new corridor.

3.10.7 Future Tier 2 Analysis

If a Build Corridor Alternative is selected for construction, it would require a transportation conformity analysis due to the NAAs and maintenance designations of the areas surrounding the Study Area. During Tier 2 NEPA analysis, a detailed air quality analysis would be conducted once a future alignment or alternative alignments have been selected and advanced for further environmental evaluation. Individual projects on the I-11 Corridor that are in NAAs or maintenance areas would need to conform to the NAAQS, requiring an assessment of vehicle emissions within the region. Modeling of CO and particulate emissions at the project level would be conducted during Tier 2 analysis to determine potential localized air quality effects (hotspots) from future construction and operation of the I-11 Corridor. GHG emissions could be quantitatively assessed in the Tier 2 NEPA analysis using USEPA's Motor Vehicles Emissions Simulator model. Detailed mitigation measures also would be developed and refined during Tier 2.

National Park Service (NPS) recommended analysis on local air quality impacts near the SNP. ADOT will conduct an analysis of localized air quality impacts to sensitive areas including the SNP in the Tier 2 environmental process. The analysis will assess NAAQS and criteria pollutants and will consider the spacing of interchanges and associated idling impacts on adjacent receptors. ADOT will provide the opportunity for NPS to review the air quality emission inventory and modeling protocols in the Tier 2 analysis.

Table 3.10-3 Summary of the Potential Impacts on Air Quality

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Major Resource Features	<ul style="list-style-type: none"> No I-11 impacts identified. Existing conditions and baseline trends would continue. 	<p>There is little difference in air quality between the Build Corridor Alternatives. In Corridor Option A, near Nogales, USEPA has classified the area as moderate NAA for PM₅ and PM₁₀. The Rillito and West Pinal areas have been classified as moderate NAA for PM₁₀. Phoenix Mesa PM₁₀ NAA is classified as serious; this is part of the Green and Purple Alternatives. There also is marginal nonattainment in Phoenix Mesa for O₃. The South Section is in proximity to the SNP Class 1 air shed; however the air shed is regional in nature and the variance in distance to the park between alternatives is not substantial. The South Section transverses the Tucson CO limited maintenance area.</p>		
General trends	<ul style="list-style-type: none"> Could have negative effects on NAAQS, NAAs, and maintenance areas. Could see localized violations of CO on the existing road network. 	<ul style="list-style-type: none"> Could benefit regional air quality by shifting traffic away from existing roadways and reducing congestion. Could see localized violations of CO, PM₁₀, and PM_{2.5} on co-located corridors. Freight volumes could lead to the Corridor Alternative being classified as a "project of air quality concern." 	<ul style="list-style-type: none"> Could benefit regional air quality by shifting traffic away from existing roadways and reducing congestion. Could see localized violations of CO, PM₁₀, and PM_{2.5} on SR 85 and I-10 Freight volumes could lead to the Corridor Alternative being classified as a "project of air quality concern." 	<ul style="list-style-type: none"> Could benefit regional air quality by reducing congestion more than the Green and Purple Alternatives. Could see localized violations of CO, PM₁₀, and PM_{2.5} on co-located corridors. Freight volumes could lead to the Corridor Alternative being classified as a "project of air quality concern."
End to end changes in daily freight volumes	County-to-county daily freight truck flows are expected to increase.	<ul style="list-style-type: none"> Negligible effect to freight travel in the South Section. Substantial change in freight volumes in the Central Section. Moderate changes in the North Section. 	<ul style="list-style-type: none"> Negligible effect to freight travel in the South Section. Substantial change in freight volumes in the Central and North Sections. 	<ul style="list-style-type: none"> Negligible effect to freight travel in the South Section. Moderate change in freight volumes in the Central Section. Substantial change in freight travel in the North Section.

Table 3.10-3 Summary of the Potential Impacts on Air Quality (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
PM	<ul style="list-style-type: none"> • Could see localized violations of PM₁₀ and PM_{2.5} on the existing road network. 	<ul style="list-style-type: none"> • Potential for new localized violations of PM in the South Section. • Potential improvements in PM levels where traffic is shifted off of the existing network in the Central and North Sections. 	<ul style="list-style-type: none"> • Potential for new localized violations of PM in the South Section similar to the No Build Alternative. • Could see moderate improvements in PM levels where traffic is shifted off of the existing network. 	<ul style="list-style-type: none"> • Potential for new localized violations of PM in the South Section. • Roughly equivalent to other Build Corridor Alternatives regarding decreased potential for localized violations of PM.
O ₃	<ul style="list-style-type: none"> • Could degrade air quality in the O₃ NAA in the North Section. 	<ul style="list-style-type: none"> • Potential to improve O₃ levels by shifting traffic from the existing road network and reducing congestion. 	<ul style="list-style-type: none"> • Potential to improve O₃ levels by shifting traffic from the existing road network and reducing congestion. 	<ul style="list-style-type: none"> • Potential to improve O₃ levels by reducing congestion.
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> • Decrease air quality due to population growth, increasing traffic and the resulting traffic congestion. 	<p>Land development induced by the project could:</p> <ul style="list-style-type: none"> • Impact I-10 through a reduction in traffic volumes potentially reducing congestion. This could improve regional air quality and could reduce future delays due to congestion. • Lead to the creation of localized air pollution hotspots that exceed the NAAQS. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> • There is a greater potential for induced growth, which could occur at a faster pace than the Purple Alternative. It also has the second highest number (16) of new interchanges that increase automobile accessibility. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> • There is a greater potential for temporary increases in emissions due to dependency on the existing highway, greater traffic delays and congestion during the construction phase. • Induced growth may be lower than the other build alternatives due to co-location with existing facilities.

Table 3.10-3 Summary of the Potential Impacts on Air Quality (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Generate minor potential incremental effects due to the combined effects of indirect effects and additional traffic volumes and congestion. Potential implementation of new air quality regulations, improving diesel and dust controls, reduced dependence on fossil fuels, and adoption of cleaner car engine technologies may offset these effects. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Not generate potential incremental effects due to reduced congestion, the potential implementation of new air quality regulations, improving diesel and dust controls, reduced dependence on fossil fuels, and adoption of cleaner car engine technologies. 	Similar to the Purple Alternative.	Similar to the Purple Alternative.

NOTES: CO = carbon monoxide, I-10 = Interstate 10, NAA = nonattainment area, NAAQS = National Ambient Air Quality Standards, O₃ = ozone, PM = particulate matter, PM_{2.5} = fine particulate matter less than or equal to 2.5 microns, PM₅ = fine particulate matter less than or equal to 5 microns, PM₁₀ = fine particulate matter less than or equal to 10 microns, SNP = Saguaro National Park, SR = State Route, USEPA = United States Environmental Protection Agency



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3.11 Hazardous Materials

Hazardous materials, which also may include hazardous waste, hazardous substances, petroleum products, or other regulated materials, could be encountered during construction along the Interstate 11 (I-11) Corridor Study Area (Study Area). These materials can be found in various forms and can originate from a variety of sources. Examples of potential properties that may generate or use hazardous materials include landfills, gas stations, industrial facilities, dry cleaners, military installations, and railroad corridors. The disturbance of soil and/or groundwater contamination within the Study Area may adversely impact human health and the environment, and negatively affect the cost and schedule of the project. Early identification of facilities that may be impacted by a release of hazardous materials provides valuable information for the alternatives analysis, design, right-of-way acquisition, and engineering, as it may be possible to design alignments to avoid these facilities. If hazardous materials cannot be avoided, it is important to identify the additional work required to mitigate those impacts before property acquisition and the start of construction.

Hazardous materials also are transported through the Study Area on existing transportation routes and could be transported through future transportation routes. Transportation of hazardous materials and procedures for avoiding, minimizing, and cleaning spills are addressed by local, state, and federal transportation design standards; freight transportation regulations; and management requirements for specific hazardous substances. The movement and use of hazardous materials presents exposure risks from accidental releases and spills. Many local agencies and organizations have developed plans to address accidental releases and spills. Two examples of these plans include the Pima County Multi-Jurisdictional Hazard Mitigation Plan and the plans developed by CAVSARP/SAVSARP to protect their basins and water wells. These plans are localized in nature and address the resources that local agencies will use if there is a spill and the local resources that are of greatest concern.

3.11.1 Regulatory Setting

Environmental regulations are developed and enforced by federal, state, and local governments. States can adopt regulations that are at least as strict as the federal regulations and obtain primacy to enforce such regulations. **Table 3.11-1** (Hazardous Materials Regulations) summarizes common regulations that pertain to hazardous materials.

Table 3.11-1 Hazardous Materials Regulations

Regulation	Description
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) enacted in 1980 (42 United States Code [USC] § 9601 et seq.) and subsequently amended by the Superfund Amendments and Reauthorization Act (42 USC § 9601 et seq.) (Superfund)	This law authorizes the United States Environmental Protection Agency (USEPA) to identify parties responsible for contamination of closed or abandoned sites and compel the parties to clean up the sites. Sites are reported to USEPA, and based on the results of an investigation, USEPA either determines that no further action is necessary at the federal level (but may refer the site to the state for additional activities) or place the site on the National Priority List (NPL). Sites remain on the NPL until cleanup activities have been completed, and the site is removed or delisted.

Table 3.11-1 Hazardous Materials Regulations (Continued)

Regulation	Description
Formerly Used Defense Sites (FUDS)	The Department of Defense used land to train and test soldiers and weapons to ensure the nation's military readiness. The Department of Defense is responsible for environmental restoration (cleanup) of properties that were formerly owned by, leased to, or otherwise possessed by the United States (US) and under the jurisdiction of the Secretary of Defense prior to October 1986. Environmental cleanup of FUDS sites is conducted under CERCLA.
Resource Conservation and Recovery Act (RCRA) (42 USC § 321 et seq.), enacted in 1976	RCRA establishes a framework for the management of both solid waste and solid hazardous waste. RCRA Subtitle C authorizes the USEPA to develop regulations for cradle-to-grave management of these wastes.
Arizona State regulation for management of both solid waste (Arizona Revised Statute [ARS] Title 49, Chapter 4 and Arizona Administrative Code [AAC] Title 18, Chapter 13) and hazardous waste (ARS Title 49, Chapter 5 and AAC Title 18, Chapter 8).	The Arizona Department of Environmental Quality (ADEQ) regulates hazardous waste through implementation of the USEPA regulations. State solid waste regulations in Arizona regulate solid waste facilities (landfills), including: municipal and non-municipal solid waste landfills; biohazardous medical waste facilities; solid waste transfer stations; waste tire collection sites; special waste transporters and receivers; used oil marketers, processors, and transporters; and battery collection sites.
Water Quality Assurance Revolving Fund (WQARF) ARS Title 49, Chapter 2 and AAC Title 18, Chapter 16)	The State of Arizona has regulations to address sites potentially impacted by hazardous substances. This program is administered by the ADEQ. The model of the WQARF program is similar to CERCLA, with sites investigated and either cleaned up or granted a determination that no further action is necessary.
Underground Storage Tanks (UST) (ARS Title 49, Chapter 6 and AAC Title 18, Chapter 12)	Regulation of USTs that are used to store either gasoline, petroleum products, or certain hazardous substances is the responsibility of ADEQ. USTs are commonly used at retail fueling stations, auto repair facilities, and fleet service operators. Releases from USTs (Leaking USTs [LUSTs]) must be reported to ADEQ and investigated to evaluate whether remedial action is required. Regulations provide guidance for remediation of releases and closure of facilities after remediation is complete.
Voluntary Remediation Program (VRP) and Brownfields	VRP encourages property owners and other interested parties to voluntarily remediate impacted properties. Ineligible sites include: those that are listed on the WQARF registry with the same contaminants of concern; and hazardous waste sites and UST sites undergoing certain remedial actions required by ADEQ, a court of law, or an administrative order. The Brownfields program assists with cleanup and redevelopment of abandoned or underutilized properties where reuse is complicated by actual or perceived environmental contamination. The Brownfields program is administered through ADEQ with funding from the USEPA state response grant.
Other Regulations	Other state and federal regulations exist; however, they are not applicable to this project since there are no identified facilities under their jurisdiction within the Study Area.



3.11.2 Methodology

The assessment of hazardous materials involves analyzing two types of potential impacts. The first type involves the possibility of encountering hazardous materials during future construction activities. This impact is assessed by identifying the number and general characteristics of known sites within the 2,000-foot-wide Project Area and considering the anticipated disturbance area within the Corridor Options that are co-located with other roadways and Corridor Options that occur in new locations. The density of sites and the relative magnitude of the anticipated construction disruption are considered to qualitatively assess the risk of encountering hazardous materials during construction. The second potential impact involves hazardous materials exposure that could result from a spill or accident on I-11 associated with the transportation of hazardous materials.

Properties with contamination issues that have been reported to a regulatory agency were identified. The search radius for these properties used the ASTM International (ASTM) Standard for Phase I Environmental Site Assessments, specified in ASTM E1527-13. This means that the search radius for hazardous materials varies by the type of site and the governing regulations. Generally, the search radius identified hazardous materials located within 0.25 mile and 1 mile from the centerline for all Build Corridor Alternatives. This Analysis Area is inclusive of the 2,000-foot-wide Project Area within which I-11 could be located.

The analysis outlines the number of potential facilities that occur within the Corridor Options. The analysis does not include a detailed review of each facility identified, such as whether a release was reported or confirmed, regulatory compliance, remediation, or regulatory closure. Therefore, many of the sites recorded may have limited or no remaining environmental conditions. Others may have environmental conditions that require substantial remediation. For this Tier 1 analysis, the number and types of facilities were identified within the prescribed ASTM search distances, and utilized to evaluate the potential for environmental consequences related to hazardous materials.

Federal database listings that were reviewed include: hazardous waste sites, Brownfields sites, NPL/Superfund sites, and FUDS. State database listings that were reviewed include: Declaration of Environmental Use Restriction sites; dry cleaners; USTs; LUSTs; open and closed landfills; state hazardous waste sites; VRP and Brownfields sites; and WQARF sites. Other readily available databases were searched including the City of Tucson landfill registry and applicable Tribal databases for USTs, LUSTs, and open dumps. It is possible that a facility may be listed on multiple databases (and thus counted more than once).

The types of sites can often be used to inform the potential risk a facility may pose. For instance, a Superfund site generally carries with it a high potential environmental liability (and corresponding high project risk) as the criteria for placement in Superfund is that the facility has a higher magnitude of contamination, and thus increased potential to negatively affect human health and the environment. RCRA corrective action sites, or WQARF sites, (where releases of hazardous substances to the soil or groundwater have been confirmed) also may carry a high potential liability (and corresponding high project risk). In the following list, generally, the risk level descends from highest to lowest, but this is in no way the rule, as risks will vary from facility to facility, and by the type of disturbance that would occur from the Build Corridor Alternatives. Using this protocol, the data obtained for this analysis was compiled into the following types of sites:



- 1 • Superfund
- 2 • Hazardous Waste
- 3 • UST/LUST
- 4 • VRP and Brownfields
- 5 • Landfill
- 6 • Environmental Covenant

7 Superfund sites present a considerable risk if they are encountered. Often these facilities have
8 complicated, considerable, and costly contamination issues spread over large areas both
9 horizontally and vertically, and tend to have known impacts that pose high risks to human health
10 and the environment. Hazardous waste facilities under a corrective action program also tend to
11 have complicated environmental releases, and the magnitude of releases could be localized or
12 spread over a large area; thus, the risks can vary, but sometimes those risks may be large.
13 UST/LUST facilities tend to have more localized impacts; however, the magnitude of the
14 number of facilities, particularly along heavily urbanized travel corridors, should not be
15 discounted. VRP/Brownfields, landfill, and environmental covenant facilities occur less
16 frequently throughout the Study Area and tend to have impacts that are localized at or near the
17 source facilities.

18 The database searches supporting the analysis of hazardous materials concerns were
19 performed in June and July 2017. The database search results, including applicable mapping,
20 are available in **Appendix E11**. It is important to acknowledge that hazardous materials
21 evaluations may be constrained by active or completed remedial actions, reported releases,
22 new or historical facilities that will be identified in the future, and other factors. Therefore,
23 information related to these items would be updated during the Tier 2 National Environmental
24 Policy Act (NEPA) studies to maintain up-to-date information. Further, during the Tier 2 NEPA
25 analysis, evaluation of the environmental consequences will be completed for a specific
26 alignment, as well as project-specific mitigation measures.

27 3.11.3 Affected Environment

28 There are 780 regulated sites in the South Section within the ASTM search radius
29 (**Table 3.11-2** [Regulated Sites – Comparison of Options from Nogales to Casa Grande]).
30 Option B generally follows the existing I-10 alignment. Option B begins near Sahuarita, travels
31 through Tucson, and ends near Marana. This Option contains the largest number of regulated
32 sites (619), including the largest number of Superfund sites (93). The number of Superfund sites
33 in Option B is higher than all the other Corridor Options combined (93 vs. 12). Option B also has
34 more total sites than all of the other Corridor Options combined (619 vs. 158). The largest
35 number of regulated sites in Option B is UST/LUST (235) and hazardous waste (188) sites;
36 therefore, potential risks are likely localized near those specific facilities depending on the
37 magnitude of the releases, if any. Most of the remaining regulated sites are in Option G (near
38 Casa Grande), Option A (north of Nogales), and Option D (near Avra Valley). Option C and
39 Option F each have less than 10 regulated sites. Both Central Arizona Project (CAP) Design
40 Options each have an additional site in comparison to Options C and D.

Table 3.11-2 Regulated Sites – Comparison of Options from Nogales to Casa Grande

Type of Site	Corridor Options						
	A	B	C	D	F	G	Total
Superfund	3	93	2	4	2	1	105
Hazardous Waste	23	188	3	9	3	9	235
UST/LUST ⁽¹⁾	22	235	1	15	2	54	329
VRP ⁽²⁾ and Brownfields	1	65	0	1	0	0	67
Landfill	3	36	0	1	1	1	42
Environmental Covenant	0	2	0	0	0	0	2
Total	49	619	6	30	8	65	780

(1) Underground Storage Tank/Leaking Underground Storage Tank.

(2) Voluntary Remediation Program.

SOURCE: GeoSearch E RecSearch Reports, June 29, 2017 through July 3, 2017.

- 1 There are 51 regulated sites in the Central Section within the ASTM search radius (**Table 3.11-3**
- 2 [Regulated Sites – Comparison of Options in the Central Section]). Options H, K, and Q1 in the
- 3 Central Section were evaluated together because of their geographic proximity and setting.
- 4 Options I1, I2, and L also were evaluated together as they are geographically proximate and
- 5 their settings were similar. Generally, the area from Casa Grande to Buckeye (Central Section)
- 6 is relatively undeveloped, and the number of sites identified is smaller than in the area to the
- 7 south.

Table 3.11-3 Regulated Sites – Comparison of Options in the Central Section

Type of Site	Corridor Options							Total
	H, K, and Q1	I1, I2, and L	M	N	Q2	Q3	R	
Superfund	0	0	0	1	0	1	1	3
Hazardous Waste	5	0	0	7	1	5	3	21
UST/LUST ⁽¹⁾	14	3	0	0	0	7	0	24
VRP ⁽²⁾ and Brownfields	0	0	0	0	0	0	0	0
Landfill	2	1	0	0	0	0	0	3
Environmental Covenant	0	0	0	0	0	0	0	0
Total	21	4	0	8	1	13	4	51

(1) Underground Storage Tank/Leaking Underground Storage Tank.

(2) Voluntary Remediation Program.

SOURCE: GeoSearch E RecSearch Reports, June 29, 2017 through July 3, 2017.

- 8 There are six regulated sites in the North Section within the ASTM search radius (**Table 3.11-4**
- 9 [Regulated Sites – Comparison of Options in the North Section]). Options in the North Section



- 1 have the fewest regulated sites and no Superfund sites. All of the regulated sites in the North
2 Section are USTs or LUSTs, which are spread evenly with the three Options.

Table 3.11-4 Regulated Sites – Comparison of Options in the North Section

Type of Site	Corridor Options			Total
	S	U	X	
Superfund	0	0	0	0
Hazardous Waste	0	0	0	0
UST/LUST ⁽¹⁾	2	2	2	6
VRP ⁽²⁾ and Brownfields	0	0	0	0
Landfill	0	0	0	0
Environmental Covenant	0	0	0	0
Total	2	2	2	6

(1) Underground Storage Tank/Leaking Underground Storage Tank.

(2) Voluntary Remediation Program.

SOURCE: GeoSearch E RecSearch Reports, June 29, 2017 through July 3, 2017.

- 3 Overall, there are 837 regulated sites within the ASTM search radius (**Table 3.11-5** [Regulated
4 Sites –Study Area]). Hazardous materials sites are more prevalent in highly developed areas in
5 the South Section, including within Tucson, where more dense land uses and a longer history of
6 development, may have resulted in releases of hazardous materials to the soil and/or
7 groundwater.
- 8 Developed urban areas tend to have more facilities that are riskier in terms of potential project
9 exposure to hazardous materials, such as Superfund sites. Areas where less development has
10 occurred (e.g., undeveloped or agricultural areas) tend to demonstrate less risk as related to
11 hazardous materials sites.

Table 3.11-5 Regulated Sites – Study Area

Type of Site	Total
Superfund	108
Hazardous Waste	256
UST/LUST ⁽¹⁾	359
VRP ⁽²⁾ and Brownfields	67
Landfill	45
Environmental Covenant	2
Total	837

(1) Underground Storage Tank/Leaking Underground Storage Tank.

(2) Voluntary Remediation Program.

SOURCE: GeoSearch E RecSearch Reports, June 29, 2017 through July 3, 2017.



3.11.4 Environmental Consequences

The potential environmental consequences of the Build Corridor Alternatives are two-fold. The first involves the possibility of encountering hazardous materials during construction and associated human health and environmental health risks. The second comes from the risk of a spill or accident on I-11 associated with the transportation of hazardous materials. Encountering hazardous materials during construction can have negative environmental consequences on human health and the environment due to direct exposures, or by inadvertently distributing contaminants into surrounding soil, surface water, or groundwater. Disturbance of hazardous materials can greatly increase the project costs, and delay a project schedule.

Hazardous materials are transported through the Study Area on existing transportation routes, and could be transported on the future transportation routes associated with the Build Corridor Alternatives. The movement of hazardous materials presents exposure risks from accidental releases and spills. The construction of I-11 would have beneficial effects on transportation safety after roadway construction is completed. However, in some instances, new risks could be added where new routes expose sensitive receptors such as water resources, wildlife habitat, or recreation resources to new hazardous materials, or reduced proximity to adjacent receptors occurs after roadway widening. In these instances, reduced risks elsewhere would generally offset the new risks because of improved travel safety conditions along I-11.

The magnitude of impact from hazardous materials during construction is influenced by several variables, including: the magnitude of the planned project disturbance (i.e., the volume of soil disturbance required to meet the project objectives); the probability of hazardous materials sites being near and within the anticipated construction disturbance footprint; the spatial distribution and density of hazardous materials sites; the types of sites (e.g., Superfund); and/or the proximity of the anticipated construction disturbance to sensitive receptors.

The co-located Options would have a smaller construction footprint than Options in undeveloped areas so they may be less likely to substantially disturb hazardous materials sites. However, Options in less developed areas may encounter fewer hazardous materials sites because of limited adjacent development. Generally, in both instances, the environmental consequences are likely to be limited.

The following text summarizes the hazardous materials sites that could be encountered in the Build Corridor Alternatives. The text generally characterizes the associated risks (Low, Moderate, High) given each Option's potential to disturb existing conditions. Low applies where the anticipated construction footprint is small because of co-location with existing major roadways and the number and/or density of hazardous materials sites are low; or where the anticipated construction footprint is large, but a low density of hazardous materials sites occurs. High risks apply where the anticipated construction footprint is large and/or known sites are present which might be unavoidable during construction. Moderate risks fall in-between. Risks for this project were found to be low.

3.11.4.1 Purple Alternative

The Purple Alternative includes a mix of Corridor Options co-located with existing interstate highways that would require a small construction footprint, and Options using new alignments that would require a large construction footprint. The large construction footprint does not impact a high density of hazardous materials facilities in most Options.



1 The Purple Alternative would pass through an existing Bureau of Land Management (BLM)
2 multi-use utility corridor within the Vulture Mountains Recreation Area. Two hazardous materials
3 facilities are recorded in the vicinity. Where new construction footprints are required, avoidance
4 measures would be implemented. Therefore, the environmental consequences to the Purple
5 Alternative from hazardous materials would be low. **Table 3.11-6** (Purple Alternative Summary
6 of End-to-End Considerations) summarizes the environmental consequences within the Purple
7 Alternative.

**Table 3.11-6 Purple Alternative Summary of
End-to-End Considerations**

Option	# of Hazardous Materials Sites	Construction Footprint (New Disturbance)	Potential Environmental Consequences	Alignment Notes and Sensitive Sites
Option A	52	Small	Low	Follows the existing I-19 alignment Near the Tumacacori National Historical Park.
Option C Sandario Road (CAP Design Option)	6 (1)	Large	Low	Follows some existing rural roads, but generally requires a larger construction footprint. Near CAVSARP/SAVSARP.
Option G	65	Small	Low	Follows existing I-10 and I-8 alignments Near Picacho Peak State Park.
Options I[1,2], L	4	Large	Low	Generally large construction footprint and few sites. Juan Bautista de Anza National Historic Trail Management Area.
Option N	8	Large	Low	Generally large construction footprint and few sites.
Option R	4	Large	Low	Generally large construction footprint and few sites.
Option X	2	Large	Low	Generally large construction footprint and few sites. Near the Hassayampa Special Recreation Management Area.
End-to-End Considerations	141	Varies	Low	Aside from Options A and G, most of the construction footprints are in undeveloped areas where relatively few hazardous materials sites occur.

8 3.11.4.2 Green Alternative

9 The Green Alternative includes a mix of Corridor Options co-located with interstate highways
10 that would require a small construction footprint and Options using new alignments that would
11 require a large construction footprint. The large construction footprint does not impact a high
12 density of hazardous materials facilities in most Options. Where new construction footprints are



- 1 required, avoidance measures would be implemented. Therefore, the environmental
2 consequences to the Green Alternative from hazardous materials would be low. **Table 3.11-7**
3 (Green Alternative Summary of End-to-End Considerations) summarizes the environmental
4 consequences within the Green Alternative.

**Table 3.11-7 Green Alternative Summary of
End-to-End Considerations**

Option	# of Hazardous Materials Sites	Construction Footprint	Environmental Consequences	Alignment Notes and Sensitive Sites
Option A	52	Small	Low	Follows the existing I-19 alignment Near the Tumacacori National Historical Park.
Option D Sandario Road (CAP Design Option)	30 (1)	Large	Low	Requires a larger construction footprint Near CAVSARP/SAVSARP.
Option F	8	Large	Low	Requires a larger construction footprint.
Options I[,2], L	4	Large	Low	Generally large construction footprint and few sites. Near Juan Bautista de Anza National Historic Trail Management Area.
Option M	0	Large	Low	Generally large construction footprint and few sites. Near Buckeye Hills East Trails Special Recreation Management Area.
Option Q2	1	Large	Low	Generally large construction footprint and few sites. Near Buckeye Hills East Trails Special Recreation Management Area; Buckeye Hills West Extensive Recreation Management Area; Robbins Butte Wildlife Area.
Option R	4	Large	Low	Generally large construction footprint and few sites.
Option U	2	Large	Low	Generally large construction footprint and few sites. Near the Hassayampa Special Recreation Management Area
End-to-End Considerations	100	Small to Large	Low	Aside from Option A, most of the construction footprints are in undeveloped areas where relatively few hazardous materials sites occur.



1 **3.11.4.3 Orange Alternative**

2 The Orange Alternative includes a mix of Corridor Options that are co-located with interstate
3 highways that would require a small construction footprint and new alignments that would
4 require a large construction footprint. The Orange Alternative does not require as many large
5 construction footprints as the other Build Corridor Alternatives, but encounters a higher density
6 of hazardous materials sites. Where new construction footprints are required, avoidance
7 measures would be implemented. Therefore, the environmental consequences to the Orange
8 Alternative from hazardous materials would be low. **Table 3.11-8** (Orange Alternative Summary
9 of End-to-End Considerations) summarizes the environmental consequences within the Orange
10 Alternative.

**Table 3.11-8 Orange Alternative Summary of
End-to-End Considerations**

Option	# of Hazardous Materials Sites	Construction Footprint	Environmental Consequences	Alignment Notes and Sensitive Sites
Option A	52	Small	Low	Follows the existing I-19 alignment. Near the Tumacacori National Historical Park.
Option B	619	Small	Low	Follows the existing I-19 and I-10 alignments through Tucson.
Option G	65	Small	Low	Follows the existing I-10 alignment. Near Picacho Peak State Park.
Options H+K+Q[1,2,3]	35	Small	Low	Follows existing I-8, US 85, and I-10 alignments. Near the Sonoran Desert National Monument; Buckeye Hills East Trails Special Recreation Management Area; Buckeye Hills West Extensive Recreation Management Area; Robbins Butte Wildlife Area.
Option S	2	Large	Low	Generally large construction footprint and few sites. Near the Hassayampa Special Recreation Management Area.
End-to-End Considerations	773	Small to Large	Low	More overall sites than other alternatives, as this alternative is located in more urban environments with more development, but overall smaller construction footprint.



3.11.4.4 No Build Alternative

The No Build Alternative is the “do-nothing” alternative. The Arizona Department of Transportation (ADOT) would complete the committed widening improvements and routine maintenance for this alternative. Construction impacts from the Build Corridor Alternatives would not occur. Previously committed roadway improvement projects would be constructed generating some impacts and some risks while also providing some travel safety benefits. Existing and future protocols related to the evaluation and mitigation of hazardous materials would be followed. Vehicles transporting hazardous materials would continue to use the existing transportation network and risks would be similar to existing conditions. The transportation safety improvements associated with the Build Corridor Alternatives would not occur. No new receptors would be exposed to hazardous materials risks.

Under the No Build Alternative, as with the Build Corridor Alternatives, hazardous materials facilities would continue to operate, and hazardous materials transportation would continue within the existing transportation network. Previously committed roadway improvement projects would be constructed, and hazardous materials may be identified and mitigated in soil or groundwater, or may be used in construction equipment. It is expected that existing and future protocols related to the evaluation and mitigation of hazardous materials would be implemented; therefore, the environmental consequences from hazardous materials would be small under the No Build Alternative.

3.11.4.5 Summary

The following summarizes the hazardous materials sites that could be encountered in the three Build Corridor Alternatives and generally characterize the associated risks (Lowest, Low, Moderate, High) given each Option’s potential to disturb existing conditions (**Table 3.11-9** [Summary of Impacts to Hazardous Materials]). Lowest and low applies where the construction footprint is small because of co-location with existing major roadways and the number and/or density of hazardous materials sites are low; or where the construction footprint is large, but a low density of hazardous materials sites occurs. High risks apply where the construction foot is large and/or known sites are present which might be unavoidable during construction. No moderate or high impacts are expected.

Review of **Table 3.11-9** (Summary of Impacts to Hazardous Materials) indicates far more hazardous materials site are located within the Orange Alternative but the risks are still low given the potential for impacting those sites. Consequently, despite a higher number of sites, the potential risks for encountering hazardous materials are low and similar for all of the Build Corridor Alternatives.

3.11.5 Potential Mitigation Strategies

The following potential mitigation strategies and best practices for environmental consequences related to hazardous materials for the Proposed Action should be considered during the future Tier 2 NEPA analysis.

- Update hazardous materials sites search databases to reflect most recent records; conduct reviews of regulatory files prior to the Tier 2 NEPA analysis to evaluate the extent of contamination; and compare to the project construction requirements.
- Before right-of-way acquisition, conduct a Phase I Environmental Site Assessment for those properties identified for acquisition; based on these assessments, additional subsurface



investigation may be required depending on the recognized environmental conditions identified and potential risk to the project.

- Avoid contaminated sites wherever practical; where unavoidable, initiate further site investigation and coordination with affected property owners.
- Conduct appropriate surveys for asbestos, lead-based paint, and universal wastes prior to demolition of any building structures and bridges or elevated structures; if these regulated materials are encountered, abate them in accordance with applicable regulations and guidelines.
- Prior to construction, prepare and implement a project-specific Health and Safety Plan and Hazardous Materials Management Plan to address potential hazardous materials that could be encountered; these plans should consist of specific measures to protect worker and public health and safety, as well as programs to manage contaminated materials during construction.
- In the event that unknown contaminated media is encountered during construction, stop working until the contamination is properly evaluated and measures are developed to protect worker health and safety in accordance with the project-specific Health and Safety Plan and Hazardous Materials Management Plan.
- Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil. During the construction phase, require the contractor to file and abide by a dust management plan to minimize the effects of dust on surrounding communities.
- Abide by local, state, and federal regulations regarding the storage and use of hazardous materials on the site.

3.11.6 Future Tier 2 Analysis

During Tier 2 NEPA analysis, detailed hazardous materials evaluations would be conducted, including: review of regulatory agency files; completion of Phase I Environmental Site Assessment reports; subsurface investigations to quantify the vertical and horizontal distribution of hazardous materials; and remediation planning as needed. Additionally, the identification of practical measures to avoid, minimize, and mitigate the environmental consequences from hazardous materials would be completed.

Table 3.11-9 Summary of Impacts to Hazardous Materials

Type of Site	Alternatives			
	No Build	Purple	Green	Orange
Superfund	No I-11 impacts identified; Existing conditions and baseline trends would continue; Other projects in the Study Area would be subject to their own evaluation.	8 Sites = Lowest	10 Sites = Low	98 Sites = Low
Hazardous Waste		46 Sites = Low	39 Sites = Lowest	231 Sites = Low
UST/LUST ⁽¹⁾		81 Sites = Low	44 Sites = Lowest	354 Sites = Low
VRP ⁽²⁾ and Brownfield		1 Site = Lowest	2 Sites = Low	66 Sites = Low
Landfill		5 Sites = Lowest	6 Sites = Low	42 Sites = Low
Environmental Covenant		0 Sites = Lowest	0 Sites = Lowest	2 Sites = Low
Indirect Effects	No potential indirect effects.	Land development induced by the project could: <ul style="list-style-type: none"> • Result in improved accessibility that induces commercial and/or industrial development in new areas. • Increase the potential for spills or releases to land that is not currently impacted by hazardous materials. 	Similar to the Purple Alternative.	Similar to the Purple Alternative, except: <ul style="list-style-type: none"> • Less potential for effects in South and Central Sections due to the planned co-location with existing transportation facilities.

Table 3.11-9 Summary of Impacts to Hazardous Materials (Continued)

Type of Site	Alternatives			
	No Build	Purple	Green	Orange
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Increase use of the existing transportation infrastructure for transport of materials. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Generate potential incremental effects greater than the No Build alternative due to the increase in transport of materials and the release of existing hazardous materials during construction. 	Similar to the Purple Alternative.	Similar to the Purple Alternative.

(1) Underground Storage Tank/Leaking Underground Storage Tank.

(2) Voluntary Remediation Program.

NOTE: Potential for Impact/Risk:

- Lowest: lowest potential impact from an existing hazardous materials release, past release, or material threat of release. Applies where the construction footprint is small and/or density of hazardous materials sites are low; or where the construction footprint is large, but a low density of hazardous materials sites occurs
- Low: minimal potential impact from an existing hazardous materials release, past release, or material threat of release. Applies where the construction footprint is small and/or densities of hazardous materials sites are low; or where the construction footprint is large, but a low density of hazardous materials sites occurs.
- Moderate: moderate potential impact to the alternative from an existing hazardous materials release, past release, or material threat of release. Applies where the construction footprint is large, and the density of hazardous materials sites is moderate; or where the construction footprint is large, and a moderate density of hazardous materials sites occurs.
- High: a high potential impact to the alternative from an existing hazardous materials release, past release, or material threat of release. Applies where the construction footprint is large, and the density of hazardous materials sites is large; or where the construction footprint is large, and a large density of hazardous materials sites occurs.



3.12 Geology, Soils, and Prime and Unique Farmlands

3.12.1 Geology

The geology of the Interstate 11 (I-11) Corridor Study Area (Study Area) can influence design and construction practices as certain geologic features are considered resources while others are considered potential hazards. This section identifies geologic features and conditions within the Study Area and specifically encountered by the Build Corridor Alternatives.

3.12.1.1 Regulatory Setting

No state or federal laws were identified that apply to geologic resources. Geologic resources are subject to regulation based on land ownership and the intended use of the resource. Depending on land ownership and planned resource use, geologic resources may be regulated by various agencies. Potential regulators include federal agencies such as the Bureau of Land Management (BLM), Department of the Interior, Department of Energy, National Park Service (NPS), and National Forest Service (USFS); state agencies such as the Arizona State Land Department (ASLD), Arizona Department of Mines and Mineral Resources, Arizona Department of Environmental Quality, (ADWR); counties; cities; and other local municipalities. The United States Geological Survey (USGS) is a non-regulatory agency under the Department of the Interior responsible for information pertaining to geologic, topographic, and seismic data.

3.12.1.2 Methodology

Geologic resources considered in this analysis include surface geology and surface topography, and selected geologic conditions including depth to bedrock, land subsidence and earth fissures, and active faults and seismicity. The geologic resource information presented is based on readily available geological information and maps collected to develop a description of existing conditions and a comparison of impacts. Information on topography, seismicity, and active faults was obtained from published USGS data. Seismic hazard information for the Study Area was obtained from the online *USGS Earthquake Hazards Program, Quaternary Faults and Folds Database* (USGS 2015) and the *National Seismic Hazard Maps, Simplified Hazard Maps* (USGS 2014). Surface geology, depth to bedrock, and earth fissure information was obtained from published Arizona Geological Survey (AZGS) data (AZGS 2000, 2007, 2017a, 2017b). Land subsidence information was obtained from ADWR.

The geological characteristics of each Corridor Option are characterized in terms of presence or absence (Yes or No) within the 2,000-foot-wide corridor. The effects analysis is qualitative because the identified impacts would occur within the Corridor Option limits regardless of the applicable cross section.

3.12.1.3 Affected Environment

Regional Geology

The Study Area is located within the Basin and Range physiographic province of the southwestern United States (US). The Basin and Range province topography is the result of tectonic extension in the middle and late Cenozoic period (15 to 17 million years before present). It is characterized by a northwest-southeast trending system of rugged mountains with intervening, broad, and extensive alluvial valleys created by high-angle normal faults. Early



geologic forces created valleys and mountains; subsequent erosion degraded the mountain ranges and partially filled in the valleys with sediments, creating the present landforms.

Local Geology

Geologic units within the Study Area mostly consist of Quaternary-age (0 to 1.8 million years before present) alluvial deposits along broad alluvial valley floors (AZGS 2000). These deposits include Holocene-age (0 to 11,000 years before present) river alluvium; undivided (non-differentiated) Quaternary-age surficial alluvium and eolian (wind deposited) material; and surficial soils of Holocene-age to Pleistocene-age (11,000 to 1.8 million years before present). The soil deposits are comprised primarily of alluvial mixtures of gravel, sand, and silt in floodplains; river and stream terraces; and alluvial fans bordering the basins. The surficial alluvial soils generally become coarser grained with closer proximity to the bordering mountain ranges.

A total of 12 bedrock units comprise the surface geology of the mountains within and along the boundaries of the Study Area, and include granitic, volcanic, sedimentary, and metamorphic rock units (AZGS 2000). Depth to bedrock below surface alluvial deposits in the intervening valleys ranges from as little as about 400 feet near the mountains at the valley edges, to as much as 11,200 feet near the centers of valley basins (AZGS 2007, 2017b). Shallower bedrock conditions, at depths ranging from zero at bedrock outcrops to 4,800 feet below the existing ground surface, are common near the Study Area near Nogales, Gila Bend, and Wickenburg, respectively, where mountains comprise the dominant landforms.

Additional information about local geology can be found in **Appendix E12**, Geology, Soils, and Prime and Unique Farmland Technical Memorandum.

Land Subsidence and Earth Fissures

Land subsidence and earth fissures are identified as geotechnical issues for the Study Area. Land subsidence in the southwestern and western US has occurred as a result of long-term groundwater pumping/withdrawals and groundwater level decline. Associated with this land subsidence, earth fissures and potential earth fissure features have been identified in Arizona since the late 1980s. Earth fissures are tension cracks which form in deep alluvium-filled basins in response to the land subsidence. Earth fissures commonly parallel nearby mountain fronts or buried bedrock highs and often bisect surface drainage features. They can intercept surface flows and create vertical/near-vertical pathways to the subsurface groundwater table. Hazards associated with earth fissures include damage to buildings, roads, flood control structures, dams, impoundments and embankments, canals and channels, and sewer, water, and other utility lines. High surface flow gradients contribute to erosive forces that move sediments along and downward into the fissures, and can create gully features ranging from slightly eroded fissures with occasional small potholes to gullies that are tens of feet wide and tens of feet deep.

Active land subsidence areas occupy portions of the Study Area from near Sahuarita in the South Section and extend to Buckeye in the North Section, and comprise large areas near Green Valley, Sahuarita, Tucson, Eloy, Casa Grande, Gila Bend, and Buckeye/Goodyear (ADWR 2017). Earth fissure study areas containing numerous earth fissures occupy portions of the Study Area from near Marana in the South Section, extending to Buckeye in the North Section, and comprise large areas near Marana, Picacho, Eloy, Casa Grande, Maricopa, and Buckeye/Goodyear (AZGS 2017a).

Active Faults and Seismicity

The *USGS Quaternary Fault and Fold Database* search identified two faults or fault systems in the Study Area. The Santa Rita Fault Zone extends along the east side of the Study Area from just north of Nogales to Sahuarita. The Sand Tank Fault exists a few miles south of the Study Area boundary near Gila Bend. USGS indicated that both faults/fault systems exhibit evidence of deformation within the past 750,000 years, with slip rates of less than 0.2 millimeter/year (0.008 inch/year). No other faults with Quaternary-age deformation were identified within a 40-mile radius of the Study Area.

The Project Team obtained probabilistic earthquake ground motion values of peak ground acceleration (PGA) in bedrock for the Study Area and surrounding regions using the *USGS National Seismic Hazard Maps, Simplified Hazard Maps* (USGS 2014). These values are expressed as a fraction of standard gravity (g) for 2- and 10-percent probabilities of exceedance in 50 years. The mapped PGA values are as follows: 10 percent probability of exceedance in 50 years, with a return period of 475 years, 0.02g to 0.05g; and, 2 percent probability of exceedance in 50 years, with a return period of 2,475 years, 0.06g to 0.14g. These PGA values are for firm rock (rock with shear-wave velocity of 2,500 to 5,000 feet per second in the upper 100 feet of the underlying profile). These values would need to be evaluated and adjusted as appropriate based on the subsurface profile encountered during future geotechnical investigations completed for design of I-11 roadways, bridges, water conveyance and retention facilities, utilities, and other structures.

Maps and additional information about local geology, land subsidence and earth fissures, active faults and seismicity, and section by section features can be found in **Appendix E12**, Geology, Soils, and Prime and Unique Farmland Technical Memorandum.

Build Corridor Alternative Considerations

The Build Corridor Alternatives would encounter surface geology and geologic conditions as described above. Geologic conditions encountered by each Build Corridor Alternative would be generally similar. Some minor differences exist in the total number of land subsidence/earth fissure areas and surface bedrock conditions (mountains) that would be encountered by each Build Corridor Alternative (**Table 3.12-1** [Subsidence, Earth Fissures, and Bedrock: Purple Alternative], **Table 3.12-2** [Subsidence, Earth Fissures, and Bedrock: Green Alternative], and **Table 3.12-3** [Subsidence, Earth Fissures, and Bedrock: Orange Build Corridor Alternative]).

Table 3.12-1 Subsidence, Earth Fissures, and Bedrock: Purple Alternative

	South Section			Central Section					North Section
	A	C*	G	I1	I2	L	N	R	X
Encounters Subsidence Area	No	No	Yes	Yes	Yes	No	Yes	Yes	No
Encounters Earth Fissure Area	No	Yes	Yes	Yes	No	No	No	No	No
Encounters Surface Bedrock	Yes	Yes	No	No	No	No	Yes	No	Yes

* Includes the Sandario Road and Central Arizona Project (CAP) Design Option.

SOURCES: ADWR 2017; AZGS 2007, 2017a.



Table 3.12-2 Subsidence, Earth Fissures, and Bedrock: Green Alternative

	South Section			Central Section						North Section
	A	D*	F	I1	I2	L	M	Q2	R	U
Encounters Subsidence Area	No	No	Yes	Yes	Yes	No	No	Yes	Yes	No
Encounters Earth Fissure Area	No	Yes	Yes	Yes	No	No	No	No	No	No
Encounters Surface Bedrock	Yes	Yes	No	No	No	No	Yes	Yes	No	Yes

* Includes the Sandario Road and CAP Design Option.

SOURCES: ADWR 2017; AZGS 2007, 2017a.

Table 3.12-3 Subsidence, Earth Fissures, and Bedrock: Orange Alternative

	South Section			Central Section					North Section
	A	B	G	H	K	Q1	Q2	Q3	S
Encounters Subsidence Area	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Encounters Earth Fissure Area	No	No	Yes	Yes	No	No	No	No	No
Encounters Surface Bedrock	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes

SOURCES: ADWR 2017; AZGS 2007, 2017a.

3.12.2 Soils

The soil resources within the Study Area can influence design and construction practices because some soils are more suitable for these uses while others can be considered potential constraints. This section identifies soil conditions within the Study Area and specifically encountered by the Corridor Options regarding the suitability for or potential limitation to construction of roads and streets.

3.12.2.1 Regulatory Setting

The US Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) identifies, maintains, inventories, and monitors the use and development of soil resources. The NRCS does not have regulatory authority.

3.12.2.2 Methodology

This section evaluates potential effects on soils and summarizes NRCS ratings of encountered soils for construction of roads and streets. The NRCS ratings are based on soil properties that affect the capacity of the soil to support a load without movement and on soil properties that affect excavation and construction costs. These properties include depth to a water table, ponding and flooding, subsidence, linear extensibility (shrink-swell potential), compressibility (inferred by NRCS from the United Soil Classification System classification of the soil), slope, depth to bedrock or a cemented/hard soil layer, hardness of bedrock or a cemented/hard soil layer, and the frequency and size of rock fragments. The effects analysis is qualitative and does not quantify acreage impacts on each soil type.



1 3.12.2.3 Affected Environment

2 A total of 162,082 acres of soil are contained within the Study Area. Of the total soil acreage
3 comprising the Build Corridor Alternatives, 34 percent (54,209 acres) are categorized as "Very
4 Limited", 29 percent (47,681 acres) as "Somewhat Limited", and 35 percent (57,304 acres) as
5 "Not Limited". About 2 percent of the soils located within the Study Area are not categorized by
6 the NRCS. Site-specific field investigations would be required to validate these interpretations
7 and confirm soil characteristics.

8 Soils categorized as "Not limited" possess characteristics very favorable for the specified use,
9 and good performance and low maintenance can be expected. "Somewhat limited" indicates the
10 soil is moderately favorable for the specified use and limitations can be overcome or minimized
11 by special planning, design, or installation. Fair performance and moderate maintenance can be
12 expected. "Very limited" indicates that the soil has one or more characteristics unfavorable for
13 the specified use. The soil limitations generally cannot be overcome without major soil
14 reclamation, special design, or expensive installation procedures.

15 This descriptive terminology is taken directly from NRCS Soil Survey, but based on local
16 experience the Project Team has found that these soil limitations do not represent a significant
17 constraint and represent soil conditions that are common to many other transportation projects.
18 The soil limitations have the potential to impact cost and will be addressed and mitigated during
19 design.

20 Maps and additional information about soils and section by section features can be found in
21 **Appendix E12**, Geology, Soils, and Prime and Unique Farmland Technical Memorandum.

22 **Build Corridor Alternative Considerations**

23 Soil conditions encountered by each Build Corridor Alternative would be generally similar. Minor
24 differences that exist between the Build Corridor Alternatives are summarized in **Table 3.12-4**
25 (Limitations to Construction of Roads and Streets: Purple Alternative), **Table 3.12-5** (Limitations
26 to Construction of Roads and Streets: Green Alternative), and **Table 3.12-6** (Limitations to
27 Construction of Roads and Streets: Orange Alternative).

28 The Purple Alternative includes the most soils categorized as "very limited" (41 percent). Most of
29 those soils occur in the Options G and I1. The percentages of soils categorized as "very limited"
30 in the Green Alternative and Orange Alternative are 35 and 34 percent, respectively.



Table 3.12-4 Limitations to Construction of Roads and Streets: Purple Alternative

	South Section			Central Section					North Section	Purple Summary
	A	C*	G	I1	I2	L	N	R	X	
% Very Limited	34	48	61	67	56	47	25	11	25	41
Acres Very Limited	2,396	6,790 (6887)	6,707	1,191	2,546	1,722	1,573	474	3,368	26,767 (26,864)
% Somewhat Limited	59	39	23	20	27	7	4	13	28	28
Acres Somewhat Limited	4,139	5,454 (5671)	2,465	335	1,214	267	258	551	3,754	18,437 (18,654)
% Not Limited	6	13	15	12	17	45	68	75	46	31
Acres Not Limited	426	1,902 (1876)	1,612	206	756	1,658	4,220	3,184	6,106	20,070 (20,044)

* CAP Design Option data shown in parenthesis.

SOURCE: NRCS 2017.

Table 3.12-5 Limitations to Construction of Roads and Streets: Green Alternative

	South Section			Central Section						North Section	Green Summary
	A	D*	F	I1	I2	L	M	Q2	R	U	
% Very Limited	34	25 (26)	42	67	56	47	13	48	11	32	34
Acres Very Limited	2,396	3,922 (4,098)	5,228	1,191	2,546	1,722	571	531	474	3,851	22,432 (22,608)
% Somewhat Limited	59	57 (55)	45	20	27	7	10	0	13	26	37
Acres Somewhat Limited	4,139	8,815 (8,687)	5,515	335	1,214	267	445	0	551	3,166	234,447 (24,319)
% Not Limited	6	18	13	12	17	45	77	44	76	42	29 (30)
Acres Not Limited	426	2,834 (2,884)	1,573	206	756	1,658	3,437	483	318 4	5,055	19,612 (19,662)

* CAP Design Option shown in parenthesis.

SOURCE: NRCS 2017.



**Table 3.12-6 Limitations to Construction of Roads and Streets:
Orange Alternative**

	South Section			Central Section					North Section	Orange Summary
	A	B	G	H	K	Q1	Q2	Q3	S	
% Very Limited	34	25	61	39	27	27	48	9	32	34
Acres Very Limited	2,396	3,603	6,707	1,706	2,757	1,027	531	379	3,868	22,974
% Somewhat Limited	59	53	23	7	3	0	0	9	22	26
Acres Somewhat Limited	4,139	7,544	2,465	297	346	0	0	379	2,718	17,888
% Not Limited	6	21	15	52	69	73	44	74	46	39
Acres Not Limited	426	3,047	1,612	2,289	6,928	2,833	483	3,118	5,637	26,373

SOURCE: NRCS 2017.

1 Dust Storms

2 Dust storms causing poor visibility are a common hazard in the arid southwestern US and are
3 known to impact the Study Area, such as along the existing Interstate 10 and Interstate 8
4 corridors and surrounding areas between Tucson and Phoenix, especially between Casa
5 Grande and Marana. Dust storms result from the interaction between meteorological conditions
6 (high winds) and poor surface soil conditions (loose, unstable, and/or disturbed soils).
7 Meteorological conditions related to dust storms include two categories – summertime
8 monsoonal thunderstorms¹ and large scale synoptic weather systems² that cross Arizona in the
9 fall, winter and spring.

10 During the summer monsoon season, thunderstorms tend to cause large-scale dust storms from
11 strong outflow winds that typically reach 40 to 60 miles per hour. These winds can pick up fine
12 grained soil particles creating vast dust storms called haboobs³, which can be 50 to 100 miles
13 across and extend vertically hundreds to thousands of feet up into the atmosphere (UCAR
14 2010). Haboobs can be seen on radar due to their size and composition and the public is often
15 warned (NWS 2018).

16 During the rest of the year (fall, winter, and spring) large scale synoptic weather systems
17 including Pacific Storms and cut-off low pressure systems can cause dust storms as they cross
18 the desert Southwest creating large regions of elevated, gusty winds (Lader et al. 2016).

¹ Monsoon/ Monsoon Thunderstorms are defined as a pattern of pronounced increase in thunderstorms and rainfall over large areas of the southwestern US and northwestern Mexico that typically occur between July and September. The thunderstorms are fueled by daytime heat and a shift in wind patterns where the usual flow and the prevailing winds start to flow from moist ocean areas into dry land areas. The storms typically build up in the late afternoon or early evening.

² In meteorology, synoptic weather systems are a weather pattern or system with a horizontal length scale of the order of 1,000 kilometers (about 620 miles) or more; also known as large scale or cyclonic scale weather systems.

³ Haboobs are intense sandstorms or dust storms caused by strong winds, with sand and/or dust elevated to heights as high as 5,000 feet, resulting in a "wall of dust" along the leading edge. Haboobs are often caused by an atmospheric gravity current, such as thunderstorm outflow and can occur in arid and semiarid regions of the world and sometimes deposit large quantities of sand and/or dust.

Synoptic systems do not necessarily cause dust storm hazards, but can do so when they encounter a strong dust source. This typically happens in relatively localized areas referred to as dust channels, which are limited in vertical and horizontal extent (widths of about 10 to 100 feet). Synoptic system dust storms are usually too low to the ground to be seen on radar making it difficult to warn the public.

Both monsoonal and synoptic weather systems can create dangerous conditions due to reduced visibility. This happens when these systems encounter soils prone to wind erosion including naturally occurring loose/uncemented, fine-grained alluvial soils, disturbed soil such as abandoned or fallow farmlands or active dirt roads, and soils with poor vegetative cover or lacking cover by urban development. All of these soil conditions can and do vary over time and cannot be expected to remain the same into the future.

3.12.3 Prime and Unique Farmlands

Prime and Unique Farmlands are unique soil resources capable of providing food, feed, fiber, or other specific high-value crops. Conversion of Prime and Unique Farmlands to non-agricultural uses, such as a transportation use, results in the loss of these lands for agricultural purposes. This section describes Prime and Unique Farmlands in the Study Area and identifies potential impacts on these resources associated with each of the Corridor Options.

3.12.3.1 Regulatory Setting

Agricultural lands are subject to regulation by the USDA. The Farmland Protection Policy Act (§4202 (b) Title 7 Chapter 73) (FPPA) directs federal agencies to minimize the extent to which their federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. FPPA was established in 1981 in response to concerns about the declining acreages in the US being actively farmed. Prime farmland and agricultural land are not necessarily the same. The agricultural land use designation is a product of local community planning efforts, while the designation of Prime or Unique Farmland is a product of NRCS criteria. Additionally, farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forestland, pastureland, cropland, or other land, but not surface waterbodies or developed urban land.

3.12.3.2 Methodology

Soils comprising certain chemical and physical properties, in combination with certain current and planned uses, are designated as Prime and Unique Farmlands and farmland of unique importance. The Project Team identified Prime and Unique Farmlands using existing NRCS information and soil maps to develop a description of existing conditions for a comparison of impacts. For this Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS), prime farmland and farmland of unique importance are aggregated and are referred together as Prime and Unique Farmlands. No information was gathered on irrigation for the identified acres. Future Tier 2 analysis would identify non-agricultural land use and development to remove those acres from this categorization.

The acreages presented for the referenced farmland classifications include the 2,000-foot-wide corridor for each Corridor Option. The effects analysis is qualitative and does not quantify acreage impacts on each farmland classification.

**3.12.3.3 Affected Environment**

A total of 162,082 acres of soil are contained within the boundaries of the Corridor Options. These soils were evaluated relative to NRCS categorization as Prime and Unique Farmlands, as discussed above. The percentage of prime and unique farmland was calculated based on NRCS soil surveys data and the 2,000-foot-wide corridor of the Build Corridor Alternative. Of the total soil acreage comprising the Build Corridor Alternative, 44 percent (72,018 acres) are categorized as Prime and Unique Farmlands. About 2 percent of the Corridor Options soils are not categorized by the NRCS.

These acreages include areas that are not irrigated, have been developed since the soil survey data was collected, or will be developed in the future under existing municipal land use plans. Data on areas that have already been developed or are currently planned for future development and areas not under irrigation need to be removed from the Prime and Unique Farmland categorization as part of Tier 2 analysis. Maps and additional information about prime and unique farmland and section by section features can be found in **Appendix E12**, Geology, Soils, and Prime and Unique Farmland Technical Memorandum.

Build Corridor Alternative Considerations

Soil conditions encountered by each end-to-end Alternative would be generally similar. Minor differences that exist between the Build Corridor Alternatives are summarized in **Table 3.12-7** (Prime and Unique Farmlands: Purple Alternative), **Table 3.12-8** (Prime and Unique Farmlands: Green Alternative), and **Table 3.12-9** (Prime and Unique Farmlands: Orange Alternative).

Table 3.12-7 Prime and Unique Farmlands: Purple Alternative

	South Section			Central Section					North Section	Purple Summary
	A	C*	G	I1	I2	L	N	R	X	
% Prime and Unique Farmland	54	35 (32)	94	99	95	26	83	49	8.3	52
Acres of Prime and Unique Farmland	3,775	4,986 (4,531)	10,222	1,754	4,297	938	5,151	2,064	1,102	34,289 (33,834)

* CAP Design Option shown in parenthesis.

SOURCE: NRCS 2017.



Table 3.12-8 Prime and Unique Farmlands: Green Alternative

	South Section			Central Section						North Section	Green Summary
	A	D*	F	I1	I2	L	M	Q2	R	U	
% Prime and Unique Farmland	54	41 (38)	99	99	95	26	17	41	49	8.0	51 (50)
Acres of Prime and Unique Farmland	3,775	6,444 (5,948)	12,268	1,754	4,297	938	752	448	2,064	971	33,711 (33,215)

* CAP Design Option shown in parenthesis.
SOURCE: NRCS 2017.

Table 3.12-9 Prime and Unique Farmlands: Orange Alternative

	South Section			Central Section					North Section	Orange Summary
	A	B	G	H	K	Q1	Q2	Q3	S	
% Prime and Unique Farmland	54	63	94	46	8	11	41	29	11.6	43
Acres of Prime and Unique Farmland	3,775	9006	10,222	1,994	808	408	448	1,233	1422	29,316

SOURCE: NRCS 2017.

- 1 The Purple and Green Alternatives have the most Prime and Unique Farmland with 52 and
2 51 percent, respectively. The Orange Alternative has 43 percent Prime and Unique Farmland.

3.12.4 Environmental Consequences

- 4 Based on this Draft Tier 1 EIS analysis, variations in the geologic, soil, and Prime and Unique
5 Farmlands resources exist among the Build Corridor Alternatives to varying degrees.

- 6 The Corridor Alternatives share many similarities; however, some distinctions can be made
7 based on this preliminary analysis. This section outlines the potential impacts on geology, soils,
8 and Prime and Unique Farmlands in the 2,000-foot-wide corridor.

3.12.4.1 Geology

- 10 Potential effects of the project on surface and near surface geologic resources will be similar for
11 all build alternatives and include:



- 1 • Loss of geologic material (rock or soil) through removal,
 - 2 • Loss of access to surface geologic material as part of the construction process (i.e.,
 - 3 covering by pavements or improved right-of-way areas), and
 - 4 • Cut slope instability.
- 5 Excavation and removal of existing geologic materials would be required for construction. This
- 6 would result in loss of native materials from the environment. Access to surface and near-
- 7 surface geologic materials would be lost following construction of roadway pavements, bridge
- 8 and wall structures, and other coverings such as engineered fills and landscape materials.
- 9 Slopes resulting from excavations and fills would be designed in Tier 2 to mitigate erosion prone
- 10 or unstable slope conditions. Operation and maintenance of a new or expanded roadway
- 11 system as the result of a Build Alternative would generally not be expected to affect the geology
- 12 within the Study Area. Additional details about the specific alternatives and Build Corridor
- 13 Options are included below.

14 Purple Alternative

- 15 • Options A and G would avoid bedrock and related difficult excavation and cut slope stability
- 16 issues.
- 17 • Option A would avoid land subsidence and earth fissure areas.
- 18 • Options I1, I2, L, and R would avoid bedrock and related difficult excavation and cut slope
- 19 stability issues.
- 20 • Options L and N would avoid land subsidence and earth fissure areas.
- 21 • Option X would avoid land subsidence and earth fissure areas.

22 Green Alternative

- 23 • Options A and F would avoid bedrock and related difficult excavation and cut slope stability
- 24 issues.
- 25 • Option A would avoid land subsidence and earth fissure areas.
- 26 • Options I1, I2, and L would avoid bedrock and related difficult excavation and cut slope
- 27 stability issues.
- 28 • Options L and M would avoid land subsidence and earth fissure areas.
- 29 • Option U would avoid land subsidence and earth fissure areas.

30 Orange Alternative

- 31 • Options A and G would avoid bedrock and related difficult excavation and cut slope stability
- 32 issues.
- 33 • Option A would avoid land subsidence and earth fissure areas.
- 34 • Option S would avoid land subsidence and earth fissure areas.

35 **3.12.4.2 Soils**

36 Potential effects of I-11 on surface and near surface soil resources are the same for all of the

37 Build Alternatives and include:



- 1 • Loss of soil through removal,
- 2 • Loss of access to soil by covering,
- 3 • Loss of soil by water and wind erosion, and
- 4 • Reduced stability by disturbance.

5 Excavation and removal of native soils would be required for construction of I-11, which would
6 result in loss of these native materials from the environment. Access to surface and near-
7 surface soil resources would be lost following construction of roadway pavements, bridge and
8 wall structures, and other coverings such as engineered fills, erosion protection layers, and
9 landscape materials. Slopes in native materials resulting from excavations and fills would be
10 designed in Tier 2 to mitigate erosion prone or unstable slope conditions. If a Build Corridor
11 Alternative were to be selected, operation and maintenance of a new or expanded roadway
12 generally would not be expected to affect soil resources after the construction period.

13 Soil conditions across the Study Area, specifically in the dust storm prone-areas are generally
14 similar. Where not developed, they are comprised predominately of exposed alluvial soils with
15 little vegetative cover in active river channels and agricultural lands. Considering this and the
16 variable, widespread meteorological conditions responsible for winds capable of soil disturbance
17 resulting in dust storms, none of the proposed I-11 Corridor Options are expected to be more or
18 less susceptible to dust storms and related hazards associated with low visibility, nor would they
19 be expected provide a safer roadway alternative to avoid dust storms.

20 **3.12.4.3 Prime and Unique Farmlands**

21 Potential impacts of the project on Prime and Unique Farmlands resources are the same for all
22 of the Build Alternatives and include:

- 23 • Direct conversion of farmland,
- 24 • Cumulative impacts by isolation of remnant parcels, and
- 25 • Indirect (secondary) impacts resulting from the acquisition of adjacent land.

26 Prime and Unique Farmlands occupy portions of all the Build Corridor Alternatives and all action
27 alternatives would directly affect Prime and Unique Farmlands by conversion.

28 Direct conversion of farmland would occur through construction of the proposed action.
29 Agricultural parcels bisected by the proposed action would result in separated parcels which
30 might become too isolated or too small for continued economic use and/or result in the need to
31 transport equipment using the existing local road network to gain access to opposite sides of the
32 proposed action. Land adjacent to the proposed action is likely to be developed and could result in
33 loss of agricultural land.

34 During the future Tier 2 analysis, the actual acreage of Prime and Unique Farmlands would be
35 further refined and be dependent on the Tier 2 alternative alignment.

36 **3.12.4.4 No Build Alternative**

37 Under the No Build Alternative, there would be no impact to geologic, soil, or Prime and Unique
38 Farmlands resources from I-11. Urban growth of the metropolitan areas encompassed by the
39 Study Area over the long term is projected to continue and expected to impact geologic, soil, or
40 Prime and Unique Farmlands resources through conversion to residential, commercial, and



1 industrial uses. These are considered indirect and cumulative effect and are further discussed in
2 Section 3.17.

3 **3.12.5 Summary**

4 The impacts associated with geology, soils and prime farmlands are similar for the Build
5 Corridor Alternatives. Each Build Corridor Alternative would encounter geologic features and
6 soils that would impact the design and construction process, but the conditions would be similar.
7 All Build Corridor Alternatives would impact agricultural lands through direct conversion during
8 construction.

9 As part of the Tier 2 environmental process, field investigations will determine the exact
10 resource characteristics and how to avoid, minimize, and mitigate associated effects during the
11 design process. The key issues are summarized in **Table 3.12-10** (Summary of Potential
12 Impacts on Geology, Soils, and Prime and Unique Farmlands) located at the end of this section.

13 **3.12.6 Potential Mitigation Strategies**

14 Mitigation for specific effects on geology, soils, and Prime and Unique Farmlands would be
15 identified based on the assessment conducted during Tier 2 analysis. Mitigation strategies that
16 could be implemented when setting the specific alignment of I-11 in Tier 2, as well as best
17 management practices to employ during construction activities, are identified below. These are
18 listed separately for each resource.

19 **Geology**

- 20 • Monitor disturbance and erosion areas during construction and through restoration.
- 21 • Avoid steep slopes and known bedrock outcrops.
- 22 • Evaluate and design for safe, stable excavated slopes in bedrock.
- 23 • Minimize areas of disturbance by using existing roads where possible.
- 24 • Avoid known land subsidence areas when feasible.
- 25 • Avoid known earth fissures when feasible.
- 26 • Appropriate design to avoid or mitigate geotechnical-related construction constraints.
- 27 • Design and excavate slopes in accordance with accepted practices and suitable factors of
28 safety.
- 29 • Design and place fills in accordance with accepted practices and suitable factors of safety.
- 30 • Protect excavation and fill slopes against erosion.
- 31 • Design subgrade and foundations in accordance with accepted practices.

32 **Soils**

- 33 • Monitor potential erosion or settlement areas during construction and through restoration.
- 34 • Minimize areas of disturbance by using existing roads where possible.
- 35 • Develop and implement dust control and erosion control strategies.



- 1 • Stockpile topsoil for use in reclamation.
- 2 • Develop and implement a reclamation and revegetation plan.
- 3 • Protect excavation and fill slopes against erosion.
- 4 Prime and Unique Farmlands
- 5 • Formal coordination with NRCS as part of compliance with the FPPA.
- 6 • Alignment within or near existing linear transportation features or planned urban areas to
- 7 avoid agricultural areas.
- 8 • Work with local land owners to facilitate swaps and purchases as applicable to avoid
- 9 fragmented parcels with barriers to equipment access.
- 10 • Provide access for farm equipment between divided agricultural parcels, where feasible.
- 11 • Implement, during final design, a right-of-way acquisition program in accordance with the
- 12 Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91
- 13 646) and the Uniform Relocation Act Amendments of 1987 (Public Law 100 17).

14 **3.12.7 Future Tier 2 Analysis**

15 Future Tier 2 analyses would consider project-level effects on geology, soil, and Prime and
16 Unique Farmlands. Additional and more detailed analysis will be needed for the preferred
17 alternative(s) during future Tier 2 project-level National Environmental Policy Act reviews. Such
18 Tier 2 National Environmental Policy Act analysis could be advanced for the following:

- 19 • Identify and determine the extent of impacts to specific geology, soils, and prime or unique
- 20 farmland resources.
- 21 • Identify and review regulations related to geologic resources based upon local land
- 22 ownership and the intended use.
- 23 • Evaluate the probabilistic earthquake ground motion values of PGA in bedrock and adjust
- 24 the design as appropriate based on the subsurface profile encountered during final
- 25 geotechnical investigations for design of roadways, bridges, water conveyance and retention
- 26 facilities, utilities, and other structures.
- 27 • Collect any additional or refined data (NRCS, USGS, or other sources) on geotechnical
- 28 conditions that could affect design and performance such as shrink/swell,
- 29 compression/collapse, and corrosion potential.
- 30 • As part of design and geotechnical investigations, determine the amount of ground
- 31 disturbance anticipated and factors that affect the potential for soils to erode by water and
- 32 wind, including physical characteristics, slope gradient, vegetative cover, surface roughness,
- 33 and rainfall or wind intensity.
- 34 • Identify the number of irrigated acres for refinement of potential Prime or Unique Farmlands
- 35 impacts through NRCS completion of the USDA Form AD 1006 (Farmland Conversion
- 36 Impact Rating form).
- 37 • Identify areas of current and planned development that should be removed from Prime and
- 38 Unique farmland categorization thorough the analysis of local land use and zoning maps.



- 1 • Participate in site visits to supplement additional Tier 2 analysis of the areas that may be
- 2 affected by construction and operation of a selected alternative.
- 3 • Site-specific field investigations required during design to validate interpretations and
- 4 confirm soil characteristics.
- 5 • Evaluations for existence and status of mining claims and active mining operations.

Table 3.12-10 Summary of Potential Impacts on Geology, Soils, and Prime and Unique Farmlands

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Major Resource Features	Unique geology soils and farmland features are found throughout the Build Corridor Alternatives. Some features are considered resources (i.e., soil/rock for construction, farmlands for food production) while others are considered hazards (earth fissures, land subsidence, unstable slopes). The potential hazards are highly likely to influence the design and construction methodologies when the selected alternative advances to the future Tier 2 analysis.			
Land Subsidence Areas	No I-11 impacts identified. Existing conditions and baseline trends would continue. Other projects in the Study Area would be subject to their own evaluation.	Encountered in Options G, I1, I2, N, R.	Encountered in Options F, I1, I2, Q2, R.	Encountered in Options B, G, H, K, Q1, Q2, Q3.
Earth Fissure Areas		Encountered in Options C, G, I1.	Encountered in Options D, F, I1.	Encountered in Options G, H.
Surface Bedrock		Encountered in Options A, C, N, X.	Encountered in Options A, D, M, Q2, U.	Encountered in Options A, H, K, Q1, Q2, S.
Construction of Road and Streets: Very Limited Soils		41% of soils in the corridor identified as Very Limited.	35% of soils in the corridor identified as Very Limited.	34% of soils in the corridor identified as Very Limited.
Construction of Road and Streets: Somewhat Limited Soils		28% of soils in the corridor identified as Somewhat Limited.	38% of soils in the corridor identified as Somewhat Limited.	26% of soils in the corridor identified as Somewhat Limited.
Prime and Unique Farmland Soils		52% of soils identified as potentially Prime and Unique Farmland.	51% of soils identified as potentially Prime and Unique Farmland.	43% of soils identified as potentially Prime and Unique Farmland.
Indirect Effects	No potential indirect effects.	Land development induced by the project could lead to: <ul style="list-style-type: none"> • Loss of access to geologic material through covering with construction materials. • Improved access to geologic materials (sand and gravel) needed for construction. 	Similar to the Purple Alternative, except: <ul style="list-style-type: none"> • Overall indirect effects would be increased due to the corridor being located in undeveloped areas with limited planned future development and due to greater area of new ground disturbance in the Central Section. 	Similar to the Purple Alternative, except: <ul style="list-style-type: none"> • Potential effects would be less than that of both the Green and Purple Alternatives due to smaller area of new ground disturbance.

Table 3.12-10 Summary of Potential Impacts on Geology, Soils, and Prime and Unique Farmlands (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		<ul style="list-style-type: none"> • Additional isolation of and remnant prime and unique farmland parcels. • Changes in agricultural land use where land value inflation occurs as a result of land conversion from farmland to developed land. 		
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Drive effects through land conversion to residential, commercial, and industrial uses. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Increase incremental effects including the use of geologic resources and soils, loss of those resources through covering, and the loss of farmland potentially accelerated by increasing land value. 	Similar to the Purple Alternative.	Similar to the Purple Alternative.



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3.13 Water Resources

This water quality assessment addresses the potential direct effects of the No Build Alternative and Build Corridor Alternatives on water resources. This analysis pertains to six categories of water resources, as further defined below: sensitive waters (includes Outstanding Arizona Waters [OAWs], Active Management Areas [AMAs], and Sole Source Aquifers [SSAs]), impaired waters, groundwater, waters of the United States (US), wetlands, and floodplains. The impacts assessed include effects of sediment erosion and chemical pollution on surface water resources (e.g., streams, lakes, ponds, wetlands) and groundwater. This assessment also addresses placement of fill material in waters, wetlands, and floodplains, which can result in impacts to surface water and groundwater quality. However, it should be noted that this Tier 1 review is designed to evaluate the impacts at a high level. Design features and actual alignment of the corridor will be defined during Tier 2 studies. For more details, refer to the Water Resources Technical Memorandum (**Appendix E13**).

3.13.1 Regulatory Setting

This section contains a brief explanation of the federal, state, and local regulations pertaining to activities that may impact water quality.

3.13.1.1 Federal

Clean Water Act (CWA). The CWA governs discharge of pollutants into waters of the US. Waters of the US include traditional navigable waters as defined in 33 Code of Federal Regulations (CFR) 328.3(a), which includes relatively permanent tributaries and adjacent wetlands. Jurisdictional wetlands in Arizona also are regulated as special aquatic sites (40 CFR section 230.41). The following regulations fall under the CWA:

- **Section 404:** Under this regulation, the US Army Corps of Engineers (USACE) regulates discharges of dredged or fill materials (including from construction activities) into waters of the US, including wetlands (33 United States Code [USC] section 1344). Section 404 also is the permitting process that reviews alternatives to determine if the preferred alternative is the least environmentally damaging practicable alternative (LEDPA).
- **Section 401:** Requires that activities covered by a Section 404 permit are certified per the state's applicable effluent limitations and water quality standards (33 USC part 1341). In Arizona, Section 401 certification is administered by the Arizona Department of Environmental Quality (ADEQ) if the action is entirely on non-Tribal lands. If any portion of the action affects Tribal waters of the US, the Section 401 certification would be obtained from either the US Environmental Protection Agency (USEPA) or the respective Tribe.
- **Section 402:** This regulation forms the National Pollutant Discharge Elimination System (NPDES), which regulates pollutant discharges, including stormwater, into waters of the US. NPDES permits set specific discharge limits for point-source pollutants and outline special conditions and requirements for projects to reduce water quality impacts (33 USC section 1342). Permits require that projects be designed to protect waters of the US. Construction projects that will disturb more than 1 acre of land must comply with the requirements of the NPDES Construction General Permit, which, among other provisions, requires preparation and implementation of a Storm Water Pollution Prevention Plan (ADEQ 2013). NPDES permits on non-Tribal lands in Arizona are administered by the state under the Arizona



Pollutant Discharge Elimination System (AZPDES). Pollutant discharges on Tribal lands must be permitted through USEPA Region 9.

- Section 402(p): This regulation also falls under the NPDES and requires implementation of controls for discharges from storm sewers. Two permit types, or “phases,” are available under this regulation, depending on the size and type of operator. Phase I regulations (64 Federal Register [FR] 68722) require discharges from large construction sites, certain industrial activities, and operators of “medium” or “large” Municipal Separate Stormwater Sewer Systems (MS4s) (MS4s that serve a population of 100,000 or greater), to obtain a permit and implement a stormwater management program. The Phase II Regulations (64 FR 68722) require smaller operators to obtain a permit for their stormwater discharges. Both types of permits require controls to reduce the discharge of pollutants to the maximum extent practicable. ADEQ was delegated authority to implement AZPDES permitting for MS4 operators in 2002.
- Section 303(d): This regulation requires states, territories, and authorized Tribes to develop a list of water quality-impaired segments of waterways (33 USC section 1313(d)). The 303(d) list includes water bodies that do not meet water quality standards, ranks the waterbodies by priority, and establishes Total Maximum Daily Loads to meet water quality standards. Total Maximum Daily Loads are the maximum amount of pollutants a water body can receive and still meet water quality standards.

Rivers and Harbors Appropriation Act. USACE has jurisdiction over flood protection systems under Section 14 of the Rivers and Harbors Appropriation Act (33 USC section 408).

Federal Regulation of Land Development in Flood Control Basins. Under Policy Guidance Letter No. 32 and Regulation 1110-2-240, USACE evaluates land development proposals within reservoirs and flood control basins (USACE 2016, 1993).

National Flood Insurance Program. The Federal Emergency Management Agency (FEMA) issues flood zone maps on a countywide level. Among other provisions, the National Flood Insurance Program regulations state that if an area of construction is located within a regulatory floodway, as delineated on the Flood Insurance Rate Map, it must not increase base flood elevation levels (44 CFR section 59-65).

Floodplain Management Department of Transportation (DOT) Order 5650.2 “Floodplain Management and Protection.” The purpose of DOT Order 5650.2 is to ensure that proper consideration is given to the avoidance and mitigation of adverse floodplain impacts by DOT actions, planning programs and budget requests (USDOT 1979).

Executive Order (EO) 11988. EO 11988: Floodplain management requires federal agencies “to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative” (42 FR 26951). This EO establishes an eight-step process that agencies should carry out as part of the decision-making process on projects that could impact floodplains.

EO 13690. EO 13690 amended EO 11988 to improve the Nation’s resilience to current and future flood risk, and established the Federal Flood Risk Management Standard (80 FR 6425). EO 13690 guides agencies to use a higher flood elevation and expanded flood hazard area than the base flood to ensure that future changes are adequately accounted for in agency decisions.



Another requirement is that federal agencies should use, where possible, natural systems, ecosystem processes, and nature-based approaches in federal actions and alternatives.

EO 11990. As written in 1977, “Each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency’s responsibilities” and, per the National Environmental Policy Act of 1969 (NEPA), “shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.” (42 FR 26961)

Safe Drinking Water Act (SDWA) of 1974 (42 USC section 300 et seq.). SDWA protects drinking water supplies in areas where there are few or no alternative sources to the groundwater resource and where, if contamination occurred, using an alternative source would be extremely expensive (USEPA 2016). USEPA is authorized by Section 1424(e) of the SDWA to review proposed projects within a SSA that are federally funded. USEPA defines a SSA as one where:

- The aquifer supplies at least 50 percent of the drinking water for its service area.
- There are no reasonably available alternative drinking water sources should the aquifer become contaminated.

Fish and Wildlife Coordination Act. The Fish and Wildlife Coordination Act requires federal agencies to consult with the US Fish and Wildlife Service (USFWS) before undertaking or approving water projects that would control or modify surface water (16 USC section 662).

3.13.1.2 State

Groundwater Management Code. The 1980 Groundwater Code recognized the need to aggressively manage the state’s groundwater resources to support the growing economy. Areas with heavy reliance on mined groundwater were identified and designated as AMAs. The 1980 Groundwater Code established five AMAs: Phoenix, Tucson, Prescott, Pinal, and Santa Cruz. In 2016, Arizona Revised Statute 45 Chapter 2 updated the Groundwater Management Code of 1980.

Underground Water Storage and Recovery Program and Underground Water Storage, Savings, and Replenishment Act. The Underground Water Storage and Recovery Program and the Underground Water Storage, Savings, and Replenishment Act were established in 1986 and 1994, respectively, and together define the recharge program for Arizona (Arizona Revised Statute 45-801 et seq.; Arizona Administrative Code [AAC] R12-12-151). The recharge program and associated permits are administered by the Arizona Department of Water Resources (ADWR).

Outstanding Arizona Waters. The AAC section R18-11-112 defines Arizona’s OAWs. These are waters that meet the following conditions:

A surface water that is perennial, free-flowing, has water quality that meets or is better than applicable water quality standards, and meets one or both of the following: (1) the surface water is of “exceptional recreational or ecological significance,” or (2) threatened or endangered species are known to be associated with the water body and maintenance and protection of existing water quality is essential to the maintenance of



the threatened or endangered species, or the surface water provides critical habitat (AAC R18-11-112[D]) (ADEQ 2017a).

Aquifer Water Quality Standards. The ADEQ has adopted Aquifer Water Quality Standards (AAC R18-11 Article 4). Groundwater standards in Arizona are the Safe Drinking Water Standards established for Public Water Systems (PWS) and surface water standards for the Domestic Water Source designated use (ADEQ 2017b).

3.13.1.3 Local

County Flood Control Districts require a Floodplain Use Permit (FUP) when a project is within a jurisdictional floodplain. Approval of a FUP typically requires development of a hydraulic computer model to demonstrate that facility components will not result in increased potential for flooding or erosion. This level of detail is not available at this stage of the planning process and will be addressed, as appropriate, during Tier 2 studies. The following county Flood Control Districts would evaluate the need for and review any FUPs during a Tier 2 project assessment:

- Santa Cruz County Flood Control District
- Pima County Regional Flood Control District
- Pinal County Flood Control District
- Flood Control District of Maricopa County
- Yavapai County Flood Control District

ADEQ requires Phase I MS4 permits for operators that serve populations greater than 100,000 (ADEQ 2017c). Operators holding MS4 permits within the Interstate 11 (I-11) Corridor Study Area (Study Area) include the Arizona Department of Transportation (ADOT); Pima County; the City of Phoenix; and the City of Tucson. MS4 permittees must develop individual programs for stormwater management. For example, ADEQ issued the ADOT MS4 Permit on July 17, 2015, with an effective date of August 16, 2015. ADOT's Stormwater Management Plan identifies the program and procedures implemented by ADOT to minimize, to the extent practicable, the release of pollutants to and the discharge of pollutants from the ADOT MS4 (ADOT 2017). Pima County developed a Stormwater Management Program to ensure the quality of stormwater discharges were managed to the maximum extent practicable (Pima County 2013), and the City of Tucson passed Stormwater Management Ordinance Number 10209 in 2005 (City of Tucson 2005).

ADEQ has delegated the authority to enforce applicable requirements of AAC Title 18, Chapters 4 and 5, relating to PWS to the Pima County Department of Environmental Quality. Pima County's PWS Program reviews and approves plans for water line extensions, modifications, or relocations of public water supply systems that serve 15 or more connections, or 25 or more people, for more than 60 days a year (Pima County 2017).

3.13.2 Methodology

The Water Resources Technical Memorandum (**Appendix E13**) provides details on the impact analysis completed for water resources and supporting data, including maps and tables. The following discussion presents an overview of the process used to assess water resource impacts.

This evaluation focuses on direct impacts of the No Build Alternative and Build Corridor Alternatives on sensitive waters (includes OAWs, AMAs, and SSAs), impaired waters, groundwater, waters of the US, wetlands, and floodplains. The Analysis Area for water resources includes the Corridor Options, a 0.5-mile buffer around the Corridor Options, and areas extending beyond the 0.5-mile buffer where water resources have a direct surface connection to those crossed by the Corridor Options (e.g., major rivers, where sediment could be transported more than 0.5 mile under certain conditions). The general 0.5-mile Analysis Area is based on the potential for alternatives to affect surface water flow, sediment transport, and infiltration to groundwater.

Water resources were researched by desktop review of Geographic Information Systems (GIS) data obtained from the US Geological Survey (USGS), FEMA, USFWS, and the ADWR. Information on registered groundwater wells was obtained from ADWR (ADWR 2017a). The locations and names of surface water bodies (e.g., streams, rivers, lakes, and reservoirs) were identified using the USGS National Hydrography Dataset and the USGS 7.5-minute topographic quadrangles. Digital 100-year and 500-year floodplain data were compiled from the FEMA website and Flood Insurance Rate Maps were reviewed to identify floodways and floodplains (FEMA 2015).

The USFWS National Wetland Inventory (NWI) database (USFWS 2017) was used to identify locations of potential wetlands within the Build Corridor Alternatives. The NWI maps use the Cowardin system, which classifies the types of ecosystems related to water resources (Cowardin et al. 1979). It should be noted that the NWI data have been mapped by the USFWS at a desktop level and may not be representative of ground conditions. Formal wetland delineations using the three-part USACE methodology of identifying hydric soils, wetland hydrology, and hydrophytic vegetation would be required to accurately identify wetlands. Such formal delineations are beyond the scope of this Tier 1 analysis (but would be included in the Tier 2 analysis phase). Thus, this analysis refers to the mapped NWI wetlands as “potential wetlands.”

Each Corridor Option was overlaid on the GIS data to quantify the resource and to identify its location within the 2,000-foot-wide corridor. The potential for impacts was then qualitatively assessed by examining the location of each resource relative to the Corridor Option and potential for avoidance. Key factors that were assessed in this impact analysis included:

- Mapped quantity of water resources within each Corridor Option
- Configuration of water resources within the I-11 Project Area, which may indicate how easy it would be to avoid water resources (qualitatively assessed)
- Whether the Corridor Option is co-located within an existing transportation right-of-way (ROW), or would require construction within an undisturbed area (qualitatively assessed)

After assessing the above quantitative and qualitative factors, the level of impact for each Corridor Option by section was ranked as low, moderate, or high in comparison to other Corridor Options within the same section. The rankings for the Corridor Options were then compiled for the overall Build Corridor Alternatives, with more “low” rankings of individual corridor segments corresponding to a relatively lower impact for the overall Build Corridor Alternatives and more “high” rankings of individual corridor segments corresponding to a relatively higher impact for the overall Build Corridor Alternatives. **Appendix E13** provides further details on the analysis methodology.



3.13.3 Affected Environment

The following sections summarize the water resources in the Analysis Area.

3.13.3.1 Sensitive Water Resources

There are no OAWs within the Analysis Area (ADEQ 2017a). The Analysis Area crosses four AMAs covering about 14,700 square miles and stretches continuously from the border with Mexico at Nogales through central Arizona to the northern boundary of Maricopa County (ADWR 2008). The Analysis Area is situated within the following AMAs: Santa Cruz (716 square miles), Tucson (3,866 square miles), Pinal (4,100 square miles), and Phoenix (5,646 square miles). The Upper Santa Cruz and Avra Valley SSA is included in the Analysis Area. This SSA underlies 4,591 square miles in southern Arizona (USEPA 2008) and is the only USEPA-designated SSA within the Analysis Area (**Figure 3.13-1** [South Section Sensitive Waters, Impaired Waters, and Groundwater Resources]; **Figure 3.13-2** [Central Section Sensitive Waters, Impaired Waters, and Groundwater Resources]; and **Figure 3.13-3** [North Section Sensitive Waters, Impaired Waters, and Groundwater Resources]).

3.13.3.2 Impaired Waters

Figures 3.13-1 through 3.13-3 depict the locations of impaired waters relative to the Corridor Options. Option A has approximately 26 miles of impaired waters within its Analysis Area, Option B has approximately 8 miles of impaired waters; Option Q2 has approximately 1.7 miles of impaired waters; and Option R has approximately 0.8 mile of impaired waters (**Figures 3.13-1 through 3.13-3**). Other Corridor Options do not have any impaired waters within their Analysis Areas (ADEQ 2016). For further detail and quantification of impaired waters, see **Appendix E13**.

Impaired surface water segments within the Corridor Option Analysis Areas include the following:

- Santa Cruz River (ammonia, dissolved cadmium, chlorine, and *Escherichia coli* [*E. coli*])
- Potrero Creek (chlorine, *E. coli*, and dissolved oxygen)
- Nogales Wash (copper, *E. coli*, and chlorine)
- Hassayampa River (*E. coli* and selenium)
- Gila River (dissolved oxygen, pesticides, metals, inorganics, and nutrients)

3.13.3.3 Groundwater Resources

Groundwater is a major source of potable and irrigation water in the region. Groundwater is underground water found in pore spaces between grains of soil or rock or within fractured rock formations. Groundwater can originate from precipitation that infiltrates through soil and underlying unsaturated geologic materials until reaching the water table.

Each AMA has a management goal to guide the use of groundwater in the AMA. The management goals for the AMAs in the Analysis Area are as follows:

- Santa Cruz AMA: Maintain a safe-yield condition and prevent long-term declines of local water tables (safe-yield is accomplished when no more groundwater is being withdrawn than is annually replaced).



- Tucson AMA: Establish a safe-yield condition by 2025.
- Pinal AMA: Allow development of non-irrigation uses and preserve existing agricultural economies for as long as feasible, consistent with the necessity to preserve future water supplies for non-irrigation uses (ADWR 2016).
- Phoenix AMA: Achieve a safe-yield condition by year 2025 through increased use of renewable water supplies and decreased groundwater withdrawals in conjunction with efficient water use.

Groundwater recharge in the Analysis Area is supported by the CAVSARP. Colorado River water delivered to Tucson via the Central Arizona Project (CAP) canal sinks into the ground and recharges the aquifer in Avra Valley at the CAVSARP and SAVSARP (City of Tucson 2017). Surface ponds for these facilities are located west of Tucson in Avra Valley.

There are 430 private, municipal, utility, and corporate-owned groundwater wells within the Analysis Area. Wells are used for irrigation, livestock watering, private and public water supplies, groundwater monitoring, and geotechnical information. Most wells (133) fall within Option B; the fewest (0) fall within Option M (**Figures 3.13-1** through **3.13-3**). See **Appendix E13** for quantification of wells by Corridor Option.

Groundwater in the Analysis Area is of acceptable quality for most uses and most analytes meet federal and state drinking water standards. Contaminant levels exceed standards in a few areas (ADEQ 2002; Cordy et al. 2000). Water quality data from Pima County drinking water providers for the sampling years from 1998 to 2000 indicate that the most common regulated constituents detected were nitrate, fluoride, arsenic, and chromium; none of these was at a level that exceeded established drinking water maximum contaminant levels (Pima Association of Governments 2002). Groundwater in the Pinal AMA Basin, as measured by ADEQ, is slightly alkaline, fresh, and hard to very hard, as indicated by pH values and total dissolved solids. Of 86 sites sampled for the *Pinal AMA* study, 13 percent met all SDWA primary and secondary water quality standards. ADWR aquifer water quality standards were exceeded at 70 percent of the 86 sites sampled. Sites sampled within the Pinal AMA exceeded SDWA standards for the level of arsenic, fluoride, gross alpha, nitrate, and uranium (ADEQ 2007). Groundwater in the Phoenix AMA and Upper Hassayampa River Basin in the North Section is generally suitable for drinking water uses. While data are limited for the Phoenix AMA, nine sites within the Upper Hassayampa River Basin have exceeded primary maximum contaminant levels for arsenic, gross alpha, and nitrate. Groundwater in the basin typically has calcium or mixed-bicarbonate chemistry and is slightly-alkaline, fresh, and hard to very hard, based on pH levels, total dissolved solids concentrations, and hardness concentrations.

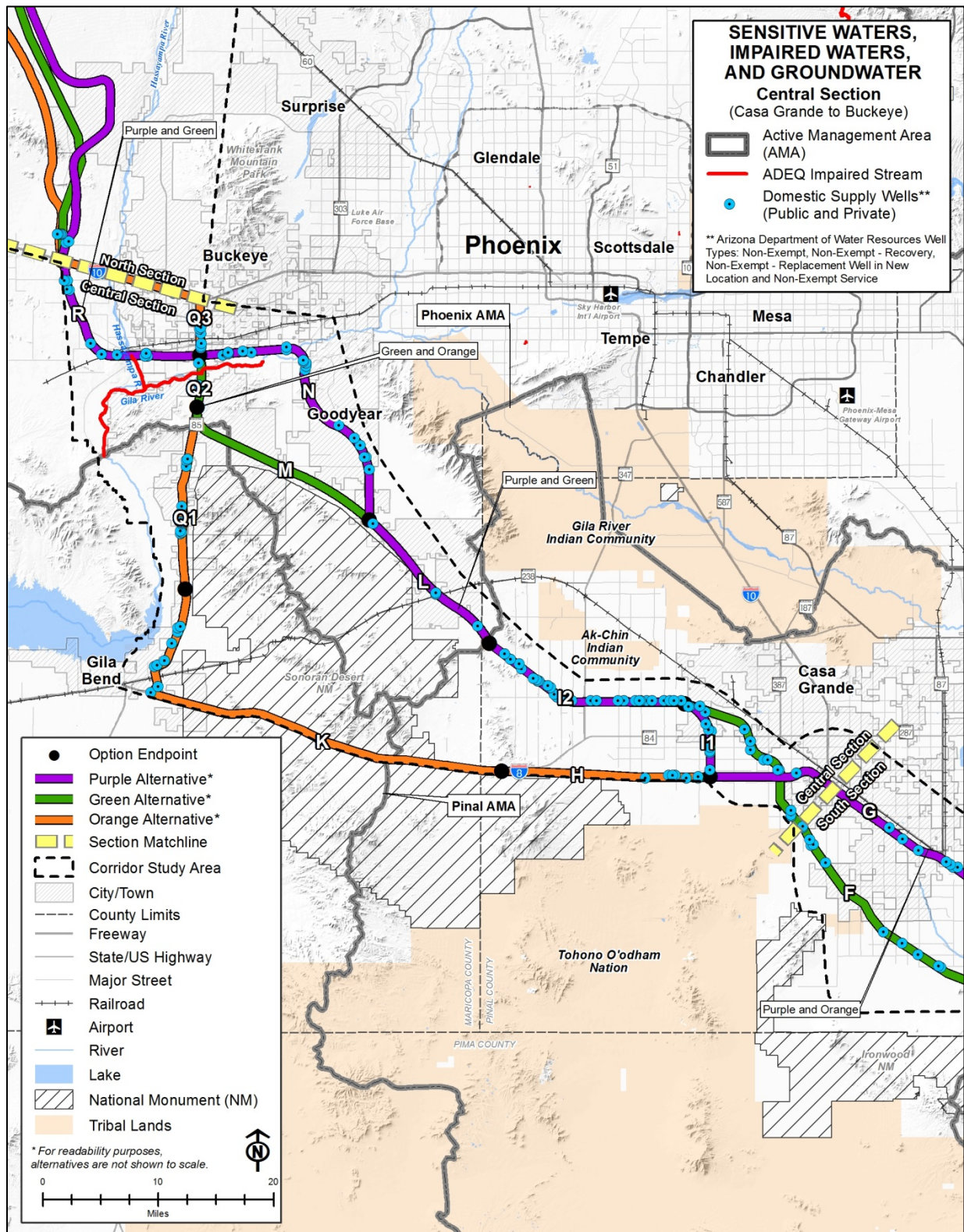


Figure 3.13-2 Central Section Sensitive Waters, Impaired Waters, and Groundwater Resources



3.13.3.4 Potential Waters of the US

Major drainages in the Analysis Area, which are likely waters of the US, include the Santa Cruz River, Gila River, Salt River, and Hassayampa River (**Figure 3.13-4** [South Section Potential Waters of the US and Wetlands], **Figure 3.13-5** [Central Section Potential Waters of the US and Wetlands], and **Figure 3.13-6** [North Section Potential Waters of the US and Wetlands]). Runoff from precipitation, mostly rainfall from infrequent winter storms and summer thunderstorms, flows toward these drainages through ephemeral desert washes. Annual precipitation ranges from 8 to 18 inches per year (ADEQ 2016).

The Santa Cruz River flows from Nogales northwest toward Eloy and the Gila River. There are about 20 named ephemeral streams and canals and numerous unnamed ephemeral washes in the South Section Analysis Area. Most ephemeral streams in the area, including the Rillito River, Cañada del Oro, and Julian Wash, are tributaries to the Santa Cruz River. Nogales Wash, a large tributary of the Santa Cruz River, originates in Sonora, Mexico, and then enters Arizona. About 1 mile south of the border, Nogales Wash enters a concrete-covered channel floodway. The South Section also includes several irrigation canals, including the CAP canal, and man-made ponds ranging from 0.25 acre to over 1,000 acres, which are used for livestock water, recharge, and tailings storage.

The Gila River in the Central Section flows during storm events from east to west, and most ephemeral washes that are tributaries to the Gila River flow north to south (ADWR 2017b). The Hassayampa River flows from north to south, and flows into the Gila River about 5 miles west of State Route 85. Within the Lower Gila watershed, most of the Gila River is ephemeral and flows only in response to precipitation events or water releases from upstream dams. Flow in the lower portion of the Gila River would be intermittent if it were not controlled by dams, and most low flow in the river upstream of Gillespie Dam is sewage effluent and irrigation return flow. There are approximately 16 named ephemeral streams and canals, including the CAP canal, and numerous other unnamed ephemeral washes in the Central Section Analysis Area.

An extensive network of perennial and ephemeral watercourses in the North Section flows into the lower Gila and Hassayampa Rivers. Within this area, most of the Salt and Lower Gila Rivers are ephemeral (ADWR 2017b). The Hassayampa River flows into the Gila River during storm events. The Hassayampa River is mostly intermittent, but it is perennial in its upper reaches and south of Wickenburg; some tributaries also have limited perennial stretches. Most of the Hassayampa River is a dry streambed, but water surfaces a few miles north of Wickenburg in Box Canyon and downstream at the Hassayampa Preserve. South and downstream of Wickenburg, the Hassayampa River broadens into a large riparian area. Tributaries to the Hassayampa River include Jackrabbit Wash, Powerline Wash, and Sols Wash. Tributaries to the Gila River include Phillips Wash and Fourmile Wash. The CAP canal flows east to west through the North Section.

See **Appendix E13** for quantification of potential waters of the US by Corridor Option.

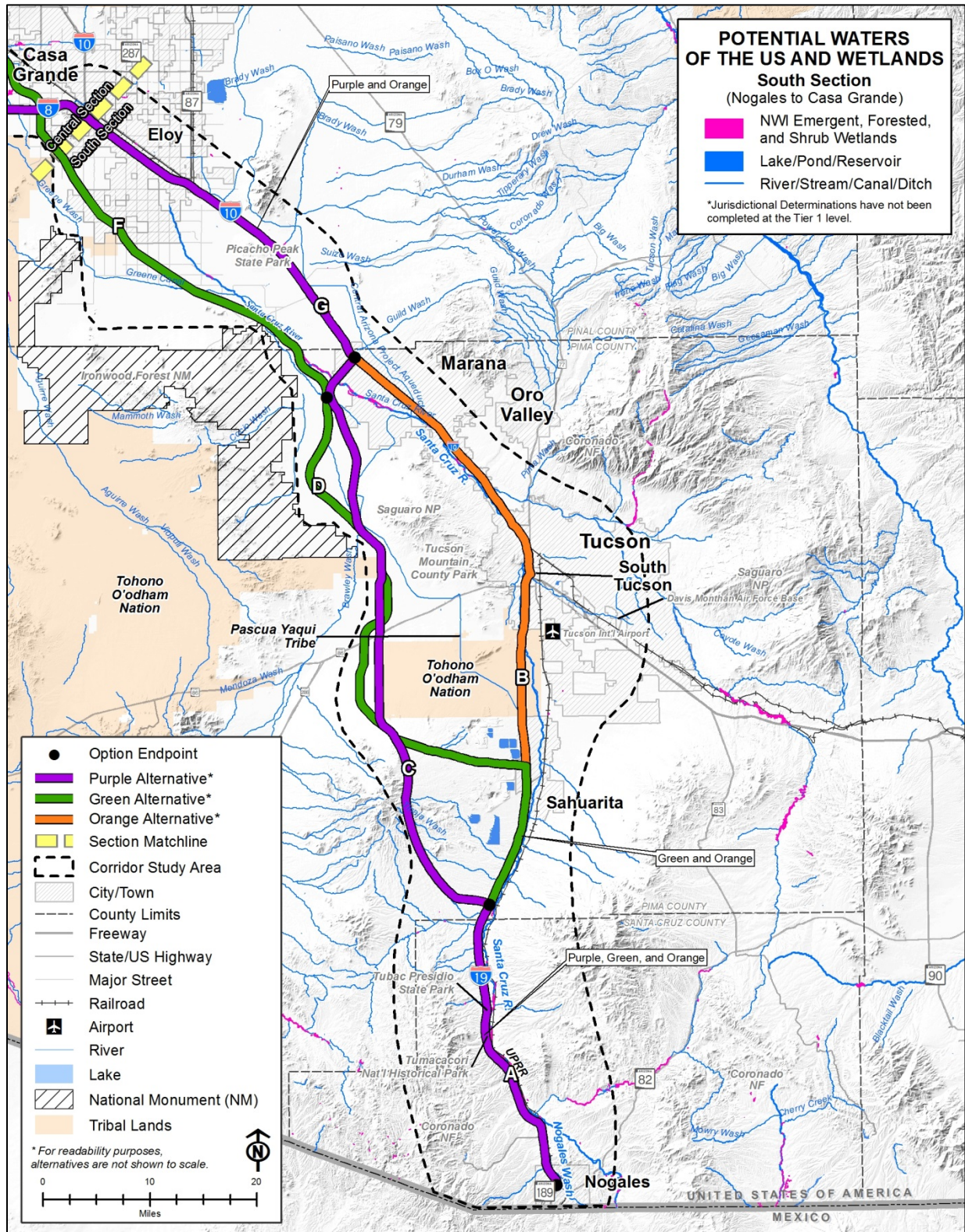


Figure 3.13-4 South Section Potential Waters of the US and Wetlands

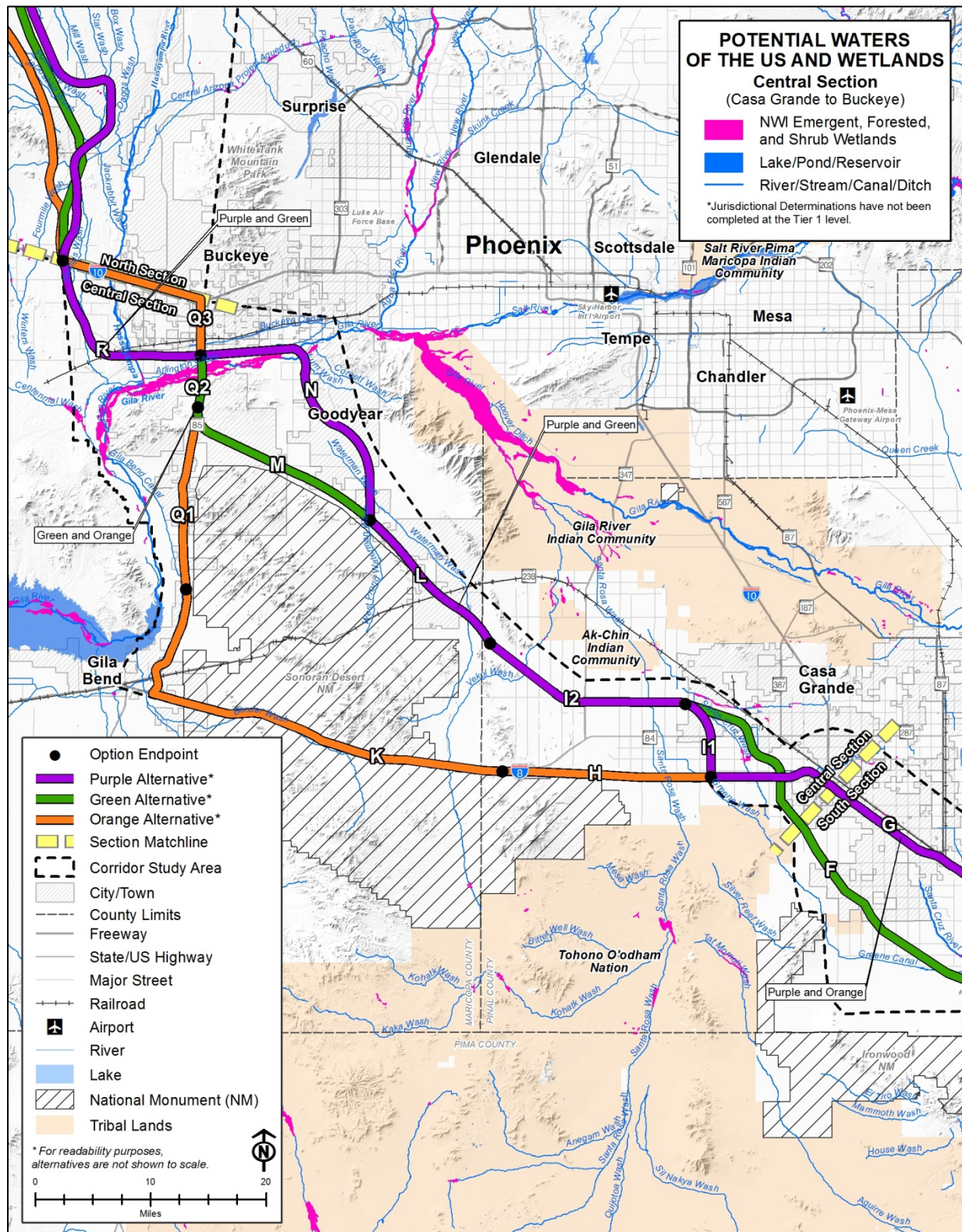


Figure 3.13-5 Central Section Potential Waters of the US and Wetlands

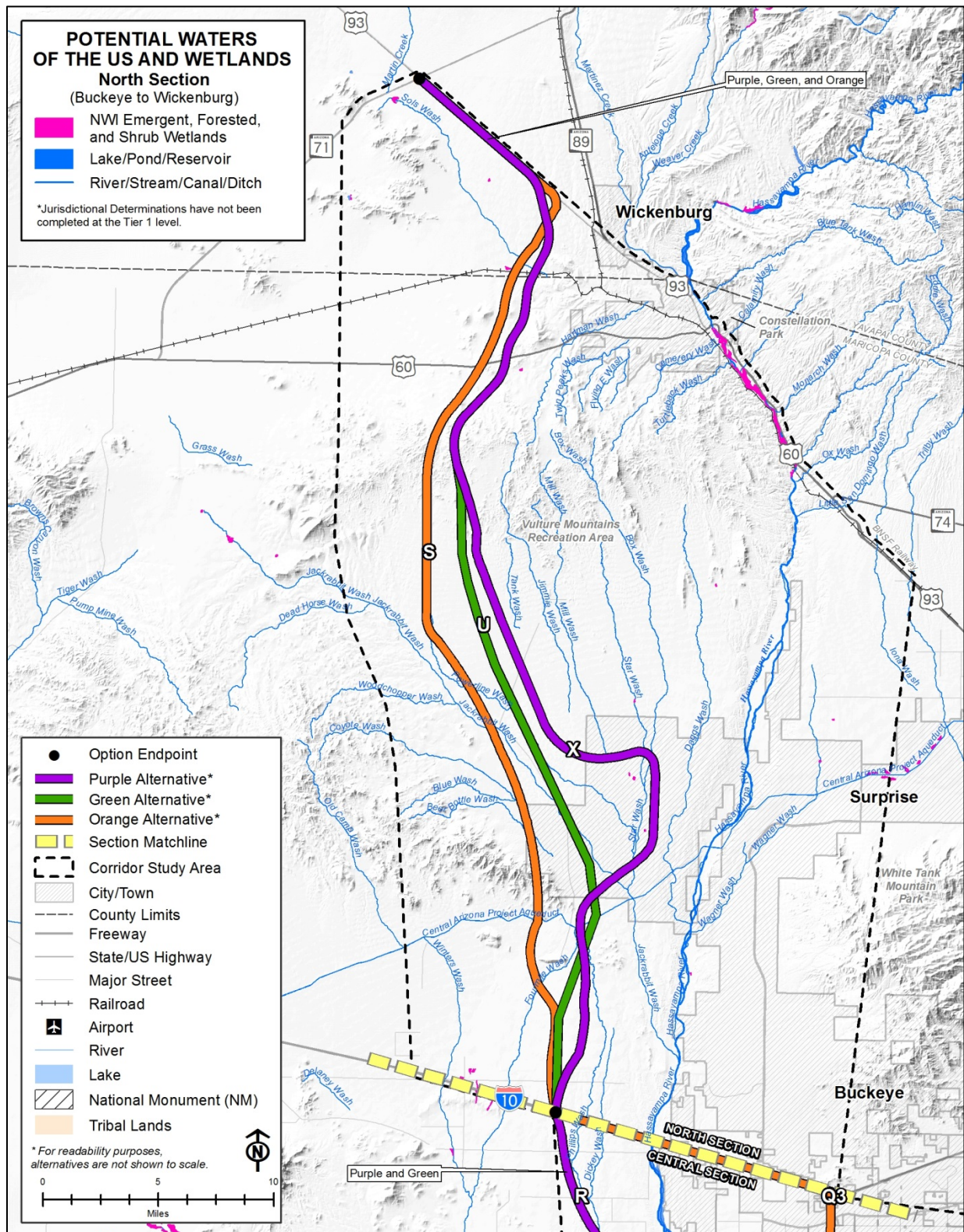


Figure 3.13-6 North Section Potential Waters of the US and Wetlands

3.13.3.5 Wetlands

The Analysis Area includes a number of mapped wetland types, including freshwater forested wetlands, scrub-shrub wetlands, emergent wetlands, riverine wetlands, lakes, and ponds (USFWS 2017). Riverine wetlands are mapped along major drainages, including the Santa Cruz River, Gila River, Hassayampa River, and their major tributaries. Other wetlands are mapped in depressional areas along ephemeral washes, and there are some man-made wetlands in the Analysis Area as well (e.g., constructed wetlands at Sweetwater Wetlands Park and the Tres Rios wetland near the confluence of the Salt, Gila, and Agua Fria Rivers west of Phoenix). NWI-mapped freshwater emergent, forested, and shrub wetlands are shown on **Figures 3.13-4 through 3.13-6**. NWI-mapped riverine wetlands, lakes, and ponds are not displayed on these figures due to the limitations of the map scale; however, many of the NWI-mapped riverine wetlands, lakes, and ponds are near the major waterways, as mapped by ADWR (2017a) and shown on **Figures 3.13-4 through 3.13-6**.

The acreage of mapped potential wetlands in the Analysis Area varies by Corridor Option, with Option K having the highest acreage (399 acres of riverine wetlands) and Option I1 having the lowest (1 acre of freshwater pond). See **Appendix E13** for quantification of mapped wetlands by Corridor Option.

3.13.3.6 Floodplains

Areas mapped by FEMA as 100-year and 500-year floodplains are shown on **Figure 3.13-7** (South Section Floodplains), **Figure 3.13-8** (Central Section Floodplains), and **Figure 3.13-9** (North Section Floodplains). Floodplains are associated with the Santa Cruz River, its tributaries, and other ephemeral streams, such as Arivaca Wash, Brawley Wash, Greene Wash, and Los Robles Wash in the South Section. The Santa Cruz River and its major tributaries also are mapped as floodways. In the Central Section, floodplains are associated with the Santa Cruz, Gila, and Hassayampa Rivers. Floodplains also are mapped along major tributaries, such as Greene Wash, Santa Rosa Wash, Vekol Wash, Bender Wash, and Waterman Wash. Floodways are present along the channel of the Gila River and Waterman Wash. In the North Section, floodplains are associated with the Hassayampa River east of the Build Corridor Alternatives as well as with major tributaries, such as Powerline Wash, Sols Wash, Jackrabbit Wash, Fourmile Wash, and Phillips Wash. Floodways are present along the channels of the Hassayampa River, Jackrabbit Wash, and Star Wash (FEMA 2015).

Sheet flooding occurs in flat or nearly flat areas with few or no well-defined washes. Sheet flow also can occur in areas where washes are not large enough to contain flows during storm events. These areas are included within the areas mapped by FEMA as Special Flood Hazard Areas.

Option F has the highest mapped floodplain acreage within the Analysis Area (5,626 acres), while Option I1 has the least (6 acres). See **Appendix E13** for additional detail and quantification of the floodplains within the Analysis Area.

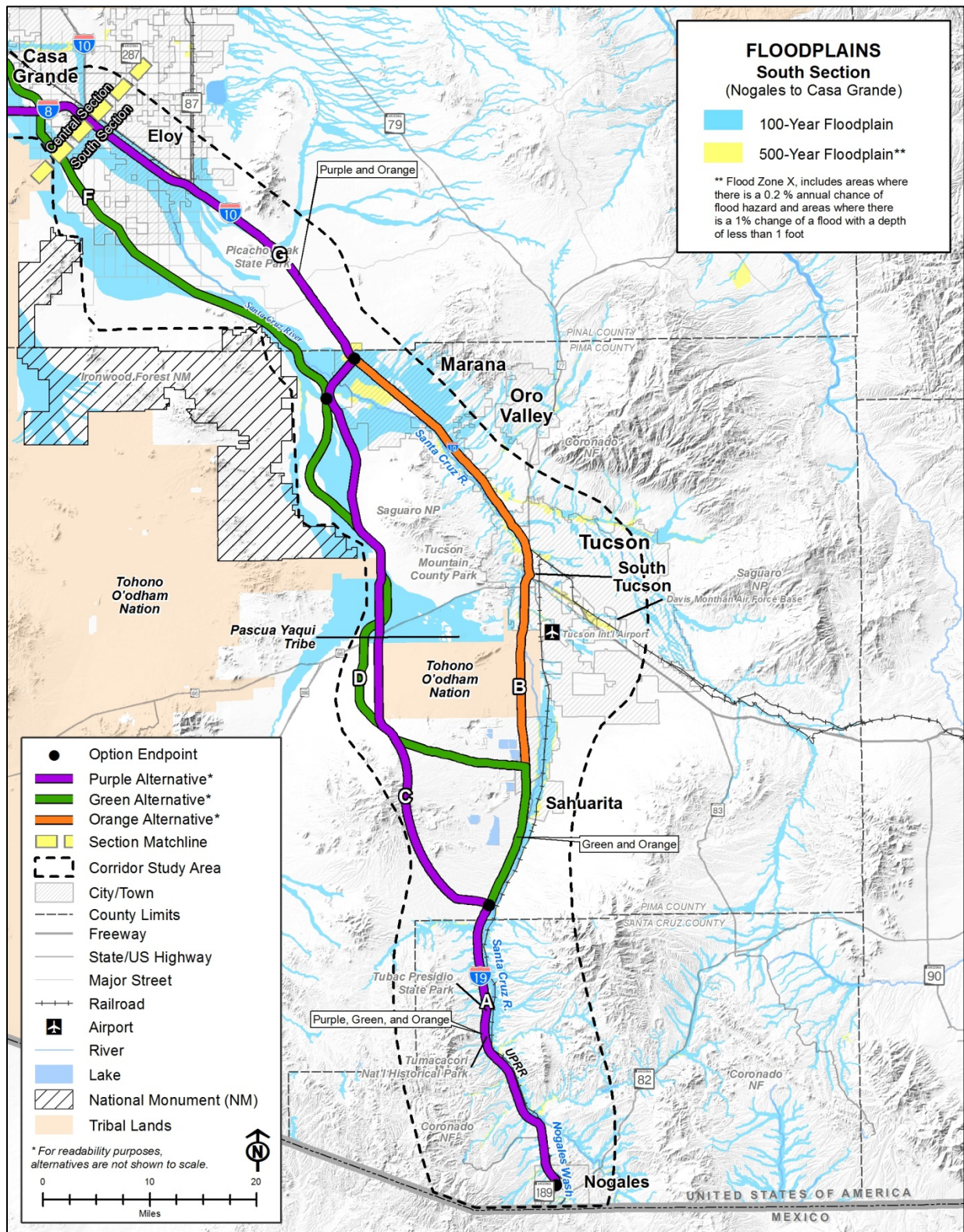


Figure 3.13-7 South Section Floodplains

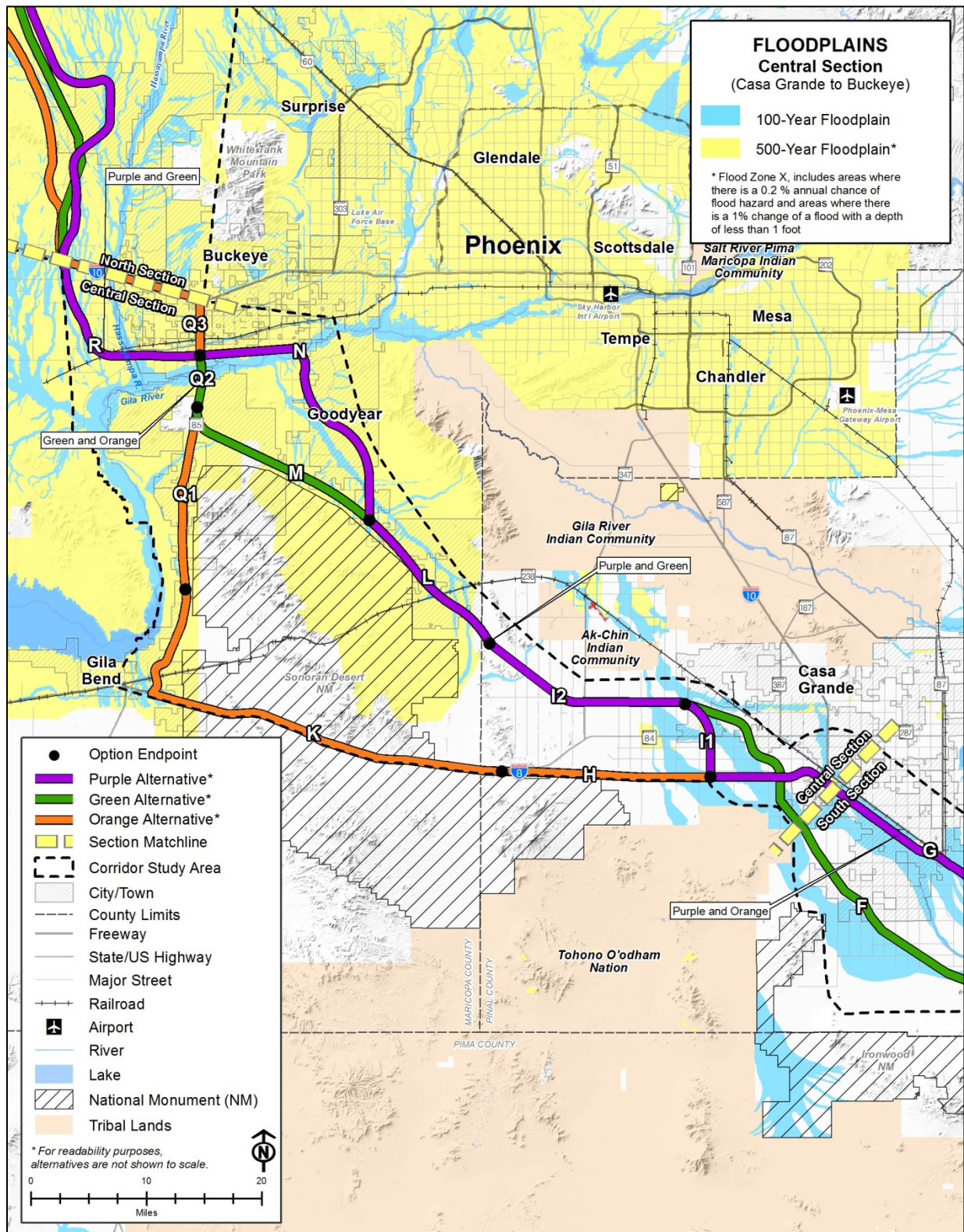


Figure 3.13-8 Central Section Floodplains

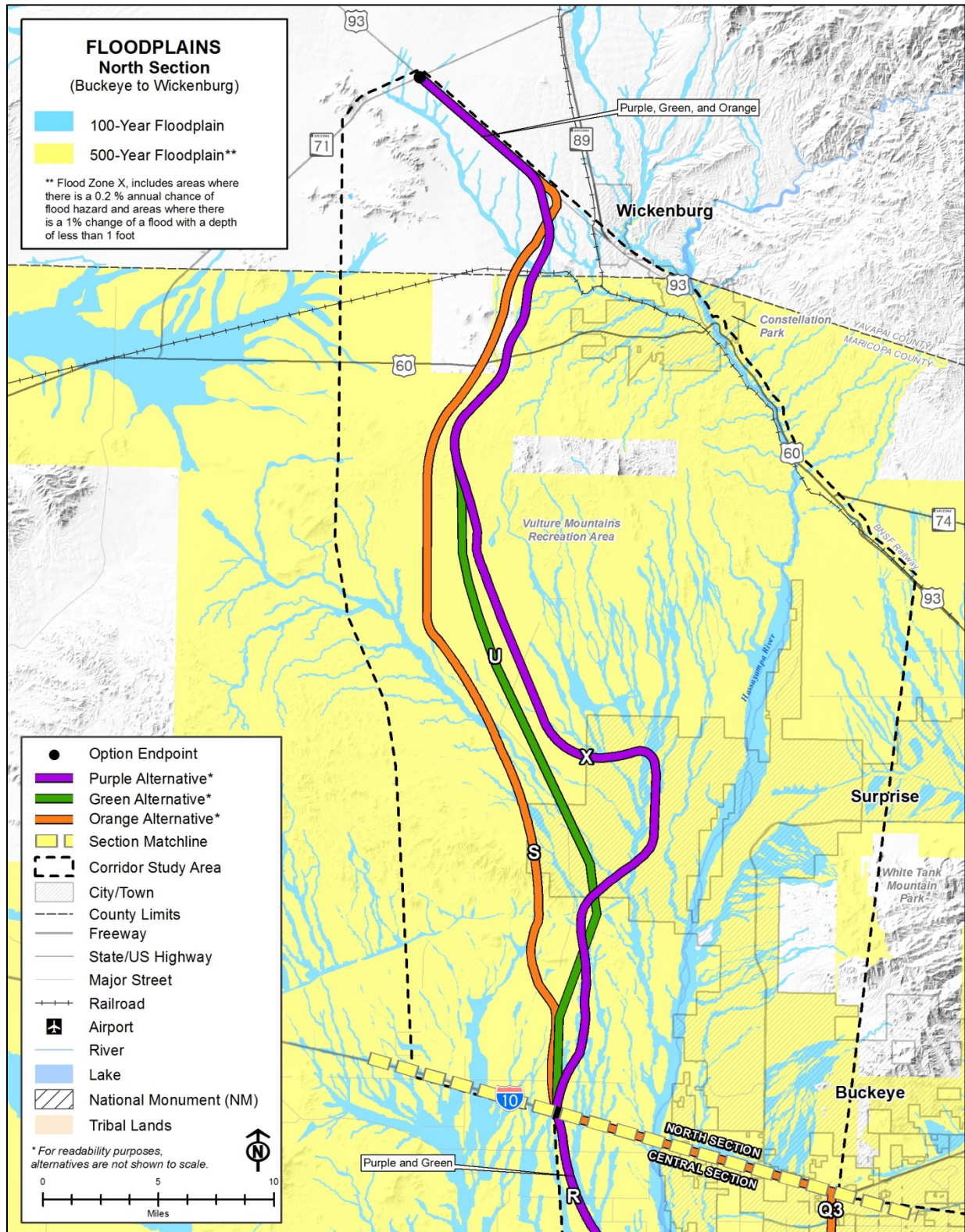


Figure 3.13-9 North Section Floodplains



1 **3.13.4 Environmental Consequences**

2 **3.13.4.1 Build Corridor Alternatives**

3 **Table 3.13-1** (Water Resource Impacts Common to the Build Corridor Alternatives) summarizes
4 the impacts to water resources that could occur under any of the Build Corridor Alternatives.

Table 3.13-1 Water Resource Impacts Common to the Build Corridor Alternatives

Water Resource Type	Description of Impacts
Sensitive Water Resources	<ul style="list-style-type: none">• Construction-phase impacts: stormwater runoff, erosion, and sedimentation due to vegetation removal and soil compaction, as well as temporary fills• Long-term impacts:<ul style="list-style-type: none">– Increased impervious surface leading to more runoff, more automotive-based nonpoint source contamination, and less infiltration to groundwater.– Pollutants may impact water resources for several miles downstream during high flows. Pollutants may move farther downstream in canals that carry water more frequently than ephemeral streams or washes. Location of stream crossings in relation to the watershed indicates how much of the watershed may be affected. Discharge of pollutants into the headwaters of a creek could affect the entire creek system, while discharge into lower reaches could impact less of the system and may benefit the system from the dilution effects of higher flows.– Fill material could be placed in water resources due to the construction of bridges, culverts, or culvert extensions. Crossings may constrict or block natural stream flows, which could result in erosion and channelization.
Impaired Waters	<ul style="list-style-type: none">• Temporary increases in runoff from construction or permanent increases in runoff from new or widened highways could impact impaired streams. For example, if soils are high in selenium or chlorides (from salts), erosion of soils during or after construction could increase loading in adjacent streams. Cadmium, a common metal in highway storm runoff, is listed as a cause for impairment of a few streams. Nutrients in soils (nitrogen or phosphorous) or use of ammonia-based fertilizers may impact streams listed for ammonia or low dissolved oxygen. At rest stations, <i>E. coli</i> from poorly maintained septic systems or, more commonly, from dog waste can be high.
Groundwater Resources	<ul style="list-style-type: none">• Potential for impacts to groundwater supply wells depends on well construction, proximity to potential pollutant sources, and geological conditions. Effects may include physical damage to well casings or wellheads, restriction in access to wellheads, restricted use of wells, and/or administrative barriers to wells or the use of wells. Operational impacts on wells may include safety issues associated with access to or use of the well.• Groundwater quantity and quality could be affected by construction activities. Groundwater quality could be degraded by spills or inadvertent discharges during construction. Increasing impermeable ground surface could decrease groundwater recharge.• Where groundwater is the principal source of potable water, stormwater runoff from a new or widened roadway could impact drinking water if it infiltrates into aquifers.

**Table 3.13-1 Water Resource Impacts Common to Build Corridor Alternatives
(Continued)**

Water Resource Type	Description of Impacts
Potential Waters of the United States, including Wetlands	<ul style="list-style-type: none"> Construction-phase impacts: stormwater runoff, erosion, and sedimentation due to vegetation removal and soil compaction, as well as temporary fills and diversions (local diversions of surface water flows could alter local sediment deposits). Long-term impacts: <ul style="list-style-type: none"> Changes in runoff and stormwater discharge due to changes in the area of impervious surfaces and automotive-based nonpoint source contamination. Placement of fill (including structural fill such as bridge piers and culverts) could result in permanent change in stream contours or loss of wetlands (would be subject to permitting by USACE). Should a Build Corridor Alternative ultimately be selected and constructed, maintenance of culverts or bridges could alter surface flow or introduce sediment.
Floodplains	<ul style="list-style-type: none"> Floodplains could be affected by an increase in impervious surface, constriction or blockage of surface water flow, and the placement of fill or structures within a floodplain. Placement of fill within a floodplain could increase base flood elevation and exacerbate flooding downstream.

Table 3.13-3 (Water Resource Impacts of the Build Corridor Alternatives) located at the end of this section, describes the impact differences between the Build Corridor Alternatives. The table provides the total number of acres of potential new impact for each alternative. The acreages vary for individual Corridor Options in relation to co-location with another roadway or the use of an undeveloped corridor. The acreages in this table are based on an assumption of 25 percent of the 2,000-foot-wide corridor (500 feet) for corridors in undeveloped areas and 5 percent of the 2,000-foot-wide corridor (100 feet) for co-located Corridor Options. The acres presented for riparian areas and important birding areas represent the total number of acres within the 2,000-foot-wide corridor. No attempt was made to calculate the acres of impact within a specifically defined and bounded 400-foot-wide corridor. Calculations related to a specific alignment footprint will be made in Tier 2 studies.

The Purple Alternative would have moderate impacts on sensitive waters, groundwater, and floodplains, and the lowest impacts on impaired waters, Waters of the US, and wetlands compared to the other Build Corridor Alternatives. The Green Alternative is generally the most impactful because it primarily follows a new corridor. This results in more overall new impervious surface, which could increase runoff, reduce infiltration to groundwater, and increase the amount of fill being placed within Waters of the US, wetlands, and floodplains. The Orange Alternative would have moderate impacts on impaired waters, Waters of the US, and wetlands, and the lowest impacts on sensitive waters, groundwater, and floodplains compared to the other Build Corridor Alternatives.

Overall, the Green Alternative would have the highest impacts to water quality based on the quantitative and qualitative analysis (**Appendix E13**). In general, this is because the Purple and Orange Alternatives share more Corridor Options with existing transportation facilities. With

these alternatives, there would be fewer new water resources impacted and less new impervious surface. Conversely, the Green Alternative is primarily on a new corridor, meaning that a higher number of affected resources were not previously affected by transportation facilities. For example, should the Orange Alternative be selected, bridges over waterways would likely need to be widened. However, should the Green Alternative be selected, there would be more new crossings of waterways in areas that do not currently have a bridge, resulting in larger impacts than the existing conditions.

3.13.4.2 No Build Alternative

Under the No Build Alternative, a new I-11 transportation corridor would not be constructed. Vehicles would continue to use the existing transportation network. Sections of I-10 in Pinal County would be widened and intersections, such as Ina Road, would be improved in the South Section. Pavement preservation and other maintenance projects also would be implemented. These projects could have localized impacts on water resources, such as placement of fill within waters of the US, wetlands, and floodplains, and may increase impervious surface in some areas, which could change patterns of runoff and groundwater infiltration. Additionally, stormwater runoff would continue to affect water resources and their quality. Overall, the effects of the No Build Alternative would likely be more localized and discrete compared to those of the Build Corridor Alternatives.

3.13.4.3 Summary

Table 3.13-2 (Summary of Potential Impacts on Water Resources) ranks the relative impacts to water resources for the three Build Corridor Alternatives as well as the No Build Alternative. As described in Section 3.13.2, these rankings were developed by evaluating individual Corridor Options relative to one another within each Section (South, Central, and North) and then compiling the Corridor Option rankings to obtain an overall relative ranking for each Build Corridor Alternative. See **Appendix E13** for additional details as well as the quantitative data that were considered in this analysis.

Table 3.13-2 Summary of Potential Impacts on Water Resources

Resource	Relative Impact			
	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Surface Water – Sensitive Resources	Negligible	Moderate	High	Low
Surface Water – Impaired Waters	Negligible	Low	High	Moderate
Groundwater	Negligible	Moderate	High	Low
Potential Waters of the US	Negligible	Low	High	Moderate
Wetlands	Negligible	Low	High	Moderate
Floodplains	Negligible	Moderate	High	Low

3.13.5 Potential Mitigation Strategies

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. For example, if a riverine wetland is located on one side of the 2,000-foot-wide corridor, shifting the Build Corridor Alternative towards the other side might avoid or could at least minimize impacts to the wetland. Similarly, a shift away from a high-hazard floodplain area could avoid or minimize impacts to the floodplain. Alignment shifts will depend on many other factors, including design standards and balancing impacts to other environmental resources.

Impact minimization could be accomplished through temporary best management practices (BMPs) during construction, permanent BMPs after construction, and adherence to federal and state water quality requirements. AZPDES permits require that projects be designed to protect waters of the US. The AZPDES Construction General Permit requires that erosion control BMPs be implemented, and that a Stormwater Pollution Prevention Plan be prepared for construction activities exceeding 1.0 acre of ground disturbance. In addition to state and federal protections of water quality, Pima County, ADOT, City of Phoenix, and City of Tucson are Phase I MS4 permittees. Each MS4 permittee must develop and enforce a Stormwater Management Program to address stormwater discharge quality. Each program includes control measures (such as the permanent BMPs noted below) to minimize the discharge of pollutants in runoff.

Construction-phase BMPs include both structural and non-structural practices. Examples of structural practices include using perimeter BMPs around the work area to capture sediment, using a tracking pad so that equipment will not carry sediment onto roadway surfaces, slowing runoff to minimize erosion, and limiting the work area to avoid sensitive areas such as wetlands. BMPs to minimize wetland impacts also include placing protective material over wetlands before any temporary fill or equipment crossings occur, and then removing all materials after work is completed to reestablish vegetation. Nonstructural BMPs include daily sweeping of adjacent roadways to pick up sediment that the tracking pads do not catch and stabilizing disturbed areas as soon as possible after work is completed.

Permanent BMPs are mainly structural. They are designed to slow stormwater runoff and retain pollutants. For example, check dams can slow water before it enters waterways or wetlands. Retention ponds hold water long enough to allow sediments to settle out. Sediments commonly carry other pollutants (such as metals), so removing them lowers impacts to water resources.

Long-term measures such as limiting the use of fertilizers along highways or at rest stops also would lower potential impacts on water quality. Locating rest stops away from streams and providing bags (and regulations) for picking up dog waste would limit impacts for both *E. coli* and nutrients.

Where avoidance or minimization are not feasible, mitigation could be implemented. If a groundwater well were affected, well abandonment and compensation (for example, financial compensation, drilling a new well, or providing a municipal connection) might be required. For activities subject to Section 404 permitting, USACE often requires 3-to-1 or greater replacement of permanently impacted jurisdictional wetlands. Mitigation for flooding potential would be addressed where avoidance and minimization of floodplain areas are not feasible. Proposed encroachments in a 100-year floodplain area would require coordination with local floodplain administrators to discuss floodplain development permitting and potential mitigation measures. County Flood Control Districts require a FUP in cases where a project encroaches within a jurisdictional floodplain.



3.13.6 Future Tier 2 Analysis

The purpose of the I-11 Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS) is to assess impacts related to three Build Corridor Alternatives and the No Build Alternative. Tier 2 NEPA reviews will require more detailed analysis of water resource impacts within refined roadway alignments. The Tier 2 NEPA analysis will include conceptual design, which will be used to avoid, minimize, and mitigate impacts to water resources. It also will include field delineation of wetlands, determination of which waters and wetlands are jurisdictional under the USACE definition, and identification of Section 404 permitting requirements.

Tier 2 NEPA reviews also will require coordination with USEPA regarding SSA impacts, and will focus on the relative values of different water resources, including water quality, wetlands, and floodplains. The Tier 2 analysis will further evaluate potential avoidance and minimization of impacts on 100-year floodplains and assess impacts to high-hazard flood areas versus low-hazard (500-year-flood zone) areas. In addition, floodplain areas that have not been categorized will be assessed in more detail, for better comparisons. The Tier 1 analysis has noted differences among the three Build Corridor Alternatives for co-location of major river crossings versus new crossings. The Tier 2 analysis will further quantify those impacts. The Tier 1 analysis has listed several Phase I MS4 jurisdictions, each of which may have differing approaches to stormwater management. The Tier 2 analysis will assess which MS4 applies in which area, and whether any small operators (Phase II MS4s) are impacted by the Build Corridor Alternatives.

USACE is a Cooperating Agency in this Draft Tier 1 EIS study. As part of the Tier 2 analysis, USACE will review the project documentation and the alternatives to determine that they are practicable and reasonable. USACE will ultimately be responsible for making a LEDPA determination when issuing Section 404 permits. Coordination with USACE has determined that USACE would not make the LEDPA determination during this Tier 1 EIS. USACE has recommended that ADOT and the Federal Highway Administration (FHWA) provide clear documentation of the Tier 1 EIS alternatives analysis and selection process so this information can be reviewed during the LEDPA analysis process in Tier 2.

Table 3.13-3 Water Resource Impacts of the Build Corridor Alternatives

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Major Resource Features	<ul style="list-style-type: none"> Three AMAs: the Santa Cruz, Tucson, and Phoenix A designated area of the Upper Santa Cruz and Avra Basin SSA Domestic water supply wells within the I-11 Study Area Santa Cruz River, Santa Cruz Wash, Gila River, Hassayampa River, and their tributaries One wastewater treatment plant (Tres Rios Water Reclamation Facility, located near I-10 and Ina Road in Tucson) 	<ul style="list-style-type: none"> Three AMAs: the Santa Cruz, Tucson, and Phoenix A designated area of the Upper Santa Cruz and Avra Basin SSA The CAVSARP/SAVSARP Domestic water supply wells within the Study Area Santa Cruz River, Santa Cruz Wash, Gila River, Hassayampa River, and their tributaries 	<ul style="list-style-type: none"> Three AMAs: the Santa Cruz, Tucson, and Phoenix A designated area of the Upper Santa Cruz and Avra Basin SSA The CAVSARP/SAVSARP Domestic water supply wells within the Study Area Santa Cruz River, Santa Cruz Wash, Gila River, Hassayampa River, and their tributaries 	<ul style="list-style-type: none"> Three AMAs: the Santa Cruz, Tucson, and Phoenix A designated area of the Upper Santa Cruz and Avra Basin SSA Domestic water supply wells within the Study Area Santa Cruz River, Santa Cruz Wash, Gila River, Hassayampa River, and their tributaries One wastewater treatment plant (Tres Rios Water Reclamation Facility, located near I-10 and Ina Road in Tucson)
Sensitive Waters	<p>No I-11 impacts identified. Existing conditions and baseline trends would continue. Other projects in the Study Area would be subject to their own evaluation.</p>	<p>Moderate anticipated impacts among the Build Corridor Alternatives. Edge of corridor is located within 1,000 feet of the CAVSARP and SAVSARP.</p>	<p>Highest anticipated impacts among the Build Corridor Alternatives. Greatest amount of new impervious surface; could increase runoff and decrease infiltration to groundwater. Edge of corridor is located within 1,000 feet of the CAVSARP and SAVSARP.</p>	<p>Lowest anticipated impacts among the Build Corridor Alternatives. Lowest amount of new impervious surface, so fewer impacts anticipated from changes in infiltration and runoff. No major recharge projects within 0.5 mile of corridor.</p>

**Table 3.13-3 Water Resource Impacts of the Build Corridor Alternatives
(Continued)**

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Impaired Waters	No I-11 impacts identified. Existing conditions and baseline trends would continue. Other projects in the Study Area would be subject to their own evaluation.	Lowest anticipated impacts to impaired waters; intermediate new disturbance and shortest length of impaired waters within 0.5 mile. Impaired segments of Santa Cruz River, Potrero Creek, Nogales Wash, and Hassayampa River are located within 0.5 mile, totaling 140,839 linear feet.	Highest anticipated impacts to impaired waters. Would have the most new disturbance within 0.5 mile of impaired waters and has the greatest number of impaired waterbodies within 0.5 mile. Impaired segments of the Santa Cruz River, Potrero Creek, Nogales Wash, Gila River, and Hassayampa River are located within 0.5 mile, totaling 149,757 linear feet.	Moderate anticipated impacts to impaired waters. Lowest new disturbance within 0.5 mile of impaired waters, but has the greatest length of impaired waters within 0.5 mile. Impaired segments of Santa Cruz River, Potrero Creek, Nogales Wash, and Gila River are located within 0.5 mile, totaling 186,840 linear feet.
Groundwater and Impacts to Wells	No I-11 impacts identified. Existing conditions and baseline trends would continue. Other projects in the Study Area would be subject to their own evaluation.	Moderate anticipated impacts among the Build Corridor Alternatives. Number of groundwater wells within 2,000-foot-wide end-to-end corridor = 170. Edge of corridor is located within 1,000 feet of the CAVSARP and SAVSARP.	Highest anticipated impacts among the Build Corridor Alternatives. Greatest amount of new impervious surface; could decrease infiltration to groundwater. Number of groundwater wells within 2,000-foot-wide end-to-end corridor = 171. Edge of corridor is located within 1,000 feet of the CAVSARP/SAVSARP.	Lowest anticipated impacts among the Build Corridor Alternatives. Highest number of wells (n = 236) within 2,000-foot-wide end-to-end corridor, but most impacts anticipated to occur within existing disturbed areas. No major recharge projects within 0.5 mile of corridor.
Waters of the United States (US)	No I-11 impacts identified. Existing conditions and baseline trends would continue. Other projects in the Study Area would be subject to their own evaluation.	Lowest anticipated impacts among the Build Corridor Alternatives. Corridor partially parallels the Santa Cruz River in the South Section; would have new crossings of Escondido Wash, Tinaja Wash, Brawley	Highest anticipated impacts among the Build Corridor Alternatives. Greatest amount of new impervious surface, which could increase runoff to Waters of the US. Corridor parallels the Santa Cruz River in the	Moderate anticipated impacts among the Build Corridor Alternatives. Corridor parallels the Santa Cruz River in the South Section; parallels Bender Wash and the Gila River in the Central Section; would

**Table 3.13-3 Water Resource Impacts of the Build Corridor Alternatives
(Continued)**

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		Wash, Los Robles Wash, the Santa Cruz River, Vekol Wash, Waterman Wash, the Gila River, the Hassayampa River, Luke Wash, the CAP Aqueduct, Jackrabbit Wash, Star Wash, Box Wash, Mill Wash, and Sols Wash, as well as other minor drainages. Partially parallels the Gila River.	South Section; would have new crossings of Brawley Wash, Los Robles Wash, Greene Canal, Casa Grande Canal, Santa Cruz Wash, Vekol Wash, Waterman Wash, the CAP Aqueduct, Phillips Wash, Jackrabbit Wash, Powerline Wash, and Sols Wash, as well as other minor drainages. Partially parallels Los Robles Wash and Brawley Wash in the Central Section.	have new crossings of Fourmile Wash, the CAP Aqueduct, Beer Bottle Wash, Jackrabbit Wash, Powerline Wash, and Sols Wash, as well as other minor drainages. Highest linear feet of mapped streams within 2,000-foot-wide end-to-end corridor compared to other alternatives.
Wetlands	No I-11 impacts identified. Existing conditions and baseline trends would continue. Other projects in the Study Area would be subject to their own evaluation.	Lowest anticipated impacts among the Build Corridor Alternatives. Impacts could include placement of fill material and runoff within wetlands associated with waterbodies in previous ROW. Moderate amount of new disturbance within 2,000 feet of potential wetlands. Lowest acreage of potential wetlands in 2,000-foot-wide corridor (1,078 acres). May be difficult to avoid impacts at new crossings and where I-11 parallels waterways.	Highest anticipated impacts among the Build Corridor Alternatives. Impacts could include placement of fill material and runoff within wetlands associated with waterbodies in previous ROW. Highest amount of new disturbance within 2,000 feet of potential wetlands. Moderate acreage of potential wetlands in 2,000-foot-wide corridor (1,364 acres); may be difficult to avoid impacts at new crossings and where I-11 parallels waterways.	Moderate anticipated impacts among the Build Corridor Alternatives. Impacts could include placement of fill material and runoff within wetlands associated with waterbodies in previous ROW. Highest acreage of potential wetlands in 2,000-foot-wide corridor (1,662 acres); may be difficult to avoid impacts at new crossings and where I-11 parallels waterways.

**Table 3.13-3 Water Resource Impacts of the Build Corridor Alternatives
(Continued)**

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Floodplains	No I-11 impacts identified. Existing conditions and baseline trends would continue. Other projects in the Study Area would be subject to their own evaluation.	Moderate anticipated impacts compared to the other two Build Corridor Alternatives. Moderate acreage of mapped floodplain (14,778 acres) within 2,000-foot-wide corridor. Would be difficult to avoid placement of new structural fill in floodplains along the Santa Cruz River, Gila River, and other intersecting/parallel drainages. Placement of fill could raise flood elevation and new crossings could constrict flood flow.	Highest anticipated impacts among the Build Corridor Alternatives. Highest acreage of mapped floodplain (15,758 acres) within 2,000-foot-wide corridor. Would be difficult to avoid placement of new structural fill in floodplains along the Santa Cruz River, Brawley Wash, Los Robles Wash, and other intersecting/parallel drainages. Placement of fill could raise flood elevation and new crossings could constrict flood flow.	Lowest anticipated impacts among the Build Corridor Alternatives. Lowest acreage of mapped floodplain (11,263 acres) within 2,000-foot-wide corridor. Would be difficult to avoid placement of new structural fill in floodplain along Santa Cruz River and other intersecting/parallel drainages. Placement of fill could raise flood elevation and new crossings could constrict flood flow.
Indirect Effects	Programmed transportation improvements plus projected population and employment growth could: <ul style="list-style-type: none"> • Generate neutral effects on water quality. • Impact routine operations and maintenance, including stormwater management and compliance with the MS4 permit and applicable local MS4 permits. • Trigger new stormwater controls in areas with programmed 	Land development induced by I-11 could: <ul style="list-style-type: none"> • Change surface water flow, impacting the quality and quantity of water available for uses including recreation, habitat, drinking, and agricultural uses. • Drive new construction to require compliance with MS4 permitting and would include water quality features such as best management practices. • Impact water resources with runoff containing 	Similar to the Purple Alternative.	Similar to the Purple Alternative, except: <ul style="list-style-type: none"> • Potentially less magnitude and intensity in the effects, due to fewer new areas of induced growth. • There is greater potential to improve current water quality, as new construction would require modernization of infrastructure, such as stormwater management features associated with existing transportation facilities.

**Table 3.13-3 Water Resource Impacts of the Build Corridor Alternatives
(Continued)**

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
	improvements along existing facilities (I-10).	pollutants, fragmentation, or changes in hydrology. <ul style="list-style-type: none"> • Influence design and construction of new structures (bridges and/or culverts) leading to local effects on erosion and sedimentation. • Infringe on floodplains. 		
Cumulative Effects	Past, present, and reasonably foreseeable projects could: <ul style="list-style-type: none"> • Increase incremental effects due to increasing demand for water resources. 	Past, present, and reasonably foreseeable projects could: <ul style="list-style-type: none"> • Increase incremental effects to a greater extent than the No Build Alternative. 	Similar to the Purple Alternative.	Similar to the Purple Alternative.

AMA = Active Management Area, CAP = Central Arizona Project, I-11 = Interstate 11, MS4 = Municipal Separate Stormwater Sewer System, ROW = Right-of-Way, SSA = Sole Source Aquifer, Study Area = I-11 Corridor Study Area.



3.14 Biological Resources

Biological resources include terrestrial and aquatic animal species and the vegetative communities that provide habitat for these species. This section describes the regulatory setting, methodology, and affected environment applicable to biological resources within the Interstate 11 (I-11) Corridor Study Area (Study Area). It evaluates the extent to which the No Build Alternative and Build Corridor Alternatives would affect these biological resources and identifies mitigation measures to avoid or minimize these impacts.

3.14.1 Regulatory Setting

A brief overview of the regulatory framework pertaining to natural habitats is summarized below. A more detailed discussion is provided in the Biological Resources Technical Memorandum in **Appendix E14**.

3.14.1.1 Federal Laws, Regulations, and Executive Orders

The federal laws and regulations relevant to biological resources include, but are not limited to, the following:

Endangered Species Act (ESA) of 1973 (16 United States Code [USC] § 1531 et. seq., Public Law 93-205). This law provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found.

Migratory Bird Treaty Act (MBTA) of 1918 (16 USC § 703-712, as amended). This law protects all migratory birds and their parts (including eggs, nests, and feathers) from being taken. The Act also affirms the commitment of the United States (US) to other international conventions for the protection of migratory birds.

Bald and Golden Eagle Protection Act of 1940 (16 USC § 668-668d, 54 Stat. 250, as amended). This law provides for the protection of bald eagles and golden eagles by prohibiting, except under specified conditions, the taking, possession, and commerce of such birds.

Fish and Wildlife Coordination Act (16 USC § 661 et. seq.). This law was enacted to protect fish and wildlife when federal actions result in a modification of a natural stream or body of water. If a modification to a natural stream or water body is expected, coordination with the US Fish and Wildlife Service (USFWS) and with state fish and wildlife agencies is required.

Federal Noxious Weed Act (7 USC § 2801 et. seq.). This law established a federal program to control the spread of noxious weeds. The law also requires any environmental assessments or environmental impact statements (EISs) that may be required to implement plant control agreements that must be completed within 1 year of the time when the need for the document is established.

Wilderness Act of 1964 (16 USC 1131-1136, 78 Stat. 890). The Wilderness Act of 1964 directed the Secretary of the Interior, within 10 years, to review all roadless areas of 5,000 acres or larger and all roadless islands, regardless of size, within the National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions to be



made by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas within the National Forest System. The Act provides criteria for determining suitability and establishes restrictions on activities that can be undertaken in a designated area. It authorizes the acceptance of gifts, bequests, and contributions in furtherance of the purposes of the Act and requires an annual report at the opening of each session of Congress on the status of the wilderness system.

Organic Act of 1916 (16 USC 1 et. seq). This act created the National Park Service (NPS) within the Department of Interior with responsibility for protecting the 35 national parks and monuments then managed by the department and those yet to be established (NPS 2018). An Executive Order (EO) in 1933 transferred 56 national monuments and military sites from the Forest Service and the War Department to NPS.

EO 13112 on Invasive Species. This EO requires federal agencies to prevent the introduction of invasive species and provide for their control, and then to minimize the economic, ecological, and human health effects that invasive species cause.

EO 13186 on Migratory Birds. When actions have, or are likely to have, a measurable negative effect on migratory bird populations, this EO directs federal agencies to develop and implement a Memorandum of Understanding with USFWS that promotes the conservation of migratory bird populations.

3.14.1.2 State Laws and Regulations

The state laws and regulations relevant to biological resources include, but are not limited to, the following:

Arizona Native Plant Law (Arizona Revised Statute § 3-903 through 3-905). This law protects various native species that are naturally occurring (not landscaped or planted) individuals.

Arizona Noxious Weed Law (Arizona Revised Statute § 3-201 et seq.). The Arizona Noxious Weed Law establishes that the Arizona Department of Agriculture (AZDA) may treat, spray, control, suppress, or eradicate noxious weeds, crop pests, or diseases through a county-wide, area-wide, or state-wide program or programs. The AZDA may take whatever actions necessary to assist, support, or enforce such programs, including entering any fields to treat, spray, control, suppress, or eradicate noxious weeds, crop pests, or diseases under these authorized or approved programs (Arizona State Legislature 2017).

EO 91-6 Protection of Riparian Areas (State of Arizona Governor EO 91-6). This order aims to recognize that the protection and restoration of riparian areas are of critical importance to the state, to encourage the development of practices that would enhance and restore degraded riparian areas, to promote public awareness about riparian areas, and to seek cooperation from regulatory and resource agencies to help in the protection and preservation of these areas.

3.14.1.3 Local Ordinances and Plans

Pima County is the only local jurisdiction within the Study Area with ordinances protecting biological communities.

Pima County Native Plant Ordinance. The Pima County Native Plant Ordinance (Pima County Zoning Code §§ 18.72) adopts comprehensive requirements for the preservation in place,



transplanting on site, and mitigation of protected native plants and native plant communities. The ordinance provides requirements and regulations for the preparation and implementation of preservation plans (Pima County 2017).

In June 1998 Pima County adopted by resolution the Native Plant Preservation Manual (Pima County 1998). The purpose of the manual is to provide standards and procedures for implementing the requirements of the Pima County Native Plant Ordinance.

Pima County Multi-Species Conservation Plan for Pima County, Arizona. Following the 1997 listing of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) as a federally endangered species, the Pima County Board of Supervisors initiated the Sonoran Desert Conservation Plan (SDCP). The purpose of the SDCP was to develop a regional plan to address the long-term conservation and preservation of Pima County's natural and cultural resources (Pima County 2016).

This Multi-Species Conservation Plan represents the culmination of many years of planning and studies in the development of the biological element of the SDCP. That work effort was guided by the SDCP biological goal, as established by the Science Technical Advisory Team. In 2001, the Pima County Board of Supervisors adopted the Pima County Comprehensive Land Use Plan Update (Pima County 2001), which incorporated land use concepts, policies, and principles of conservation that were identified in the draft Preliminary SDCP (Pima County 2000). Other milestones in the development of the SDCP include defining land-protection priorities, securing funds for land acquisitions, acquiring and managing new preserves, and revising and updating County regulations. Formalizing the County's conservation commitments for compliance with the ESA is the next milestone in advancing the vision of the SDCP.

City of Tucson Habitat Conservation Plan (HCP). The City of Tucson HCP addresses proposed development activities in three City of Tucson planning sub-areas: Southlands, Avra Valley, and Santa Cruz River (City of Tucson 2018). The plan covers eight species: the cactus ferruginous pygmy-owl, the Pima pineapple cactus (PPC) (*Coryphantha scheeri* var. *robustispina*), the western burrowing owl (*Athene cunicularia hypugaea*), the Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*), the ground snake (valley form) (*Sonora semiannulata*), the needle-spined pineapple cactus (*Echinomastus erectocentrus* var. *erectocentrus*), the pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*), and the western yellow-billed cuckoo (*Coccyzus americanus*).

City of Tucson Avra Valley HCP. The City of Tucson owns more than 21,000 acres of land west of the city limits in the Avra Valley area of Pima County. These former farmlands were purchased in the 1970s and 1980s to secure the water rights, preserve groundwater for urban use, and allow for the future development of water infrastructure supply projects. Since purchased, some of the formerly cleared lands have recovered to a more naturally vegetated state and now support native plants and animals, including some federally recognized species. The City of Tucson and USFWS began working on the Avra Valley HCP in 2004, and the final draft plan was submitted to USFWS in 2014 (City of Tucson 2014). Seven species are proposed for coverage by the Avra Valley HCP: the lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), the pale Townsend's big-eared bat, western yellow-billed cuckoo, the cactus ferruginous pygmy-owl, the western burrowing owl, the Sonoran desert tortoise, and the Tucson shovel-nosed snake.



3.14.2 Methodology

Biological resources are described at a landscape-level (i.e., large-scale) within the Study Area as defined in the *Alternative Selection Report* (see **Figure 1-1** [I-11 Corridor Study Area {Nogales to Wickenburg}]).

Regional vegetation communities, Large Intact Blocks (LIBs), and riparian areas were identified using available literature and digital spatial data, much of which was provided by the Arizona Game and Fish Department (AGFD). Specific wildlife data also provided by AGFD were used in analyzing potential impacts to wildlife and their habitat.

This analysis identifies and considers project effects on general wildlife, special-status species, special management areas, and HCPs within the Study Area. The Study Area encompasses and/or crosses a number of the wildlife linkages identified in the Arizona's Wildlife Linkages Working Group Assessment (AWLWG 2006a) and in later wildlife corridor identification efforts. Coordination with AGFD, USFWS, the Bureau of Land Management (BLM), and other resource agencies and stakeholders will continue throughout the development of the Draft and Final Tier 1 EIS to address any outstanding issues or concerns. **Appendix E14** provides additional detail on the methodology.

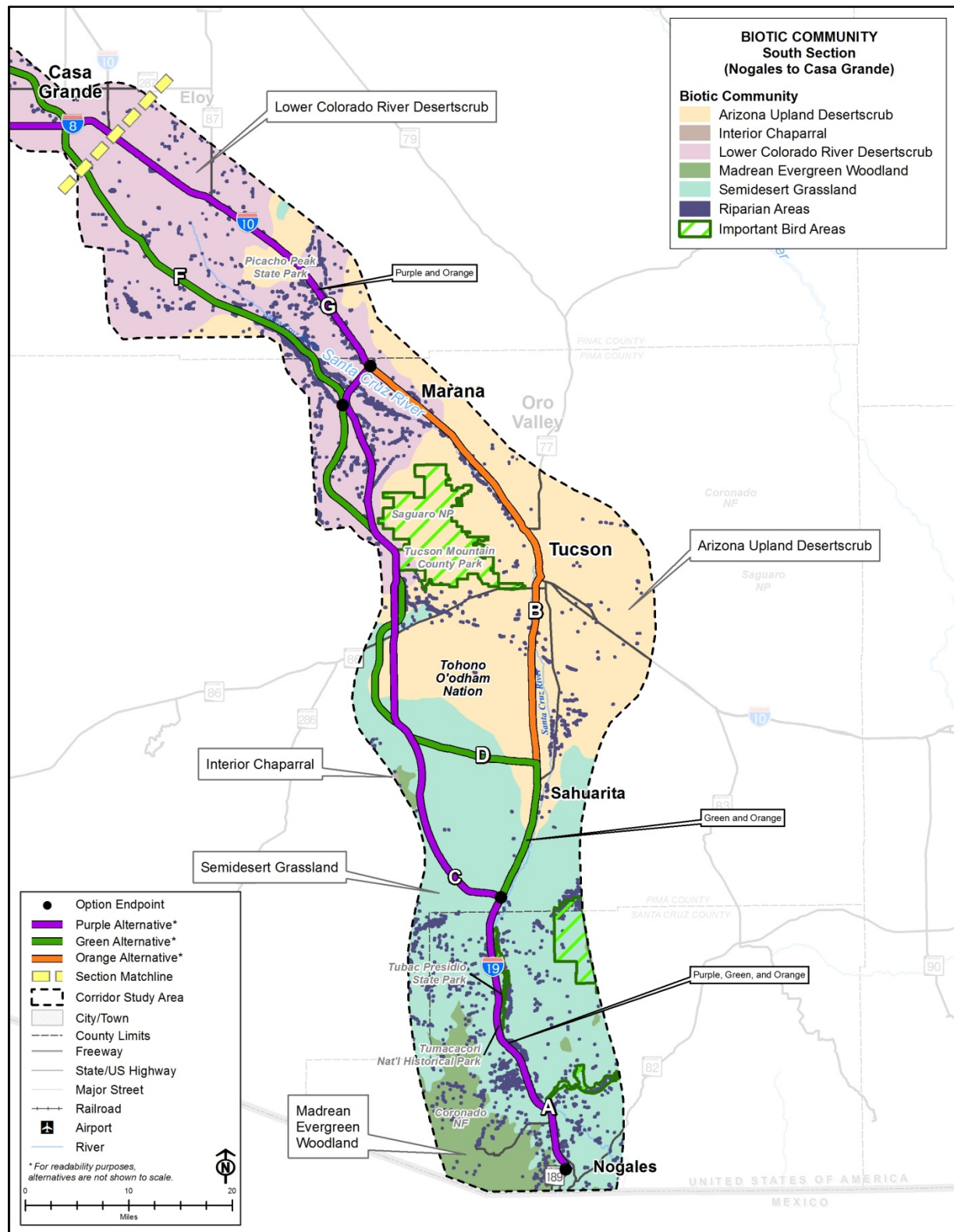
The effects analysis qualitatively considers the difference between the biological impacts created by Corridor Options that involve a new roadway versus Options that are co-located with existing roads. Acreage calculations were generated to estimate the presence of resources within the 2,000-foot-wide corridor for all Options that have the potential to be directly impacted. The Options that are not co-located may only involve a 400-foot impact footprint that would be located within the 2,000-foot-wide corridor during the Tier 2 analysis. Options that would be co-located with existing roads may or may not need widening of the existing roadway; therefore, these co-located Options would affect a smaller width of new right-of-way (ROW). This difference in the potential for impact is noted, where necessary, in various discussions.

3.14.3 Affected Environment

3.14.3.1 Biotic Communities

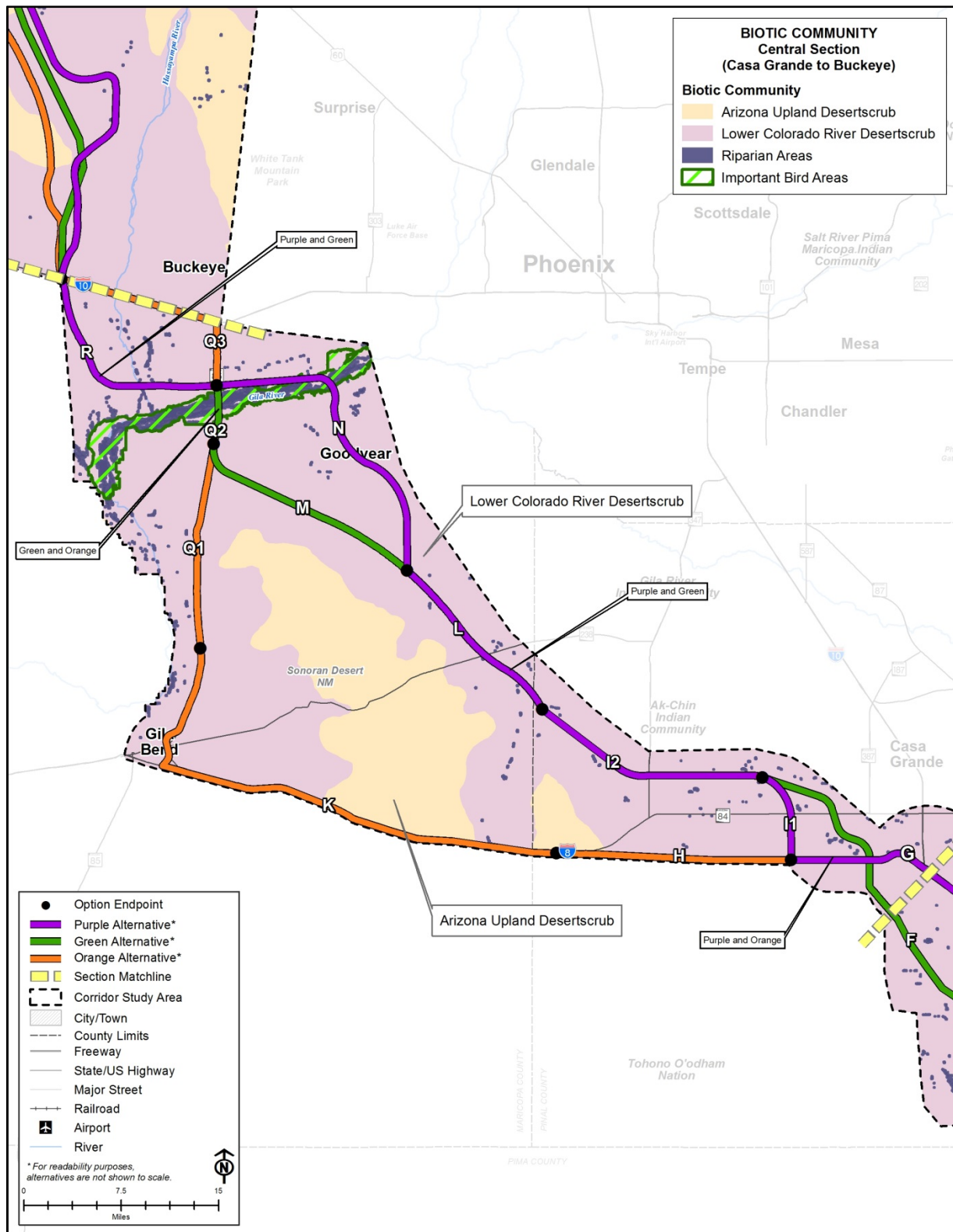
Biotic communities are characterized by distinct assemblages of plants and animals that are characteristic of the surrounding soils, geology, climate, and other environmental conditions that interact to develop the distinctiveness of one biotic community from the other communities within a region. The Study Area crosses six major biotic communities. In addition to these major biotic communities, the I-11 Build Corridor Alternatives also cross several smaller ecological communities and/or special conservation areas, such as riparian areas and designated Important Bird Areas (IBAs) (Audubon Arizona 2017) that provide important habitat for birds and other wildlife (see **Appendix E14** for more information on plant and animal assemblages within each biotic community).

Figure 3.14-1 (Biotic Communities – South Section), **Figure 3.14-2** (Biotic Communities – Central Section), and **Figure 3.14-3** (Biotic Communities – North Section), show the biotic communities crossed by each of the Build Corridor Alternatives. A description of each biotic community present in the Study Area is provided. **Table 3.14-1** (Total Acreage for Each Biotic Community within the Study Area) summarizes the areas for each biotic community within the Study Area.



SOURCE: Brown 1994.

Figure 3.14-1 Biotic Communities – South Section



SOURCE: Brown 1994.

Figure 3.14-2 Biotic Communities – Central Section

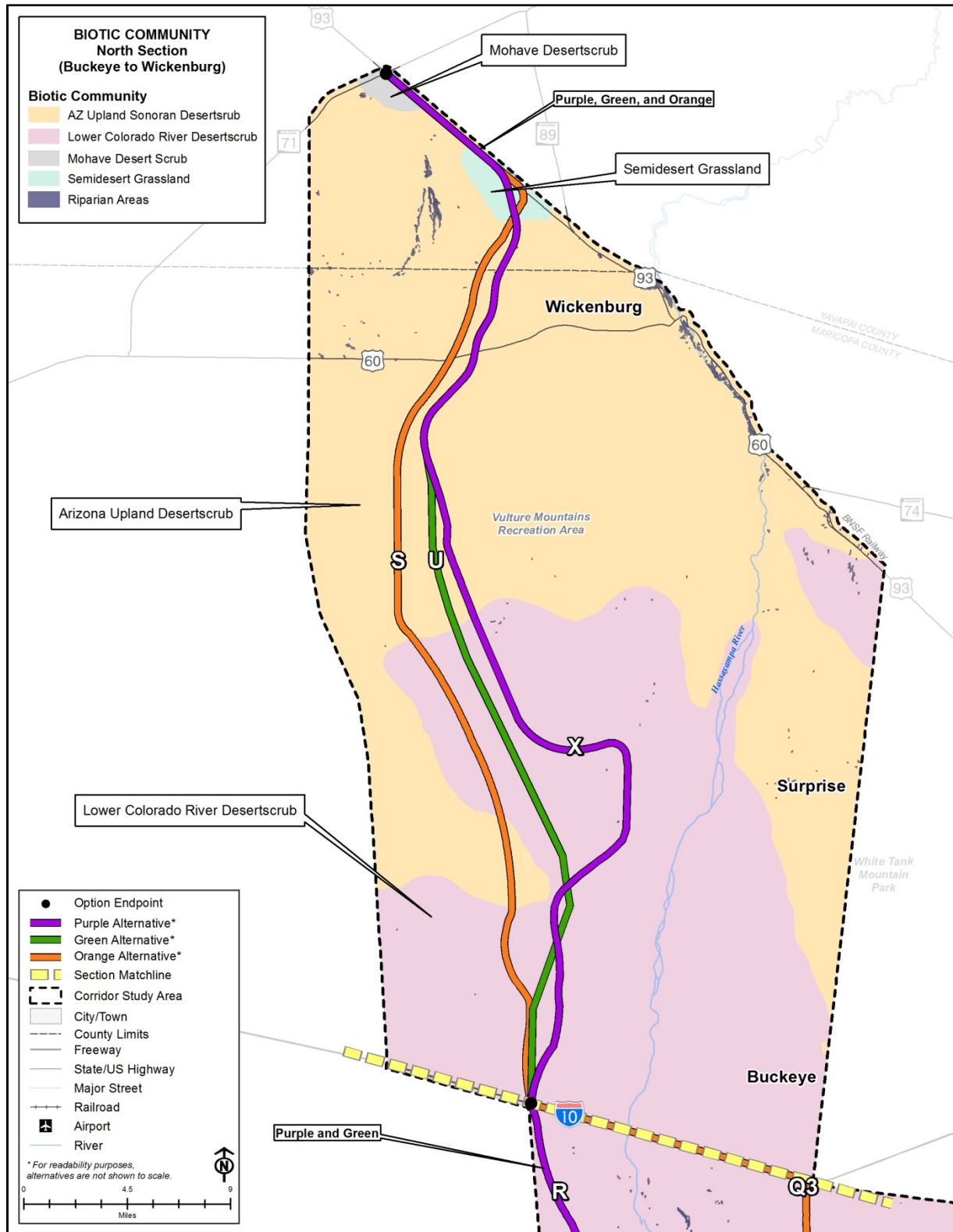


Figure 3.14-3 Biotic Communities – North Section

Semidesert Grassland: Semidesert grasslands are typically found between 3,600 and 5,600 feet above mean sea level (amsl). Winter temperatures are relatively mild, with freezing temperatures occurring less than 100 days out of the year. Summers are warm to hot, with several days over 100 degrees Fahrenheit (Brown 1994). Most areas are characterized by short grasses interspersed with a variety of low-growing trees, shrubs, and cacti. Grass species include: Tobosa grass (*Pleuraphis mutica*), black grama (*Bouteloua eriopoda*), slender grama (*B. repens*), spruce top grama (*B. chondrosioides*), several species of three-awn (*Aristida* spp.), and bush muhly (*Muhlenbergia porter*).

Madrean Evergreen Woodlands: Madrean Evergreen Woodlands are typically found on low mountains and hills at elevations ranging from 5,000 to 7,000 feet amsl. Evergreen oaks (*Quercus* spp.) dominate, and junipers (*Juniperus* spp.) and pines (*Pinus* spp.) also occur. Open savannas are common in some areas, with numerous grasses growing beneath the oaks. Common tree species include: Emory oak (*Quercus emoryi*), Mexican blue oak (*Q. oblongifolia*), Arizona white oak (*Q. arizonica*), Silverleaf oak (*Q. hypoleucoides*), and one-seed juniper (*Juniperus monosperma*).

Sonoran Desertscrub Arizona Upland Subdivision: Arizona Upland Subdivision of the Sonoran Desertscrub biotic community (Arizona Upland Desertscrub) typically is found on low mountains, hills, and bajadas at elevations ranging from 980 to 3,500 feet amsl. Trees are common on rocky slopes as well as drainages; saguaros (*Carnegiea gigantea*) are found everywhere except for the valley floors. Dominant trees include yellow palo verde (*Parkinsonia microphylla*), blue palo verde (*P. florida*), ironwood (*Olneya tesota*), and mesquite (*Prosopis* spp.). In addition to saguaro, numerous other succulent species are found in this community including: chain-fruit cholla (*Cylindropuntia fulgida*), organ pipe (*Stenocereus thurberi*), pincushion cactus (*Mammillaria* and *Escobaria* spp.), and California barrel cactus (*Ferocactus cylindraceus*).

Sonoran Desertscrub Lower Colorado River Valley Subdivision: The Sonoran Desertscrub Lower Colorado River Valley Subdivision (Lower Colorado River Desertscrub) consists of brushy flatlands transected by dry washes at elevations ranging from 80 to 1,300 feet amsl. Vegetation is dominated by low, open stands of creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Cacti, although present, are less abundant than in the neighboring upland division. Trees and taller vegetation are largely confined to washes and other drainages.

Mohave Desertscrub: Topography in this community includes flatlands, plains, low hills, and bajadas at elevations ranging from 980 to 4,270 feet amsl. Landscapes are typically barren and desolate in appearance with low, scattered shrubs. The shrubs are predominately creosote bush, brittlebush (*Encelia farinosa*), white bursage, desert holly (*Atriplex hymenelytra*), shadscale saltbush (*Atriplex confertifolia*), and blackbrush (*Coleogyne ramosissima*). Annuals cover the ground in wet years. Although this landscape is shrub-dominated and lacks giant cacti and many tree species, several large plants such as the Joshua tree (*Yucca brevifolia*) and Mojave yucca (*Yucca schidigera*) form a scattered overstory in places.

Table 3.14-1 Total Acreage for Each Biotic Community within the Study Area

Biotic Community	South Section		Central Section		North Section		Overall	
	Acres	% Total Area	Acres	% Total Area	Acres	% Total Area	Acres	% Total Area
Lower Colorado River Desertscrub	387,235	28.4	640,498	80.2	230,621	42.8	1,258,350	46.6
Arizona Upland Desertscrub	472,095	34.6	157,856	19.8	301,608	56.0	931,560	34.5
Semidesert Grassland	430,718	31.6	0	0.0	4,311	<1	435,029	16.1
Interior Chaparral	222	<0.1	0	0.0	0	0.0	222	<0.1
Madrean Evergreen Woodland	72,657	5.3	0	0.0	0	0.0	72,657	2.7
Mohave Desertscrub	0	0.0	0	0.0	2,301	<1	2,301	<0.1
Total	1,362,927	100	798,354	100	538,841	100	2,700,119	100
Riparian	South Section		Central Section		North Section		Overall	
	Acres	% Total Area	Acres	% Total Area	Acres	% Total Area	Acres	% Total Area
North American Warm Desert Lower Montane Riparian Woodland and Shrubland	13	<0.01	0	0.0	0	0.0	13	<0.01
North American Warm Desert Riparian Woodland and Shrubland	241	<0.01	458	0.02	45	<0.01	745	<0.03
North American Arid West Emergent Marsh	12	<0.01	0	0.0	0	0.0	12	<0.01
North American Warm Desert Riparian Mesquite Bosque	849	<0.03	256	0.01	87	<0.01	1,192	0.04
North American Warm Desert Wash	8	<0.01	0	0.0	0	0.0	9	<0.01
Invasive Southwest Riparian Woodland and Shrubland	10	<0.01	354	0.01	0	0.0	364	0.01
Open Water	61	<0.01	63	<0.01	2	<0.01	127	<0.01
Total Riparian	1,195	0.04	1,131	0.04	135	<0.01	2,461	0.09

SOURCE: Surface area values based on a digital map of the biotic communities of Arizona based on Brown's descriptions (The Nature Conservancy 2004) and a map of the distribution of the different types of riparian areas in Arizona (US Geological Survey [USGS] 2004).

1 **Riparian Habitats**

2 Seven different riparian habitats are described in the USGS National Gap Analysis Program
3 report Provisional Digital Land Cover Map for the Southwestern US (USGS 2004). Some of the
4 major riparian habitats within the Study Area include Sonoita Creek and the Santa Cruz, Gila,
5 and Hassayampa rivers. Segments of Sonoita Creek, the Santa Cruz River, and the Gila River
6 within the Study Area also are included in IBAs. Many of the riparian areas also fall under the
7 provisions of the Clean Water Act and are discussed in Section 3.13.

8 *North American Warm Desert Lower Montane Riparian* habitats are riparian woodlands and
9 shrublands found in the foothills and mountain canyons and valleys. They are usually narrow,



wet habitats along the streams, with a patchy mosaic of open woodlands or forests, willows, rushes, sedges, and moist herbs and grasses.

North American Warm Desert Riparian Woodland and Shrubland habitats are woodlands and shrublands that occur along low-elevation rivers and streams in desert valleys and canyons.

North American Arid West Emergent Marsh habitats are natural marshes that occur in depressions, as fringes around lakes, and along slow-flowing streams and rivers. They are frequently or continually flooded with water depths up to 6 feet deep, but have rooted, mostly grasslike plants.

The North American Warm Desert Riparian Mesquite Bosque habitat consists of low elevation riparian corridors along perennial and intermittent streams in valleys of the warm desert regions. Rivers include the Gila, Santa Cruz, and Salt rivers and their tributaries that occur in the desert portions of their range.

North American Warm Desert Wash habitats are intermittently flooded washes or arroyos that often dissect alluvial fans, mesas, plains, and basin floors. Although often dry, the stream processes define this type, which are often associated with rapid sheet and gully flow. Desert wash plants may be sparse and patchy to moderately dense, and they typically occur along the banks, but occasionally occur within the channel.

Invasive Southwest Riparian Woodland and Shrubland habitats are dominated by introduced (invasive) plant species such as tamarisk (*Tamarisk* spp). Land occupied by introduced vegetation is generally permanently altered or converted. Land cover in this habitat is altered/disturbed by introduced riparian and wetland vegetation.

Open Water habitats are relatively permanent water bodies that are primarily unvegetated. Open water habitats include ponds, lakes, streams, and canals.

Important Bird Areas

The Arizona Important Bird Area Program is part of an international program with the purpose of identifying a network of sites that maintain the long-term viability of wild bird populations. Six Arizona Important Bird Area Program sites are located within the Study Area (Arizona Important Bird Area Program 2011) and are shown in **Figure 3.14-1** (Biotic Communities – South Section) and **Table 3.14-2** (Important Bird Areas within the Study Area). Many of the IBAs within the Study Area, such as the Sonoita Creek IBA, Upper Santa Cruz River IBA, and the Gila River IBA, are associated with riparian habitats. Other IBAs, such as the Santa Rita Mountains and the Tucson Sky Islands IBAs are associated with large, relatively undisturbed habitat blocks. **Table 3.14-2** (Important Bird Areas within the Study Area) summarizes the acreages of IBAs within the Study Area.

Table 3.14-2 Important Bird Areas within the Study Area

Important Bird Areas (IBA)	South Section		Central Section		North Section		Corridor Study Area	
	Acres	% of Area	Acres	% of Area	Acres	% of Area	Acres	% of Area
Sonoita Creek State Natural Area/Patagonia Lake IBA	3,193	0.2	0	0.0	0	0.0	3,193	0.1
Upper Santa Cruz River IBA	2,184	0.2	0	0.0	0	0.0	2,184	<0.1
Santa Rita Mountains IBA	13,565	1.0	0	0.0	0	0.0	13,565	0.5
Tanque Verde Wash/Sabino Canyon IBA	26	<0.1	0	0.0	0	0.0	26	<0.1
Tucson Sky Islands IBA	47,183	3.5	0	0.0	0	0.0	47,183	1.7
Lower Salt and Gila Riparian Ecosystem IBA	0	0.0	27,125	3.4	0	0.0	27,125	1.0
Total IBA Area	66,151	4.9	27,125	3.4	0	0.0	93,275	3.5

Species of Economic and Recreational Importance

Some of the more common species associated with the biotic communities within the I-11 Study Area also are AGFD Species of Economic and Recreational Importance (SERI) in the state. The Arizona State Wildlife Action Plan – 2012-2022 (SWAP) (AGFD 2012a) describes five factors that are important in modeling areas for conservation potential. One of the factors is the economic importance of the landscape, which is represented by SERI.

This category represents the economic and recreational importance of 13 of Arizona's huntable species. The distribution of these species influences important aspects of wildlife-related recreation and the distribution of consumer spending across the state. Together, the economic and recreational importance of game species to hunters, the community, and AGFD provide a realistic view of the importance of game habitat for conservation. The SWAP provides a description of the model and its various elements (AGFD 2012a).

AGFD and the Theodore Roosevelt Conservation Partnership conducted a survey of randomly selected Arizona hunters/anglers, asking them to identify the areas of Arizona they most value for hunting and fishing. A map depicting the results of the survey (AGFD 2016) suggests that a high to moderate number of participants found portions of the Study Area to be of value to them for hunting mule deer (*Odocoileus hemionus*), whitetail deer (*Odocoileus virginianus*), javelina (*Pecari tajacu*), desert bighorn sheep (*Ovis canadensis nelsoni*), Gambel's quail (*Callipepla gambelii*), dove species, waterfowl species, and other small game species. Respondents also noted they valued a few areas within the Study Area for warmwater sportfishing (AGFD 2018a).

Invasive Species

Invasive and noxious species are a major concern in Arizona and across the country. These species are generally well suited to colonizing disturbed areas such as roadways. Because these species can readily adapt, they frequently supplant the native species, affecting the overall viability of the biotic community. The Arizona Department of Transportation (ADOT) tracks the location of invasive species within the road ROW for which they have responsibility and attempts to eradicate or control the spread of these species. The presence of invasive or noxious weed species within undeveloped areas is generally unknown.

The Biological Technical Memorandum (**Appendix E14**) lists the non-native invasive plants known to occur within the Study Area. The list is not an all-inclusive list, as much of the Study

1 Area is located in undeveloped lands where invasive and noxious weed surveys have not
2 previously occurred.

3 Fifty-two invasive and noxious plant species have been found within the Study Area. Three of
4 the species listed are aquatic and 49 are terrestrial. Data were compiled from several sources
5 and include information on federally listed noxious weeds, state-regulated noxious weeds, and
6 state-listed prohibited noxious weeds, and on lists maintained by AZDA and ADOT.

7 **3.14.3.2 Special-Status Species**

8 Special-status species include plant and animal species that have received special designations
9 by a federal, state, or local governmental agency due to concerns regarding rarity and/or a
10 species' sensitivity to perturbations in the environment.

11 **Endangered Species Act Species**

12 USFWS Information for Planning and Consultation publishes information online for ESA
13 threatened, endangered, proposed, candidate, petitioned, and conservation agreement species.
14 Special-status species potentially occurring in Santa Cruz, Pima, Pinal, Maricopa, and Yavapai
15 counties were reviewed to determine if any of these species could potentially occur in the
16 vicinity of the Study Area. Twelve species listed as threatened or endangered and critical habitat
17 for five species occur within the Study Area.

18 Only species listed as threatened or endangered were analyzed as ESA-listed species, with the
19 exception of the Sonoran desert tortoise (*Gopherus morafkai*), which is a Candidate
20 Conservation Agreement (CCA) species. The tortoise was given Candidate status (under ESA)
21 on December 14, 2010. On October 6, 2015, USFWS determined that listing this species was
22 not warranted at this time, due in part to the CCA (USFWS 2015b) developed in cooperation
23 with AGFD, USFWS, ADOT, and 13 other federal agencies. The tortoise was included in the
24 ESA species analysis because of the potentially large detrimental impacts of I-11 to this species
25 and because ADOT is a signatory to the tortoise CCA. Other species protected under a
26 conservation agreement were included with other sensitive species in this analysis. No
27 proposed, candidate, or petitioned species were located in the Study Area.

28 The potential for an ESA species to occur within the South, Central and North Sections of the
29 Study Area is denoted in **Table 3.14-3** (Distribution of ESA Protected Species within the Study
30 Area). The table provides information on habitat requirements and species distribution to
31 determine the likelihood that habitat for a particular species may be present in each section of
32 the Study Area.

33 **Critical and Protected Habitat**

34 **Table 3.14-4** (Total Surface Area Covered by ESA Critical Habitat, 10(j) Experimental
35 Population Areas or other Protected Populations within the Study Area) provides information on
36 critical habitat for ESA species that occur within the Study Area. In addition to ESA proposed
37 and designated critical habitat, **Table 3.14-4** (Total Surface Area Covered by ESA Critical
38 Habitat, 10(j) Experimental Population Areas or other Protected Populations within the Study
39 Area) provides information on other protected habitats, such as USFWS 10(j) Experimental
40 Population/Reintroduction Areas for the Mexican wolf (*Canis lupus baileyi*) and the Sonoran
41 pronghorn (*Antilocapra americana sonoriensis*). The table also includes information on Sonoran
42 desert tortoise BLM Category I and II habitat as well as habitat modeled by USFWS as "High



Value Potential Habitat” (USFWS 2015e). Critical habitat for the Sonora chub (*Gila ditaenia*) does not occur within the Study Area; this species is therefore not included in the table.

Other Sensitive Species

In addition to species protected under the federal ESA (see **Table 3.14-3** [Distribution of ESA Protected Species within the Study Area] and **Table 3.14-4** [Total Surface Area Covered by ESA Critical Habitat, 10(j) Experimental Population Areas or other Protected Populations within the Study Area]), additional sensitive species were analyzed. All sensitive species were analyzed to determine if they occur within the Study Area. **Appendix E14** (Biological Technical Memorandum), includes several additional categories of species deemed sensitive by BLM, the US Forest Service (USFS), and USFWS; species protected under the Bald and Golden Eagle Protection Act; state listed Species of Greatest Conservation Need (SGCN); county-listed species; and plant species protected under the Arizona Native Plant Law as Salvage Restricted or Highly Safeguarded.

Geographic Information System (GIS) data provided by AGFD (AGFD 2017a) along with Pima County’s list of sensitive species and Pima County Priority Conservation Area coverages (Pima County 2016, 2013) were used to find species that were within the Study Area but not included on the AGFD Heritage Data Management System (HDMS) list. The majority of the species listed in the Tohono O’odham Nation’s list of sensitive species are included in the Tier I analyses, as these species are considered sensitive by other land management entities as well. The Build Corridor Alternatives generally avoid Tribal lands, so the remaining Tohono O’odham Nation sensitive species were therefore not analyzed.

Migratory Bird Treaty Act

The Sonoran Desert is home to more than 500 species of birds (Arizona-Sonora Desert Museum 2000). The majority of these species are migratory and are protected under the MBTA. Nonnative species whose occurrences in the US are solely the result of intentional or unintentional human-assisted introduction are not covered by the MBTA. Migratory birds’ requirements for habitat vary by species, and many species use Sonoran Desert habitats, agricultural and floodplain habitats, and/or open water habitats. The sensitive species analysis includes a discussion of impacts to migratory birds. .

Table 3.14-3 Distribution of ESA Protected Species within the Study Area

Common Name	Scientific Name	Status (defined in table note)	South	Central	North	Habitat Requirement
Amphibians						
Chiricahua leopard frog with critical habitat	<i>Lithobates chiricahuensis</i>	USFWS - LT, AGFD SGCN 1A, Pima	X			Permanent or semi-permanent streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs. Elevation: 3,300 – 8,900 feet amsl (AGFD 2015).
Birds						
Mexican spotted owl with critical habitat	<i>Strix occidentalis lucida</i>	USFWS - LT, AGFD SGCN 1A	X			Mature, multistoried, uneven-aged forests with high canopy cover and diverse understories of shade-tolerant species, or rocky canyons with water, cool microclimates, and vertical cliffs containing crevices, ledges, and caves. Cover types include pine-oak, mixed-conifer, riparian, or Madrean woodlands. Elevation: 4,100 – 9,000 feet amsl (AGFD 2005; USFWS 2013a, 2012).
Southwestern willow flycatcher with critical habitat	<i>Empidonax traillii extimus</i>	USFWS - LE, AGFD SGCN 1A, Pima	X	X	X	Dense riparian vegetation with thickets of trees and shrub along rivers, streams, perimeters of lakes, or other wetlands. Generally require surface water or saturated soil. Dominant plant species, vegetation height and density, size and shape of habitat patches, and canopy structure vary widely, but generally flycatchers are not found nesting in areas without willows, tamarisk, or both. Elevation: sea level to over 8,500 feet amsl (AGFD 2002; USFWS 2014a).

Table 3.14-3 Distribution of ESA Protected Species within the Study Area (Continued)

Common Name	Scientific Name	Status (defined in table note)	South	Central	North	Habitat Requirement
Yellow-billed cuckoo (Western Distinct Population Segment [DPS]) with proposed critical habitat	<i>Coccyzus americanus</i>	USFWS - LT, USFS - S, AGFD SGCN 1A, Pima	X	X	X	Highly variable. Occurs in riparian woodlands, mesquite woodlands, or Madrean evergreen woodlands in perennial, intermittent, or ephemeral drainages, from dense contiguous patches of trees on wide floodplains to narrow stringers and small groves of scattered trees in more xero-riparian habitats. Canopy closure varies between and often within drainages. Elevation: sea level to 7,000 feet amsl (AGFD 2017b; Halterman et al. 2015; USFWS unpublished data).
Yuma Ridgeway's rail	<i>Rallus obsoletus yumanensis</i>	USFWS - LE, AGFD SGCN 1A		X		Cattail and bulrush marshes interspersed with areas of open water, mudflats, and drier upland benches with riparian trees and shrubs along rivers and backwaters. Also occurs in drains or sumps supported by irrigation water. Habitat value decreases over time due to natural marshland succession unless periodic flooding, fire, or management intervention occurs. Elevation: below 1,500 feet amsl (AGFD 2006; USFWS 2015c, 2010).

Table 3.14-3 Distribution of ESA Protected Species within the Study Area (Continued)

Common Name	Scientific Name	Status (defined in table note)	South	Central	North	Habitat Requirement
Fish						
Gila topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	USFWS - LE, AGFD SGCN 1A, Pima	X			Shallow, warm margins of perennial and intermittent rivers, streams, pools, backwaters, and springs with slow currents and aquatic vegetation for cover. Can tolerate relatively high water temperatures and low dissolved oxygen. Elevation: below 5,000 feet amsl (AGFD 2001a; USFWS 2015d, 2008).
Sonora chub with critical habitat	<i>Gila ditaenia</i>	USFWS - LT, AGFD SGCN 1A	X			Regularly confined to pools near cliffs, boulders, or other cover during arid periods, but prefers riverine habitats with fairly swift current over sand and gravel substrates. Elevation: below 3,900 feet amsl (AGFD 2001b; USFWS 2013b).
Mammals						
Jaguar with critical habitat	<i>Panthera onca</i>	USFWS - LE, AGFD SGCN 1A	X			No habitat use studies have been conducted for jaguars in Arizona; however, based on limited records, Arizona jaguars appear to be associated with Madrean evergreen woodland and semidesert grassland biotic communities, usually in intermediately rugged to extremely rugged terrain with low human disturbance, within 6.2 miles of water. Elevation: all Arizona records are between 3,400 and 9,000 feet amsl (AGFD 2004; Culver 2016; USFWS 2016, 2014b).

Table 3.14-3 Distribution of ESA Protected Species within the Study Area (Continued)

Common Name	Scientific Name	Status (defined in table note)	South	Central	North	Habitat Requirement
Ocelot	<i>Leopardus pardalis</i>	USFWS - LE, AGFD SGCN 1A	X			Although no habitat use studies have been conducted for ocelots in Arizona, based on limited records, Arizona ocelots appear to be associated with Madrean evergreen woodland semidesert grassland, and Great Basin grassland biotic communities (AGFD 2010). Recorded locations in Arizona on average were <1.5 miles from perennial water, had 23% tree cover, and were >3.5 miles from a major road. Elevation: on average 5,500 feet amsl (Avila-Villegas and Lamberton-Moreno 2013; Culver 2016; USFWS 2016).
Plants						
Huachuca water-umbel	<i>Lilaeopsis schaffneriana</i> <i>ssp. recurva</i>	USFWS - LE, NPL - HS, Pima	X			Wide range of marshland communities, including cienegas, rivers, streams, and springs in permanently wet, muddy, or silty substrates. Generally occurs in perennial, shallow, slow-flowing, or quiet waters, or in active stream channels containing refugial sites where plants can escape scouring by floods. Considered a taxon of perennial water but can survive short periods without water. Elevation: 2,000 – 7,100 feet amsl (AGFD 2003a; USFWS 2017b, 2014c).
PPC	<i>Coryphantha scheeri</i> var. <i>robustispina</i>	USFWS - LE, NPL - HS, Pima	X			Ridges in semidesert grassland and alluvial fans in Sonoran desertscrub. Occurs on alluvial hillsides in rocky, sandy soils. Habitat type is primarily desert grassland. Elevation: 2,300 – 5,000 feet amsl (AGFD 2003b).

Table 3.14-3 Distribution of ESA Protected Species within the Study Area (Continued)

Common Name	Scientific Name	Status (defined in table note)	South	Central	North	Habitat Requirement
Reptiles						
Northern Mexican gartersnake	<i>Thamnophis eques megalops</i>	USFWS - LT, USFS - S, AGFD SGCN 1A, Pima	X			Lotic and lentic habitats with edges of dense emergent vegetation, including cienegas, ponds, stock tanks and lower gradient rivers and streams with pools, protected backwaters, braided side channels, and beaver ponds. Terrestrial habitats are used during gestation and periods of inactivity, and can occur up to 1 mile from surface water. Adequate ground cover important; canopy cover less so. Elevation: 3,000 – 5,000 feet amsl, but up to 6,500 feet (range-wide up to 8,500 feet) (AGFD 2012b; Emmons and Nowak 2016; USFWS 2017c, 2014d).
Sonoran desert tortoise	<i>Gopherus morafkai</i>	USFWS - CCA, USFS - S, BLM-S; AGFD SGCN 1A, Pima	X	X	X	Primarily rocky (often steep) hillsides and bajadas of Mojave and Sonoran desertscrub. May encroach into desert grassland, juniper woodland, interior chaparral, and pine communities. Washes and valley bottoms are used in dispersal. Elevation: 500 – 5,300 feet amsl (AGFD 2015d).

NOTE: **1A** = Tier of SGCN species for which the AGFD has entered into an agreement or has legal or contractual obligation, or warrants the protection of a closed season; **1B** = Tier of SGCN species that are not Tier 1A species; **AGFD** = Arizona Game and Fish Department; **CCA** = Candidate Conservation Agreement under the ESA; **USHS** = Highly Safeguarded under Arizona Native Plant Law; **LE** = Listed as Endangered under the ESA; **LT** = Listed as Threatened under the ESA; **NPL** = Arizona Native Plant Law; **Pima** = Listed by Pima County as Sensitive; **S** = Sensitive Species **SGCN** = Species of Greatest Conservation Need; **USFS** = US Forest Service; **USFWS** = US Fish and Wildlife Service.

SOURCE: **X** = documented species presence, AGFD (2017a).

Table 3.14-4 Total Surface Area Covered by ESA Critical Habitat, 10(j) Experimental Population Areas or other Protected Populations within the Study Area

Critical/Protected Habitat	South Section		Central Section		North Section		Overall	
	Acres	% Total Area	Acres	% Total Area	Acres	% Total Area	Acres	% Total Area
USFWS Designated or Proposed Critical Habitat								
Chiricahua leopard frog	54	<0.1	0	0.0	0	0.0	54	<0.1
Mexican spotted owl	40,027	2.9	0	0.0	0	0.0	40,027	1.5
Southwestern willow flycatcher	4,536	0.3	0	0.0	468	<0.1	5,003	0.2
Yellow-billed cuckoo (Western DPS)	4,398	0.3	12,961	1.6	1,110	0.2	18,468	0.7
Jaguar	127,179	9.3	0	0.0	0	0.0	127,179	4.7
Total Critical Habitat Excluding Species Overlap	138,388	10.1	12,961	1.6	1,149	0.2	152,498	5.6
USFWS 10(j) Experimental Population/Reintroduction Areas								
Mexican wolf 10(j) Area Zone 2	516,675	37.9	0	0.0	6,100	1.1	522,775	19.4
Mexican wolf 10(j) Area Zone 3	846,253	62.0	798,531	100.0	532,740	98.9	2,177,350	80.6
Sonoran pronghorn 10(j) Area - overall	846,253	62.0	798,531	100.0	2,868	0.5	1,647,500	61.0
Sonoran pronghorn Reintroduction Area A	0	0.0	2,798	0.4	0	0.0	2,798	0.1
Sonoran pronghorn Reintroduction Area D	0	0.0	11,925	1.5	0	0.0	11,926	0.4
Sonoran Desert Tortoise Habitat								
BLM Category I	7,290	0.5	154,265	19.3	0	0.0	161,555	6.6
BLM Category II	0	0.0	84,623	10.6	200,816	37.3	285,439	16.0
USFWS High Value Potential Habitat	96,138	7.05	114,324	8.38	115,978	8.50	326,440	23.93

NOTES: **10(j)** = section of the ESA authorizing the establishment of experimental populations outside a species' current range, but within its historical range; **BLM** = Bureau of Land Management; **DPS** = Distinct Population Segment; **ESA** = Endangered Species Act; **HDMS** = Arizona Game and Fish Department (AGFD) Heritage Data Management System; **OERT** = AGFD HDMS Online Environmental Review Tool; **USFWS** = US Fish and Wildlife Service.

SOURCES: Surface area values based on digital data of designated critical habitat assigned to species protected under the ESA (USFWS 2017a), USFWS Sonoran pronghorn and Mexican wolf 10(j) Experimental Population/Reintroduction Areas (USFWS 2015a, 2011), and based on digital data of Sonoran desert tortoise habitat as designated by BLM (BLM 2009) and USFWS (USFWS 2015e).

3.14.3.3 Wildlife Connectivity

The ability for wildlife to disperse or move between habitats and across landscapes is a fundamental part of their life history. Connectivity in the landscape is maintained by comparable habitat patches being close together or linked by corridors of suitable habitat that wildlife can use or move through. All wildlife species require connectivity to complete essential aspects of their life history, including dispersal, colonization, and access to resources. For instance, many large mammal species can move tens or even hundreds of miles during seasonal migration or in search of food and other important resources. Conversely, some wildlife move small distances to obtain certain vital resources or to seek mating opportunities within habitat areas. In the long term, connectivity affects the size and genetic viability of subpopulations, which play an important role in the survival and persistence of populations. Human development fragments and isolates naturally connected habitats across the landscape. In addition, the effects of urban expansion on species dispersal may vary substantially across taxa (Perkl 2018). Research demonstrates that deleterious impacts can be minimized or mitigated by focusing on protecting and enhancing connections, corridors, or linkages between habitat areas (AGFD 2018a).

It is important to note that the synthesis of information in the efforts and reports completed on wildlife connectivity in Arizona does not necessarily represent an exhaustive mapping of all important wildlife linkages and barriers in the Study Area. Rather, this information should be considered an initial assessment of wildlife movement patterns. This initial assessment will need to be supplemented in the future by further analysis and refinement, including additional expert input, research studies of wildlife movement patterns, and additional linkage delineation based on site-specific data (AGFD 2018a).

As part of AGFD's management of wildlife and fisheries, the Arizona SWAP (AGFD 2012a) presents an outline of a Species and Habitat Conservation Guide model that identifies the conservation potential for lands within the state. AGFD decided to include five indicators of wildlife conservation value in the model. Each of those indicators, or submodels, was developed as a separate layer that can be used independently of the model. These five indicators are (AGFD 2012a):

- The importance of the landscape in maintaining biodiversity – represented by the SGCN
- The economic importance of the landscape to the State of Arizona – represented by the SERI
- The economic importance of the water bodies and aquatic systems to the State of Arizona – represented by sport fish
- Large areas of relatively intact habitats – represented by unfragmented areas
- The importance of riparian habitat to wildlife – represented by riparian habitat

To help identify areas in the landscape that have very little to no development, AGFD created a landscape integrity dataset (Perkl et al. 2013) by weighting and combining many factors that can contribute to a human modification of the landscape (e.g., roads, railroads, airports, canals, and housing). From this dataset, the most intact contiguous areas larger than 5,000 hectares were extracted to represent LIBs. This size threshold was set by AGFD for a patch of habitat to be considered a LIB; if a road segment reduces the size of a LIB so that it is smaller than this threshold value or if that block is isolated by barriers, the functionality of the entire block is compromised (AGFD 2018a).

Figure 3.14-4 (Large Intact Block Clusters) depicts clusters of LIBs which are entirely or partially contained within the Study Area. All of the Options being considered in the Draft Tier 1 EIS could influence these LIBs through habitat loss, fragmentation, and isolation. The LIB clusters were delineated in GIS data provided by AGFD (AGFD 2018b). The assignment of LIBs into numbered clusters is part of the AGFD GIS data supporting the discussion of the potential environmental consequences to LIBs from the Build Corridor Alternatives. AGFD determined LIB cluster associations by identifying road segments for which the average annual daily traffic (AADT) is at least 5,000. Canals smaller than the Central Arizona Project (CAP) canal, also were considered as potential breaks, but AGFD concluded that they currently do not represent as much of a barrier to movement compared to road segments with high traffic volumes. Traffic density correlates with the barrier effect of roadways on wildlife. For instance, roads with 4,000 to 10,000 vehicles per day are considered a strong barrier because noise and movement repel wildlife and individuals trying to cross the road become casualties. Roads with traffic levels beyond 10,000 vehicles per day are considered impermeable to most species (Luell et al. 2003).

In 2006, an interagency working group in Arizona published Arizona's Wildlife Linkages Assessment (AWLWG 2006a), which identified and mapped large areas of protected habitat and the linkages between those that were threatened by fragmentation and isolation. Subsequently, AGFD and other state and local agencies worked to refine both the habitat areas in need of conservation and the specific wildlife movement corridors that connect these areas.

Between 2006 and 2008, AGFD contracted with Paul Beier at Northern Arizona University to model the biologically best corridors in the areas ranked by the AWLWG as the highest priority at the time. Their prioritization was based on the importance of retaining wildlife movements through an area and on the perceived potential for further fragmentation of the area. Therefore, modeling efforts should not be interpreted as an indication that wildlife linkages that were not modeled are any less critical to wildlife movement across Arizona. AGFD used similar methods to supplement the identified linkages in other priority areas between 2010 and 2013; the designs in Pima County were performed through funding from the Pima County Regional Transportation Authority. **Figure 3.14-5** (Detailed and Other Wildlife Linkage Designs – South Section) depicts the detailed linkage designs based on this work for the South Section. **Figure 3.14-6** (Detailed Linkage Designs – Central Section) and **Figure 3.14-7** (Detailed Linkage Designs – North Section) depict the same information for the Central and North Sections, respectively. These figures depict the wildland blocks, which represent the core areas used for modeling connectivity in the Arizona Wildlife Linkages and AGFD Detailed Wildlife Connectivity Designs.

Wildlife corridors are permeable, contiguous habitats that help maintain connections among larger areas of similar habitat and that cross areas surrounded by or otherwise fragmented by human infrastructure (Turner et al. 2001). Although wildlife corridors represent a smaller proportion of land across a given landscape, they are critical features that are needed to maintain dispersal patterns, daily movements, and gene flow; to preserve migration routes; or to conserve satellite populations within a metapopulation¹ network.

¹ A metapopulation is a group of populations of the same species that are separated from one another. These spatially separated populations can interact as individual members move from one population to another.

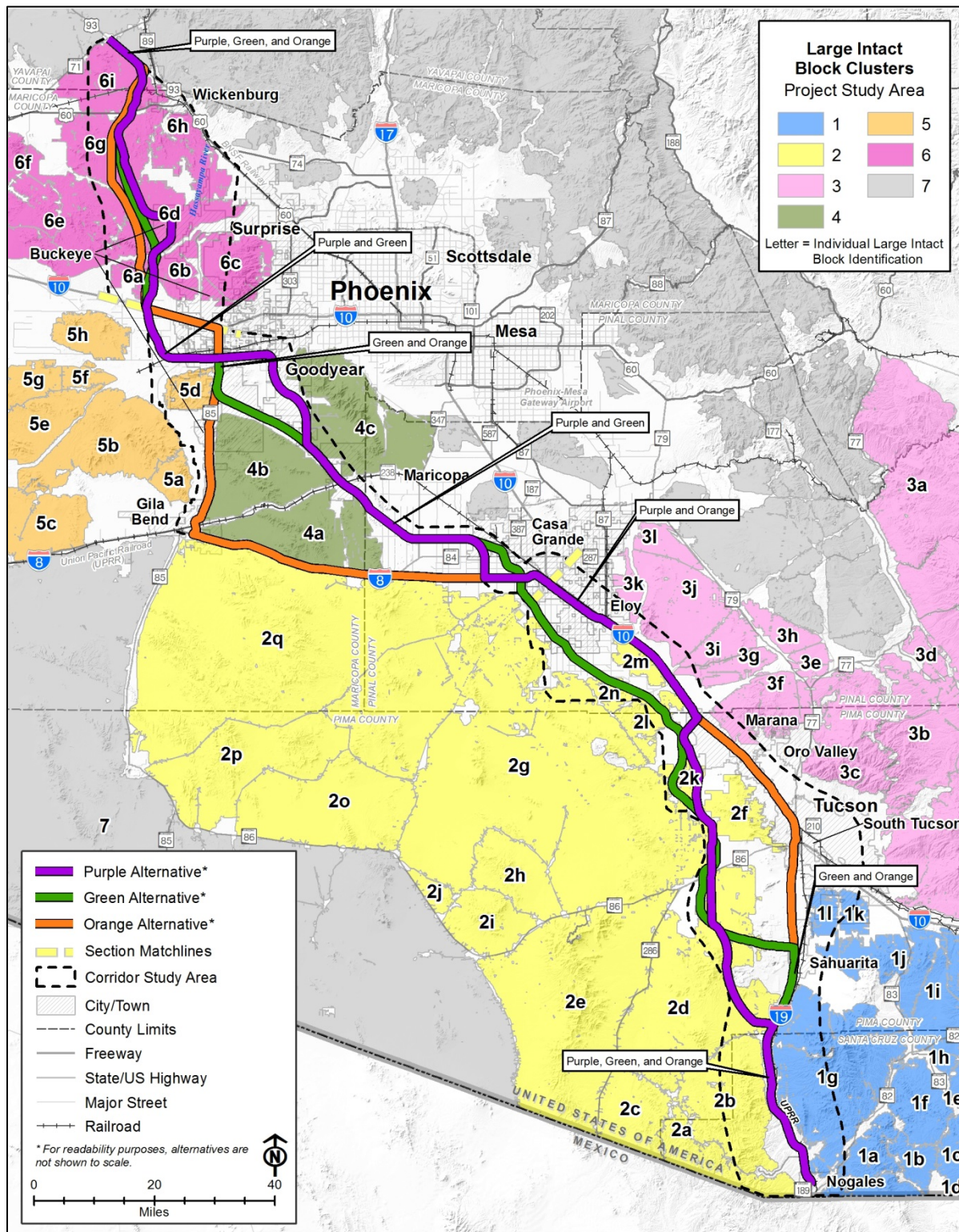


Figure 3.14-4 Large Intact Block Clusters

NOTE: Each number-letter combination corresponds to an individual Large Intact Block (LIB), where the number indicates the LIB cluster it belongs to. LIB Cluster 7 corresponds to the other LIBs that occur beyond the Study Area, and for which no calculations were made.

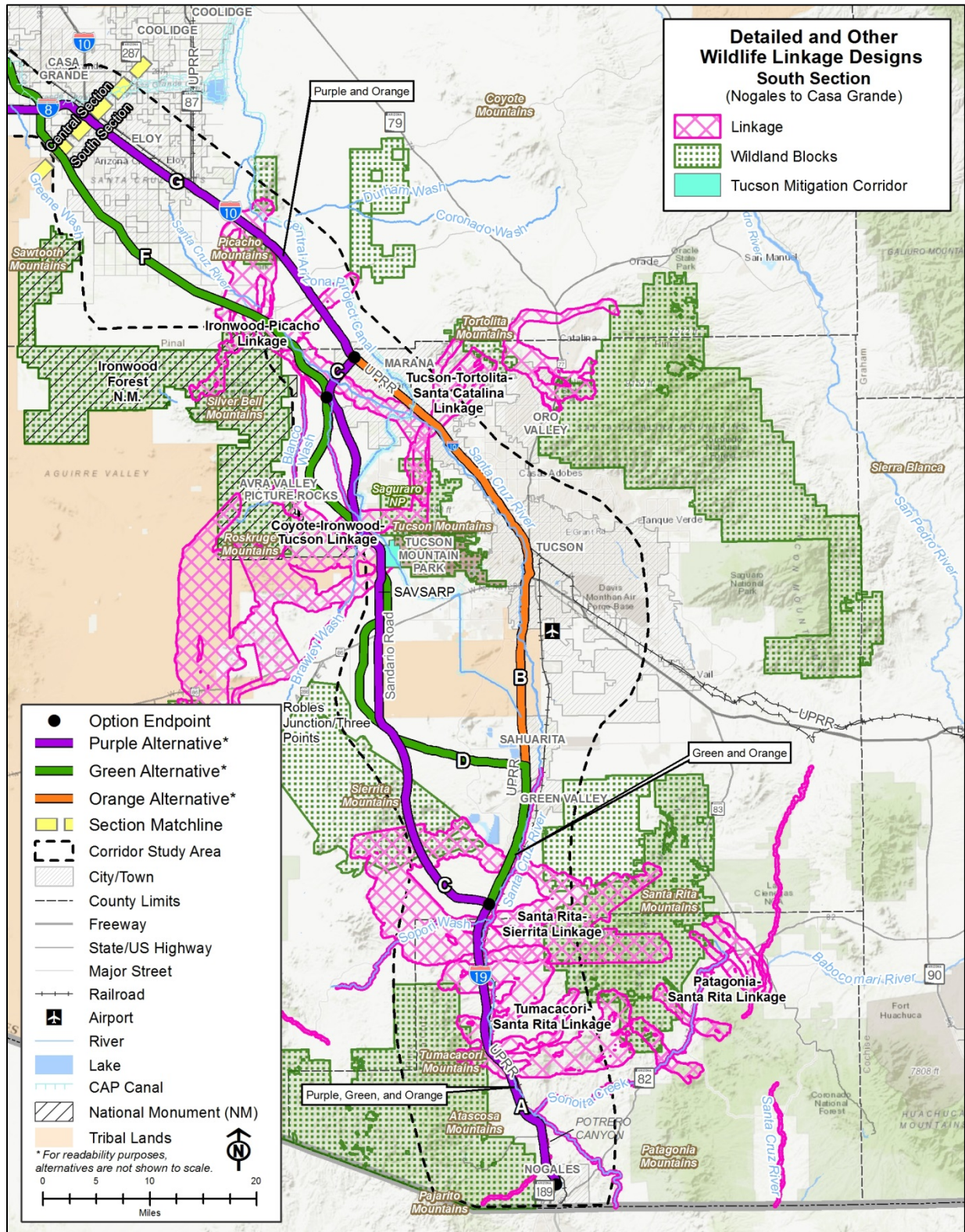


Figure 3.14-5 Detailed and Other Wildlife Linkage Designs – South Section

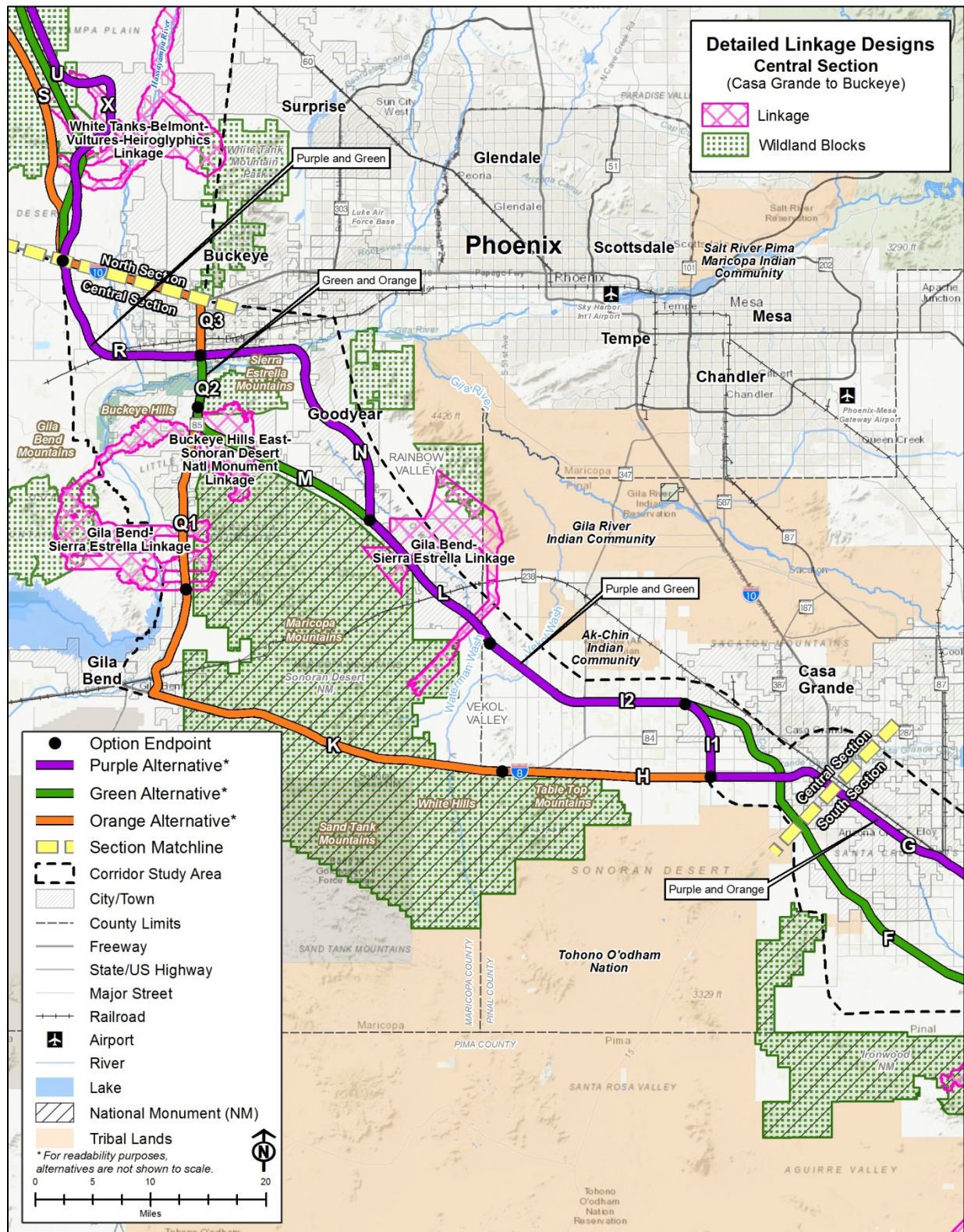


Figure 3.14-6 Detailed Linkage Designs – Central Section

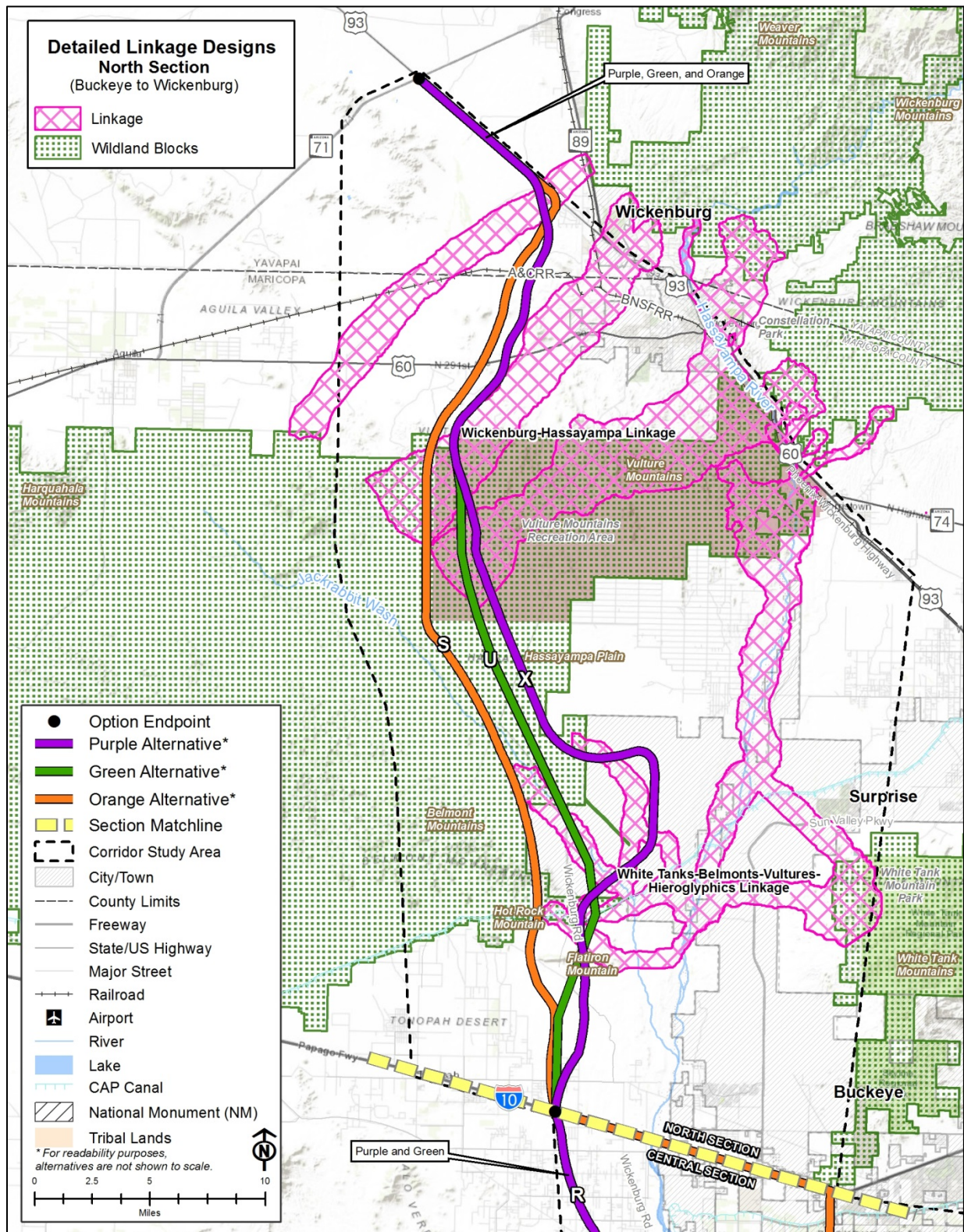


Figure 3.14-7 Detailed Linkage Designs – North Section

1 The designated wildlife corridors crossing the Study Area identified through the Arizona Missing
2 Linkages Project (Beier et al. 2008a,b, 2006a,b,c,d) are described by project section in
3 **Table 3.14-5** (Summary of Detailed Linkage Designs and Other Wildlife Corridors in the Study
4 Area) and the text that follows. Wildlife linkages identified within individual counties in the
5 County Wildlife Connectivity Assessments, which provide detail beyond the scope of the Tier 1
6 analysis, will be examined in the Tier 2 analysis. These linkages include the assessments for
7 Maricopa County (AGFD 2011), Pima County (AGFD 2012c,d), Pinal County (AGFD 2013a),
8 and Yavapai County (AGFD 2013b). The text also describes some of the major washes and
9 established wildlife crossings that are important to wildlife movement in the Study Area.
10 Additional features would need to be identified through on-the-ground studies.

**Table 3.14-5 Summary of Detailed Linkage Designs and
Other Wildlife Corridors in the Study Area**

Wildlife Movement Corridors	South Section	Central Section	North Section
Wildlife Linkages			
Santa Rita-Tumacacori	X		
Patagonia-Santa Rita	X		
Tucson-Tortolita-Santa Catalina	X		
Ironwood-Picacho	X		
Santa Rita-Sierrita	X		
Coyote-Ironwood-Tucson	X		
Gila Bend-Sierra Estrella		X	
Buckeye Hills East – Sonoran Desert National Monument (SDNM)		X	
Wickenburg-Hassayampa			X
White Tanks-Belmont-Hieroglyphic Mountains			X
Other Wildlife Corridors			
Tucson Mitigation Corridor (TMC)	X		

SOURCE: Wildlife linkages data obtained from AWLWG (2008a,b, 2006b,c,d,e); Tucson Mitigation Corridor data obtained from Bureau of Reclamation (Reclamation 2016b).

11 A total of approximately 597,031 acres of LIBs occur within the South Section, represented by
12 three LIB clusters designated as LIB Clusters 1 through 3. LIB Cluster 1 and LIB Cluster 2,
13 which are the southernmost blocks, occur on the east and west sides, respectively, of I-19 and
14 the Santa Cruz River. The northern boundary of LIB Cluster 1 corresponds to the I-10; that of
15 LIB Cluster 2 corresponds to the I-8. LIB Cluster 3 occurs north and east of Tucson. Major
16 barriers between the LIBs in the South Section include I-19, I-10, State Route (SR) 86, SR 82,
17 SR 83, and the cities of Tucson and Casa Grande (**Figure 3.14-4** [Large Intact Block Clusters]).

18 The Tucson-Tortolita-Santa Catalina Mountains Linkage occurs in Pima and Pinal counties and
19 connects protected lands in three mountainous areas (Tortolita Mountains, Santa Catalina
20 Mountains, and Tucson Mountains) that are connected across desert valleys by means of two
21 corridors (Beier et al. 2008c). Major barriers to movement within this linkage include highways
22 (I-10 and SR 77), the cities of Oro Valley and Marana, and a growing network of residential

developments and roads (Beier et al. 2006d). Pima County has begun to purchase land within this linkage to preserve connectivity between the Tortolita and Tucson Mountains within this corridor. This includes approximately 5,161 acres described as the Avra Valley/I-10 parcel, most of which occurs within the Tucson-Tortolita-Santa Catalina Mountains Linkage.

The Santa Rita-Tumacacori Linkage includes a complex of upland and riparian corridors connecting the Santa Rita Mountain Complex and surrounding semidesert grasslands with the Tumacacori-Atascosa-Pajarito Mountain Complex (Beier et al. 2006b). Riparian corridors in the linkage include parts of Sabori Wash, the Santa Cruz River, Sonoita Creek, and Potrero Canyon (Beier et al. 2006b). In the linkage, I-19, the Union Pacific Railroad, and urban development along I-19 are major potential barriers that could inhibit wildlife movement between the two wildland blocks (Beier et al. 2006b). Traffic by undocumented migrants from Mexico and border security efforts to control that traffic also affect animal movement in the linkage (Beier et al. 2006b).

The Patagonia-Santa Rita Linkage, which connects the Santa Rita Mountains and the Patagonia Mountains across Sonoita Creek (Beier et al. 2008b), occurs on private land, national forest land, and state trust land. This linkage consists of four distinct corridors that are approximately 1 to 2 miles wide. The four corridors are linked by a narrower corridor of riparian habitat along Sonoita Creek. The major potential barriers in the linkage include SR 82, SR 83, border security, and expanding urban development in and near Patagonia and Sonoita (Beier et al. 2008b).

The Ironwood-Picacho linkage connects protected lands managed by the BLM, located at the Ironwood Forest National Monument, the Picacho Mountains, and a block of Sonoran Desert surrounding Durham Wash and Coronado Wash (Beier et al. 2006a). One corridor complex connects the Ironwood Forest National Monument with the Picacho Mountains, and another corridor connects a block of Sonoran Desert with the Ironwood Forest National Monument (Beier et al. 2006a). Major potential barriers to wildlife movement within the linkage include I-10, the Union Pacific Railroad, the CAP canal, the Tucson Canal and irrigation canals, and urban and agricultural development along the I-10 corridor (Beier et al. 2006a).

The Santa Rita-Sierrita Detailed Linkage includes a large, divided wildlife corridor that connects habitat blocks associated with the Santa Rita and Sierrita Mountains that are separated by the Santa Cruz Valley (AGFD 2012c). Substantial barriers that impede wildlife passage between the two areas include I-19, major roads, a number of mine features, the Union Pacific Railroad, and urban growth in Green Valley (AGFD 2012c).

The Coyote-Ironwood-Tucson Detailed Linkage includes a series of interconnected corridors joining protected native lands in the Coyote Mountains; the Ironwood Forest National Monument, including part of the Roskrige, Silver Bell, and Sawtooth Mountains; and the Tucson Mountains, including Saguaro National Park (SNP) and its designated wilderness area (AGFD 2012d). The branches of the corridor pass through various features, including steep foothills around the Roskrige Mountains and Avra Valley. Smaller portions of the corridor include Brawley Wash, Blanco Wash, and portions of the Santa Cruz River (AGFD 2012a). Potential impediments to wildlife movement through this linkage include SR 86 and other major roads, and the communities in the local region (i.e., Avra Valley, Picture Rocks, Robles Junction/Three Points, and the Town of Marana) (AGFD 2012d).

Major xero-riparian features that facilitate movement in the South Section of the Study Area include Brawley Wash, Greene Wash, Robles Wash, and the Santa Cruz River. These features

aid wildlife movement north-south through the Avra Valley. Seventeen tributaries, such as Sopori Wash and Sonoita Creek to the east and west, aid movement across the valleys.

The Bureau of Reclamation (Reclamation) established the 2,514-acre Tucson Mitigation Corridor (TMC) in 1990 west of Tucson Mountain Park (Reclamation 2016a). The western portion of the TMC occurs within the Coyote-Ironwood-Tucson Linkage. The purchase and protection of these lands was a commitment made by Reclamation with USFWS and AGFD as a conservation measure developed for the Tucson Aqueduct EIS (Reclamation 2016a). The Master Management Plan agreed to by these agencies prohibits any future development within the area except for existing wildlife developments or habitat improvements (Reclamation 2016a). This prohibition is intended to preserve habitat from urbanization while maintaining an open wildlife movement corridor (Reclamation 2016a).

In order to maintain a functional wildlife movement corridor, Reclamation installed a series of seven CAP canal siphons, which are concrete pipe sections that travel underneath desert washes (Reclamation 2016a). In March 2016, two desert bighorn sheep were observed using one of the siphon crossings within the TMC to move from the Ironwood Forest National Monument to the Tucson Mountain District of SNP (Reclamation 2016a). AGFD biologists believe these sheep are dispersing from populations in the Silver Bell and Waterman Mountains, directly south of the Silver Bell Mountain Range (AGFD 2018a). Mule deer and javelina also have been observed using the siphon crossings (Popowski and Krausman 2002). Bobcat (*Lynx rufus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), American badger (*Taxidea taxus*), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), and Harris' antelope squirrel (*Ammospermophilus harrisi*) activity have been documented at camera sites located in the designated wildlife crossings within or just outside the TMC (Haynes et al. 2010). In addition, a mountain lion (*Puma concolor*) was observed crossing Sandario Road, east of the Southern Avra Valley Storage and Recovery Project, which suggests the potential for lion movement in and out of the Tucson Mountains (Haynes et al. 2010).

Pima County has targeted an additional 1,896 acres adjacent to the southern boundary of the TMC parcel in the Brawley Wash/Black Wash area for purchase. If Pima County can purchase this land, land on either side of the CAP canal would be preserved from development. The CAP canal is crossed by two roadway bridges in this area (West Manville Road, north of Mile Wide Road, and West Milky Way Drive, south of the TMC) that could facilitate wildlife movement between Ironwood Forest National Monument and the Tucson Mountain District of SNP. The land is suitable for installing wildlife specific crossings at a later date. In addition, to support federally recognized species, the City of Tucson has designated an Avra Valley Habitat Conservation Plan Permit Area that sets aside 21,000 acres of city-owned land in the Avra Valley of Pima County for limited development (City of Tucson 2014).

Approximately 335,802 acres of LIBs occur within the Central Section, represented by two LIB clusters designated as LIB Clusters 4 and 5. LIB Cluster 5 is bounded by I-10 to the north and I-8 to the south and includes habitat adjacent to the Gila River. LIB Cluster 4 is east of LIB Cluster 5 and east of Gila Bend. Major barriers between LIBs in the Central Section include I-8; SR 238; and SR 85, which isolates LIB Cluster 4 from LIB Cluster 5 (**Figure 3.14-4** [Large Intact Block Clusters]).

The Gila Bend-Sierra Estrella Linkage connects protected lands in four areas: the Gila Bend Mountains, the SDNM, the Sierra Estrella Mountains, and the Buckeye Hills (Beier et al. 2008a). The linkage consists of two separate corridor complexes. One corridor complex connects the

SDNM to the Gila Bend Mountains across the Gila River lowlands and Buckeye Hills. The other connects the SDNM to the Sierra Estrella Mountains (Beier et al. 2008a). Major barriers in these corridors include SR 85, irrigation canals, and agricultural and urban development (Beier et al. 2008a).

The Buckeye Hills East-SDNM Linkage, which is approximately 4.3 to 6.2 miles long, connects the Buckeye Hills and Gila River corridor to the north with the Maricopa Mountains in the SDNM to the south (AGFD 2018a). Although the linkage is relatively free of development and barriers to wildlife movement, it includes unimproved roads, dispersed off-road vehicle recreation, and utility lines (AGFD 2018a).

The primary natural corridors in the Central Section include Waterman Wash, Vekol Wash, and the Gila River. Waterman Wash and Vekol Wash aid the north-south movement of wildlife through Rainbow Valley to the Gila River. The east-west oriented tributaries to these two washes aid movement of wildlife across Vekol Valley and Rainbow Valley. The Gila River aids movement east-west along the Buckeye Hills and north-south through the lowlands bounded by the Maricopa and Gila Bend Mountains.

Currently, the greatest potential for wildlife mobility from the Maricopa Mountains to a neighboring mountain range is through Rainbow Valley to the Estrella Mountains.

A total of approximately 403,140 acres of LIBs occur within the North Section, represented by one LIB cluster designated as LIB Cluster 6, which occurs west of Phoenix and north of I-10. To the north, LIB Cluster 6 is bound by US 60, US 93, and SR 71 at the northern end of the Study Area (**Figure 3.14-4** [Large Intact Block Clusters]). The CAP canal, which occurs within LIB Cluster 6 and is a major barrier to wildlife movement in the North Section, includes mitigation for wildlife connectivity.

The Wickenburg-Hassayampa linkage connects wildland blocks in the Wickenburg, Weaver, Hieroglyphic, Buckhorn, and Sheep Mountains to wildland blocks in the Vulture, Harquahala, and Big Horn Mountains via three separate corridor areas (Beier et al. 2006c). Major potential barriers within the wildlife corridors include US 60, the Phoenix-Wickenburg Highway, US 93, the Burlington Northern Santa Fe Railroad, the proposed Wickenburg bypass, and expanding urban development in and near Wickenburg (Beier et al. 2006c).

The White Tanks-Belmont-Hieroglyphic Mountains Linkage connects wildland blocks between the White Tank Mountains and surrounding core wildlife wildland blocks in the Belmont Mountains, Big Horn Mountains, Vulture Mountains, Hieroglyphic Mountains, and Hassayampa River (AGFD 2018a). The purpose of these wildlife corridors is to conserve the current ecological integrity and long-term viability of wildlife populations in the White Tank Mountains by ensuring the habitat network can provide robust resistance to the pressures of development and climate change (AGFD 2018a). The primary barriers or impairments within the corridor arms include Sun Valley Parkway, North Wickenburg Road/135th Ave, US 60, rural roadways, the CAP canal, livestock fencing along the CAP canal, rural housing units, and the potential for future urban development (AGFD 2018a).

The principal natural corridors in the North Section include the Hassayampa River, Jackrabbit Wash, Coyote Wash, Star Wash, and Daggs Wash. These aid the north-south movement of wildlife from highlands near Wickenburg to the lowlands near the Gila River. The Hassayampa River also functions as an important transition from a riparian to xero-riparian corridor in the vicinity of Wickenburg.



Reclamation maintains a number of wildlife crossings where the CAP canal would otherwise block the north-south movement of terrestrial wildlife across the Hassayampa Plain. There are eight crossing features along the CAP canal within the North Section. Two of the wildlife bridges were placed between the Belmont Mountains and Hot Rock Mountain, and the Belmont Mountains and Flatiron Mountain, respectively, while a third was placed just north of the White Tank Mountain Regional Park to facilitate movement of terrestrial wildlife across the canal. Siphons under the Hassayampa River and Jackrabbit Wash also preserve movement opportunities for wildlife along these washes. Five concrete wash overchute structures designed for drainage purposes, although not optimal in design, also provide opportunities for wildlife to cross the CAP canal at Coyote Wash and Daggs Wash. Three of the concrete overchutes occur west of the Hassayampa River; the other two occur to the east. Recent and ongoing monitoring of CAP canal crossing structures by Reclamation personnel have recognized that concrete overchutes are used for crossing purposes by wildlife, including mule deer, kit fox (*Vulpes macrotis*), American badger, skunks (Mephitidae family), mountain lion, and desert bighorn sheep, (Thomas Bommarito, personal communication).

3.14.4 Environmental Consequences

This section includes an analysis and comparison of the three Build Corridor Alternatives and the No Build Alternative as well as the individual Corridor Options. This section also analyzes a CAP Design Option for Options C and D located in the vicinity of the TMC.

This CAP Design Option is within the South Section of the Purple and Green Alternatives. It includes a deviation to the east from the Sandario Road alignment to parallel the CAP canal. This option, which is described further in **Chapter 2** (Alternatives Considered), would introduce negligible differences in impacts to most biological resources, with the exception of wildlife connectivity. When differences occurred for a biological resource, they were noted in the appropriate tables or text discussions.

3.14.4.1 Biotic Communities

Build Corridor Alternatives

Biotic Communities

Table 3.14-6 (Acres of Biotic Communities within the Build Corridor Alternatives and Percent of Total Biotic Community Area within the Study Area) summarizes the number of acres of each biotic community within the 2,000-foot-wide corridor for each Build Corridor Alternative as well as for the No Build Alternative.

Calculated using the entire 2,000-foot-wide corridor, the Orange Alternative would encompass approximately 33 percent fewer acres in the Semidesert Grassland than either the Purple or the Green Alternative, and approximately 25 percent fewer acres in the Lower Colorado River Desertscrub. Within the Arizona Upland Desertscrub, the Orange Alternative would include approximately 63 percent more acres than the Purple Alternative and 58 percent more acres than the Green Alternative. All three Build Corridor Alternatives would have identical impacts on Mohave Desertscrub. Within the 2,000-foot-wide corridor, the acreage within the Orange Alternative is 2 percent less than the Green Alternative and 3 percent less than the Purple Alternative. Note that the overall footprint of the Orange Alternative, and to a lesser extent that of the Purple Alternative, would be reduced compared to the Green Alternative because these two alternatives would be partially co-located along existing transportation routes.

Table 3.14-6 Acres of Biotic Communities within the Build Corridor Alternatives and Percent of Total Biotic Community Area within the Study Area

Build Corridor Alternative	Semidesert Grassland	Arizona Upland Desertscrub	Lower Colorado River Desertscrub	Mohave Desertscrub
Purple Alternative (Options A, C*, G, I, L, N, R, X)	14,043 3.2% (14,088) (3.2%)	8,185 0.9% (8,312) (0.9%)	42,820 3.4% (42,887) (3.4%)	570 24.8% (570) (24.8%)
Green Alternative (Options A, D*, F, I2, L, M, Q2, R, U)	14,024 3.2% (14,024) (3.2%)	9,412 1.0% (9,513) (1.0%)	40,888 3.2% (40,947) (3.3%)	570 24.8% (570) (24.8%)
Orange Alternative (Options A, B, G, H, K, Q, S)	9,488 2.2%	22,326 2.4%	31,290 2.5%	570 24.6%
No Build Alternative	0 0%	105 <0.1%	64 <0.1	0 0%

* Acreage for the alternative using the CAP Design Option instead of the regular option (designated by an asterisk) is in parentheses.

NOTES: Bold letters under option indicate the Options that are co-located with existing routes.

Impacts for the No Build Alternative were analyzed using currently programmed projects. These projects include widening projects along existing routes (including I-10 in Tucson and Picacho as well as US 93 in Wickenburg). Because these improvements would occur on existing facilities, the overall impact to biotic communities would be negligible.

Riparian Habitats and Important Bird Areas

In addition to crossing major biotic communities, the Corridor Options also cross several unique habitat types, including several riparian areas. Several IBAs coincide with riparian areas. **Table 3.14-7** (Acres of Riparian and IBA Habitats within the Build Corridor Alternatives and Percent of Total Riparian and IBA Habitat Area within the Study Area) summarizes the potential impacts to riparian areas and IBAs for each of the three proposed Build Corridor Alternatives. Acreage values for the No Build Alternative were all equal to zero and therefore are not included in the table.

The Green Alternative would have the greatest potential impact to overall riparian habitat because it parallels the Santa Cruz River to a greater extent than the rest of the Build Corridor Alternatives. However, even though the Purple Alternative has less acreage with impacts to the overall riparian habitat than the Green Alternative, it may have the greatest impact to perennial riparian areas, given the new crossing of the Gila River. The Orange Alternative would have the least potential impact to riparian habitat and IBAs. For all Build Corridor Alternatives, the actual impacts to riparian habitat would be much less than the impacts analyzed here for the 2,000-foot corridor because the final 400-foot corridor would be designed to avoid riparian habitat wherever possible.



Species of Economic and Recreational Importance

Direct impacts to SERI and their habitat would be similar to the impacts on other wildlife species within the Study Area. All of the Build Corridor Alternatives would result in the loss of potential habitat. In addition, under all of the alternatives, there is the potential for increased mortality of SERI due to animal-vehicle collisions. Because the Orange Alternative would be co-located along existing transportation corridors, it would have the least potential direct impact on habitat for SERI. The Purple Alternative also would be co-located along existing highways, but not to the same extent as the Orange Alternative. As a result, its potential impact would be less than that of the Green Alternative, but still greater than the potential impact of the Orange Alternative.

Impacts to wildlife mortality, including SERI mortality, are more difficult to predict. Nevertheless, it is reasonable to assume that the Orange Alternative would have the smallest impact (the least increase in wildlife mortality), given this alternative's co-location along existing highways.

Estimating the relative magnitude of wildlife mortality and the relative impacts due to vehicle collisions under the Purple and Green Alternatives within the Central and North Sections and making comparisons between the two alternatives are more problematic tasks in a Tier 1 level of analysis. The impacts of the Build Corridor Alternatives on recreation, an important component of SERI, are discussed in Section 3.4.

Table 3.14-7 Acres of Riparian and IBA Habitats within the Build Corridor Alternatives and Percent of Total Riparian and IBA Habitat Area within the Study Area

Build Alternative	Riparian Areas	Important Bird Areas
Purple Alternative (Options A, C*, G, I, L, N, R, X)	663 26.9% (643) (26.1%)	1,357 1.4% (1,457) (1.5%)
Green Alternative (Options A, D*, F, I2, L, M, Q2, R, U)	1,302 52.8% (1,230) (49.9%)	1,032 1.1% (1,128) (1.2%)
Orange Alternative (Options A, B, G, H, K, Q, S)	611 24.8%	573 0.6%

* Acreage for the alternative using the CAP Option instead of the regular option (designated by an asterisk) is in parentheses.

Invasive Species

The greatest potential indirect impact during construction would be the introduction of invasive species, particularly for Options that are on undeveloped land. Surrounding lands also would be impacted as invasive species gradually disperse from the roadway. The spread of invasive species entails negative impacts to native species, including interspecific competition and altered fire regimes. In the South and Central Sections where there already is considerable urban development, many of the noxious and invasive species are well established in the Study Area. Thus there is a greater chance that they could begin colonizing the new road ROW and surrounding habitats. The Corridor Options in the North Section and in the northeast part of the



Central Section (Purple and Green Alternatives) are in relatively undisturbed areas where the presence of invasive species may not be as prolific. As a result the establishment and spread of invasive species may take longer to occur, but may have a greater impact on native species.

No Build Alternative

The No Build Alternative, as described in **Chapter 2** (Alternatives Considered), is used as a baseline for comparison with the Build Corridor Alternatives. The No Build Alternative would not implement any of the Build Corridor Alternatives for development of I-11. Impacts for the No Build Alternative were analyzed using currently programmed projects. These projects include widening projects along existing routes (I-10 in Tucson and Picacho as well as US 93 in Wickenburg).

Biotic Community

The No Build Alternative would have minimal direct impact to biotic communities. The only impacts would be associated with the identified projects within the Central and North Sections (as described above). The numbers of acres potentially affected by the No Build Alternative are 105 acres of Arizona Upland Desertscrub and 64 acres of Lower Colorado River Desertscrub.

Riparian and Important Bird Areas

The No Build Alternative would have no impact on riparian areas or IBAs.

Species of Economic and Recreational Importance

The No Build Alternative would have no measurable increased impact on SERI.

3.14.4.2 Special-Status Species

Build Corridor Alternatives

Endangered Species Act Species

Aquatic and Riparian ESA-listed Species

The biotic communities and riparian areas that fall under this habitat association include:

- North American Warm Desert Lower Montane Riparian Woodland and Shrubland
- North American Warm Desert Riparian Woodland and Shrubland
- North American Arid West Emergent Marsh
- North American Warm Desert Riparian Mesquite Bosque
- North American Warm Desert Wash
- Invasive Southwest Riparian Woodland and Shrubland
- Open Water.

Within the Study Area, aquatic and riparian exists for 10 ESA-listed species: Chiricahua leopard frog, southwestern willow flycatcher, western yellow-billed cuckoo, Yuma Ridgeway's rail Gila topminnow, Sonora chub, northern Mexican gartersnake, Huachuca water-umbel, and two highly mobile mammal species, the jaguar and ocelot habitat (**Table 3.14-3** [Distribution of ESA

Protected Species within the Study Area] and **Table 3.14-4** [Total Surface Area Covered by ESA Critical Habitat, 10(j) Experimental Population Areas or other Protected Populations within the Study Area]). Habitat associated with these 10 species is predominately located within Options A, B, C, N, and Q2 and includes the Santa Cruz and Gila rivers, and other designated washes and associated floodplains (**Appendix E14, Table E14-19** [Potential Occurrences of ESA Protected Species per Corridor Option] and **Table E14-20** [Total Surface Area Covered by Critical or other Protected Habitat within the 2,000-foot-wide Corridor]).

Because all of the Build Corridor Alternatives in the South Section are located along the existing I-19 alignment (Options A and B), all Build Corridor Alternatives in the South Section have the potential to impact ESA protected species and sensitive habitats associated with the Santa Cruz River. I-19 (Option A and B) is located west and adjacent to the floodplain of the river. In addition to direct impacts to the riparian habitat these species occupy, the operations of co-locating I-19 and I-11 have the potential to impact ESA species by increasing air, noise, and light pollution, which further degrade habitat quality and add stress to species' biological life cycles, which include breeding, feeding, and resting periods. However, if the I-19 does require widening in this area, every attempt will be made to avoid impacts to riparian habitat by widening the roadway to the west and away from the Santa Cruz River, if at all possible.

Within the Central Section, all three Build Corridor Alternatives would span the perennial Gila River with bridges (Options N and Q2). Some permanent floodplain tree habitat removal would be required; however, habitat modifications would be localized in nature, as small in size as feasible, and short in duration. Potential impacts from all three Build Corridor Alternatives would occur at two possible Gila River locations (approximately 7 miles apart), which are similar in design (bridged roadway over riparian floodplains). The Orange and Green Alternatives would be co-located along the existing SR 85 bridge (Option Q2). The Purple Alternative would add an additional roadway crossing (Option N) upstream of the existing SR 85 bridge crossing. Adding a second Gila River bridge crossing would increase the potential for impacts on ESA species and habitat quality by increasing noise, air, and light pollution in the vicinity of the Gila River. The Orange and Green Alternatives would result in fewer potential impacts to ESA species and habitat quality.

Impacts to Chiricahua leopard frogs should be avoided, minimized, and mitigated by implementing measures to address impacts related to invasive species and habitat modifications and to address wildlife movements and landscape connectivity impacts. Impacts to Gila topminnow should be addressed by avoiding increases of sediment or delivering pollutants to the stream course and by avoiding reductions in surface flow to available aquatic habitats. Impacts to southwestern willow flycatcher, western yellow-billed cuckoo, and Yuma Ridgeway's rail, and their respective designated and proposed critical habitat should be avoided, minimized, or mitigated according to the mitigation strategies summarized in **Table 3.14-11** (General Mitigation Strategies Applicable to all Corridor Options) and **Table 3.14-12** (Specific Mitigation Strategies for each Corridor Option).

Within the North Section, all three Build Corridor Alternatives avoid perennial waters and associated riparian habitats.

Sonoran Desert and Mountainous Area ESA-listed Species

The biotic communities that fall under this habitat association consist of Lower Colorado River Desertscrub, Arizona Upland Desertscrub, Semidesert Grassland, Mohave Desertscrub, and Madrean Evergreen Woodland. All three Build Corridor Alternatives impact previously disturbed

1 and undisturbed lands of the Sonoran Desert (see **Table 3.14-6** [Acres of Biotic Communities
2 within the Build Corridor Alternatives and Percent of Total Biotic Community Area within the
3 Study Area] and **Table 3.14-7** [Acres of Riparian and IBA Habitats within the Build Corridor
4 Alternatives and Percent of Total Riparian and IBA Habitat Area within the Study Area]) which
5 are considered habitat for plant and animal ESA-listed species. These species include PPC, as
6 well as ocelot and jaguar, which prefer large habitat blocks. Both the ocelot and jaguar use
7 areas within more mountainous terrain and other areas with denser vegetation, such as areas
8 along larger drainages. Mountainous terrain within the South Section of the Study Area is
9 avoided by all three Build Corridor Alternatives, while Option S in the North Section of the Study
10 Area goes through the eastern portion of the Belmont Mountains. Pre-Tier 2 analyses would
11 develop specific project mitigation measures to minimize habitat fragmentation effects to the
12 species. These mitigation measures would include incorporation of potential wildlife roadway
13 crossings into interstate designs.

14 Tree and cactus removal and minor habitat modifications would occur in upland habitats and
15 floodplain habitat during construction; however, habitat modifications would be localized in
16 nature, as small in size as feasible, and short in duration (less than 5 years). Impacts to
17 Semidesert Grassland within the Sonoran Desert may require substantial compensatory
18 mitigation due to the likely presence of PPC and its habitat within this biotic community.
19 Destruction of grassland habitat for construction of I-11 would be a permanent impact to
20 grassland plant species, including PPC, within the anticipated 400-foot roadway footprint.
21 Dispersal of noxious and invasive weeds into Semidesert Grassland following construction of I-
22 11 may negatively impact ESA-listed species such as PPC, and CCA species such as the
23 Sonoran desert tortoise, due to competition and altered fire regimes.

24 Although all three Build Corridor Alternatives dissect PPC habitat, the Orange Alternative is
25 likely to have fewer impacts to this species, as it is co-located with the I-19 through PPC habitat.
26 I-19 may or may not need to be widened in this area and some impacts to this species have
27 already occurred within the roadway prism. The Purple and Green Alternatives, on the other
28 hand, dissect high-quality, densely occupied PPC habitat which is likely to impact hundreds of
29 Pima pineapple individuals. In order to avoid a potential "Jeopardy" decision by the USFWS for
30 this species, substantial mitigation and compensation will need to occur within these two Build
31 Corridor Alternatives. Impacts to PPC and its habitat can be minimized by reduction of the
32 construction footprint through quality PPC habitat, detailed surveys of suitable habitat prior to
33 the Tier 2 process, and the implementation of long-term control of noxious and invasive weeds.
34 See the additional mitigation strategies summarized in **Table 3.14-11** (General Mitigation
35 Strategies Applicable to All Corridor Options) and **Table 3.14-12** (Specific Mitigation Strategies
36 for Each Corridor Option).

37 ESA Section 7 consultations for PPC will need to occur during Tier 2 analysis. The consultations
38 will include studies to locate the new roadway facility to further reduce impacts to this species.
39 Recent research suggests that translocation of this species is not very successful, and therefore
40 translocation is not included as a mitigation strategy.

41 Habitat Conservation Plans

42 Several HCPs cover areas within the Study Area. HCPs are formal agreements between a local
43 jurisdiction (e.g., Pima County or the City of Tucson) that provide specific conservation
44 measures for the protection of one or more ESA-listed species, but that also allow specific types
45 of development within the area covered by the Conservation Plan. One or more plans being
46 developed by the City of Tucson as well as Pima County's Multi-Species Conservation Plan

could be affected by any or all of the Build Corridor Alternatives. However, the Purple and Green Alternatives, which dissect Avra Valley, are likely to have the greatest impacts to parcels that have been set aside as conservation areas under the Avra Valley portion of the City of Tucson HCP. The extent of any impact on HCPs would be determined based on more detailed alignment definition during Tier 2.

Critical and Protected Habitat

Critical habitat for several species occurs within all three Build Corridor Alternatives (see **Table 3.14-4** (Total Surface Area Covered by ESA Critical Habitat, 10(j) Experimental Population Areas or other Protected Populations within the Study Area) and **Appendix E14**). None of the Build Corridor Alternatives would cross designated or proposed critical habitat for the Chiricahua leopard frog, Mexican spotted owl, or Sonora chub.

Within the South Section, I-19 is adjacent to the Santa Cruz River. All of the Build Corridor Alternatives, which share the designated Option A, have the potential to impact critical habitat and proposed critical habitat, associated with the Santa Cruz River, for the southwestern willow flycatcher and western yellow-billed cuckoo. Options C and D have the potential to impact currently undeveloped grasslands, thereby posing a possibly significant threat to species such as PPC via habitat loss and degradation, which includes impacts from noxious weed invasions and altered fire regimes. Proximity impacts associated with the potential widening of I-19 (co-located I-11 facility), such as additional air, light, and noise pollution, have the potential to impact habitat. The only critical habitat for the Chiricahua leopard frog occurring within the Study Area consists of two small stock ponds approximately 0.6 mile to the east of Option C.

Mexican spotted owl and jaguar habitat occurs at higher elevations predominately located in the mountainous and forested portions of the Study Area east and west of I-19 and north of I-10. All three of the Build Corridor Alternatives avoid those types of habitats. Depending on the results of wildlife movement studies that will be conducted prior to the Tier 2 process, wildlife connectivity between these higher elevation areas (sky islands) used by the jaguar and ocelot may need to be enhanced with species-specific wildlife crossings designed for I-11. See the Section 3.14.4.3, Wildlife Connectivity, for more impact discussions that relate to mobility of both general wildlife and special-status species.

Within the Central Section, all three Build Corridor Alternatives would cross the Gila River over bridges in similar locations. The Gila River contains proposed critical habitat for the yellow-billed cuckoo, and habitat for the southwestern willow flycatcher and Yuma Ridgeway's rail. Some floodplain tree habitat will be permanently removed; however, it is assumed that habitat modifications would be localized in nature, as small in size as feasible, and short in duration. Option N would add an additional roadway crossing over the Gila River approximately 7 miles upstream of the existing SR 85 bridge. Proposed critical habitat for the yellow-billed cuckoo has the potential to be degraded between the two bridges and their associated roadways. Runoff of irrigation water into the Gila River at the proposed crossing is an important source of water that helps to sustain the marshes and Yuma Ridgeway's rail habitat at that location. Irrigation runoff also may supply marsh habitat downstream of the crossing. Loss of irrigation water resulting from replacement of croplands by I-11 would need to be evaluated in more detail during the Tier 2 analysis.

No critical habitat for ESA-protected species occurs in the North Section.

Mexican wolf and the Sonoran pronghorn have USFWS 10(j) Experimental Populations/Reintroduction Areas associated with Sonoran Desert habitats (see **Table 3.14-4** [Total Surface

Area Covered by ESA Critical Habitat, 10(j) Experimental Population Areas or other Protected Populations within the Study Area] and **Appendix E14, Table E14-19** [Potential Occurrences of ESA Protected Species per Corridor Option] and **Table E14-20** [Total Surface Area Covered by Critical or other Protected Habitat within the 2,000-foot-wide Corridor]). Within the Study Area, over 2 million acres and 1.6 million acres of future reintroduction areas have been assigned for the Mexican wolf and the Sonoran pronghorn, respectively. Connectivity between these large swaths of land is paramount to future success of reintroduced populations. See Wildlife Connectivity for more impact discussions that relate to mobility of both general wildlife and special status species.

The Sonoran desert tortoise (*Gopherus morafkai*), which has a USFWS CCA under ESA and is a BLM sensitive species, has BLM designated Category I and II habitats within the Study Area. In addition, the USFWS has provided GIS data depicting the modelled locations and extent of USFWS-defined predicted High Value Potential Habitat based on specific spatial criteria. BLM and USFWS tortoise habitat digital maps were both used in this analysis. Sonoran desert tortoise habitat acreages are discussed in **Table 3.14-4** [Total Surface Area Covered by ESA Critical Habitat, 10(j) Experimental Population Areas or other Protected Populations within the Study Area] and **Appendix E14, Table E14-20** (Total Surface Area Covered by Critical or other Protected Habitat within the 2,000-foot-wide Corridor). Potential impacts to the Sonoran desert tortoise include direct mortality, as well as impacts to suitable habitat due to habitat fragmentation, habitat conversion, and altered fire regimes. The introduction of invasive plants also can alter the ecosystem by increasing the frequency, duration, and magnitude of wildfires. If vegetation the tortoise uses for forage, cover, and sheltering sites is lost, the species will no longer have the ability to adequately fulfill its life cycle needs and may suffer delayed fatalities from starvation, exposure, or predation.

In the North Section, all Build Corridor Alternatives would potentially impact Sonoran desert tortoise. In the Central and South sections, selecting Options that follow existing roadways would minimize impacts to Sonoran desert tortoise. The overarching conservation goal of the CAA for the tortoise is to provide a clear conservation benefit to the species by working with the agencies involved and contribute to avoid potential ESA listing through reduction of threats in Arizona. As such, prior to project design and Tier 2 NEPA review, detailed habitat assessments should be made for the Sonoran desert tortoise within the Tier 1-identified 2,000-foot corridor to map suitable habitat for this species and develop design recommendations that help avoid and minimize impacts to it (see **Table 3.14-11** [General Mitigation Strategies Applicable to All Corridor Options] for detailed tortoise mitigation strategies).

Other Sensitive Species

As stated above, other sensitive species include non-ESA-listed species deemed sensitive by BLM, USFS, USFWS, or the counties; species protected under the Bald and Golden Eagle Protection Act, AGFD SGCN; and plant species protected under the Arizona Native Plant Law. In **Appendix E14**, Biological Technical Memorandum, **Table E14-21** (Distribution of Other Sensitive Species within the 2,000-foot-wide Corridor) lists the sensitive species recorded for each I-11 Option based on GIS data or inferred by range and habitat.

In addition to being considered habitat for several ESA-protected species, riparian and aquatic areas and Sonoran Desert and mountainous areas also are considered important habitat for other sensitive plant and animal species. As discussed in **Appendix E14 (Table E14-21** [Distribution of Other Sensitive Species within the 2,000-foot-wide Corridor]), other sensitive species analyzed include 3 amphibians, 21 birds (including bald and golden eagles), 3 fish,

2 invertebrates, 13 mammals (including 8 bats), 21 plants (including Tumamoc globeberry, and 12 reptiles. In habitats that are shared by ESA-listed species and other sensitive species, such as riparian areas, impacts to sensitive species would be similar to those experienced by ESA-listed species. However, sensitive species also occur in areas in which ESA-listed species are not present. Thus, all biotic communities impacted by Build Corridor Alternatives are habitat for different sensitive species, and mitigation measures must therefore be developed during Tier 2 studies. Construction of I-11 would result in substantial negative impacts to biotic communities (see **Table 3.14-6** [Acres of Biotic Communities within the Build Corridor Alternatives and Percent of Total Biotic Community Area within the Study Area] and **Table 3.14-7** [Acres of Riparian and IBA Habitats within the Build Corridor Alternatives and Percent of Total Riparian and IBA Habitat Area within the Study Area]). These impacts on biotic communities would require a combination of avoidance, minimization, and/or other species-specific mitigation measures to mitigate any negative impacts to sensitive species.

Impacts associated with construction of a freeway facility include the potential for mortality and injury from roadway/vehicle interactions, and the direct removal of potential habitats for amphibians, birds, fish, invertebrates, mammals, and reptiles. Additional impacts to animal species include increased habitat degradation due to the increased noise, air, and light pollution from new or improved roadway facilities.

Migratory Bird Treaty Act

The Green and Purple Alternatives increase accessibility into adjacent lands in Pima, Pinal, and Maricopa counties and may increase accessibility to wildlife refuges and IBAs used by migratory birds and other sensitive wildlife.

Habitat for migratory birds varies by species. Many species use Sonoran Desert habitats, agricultural and floodplain habitats, and/or open water habitats. The Green and Purple Alternatives would have the most potential to impact nesting birds, as these alternatives would have the greatest amount of ground disturbance compared to the Orange Alternative, which is more co-located with existing facilities. Impacts to migratory birds, can be mitigated with standard construction techniques and species-specific mitigation measures developed during the Tier 2 analysis. Where possible, the design of I-11 should minimize tree plantings (versus low-growing shrubs) within the median of the new roadways to reduce the attractiveness of those roadways to migratory birds, thus reducing the bird mortality associated with highway operation. Minimizing highway lighting also can reduce potential impacts to nocturnal birds that prey on insects attracted to lights.

Special-Status Species End-to-End Considerations

Besides the No Build Alternative, the Orange Alternative would have the least impacts to the habitats of sensitive species (Options A, B, G, H, K, Q, and S). Habitat for numerous special-status species occurs in all 20 of the I-11 Options. **Appendix E14** provides a more robust discussion on special-status species analysis. Impacts to ESA-listed species and their critical habitat will require ESA Section 7 consultation with the USFWS during the Tier 2 analysis.

In general, the Green Alternative consists mostly of new Corridor Options; the Orange Alternative consists mostly of existing interstate and highway Corridor Options; and the Purple Alternative consists of a mix of existing and new Corridor Options.

The Green and Purple Alternatives both increase accessibility into adjacent lands in Pima, Pinal, and Maricopa counties and may increase accessibility to wildlife refuges and IBAs. All of



the Build Corridor Alternatives, due to their proximity, have the potential to impact habitats of ESA-listed species, including critical habitat, associated with the Santa Cruz River floodplain (Options A, B, and C) (**Appendix E14, Table E14-19** [Potential Occurrences of ESA Protected Species per Corridor Option] and **Table E14-20** [Total Surface Area Covered by Critical or other Protected Habitat within the 2,000-foot-wide Corridor]). Option C crosses the Santa Cruz River floodplain outside designated critical habitat areas.

All the Build Corridor Alternatives would have similar impacts on the Gila River aquatic and riparian habitats (Options Q2 and N), which are considered habitat (including proposed critical habitat) for the yellow-billed cuckoo, Yuma Ridgeway's rail, and southwestern willow flycatcher (**Appendix E14, Table E14-19** [Potential Occurrences of ESA Protected Species per Corridor Option] and **Table E14-20** [Total Surface Area Covered by Critical or other Protected Habitat within the 2,000-foot-wide Corridor]). Option N would add an additional roadway crossing over the Gila River approximately 7 miles upstream of the existing SR 85 bridge. Proposed critical habitat for the yellow-billed cuckoo could be degraded between these two transportation facilities.

Species found in the upland land classifications of the Sonoran Desert would be impacted the most by the Green Alternative (Options A, D, F, I2, L, M, Q2, R, and U) because this alternative uses the most non-collocated Corridor Options and would have the highest acreage of impacts converted from natural land uses to transportation facilities.

No Build Alternative

The No Build Alternative, as described in **Chapter 2** (Alternatives Considered), is used as a baseline for comparison with the Build Corridor Alternatives. The No Build Alternative would not implement any of the Build Corridor Alternatives for development of I-11. The analysis of impacts for the No Build Alternative assumed the construction of currently programmed projects, which include widening projects along existing routes (I-10 in Tucson and Picacho as well as US 93 in Wickenburg).

Endangered Species Act Species

Any potential impacts to ESA-protected species that might occur under the No Build Alternative will be assessed as part of the National Environmental Policy Act (NEPA) analysis for those projects.

Critical and Protected Habitat

Impacts to critical habitat for ESA and other protected habitats may occur with the No Build Alternative. Impacts associated with future projects (No Build Alternative) will be assessed during project-specific NEPA analysis and will require species-specific ESA Section 7 Consultation.

Other Sensitive Species

Impacts to special-status species may occur with the No Build Alternative. Impacts associated with future projects (No Build Alternative) will be assessed during project-specific NEPA analysis and will require species-specific mitigation measures to be developed and implemented during construction.



Migratory Bird Treaty Act

Impacts to species protected under the MBTA may occur with the No Build Alternative. Impacts associated with future projects (No Build Alternative) will be assessed during project specific NEPA analysis and will require species-specific mitigation measures to be developed and implemented during construction.

3.14.4.3 Wildlife Connectivity

Build Corridor Alternatives

Corridor Options representing a new alignment would directly fragment LIBs by introducing a new linear facility where a roadway does not currently exist. **Figure 3.14-4** (Large Intact Block Clusters) shows large areas of relatively intact and undeveloped habitat within the Study Area. LIB portions that would be adjacent to I-11 rather than directly intersected by I-11 also are expected to experience increased isolation as a result of guardrails, steep shoulders, and traffic, which are physical barriers to wildlife movement. In addition to fragmentation, habitat degradation will occur within LIB portions adjacent to I-11 due to increased disturbances, such as noise and light pollution, and the spread of invasive species, all of which have effects that occur beyond the road itself and contribute to isolation.

Table 3.14-8 (LIB Fragmentation by Build Corridor Alternative) shows which LIBs are fragmented by the alternatives, and the number and size of the LIB fragments resulting from the construction of the Build Corridor Alternatives. Surface areas are provided in hectares to facilitate comparison with the AGFD 5,000 hectare threshold under which a habitat block is no longer considered functional in terms of wildlife connectivity (AGFD 2018a). **Table 3.14-9** (Total Surface Area of Fragments Lost from Existing LIBs by Build Corridor Alternative) indicates, for each Build Corridor Alternative, the total surface area represented by LIB fragments that no longer fulfill the required 5,000-hectare threshold following construction of the alternatives.

LIBs affected by the Build Corridor Alternatives that become smaller in surface area as a result of the direct fragmentation of currently undeveloped land consist of LIBs within LIB Clusters 2, 4, and 6. LIBs that would experience the isolating effects of adjacent new roadways include LIB 4a and LIB 4b, which would experience increased isolation from LIB 4c as a result of the Purple and Green Alternatives. While LIBs beyond the I-11 corridor (LIB Cluster 7) and LIBs within the corridor but beyond the footprint of the alternatives (LIB Clusters 1, 3, and 5) will not be physically divided by I-11, they are still expected to experience the effects of increased isolation due to the reduced dispersal opportunities of wildlife species with large ranges.

Based on parameters such as traffic volume, footprint, truck use, and speed limit, and according to wildlife movement data collected by AGFD, already-existing roadways such as I-10, I-8, and I-19 represent near-total barriers to wildlife (AGFD 2018a). Therefore, when co-located with existing roadways where widening will be required, the I-11 corridor provides a potential opportunity to improve wildlife connectivity through the implementation of mitigation components such as wildlife overpasses and underpasses.



Table 3.14-8 LIB Fragmentation by Build Corridor Alternative

Large Intact Block Cluster (LIB)	LIBs Fragmented by Alternatives	Total Area (Hectares)	Area of Resulting LIB Fragments (Hectares)		
			Purple Alternative	Green Alternative	Orange Alternative
2*	2D	858,548	638,301 220,247	714,434 139,270 4,807 33 4	
	2F	21,159	21,073 86 (20,599) (560)	21,073 86 (20,599) (560)	
	2G	451,786		451,537 219 30	
	2K	5,415	4,656 728 27 3 <1 <1	5,104 243 65 3	
	2L	15,699		12,373 3,237 49 23 14 3	
	2N	6,563		6,093 470	
4	4C	74,030	73,900 92 23 15	73,923 92 15	
6	6A	7,410	7,403 7	6,912 496 2	5,659 1,751
	6B	13,709	13,609 100	13,645 64	
	6D	28,436	21,898 6,538	27,511 655 177 93	
	6E	86,421			83,948 2,415 49 9
	6G	42,849	29,005 13,821 17 6 <1	27,334 15,515	21,709 21,123 17 <1
	6I	34,479	29,712 4,757 4 4 2	29,712 4,757 4 4 2	28,719 5,760

* Surface Areas for the CAP Design Option are in parentheses under the acreages for the regular alternative.

NOTE: The surface areas of the resulting fragments of the single LIB that would be entirely lost as a result of fragmentation are indicated in bold.

Table 3.14-9 Total Surface Area of Fragments Lost from Existing LIBs by Build Corridor Alternative

		Total Surface Area of Fragments Lost from Existing LIBs by Alternative (Hectares)		
Large Intact Block Clusters	LIBs Fragmented by Alternatives	Purple Alternative	Green Alternative	Orange Alternative
2*	2D, 2F, 2G, 2K, 2L, 2N,	5,500 (5,974)	9,286 (9,760)	
4	4C	130	107	
6	6A, 6B, 6D, 6E, 6G, 6I	4,897	6,254	4,241
	Total:	10,527 (11,001)	15,647 (16,121)	4,241

* Surface areas for the CAP Design Option are in parentheses under the surface areas for the regular Build Corridor Alternative.

A highway can represent both a physical and psychological barrier for wildlife movement. Individual animals that attempt to cross can be injured or killed by traffic or can be affected by turning back, delaying their progress, or speeding their movement (van Langevelde et al. 2009). Wider roads and higher traffic volumes increase the barrier effect and decrease connectivity within the landscape (van Langevelde et al. 2009). Highways are a barrier for mammals, reptiles, amphibians, and many ground-dwelling insects (van Langevelde et al. 2009). Deer, elk, and other large ungulates may pass through a ROW fence to enter the ROW, but then often struggle to get back out due to the traffic volume and limited space within the ROW. This increases the risk for vehicle/wildlife collisions, wildlife and human injuries or fatalities, and property damage.

Failure to adequately ensure safe wildlife passage across highways can lead to various deleterious impacts to wildlife. Migration patterns, dispersal movements, and daily or seasonal activities can be disrupted within the corridor itself. Increased mortality or decreased passage across a road could lead to one or more of the following:

- A local population decline
- Decreased genetic diversity within a population
- Increased likelihood of a local population dying out (local extinction or extirpation),
- Reduced ability to adapt to ecological shifts associated with climate change
- A decrease in regional biodiversity in habitat patches that have become more isolated from each other

These problems can be of societal significance when protected natural areas such as national parks experience loss of species due to habitat fragmentation.

Purple Alternative

The Purple Alternative would intersect and therefore directly impact three of the six LIB clusters in the Study Area: LIB Clusters 2, 4, and 6. A total of nine LIBs would be fragmented by the Purple Alternative. Of these LIBs, LIB 2k would be reduced to six fragments, none of which fulfills the AGFD 5,000-hectare requirement (**Table 3.14-8** [LIB Fragmentation by Build Corridor Alternative]). Thus, LIB 2k would no longer qualify as a LIB. All other LIBs that are fragmented



by the three Build Corridor Alternatives produce at least one fragment that fulfills the 5,000-hectare threshold, indicating that following fragmentation, all LIBs other than LIB 2k would still qualify as LIBs based on the surface area requirement. In terms of connectivity, under the Purple Alternative, the loss of functional land represented by the loss of LIB fragments that are at least 5,000 hectares in surface area would be somewhere between the loss under the Green Alternative and the loss under the Orange Alternative (**Table 3.14-9** [Total Surface Area of Fragments Lost from Existing LIBs by Build Corridor Alternative]).

The Purple Alternative would create new highway infrastructure that would affect habitat quality (e.g., LIB integrity) and create impediments to wildlife movement that currently do not exist within Pima County, the Santa Rita-Sierrita Detailed Linkage, the TMC, the Buckeye Hills East-SDNM Linkage, the Gila Bend-Sierra Estrella Linkage, the Wickenburg-Hassayampa Linkage, and the White Tanks-Belmont-Hieroglyphic Mountains Linkage.

Implementing the CAP Design Option would enable the alignment to match the CAP, thereby allowing the design of I-11 to parallel the existing wildlife crossings in the TMC area; this would reduce the barrier effect of the I-11 infrastructure. Design options for this section of roadway are unknown at this time. However, mitigation for the TMC corridor includes additional land purchases for wildlife connectivity.

The Purple Alternative would contribute to the isolation of LIBs where the alternative is co-located with existing high-traffic highways (greater than 5,000 AADT), and where widening would be needed. However, in these roadway segments, the potential does exist to improve wildlife connectivity by implementing wildlife crossing mitigation during the process of upgrading these highways to the proposed I-11. Thus, wildlife movement through the following linkages could potentially be improved:

- Ironwood-Picacho Linkage
- Santa Rita-Tumacacori Linkage
- Coyote-Ironwood-Tucson Detailed Linkage

The Patagonia-Santa Rita Linkage does not intersect any of Build Corridor Alternatives and would not be impacted by changes to I-19 under Option A because it is far enough away. Therefore, there would be no impact to wildlife movement within this linkage corridor.

The Purple Alternative would introduce new highway infrastructure in the Avra Valley, Vekol Valley, Rainbow Valley, and Hassayampa Plain that would compromise the quality of wildlife corridors and linkages in these areas by increasing the cascade of effects described in the previous section. The Green Alternative also would introduce more new highway infrastructure than both the Purple and Orange Alternatives. The only new fracture zone included in the Orange Alternative is through the Hassayampa Plain. Thus, of the three alternatives, the Orange Alternative would have the lowest expense and the lowest requirements for complex wildlife connectivity mitigations because it relies on already existing roadways more than the Green and Purple Alternatives.

Green Alternative

The Green Alternative would intersect and therefore directly impact four of the six LIB clusters in the Study Area: LIB Clusters 2, 4, 5, and 6. A total of 12 LIBs would be fragmented by the Green Alternative, compared to 4 LIBs and 9 LIBs for the Orange and Purple Alternatives, respectively. Of these LIBs, none would be completely reduced to fragments below the AGFD

5,000-hectare requirement (**Table 3.14-8** [LIB Fragmentation by Build Corridor Alternative]). In terms of connectivity, under the Green Alternative, the loss of functional land represented by the loss of LIB fragments that are at least 5,000 hectares in surface area would be greater than the loss under the Orange and Purple Alternatives (**Table 3.14-9** [Total Surface Area of Fragments Lost from Existing LIBs by Build Corridor Alternative]). Under the Green Alternative, this loss would be approximately 3.6 times and 1.4 times larger than that caused by the Orange Alternative and the Purple Alternative, respectively. Thus, the Green Alternative would cause the most fragmentation of LIBs.

The Green Alternative would create new highway infrastructure that would affect habitat quality (e.g., LIB integrity) and create impediments to wildlife movement that currently do not exist within the following:

- Ironwood-Picacho Linkage
- Santa Rita-Sierrita Detailed Linkage
- Santa Rita-Tumacacori Linkage
- Tucson Mitigation Corridor
- Coyote-Ironwood-Tucson Detailed Linkage
- Buckeye Hills East-SDNM Linkage
- Gila Bend-Sierra Estrella Linkage
- Wickenburg-Hassayampa Linkage
- White Tanks-Belmont- Hieroglyphic Mountains Linkage

Implementing the CAP Design Option would enable the alignment to parallel the CAP, thereby allowing the design of I-11 to match the existing wildlife crossings in the TMC area. This would reduce, but not eliminate, the barrier effect of the I-11 infrastructure. Design options for this section of roadway are unknown at this time; however, mitigation for the TMC corridor includes additional land purchases for wildlife connectivity. The Green Alternative would contribute to the isolation of LIBs where it is co-located with existing high-traffic highways (greater than 5,000 AADT) and where widening would be needed. However, in these roadway segments, there is potential to improve wildlife connectivity if wildlife crossing mitigation is implemented in the process of upgrading these highways to the proposed I-11. The Patagonia-Santa Rita Linkage does not intersect any of the Build Corridor Alternatives, and changes to I-19 under Option A would not impact the linkage because it is far enough away. Therefore, there would be no impact to wildlife movement within this linkage corridor.

Overall, the Options under the Green Alternative are primarily situated in areas without existing major highways, which would introduce more new highway infrastructure and therefore more fragmentation of wildlife habitat and wildlife corridors within wildlife linkages than either the Purple Alternative or the Orange Alternative. The Green Alternative has the greatest potential to disrupt wildlife linkages and connectivity compared to the Purple and Orange Alternatives. For instance, in the North Section, while the Green Alternative is shorter and less convoluted than the other alternatives, it impacts the Wickenburg-Hassayampa and the White Tanks-Belmont-Hieroglyphic Mountains wildlife linkages to a greater extent. In contrast, the Orange Alternative traverses the fewest linkage areas where roadways do not currently exist and therefore would have the least impact on wildlife linkages.



However, all of these Options could create a blockage at or near the interface of the wildlife linkages and the wildland blocks that these linkages connect where high-traffic roadways do not currently exist. All of the Options also could impair wildlife movement across the CAP canal. While the Green Alternative, followed by the Purple Alternative, creates more new barriers to wildlife movement, the Orange Alternative creates the fewest new barriers and provides a limited opportunity to reduce the barrier effect of existing roadways.

Orange Alternative

The Orange Alternative would intersect and therefore directly impact four of the six LIB clusters within the Study Area: LIB clusters 2, 4, 5, and 6. A total of four LIBs would be fragmented by the Orange Alternative. Of these LIBs, none would be completely reduced to fragments below the AGFD 5,000-hectare requirement (**Table 3.14-8** [LIB Fragmentation by Build Corridor Alternative]). In terms of connectivity, under the Orange Alternative, the loss of functional land represented by the loss of LIB fragments that are at least 5,000 hectares in surface area would be the smallest compared to the losses under the Green and Purple Alternatives (**Table 3.14-9** [Total Surface Area of Fragments Lost from Existing LIBs by Build Corridor Alternative]). The loss under the Orange Alternative would be approximately 2.4 times and 3.6 times smaller than the losses under the Purple Alternative and Green Alternative, respectively. Thus, the Orange Alternative would cause the least fragmentation of LIBs.

The Orange Alternative would create new highway infrastructure that would affect habitat quality (e.g., LIB integrity) and create impediments to wildlife movement that currently do not exist within the Wickenburg-Hassayampa Linkage and the White Tanks-Belmont-Hieroglyphic Mountains Linkage. The Orange Alternative would contribute to the isolation of LIBs where it is co-located with existing high-traffic highways (greater than 5,000 AADT), and where widening would be needed. However, in these roadway segments, there is potential to improve wildlife connectivity if wildlife crossing mitigation is implemented in the process of upgrading these highways to the proposed I-11. Thus, wildlife movement through the following linkages could potentially be improved:

- Ironwood-Picacho Linkage
- Santa Rita-Sierrita Detailed Linkage
- Santa Rita-Tumacacori Linkage
- Tucson-Tortolita-Santa Catalina linkage
- Coyote-Ironwood-Tucson Detailed Linkage
- Gila Bend-Sierra Estrella Linkage

The Patagonia-Santa Rita Linkage does not intersect any of the Build Corridor Alternatives and would not be impacted by changes to I-19 under Option A because it is far enough away. Therefore, there would be no impact to wildlife movement within this linkage corridor.

Overall, the Corridor Options are co-located along existing major highways to a greater extent under the Orange Alternative than under the Purple or Green Alternative. As a result, the Orange Alternative is the alternative that creates the fewest impediments to wildlife movement as a result of new roadway infrastructure.

For instance, while the Purple and Green Alternatives impact the Coyote-Ironwood-Tucson linkage by creating new highway infrastructure that traverses the linkage, the Orange Alternative

would only impact this linkage through potential expansion of the already-existing I-10, which occurs along a relatively small portion of the east edge of the linkage. In the North Section, where new highway infrastructure would be required, the overall environmental impact to wildlife corridors and linkages would be smaller under the Orange Alternative than under the Purple or the Green Alternative. However, each of these alternatives could create a blockage at or near the interface of the wildlife linkages and the wildland blocks that these connect, where high-traffic roadways do not currently exist. All of them also could impair wildlife movement across the CAP canal due to their proximity to existing CAP canal wildlife crossings.

Wildlife Corridors End-to-End Considerations

Overall, the Orange Alternative is co-located along existing major highways to a greater extent than either the Purple or the Green Alternative. The Green Alternative is primarily situated in areas without existing major highways and therefore would introduce more new highway infrastructure within wildlife corridors than either the Purple or the Orange Alternative.

The overall environmental impact to wildlife corridors and linkages would be smaller under the Orange Alternative than under the Purple or Green Alternative. Since the Orange Alternative relies on co-location with existing roadways more than the other alternatives, it could offer a limited opportunity to build wildlife crossings on existing roads when new construction is needed to upgrade the existing roadway to the proposed I-11. However, each of these Build Corridor Alternatives could create a blockage at or near the interface of the wildlife linkages and the wildland blocks these connect, where high-traffic roadways do not currently exist, as well as impair wildlife movement across the CAP canal due to their proximity to existing CAP canal wildlife crossings. In addition, mitigation under the Orange Alternative might initially be more effective because wildlife may have already acclimated to structures where they can cross the highway.

No Build Alternative

The No Build Alternative, as described in **Chapter 2** (Alternatives Considered), is used as a baseline for comparison with the Build Corridor Alternatives. The No Build Alternative would not implement any of the Build Corridor Alternatives for development of I-11. Impacts for the No Build Alternative were analyzed using currently programmed projects. These projects include widening projects along existing routes (I-10 in Tucson and near the Town of Picacho and US 93 in Wickenburg).

Therefore, the No Build Alternative is anticipated to have the least effect on wildlife connectivity and the modeled linkages and natural corridors in the region (**Table 3.14-10** [Summary of Potential Impacts on Biological Resources]).

Summary

The Orange Alternative overall has the least potential direct impacts on biological resources. In contrast, the Green Alternative would cause the most deleterious impacts to biotic communities, IBAs, SERI, and special-status species compared to the other alternatives based on its greater impacts to riparian areas and to wildlife connectivity. The Green Alternative also has the greatest potential to increase the spread of invasive species compared to the other alternatives.

Table 3.14-10 Summary of Potential Impacts on Biological Resources

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Biotic Communities ⁽¹⁾	<ul style="list-style-type: none"> Minimal impacts to biotic communities associated with programmed projects. Acres potentially affected are 105 acres of Arizona Upland Desertscrub and 64 acres of Lower Colorado River Desertscrub. 	<ul style="list-style-type: none"> 65,618 acres within the Build Corridor Alternative The Purple Alternative would be co-located along portions of I-19, I-10, and I-8, but to a lesser extent than the Orange Alternative. As a result, it would likely have a larger footprint than the Orange Alternative but a smaller footprint than the Green Alternative in the South and Central Sections. 	<ul style="list-style-type: none"> 64,894 acres within the Build Corridor Alternative. All three Build Corridor Alternatives would have similar acreages of habitat loss in the North Section; however, the Green Alternative would likely result in the largest amount of habitat loss in the South and Central Sections. 	<ul style="list-style-type: none"> 63,674 acres within the Build Corridor Alternative. The Orange Alternative would be co-located along existing highway corridors in the South and Central Sections and as a result would likely have a substantially smaller footprint and less impact on biotic communities than either the Purple or the Green Alternative.
Riparian Areas ⁽²⁾	<ul style="list-style-type: none"> No impacts identified; Existing conditions and baseline trends would continue. 	<ul style="list-style-type: none"> 663 acres within the Build Corridor Alternative. 	<ul style="list-style-type: none"> 1,302 acres within the Build Corridor Alternative. 	<ul style="list-style-type: none"> 611 acres within the Build Corridor Alternative, so the least potential impact to riparian areas of all the alternatives.
IBAs ⁽²⁾	<ul style="list-style-type: none"> No impacts identified; Existing conditions and baseline trends would continue. 	<ul style="list-style-type: none"> 1,357 acres of IBAs within the Build Corridor Alternative. All three Build Corridor Alternatives include IBAs under Option A. The Purple Alternative has a new crossing of the Gila River and then parallels the river, incorporating portions of the IBAs within the 2,000-foot-wide corridor. 	<ul style="list-style-type: none"> 1,032 acres of IBAs within the Build Corridor Alternative. All three Build Corridor Alternatives include IBAs under Option A. The Green Alternative crosses the Gila River along the existing SR 85 alignment. 	<ul style="list-style-type: none"> 573 acres of IBAs within the Build Corridor Alternative. All three Build Corridor Alternatives include IBAs under Option A. The Orange Alternative crosses the Gila River along the existing SR 85 alignment.

Table 3.14-10 Summary of Potential Impacts on Biological Resources (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
SERI	<ul style="list-style-type: none"> No impacts identified. Existing conditions and baseline trends would continue. 	<ul style="list-style-type: none"> The Purple Alternative would be co-located along portions of I-19, I-10, and I-8, but to a lesser extent than the Orange Alternative. As a result, it would likely have a larger footprint than the Orange Alternative, but a smaller footprint than the Green Alternative in the South and Central Sections. 	<ul style="list-style-type: none"> The Green Alternative would likely have less of an impact on SERI than the Orange Alternative in the South and Central Sections, but greater impacts than the Purple Alternative. Within the North Section, impacts, based upon total habitat loss, would be similar. 	<ul style="list-style-type: none"> Each of the Build Corridor Alternatives would result in loss of potential habitat and impact species movement within the vicinity of the I-11 Corridor. Because the Orange Alternative would be co-located along existing transportation corridors within the South and Central Sections, that alternative would have the least potential direct impact on SERI.
Invasive Species	<ul style="list-style-type: none"> No impacts identified. Existing conditions and baseline trends would continue. 	<ul style="list-style-type: none"> There will be an increased threat of noxious and invasive species spreading and impacting native species, especially along new alignments in rural, undeveloped areas. In the North Section, all Build Corridor Alternatives would have similar impacts. 	<ul style="list-style-type: none"> There will be an increased threat of noxious and invasive species spreading and impacting native species, especially along new alignments in rural, undeveloped areas. In the North Section, all Build Corridor Alternatives would have similar impacts. 	<ul style="list-style-type: none"> The Orange Alternative in the South and Central Sections would be co-located along the existing highway where many noxious and invasive species have already become established. As such, the Orange Alternative would likely have the least impact of the three Build Corridor Alternatives. In the North Section all Build Corridor Alternatives would have similar impacts.

Table 3.14-10 Summary of Potential Impacts on Biological Resources (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Threatened and Endangered Species	<ul style="list-style-type: none"> No impacts identified; programmed transportation projects would be subject to environmental review. 	<ul style="list-style-type: none"> None of the Build Corridor Alternatives would impact critical habitat for the Chiricahua leopard frog, southwestern willow flycatcher, and western yellow-billed cuckoo associated with the Santa Cruz River. A new crossing of the Gila River would be required in an area that provides potential habitat for several threatened or endangered species that utilize riparian and aquatic areas. Option C of this alternative is likely to impact large swaths of semidesert grassland occupied by PPC. In order to avoid a Jeopardy decision by USFWS for this species, a substantial amount of compensatory mitigation will be required. 	<ul style="list-style-type: none"> None of the Build Corridor Alternatives would impact critical habitat for the Chiricahua leopard frog, southwestern willow flycatcher, and western yellow-billed cuckoo associated with the Santa Cruz River. The existing SR 85 crossing of the Gila River provides potential habitat for several threatened or endangered species that utilize riparian and aquatic habitat. No new crossing of the Gila River would be required. Option D of this alternative is likely to impact large swaths of semidesert grassland occupied by PPC. In order to avoid a Jeopardy decision by USFWS for this species, a substantial amount of compensatory mitigation will be required. 	<ul style="list-style-type: none"> None of the Build Corridor Alternatives would impact critical for the Chiricahua leopard frog, southwestern willow flycatcher, and western yellow-billed cuckoo associated with the Santa Cruz River. The existing SR 85 crossing of the Gila River provides potential habitat for several threatened or endangered species that utilize riparian and aquatic habitat. No new crossing of the Gila River would be required. Option B of this alternative also will impact semidesert grassland occupied by PPC; however, this alternative is co-located with the existing I-19 roadway, which may or may not require widening. New ground disturbance will be less for this option than for the other alternatives, and will be less likely to result in a possible Jeopardy decision by USFWS.

Table 3.14-10 Summary of Potential Impacts on Biological Resources (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Other Sensitive Species	<ul style="list-style-type: none"> No impacts identified; programmed transportation projects would be subject to environmental review. 	<ul style="list-style-type: none"> The Purple Alternative would be co-located along portions of I-19, I-10, and I-8, but to a lesser extent than the Orange Alternative. As a result, it would likely have a larger footprint than the Orange Alternative, but a smaller footprint and less of a potential impact to other sensitive species than the Green Alternative in the South and Central Sections. 	<ul style="list-style-type: none"> All three Build Corridor Alternatives would have similar acreages of habitat loss in the Northern Section; however, the Green Alternative would likely result in the largest amount of habitat loss and potential impacts to other sensitive species in the South and Central Sections. 	<ul style="list-style-type: none"> As the Orange Alternative contains the most co-located options and the least acreage impacts to biotic communities, it will have the least potential to impact other sensitive species.
Wildlife Connectivity	<ul style="list-style-type: none"> Existing conditions and baseline trends would continue. Programmed transportation projects would be subject to environmental review. 	<ul style="list-style-type: none"> In the South Section, all Build Corridor Alternatives cross or parallel a number of linkage corridors. The Purple Alternative crosses through one wildland block within the South Section. A portion of the Purple Alternative is co-located with I-10, which would minimize the creation of new barriers to wildlife movement. In the Central Section, the Purple Alternative crosses the Gila Bend-Sierra Estrella Linkage, which connects two large wildland blocks located on the Gila River Indian 	<ul style="list-style-type: none"> In the South Section, all Build Corridor Alternatives cross or parallel a number of linkage corridors. The Green Alternative crosses through one wildland block within the South Section and has the greatest number of new crossings of potential wildlife corridors. In the Central Section, the Green Alternative crosses the Gila Bend-Sierra Estrella Linkage isolating two large wildland blocks located on the Gila River Indian Community and the SDNM. The Green Alternative (Option M) 	<ul style="list-style-type: none"> In the South Section, all Build Corridor Alternatives cross or parallel a number of linkage corridors. The Orange Alternative crosses through only one wildland block, which is located within the Tohono O'odham Nation but also is on the existing I-19 alignment. The Central Section of this alternative is co-located with I-8 and crosses a large wildland block within the SDNM. In the North Section, all three Build Corridor Alternatives are similar and cross through large

Table 3.14-10 Summary of Potential Impacts on Biological Resources (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		<p>Community and the SDNM.</p> <ul style="list-style-type: none"> In the North Section all three Build Corridor Alternatives are similar and cross through large habitat blocks and the Wickenburg-Hassayampa Linkage. The Purple Alternative also crosses the Vulture Mountains Recreation Area. 	<p>then runs through the SDNM wildland block.</p> <ul style="list-style-type: none"> In the North Section, all three Build Corridor Alternatives are similar and cross through large habitat blocks and the Wickenburg-Hassayampa Linkage. The Green Alternative also crosses the Vulture Mountains Recreation Area. 	<p>habitat blocks and the Wickenburg-Hassayampa Linkage. The Orange Alternative is outside of the Vulture Mountains Recreation Area.</p> <ul style="list-style-type: none"> Overall, the Orange Alternative has the most co-located segments and therefore the least potential impacts to wildlife connectivity.
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> Continue historical trends where construction added to the fragmentation and destruction of biotic communities. Generally increase development pressure that will further degrade and fragment wildlife habitat. 	<p>Land development induced by I-11 could:</p> <ul style="list-style-type: none"> Introduce or exacerbate the introduction of unwanted or invasive plant or wildlife species into new areas. Impacts associated with new alignments would take longer to occur and have potentially greater indirect negative impacts to native species than impacts associated with co-located alignments. Cause or increase gradual changes in species composition, diversity, genetic makeup, and/or health due to impacts to habitat, habitat fragmentation, or genetic isolation. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> Increased potential for indirect effects to biotic communities due to a greater portion of the alternative being on a greater amount of new alignment as compared with the Purple and Orange Alternatives. Greater potential for increased wildlife mortality, including SERI, due to wildlife/vehicle collisions than the Purple or the Orange Alternative because of the greater amount of new alignment. Greater potential for possible disruption of mating or feeding by 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> This alternative has the most co-located highway segments, which may or may not require widening. Most of these highway segments are already considered impermeable to most wildlife due to high traffic volumes; therefore selection of this alternative would provide some limited opportunities to improve wildlife connectivity by adding wildlife crossings to the design. Least potential for increased wildlife mortality, including SERI, due to wildlife/vehicle

Table 3.14-10 Summary of Potential Impacts on Biological Resources (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		<ul style="list-style-type: none"> • Change the quantity and quality of habitat and the resources that species rely on for food, hunting/ scavenging, and breeding due to the introduction of contaminants or pollutants from runoff or changes in hydrology. • Within the North Section, the Purple Alternative might have the least amount of indirect on biotic communities and wildlife habitat due to its location within the Douglas Ranch planned development. • Potential for increased wildlife mortality, including SERI, due to wildlife/vehicle collisions on segments of new alignment. • Possible disruption of mating or feeding by wildlife species within the immediate vicinity of the highway due to the introduction of increased noise or light pollution from the highway as well as to induced development due to the highway. 	<p>wildlife species within the immediate vicinity of the highway than the Purple or the Orange Alternative due to the introduction of increased noise or light pollution from the highway as well as due to induced development resulting from the highway.</p>	<p>collisions than the Purple or Green alternatives.</p> <ul style="list-style-type: none"> • Least potential for possible disruption of mating or feeding by wildlife species within the immediate vicinity of the highway than the Purple or the Green Alternative due to the introduction of increased noise or light pollution from the highway as well as due to induced development resulting from the highway.

Table 3.14-10 Summary of Potential Impacts on Biological Resources (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Cause localized, incremental effects in locations with planned corridor improvements and increased development. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Create substantial habitat loss, fragmentation, and isolation effects corridor-wide and this is of greatest concern near threatened and endangered species habitats and along wildlife corridors as land is developed. • Within the North Section, the Purple Alternative might have a somewhat lesser cumulative effect on biotic communities and wildlife habitat due to its location within the Douglas Ranch planned development. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> • Potential incremental effects could be somewhat greater than the Purple Alternative due to a greater amount of new alignment. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> • Potential incremental effects would be greater than the No Build Alternative and less than the Purple or the Green Alternative.

(1) This is the total number of acres within the 2,000-foot-wide corridor. The actual construction footprint would be approximately one-fourth (25 percent) of the total area shown for each Build Corridor Alternative. In areas where the Build Corridor Alternative would be co-located with existing highway facilities, the acreage of impact would likely be further reduced.

(2) The acres presented for riparian areas and IBAs represent the total number of acres within the 2,000-foot-wide corridor.

I-10 = Interstate 10, I-11 = Interstate 11, I-19 = Interstate 19, I-8 = Interstate 8, IBA = Important Bird Areas, PPC = Pima pineapple cactus, SDNM = Sonoran Desert National Monument, SERI = Species of Economic and Recreational Importance, SR = State Route, USFWS = US Fish and Wildlife Service.

1 3.14.5 Potential Mitigation Strategies

2 This Tier 1 analysis provides an overview of potential impacts from the construction and
3 operation of a new I-11 transportation facility within one of the Build Corridor Alternatives.
4 Specific project design, construction methods, and facility alignment within a Build Corridor
5 Alternative have not been determined; therefore, specific methods to avoid, minimize, or
6 mitigate project-related impacts cannot be developed. However, **Table 3.14-11** (General
7 Mitigation Strategies Applicable to All Corridor Options) outlines the general mitigation
8 strategies, by type of resource that would be implemented for all the Corridor Options.
9 **Table 3.14-12** (Specific Mitigation Strategies for Each Corridor Option) identifies more specific
10 mitigation strategies for each Corridor Option in addition to the general strategies. These
11 strategies would be refined during the Tier 2 process.

**Table 3.14-11 General Mitigation Strategies Applicable to All
Corridor Options**

General Mitigation Strategies Applicable to all Options	
Noxious and Invasive Species	ADOT will participate, support, and commit to long-term noxious weed management efforts in the I-11 Corridor. To effectively combat noxious and invasive weeds, a coordinated effort across federal, state and local levels is required. Noxious and invasive weed control on BLM or US Forest Service (USFS) lands would occur in accordance with previously approved environmental assessments. Long-term management of noxious and invasive weeds would be necessary to minimize indirect and cumulative effects to the PPC and its habitat.
	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 must be washed and free of all attached plant/vegetation and soil/mud debris prior to entering/leaving the construction sites.
	All disturbed soils that are not paved and that will not be landscaped or otherwise permanently stabilized by construction will be seeded using species native to the project vicinity.
Native Plants	Protected native plants within the project limits will be impacted by I-11; therefore, it will be determined if AZDA notification is needed for compensation purposes. If notification is needed, ADOT will send the notification prior to the start of construction.
Wildlife Connectivity	ADOT will coordinate with the AGFD, BLM, and other stakeholders to determine wildlife connectivity data needs and study design. ADOT will then fund and facilitate implementation of identified studies prior to the initiation of the Tier 2 process, due to the timeline required (likely 2 to 4 years) to collect and analyze sufficient data before draft design plans begin to limit the mitigations possible. ADOT and the stakeholders will identify the crossing structures, design features, and supporting mitigation or conservation necessary to facilitate the movement of wildlife through the roadway barrier, and will incorporate the solutions into subsequent I-11 projects.
	ADOT will establish partnering opportunities with key landowners (e.g., private, BLM, Reclamation, Maricopa County, Pinal County, and Pima County) and appropriate municipal, county, state, and federal agencies prior to and during the Tier 2 process for long-term planning strategies.

Table 3.14-11 General Mitigation Strategies Applicable to All Corridor Options (Continued)

General Mitigation Strategies Applicable to all Options	
Wildlife Connectivity (continued)	Prior to the Tier 2 analysis, ADOT will evaluate the Wildlife Connectivity Assessment reports from Pima, Pinal, Maricopa and Yavapai counties to identify and, if possible, avoid I-11 impacts on the diffuse, landscape, and riparian wildlife movement areas identified in each report.
	Structures designed to enhance wildlife connectivity, such as wildlife overpasses and underpasses, and fencing to funnel wildlife to these structures, would be evaluated by ADOT in association with AGFD, designed, and constructed taking species-specific needs into consideration.
ESA-listed Species	ADOT will avoid or minimize impacts to designated or proposed critical habitat. If impacts to critical habitat cannot be avoided, consultation with the USFWS will occur during the Tier 2 analysis.
	Prior to the Tier 2 process, ADOT will conduct a thorough habitat assessment in all areas that have potential habitat for ESA-listed species. If suitable habitat occurs within the construction footprint, ADOT will avoid or minimize impacts. Additionally, pre-construction surveys will be completed for all ESA-listed species, or it will be assumed that the species occurs on site. For the southwestern willow flycatcher, western yellow-billed cuckoo, and Yuma Ridgeway's rail, surveys during two breeding seasons will be conducted prior to the Tier 2 process. During the Tier 2 process, ADOT will conduct consultation with USFWS.
	Potential mitigation measures to avoid or minimize impacts to ESA-listed species will be determined through consultation with USFWS during the Tier 2 process, but could include breeding season restrictions, translocation of individuals, minimization of vegetation removal, minimization of the project footprint, etc.
	During the Tier 2 process, if impacts to ESA-listed species or habitat are determined likely to occur, compensatory mitigation will be negotiated with USFWS.
Sonoran Desert Tortoise	ADOT will continue to honor its commitments within the Candidate Conservation Agreement for the Sonoran Desert Tortoise in Arizona (USFWS 2015e).
	Prior to the Tier 2 process, ADOT will conduct habitat suitability surveys within agency-mapped tortoise habitat that may be impacted by I-11.
	ADOT will partner with state and federal agencies during the Tier 2 and design process, and will use data obtained from habitat suitability studies to inform design features to minimize impacts to the Sonoran Desert Tortoise and its habitat.
	Any future I-11 segments selected for construction that are located within Sonoran desert tortoise habitat will 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 on tortoise awareness, pre-construction surveys, relocation of tortoises, on-site monitoring of construction activities, and best management practices designed to reduce potential tortoise mortalities during construction.

ADOT = Arizona Department of Transportation, AZDA = Arizona Department of Agriculture, BLM = Bureau of Land Management, ESA = Endangered Species Act, PPC = Pima pineapple cactus, Reclamation = Bureau of Reclamation, USFS = US Forest Service, USFWS = US Fish and Wildlife Service.

Table 3.14-12 Specific Mitigation Strategies for Each Corridor Option

Option	Resources*	Mitigation Strategy
A	Southwestern willow flycatcher, western yellow-billed cuckoo, and their critical habitat; Gila topminnow; and Northern Mexican gartersnake	Avoid widening I-19 to the east along the Santa Cruz River and impacting habitat; conduct pre-construction surveys where appropriate; and consult with the USFWS, as needed.
	Jaguar and its critical habitat; ocelot	Minimize the construction footprint to the extent possible, and improve or construct wildlife crossings that jaguar and ocelots will use.
	PPC	Minimize construction footprint through quality PPC habitat; survey suitable habitat 1 year prior to Tier 2 process to inform design; implement long-term control of noxious weeds; and negotiate compensatory mitigation with USFWS, as needed.
	Santa Cruz River	Avoid or minimize impacts to this major riparian corridor. The need for potential additional wildlife crossings would be assessed and implemented where warranted to preserve wildlife movement. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
	Tumacacori-Santa Rita Linkage	Avoid or minimize impacts to linkages. Assess whether recommendations provided in the specific or the county linkage reports can be used to improve or construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
	Santa Rita-Sierrita Linkage	
B	PPC	Minimize construction footprint through quality PPC habitat; survey suitable habitat 1 year prior to Tier 2 process to inform design; implement long-term control of noxious and invasive weeds; and negotiate compensatory mitigation with USFWS, as needed.
	Yellow-billed cuckoo	Avoid widening the I-19 or I-10 into the Santa Cruz River floodplain; conduct pre-construction surveys in suitable habitat during two breeding seasons; implement seasonal restrictions and consult with USFWS, as needed.
	Santa Cruz River	Avoid or minimize impacts to this major riparian corridor. The need for potential additional wildlife crossings would be assessed and implemented where warranted to preserve wildlife movement. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
	Santa Rita-Sierrita Linkage	Avoid or minimize impacts to linkages. Assess whether recommendations provided in the specific or the county linkage reports can be used to improve and construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
	Tucson-Tortolita-Santa Catalina Linkage	
	Coyote-Ironwood-Tucson Linkage	

Table 3.14-12 Specific Mitigation Strategies for Each Corridor Option (Continued)

Option	Resources*	Mitigation Strategy
C, D, CAP Design Option, I-10 Connector	PPC	Minimize construction footprint through quality PPC habitat; survey suitable habitat 1 year prior to Tier 2 process to inform design; implement long-term control of noxious weeds; and negotiate compensatory mitigation with USFWS, as needed.
	Chiricahua leopard frog	Avoid critical and occupied habitat that is adjacent to the southern end of this option.
	Santa Rita-Sierrita Linkage	Avoid or minimize impacts to linkages. Assess whether recommendations provided in the specific or the county linkage reports can be used to improve and construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
	Coyote-Ironwood-Tucson Linkage	
	TMC	Avoid, minimize, or mitigate impacts to the TMC. Coordinate with the Reclamation, AGFD, and other relevant agencies to improve and design wildlife crossings in and near the TMC. Specific mitigation related to the TMC includes: (1) relocating and reclaiming Sandario Road; (2) conducting wildlife studies prior to the Tier 2 process; (3) aligning I-11 wildlife crossing structures to match the existing CAP canal siphons (7 crossings total); (4) creating an additional wildlife crossing near the TMC, depending on the results of wildlife studies; (5) acquiring property (at a 1:1 ratio) to support additional wildlife connectivity corridors within Avra Valley for the number of acres of the TMC that will be impacted by I-11; and (6) implementing design restrictions, such as no interchanges in the TMC or immediate area, and minimizing the width of I-11 to limit the I-11 footprint in the TMC area (see Chapter 4 [Preliminary Draft Section 4(f) Evaluation] for more detail on these mitigation strategies).
F	Yellow-billed cuckoo	Avoid or minimize impacts to the Santa Cruz River along Option F; conduct pre-construction surveys during two breeding seasons; implement seasonal restrictions; and consult with USFWS, as needed.
	Coyote-Ironwood-Tucson Linkage	Avoid or minimize impacts to linkages. Assess whether recommendations provided in the specific or the county linkage reports can be used to improve and construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
	Ironwood-Picacho Linkage	
G	Ironwood-Picacho Linkage	Avoid or minimize impacts to this linkage. Assess whether recommendations provided in the specific or the county linkage reports can be used to improve and construct wildlife crossings in this linkage. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
H, I1, and I2		No specific mitigation strategies needed for these Options.
K, L	Gila Bend-Sierra Estrella Linkage	Avoid or minimize impacts to this linkage. Assess whether recommendations provided in the specific or



**Table 3.14-12 Specific Mitigation Strategies for Each Corridor Option
(Continued)**

Option	Resources*	Mitigation Strategy
		the county linkage reports can be used to improve and construct wildlife crossings in this linkage. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
M	Buckeye Hills East-SDNM Linkage	Avoid or minimize impacts to this linkage. Assess whether recommendations provided in the specific or the county linkage reports can be used to improve and construct wildlife crossings in this linkage. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
N	Yellow-billed cuckoo and its proposed critical habitat; southwestern willow flycatcher; and Yuma Ridgeway's rail	Minimize the footprint of the bridge crossing the Gila River to the extent possible; conduct pre-construction surveys in suitable habitat during two breeding seasons; implement seasonal restrictions; and consult with the USFWS, as needed.
	Gila River	Avoid or minimize impacts to this major riparian corridor. The need for potential additional wildlife crossings to preserve wildlife movement would be assessed. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
Q1	Gila Bend-Sierra Estrella Linkage	Avoid or minimize impacts to this linkage. Assess whether recommendations provided in the specific or the county linkage reports can be used to improve and construct wildlife crossings in this linkage. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
Q2	Yellow-billed cuckoo and its proposed critical habitat; southwestern willow flycatcher; and Yuma Ridgeway's rail	Minimize the footprint of bridge widening or new bridge construction on the SR 85 crossing the Gila River to the extent possible; conduct pre-construction surveys in suitable habitat during two breeding seasons; implement seasonal restrictions; and consult with USFWS, if species are present, as needed.
	Gila River	Avoid or minimize impacts to this major riparian corridor. The need for potential additional wildlife crossings to preserve wildlife movement would be assessed. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
Q3, R	Yellow-billed cuckoo	Minimize construction in the Gila River floodplain to the extent possible; conduct pre-construction surveys in suitable habitat during two breeding seasons; implement seasonal restrictions; and consult with the USFWS, if species are present, as needed.
S, U, X	White Tanks-Belmonts-Vultures-Hieroglyphics Linkage	Avoid or minimize impacts to linkages. Assess whether recommendations provided in the specific or the county linkage reports can be used to improve and construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
	Wickenburg-Hassayampa Linkage	

NOTE: Resources that share the same mitigation strategies are grouped together.



3.14.6 Future Tier 2 Analysis

ADOT will continue to work with agencies prior to and during the Tier 2 process to conduct surveys needed to identify occupied habitat for ESA-listed species at the time of the Tier 2 project and to develop specific conservation measures to avoid, minimize, or mitigate impacts to listed species. It is acknowledged that ESA-listed species could change over time.

ADOT will continue to work with federal and state agencies as well as affected municipalities during the Tier 2 process to evaluate potential impacts to other sensitive species listed by these entities. ADOT will work with Tribal agencies during the Tier 2 process to avoid or minimize effects to tribally sensitive species.

ADOT will continue to work with stakeholders and partners, such as AGFD and BLM, prior to and during the Tier 2 process to develop and fund appropriate studies to evaluate wildlife movement and roadway mortality. Sufficient time (at least 2 to 4 years) will be given to ensure the studies acquire adequate data for guiding the development of mitigation measures. Future studies in support of Tier 2 impact analysis would focus on refining information relating to specific impact areas within known wildlife linkages and corridors identified now and in the future.

Tracking studies using camera traps, satellite telemetry, track plates, or other methods will identify spatial and temporal use patterns of target species within the Study Area. Collision studies will be utilized along co-located Corridor Options of I-11 to identify sites where overpasses or underpasses could be installed. ADOT would implement on-the-ground mitigation based on recommendations generated by these studies, such as constructing wildlife crossings where previous crossings by wildlife has been documented and building culverts of a specific size and design for wildlife occurring in specific locations in the Study Area. Also existing culverts, bridges, and other roadway features that are in place along co-located highways should be monitored to identify the species that use these and the degree to which these existing features are effective at maintaining movement across the highway barriers.



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3.15 Temporary Construction-related Impacts

Construction impacts are impacts associated with the construction process and can be either temporary or permanent. Permanent impacts are reviewed in the individual resource sections of this chapter. This section will discuss the temporary construction impacts expected for all Build Corridor Alternatives and potential mitigation measures. The No Build Alternative would not lead to construction activities and therefore will not be discussed.

3.15.1 Transportation

Construction activities would increase traffic congestion and travel times through construction areas, which may change traffic patterns on local roads. Temporary impacts to transportation would be the greatest for the Orange Alternative, which is primarily co-located with other highway facilities (Interstate 19 [I-19], I-10, I-8, and State Route [SR] 85). In general, fewer impacts would occur when a Build Alternative is constructed where no existing facilities exist, due to a lower likelihood of affecting major existing traffic patterns on high-capacity roadways. During Tier 2 analysis, plans to mitigate impacts on vehicular traffic during construction would be prepared to avoid, minimize, or mitigate these types of impacts.

3.15.2 Land Use

The most likely temporary short-term impact on land use would be the need for temporary construction easements (TCEs). TCEs typically would be needed for alternatives with co-located facilities and activities such as the reconstruction of adjacent local roads, driveways, construction of noise walls or retaining walls, and relocation of utilities. TCEs would generally consist of narrow strips adjacent to the permanent right-of-way (ROW). Staging and stockpiling would likely occur within the existing ROW; however, TCEs may be required if sufficient area is not available within the ROW. The exact locations for TCEs would be determined during the final design of the Tier 2 project.

3.15.3 Recreation

The majority of temporary construction impacts to recreation would occur within the South and Central Sections where there are more established recreation areas and larger populations. Within the North Section, the Purple Alternative (Purple Alternative) and Green Build Corridor Alternative (Green Alternative) cross the Vulture Mountains Recreation Area within a Bureau of Land Management-designated multi-use corridor.

Impacts on recreation would typically include temporary restrictions on access to trails or other recreational facilities. Access issues and restrictions would be addressed as part of Tier 2 Analysis and the development of mitigation measures in collaboration with the owners of the recreation facilities and local communities.

For all Build Corridor Alternatives, there could be a need for TCEs within designated recreational areas. Construction activities also could impact the user's experience within these recreational areas due to noise and/or visual impacts, as well as poorer air quality attributed to dust from the construction activities. Hunting access to game management areas would likely be maintained, though traffic detours might impact property access.



3.15.4 Social Resources and Environmental Justice

Construction impacts to social resources and environmental justice would be greatest in the areas with dense development and environmental justice populations. Construction along existing routes would result in temporary land and road closures, traffic congestion, and delays through the construction zones. Reconstruction of traffic interchanges would result in the temporary closure of the interchanges, requiring potentially lengthy detours. The added congestion also could impact emergency response times for fire, police, and ambulance services.

All the Build Corridor Alternatives would be co-located along a portion of I-19. Because the Orange Alternative would be co-located along the entire length of I-19 (as well as I-10, I-8, and SR 85) it would have the greatest potential for temporary road and lane closures and the need for detours. The Purple Alternative would have the next greatest potential for temporary road and lane closures and the need for detours. The Green Alternative, which has the least amount of co-located roadway and the greatest amount of new interstate alignment, would have the least amount of impact on road closures and detours.

Tier 2 analysis would include a full evaluation into the short-term and long-term benefits and adverse effects of I-11 and determine whether the environmental justice populations would bear disproportionately high and adverse effects. This evaluation would look at the totality of the circumstances surrounding I-11, including the effects of I-11 construction. If the construction-related impacts have the potential to affect an environmental justice population, full and fair participation of those groups in the planning process would be critical to identify measures to avoid, minimize, and mitigate those impacts.

3.15.5 Economics

Construction would create a beneficial economic effect due to temporary job creation and the introduction of construction dollars into the local economy. The most likely construction-related adverse economic impacts would be on businesses that experience limits on, or changes to access because they are located along roads that are temporarily closed for construction or near traffic interchanges that are temporarily closed. These types of impacts would be more likely for alternatives that are co-located with existing highway facilities, where reconstruction of existing traffic interchanges may be necessary. Temporary road closures also could occur along Corridor Options where I-11 crosses existing roads. These situations would require detours which could make getting to the businesses more difficult.

A less quantifiable short-term impact due to construction would be the economic impact due to traffic delays through construction zones. This would include both delays in commuters traveling to and from work, as well as local and pass-through commercial traffic, such as long-haul trucks.

3.15.6 Cultural Resources

Additional cultural resource studies, including on-the-ground surveys, would be conducted during Tier 2 if a Build Corridor Alternative is selected. Construction-related impacts are unknown until the cultural work associated with individual Tier 2 projects has been completed. Processes regarding site discovery during construction would be laid out as part of the individual Tier 2 projects, likely in Section 106 agreement documents. Noise impacts during



construction may temporarily affect historic structures or districts. These impacts would be most likely to occur along co-located Corridor Options.

3.15.7 Noise and Vibration

Construction noise and vibration could have effects on both the natural and human environments, as well as on cultural resources. General construction noise and vibration from activities, such as pile driving for bridge structures, could affect local residences and other noise-sensitive resources (e.g., hospitals, nursing homes, etc.). These impacts would be most likely within urbanized areas where I-11 would be co-located with other highway facilities such as along I-10 through Tucson.

Construction excavations along some alternatives may require blasting to facilitate the removal of material. This would be more likely in rural areas and where no transportation facilities currently exist than in urbanized areas or along alignments co-located with other transportation facilities. In more rural areas, noise and vibration could impact wildlife species, introducing stress affecting normal lifecycle activities, such as wildlife movement and nesting for bird species. Specific strategies to mitigate these impacts will be developed in Tier 2.

3.15.8 Visual and Aesthetic

Temporary construction features such as excavation areas, soil stockpiles, crane towers, equipment and materials storage, false work, and other miscellaneous items would be visible from surrounding areas. Temporary visual impacts would be greatest where the freeway route would be located adjacent to existing residential developments and where large system traffic interchanges would be constructed.

Within Options C and D, construction would be more visible to users on the Central Arizona Project (CAP) canal trail if the CAP Design Option is selected and less visible for drivers on Sandario Road. Visual expectations for drivers might be somewhat different than those of hikers or cyclists on the CAP canal trail. Visual and aesthetic impairments, such as dust generated air pollution and/or light pollution from machinery, could impact recreational users' experience per construction activities of the CAP Design Option.

Night construction in more rural areas would be unlikely or minimal, but lighting from any night-time construction could affect night skies, nearby sensitive land uses, or sensitive wildlife species. This would be less of an impact in urban areas where light pollution is more prevalent or in areas where I-11 would be co-located with other facilities.

3.15.9 Air Quality

Temporary construction impacts to air quality would be limited to the areas where construction is taking place. Dust from heavy machinery and additional vehicle traffic emissions due to lane or facility closures may occur.

Construction air quality impacts would be limited to short-term increased fugitive dust and mobile source emissions. Because carbon monoxide emissions from motor vehicles increase with slower speeds, disruption of traffic during construction could result in short-term elevated concentrations of carbon monoxide because of the temporary reduction of road capacity and increased delays.



Fugitive dust would be generated by construction vehicles and other earthmoving machinery. Increased dust levels would be attributable primarily to particulate matter generated by vehicle movement over paved and unpaved roads, dirt tracked onto paved surfaces, and material blown from haul trucks.

3.15.10 Hazardous Materials

A risk associated with construction would be spills of hazardous materials such as fuel or oil. If a large volume of material were spilled within the vicinity of a flowing stream or river, the spilled material could be carried downstream and off site, potentially impacting wildlife, fisheries, and/or domestic water supplies.

Another potential construction impact could be airborne asbestos derived from the demolition of load bearing concrete structures and the removal of roadway paint that contains asbestos, lead, or crystalline silica. The risks from both of these sources would be greatest for the Orange Alternative, which is co-located with existing roads.

3.15.11 Geology, Soils, and Farmland

There would be no short-term impacts to geology or farmlands due to construction. Local geology, however, could affect construction techniques and require blasting to remove material.

3.15.12 Water Resources

The greatest potential for temporary construction impacts to surface waters would be increased sedimentation from erosion during stormwater runoff. While best management practices for stormwater control would be implemented, a substantial storm event could result in the failure of these mitigation features. Increased sediment also could result in impacts to aquatic species downstream from the construction area. Construction impacts on specific water resources would be evaluated during the design phase of the Tier 2 project.

3.15.13 Biological Resources

Construction of I-11, and in particular construction where no transportation facilities currently exist, would result in the removal of vegetation, including protected plant species. While these protected plants would be relocated, it would take some time for the plants to become established. Following construction, the new ROW would be revegetated, but this would still represent a change in habitat. Additionally, Section 3.14 details efforts that could be undertaken to minimize the spread and colonization of invasive and noxious species.

Similarly, construction activities would pose a threat to wildlife species, especially less mobile species, such as the Sonoran desert tortoise, or ground nesting species, such as the burrowing owl. Arizona Department of Transportation (ADOT) has specific guidelines for avoiding impacts to these species, which include the relocation of burrowing owls occupying burrows within the construction area. Specific mitigation would be developed during Tier 2.

Construction where no transportation facilities currently exist would create a new barrier to wildlife movement. While permanent impacts would be mitigated through the use of fencing and wildlife crossings, the construction activities could result in a temporary barrier to wildlife movement. Noise and vibration from construction equipment or from blasting could disrupt



species movement in the area, as well as nesting and mating of species. Many bird species, such as eagles, nest in the same location every year and construction activities could impact their nesting. Specific strategies to mitigate these impacts would be developed in Tier 2.

Night construction in more rural areas would be unlikely or minimal, but lighting from any night-time construction also could disrupt wildlife and disorient nocturnal species. This would be less of a problem in urban areas where light pollution is more prevalent or in areas where I-11 would be co-located with other facilities.

3.15.14 Summary

The Build Alternatives would result in temporary construction-related impacts, with the most consequential impacts where new roadway would be constructed. In those locations, construction activities would occur in generally undeveloped areas where mitigation could be more extensive.

3.15.15 Potential Mitigation Strategies

Specific mitigation measures would be identified following the Tier 2 analysis. Once project design is more defined, temporary construction impacts can be evaluated and addressed in commensurate detail.

3.15.16 Future Tier 2 Analysis

Future Tier 2 analysis would provide additional detail on the construction methodology if a Build Corridor Alternative is selected. Additional details would be expected to include the number of aerial structures (bridges or viaducts), the need for embankments and other earth moving activities, and other design details for I-11. The exact design and configuration of I-11 would be highly dependent upon local conditions, and efforts would be undertaken to gather information about local features like soils and ground water through subsurface testing as part of the future Tier 2 analysis. Further, the Tier 2 analysis would address traffic management and detours that may occur during the construction period. Details about construction techniques, equipment, and staging areas also would be documented as part of the future Tier 2 analysis.



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3.16 Irreversible and Irretrievable Commitment of Resources

Irreversible commitments involve the use or destruction of a specific resource (for example, energy and natural resources such as water, minerals, or timber) that cannot be replaced within a reasonable timeframe. These resources would be used in the project implementation and would never return.

Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (for example, disturbance of a cultural site or extinction of a threatened or endangered species). These resources or their traditional use is lost for a period of time.

Resources of greatest concern are those that are considered scarce or rare and those resources where the effects cannot be minimized or mitigated.

3.16.1 Regulatory Setting

Irreversible and irretrievable commitments of resources directly relate to the trade-offs of implementing a project versus not implementing a project. Irreversible and irretrievable impacts were evaluated in accordance with the National Environmental Policy Act (42 United States Code § 4321-4347) and regulations published by the Council on Environmental Quality on implementing NEPA (40 Code of Federal Regulations 1502.16).

3.16.2 Methodology

Federal Highway Administration (FHWA) and Arizona Department of Transportation (ADOT) considered data from all the applicable resources documented in this Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS). The resources of particular concern were those that could result in an irretrievable use, such as consumption of a resource or use of new land area committed to future transportation uses.

3.16.3 Potential Impacted Resources

The following resource areas may have an irreversible and irretrievable commitment of resources as a result of the construction of a Build Corridor Alternative.

- **Natural Resources:** Resources such as land, threatened and endangered species and their associated habitat, biological resources, water resources, and agricultural lands may experience irreversible and irretrievable effects. Given the level of analysis within this Draft Tier 1 EIS, specific effects and the attributes that would make the resources scarce or unique have not been determined. In general, the effects would be a result of the conversion from undeveloped land to developed land, including Interstate 11 and its related uses.
- **Cultural Resources and Section 4(f) Resources:** These resources are both scarce and impacts would be an irretrievable commitment. Sites located within the actual construction footprint would require documentation through data recovery. Archaeological artifacts could be preserved through curation but the historic integrity of the site would be lost. Impacts to historic sites outside of the construction area would be primarily contextual. Construction on new alignment could potentially impact traditional cultural properties.



- 1 • **Energy:** Energy resources such as oil and gas are not considered rare, but once used,
2 these materials are not renewable. During construction, consumption of oil and gas would
3 be increased for the construction time period. Advances in technology may contribute to a
4 reduction in the consumption and usage of oil and gas in the long term.
- 5 • **Construction Materials:** These materials could include Portland cement concrete
6 (concrete), asphalt concrete (asphalt), rock base course, and steel. Water would be
7 consumed for the mixing concrete, washing equipment, and dust control. The use of these
8 materials would be largely irretrievable; however, these resources are generally not in short
9 supply.

10 Under the No Build Alternative, Interstate 11 would not be built; and new commitments of
11 resources would not occur beyond those that could occur in relation to other projects and the
12 maintenance of existing facilities.

13 **3.16.4 Summary**

14 Each of the Build Corridor Alternatives would impact irreversible and irretrievable resources.

15 The Purple Alternative would have a moderate resource need. It would require large amounts of
16 undeveloped land and construction materials. However, these commitments would be less than
17 what the Green Alternative would require. The Green Alternative would impact relatively more
18 undeveloped land and require more construction materials.

19 The Orange Alternative would require the least amount of undeveloped land and construction
20 materials. It would cause the least disruption to nearby natural resources due to its being largely
21 co-located with existing transportation facilities. However, it would likely impact cultural and
22 historic resources in the downtown Tucson area.

23 The No Build Alternative would not have a new commitment of resources so the existing
24 conditions and baseline trends would continue.

25 **3.16.5 Potential Mitigation Strategies**

26 Specific mitigation strategies would be identified as part of the Tier 2 analysis. Implementation
27 of Best Management Practices and mitigation measures, as described in the various resource
28 sections, would minimize resource impacts.

29 **3.16.6 Future Tier 2 Analysis**

30 Potential effects and mitigations for the identified resources would be further evaluated as part
31 of the future Tier 2 analysis. Those efforts would be used to refine the irreversible and
32 irretrievable commitments of resources including the quantification of potential effects for each
33 resource.

3.17 Indirect and Cumulative Effects

This section identifies potential indirect and cumulative effects that would result from the implementation of the Build Corridor Alternatives.

3.17.1 Regulatory Guidance

The Council on Environmental Quality (CEQ) states that indirect effects *“are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems”* (Code of Federal Regulations Title 40, Sec. 1508.8[b]). Indirect effects are commonly categorized as effects that would not occur “but for” the implementation of a project. Indirect effects also can be considered “ripple effects” (Transportation Research Board 2002).

The CEQ states that cumulative effects result from the *“incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor, but collectively significant actions taking place over a period of time”* (Code of Federal Regulations title 40, sec. 1508.7). An action cannot contribute to the cumulative effects on a resource if it will not have either a direct or indirect effect on that resource. The CEQ recommends that cumulative impact analyses examine resources that could be impacted by the action(s) under investigation or that are known to be vulnerable. Additionally, spatial and geographic parameters must be established to evaluate effects that may occur in a different area and to capture effects from past or future actions. The CEQ has released a document, *Considering Cumulative Effects under National Environmental Policy Act*, to aid in assessment of cumulative impacts in National Environmental Policy Act documents (CEQ 1997).

The Federal Highway Administration (FHWA) guidance, *Secondary and Cumulative Impact Assessment in the Highway Project Development Process*, (FHWA 1992) reiterates the CEQ’s message of the importance of considering potential indirect and cumulative effects in decision making for transportation projects and provides direction on implementation of CEQ requirements. It emphasizes the importance of considering the functionality of the resources and trends in the condition of the resources that may be impacted. This guidance, along with the United States Environmental Protection Agency’s (USEPA) document titled *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* (USEPA 1999), provided direction for the cumulative impact assessment for this study.

3.17.2 Methodology

The methodology below explains how indirect and cumulative effects are assessed in this Draft Tier 1 Environmental Impact Statement (EIS).

3.17.2.1 Indirect Effects

The methodology follows the steps outlined in the *National Cooperative Highway Research Program Report 466: Desk Reference for Estimating Indirect Effects of Proposed Transportation*



Projects (Transportation Research Board 2002). The initial step is to identify an Area of Influence (AOI) for each Build Corridor Alternative where indirect, or project-induced, effects could occur. Once the AOI identified, the potential for indirect effects is assessed and mitigation strategies are considered to minimize adverse effects.

Area of Influence

The determination of an AOI for the Build Corridor Alternatives considered the potential changes in travel patterns and demand that could result from the implementation of the Interstate 11 (I-11) Corridor. This was accomplished through the consideration of the following:

- **Where would faster travel times occur?** Faster travel times benefit freight carriers, for whom costs are sensitive to travel time, and faster routes may shift the movement of freight away from congested areas. Currently, Interstate 19 (I-19) and Interstate 10 (I-10) carry substantial amounts of international, national, and regional freight traffic. Interstate 8 (I-8) also plays a role in the movement of goods to California to the west. Trips that are destined for areas outside of Arizona may seek a route that avoids urban areas if it offers a more direct, less congested route that could result in faster arrival times at the ultimate destination.

Faster travel times also would benefit the traveling public through improved access to employment and economic centers, which in turn may affect land uses in terms of location and density. More convenient commute times to employment centers can promote residential development farther from those employment centers. In addition, better access to the transportation network may promote employment centers in new locations.

- **Where would new access occur?** Interchanges provide direct access to interstate facilities. The locations of new interchanges generally coincide with improved accessibility, thus increasing the development potential of nearby land along the corridor. Businesses (e.g., restaurants, gas stations, and accommodations) and residents may move to take advantage of the accessibility of the new interstate. For the purposes of this analysis, it was assumed that new interchanges would influence commercial development up to 0.5 mile away and residential development up to 5 miles away.

Interchange locations for I-11 would not be determined as part of the Tier 1 process, but rather would be developed as part of more detailed alignments subject to project-level or Tier 2 environmental review. However, the Arizona Statewide Travel Demand Model (Arizona Model) includes interchange assumptions based on current regional transportation plan networks that would warrant connections to a new high-capacity transportation facility. Additional information about interchanges and transportation modeling can be found in **Chapter 2**, Alternatives Considered and Section 3.2, Transportation. In the future, additional or different interchange locations could be identified based on land use patterns, growth, and specific access needs.

- **Where would growth occur?** Improved access could induce growth. Developable areas within 5 miles of interchanges are assumed to have project-induced growth.

Evaluation of Indirect Effects

To identify the potential for indirect effects, the Project Team completed the following steps.

- Assessed potential for changes in transportation and land use that would result from the changes in travel patterns and accessibility within the AOI. **Figure 3.17-1** (Purple Alternative



Area of Influence), **Figure 3.17-2** (Green Alternative Area of Influence), and **Figure 3.17-3** (Orange Alternative Area of Influence) illustrate contributors to the AOI for each Build Corridor Alternative.

- Reviewed resources that are present within the AOI and considered whether environmentally sensitive areas may be indirectly affected by changes in land use and transportation patterns and accessibility, or related economic activity.
- Determined if regulatory restrictions or mitigation strategies (provided in the previous sections of **Chapter 3**) could effectively minimize or avoid the potential for indirect effects, or whether additional measures could be warranted. These strategies would be used to inform the Tier 2 studies and mitigation commitment made in future decision documents.

Figures 3.17-1 through 3.17-3 illustrate the future growth areas in the I-11 Corridor Study Area (Study Area), as reflected in municipal general and county comprehensive plans, and supported by interviews with local planning and economic development staff (**Appendix E6**). These figures also show generalized areas where improved accessibility and project-induced growth may occur, based on a preliminary list of potential future interchange locations utilized for travel demand modeling purposes based on current regional transportation system plans. As noted earlier, additional or different interchange locations could be identified based on land use patterns, growth, and specific access needs.

The discussion of indirect effects is qualitative and identifies the types of indirect effects that could occur for each alternative. Indirect effects may be positive or negative and differ by resource as well as alternative, meaning an indirect effect may be positive for one resource and negative for another. For example, a change in tax base due to increased development may be positive for the economy and negative with regard to the opportunities for primitive recreation or solitude.

While the I-11 Corridor has the potential to influence changes in land development and travel patterns, regulation of land use occurs at the local level. Therefore, potential mitigation strategies proposed in the Draft Tier 1 EIS are limited to those within the purview of FHWA and Arizona Department of Transportation (ADOT). However, the indirect impact analysis may aid local governments in managing potential induced development in their jurisdictions.

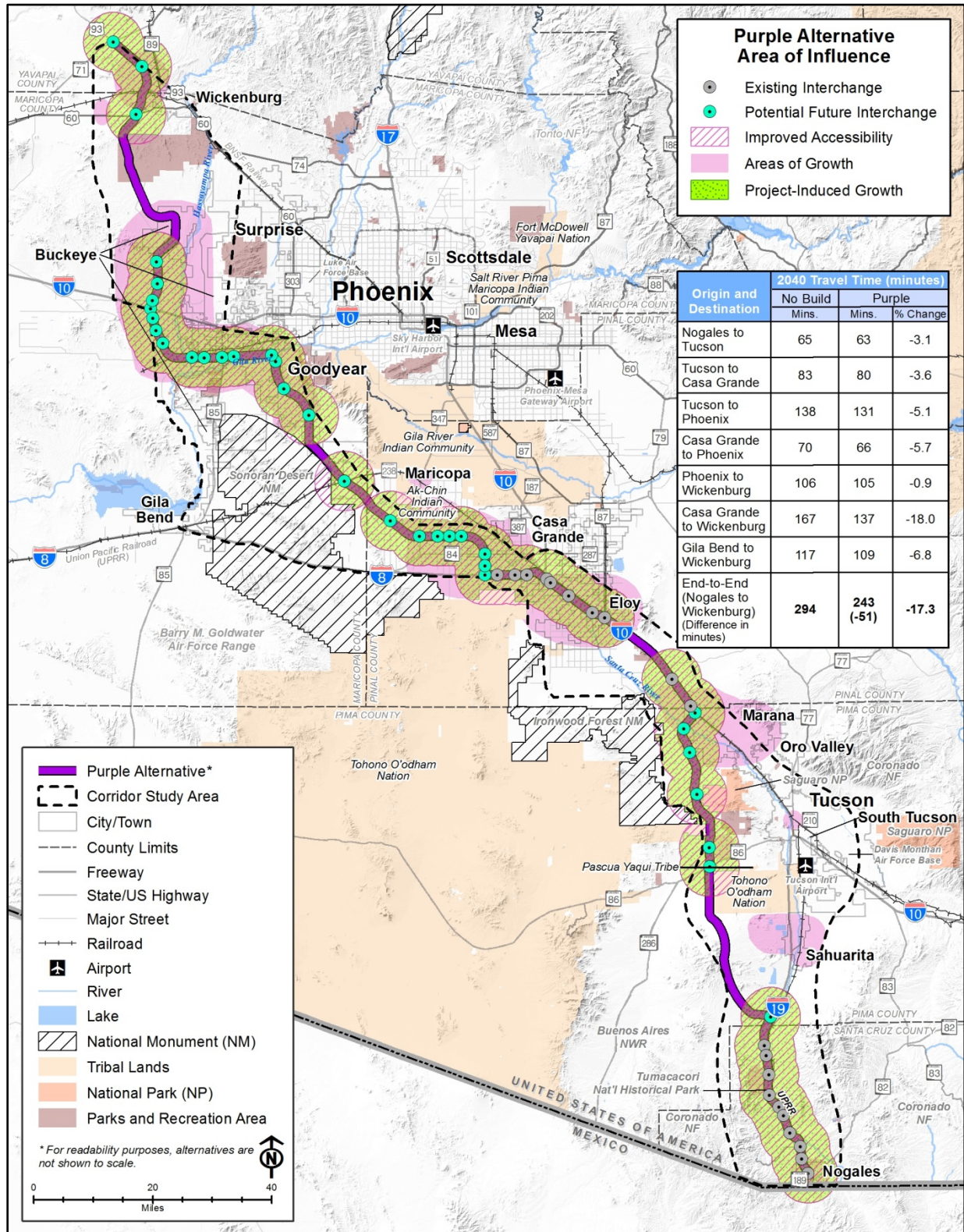


Figure 3.17-1 Purple Alternative Area of Influence

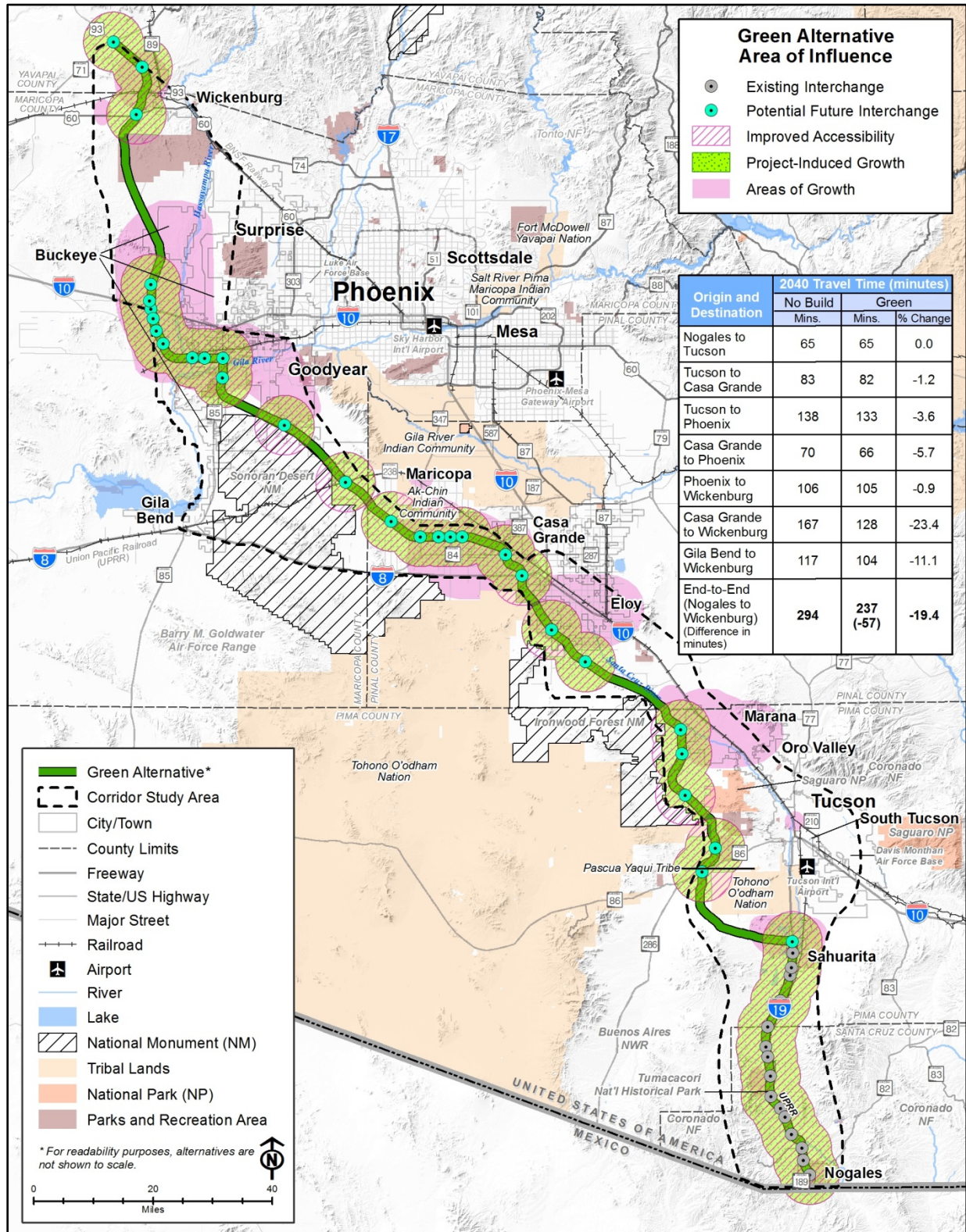


Figure 3.17-2 Green Alternative Area of Influence

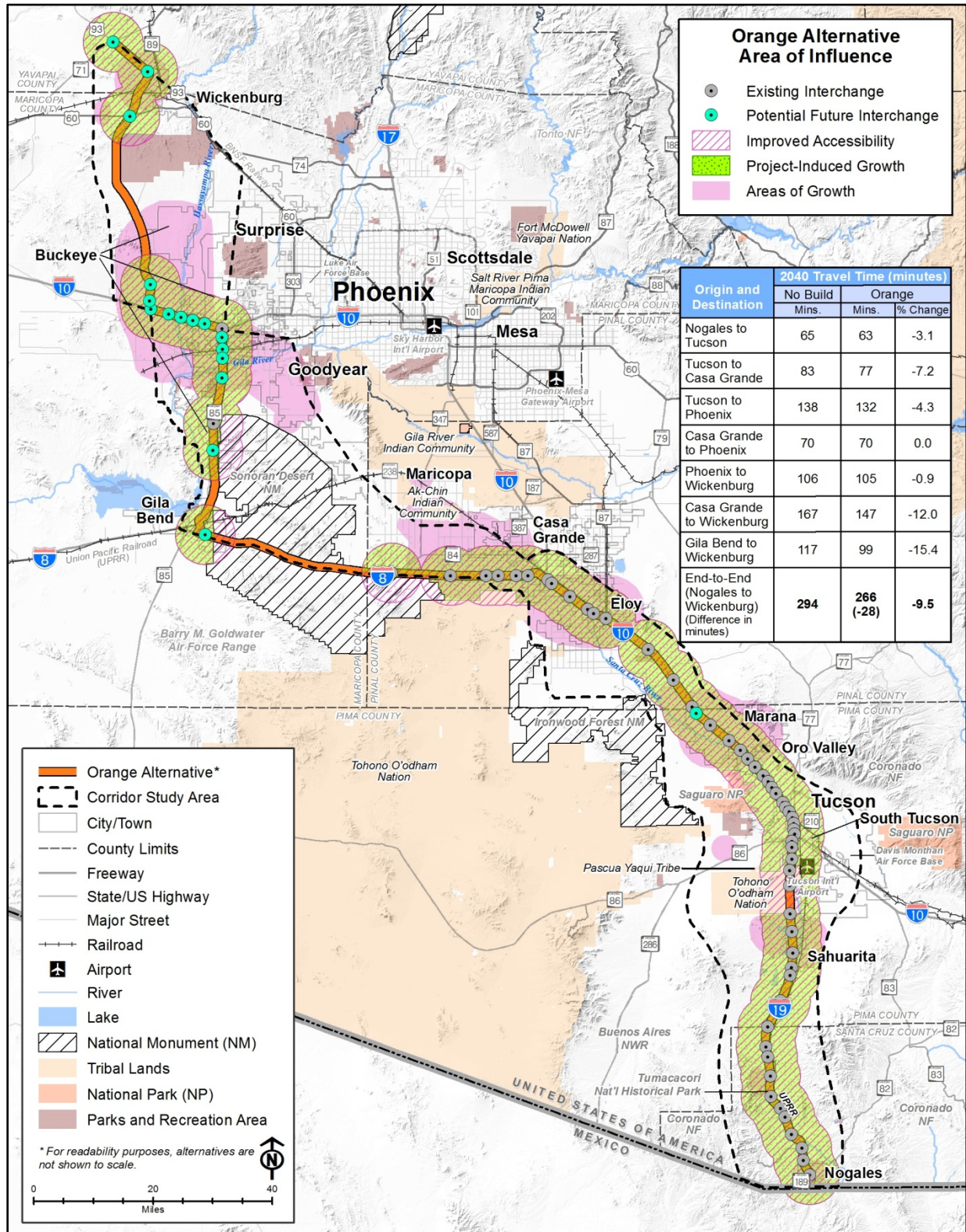


Figure 3.17-3 Orange Alternative Area of Influence



3.17.2.2 Cumulative Effects

To assess the potential for cumulative effects, the Project Team completed the following steps.

- *Established a temporal scope for the cumulative impact assessment.* The timeframe established for the cumulative impact analysis extends between 1950 and 2040, to correspond with adopted demographic data utilized in the Arizona Model. The year of 1950 was the beginning of the interstate era with the construction of I-10 starting in 1956, the construction of the first section of I-8 completed in 1959, and the opening of the Colorado River Bridge, which completed I-8, in 1979. The first section of I-19 opened to vehicular traffic in 1966 with its last section opening in 1979. Therefore, 1950 was selected as the temporal starting point for analyses as it captures the travel and development patterns associated with the construction of the Interstate System in the State of Arizona.
- *Established a geographic scope for the cumulative impact assessment.* The geographic Cumulative Effects Study Area (CESA) varies by resource and is as large as the area of direct and indirect effects. The CESAs are established to encompass an area that includes past, present, and reasonably foreseeable actions that have or may contribute to the trend in the health of the resource. The CESA takes into account watersheds, ecosystems, geopolitical boundaries, and other large-scale areas—such as wildlife movement corridors—that have the potential to be directly or indirectly affected by the project.
- *Determined other actions – past, present, and reasonably foreseeable – and their effect on each resource.* Future actions were identified out to 2040 and beyond, if possible. Reasonably foreseeable actions were identified by review of resource sections; professional knowledge; review of studies and plans that are readily available; and input from the Cooperating and Participating Agencies. Additionally, information was gleaned from a series of interviews held in August and September 2017 with municipalities, counties, and Tribes to bolster the understanding of reasonably foreseeable actions (see **Appendix E6**). The objective of the interviews was to identify changes in development, economic patterns, and other actions that local, state, and federal agencies are considering in response to the direct effects that could result from I-11 and due to agency's planned projects independent of I-11.

3.17.3 Affected Environment: Past, Present, and Reasonably Foreseeable Future Actions

Following World War II, Arizona's population and road construction began to grow. By 1950, the state's population was 750,000, an increase of 50 percent since 1940. By 1960, the population had grown to 1.3 million, and by 1970, the population was 1.8 million. Most new residents settled in the Phoenix and Tucson areas (ADOT 2011). The increased population growth led to an increase in the number of automobiles within the state, and in 1945 there were 154,000 motor vehicles in Arizona. By 1959, the number had risen to 649,000 vehicles and by 1974 there were 1.7 million (ADOT 2011).

During the late 1940s and 1950s, Arizona began to overhaul its state highway system, rebuilding routes such as United States (US) 60 and US 66. The Federal Aid Highway Act of 1956 appropriated \$25 billion to build the National System of Interstate and Defense Highways, and authorized funding construction on a pay-as-you-go basis. Arizona's interstate routes were designed to replace existing highways: Interstate 40 replaced US 66; I-10 replaced parts of US 80 and US 60; I-8 replaced the remainder of US 80; I-19 replaced US 89 from Nogales to Tucson; and I-17 replaced State Route (SR) 69 and SR 79 between Phoenix and Flagstaff (ADOT 2011).



Policies established by the Bureau of Public Roads (predecessor to FHWA) required the alignments to be located away from existing highways. The Bureau of Public Roads established this policy to secure the rights-of-way (ROWs) needed to build wider and straighter roads and to establish the most direct routes between Arizona's most important cities and towns. One of the more controversial projects was I-10. Instead of following US 60 from Phoenix through Wickenburg and Aguila, a more direct route west of Phoenix was constructed, which was known as the Brenda Cutoff. I-10 also encountered opposition to their proposal for a new alignment through Pinal County. Instead of passing through Casa Grande and Coolidge, as US 80 then did, the new I-10 followed a more direct route midway between the two towns. Local farmers opposed this route because the new alignment angled across their cotton and alfalfa fields and cut their properties into triangular parcels (ADOT 2011).

By 1967, just under half of the state's total interstate mileage was open to traffic, with almost all of the remaining mileage either under construction or being designed. By 1972, the interstate system was 79 percent complete. In 1978, Arizona completed I-8 between Yuma and its intersection with I-10 (ADOT 2011). Construction of these interstates supported population growth and development.

Agricultural development in Arizona is concentrated along major river systems, resulting in population and land use increases in Pima, Pinal, and Maricopa counties, with concentrations around established towns and cities, such as Tucson, Casa Grande, Buckeye, and Goodyear. Irrigation canal systems, including Salt River Project, Central Arizona Project (CAP), and San Carlos Irrigation Project, maximized agricultural production in Maricopa and Pinal counties, while public lands beyond these cultivated areas were leased as grazing allotments, explored for profitable mining resources, or sold for private development.

Increasing urbanization has resulted in cities like Casa Grande, Buckeye, and Goodyear extending their incorporated boundaries in anticipation of future residential and commercial development. Construction projects have occurred on public lands that surround urban areas, such as solar plant development, road and highway construction, and flood control structures, while preservation of large areas as city or regional parks and recreation areas has provided a measure of protection for intact cultural resources that might otherwise have been destroyed by development.

To assess the potential for cumulative effects to the resource areas, trends in the status of the resources were reviewed since the 1950s. Each resource was evaluated and an assessment of whether the alternatives may affect trends when combined with other past, present, and reasonably foreseeable actions was completed. Past, present, and reasonably foreseeable future actions that were considered are provided in **Table 3.17-1** (Summary of Past and Present Actions), **Table 3.17-2** (Reasonably Foreseeable Future Actions), and **Figure 3.17-4** (Reasonably Foreseeable Future Actions).

3.17.4 Environmental Consequences: Indirect and Cumulative Effects

This section discusses the potential indirect and cumulative effects for the No Build and Build Corridor Alternatives. Section 3.17.4.1 addresses transportation and land use, and Section 3.17.4.2 addresses the remaining resource topics.

Table 3.17-1 Summary of Past and Present Actions

Action/Project	Description	Location
Past and Present Actions		
Community and Population Growth	Population growth within the Study Area has led to land use changes over the last century, expanding urban development and the associated demand for services. Within the Maricopa County portion of the Study Area, population and employment is projected to more than triple, increasing by 259 percent and 248 percent from 2015 to 2040, respectively. During that same time period, similar high growth rates also are forecasted for employment within the Pinal County portion of the Study Area at 234 percent. Pima County would have growth in both population and employment at 25 percent and 38 percent, respectively (ADOT 2017).	Arizona statewide
Tribal Lands	The Gila River Indian Community was established in 1859; the Tohono O'odham Nation was established in 1874; the Salt River Pima-Maricopa Indian Community in 1879; the Ak-Chin Indian Community in 1912; and the Pascua Yaqui Tribe in 1978 (Arizona Geographic Alliance 2014).	Arizona statewide
Southern Pacific Railroad; now Union Pacific Railroad (UPRR)	The Southern Pacific Railroad was extended from Yuma to Tucson in 1880; the line between Tucson and Phoenix was established in the late 1800s. In 1996, the Southern Pacific Railroad merged with the UPRR. In 2016, UPRR employed 1,126 persons in Arizona, with 13,800 rail cars originating and more than 82,650 rail cars terminating in Arizona (UPRR 2017). UPRR recently double-tracked several segments of the Sunset Corridor (UPRR mainline across the southern US) in Arizona and completed plans to double-track the remaining segments for near-term completion. The Nogales Subdivision links with the Sunset Route through a direct connection into the Tucson Yard. Pending the construction of the UPRR Red Rock classification yard, a connection between the Nogales Subdivision and UPRR Sunset Route would permit direct traffic flow between Nogales and Red Rock, avoiding the Tucson Yard and increasing capacity.	Rail facilities owned by UPRR parallel I-19 and I-10 from Nogales to the vicinity of the I-8/I-10 junction, then crosses I-10 and extends west to California, generally parallel and located in close proximity to I-8.
Burlington Northern Santa Fe Railroad (BNSF)	The BNSF Phoenix Subdivision branch line (i.e., Peavine Line) parallels Grand Avenue/US 60 in the Phoenix metropolitan area and passes through Wickenburg. The Forepaugh Industrial Rail Park is located in Wickenburg, adjacent to the BNSF rail line and currently consists of 76 acres with plans for an expansion to over 700 acres.	Maricopa County

Table 3.17-1 Summary of Past and Present Actions (Continued)

Action/Project	Description	Location
Central Arizona Project (CAP) canal	The CAP canal was constructed between 1973 and 1993 to bring water from Lake Havasu on the Colorado River over a distance of 336 miles to Tucson. It is a major potable water supply source for all of south central Arizona.	South and Central Arizona
Palo Verde Nuclear Power Plant	The Palo Verde Nuclear Power Plant went into commercial operation in 1986 and became fully operational in 1988. It is a major source of electric power, generating approximately 4,000 megawatt (MW) annually for the Tucson, Phoenix, Los Angeles, and San Diego metropolitan areas. Various transmission lines extend from the power plant as well as from other power generation facilities, including Roosevelt Dam located east of Phoenix.	Maricopa County
Agricultural Production	<p>Arizona data from the Census of Agriculture indicate that the quantity of land in cultivation grew in the early 1900s, peaked in the mid-1950s, and then gradually declined. Approximately 14 million acres of Arizona land was in cultivation in 1935. In 1954 the figure approached 42 million acres, but dropped to about 38 million acres by 1969, 36 million acres in 1987 (US Department of Agriculture [USDA] 2014), and 25.9 million in 2016 (USDA 2017).</p> <p>While the amount of land in agricultural cultivation has been declining from historic levels, agricultural production remains an important component of land use in the Study Area. The 2012 Census of Agriculture reports that Pima County had 855 farms with acreage of land in cultivation not disclosed; Pinal County had 938 farms and 1,174,727 acres of land in cultivation; and Maricopa County had 2,479 farms and 475,898 acres of land in cultivation (USDA 2012). While county statistics are not necessarily a reflection of the Build Corridor Alternatives, the corridors intersect with land in agricultural production in each county. However, the majority of the farmland crossed by the Corridor Options is in Pinal County.</p>	Arizona statewide
Rangeland/Grazing Allotments	Ranching has been a historic land use in Arizona and grazing allotments remain active within the Study Area, particularly in Pinal County.	Arizona statewide
Proving Grounds	Proving grounds in the Study Area include Toyota, Nissan, Ford, and Volkswagen.	South and Central Arizona
Mining Operations	<p>Mines within the Study Area include Sierrita Mine (open-pit copper), Mission Mine (open-pit copper), Silver Bell Mine (open-pit copper), and Rillito Mine (cement).</p> <p>Vulture Mine is located in Maricopa County.</p>	<p>Pima County</p> <p>Maricopa County</p>

Table 3.17-1 Summary of Past and Present Actions (Continued)

Action/Project	Description	Location
State Highway and Road System	The major transportation features in the Study Area include I-8, I-10, I-19, US 60, US 93, SR 77, SR 79, SR 84, SR 85, SR 86, SR 87, SR 189, SR 210, SR 238, SR 287, SR 347, and SR 387. The metropolitan areas of Tucson and Phoenix also have a system of major and minor arterial streets contributing to the transportation system.	South and Central Arizona
Urban and Rural Development	Approximately 20 to 25 percent of the Build Corridor Alternatives pass through developed areas, including residential, industrial, and commercial/business land uses. Emerging economic centers throughout the corridor include, but are not limited to: Forepaugh Industrial Railpark in Wickenburg, Casa Grande Commerce Park, UPRR Red Rock Classification, Sonoran Corridor Economic Development region, and Mariposa International Commerce/Industry Park in Nogales.	Study Area
Port of Tucson	An intermodal freight facility fulfilling both domestic and international shipments along I-10 and the UPRR Sunset Corridor east of Tucson.	City of Tucson
Downtown Tucson	Primary employment center in the Tucson metropolitan area, located along I-10 north of the I-10/I-19 junction, includes a mix of employment types, including office, commercial, institutional, and industrial, combined with residential and other mixed uses.	City of Tucson
San Carlos Irrigation Project (SCIP)	The SCIP was authorized by an act of Congress in 1924. It is managed by the Bureau of Indian Affairs and was established to provide irrigation and electricity on the San Carlos Apache Tribe, Gila River Indian Community, and certain lands adjacent to the reservation. SCIP provides service to approximately 2,400 square miles in Pinal County and parts of Pima, Maricopa, Graham, and Gila counties. The customer base is primarily agricultural and rural.	Pinal County
Solar Energy Projects	A number of solar projects have been considered in western Maricopa County. Several have been built; examples of larger projects include: Arlington Valley Solar Energy – 125 MW on 1,433-acre site; Arlington Valley Solar Energy II – 125 MW on 1,160-acre site; and Solana Generating Station in Gila Bend – 280 MW on 1,920-acre site. Other examples include photovoltaic facilities in Marana, Avra Valley, and Picture Rocks; Red Rock Power Plant, and Saguaro Power Plant.	Study Area

Table 3.17-1 Summary of Past and Present Actions (Continued)

Action/Project	Description	Location
National Monuments and other Open Space Preservation	The Ironwood Forest National Monument was established in 2000 (Encyclopedia Britannica 2017) and was quickly followed by the designation in 2001 of the Sonoran Desert National Monument (The American Southwest 2017). Other parks and dedicated open space have designated throughout the Study Area. Key parks are shown and labeled on Figure 3.17-4 , and are discussed in more detail in Section 3.4.	Maricopa, Pima, and Pinal counties
Mariposa Land Port of Entry (LPOE) Expansion and Modernization	The LPOE, accessible via SR 189, was reconstructed to improve efficiency and security by increasing the number of lanes and pedestrian walkways. The new LPOE facilities opened in 2014 and are able to process 4,000 trucks per day and have an additional 12 car lanes and a bus lane (Greater Nogales Santa Cruz County Port Authority 2017). Mariposa is the country's fourth busiest land port. All commercial traffic entering the US at Nogales enters through the LPOE.	Santa Cruz County

NOTES: BNSF = BNSF Railway, CAP = Central Arizona Project, I-8 = Interstate 8, I-10 = Interstate 10, I-19 = Interstate 19, LPOE = Land Port of Entry, MW = megawatts, SCIP = San Carlos Irrigation Project, SR = State Route, UPRR = Union Pacific Railroad, US = United States.

Table 3.17-2 Reasonably Foreseeable Future Actions

Reasonably Foreseeable Future Actions/Projects				
#	Project Type	Project Name	Description	Location
1	Transportation	US 93 Tegner Drive to SR 89	Widen existing transportation facility from two to four lanes.	Town of Wickenburg
2	Industrial Park	Forepaugh Industrial Rail Park	A 76-acre industrial park approximately 10 miles west of Wickenburg that is planned for over 700 acres of light and heavy industrial uses and would serve as a transportation distribution center.	Town of Wickenburg
3	Master Planned Communities (MPCs)	Various	<p>Numerous MPCs are located within the Study Area and are in various stages of planning (e.g., concept design, platting, or construction). Many of these plans have been in place for nearly 10 years, evolving with the regional economy post-Great Recession, while new community development initiatives continue to arise on a frequent basis. Creating a comprehensive and up-to-date list is not realistic, as it will only reflect one snapshot in time during this study. The majority of large-scale MPCs are located in Buckeye, Casa Grande, Goodyear, and unincorporated Maricopa County, with hundreds of smaller developments throughout the Study Area. An illustrative list of major MPCs within the Study Area includes:</p> <ul style="list-style-type: none"> ▪ Douglas Ranch – 33,800 Acres (City of Buckeye) ▪ Belmont – 25,000 Acres (Maricopa County) ▪ Estrella – 25,000 Acres (City of Goodyear) <p>The Draft Tier 1 EIS analysis is based on current adopted land use plans in the local jurisdictions, which reflect planned developments, as well as input from local jurisdictions and other stakeholders on the status of major MPCs.</p>	South and Central Arizona
4	Industrial	Nikola Motor Company facility	Nikola Motor Company, the maker of zero-emissions commercial trucks, will establish operations in Coolidge. The investment will include a \$1-billion capital investment, with 4,000 construction jobs and an additional 2000 permanent jobs.	City of Coolidge

Table 3.17-2 Reasonably Foreseeable Future Actions (Continued)

Reasonably Foreseeable Future Actions/Projects				
#	Project Type	Project Name	Description	Location
5	Industrial	Buckeye Industrial Corridor	More than 16 miles of industrial and business park property supporting both domestic and international business, oriented around the Buckeye Municipal Airport.	City of Buckeye
6	New Transportation Facility*	SR 30/Tres Rios Corridor	Formerly SR 801, also known as the I-10 Reliever, is a planned high capacity roadway in the southwest portion of the City of Phoenix and the southwest metropolitan suburbs. Maricopa Association of Governments (MAG) has included interim construction of SR 30/Tres Rios Corridor as a Group 1 (Fiscal Year 2018-2022) project.	Maricopa County
7	Solar	Mesquite Solar	The Mesquite Solar project is a photovoltaic power plant being built in Arlington, Maricopa County, owned by Sempra Generation. Phase 1 has a nameplate capacity of 150 MW. The project has a planned capacity of up to 700 MW when completed.	Maricopa County
8	New Transportation Facility*	Loop 202-South Mountain Freeway	ADOT is currently constructing the South Mountain Freeway project to complete the Loop 202 highway system with a 22-mile freeway running east and west along Pecos Road and then turning north between 55th and 63rd avenues, connecting with I-10 on each end. As of 2018, this project is under construction and will open in late 2019.	Maricopa County
9	New Transportation Facility	Passenger Rail Corridor	The Federal Railroad Administration (FRA) completed a Tier 1 EIS and issued a Record of Decision for this intercity passenger rail corridor in 2016 connecting the Phoenix and Tucson metropolitan areas.	Maricopa, Pinal, and Pima counties

Table 3.17-2 Reasonably Foreseeable Future Actions (Continued)

Reasonably Foreseeable Future Actions/Projects				
#	Project Type	Project Name	Description	Location
10	New Transportation Facility*	SR 303L Extension/Loop 303 Spur	The Loop 303 would extend south of the interchange with I-10 in Goodyear to the planned SR 30/Tres Rios Corridor. MAG has included SR 303L from I-10 to SR 30/Tres Rios Corridor as a Group 1 (Fiscal Year 2018-2022) project. Its ultimate terminus is planned at the Riggs Road alignment; however, the current MAG Regional Transportation Plan only provides for ROW preservation between SR 30/Tres Rios Corridor and Riggs Road. MAG's Hidden Valley Regional Transportation Framework Study, which includes the 303-spur concept, also assumes the presence of an I-11 Corridor to further connect the network.	Maricopa County
11	Solar	Sonoran Solar Project	Sonoran Solar Energy proposed to construct and operate a 3,700-acre solar power plant and ancillary facilities located on land administered by the Bureau of Land Management (BLM). The proposed project would be located in the Little Rainbow Valley, east of SR 85 and south of the Buckeye Hills and the City of Buckeye (Sonoran Solar Energy, LLC 2011).	Maricopa County
12	New Transportation Facility	Sonoran Valley Parkway	A two- to six-lane parkway in Goodyear, Arizona that would originate on Rainbow Valley Road and Riggs Road at the southern end of Goodyear and proceeds southeast to intersect with SR 238 in Mobile, Arizona. The Record of Decision is expected in 2018. The project is contingent upon pace of development and according to City of Goodyear, staff will require developer involvement.	City of Goodyear
13	New Transportation Facility	North-South Corridor Study Tier 1 EIS	This highway study in Pinal County would improve regional connectivity, provide an additional way of getting around a growing area of the Sun Corridor (merging metropolitan areas between Tucson and Phoenix), and address current and future transportation needs in a growing area. A Tier 1 EIS was initiated in 2016, and is planned for completion in 2019. The project scope incorporates the extension of SR 24 from Ironwood Drive to the North-South Corridor.	Pinal County

Table 3.17-2 Reasonably Foreseeable Future Actions (Continued)

Reasonably Foreseeable Future Actions/Projects				
#	Project Type	Project Name	Description	Location
14	Irrigation and Power	San Carlos Irrigation Project (SCIP)	Under the Arizona Water Settlement Act, Bureau of Reclamation (Reclamation) is lead agency undertaking a large rehabilitation project for the SCIP irrigation system.	Pinal County
15	New Transportation Facility	Pinal County East-West Corridor West Pinal Freeway	The purpose of this corridor is to improve the mobility and connectivity of the Pinal County regional transportation networks by providing a new, high-capacity facility that can handle the projected east-west travel demand from SR 347 to I-10. A Design Concept Report was completed in December 2015. The Pinal Transportation Plan revised in May 2016 incorporates the West Pinal Freeway.	Pinal County
16	Industrial	Casa Grande Airport Industrial Park	The Casa Grande Airport Industrial Park (SR 387 between Val Vista and McCartney Road) and the City of Casa Grande are considering zoning industrial all the way to I-8 between Burris and Thornton Road.	City of Casa Grande
17	Activity Center	Lucid	New 500-acre development featuring auto manufacturing at the southwest corner of Peters and Thornton roads. Expected to generate 2,200 jobs over the next 7 years.	City of Casa Grande
18	Activity Center	Phoenix Mart	Mixed-use development and proposed global trade center in Casa Grande that would be an international exposition center similar to the Merchandise Mart in Chicago, with numerous business and showroom suites as well as facilities to conduct major events.	City of Casa Grande
19	Activity Center	Casa Grande Commerce Park	Employment area consisting of nearly 600 acres.	City of Casa Grande
20	Activity Center	Attesa	Motorsports raceway, research and development center, and automotive services that will occupy 2,500 acres and provide 15,000 jobs at build out. Located south of I-8 between Montgomery and Bianca roads.	City of Casa Grande
22	Activity Center	Coolidge Inland Port/Logistics Zone	A planned 1,600-acre inland port on the eastern edge of the proposed North-South Freeway.	City of Coolidge

Table 3.17-2 Reasonably Foreseeable Future Actions (Continued)

Reasonably Foreseeable Future Actions/Projects				
#	Project Type	Project Name	Description	Location
23	Improvement to Existing Transportation Facility**	I-10 Corridor Study: Junction I-8 to Tangerine Road	<p>This corridor study recommended providing a 10-lane divided interstate highway with continuous parallel one-way frontage roads and reconstructed and/or relocated Traffic Interchanges (Tis) along I-10 between Earley Road (milepost 196) and Tangerine Road (milepost 240). A Finding of No Significant Impact based on the Final Environmental Assessment and Section 4(f) Evaluation for the project was signed in December 2010.</p> <p>Some segments along these limits have already been widened to three lanes in each direction from the existing two lanes. Work on a widening project to realign the highway and add one general-purpose lane in each direction between Sunshine Boulevard (milepost 209.59) and Picacho Highway (milepost 213) is currently under construction. The SR 87 TI also will be reconstructed.</p>	Pinal and Pima counties
24	Solar	Picacho Solar Project	Proposed 400-MW solar facility on a 2,726-acre site of State Trust land east of Picacho Peak.	Pinal County
25	Industrial	UPRR Red Rock Classification Yard	UPRR submitted an application to purchase approximately 1,873 acres of land adjacent to I-10 from the Arizona State Land Department (ASLD) to construct a classification yard where rail cars would be separated and classified and trains assembled to improve operations efficiency.	Pinal County
26	Activity Center	Transportation Logistics Zone	Area encompassing the Pinal Airpark, I-10, and planned rail system improvements.	Pinal County
27	Activity Center	Tangerine Road Corridor	Planned activity center targeted for high-tech business park development, with surrounding residential, commercial, and mixed-use development.	Pima County
28	Improvement to Existing Transportation Facility*	I-10	I-10 widening (six lanes to eight lanes) from Prince Road to Ina Road.	Pima County

Table 3.17-2 Reasonably Foreseeable Future Actions (Continued)

Reasonably Foreseeable Future Actions/Projects				
#	Project Type	Project Name	Description	Location
29	Improvement to Existing Transportation Facility*	I-10/Ina Road TI	Operational improvements including reconstruction of a TI and constructing railroad overpass. Currently under construction with planned completion in 2018.	Pima County
30	Improvement to Existing Transportation Facility*	I-10/Ruthrauff TI	Improve TI at I-10 and Ruthrauff Road.	Pima County
31	Activity Center	Ryan Airfield	Major improvements are underway at Ryan Airfield including hooking up to county sewer, Valencia Road improvements, and construction to remove land from the designated floodplain along with Federal Emergency Management Administration (FEMA) map revisions to position Ryan Airfield for future development. The amount of commercial and industrial land available is 1,800 acres. They have planned a flight campus and are looking at commercial development along Valencia Road. Pima County has identified this area as a major employment hub in Pima Prospers, its comprehensive plan.	Pima County
32	New Transportation Facility	I-10/SR 210 Improvements	Improvements to SR 210 and I-10 east of I-19. An Environmental Assessment is in preparation in 2018 to consider capacity improvements in this area.	City of Tucson
33	Improvement to Existing Transportation Facility*	I-19/Ajo Highway (SR 86) TI	Reconstructed TI on Ajo Highway (SR 86) is currently under construction with a planned completion in 2018.	Pima County

Table 3.17-2 Reasonably Foreseeable Future Actions (Continued)

Reasonably Foreseeable Future Actions/Projects				
#	Project Type	Project Name	Description	Location
34	Improvement to Existing Transportation Facility	I-19, San Xavier Road to I-10	This 2012 study recommended widening I-19 to four lanes in each direction between San Xavier Road (milepost 56.3) and milepost 63.0. Many traffic interchanges and ramps within those limits also were recommended to be reconstructed. Some recommendations from this study have been constructed and are moving forward, including reconstruction of the interchange at Ajo Highway (SR 86) (detailed above).	Pima County
35	Improvement to Existing Transportation Facility	Ajo Highway (SR 86) reconstruction: Valencia Road to Kinney Road	Approximately 7-mile section of Ajo Highway (SR 86) is currently under construction from west of Valencia Road near Ryan Airfield to just east of Kinney Road with planned completion in 2018.	Pima County
36	New Transportation Facility	Sonoran Corridor	ADOT initiated a Tier 1 EIS in 2017 for the Sonoran Corridor, a potential new transportation corridor that would connect I-19 and I-10 south of the Tucson International Airport.	Pima County
37	Industrial	Sonoran Corridor economic development	Planned 50-square mile import/export logistics hub area that includes aviation and defense-related uses (e.g., Raytheon Missile Systems, Davis-Monthan Air Force Base, Tucson International Airport, University of Arizona Tech Park).	Pima County
38	Activity Center	Sahuarita Farms	A mixed-use development totaling approximately 5,592 acres including 3,416 acres of residential development with 16,605 housing units; 1,438 acres of employment development; 531 acres of mixed-use development; and 207 acres of open space.	Town of Sahuarita
39	Improvement to Existing Transportation Facility	SR 189	An approximately 4-mile-long, north-south, four-lane major arterial through Nogales beginning at the Nogales-Mariposa LPOE to the south and ending at Grand Avenue to the north. The Finding of No Significant Impact is complete for these improvements and ADOT is considering implementation. It serves at the connection with the southern terminus of the corridor.	Santa Cruz County

Table 3.17-2 Reasonably Foreseeable Future Actions (Continued)

Reasonably Foreseeable Future Actions/Projects				
#	Project Type	Project Name	Description	Location
NA	Transportation (General)	Planned transportation network	The Regional Transportation Plans adopted throughout the Study Area are considered as the planned transportation network.	Study Area

NOTES: EIS = Environmental Impact Statement, I-8 = Interstate 8, I-10 = Interstate 10, I-19 = Interstate 19, LPOE = Land Port of Entry, MAG = Maricopa Association of Governments, MPCs = Master-Planned Communities, MW = megawatt, ROW = right-of-way, SCIP = San Carlos Irrigation Project, SR = State Route, TI = traffic interchange, UPRR = Union Pacific Railroad, US = United States

* Included in Statewide Travel Demand Model (ADOT 2017).

** The additional new travel lanes identified in the ADOT 2017-2021 Five-Year Transportation Facilities Construction Program included: I-10: Earley Road to Jct I-8 – widen to 6 lanes and I-10: SR 87 to Town of Picacho – widen to 6 lanes. For these segments where the widening is identified, we updated the highway network to reflect three lanes in each direction instead of the two lanes in each direction that existed in 2015.

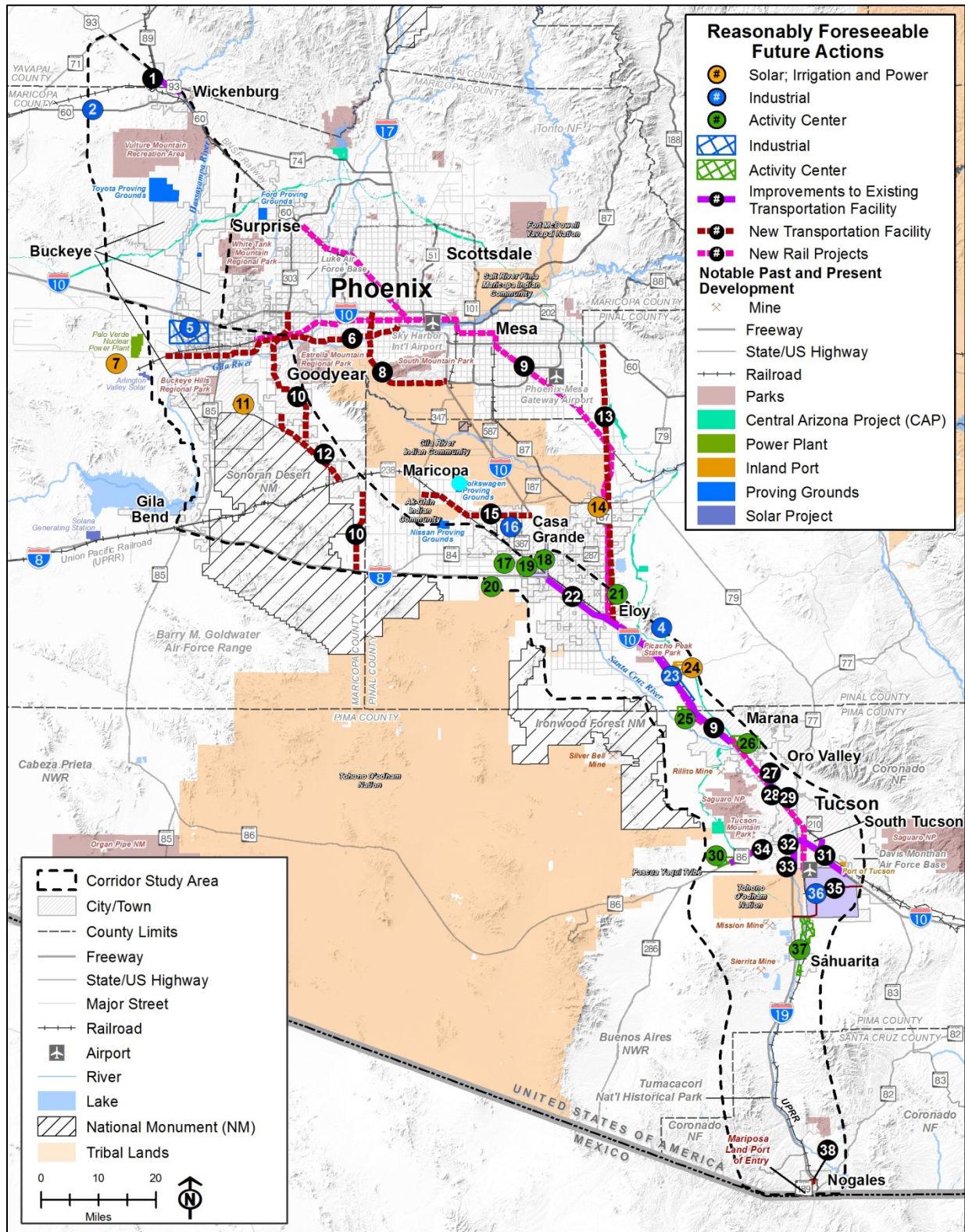


Figure 3.17-4 Reasonably Foreseeable Future Actions



3.17.4.1 Transportation and Land Use Indirect Effects

As described in Section 3.17.2.1, indirect effects to transportation and land use were considered by identifying potential changes to travel times and travel patterns resulting from the construction of I-11, which could influence the type and pace of land use change, as well as growth. The AOI for land use was defined as a 0.25-mile to 0.5-mile radius around potential interchange locations (see **Figures 3.17-1** through **3.17-3**) and properties generally within a quarter mile buffer along the Build Corridor Alternatives. Beyond that buffer but generally within a 5- to 10-minute drive there may be additional development as larger parcels become available. Induced development could include logistics parks, master-planned employment or industrial centers, or MPCs. It is anticipated that improved or new access could expedite the rate of development as well as the types of land uses. The density of development also might increase due to accessibility and improved travel times.

No Build Alternative

Under the No Build Alternative, travel demand is projected to increase and would be addressed on the existing and programmed transportation network. This is forecasted to result in reduced levels of service, particularly in the metropolitan areas (see Section 3.2).

Under the No Build Alternative, land uses would continue along current trajectories, with continued growth and development along existing transportation corridors. Planned developments are present in western Maricopa County (particularly Buckeye and Goodyear) and in the Casa Grande area. The pace of development and subsequent change in land use patterns would be guided by market forces and availability of public services. No indirect effects to land uses are anticipated.

Build Corridor Alternatives

Under all Build Corridor Alternatives, the construction of a new transportation facility could affect the type or pace of land use change in areas that are currently undeveloped. The introduction of new access could trigger or accelerate the development of land that would be better connected to employment and services; result in the development of commercial services that serve long-distance travel; or promote development of new industrial, manufacturing, or other businesses that value close access to high-capacity transportation. As noted previously, the Tier 1 analysis assumes the interchange locations included in the Arizona Model, which are based on current regional transportation plan networks that would warrant connections to a new high capacity transportation facility. In the future, additional or different potential interchange locations could be identified based on land use patterns, growth, and specific access needs.

Purple Alternative

In general, land around proposed new interchanges and areas with increased accessibility would be expected to experience changes in land uses as well as the rate of development in comparison to the No Build Alternative. Employment (business park, freestanding office, industrial); commercial (convenience retail/filling stations, convenience food service, community shopping centers, regional shopping centers); and mid- to high-density residential type uses are likely in urban locations. Warehousing/distribution, convenience retail/filling stations, and convenience food service type uses are likely in rural locations. Key considerations for indirect effects on transportation and land use are summarized below.



South Section

- The Purple Alternative provides direct mobility benefits by diverting traffic from congested areas along existing highways, improving travel times for longer trips by avoiding those congested areas, and providing an alternate route to I-10 in some areas.
- Includes seven potential interchanges in generally rural areas: land around new interchanges is likely to experience changes due to creation of major transportation nodes. Employment (warehousing/ distribution, light industrial) and commercial (convenience retail/filling stations, convenient food service) type uses are likely in these rural locations.
- Includes 18 existing interchanges: these locations could experience additional land use activity due to an increase in traffic related to I-11.
- Developable land around new potential interchange locations in the South Section is mostly planned for residential. Development in the South Section is limited by the presence of National and local parks, National Monuments, and Tribal land, as well as Tucson Water's CAVSARP and SAVSARP facilities.
- Locations along the I-11 Corridor Options within incorporated jurisdictions such as Nogales, Marana, and Eloy are more likely to experience land use change compared to others, based on access to existing utilities/services (water/sanitary sewer/storm drainage/private utilities).

Central Section

- The Purple Alternative provides direct mobility benefits by diverting traffic from congested areas, improving travel times for longer trips by providing a more direct route through the Central Section, and providing an alternate route to I-10.
- Includes 20 new potential interchanges: land around new interchanges is most likely to see changes due to creation of major transportation nodes. Employment (business park, freestanding office, industrial); commercial (convenience retail/filling stations, convenience food service, community shopping centers, regional shopping centers); and mid- to high-density residential are likely in urban locations. Warehousing/distribution, convenience retail/filling stations and convenience food service type uses are likely in rural locations.
- The majority of planned land uses throughout the Central Section are categorized as open space/recreation with clusters of residential and commercial activity centers located within master-planned communities closer to Goodyear and I-10.
- Although this part of the corridor could attract trips away from the existing network, large parts of the area are not subject to development, including the Sonoran Desert National Monument and protected areas along the Gila River.
- Locations along the I-11 Corridor Options within incorporated jurisdictions such as Casa Grande, Goodyear, and Buckeye are more likely to experience land use change compared to others, based on access to existing utilities/services (water/sanitary sewer/storm drainage/private utilities).

North Section

- The Purple Alternative in the North Section provides direct mobility benefits by improving access to an area that is planned for development by local jurisdictions but contains no north-south connectivity today, improving travel times by providing a more direct and continuous high-capacity route through the North Section.



- Includes four new potential interchanges: land around new interchanges is most likely to see changes due to creation of major transportation nodes. Employment (business park, freestanding office, industrial); commercial (convenience retail/filling stations, convenience food service, community shopping centers, regional shopping centers); and mid- to high-density residential type uses are likely in urban locations. Warehousing/distribution, convenience retail/filling stations, and convenience food service type uses are likely in rural locations.
- The majority of planned land uses within the North Section are within master-planned communities within and near Buckeye, unincorporated Maricopa County, and Surprise, while the northern area immediately south of Wickenburg is categorized as open space/recreation due to the location of the Vulture Mountain Recreation Area (VMRA).
- Locations along the I-11 Corridor within incorporated jurisdictions such as Buckeye and Wickenburg are more likely to experience land use change compared to others, based on access to existing utilities/services (water/sanitary sewer/storm drainage/private utilities).

Green Alternative

The types of indirect effects for the Green Alternative are expected to be similar in nature to those of the Purple Alternative, although some different areas might experience effects.

South Section

- The Green Alternative provides direct mobility benefits by diverting traffic from congested areas along existing highways, improving travel times for longer trips by avoiding those congested areas, and providing an alternate route to I-10.
- Includes 10 new potential interchanges: land around new interchanges is most likely to see changes due to creation of major transportation nodes. Employment (warehousing/distribution, freestanding office, light industrial) and commercial (convenience retail/filling stations, convenient food service, community shopping centers) type uses are likely in urban locations, while warehousing/distribution, convenience/filling stations, and convenience food service uses are likely in rural locations.
- Includes 10 existing interchanges: these locations are likely to see additional land use activity due to increase in traffic related to I-11.
- Developable land around new potential interchange locations in the South Section is mostly planned for residential. Development in the South Section is limited by the presence of National and local parks, National Monuments, and Tribal land as well as Tucson CAVSARP and SAVSARP facilities.
- Locations along the I-11 Corridor within incorporated jurisdictions such as Nogales, Sahuarita, Marana, and Eloy are more likely to experience land use change compared to others, based on access to existing utilities/services (water/sanitary sewer/storm drainage/private utilities).

Central Section

- The Green Alternative in the Central Section provides direct mobility benefits by diverting traffic from congested areas, improving travel times for longer trips by providing a more direct route through the Central Section, and providing an alternate route to I-10.



- Includes 16 new potential interchanges: land around new interchanges is most likely to see changes due to creation of major transportation nodes. Employment (business park, freestanding office, corporate office, industrial); commercial (convenience retail/filling stations, convenience food service, community shopping centers, regional shopping centers); and mid- to high-density residential are likely in urban locations. Warehousing/distribution and convenience retail/filling stations and convenience food service type uses are likely in rural locations.
- The majority of planned land uses throughout the Central Section are categorized as open space/recreation with clusters of residential and commercial activity centers located in Casa Grande and Goodyear.
- Although this part of the corridor could attract trips away from the existing network, large parts of the area are not subject to development, including the Sonoran Desert National Monument and protected areas along the Gila River.
- Locations along the I-11 Corridor within incorporated jurisdictions such as Casa Grande, Goodyear, and Buckeye are more likely to experience land use change compared to others, based on access to existing utilities/services (water/sanitary sewer/storm drainage/private utilities).

North Section

- The Green Alternative in the North Section provides direct mobility benefits by improving access to an area that is planned for development by local jurisdictions, improving travel times by providing a more direct and continuous high-capacity route through the North Section.
- Includes four new potential interchanges: land around new interchanges is most likely to see changes due to creation of major transportation nodes. Employment (business park, freestanding office, corporate office, industrial); commercial (convenience retail/filling stations, convenience food service, community shopping centers, regional shopping centers); and mid-density residential type uses are likely in urban locations. Warehousing/distribution, light industrial, convenience retail/filling stations, and convenience food service type uses are likely in rural locations.
- The majority of planned land uses within the North Section are categorized as mixed use or residential within and near Buckeye, Maricopa County, and Surprise, while the northern area immediately south of Wickenburg is categorized as open space/recreation due to the location of the VMRA.
- Locations along the I-11 Corridor within incorporated jurisdictions such as Buckeye and Wickenburg are more likely to experience land use change compared to others, based on access to existing utilities/services (water/sanitary sewer/storm drainage/private utilities).

Orange Alternative

South Section

- The Orange Alternative in the South Section provides direct mobility benefits by increasing capacity in existing transportation corridors, but would not provide benefits related to incident management since it provides relatively few new lane miles in the South Section and no alternate route.



- Includes one new potential interchange: land around the new interchange is most likely to see changes due to creation of a more major transportation node.
- Includes 50 existing interchanges: these locations may experience additional land use activity due to an increase in traffic related to I-10.
- Since land uses have already developed along the I-10 Corridor within incorporated jurisdictions such as Nogales, Sahuarita, Tucson, Marana, and Eloy, improvements along the existing corridor would not be expected to cause major changes in overall land use patterns.

Central Section

- The Orange Alternative in the Central Section provides direct mobility benefits by increasing capacity in existing transportation corridors, but would not provide benefits related to incident management since it does not provide an alternate route.
- Includes 11 new potential interchanges: land around new interchanges clustered around I-10 in Maricopa County are most likely to see changes due to creation of a major transportation node where I-11 and I-10 intersect. Employment (warehousing/distribution, light industrial); commercial (convenience retail/filling stations, convenience food service, community shopping centers, regional shopping centers); and mid- to high-density residential type uses are likely in urban locations (particularly in the I-10 Corridor), while industrial/warehousing, convenience retail/filling stations, and convenience food service type uses are likely in rural locations.
- Includes four existing interchanges: these locations are likely to see additional land use activity due to increase in traffic related to I-11.
- Land around new potential interchange locations is mostly planned commercial and residential land along I-10 and the northern portion of SR 85.
- Locations along the I-11 Corridor within incorporated jurisdictions such as Casa Grande, Gila Bend, and Buckeye are more likely to experience land use change compared to others, based on access to existing utilities/services (water/sanitary sewer/storm drainage/private utilities).

North Section

- The Orange Alternative in the North Section provides direct mobility benefits by improving access to an area that is planned for development by local jurisdictions, improving travel times by providing a more direct and continuous high-capacity route through the North Section.
- Includes three new potential interchanges: land around new interchanges is most likely to see changes due to creation of major transportation nodes. Employment (business park, freestanding office, corporate office, industrial); commercial (convenience retail/filling stations, convenience food service, community shopping centers, regional shopping centers); and mid- to high-density residential type uses are likely in urban locations. Warehousing/distribution, light industrial, convenience retail/filling stations, and convenience food service type uses are likely in rural locations.
- The majority of planned land uses within the North Section are categorized as mixed use or residential within and near Buckeye and Surprise, while the northern area immediately south of Wickenburg is categorized as open space/recreation due to the location of the VMRA.



- Locations along the I-11 Corridor within incorporated jurisdictions such as Buckeye and Wickenburg are more likely to experience land use change compared to others, based on access to existing utilities/services (water/sanitary sewer/storm drainage/private utilities).

3.17.4.2 Transportation and Land Use Cumulative Effects

Transportation

The CESA for transportation is the existing and planned transportation network in the regions included in MAG, Sun Corridor Metropolitan Planning Organization, Pima Association of Governments, and Santa Cruz County. Transportation facilities (e.g., I-19, I-10, I-8, local roadways) have historically been developed to address mobility associated with urbanization and to facilitate commerce. As a result, an extensive regional highway and local road network has been developed within south and central Arizona. Potential direct effects to the transportation system were evaluated in Section 3.2, and included changes in vehicle miles traveled, travel times, level of service, safety performance, travel patterns, and incident management. The evaluations also provided a range of expected changes to freight, transit, and air travel.

In support of the transportation analysis, the Arizona Model was used to develop the travel forecasts for development and growth in the region through the year 2040. The Arizona Model covers the entire state's transportation network and has more than 6,000 Traffic Analysis Zones representing population, employment, and other socioeconomic data for different regions of the state. The traffic network used in the model includes not only facilities and services in place today, but also those transportation improvements funded and committed for implementation through 2040. Forecast socioeconomic data by traffic analysis zone account for land development and related trips expected within the forecast horizon year. Because the transportation analysis is based on accepted regional land use forecasts and assumes transportation improvements programmed within the same timeframe, transportation effects evaluated under the Build Corridor Alternatives include many of the cumulative effects of development within the region. The Arizona Model includes SR 30/Tres Rios Corridor and portions of SR 303L, which have some near-term funding in the current MAG Regional Transportation Plan.

In addition to the development projects included in the 2040 forecasts, there are other major proposed transportation projects in the CESA not included in the Arizona Model, which could contribute to additional cumulative effects not already evaluated (see **Table 3.17-2** for more information). These include:

- the Arizona Passenger Rail Corridor, an intercity rail project in Maricopa, Pinal, and Pima counties;
- the SR 303L Extension/Loop 303 Spur, extending from planned SR 30/Tres Rios Corridor south through Goodyear to I-8, west of Casa Grande;
- the Sonoran Valley Parkway, a two- to six-lane parkway in Goodyear;
- the North-South Corridor, a proposed high capacity transportation facility between US 60 in Apache Junction and I-10 near Eloy and Picacho;
- the West Pinal Freeway Corridor, a high-capacity facility to support the projected east-west travel demand from SR 347 to I-10 in Pinal County; and



- the Sonoran Corridor, a new transportation facility that would connect I-19 and I-10 south of Tucson International Airport in Pima County.

Many of these projects have not been funded and no schedule has been identified; however, once constructed the projects would provide added capacity and congestion relief to the regional transportation network. The projects would result in additional beneficial cumulative transportation effects.

No Build Alternative

Under the No Build Alternative, I-11 would not be constructed. Travel demand (including passenger cars and freight) would be accommodated on the existing and programmed transportation network, including the potential transportation projects identified above. Based on the 2040 analysis, travel demand is forecast to increase throughout the region. While many of the highway segments in the Study Area would continue to operate at acceptable levels of service with the No Build Alternative, some segments are forecast to operate poorly under the No Build Alternative, resulting in potential cumulative effects on the transportation system. Additional potential cumulative effects include reduced travel times and speeds. Cumulative increases in roadway congestion also would increase truck travel times and freight operating costs.

Build Corridor Alternatives

Based on the 2040 analysis, all the Build Corridor Alternatives would result in additional beneficial effects on the efficiency and mobility benefits provided by the transportation system. These include diversion of traffic from existing facilities because of demand for the proposed I-11 Corridor, improved travel times and lower congestion levels, improved safety performance, and a new long-distance and more direct route, which is particularly important for improved freight mobility. The project also would increase the number of new alternate lane miles, which improves the ability to provide effective incident management.

With implementation of the project, traffic conditions within the Study Area would improve in the horizon year; therefore, no cumulatively considerable adverse direct or indirect traffic effects are anticipated. However, the project would likely result in adverse temporary cumulative effects during construction. Given the magnitude of the project, it is anticipated that construction of the project would coincide with construction of multiple other projects throughout the Study Area. Construction-related traffic would overlap with other project-related traffic, resulting in potential construction-related cumulative effects. These effects would be determined during the project level analyses and would be temporary.

Land Use

Arizona continues to be one of the fastest growing states in the country. Economic growth has caused increased urban development activities within the communities in the Phoenix and Tucson metropolitan areas, which includes suburban communities such as Sahuarita, Marana, Goodyear, and Buckeye. Most cities, towns, and counties already have adopted local general or comprehensive plans to manage growth and development within their jurisdictions.

No Build Alternative

Under the No Build Alternative, existing land use trends would be expected to continue. The No Build alternative will not create cumulative land use effects. Development is expected to



1 progress according to market trends and in line with adopted general or comprehensive plans
2 and/or in response to regional/local transportation initiatives.

3 **Build Corridor Alternatives**

4 Within Maricopa and Pinal counties, many adopted plans and transportation studies already
5 contemplate the addition of a general I-11 Corridor, and have planned land uses accordingly.
6 The implementation of an I-11 Build Corridor Alternative, in combination with other past,
7 present, and reasonably foreseeable future actions, would contribute to the trend in expanding
8 development activities throughout southern and central Arizona. The implementation of multiple
9 projects in the same region could have a synergistic effect of accelerating the timing of planned
10 developments.

11 **Purple Alternative**

12 The Purple Alternative may cause accelerated growth with the implementation of the I-11
13 Corridor. However, much of this Build Corridor Alternative is already planned as a future
14 transportation corridor in local transportation and land use plans (e.g., West Pinal Freeway,
15 SR 303L, SR 30/Tres Rios Corridor, Hassayampa Freeway), so new growth would not be
16 inconsistent with planned growth. Implementation of this freeway not only provides new access
17 to communities along the corridor, but to the wider planning area. For example, in the North
18 Section, one impediment to new development in the Hassayampa Valley (west of the White
19 Tank Mountains) is limited transportation access – both north/south (connecting I-10 and
20 US 93/US 60 and east/west). I-11 would provide a critical connectivity solution for the existing
21 local roadway network, enhancing access to such large master-planned communities such as
22 Festival Ranch or Trillium West, which are both located east of all Build Corridor Alternatives.

23 **Green Alternative**

24 The cumulative effects of the Green Alternative are similar to the Purple Alternative, but may be
25 exacerbated because the Green Alternative has the greatest potential to change planned land
26 uses in the Study Area. Because the Green Alternative is primarily composed of new unplanned
27 corridor development, it would increase access within the Study Area more than the other Build
28 Corridor Alternatives. Land uses along the Green Alternative are primarily vacant today, and
29 largely planned for residential uses. I-11 may influence adjacent growth if planned residential
30 uses along the corridor and in the nearby vicinity instead build out as commercial, office, or
31 industrial in response to new and enhanced access.

32 **Orange Alternative**

33 In the South and Central Sections, the Orange Alternative has the least amount of direct,
34 indirect, and cumulative effects, as the alternative is improving an existing corridor with existing
35 access in place. Added capacity that increases reliability could make these existing highway
36 corridors more attractive by lessening congestion, but land uses are expected to change to a
37 much lesser degree. However, the Orange Alternative in the North Section is similar to the
38 Purple and Green Alternatives. With no current north-south high capacity transportation access,
39 this alternative has the potential to induce growth in the overall vicinity.



3.17.4.3 Indirect and Cumulative Effects on Other Resources

This section qualitatively assesses the potential for indirect and cumulative effects, as defined in Section 3.17.1, on environmental and social resources other than land use and transportation. The analysis of the direct effects, which occur in the same time and place as the action, is identified in each respective resource section within **Chapter 3** and it is not replicated in this section. Summary statements regarding the potential for indirect and cumulative effects on each resource area are provided in **Table 3.17-3** (Summary of Indirect and Cumulative Effects) located at the end of this section.

3.17.5 Summary

The No Build Alternative would result in higher travel times and congestion levels throughout the Study Area. As the region continues to grow, the transportation projects identified and approved for funding through 2022 and beyond will come online. The anticipated effects associated with transportation projects to meet projected demands would include a general increase in traffic noise and congestion; a continuing trend to develop areas that are currently mapped as agricultural, rural communities or privately owned open space; increased highway capacity affecting conditions on local roadways; changes to visual character; pressure on cultural resources; increased demand for water; increased loss of water quality; and a general trend toward urbanization and development corridor-wide.

Population and employment growth are forecasted under the No Build Alternative; however, the implementation of the I-11 Corridor under any of the Build Corridor Alternatives would be expected to direct growth and accelerate its pace. The potential change in land use and travel patterns is expected to be greatest with the implementation of the Purple or Green Alternative, which would introduce the most new highway miles in rural and undeveloped areas. They would introduce the most new access points as well as reduce travel time between city pairs. This will tend to accelerate the rate of development in areas further away from current urban centers and locate it near new or improved interchanges.

Since it follows existing roadways the most, the Orange Alternative may not introduce as many new effects but rather is highly likely to intensify existing effects. There is potential for indirect and cumulative effects to be concentrated in the downtown Tucson area and the surrounding neighborhoods, which include historic properties and districts. Within the North Section, there is less to distinguish between the Build Corridor Alternatives with regard to potential indirect and cumulative effects.

3.17.6 Mitigation Strategies

ADOT would be an active partner in a broader effort with Metropolitan Planning Organizations, local jurisdictions, resource agencies, and private stakeholders to cooperatively plan development in the I-11 corridor. The effort would coordinate wildlife connectivity, local land use planning, and context sensitive design for the I-11 facility. The White Tanks Conservancy may be a model for this type of effort. Coordination with Pima County on the implementation of the Sonoran Desert Conservation Plan also could be part of the effort.

All mitigation strategies in technical resource areas to address direct impacts also would mitigate cumulative impacts.



3.17.7 Future Tier 2 Analysis

The methodology to address indirect and cumulative effects would be revisited during future Tier 2 analysis to reflect a more detailed understanding of a proposed project. A typical analysis used at the project level to identify and assess cumulative effects would incorporate the following general concepts: identifying resources, identifying geographic boundaries, discussing current health and historic context, identifying reasonably foreseeable future actions, assessing effects, and reporting. *Guidance for Preparers of Cumulative Impact Analysis: Approach and Guidance* is one example of the type of policy implemented by a state to address the complexity of Indirect and Cumulative effects. This document generally addresses those concepts within the framework for a Tier 1 analysis, which is based on broad corridors rather than specific alignment concepts. During Tier 2 environmental review, ADOT would revisit the issue in coordination with the USEPA and all applicable agencies to either identify or develop an appropriate methodology for the indirect and cumulative effects analysis.

Future Tier 2 analysis would refine the indirect and cumulative effects based on a more detailed alignment. Coordination would occur with state, regional, and local agencies to identify local projects for consideration as part of the analysis. Future Tier 2 analysis would further refine the mitigation to minimize direct, indirect, and cumulative effects on resources.

Table 3.17-3 Summary of Indirect and Cumulative Effects

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Economic Effects				
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> Result in high levels of congestion in the I-10 and I-19 corridors that would hinder business growth. 	<p>Land development induced by the project could:</p> <ul style="list-style-type: none"> Improve access to existing employment centers (and tourist attractions), thereby promoting their growth. Attract new businesses to the corridor, thereby providing new employment opportunities. Generate large travel time savings for both passenger car and truck drivers. Increase business productivity by lowering shipping and logistic costs. Cause adverse effects to existing businesses in the corridor during construction (i.e., commercial displacements and limited access to businesses). Decrease property tax revenues from land acquired for ROW. Provide better access and opportunities for appropriate gateway services to support ecotourism, such as lodging. 	Similar to the Purple Alternative.	<p>Similar to the Purple Alternative. In addition, land development induced by the project could:</p> <ul style="list-style-type: none"> Result in out-of-pocket cost savings (i.e., vehicle operating and fuel cost savings) for passenger car drivers.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		<ul style="list-style-type: none"> Deter park visits and economic contributions from outdoor enthusiasts by reducing the rural character of parks, impinging on wildlife habitats, or diminishing visitor experiences. 		
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Lead to incremental economic losses and fewer economic opportunities due to increased levels of congestion. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Stimulate economic growth in Arizona by means of the economic multiplier (i.e., increase in supplier spending and employee spending across all sectors of the economy). 	Similar to the Purple Alternative.	<p>Similar to the Purple Alternative. In addition, past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Re-allocate household consumption (from fuel cost savings) towards more productive sectors of the economy.
Archaeological Sites, Historic Structures, and Historic Districts and Buildings				
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> Increase pressure for potential land use conversion with an associated loss of cultural resources. Define an extent of potential indirect effects that is much less than for Build Corridor Alternatives. Generally avoid potential adverse effects if the project is subject to regulatory review. 	<p>Land development induced by the project could:</p> <ul style="list-style-type: none"> Increase loss of archaeological sites and historic properties due to land use conversions. Increase access to previously unknown cultural resources which potentially degrade the site. Define an extent of potential indirect effects rated moderate because of extent of co-located Corridor Options (122 miles). Generally avoid potential adverse effects if the project 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> Greater potential for indirect effects because of shorter length of co-located Corridor Options (90 miles). 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> Longer length of co-located Corridor Options (263 miles) may reduce or slow induced growth in new areas. More potential for indirect effects on historic districts and buildings in Tucson due to visual and auditory effects on nearby historic neighborhoods. Generally avoid potential adverse effects if the project is subject to regulatory review.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		is subject to regulatory review.		
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Have and will continue to affect cultural resources. • Have minor incremental effects. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Have and will continue to affect cultural resources. • Have potential incremental effects, such as increased noise, public access, or visual effects on archaeological sites; effects are expected to be moderate in the South Section near Tucson and Eloy; in the Central Section near Casa Grande, Goodyear, and Buckeye; and in the North Section near Buckeye and Wickenburg. • Have minor incremental effects on historic districts and buildings. 	<p>Similar to Purple Alternative except:</p> <ul style="list-style-type: none"> • Potential incremental effects on archaeological sites are expected to be greater because more archaeological sites are likely to be affected. 	<p>Similar to Purple Alternative except:</p> <ul style="list-style-type: none"> • Potential incremental effects on historic districts and buildings are expected to be greater if new right-of-way is needed for Option B near historic Tucson neighborhoods.
Parks, Recreational Land, and Open Space				
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> • Reduce the availability of land that could be used for future parks, recreational facilities and open space. • Increased use of park, recreational facilities and open space due to an 	<p>Land development induced by the project could:</p> <ul style="list-style-type: none"> • Reduce the availability of land that could be used for future parks, recreational facilities and open space. Could increase the rate and geographic extent of this impact compared to the No Build Alternative. • Increased use of park, 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> • The resources present within the corridor have greater potential to be indirectly affected by induced changes to land use and traffic. 	<p>Similar to the Green Alternative, except:</p> <ul style="list-style-type: none"> • More resources are present within the corridor and so could be indirectly affected by induced changes to land use and traffic. However, these resources are already located adjacent to a transportation facility in the South and Central Sections.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
	<p>increased population.</p> <ul style="list-style-type: none"> • Reduce the availability of certain recreation opportunities and experiences due to the expansion of urban areas into formerly rural areas. • Lack transportation facilities to reach recreational facilities. 	<p>recreational facilities and open space due to an increased population. Could cause more pressure for open space protection if the Build Alternative results in induced growth in additional areas.</p> <ul style="list-style-type: none"> • Affect the visitor experience at recreation resources that are close to the corridor, by changing the views from the park or the visual character of the area outside the park, adding to noise or traffic levels in the vicinity and changing visitor use of recreation resources. • Improve accessibility and increased park visitors due to increasing population in proximity to parks, recreation lands and open space increasing awareness of natural and historic resources. • Improve firefighting and emergency accessibility. 		

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects and planning could:</p> <ul style="list-style-type: none"> Decrease the potential land available for recreation uses. Increase the demand to provide parks, recreational facilities and open spaces in growing urban/suburban areas. Increase the demand to provide protected land with recreational components in rural/undeveloped areas. Alter the recreation setting for existing and future recreation resources. Change the existing and potential recreation opportunities, ability to reach recreation destinations, and experiences available within an area. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Reduce the amount of land available for future parks, recreational facilities or open space, compared to No Build Alternative. Alter the recreation setting, opportunities, and experiences, as well as user expectations similar to the No Build Alternative, particularly for existing recreation resources due to an increase in accessibility of these sites due to I-11 and other planned transportation facilities and a potential increase in use of existing facilities due to increased accessibility and potential radiating urbanization around I-11 in conjunction with new planned developments. 	<p>Similar to the Purple Alternative.</p>	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> Effects to specific parks, recreational facilities or open space, but these are more likely to already be in proximity to an existing transportation use. Reduce the amount of land available for future parks, recreational facilities or open space, compared to No Build Alternative (less than Purple and Green Alternatives because large portions of corridor are in developed areas). Alter the recreation setting, opportunities and experiences, but to a lesser degree than the Purple and Green Alternatives due to the already developed nature of most of the Orange Alternative.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Noise and Vibration				
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> Continue to follow the trend in increasing noise levels, which are already exceeding FHWA Noise Abatement Criteria in certain locations. 	<p>Land development and the affiliated increase in traffic induced by the project could:</p> <ul style="list-style-type: none"> Alter the soundscape in areas that have lower existing ambient noise conditions. Potentially reduce noise levels through mitigation measures on existing infrastructure in the South and Central Sections where improvements are made. Increase noise levels for cultural/historic and recreation resources. Increase the noise levels affecting biologic resources in areas that are currently not developed. 	Similar to the Purple Alternative.	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> Noise levels potentially increase in areas where there is an existing transportation use in the South and Central Sections.
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Potential incremental increases in noise levels in communities as population growth occurs. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Increase noise levels and the associated effects in communities surrounding the corridor. 	Similar to the Purple Alternative.	Similar to the Purple Alternative.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Visual and Aesthetic Resources				
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> Generally continue current growth and development, with associated visual effects, along existing transportation corridors. 	<p>Land development induced by the project could:</p> <ul style="list-style-type: none"> Change the visual character, particularly in rural areas or near recreation areas where development is currently limited. Create potential for changes in visual character near new interchanges as agricultural land or open space is developed. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> Potential effects may have increased intensity due to more Corridor Options requiring new facility development. 	<ul style="list-style-type: none"> Overall potential indirect visual effects would be lower than the other Purple and Green Alternatives in the South and Central Sections due to co-location with existing transportation facilities. Within Tucson ordinances authorize designation of Tucson Historic Preservation Zones, Tucson Neighborhood Preservation Zones, and City Historic Landmarks that require review of new construction to protect the settings of historic buildings. Within Tucson, the Rio Nuevo and Downtown Zone requires that exterior alterations to National Register of Historic Places listed or eligible building follow national standards for rehabilitation of historic buildings. Similar to Purple and Green Alternatives in the North Section.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Change visual character and quality due to the reasonably foreseeable continued urbanization of corridor, especially in the Tucson, Casa Grande, and metropolitan Phoenix areas. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Increase potential visual effects on cultural resources and in viewsheds near recreation resources. 	<p>Similar to the Purple Alternative.</p>	<p>Similar to the Purple Alternative.</p>
Air Quality				
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> Decrease air quality due to population growth, increasing traffic and the resulting traffic congestion. 	<p>Land development induced by the project could:</p> <ul style="list-style-type: none"> Impact I-10 through a reduction in traffic volumes potentially reducing congestion. This could improve regional air quality and could reduce future delays due to congestion. Lead to the creation of localized air pollution hotspots that exceed the National Ambient Air Quality Standards. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> There is a greater potential for induced growth, which could occur at a faster pace than the Purple Alternative. It also has the second highest number (16) of new interchanges that increase automobile accessibility. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> There is a greater potential for temporary increases in emissions due to dependency on the existing highway, greater traffic delays and congestion during the construction phase. Induced growth may be lower than the other build alternatives due to co-location with existing facilities.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Generate minor potential incremental effects due to the combined effects of indirect effects and additional traffic volumes and congestion. Potential implementation of new air quality regulations, improving diesel and dust controls, reduced dependence on fossil fuels, and adoption of cleaner car engine technologies may offset these effects. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Not generate potential incremental effects due to reduced congestion, the potential implementation of new air quality regulations, improving diesel and dust controls, reduced dependence on fossil fuels, and adoption of cleaner car engine technologies. 	Similar to the Purple Alternative.	Similar to the Purple Alternative.
Hazardous Waste and Contaminated Material				
Indirect Effects	No potential indirect effects.	<p>Land development induced by the project could:</p> <ul style="list-style-type: none"> Result in improved accessibility that induces commercial and/or industrial development in new areas. Increase the potential for spills or releases to land that is not currently impacted by hazardous materials. 	Similar to the Purple Alternative.	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> Less potential for effects in South and Central Sections due to the planned co-location with existing transportation facilities.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	Past, present, and reasonably foreseeable projects could: <ul style="list-style-type: none"> Increase use of the existing transportation infrastructure for transport of materials. 	Past, present, and reasonably foreseeable projects could: <ul style="list-style-type: none"> Generate potential incremental effects greater than the No Build alternative due to the increase in transport of materials and the release of existing hazardous materials during construction. 	Similar to the Purple Alternative.	Similar to the Purple Alternative.
Geologic Resources, Soils, and Prime Farmlands				
Indirect Effects	No potential indirect effects.	Land development induced by the project could lead to: <ul style="list-style-type: none"> Loss of access to geologic material through covering with construction materials. Improved access to geologic materials (sand and gravel) needed for construction. Additional isolation of remnant prime and unique farmland parcels. Changes in agricultural land use where land value inflation occurs as a result of land conversion from farmland to developed land. 	Similar to the Purple Alternative, except: <ul style="list-style-type: none"> Overall indirect effects would be increased due to the corridor being located in undeveloped areas with limited planned future development and due to greater area of new ground disturbance in the Central Section. 	Similar to the Purple Alternative, except: <ul style="list-style-type: none"> Potential effects would be less than that of both the Green and Purple Alternatives due to smaller area of new ground disturbance.
Cumulative Effects	Past, present, and reasonably foreseeable projects could: <ul style="list-style-type: none"> Drive effects through land conversion to residential, commercial, and industrial uses. 	Past, present, and reasonably foreseeable projects could: <ul style="list-style-type: none"> Increase incremental effects including the use of geologic resources and soils; loss of those resources through covering, and the loss of farmland potentially 	Similar to the Purple Alternative.	Similar to the Purple Alternative.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		accelerated by increasing land value.		
Water Resources				
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> • Generate neutral effects on water quality. • Impact routine operations and maintenance including stormwater management and compliance with the Municipal Separate Sewer System permit and applicable local MS4 permits. • Trigger new stormwater controls in areas with programmed improvements along existing facilities (I-10). 	<p>Land development induced by the project could:</p> <ul style="list-style-type: none"> • Change surface water flow impacting the quality and quantity of water available for uses including recreation, habitat, drinking, or agricultural purposes. • Drive new construction to require compliance with MS4 permitting and would include water quality features such as Best Management Practices. • Impact water resources with runoff containing pollutants, fragmentation, or changes in hydrology. • Influence design and construction of new structures (bridges and/or culverts) leading to local effects on erosion and sedimentation. • Infringe on floodplains. 	<p>Similar to the Purple Alternative.</p> <ul style="list-style-type: none"> • Infringe on the Santa Cruz floodplain. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> • Potentially less magnitude and intensity in the effects, due to fewer new areas of induced growth. • There is greater potential to improve current water quality, as new construction would require modernization of infrastructure such as stormwater management features associated with existing transportation facilities.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Increase incremental effects due to increasing demand for water resources. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> Increase incremental effects to a greater extent than the No Build Alternative. 	Similar to the Purple Alternative.	Similar to the Purple Alternative.
Biologic Resources				
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> Continue historical trends where construction added to the fragmentation and destruction of biotic communities. Generally increase development pressure that will further degrade and fragment wildlife habitat. 	<p>Land development induced by the project could:</p> <ul style="list-style-type: none"> Introduce or exacerbate the introduction of unwanted or invasive plant or wildlife species into new areas. Impacts associated with new alignments would take longer to occur and have potentially greater indirect negative impacts to native species than impacts associated with co-located alignments. Cause or increase gradual changes in species composition, diversity, genetic makeup, and/or health due to impacts to habitat, habitat fragmentation, or genetic isolation. Change the quantity and quality of habitat and the resources that species rely on for food, hunting/ scavenging, and breeding due to the introduction of 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> Increased potential for indirect effects to biotic communities due to a greater portion of alternative being on new alignment as compared with the Purple and Orange alternatives. Greater potential for increased wildlife mortality, including SERI, due to wildlife/vehicle collisions than the Purple or Orange alternatives because of the greater amount of new alignment. Greater potential for possible disruption of mating or feeding by wildlife species within the immediate vicinity of the highway than the Purple or Orange alternatives due to the introduction of increased noise or light pollution from the highway as well as to 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> This alternative has the most co-located highway segments, which may or may not require widening. Most of these highway segments are already considered impermeable to most wildlife due to high traffic volumes; therefore selection of this alternative would provide more opportunities to improve wildlife connectivity by adding wildlife crossings into the design. Least potential for increased wildlife mortality, including SERI, due to wildlife/vehicle collisions than the Purple or Green alternatives. Least potential for possible disruption of mating or feeding by wildlife species within the immediate vicinity of the highway than the

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		<p>contaminants or pollutants from runoff or changes in hydrology.</p> <ul style="list-style-type: none"> • Within the North Section, the Purple Alternative might have the least amount of indirect effects on biotic communities and wildlife habitat due to its location within the Douglas Ranch planned development. • Potential for increased wildlife mortality, including Species of Economic and Recreational Importance (SERI), due to wildlife/vehicle collisions on segments of new alignment. • Possible disruption of mating or feeding by wildlife species within the immediate vicinity of the highway due to the introduction of increased noise or light pollution from the highway as well as to induced development due to the highway. 	<p>induced development due to the highway.</p>	<p>Purple or Green alternatives due to the introduction of increased noise or light pollution from the highway as well as to induced development resulting from the highway.</p>
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Cause localized, incremental effects in locations with planned corridor improvements and increased development. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Creates habitat loss, fragmentation, and isolation effects corridor-wide and of greatest concern near threatened and endangered species habitats and along wildlife corridors as land is developed. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> • Potential incremental effects could be somewhat greater than the Purple Alternative due to a greater amount of new alignment. 	<p>Similar to the Purple Alternative, except:</p> <ul style="list-style-type: none"> • Potential incremental effects would be greater than the No Build Alternative and less than the Purple or Green Alternative.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		<ul style="list-style-type: none"> Within the North Section, the Purple Alternative might have a somewhat lesser cumulative effect on biotic communities and wildlife habitat due to its location within the Douglas Ranch planned development. 		
Environmental Justice and Social Resources				
Indirect Effects	<p>Programmed transportation improvements plus projected population and employment growth could:</p> <ul style="list-style-type: none"> Decrease mobility and access to job opportunities and housing options due to increased travel times and congestion. 	<p>Land development induced by the project could increase or change the nature and location of residential, business, and other uses could:</p> <ul style="list-style-type: none"> Increase traffic on local roads. Displace existing residents and businesses. Increase job opportunities and housing options. Enhance mobility where future growth and development is planned. Change property values. Change air quality, noise, and visual characteristics. Create demand for public facilities and services. 	Similar to the Purple Alternative.	<p>Similar to the Purple Alternative; except:</p> <ul style="list-style-type: none"> The benefits and changes from improved mobility would be reduced in the South and Central Sections.

Table 3.17-3 Summary of Indirect and Cumulative Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Increase displacements, increase noise levels, and impact air quality as part of the ongoing trend to develop land in the region. 	<p>Past, present, and reasonably foreseeable projects could:</p> <ul style="list-style-type: none"> • Potentially have an incremental role improving access to housing and jobs for minority and low income communities. • Increase the number of displacements. • Increase noise levels and new visual highway features. • Potentially reduce noise levels along existing infrastructure in the South and Central Sections. • Impact air quality. • Potential changes in access to community facilities. • Impact quality of life; however, changes will be subjective depending on individual perspective and personal value of their current rural or urban lifestyle. 	Similar to the Purple Alternative.	Similar to the Purple Alternative.

NOTES: 1-10 = Interstate 10, I-19 = Interstate 19, SERI = Species of Economic and Recreational Importance.



4 PRELIMINARY DRAFT SECTION 4(F) EVALUATION

4.1 Introduction

This chapter presents a Preliminary Draft Section 4(f) Evaluation. The Preliminary Draft Section 4(f) Evaluation was prepared to comply with Section 4(f) of the United States (US) Department of Transportation Act of 1966 (49 United States Code [USC] 303), hereinafter referred to as “Section 4(f),” and its implementing regulations codified at 23 Code of Federal Regulations (CFR) Part 774. Additional guidance was obtained from the revised Federal Highway Administration (FHWA) Section 4(f) Policy Paper (FHWA 2012). As allowed by 23 CFR 774.7(e)(1), a Preliminary Draft Section 4(f) Evaluation was determined to be the appropriate level of evaluation in light of the tiered Environmental Impact Statement (EIS) approach.

The Preliminary Draft Section 4(f) Evaluation identifies properties that are afforded protection by Section 4(f) (Section 4.3) and evaluates the potential use of these properties by the Build Corridor Alternatives (Sections 4.4 and 4.5). **Figure 4-1** (Purple Alternative), **Figure 4-2** (Green Alternative), and **Figure 4-3** (Orange Alternative) show the Build Corridor Alternatives, which are further described in **Chapter 2** (Alternatives Considered). FHWA’s Final Tier 1 EIS will examine the Preferred Alternative, and a Preliminary Final Section 4(f) Evaluation will be part of the Final Tier 1 EIS document. FHWA will make its Preliminary Section 4(f) determination as part of the Record of Decision (ROD) for the Tier 1 process. The public comment period for the Preliminary Draft Section 4(f) Evaluation is equal in duration to and concurrent with the comment period for the Draft Tier 1 EIS. As set forth in 23 CFR 774.7(e)(1), FHWA would complete a Final Section 4(f) Evaluation during future Tier 2 National Environmental Policy Act (NEPA) studies. At that time, FHWA would focus on making final determinations of use, assessing avoidance and least harm as warranted, and identifying specific measures to minimize harm. FHWA and Arizona Department of Transportation (ADOT) will use the information presented in this Preliminary Draft Section 4(f) Evaluation, along with the findings of the Draft Tier 1 EIS process, to identify and select a Preferred Alternative.

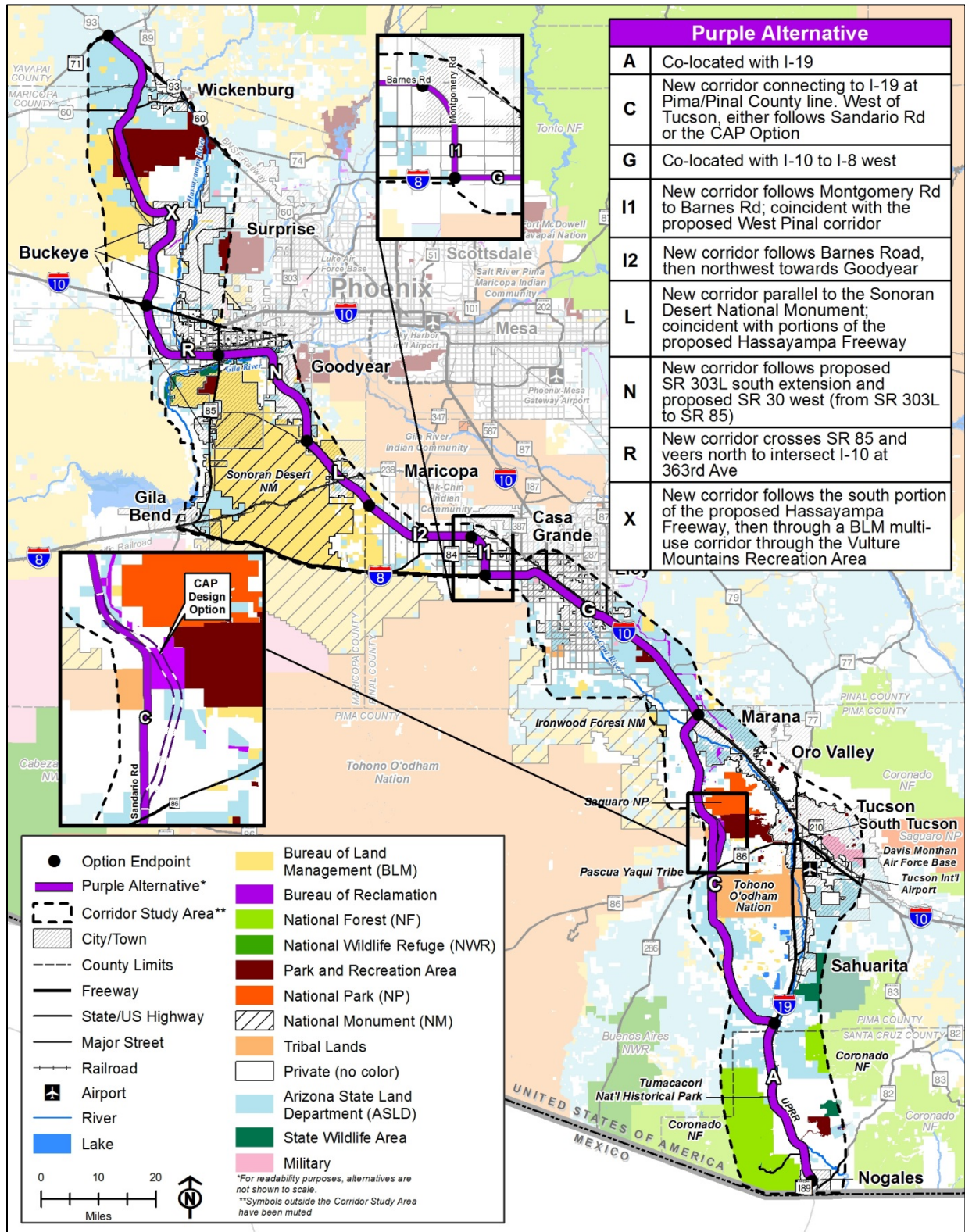


Figure 4-1 Purple Alternative

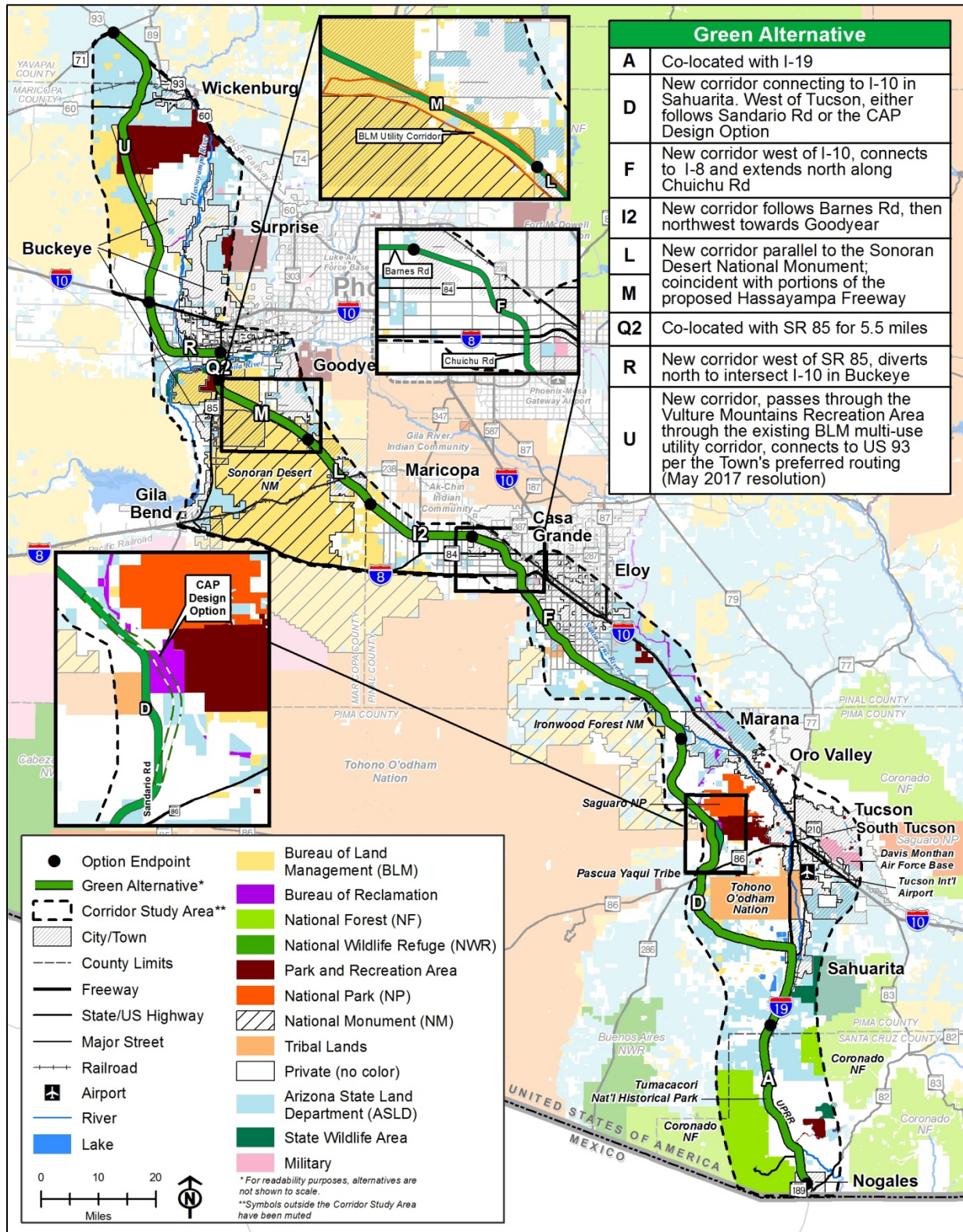


Figure 4-2 Green Alternative

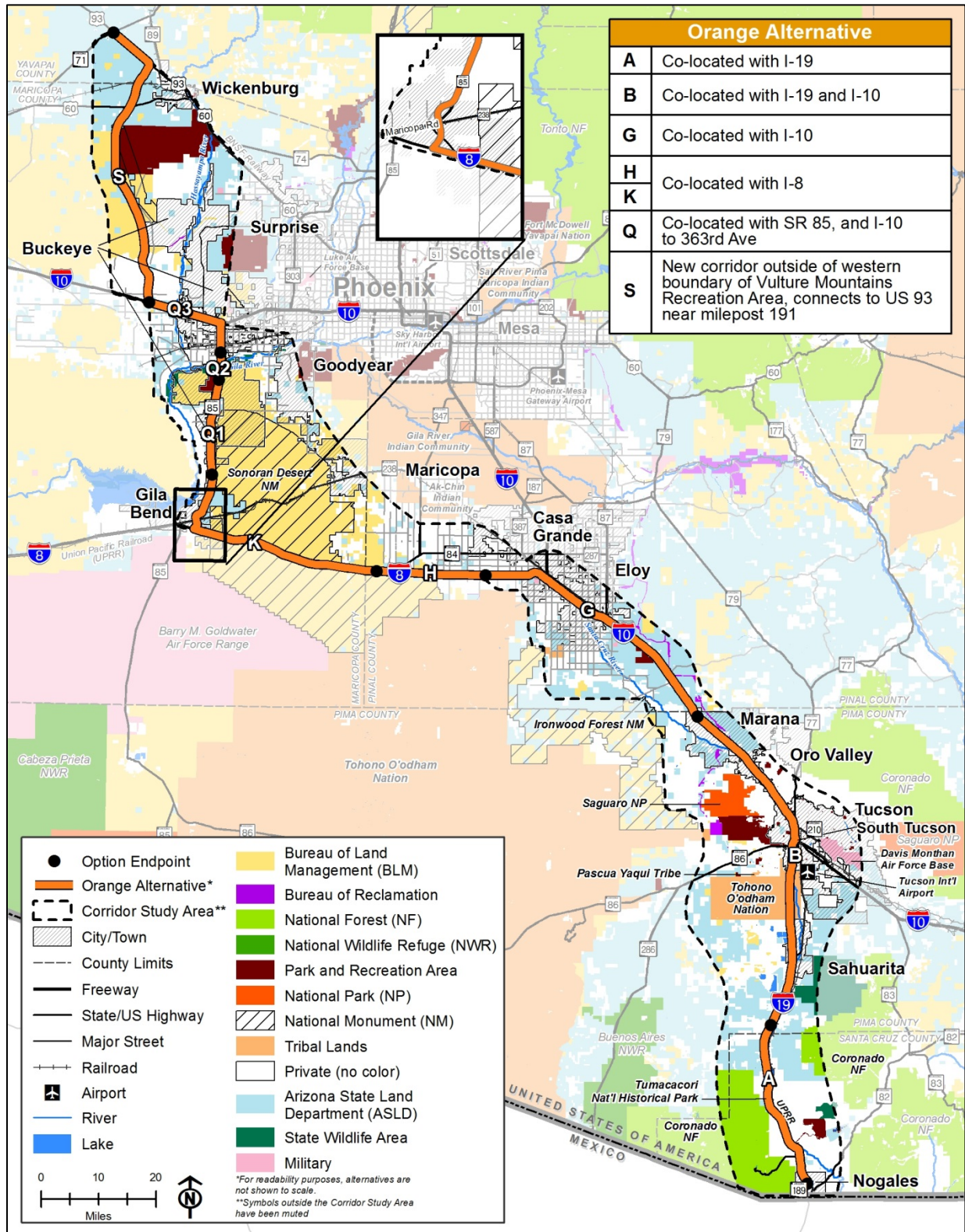


Figure 4-3 Orange Alternative

4.2 Regulatory Context and Methodology

The law on lands, wildlife and waterfowl refuges, and historic sites that is codified in Title 49 of the USC 303 states, “The Secretary of Transportation may approve a transportation program or project (other than any project for a park road or parkway under section 204 [1] of title 23) 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 an historic site of national, State, or local significance (as determined by the federal, state, or local officials having jurisdiction¹ over the park, area, refuge, or site) only if:

- 1) There is no prudent and feasible alternative to using that land; and
- 2) The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use; or
- 3) The Administration determines that the use of the property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures) committed to by the applicant, will have a *de minimis* use, as defined in Sec. 774.17, on the property.”

4.2.1 Applicability

Section 4(f) applies to the use of significant public parks, recreation areas, wildlife and waterfowl refuges, and historic sites. Significance is determined in consultation with officials having jurisdiction over those properties (see 23 CFR 774.11, Applicability).

4.2.2 Definitions of Use

Pursuant to 23 CFR 774.17 and “except as set forth in Section 774.11 and 774.13, a ‘use’ of Section 4(f) property occurs: (1) when land is permanently incorporated into a transportation facility; (2) when there is a temporary occupancy of land that is adverse in terms of the statute’s preservation purpose as determined by the criteria in Section 774.13(d); or (3) when there is a constructive use of a Section 4(f) property as determined by the criteria in Section 774.15.”

Permanent Use – As outlined in Section 3.3.3 of FHWA’s Section 4(f) Policy Paper (FHWA 2012), an individual Section 4(f) evaluation must be completed when approving a project that requires the use of Section 4(f) property if the use, as described in Sections 3.1 and 3.2 (of the policy paper: Identification of Section 4(f) Properties and Assessing the Use of Section 4(f) Properties), results in a greater than *de minimis* use and a programmatic Section 4(f) evaluation cannot be applied to the situation (23 CFR 774.3).

¹ 23 CFR 774.17 defines officials with jurisdiction over parks, recreation areas, wildlife and waterfowl refuges, and historic sites as “(1) In the case of historic properties, the official with jurisdiction is the State Historic Preservation Office (SHPO) for the State wherein the property is located or, if the property is located on tribal land, the Tribal Historic Preservation Officer (THPO). If the property is located on tribal land but the Indian tribe has not assumed the responsibilities of the SHPO as provided for in the National Historic Preservation Act (NHPA), then a representative designated by such Indian tribe shall be recognized as an official with jurisdiction in addition to the SHPO. When the Advisory Council on Historic Preservation (ACHP) is involved in a consultation concerning a property under Section 106 of the NHPA, the ACHP also is an official with jurisdiction over that resource for purposes of this part. When the Section 4(f) property is a National Historic Landmark, the National Park Service also is an official with jurisdiction over that resource for purposes of this part. (2) In the case of public parks, recreation areas, and wildlife and waterfowl refuges, the official(s) with jurisdiction are the official(s) of the agency or agencies that own or administer the property in question and who are empowered to represent the agency on matters related to the property.”

Constructive Use – As defined in 23 CFR 774.15(a), “a constructive use occurs when a transportation project does not incorporate land from a Section 4(f) property, but the project’s proximity impacts are so severe that the protected activities, features, or attributes that qualify a property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the property are substantially diminished.” A project’s proximity to a Section 4(f) property is not in itself an impact that results in constructive use. Due to the subjective nature of proximity impacts, a determination of constructive use is rare.

Temporary Occupancy – 23 CFR 774.13(d) defines temporary occupancies of land from a Section 4(f) property as being “so minimal as to not constitute a use within the meaning of Section 4(f). The following conditions must be satisfied: (1) Duration must be temporary, i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land; (2) Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal; (3) There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis; (4) The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and (5) There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) resource regarding the above conditions.”

4.2.3 Types of Section 4(f) Approvals

FHWA may not approve the use, as defined in Section 774.17 of a Section 4(f) property unless a determination is made under paragraph (a) or (b) of 23 CFR 774.3: “(1) There is no feasible and prudent avoidance alternative, as defined in Sec. 774.17, to the use of land from the property; and (2) The action includes all possible planning, as defined in Sec. 774.17, to minimize harm to the property resulting from such use; or (b) The Administration determines that the use of the property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures) committed to by the applicant, will have a *de minimis* use, as defined in Section 774.17, on the property.”

As stated in 23 CFR 774.17, “(1) For historic sites, *de minimis* use means that the Administration has determined, in accordance with 36 CFR part 800 that no historic property is affected by the project or that the project will have ‘no adverse effect’ on the historic property in question. (2) For parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* use is one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).” When a Tier 1 EIS is prepared, the regulations of Section 4(f) allow for a preliminary Section 4(f) approval of a *de minimis* use or a not *de minimis* use, provided that opportunities to minimize harm at subsequent stages in the project development process are not precluded by the Tier 1 decisions (23 CFR 774.7(e)(1)).

Two types of approvals are sought in the Section 4(f) Evaluation for I-11: a preliminary Section 4(f) approval when a first-tier, broad-scale EIS is prepared and a Nationwide Programmatic Section 4(f) Approval for Transportation Projects That Have a Net Benefit to a Section 4(f) Property. Each of these approvals is defined below:

- **Preliminary Section 4(f) Approval** – “When the first-tier, broad-scale EIS is prepared, the detailed information necessary to complete the Section 4(f) approval may not be available at that stage in the development of the action. In such cases, the documentation should

address the potential impacts that a proposed action will have on Section 4(f) property and whether those impacts could have a bearing on the decision to be made. A preliminary Section 4(f) approval may be made at this time as to whether the impacts resulting from the use of a Section 4(f) property are a *de minimis* use or whether there are feasible and prudent avoidance alternatives. This preliminary approval will include all possible planning to minimize harm to the extent that the level of detail available at the first-tier EIS stage allows. It is recognized that such planning at this stage may be limited to ensuring that opportunities to minimize harm at subsequent stages in the development process have not been precluded by decisions made at the first-tier stage. This preliminary Section 4(f) approval is then incorporated into the first-tier EIS. The Section 4(f) approval will be finalized in the second-tier Study (23 CFR 774.7(e)).”

- **Nationwide Programmatic Section 4(f) Approval, Net Benefit** – FHWA has issued a Final Nationwide Programmatic Section 4(f) Evaluation and Determination for Federal-Aid Transportation Projects That Have a Net Benefit to a Section 4(f) Property. This nationwide programmatic approval is a procedural option for preparing an individual Section 4(f) Evaluation. As defined in FHWA’s guidance, *Section 4(f) Evaluation and Approval for Transportation Projects That Have a Net Benefit to a Section 4(f) Property*, “this nationwide programmatic Section 4(f) evaluation has been prepared for certain federally assisted transportation improvement projects on existing or new alignments that will use property of a Section 4(f) park, recreation area, wildlife or waterfowl refuge, or historic property, which in the view of FHWA and official(s) with jurisdiction over the Section 4(f) property, the use of the Section 4(f) property will result in a net benefit to the Section 4(f) property.”

Within the same guidance, a net benefit is defined as “achieved when the transportation use, the measures to minimize harm and the mitigation incorporated into the project results in an overall enhancement of the Section 4(f) property when compared to both the future do-nothing or avoidance alternatives and the present condition of the Section 4(f) property, considering the activities, features and attributes that qualify the property for Section 4(f) protection. A project does not achieve a ‘net benefit’ if it will result in a substantial diminishment of the function or value that made the property eligible for Section 4(f) protection.”

4.2.4 Section 4(f) Evaluation Process

4.2.4.1 Individual Section 4(f) Evaluations

Individual Section 4(f) Evaluations involve the following steps:

- **Determine Applicability** – In this step, FHWA identifies parks, recreational areas, wildlife and waterfowl refuges, and historic sites that are protected by Section 4(f) using the definitions of primary purpose and significance described in Section 4.2.1.
- **Assess Impact and Determine Use** – FHWA determines what impact a project would have on each protected property and what type of use that impact would be, using the definitions in 23 CFR 774 and described in Section 4.2.1.
- **Analyze Avoidance Alternatives** – In this step, FHWA and ADOT consider alternatives that completely avoid the potential use of a Section 4(f) property. The avoidance analysis applies the Section 4(f) feasible and prudent criteria (23 CFR 774.17(2) and (3)). “An alternative is not feasible if it cannot be built as a matter of sound engineering judgment. An alternative is not prudent if:

Factor 1 – It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;

Factor 2 – It results in unacceptable safety or operational problems;

Factor 3 – After reasonable mitigation, it still causes:

- Severe social, economic, or environmental impacts;
- Severe disruption to established communities;
- Severe, disproportionate impacts on low-income or minority populations; or
- Severe impacts on environmental resources protected under other Federal statutes;

Factor 4 – It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;

Factor 5 – It causes other unique problems or unusual factors; or

Factor 6 – It involves multiple factors in (Factors 1 through 5) of this definition, that while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.”

- **Determine Alternative with Least Overall Harm** – If the avoidance analysis concludes there is no feasible and prudent avoidance alternative, then in accordance with (23 CFR 774.3(c)1) FHWA “may approve only the alternative that: Causes the least overall harm in light of the statue’s preservation purpose. The least overall harm is determined by balancing the following factors: (1) the ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property); (2) the relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection; (3) the relative significance of each Section 4(f) property; (4) the views of the official(s) with jurisdiction over each Section 4(f) property; (5) the degree to which each alternative meets the purpose and need for the project; (6) after reasonable mitigation, the magnitude of any adverse effects to resources not protected by Section 4(f); and (7) substantial differences in costs among the alternatives.”
- **Consider All Planning to Minimize Harm** – After the determination that there are no feasible and prudent alternatives to avoid a Section 4(f) property, FHWA and ADOT consider and incorporate all possible planning to minimize the impacts of the Proposed Action. All possible planning, as defined in 23 CFR 774.17, means “all reasonable measures identified in the Section 4(f) evaluation to minimize harm or mitigate for adverse impacts and effects must be included in the project.”
- **Coordination and Public Involvement** – The Section 4(f) regulations require FHWA to coordinate with the officials with jurisdiction over each of the Section 4(f) properties for which a determination is made in this Preliminary Draft Section 4(f) Evaluation. In compliance with the requirements of Section 4(f) (23 CFR 774.5), the steps in coordination include:
 - “For historic properties:
 - (i) The consulting parties identified in accordance with 36 CFR part 800 must be consulted; and
 - (ii) The Administration must receive written concurrence from the pertinent State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Officer (THPO), and from the Advisory Council on Historic Preservation (ACHP) if participating in the



consultation process, in a finding of 'no adverse effect' or 'no historic properties affected' in accordance with 36 CFR part 800. The Administration shall inform these officials of its intent to make a *de minimis* use determination based on their concurrence in the finding of 'no adverse effect' or 'no historic properties affected.'

- (iii) Public notice and comment, beyond that required by 36 CFR part 800, is not required.

– For parks, recreation areas, and wildlife and waterfowl refuges:

- (i) Public notice and an opportunity for public review and comment concerning the effects on the protected activities, features, or attributes of the property must be provided. This requirement can be satisfied in conjunction with other public involvement procedures, such as a comment period provided on a NEPA document."

4.2.4.2 De Minimis Use Evaluations

In a *de minimis* use evaluation, the following steps apply, as stated in 23 CFR 774.7(b) and 23 CFR 774.5(c):

- **Determine that the Proposed Use is *de minimis*** – "A *de minimis* use determination under Sec. 774.3(b) shall include sufficient supporting documentation to demonstrate that the impacts, after avoidance, minimization, mitigation, or enhancement measures are taken into account, are *de minimis* uses as defined in Sec. 774.17; and that the coordination required in Sec. 774.5(b) has been completed.
- **Coordination and Public Involvement** – Prior to making *de minimis* use determinations under Sec. 774.3(b), the following coordination shall be undertaken:
 - (1) For historic properties: (i) The consulting parties identified in accordance with 36 CFR part 800 (Section 106) must be consulted; and (ii) FHWA must receive written concurrence from the pertinent SHPO or THPO, and from the ACHP if participating in the consultation process, in a finding of "no adverse effect" or "no historic properties affected" in accordance with 36 CFR part 800. FHWA shall inform these officials of its intent to make a *de minimis* use determination based on their concurrence in the finding of 'no adverse effect' or 'no historic properties affected.' (iii) Public notice and comment, beyond that required by 36 CFR part 800, is not required.
 - (2) For parks, recreation areas, and wildlife and waterfowl refuges: (i) Public notice and an opportunity for public review and comment concerning the effects on the protected activities, features, or attributes of the property must be provided. This requirement can be satisfied in conjunction with other public involvement procedures, such as a comment period provided on a NEPA document. (ii) The Administration shall inform the official(s) with jurisdiction of its intent to make a *de minimis* use finding. Following an opportunity for public review and comment as described in paragraph (b)(2)(i) of this section, the official(s) with jurisdiction over the Section 4(f) resource must concur in writing that the project will not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection. This concurrence may be combined with other comments on the project provided by the official(s)."

4.2.4.3 Nationwide Programmatic Section 4(f) Evaluations (Net Benefit)

The steps for a Nationwide Programmatic Section 4(f) Evaluation (Net Benefit) are the same as the steps for an individual Section 4(f) evaluation, except for the following:



- 1 • **Assess Impact and Determine Use** – “For historic properties, the project does not require
2 the major alteration of the characteristics that qualify the property for the National Register
3 of Historic Places (NRHP) such that the property would no longer retain sufficient integrity to
4 be considered eligible for listing. For archeological properties, the project does not require
5 the disturbance or removal of the archaeological resources that have been determined
6 important for preservation in-place rather than for the information that can be obtained
7 through data recovery. The determination of a major alteration or the importance to preserve
8 in-place will be based on consultation consistent with 36 CFR part 800.”
- 9 • **Analyze Avoidance Alternatives** – “To demonstrate that there are no feasible and prudent
10 alternatives to the use of Section 4(f) property, the programmatic evaluation analysis must
11 address alternatives that avoid the Section 4(f) property. The following alternatives avoid the
12 use of the Section 4(f) property:
 - 13 – Do nothing.
 - 14 – Improve the transportation facility in a manner that addresses the project's purpose and
15 need without a use of the Section 4(f) property.
 - 16 – Build the transportation facility at a location that does not require use of the Section 4(f)
17 property.
- 18 This list is intended to be all-inclusive. The programmatic evaluation does not apply if a
19 feasible and prudent alternative is identified that is not discussed in this document.”
- 20 • **Measures to Minimize Harm** – “The proposed project includes all appropriate measures to
21 minimize harm and subsequent mitigation necessary to preserve and enhance those
22 features and values of the property that originally qualified the property for Section 4(f)
23 protection.”
- 24 • **Coordination** – “The official(s) with jurisdiction over the Section 4(f) property agree in
25 writing with the assessment of the impacts; the proposed measures to minimize harm; and
26 the mitigation necessary to preserve, rehabilitate and enhance those features and values of
27 the Section 4(f) property; and that such measures will result in a net benefit to the
28 Section 4(f) property.

29 For historic properties, consistent with 36 CFR part 800, there must be agreement reached
30 amongst the SHPO and/or THPO, as appropriate, FHWA and the Applicant on measures to
31 minimize harm when there is a use of Section 4(f) property. Such measures must be
32 incorporated into the project.”

33 4.2.4.4 Constructive Use Evaluations

34 In a constructive use evaluation, the following steps apply, as stated in 23 CFR 774.15(d):

- 35 • **Determine Applicability** – “Identification of the current activities, features, or attributes of
36 the property which qualify for protection under Section 4(f) and which may be sensitive to
37 proximity impacts;”



- **Proximity Impacts Analysis** – “An analysis of the proximity impacts of the proposed project on the Section 4(f) property. If any of the proximity impacts will be mitigated, only the net impact need be considered in this analysis. The analysis also should describe and consider the impacts which could reasonably be expected if the proposed project were not implemented, since such impacts should not be attributed to the proposed project; and”
- **Coordination** – “Consultation, on the foregoing identification and analysis, with the official(s) with jurisdiction over the Section 4(f) property.”

4.3 Identification of Section 4(f) Properties

FHWA and ADOT reviewed existing maps (including Geographic Information System (GIS) data and online maps available from federal, state, county, and city agencies), searched property records, and consulted with officials with jurisdiction to identify the properties protected by Section 4(f) within the I-11 Corridor Study Area (Study Area), as defined by 23 USC 138(a) and 49 USC 303(a), for the following:

1. “Parks and recreational areas of national, state or local significance that are both publicly owned and open to the public;
2. 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; and
3. Historic sites of national, state or local significance in public or private ownership regardless of whether they are open to the public.”

Public ownership and administration of parks, recreation areas and wildlife and waterfowl refuges was verified through available documentation as well as coordination with the officials with jurisdiction over those properties. Properties that meet definitions 1 and 2 above are presumed to be significant unless the official with jurisdiction over a property concludes that the site is not significant. FHWA will make an independent evaluation under such circumstances and may override the official with jurisdiction. FHWA defines significance in its Section 4(f) Policy Paper (FHWA 2012) as follows: “comparing the availability and function of the park, recreation area or wildlife and waterfowl refuge, with the park, recreation area or wildlife and waterfowl refuge objectives of the agency, community or authority, the property in question plays an important role in meeting those objectives.” In making such an evaluation, FHWA examines the primary purpose of the property. As described in FHWA’s Section 4(f) Policy Paper (response to Question 1A), primary purpose “is related to a property’s primary function and how it is intended to be managed. Incidental, secondary, occasional or dispersed activities similar to park, recreational or refuge activities do not constitute a primary purpose within the context of Section 4(f).”

As discussed in the Draft Tier 1 EIS Section 3.7, historic sites that meet definition 3 above were identified using AZSITE, a GIS-based system that serves as a consolidated informational network of recorded cultural resources, including prehistoric and historic sites and properties, and surface surveys within the State of Arizona and a 40-mile buffer around the state. Such historic sites are significant if they are listed on the NRHP or have been determined to be eligible for listing on the NRHP (Section 4(f) Policy Paper Answer to Question 2A). FHWA consults with the SHPO, the official with jurisdiction over historic sites, Tribes, and other consulting parties, and makes the determination of significance based on the context of Section 106 of the NHPA (36 CFR 800). At this Tier 1 stage, previous determinations of



eligibility are being used. Section 106 evaluations of the properties and effects will be determined during Tier 2 undertakings.

While both Section 106 and Section 4(f) are preservation legislation and are both considered in the NEPA process, Section 106 applies to all federal undertakings and Section 4(f) applies to only US Department of Transportation (USDOT) actions. Section 106 considers the “effect” of an undertaking, while Section 4(f) considers the “use of a property” by an undertaking. Section 4(f) is not integral to Section 106, but Section 106 is integral to Section 4(f) compliance insofar as historic sites are concerned. Section 106 requires consultation and possibly mitigation, while Section 4(f) requires analysis of avoidance, then all possible planning to minimize harm.

4.3.1 Parks, Recreation Areas, or Wildlife and Waterfowl Refuges

Table 4-1 (Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area) lists the Section 4(f) properties from south to north in the Study Area.

Figure 4-4 (Section 4(f) Properties in the Study Area) shows the location of each property in relation to the Build Corridor Alternatives.

The following properties in the Study Area were evaluated and preliminarily determined to not be protected by Section 4(f):

- Santa Rita Experimental Range and Wildlife Area. A memo providing a preliminary evaluation of wildlife areas is in **Appendix F** (Supporting Documentation for Preliminary Draft Section 4(F) Evaluation: ADOT Memo Entitled “Applicability of Identifying Wildlife Areas and Section 4(f) Properties for the I-11 Tier 1 EIS”). According to the memo, the primary purpose of the property is for research. Since the purpose is not a public park, recreation area, or wildlife or waterfowl refuge, the preliminary determination is that it does qualify for protection under Section 4(f).
- Ironwood Forest National Monument. This property, which is mainly owned and managed by the Bureau of Land Management (BLM), does not function as or is not designated within its BLM Resource Management Plan as “a significant park, recreation area, or wildlife and waterfowl refuge.” The Ironwood Forest National Monument was designated to protect objects of scientific interest within the Monument. A memo discussing the evaluation of Ironwood Forest National Monument is in **Appendix F** (Supporting Documentation for Preliminary Draft Section 4(F) Evaluation: Memo entitled “White Paper Regarding Potential Section 4(f) Constructive Use Impacts: Ironwood Forest National Monument, Tucson Mitigation Corridor, Saguaro National Park, and Tucson Mountain Park”).
- Tucson Mountain Wildlife Area. This area is managed by various agencies and is made up of publicly and privately owned land. This broad area does not qualify for Section 4(f) protection; however, Tucson Mountain Park, Saguaro National Park (SNP), and the Tucson Mitigation Corridor (TMC) fall within this wildlife area and do qualify for Section 4(f) protection.
- Sonoran Desert National Monument. The Sonoran Desert National Monument Record of Decision and Approved Resource Management Plan, dated September 2012, states that the monument was designated to protect a magnificent example of untrammelled Sonoran desert landscape with an extraordinary array of biological, scientific, and historic resources. The land is mainly managed by BLM. Because the purpose is not related to a public park, recreation area, or wildlife or waterfowl refuge, it is not protected by Section 4(f). There are historic and recreation resources within the monument that are protected by Section 4(f),



and these are included in **Table 4-1** (Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area) and **Table 4-2** (Historic Sites Protected by Section 4(f) in the Project Corridors) and on **Figure 4-4** (Section 4(f) Properties in the Study Area).

4.3.2 Historic Sites

Historic sites (including historic properties and archaeological sites) are identified and discussed in Section 3.7 of this Draft Tier 1 EIS. The sites include those properties that have been (1) previously determined eligible for listing by others or (2) are already listed on the NRHP. **Table 4-2** (Historic Sites Protected by Section 4(f) in the Project Corridors) lists the historic properties within the 2,000-foot-wide Build Corridor Alternatives from south to north. **Figure 4-4** (Section 4(f) Properties in the Study Area) shows the location of each property in relation to the Build Corridor Alternatives.

Potentially eligible sites were not considered in the Tier 1 level of evaluation, but would be considered during Tier 2. During Tier 2 studies, the 2,000-foot-wide corridor of a selected Build Corridor Alternative would be refined to a specific roadway alignment. At that time, historic and archaeological resources will be surveyed, Section 106 consultation will be undertaken, and a Final Section 4(f) Evaluation will be conducted. The findings of this Draft Section 4(f) Evaluation could be refined during Tier 2 if additional historic and/or archaeological resources are identified at that time. Tier 2 activities will include examination of means to avoid, mitigate, and/or minimize harm to protected resources.

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
Multiple Counties					
1	Juan Bautista de Anza National Historic Trail	Recreation trail (multi-state)	Santa Cruz, Pima, Pinal, and Maricopa counties, Arizona (part of 1,200-mile multi-state historic trail); Santa Cruz County: 4.5 miles between Tumacacori National Historical Park to Tubac Presidio State Historic Park; Pima County: Elephant Road to Torres Blanca Golf Club (approx. 7 miles), on the east side of and parallel to I-19; part of Pinal County-adopted and proposed 80-mile corridor (TR-2); 13 miles in Maricopa County on BLM land co-aligned with Mormon Battalion Trail and Butterfield Overland Mail Route at Butterfield Pass	National Park Service (NPS) administers; implemented by other government agencies, including counties, private nonprofits (such as the Anza Trail Foundation), and private citizens	A commemorative route of the de Anza expeditions; Study Area includes existing and proposed trail segments, including walking, auto, and off-road elements

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
Santa Cruz County					
2	Nogales Recreation Area and existing/planned critical habitat areas (portion of Coronado National Forest)	Recreation area	303 Old Tucson Road, Nogales, AZ	US Department of Agriculture (USDA), Forest Service owns land	Forest is 1.7 million acres; resource management for multiple uses (forest, mining, range grazing, wilderness, recreation); areas developed for recreation are not close to I-19; critical wildlife habitat areas – this area was identified in the recent EIS for determining motorized and non-motorized access. Roadless areas or wilderness: Pajarita and Mount. Wrightson
Pima County					
3	Tubac Presidio State Historic Park	Public park	1 Burrue Street, Tubac, AZ 85646	AZ State Parks	8 acres, historical interpretation
4	Historic Hacienda de la Canoa (Raul M. Grijalva Canoa Ranch Conservation Park)	Historic site and recreation area	5375 S. I-19 Frontage Road, Green Valley, AZ	Pima County	4,800 acres, historical and natural resources preservation and interpretation
5	Canoa Preserve Park	Public park	35 S. Camino de la Canoa, Green Valley, AZ	Pima County	6 acres, baseball fields, ramada with picnic table
6	Quail Creek Veterans Municipal Park	Public park	1905 N. Old Nogales Highway, Sahuarita, AZ	Town of Sahuarita	25 acres, playground, picnic area, walking paths, dog area
7	Parque Los Arroyos	Public park	18225 South Avenida Arroyo Seco, Sahuarita, AZ	Town of Sahuarita	7 acres, playground, basketball court, picnic areas

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
8	Anamax Park	Public park	17501 South Camino Royale De Las Quintas, Sahuarita, AZ	Town of Sahuarita	42 acres, recreation center, ball fields, dog park
9	Sahuarita Lake Park	Public park	15466 S. Rancho Sahuarita Boulevard, Sahuarita, AZ	Town of Sahuarita	15 acres with lake, boating, pathway, amphitheater, gazebos
10	North Santa Cruz Park	Public park	14455 S. Rancho Sahuarita Blvd, Sahuarita, AZ	Town of Sahuarita	15 acres, ball fields, skating and playground areas, picnic facilities, pathway, restrooms
11	Summit Park	Public park	1800 East Summit Street, Tucson, AZ	Pima County	9 acres, ball fields, picnic area, playground
12	Star Valley Park	Public park	6852 West Brightwater Way, Tucson, AZ	Pima County	14 acres, basketball court, dog park, trails, picnic areas, playgrounds
13	Lawrence Park	Public park	6777 South Mark Road, Tucson, AZ	Pima County	30 acres, ball fields, playground, picnic areas, path
14	Mission Ridge Park	Public park	3121 West Tucker Street, Tucson, AZ	Pima County	6 acres, ball fields, picnic area
15	Ebonee Marie Moody Park	Public park	6925 South Cardinal Avenue, Tucson, AZ	Pima County	5 acres, ball fields, playground, picnic area, horseshoes
16	Pima Community College, Desert Vista Campus	Public access to recreation facilities	5901 South Calle Santa Cruz, Tucson, AZ	City of Tucson	4.6 acres, fitness center and ball fields
17	Mission Manor Park	Public park	701 West Calle Ramona, Tucson, AZ	City of Tucson	6 acres, ball fields adjacent to Mission Manor Elementary School

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
18	CSM Martin "Gunny" Barreras Memorial Park (formerly Sunnyside Park)	Public park	5811 South Del Moral Boulevard, Tucson, AZ	City of Tucson and Sunnyside Unified School District	33 acres, ball fields adjacent to Sunnyside District School
19	Branding Iron Park	Public park	5900 Branding Iron Circle, Tucson, AZ	Pima County	2 acres, basketball court, picnic area, swings
20	Oak Tree Park	Public park	5433 South Oak Tree Drive, Tucson, AZ	City of Tucson	8 acres, ball fields, ball court
21	Winston Reynolds – Manzanita District Park	Public park	5200 South Westover Avenue, Tucson, AZ	Pima County	69 acres, community center, pool
22	TMC	Wildlife travel corridor	West of Tucson Mountain Wildlife Area, Pima County, AZ	Owned and managed by Bureau of Reclamation (Reclamation) in cooperation with the US Fish and Wildlife Service (USFWS), Arizona Game and Fish Commission, and Pima County (funding by Reclamation)	2,514 acres, restore and conserve wildlife population in Tucson Mountains by providing for wildlife travel on public lands and across the Central Arizona Project (CAP) aqueduct
23	Santa Cruz River Park	Public park	West of I-10, Tucson	Pima County	459 acres, trails, play equipment

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
24	Robles Pass at Tucson Mountain Park	Public park	3500 West River Road, Tucson, AZ	Pima County	992 acres, mountain biking trails
25	La Mar Park	Public park	900 West Lincoln Street, Tucson, AZ	City of Tucson	3 acres, playground
26	Tucson Mountain Park	Public park	2451 West McCain Loop, Tucson, AZ	Pima County	19,308 acres, camping, trails, shooting range, overlook
27	John F. Kennedy Park	Public park	3700 South Mission Road, Tucson, AZ	City of Tucson	163 acres, pool, ball fields, play equipment
28	St. John's School Skate Park	Public park	602 West Ajo Way, Tucson, AZ	City of Tucson	4 acres, skate park
29	Julian Wash Greenway	Public trail	South side of Tucson, along and across I-10, Tucson, AZ	City of Tucson	14 miles, paved multi-use trail
30	Julian Wash Archaeological Park	Public park	2820 South 12th Avenue, Tucson, AZ	City of Tucson	9 acres, sculpture garden
31	El Paso and Southwestern Greenway (planned trail)	Planned trail	Former railroad corridor between Downtown Tucson and Kino Sports Complex, South Tucson, AZ	City of Tucson	4 miles, planned multi-use historic interpretation and recreation trail
32	Vista Del Pueblo Park	Public park	1800 W. San Marcos Boulevard, Tucson, AZ	City of Tucson	2.8 acres, playground, open space
33	Ormsby Park	Public park	1401 South Verdugo Avenue, Tucson, AZ	City of Tucson	6 acres, ball fields, ball courts, playground, picnic area
34	Ochoa Park	Public park	3457 North Fairview Avenue, Tucson, AZ	City of Tucson	0.7 acre, ball fields, picnic area
35	Santa Rita Park	Public park	South 3rd Avenue, Tucson, AZ	City of Tucson	22 acres, ball fields, skate park

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
36	Tumamoc Preserve	Nature preserve and National Historical Landmark	Off West Anklam Road, just west of North Silverbell Road, Pima County, AZ	University of Arizona	860 acres, site of the Desert Botanical Laboratory of the Carnegie Institution of Washington, prehistoric resources, natural resources conservation, public access
37	Sentinel Peak Park	Public park	1000 Sentinel Peak Road, South Tucson, AZ	City of Tucson	373 acres, mountaintop views, gazebo
38	Verdugo Park	Public park	South Verdugo Avenue, Tucson, AZ	City of Tucson	0.8 acre, playground
39	Santa Rosa Park	Public park	1055 South 10th Avenue, Tucson, AZ	City of Tucson	8 acres, ball fields, ball courts
40	Parque De Orlando Y Diego Mendoza	Public park	18th Street and 8th Avenue, Tucson, AZ	City of Tucson	0.3 acre, memorial plaque, and seating
41	El Paso and Southwestern Greenway (existing trail)	Recreation trail	Former El Paso and Southwestern Railroad corridor, Tucson and South Tucson, AZ	City of Tucson	0.2 mile, multi-use path
42	El Parque De San Cosme	Public park	496 West Cushing Street, Tucson, AZ	City of Tucson	1 acre, gazebo. and green space
43	Rosendo S. Perez Park	Public park	424 South Main Avenue, Tucson, AZ	City of Tucson	0.2 acre, fountain, mural
44	La Pilita	Public park	420 South Main Avenue, Tucson, AZ	City of Tucson	0.2 acre, adobe building adjacent to Rosendo S. Perez Park
45	El Tiradito Wishing Shrine	Public park	400 South Main Avenue, Tucson, AZ	City of Tucson	0.1 acre, shrine
46	Garden of Gethsemane	Public park	670 West Congress Street, Tucson, AZ	City of Tucson	1.3 acres, sculpture garden

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
47	La Placita Park	Public park	West Broadway near South Church Avenue, Tucson, AZ	City of Tucson	0.4 acre, park closed, according to the City website, as of July 2017
48	Viente De Agosto Park	Public park	Congress Street and South Church Avenue, Tucson, AZ	City of Tucson	2 acres, park closed, according to the City website, as of July 2017
49	Bonita Park	Public park	20 North Bonita Avenue, Tucson, AZ	City of Tucson	1.4 acres, trail and green space along river
50	Sunset Park	Public park	255 West Alameda Street, Tucson, AZ	City of Tucson	1 acre, urban plaza, walkways, landscaping
51	El Presidio Park	Public park	160 West Alameda Street, Tucson, AZ	City of Tucson	2 acres, urban plaza, veterans memorials, rose garden, fountain, sculptures
52	Jacome Plaza	Public park	101 North Stone Avenue, Tucson, AZ	City of Tucson	2 acres, walkways, landscaping, fountain, seating
53	Christopher Franklin Carroll Centennial Park	Public park	1 West Paseo Redondo, Tucson, AZ	City of Tucson	0.1 acre, path, seating, green space, plaques
54	Presidio San Augustin Del Tucson	Public park	133 West Washington Street, Tucson, AZ	City of Tucson	0.8 acre, recreated 18th Century Spanish presidio
55	Alene Dunlap Smith Garden	Public park	355 North Granada Avenue, Tucson, AZ	City of Tucson	0.1 acre, sculpture garden
56, 57	David G. Herrera and Ramon Quiroz Park (formerly Oury Park)	Public park	600 W. Saint Mary's Road, Tucson, AZ	City of Tucson	7 acres, Oury Recreation Center, softball fields, basketball court, walking path, picnic area, play equipment
58	Greasewood Park	Public park	1075 North Greasewood Road, Tucson, AZ	City of Tucson	152 acres, natural resources preservation and orienteering



**Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area
(Continued)**

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
59	Estevan Park	Public park	1001 North Main Avenue, Tucson, AZ	City of Tucson	8 acres, ball fields, ball courts, picnic area, playground
60	Feliz Paseos Park	Public park	1600 North Camino de Oeste, Tucson, AZ	Pima County	57 acres, environmental education, trails
61	Joachim Murrieta Park	Public park	1400 North Silverbell Road, Tucson, AZ	City of Tucson	51 acres, ball fields
62	Francesco Elias Esquer Park	Public park	1331 North 14th Avenue, Tucson, AZ	City of Tucson	6 acres, playground, ramada
63	Manuel Valenzuela Alvarez Park	Public park	1945 North Calle Central, Tucson, AZ	City of Tucson	0.2 acre, playground
64	SNP	Public park	3693 S. Old Spanish Road, Tucson, AZ	NPS	91,327 acres total, including approximately 25,000 acres for SNP West, historic and nature resource preservation, recreation (not an historic property)
65	Juhan Park	Public park	1770 West Copper Street, Tucson, AZ	City of Tucson	15 acres, ball fields
66	Silverbell Golf Course	Public recreation facility	3600 N. Silverbell Road, Tucson, AZ	City of Tucson	327 acres, golf course
67	Jacobs Park	Public park	3300 North Fairview Avenue, Tucson, AZ	City of Tucson	48 acres, ball fields, pool, picnic area, playground
68	Sweetwater Preserve	Wildlife preserve	4001 North Tortolita Road, Tucson, AZ	Pima County	891 acres, of preserved land, multi-use trails
69	Sweetwater Wetlands Park	Water treatment facility with public access and education	Sweetwater Drive, Tucson, AZ	City of Tucson	58 acres, pathways, environmental education, nature observation, wastewater recharge

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
70	Christopher Columbus Park	Public park	4600 North Silverbell Road, Tucson, AZ	City of Tucson	277 acres, fishing lake, paths, dog park
71	Flowing Wells Park	Public park	5510 North Shannon Road, Tucson, AZ	Pima County	26 acres, ball fields, dog park, picnic areas, playgrounds
72	Dan Felix Memorial Park (formerly Peglar Wash Park)	Public park	5790 North Camino de la Tierra, Tucson, AZ	Pima County	40 acres, ball fields, trail
73	Pima Prickly Park	Public park	3500 West River Road, Tucson, AZ	Pima County	10 acres, paths, picnic areas
74	Rillito River Park	Public park	I-10 to North Craycroft Road along Rillito River, Tucson, AZ	Pima County	6 acres, linear park
75	Richardson Park	Public park	3535 West Green Trees Drive, Tucson, AZ	Pima County	4 acres, ball fields, picnic areas, playground, ball courts
76	Ted Walker Park	Public park	6751 North Casa Grande Highway, Marana, AZ	Pima County	61 acres, Mike Jacob Sportspark (ball fields, restrooms)
77	Ann Day Community Park (formerly Northwest Park)	Public park	7601 North Mona Lisa Road, Tucson, AZ	Pima County	21 acres, ball fields, dog park, trails, open space
78	Northwest YMCA Community Center	Recreation center	7770 North Shannon Road, Tucson, AZ	Pima County	14 acres, gymnasium, ball courts, exercise facilities, activity programs
79	Canada Del Oro Christine Taylor Green Memorial River Park	Public park	North Shannon Road at the Oro River, Tucson, AZ	Pima County	26 acres, riverside trail

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
80	Denny Dunn Park	Public park	4400 West Massingale Road, Tucson, AZ	Pima County	5 acres, ball fields, playground, picnic area
81	Crossroads at Silverbell District Park	Public park	7548 North Silverbell Road, Marana, AZ	Town of Marana	48 acres, ball fields, ball courts, picnic area, playgrounds, dog park
82	Continental Reserve Community Park	Public park	8568 North Continental Reserve Loop, Marana, AZ	Town of Marana	10 acres, ball court, picnic area, playground, path
83	Sunset Pointe Park	Public park	8535 North Star Grass Drive, Tucson, AZ	Pima County	4 acres, picnic area, playground, ball field
84	El Rio Neighborhood Park	Public park	10160 North Blue Crossing Way, Marana, AZ	Town of Marana	3 acres, green space, ball court, ramada
85	Rillito Vista Park	Public park	8820 West Robinson Street, Rillito, AZ	Pima County	2 acres, ball courts, playground, picnic area
86	Santa Cruz River Park	Public park	North of El Rio, Tucson, AZ	City of Tucson	10 acres, disc golf course, trails
87	Ora Mae Harn Park	Public park	13250 North Lon Adams Road, Marana, AZ	Town of Marana	35 acres, ball fields, ball courts, picnic areas, playgrounds, community center
88	Tortolita Preserve	Public park	North Dove Mountain Road, Marana, AZ	Town of Marana	2,400 acres of preserved land for wildlife habitat, trails
89	San Lucas Community Park	Public park	14040 North Adonis Road, Marana, AZ	Town of Marana	14 acres, ball fields, ball courts, picnic areas, playgrounds, dog park
90	Anza Park	Public park	Along Santa Cruz River near Pinal County border, Tucson, AZ	Pima County	228 acres, undeveloped

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
Pinal County					
91	Picacho Peak State Park	Public park	15520 Picacho Peak Road, Picacho, AZ	Arizona State Parks	3,747 acres, Visitor Center, picnic areas, shelter, camping areas, rest rooms
92	Pinal County West/ Kortsen Park	Community park	50801 W. Highway (Hwy) 84, adjacent to Route 8, Stanfield, AZ	Pinal County	160 acres, camping, picnicking, trails
93	Palo Verde Regional Park (Pinal County Parks)	Public recreation land	Eastern edge of Monument at western County border, between AZ State Route (SR) 238 and I-8, Pinal County, AZ	Pinal County	22.810 acres of the Monument's 12.2 million acres; picnic and play areas, camping, shooting and other sports, motorized and non-motorized trails
94	Butterfield Pass Trail segment	Recreation trail	Sonoran Desert National Monument near Maricopa Mountain Pass, known as the Butterfield Pass Trail Junction off Hwy 238; co-aligned with Mormon Battalion trail route, Gila Pioneer Route and De Anza trail route, Maricopa County, AZ	BLM	31 acres, 4-wheel drive and hiking route; BLM kiosk off Hwy 238, historic markers for Butterfield Pass and Mormon Battalion Trail routes
95	Arlington Wildlife Area	State Wildlife Area, wildlife preserve	West bank of Gila River, 3.5 miles south of Arlington and 15 miles southwest of Buckeye, Maricopa County, AZ	Arizona Game and Fish Commission and other agencies	2,574 acres, wildlife habitat area, public access for hunting and fishing
96	Powers Butte Wildlife Area	Wildlife habitat	East side of Gila River, 20 miles north of Gila Bend, Maricopa County, AZ	Arizona Game and Fish Commission and other agencies	1,947 acres, wildlife habitat preservation (riparian and aquatic habitat)

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
Maricopa County					
97	Buckeye Hills Regional Park	Public park	26700 W Buckeye Hills Drive, Buckeye, AZ	Maricopa County	4,648 acres, park, restrooms
98	Robbins Butte Wildlife Area	Wildlife habitat	Both sides of Route 85, 7 miles south of Buckeye, AZ	Arizona Game and Fish Department and other agencies	5,676 acres, wildlife habitat preservation (food and nesting habitat for game birds; enhancing riparian habitat) and interpretation (170 acres under jurisdiction of Public Land Order)
98a	Public Land Order (PLO) 1015 Lands and adjacent AGFD parcels	Wildlife refuge	Lower Gila River Wildlife area	Owned by US Fish and Wildlife Service; managed by Arizona Game and Fish Department (AGFD)	Multiple, undeveloped PLO 1015 parcels are designated as "Coordination areas" under the National Wildlife Refuge Act; adjacent AGFD parcels are those that were purchased in furtherance of the Department of the Interior/AGFD Cooperative Agreement from 1954, clause 7.
99	Foothills Community Park	Public park	12795 S. Estrella Parkway, Goodyear, AZ	Town of Goodyear	18 acres, ball fields, picnic tables and barbeque grills, amphitheater, concessions, walking path
100	White Tank Mountain Regional Park	Public park	20304 W. White Tank Mountain Road, Waddell, AZ	Maricopa County	29,200 acres, nature center, picnicking, hiking, biking, horseback riding, camping
100a	Skyline Regional Park	Public park and preserved land	2600 North Watson Road, Buckeye, AZ	BLM owned; managed by City of Buckeye	7,700 acres, trails, campsites, interpretive programs

Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
101	Vulture Mountains Recreation Management Zone (RMZ)	Recreation areas within larger BLM land holding to be developed	South of US Hwy 60 Wickenburg, AZ	BLM	70,452 acres, hiking and off-highway vehicle trails, picnic and camping areas; master-planned amenities include: multi-use trails, motorized uses, equestrian uses, picnicking, camping, day use, archery, interpretive/educational uses, wildlife and nature viewing, historical interpretation, hunting, geocaching, and other miscellaneous uses; County-planned recreation areas in a proposed lease area; contains a designated multi-use corridor that allows for non-conservation uses
102	Hassayampa River Preserve	Nature preserve with public access	West side of US 60 from N. Garden City Road to N. 100th Avenue, Maricopa County, AZ	The Nature Conservancy in partnership with Maricopa County Parks and Recreation Department	770 acres, nature preserve (planned component of Vulture Mountains RMZ with public access for hiking, walking, wildlife viewing. The Nature Conservancy to place conservation easement to protect natural values.
103	Wishing Well Park	Public park	Wickenburg Way at US 60/US 93 roundabout, Wickenburg, AZ	Town of Wickenburg	1 acre, wishing well, Hassayampa River Walk pedestrian bridge, event facility
104	Hassayampa River Walk	Public park	Bridge over Hassayampa River at US 60/US 93 roundabout, Wickenburg, AZ	Town of Wickenburg	1 acre, pedestrian, bicycle, and event facility
105	Coffinger Park	Public park	Tegner Street at Swilling Avenue (west side of US 93), Wickenburg, AZ	Town of Wickenburg	13.6 acres, pool, skate park, recreation building, tennis courts, play equipment, walking path



**Table 4-1 Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area
(Continued)**

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
106	Constellation Park	Public park	1201 Constellation Road (east side of US 93), Wickenburg, AZ	Town of Wickenburg	311 acres, campgrounds, rodeo grounds, shooting range
Yavapai County					
	None found				

SOURCES: Online information obtained from websites provided by federal (BLM, Reclamation, USDA, USFWS, US Forest Service, and NPS), state (Arizona Game and Fish Commission and Arizona State Parks), county (Pima, Pinal, Maricopa, Santa Cruz, and Yavapai) and municipal (City of Buckeye, Town of Goodyear, City of Nogales, Town of Sahuarita, Town of Marana, City of Tucson, and Town of Wickenburg) agencies with jurisdiction as well as by The Nature Conservancy. Accessed June and July 2017.

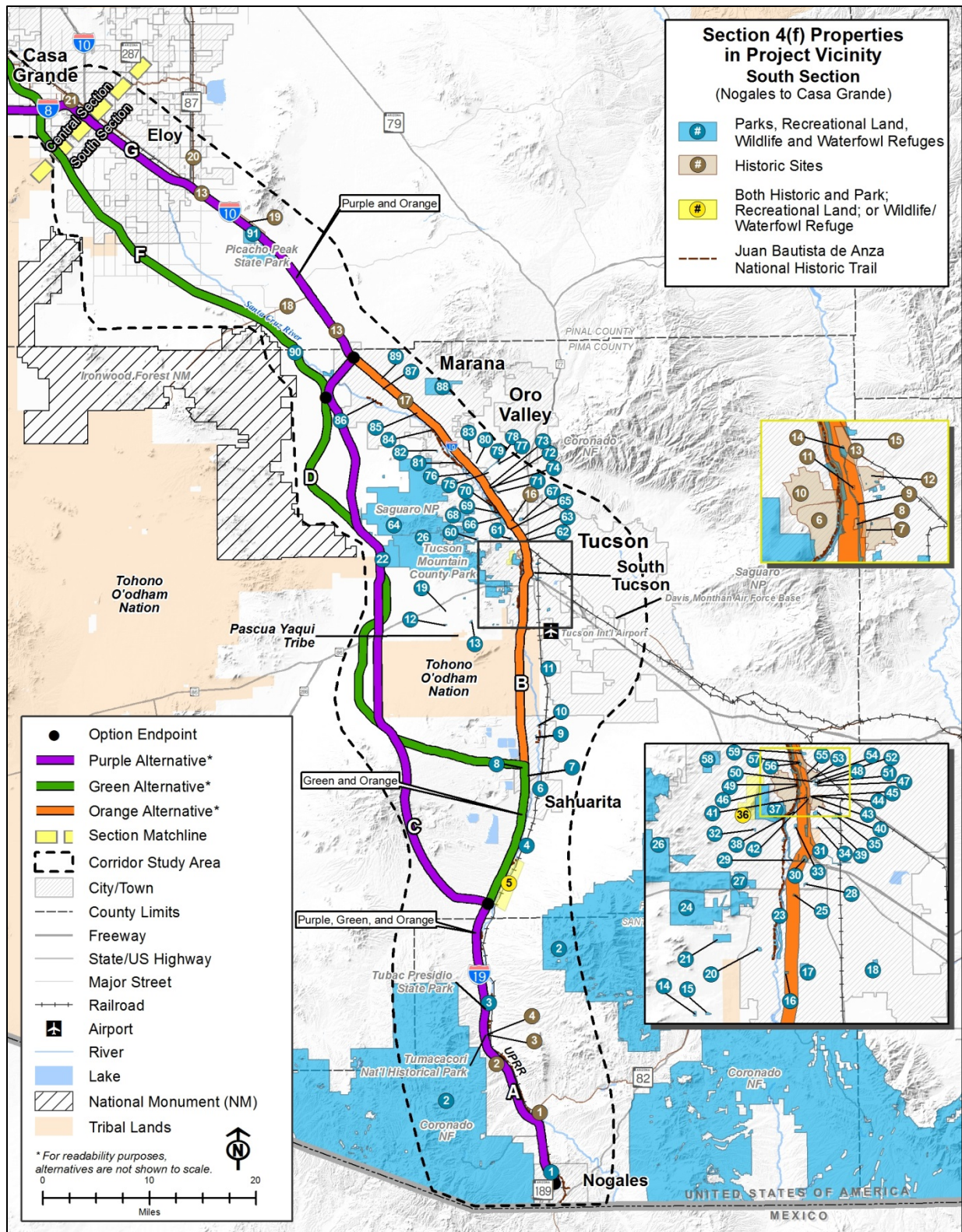


Figure 4-4 Section 4(f) Properties in the Study Area

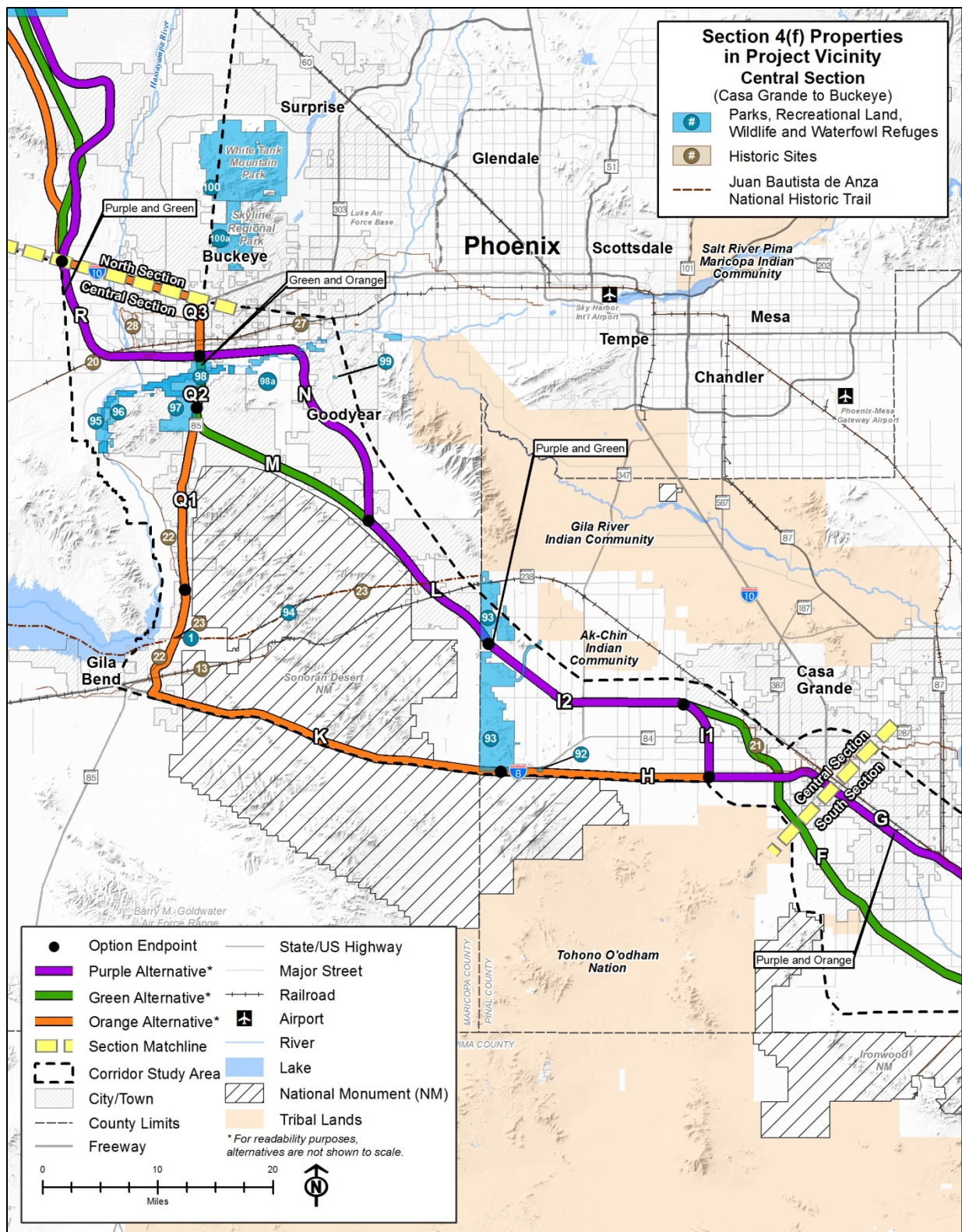


Figure 4-4 Section 4(f) Properties in the Study Area (Continued)

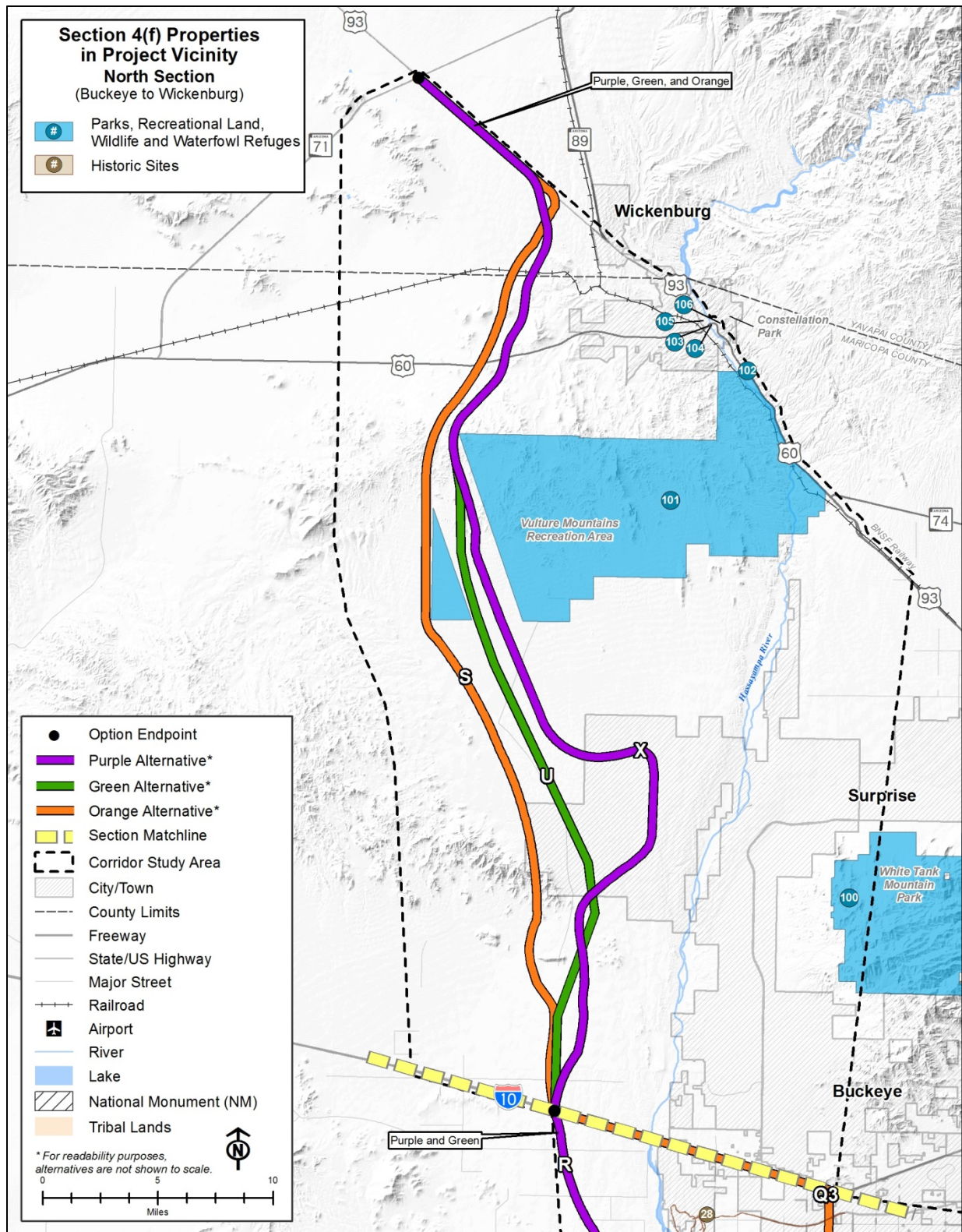


Figure 4-4 Section 4(f) Properties in the Study Area (Continued)

Table 4-2 Historic Sites Protected by Section 4(f) in the Project Corridors

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
Multiple Counties					
13	Southern Pacific Railroad (now Union Pacific), including Phoenix Main Line (AZ A:2:40(ASM))	Historic railroad corridor (1865-1988)	Maricopa, Pinal, and Pima counties	SHPO	250 miles, some segments were determined NRHP-eligible, Criterion A for association with the expansion of rail travel
18	Arizona Southern Railroad – railroad grade AZ AA:10:19(ASM)	Historic railroad corridor (1904-1933)	Maricopa, Pinal, and Pima counties	SHPO	17 miles, some segments were determined NRHP-eligible, Criterion A for association with the movement of mined materials
Santa Cruz County					
1	New Mexico and Arizona Railroad: Nogales Branch, AZ EE:4:43(ASM)	Railroad	City of Nogales, AZ	SHPO	4 acres, historic railroad property in active use; NRHP-eligible, Criterion A for significance in railroad development
2	Otero Cemetery near Palo Parado interchange, AZ DD:8:165(ASM)	Historic site	Tubac, AZ	SHPO	0.2 acre, NRHP-eligible, Criterion A and Criterion B for significant contribution to area settlement history
3, 4	Tumacacori National Monument and Museum (National Historical Park)	Historic site (three 17th and 18th Century missions and museum complex)	1895 E. Frontage Road, Tumacacori, AZ 85640	NPS	360 acres, historical and natural resources conservation and interpretation; NHL-listed, 1987, Criterion A for association with Spanish Colonial Jesuit mission period (17th and 18th centuries) and Criterion C for Mission and Spanish Colonial architecture

Table 4-2 Historic Sites Protected by Section 4(f) in the Project Corridors (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
Pima County					
5	Canoa Ranch Rural Historic District (Hacienda de la Canoa, Raul M. Grijalva Canoa Ranch Conservation Park)	Historic site (1912-1951) and recreation area	5375 S. I-19 Frontage Road, Green Valley, AZ	SHPO	4,700 acres, NRHP-listed, 2016, Criterion A for association with cattle ranching in AZ and Criterion C for cluster of features associated with the headquarters of an early ranching and agriculture operation
6	Agustin del Tucson Mission site, AZ BB:13:6(ASM)	Homestead	City of Tucson, AZ	SHPO	194 acres, reconstructed wall, garden; NRHP-eligible, Criterion A for significance as mission settlement
38	Tumamoc Preserve	National Historical Landmark and nature preserve	Off West Anklam Road, just west of North Silverbell Road, Pima County, AZ	University of Arizona	860 acres, site of the Desert Botanical Laboratory of the Carnegie Institution of Washington, prehistoric resources, natural resources conservation, public access
7	Barrio El Hoyo Historic District	Historic neighborhood (1908-1950)	Bounded by W. Cushing Street, W. 18th Street, S. 11th Avenue, and S. Samaniego Avenue, Tucson, AZ	SHPO	18 acres, NRHP-listed in 2008, Criterion A as an early garden neighborhood along the Santa Cruz River, Criterion C for its collection of residential structures built from 1908 to 1950 in the Sonoran style

Table 4-2 Historic Sites Protected by Section 4(f) in the Project Corridors (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
8	Barrio El Membrillo Historic District	Historic neighborhood (1920s)	Bounded by W. Granada Street, W. Simpson Street, and right-of-way (ROW) of former El Paso and Southwestern Railroad corridor, Tucson, AZ	SHPO	5 acres, NRHP-listed in 2009, Criterion A as an historic Hispanic neighborhood along the Santa Cruz River, Criterion C for its collection of residential structures built in the 1920s in the Sonoran style
9	El Paso and Southwestern Railroad District	Historic linear corridor (1913), with a depot, a roundhouse, a yard office building, a livestock exchange building, and four bridges	419 West Congress Street, Tucson, AZ	SHPO	48-acre corridor, including railroad grade, depot building and roundhouse; District was determined eligible under Criterion A for association with railroad transportation and mining; Depot was NRHP-listed in 2004, Criterion A (same as District) and Criterion C for its Classical Revival style.
10	Menlo Park Historic District	Historic neighborhood (1877-1964)	Bounded around intersection of Grande Avenue and W. Congress Street, Tucson, AZ	SHPO	221 acres, NRHP-listed 2010, Criterion A as an Anglo-European/American neighborhood, Criterion C for its mix of Spanish Colonial Revival, Craftsman bungalow, prairie, post-World War II ranch, and Mid-Century Modern architectural styles
11	Levi H. Manning House	Historic site (1908)	9 Paseo Redondo, Tucson, AZ (in El Presidio Historic District)	SHPO	1 acre, NRHP-listed in 1979, Criterion C for its combination of southwestern styles and association with former Tucson Mayor Levi Manning and architect Henry Trost

Table 4-2 Historic Sites Protected by Section 4(f) in the Project Corridors (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
12	Barrio El Presidio Historic District	Historic neighborhood (1860-1920)	Bounded by W. 6th and W. Alameda Streets, and N. Stone and Granada Avenues, Tucson, AZ	SHPO	48 acres, NRHP-listed 1976, Criterion A as originally an 18th Century Spanish village; subsequent Mexican village; Criterion C for architecture in Sonoran, Transitional, American Territorial, Mission Revival, and Craftsman Bungalow styles
14	Barrio Anita Historic District	Historic neighborhood (1903)	Bounded by W. Speedway Boulevard, Union Pacific Railroad, N. Granada Avenue, and St. Mary's Road	SHPO	54 acres, NRHP-listed, 2011; Criterion A began as a Hispanic barrio in 1920, named after Annie Hughes, sister of Sam Hughes; Criterion C for architecture in Sonoran, Territorial and Queen Anne styles
15	Ronstadt-Sims Warehouse	Historic site (1920)	911 N. 13th Avenue, Tucson, AZ	SHPO	0.2 acre, NRHP-listed, 1989, Criterion A for agricultural association, Criterion C for post-railroad Sonoran style and engineering technology; non-contiguous contributor to John Spring Neighborhood District and John Spring Multiple Resource Area
16	USDA Plant Materials Center	Historic site (1934)	3241 N. Romero Road, Tucson, AZ	SHPO	8 acres, NRHP-listed, 1997, Criterion A for its operation as a producer of nursery stock and seeds for regional soil stabilization and conservation projects

Table 4-2 Historic Sites Protected by Section 4(f) in the Project Corridors (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
17	Cortaro Farms Canal/Cortaro-Marana Irrigation District Canal	Historic water conduit (1920)	Town of Marana, AZ	SHPO	14 acres, NRHP-eligible, Criterion A for its significant contribution to the expansion of irrigated agriculture in the region
Pinal County					
19	Picacho Pass Skirmish Site and Overland Mail Company Station	Historic battlefield and postal station (1858-1862)	Area around Picacho Peak, 1 mile northwest of I-10 Interchange 219	SHPO	724 acres, NRHP-listed, 2002, Criterion A for association with the Battle of Picacho Peak in 1862 and for one of the stations on the Butterfield Overland Mail Route; open land with interpretive monuments and markers, portion of old mail route road
Maricopa County					
20	Southern Pacific Railroad – Phoenix Mainline (Wellton-Phoenix-Eloy Spur (AZ T:10:84(ASM)))	Historic railroad (1926)	City of Buckeye, AZ	SHPO	205 miles, some segments are NRHP-eligible, Criterion A for its association with rail travel
21	Casa Grande Canal, AZ AA:3:209(ASM)	Historic site	Pinal County, AZ	SHPO	29 miles, NRHP-eligible, Criterion A for significance as water conduit
22	Gila Bend Canal, AZ Z:2:66(ASM)	Multi-component site	Maricopa County, AZ	SHPO	35 miles, NRHP-eligible, Criterion A for significance as water conduit

Table 4-2 Historic Sites Protected by Section 4(f) in the Project Corridors (Continued)

Property # on Figures	Property Name	Classification	Address/Location	Official(s) with Jurisdiction	Features/Attributes
23	Butterfield Overland Mail Stage Route (Gila Trail Archaeological Site (AZ T:15:32(ASM)))	Historic road (1858-1861)	Segment north of Mobile; segment northeast of Gila Bend in Maricopa Mountain Pass/Butterfield Pass	SHPO	25 miles, NRHP-eligible, Criterion A for significance as remaining roadway components of the historic Butterfield postal delivery route
24	Wide Trail Site, AZ T:14:28(ASM)	Prehistoric trail with prehistoric Hohokam and Patayan pottery	Maricopa County, AZ	SHPO	NRHP-eligible, Criterion A and Criterion D for significance as prehistoric trail and artifacts
25	Three prehistoric trails, AZ T:14:94(ASM)	Prehistoric trails and rock cairns with Hohokam and Patayan artifacts	Maricopa County, AZ	SHPO	NRHP-eligible, Criterion A and Criterion D for significance as prehistoric trails and artifacts
26	Prehistoric artifacts and canal, AZ T:10:59(ASM)	Prehistoric canal with Hohokam artifacts	Maricopa County, AZ	SHPO	NRHP-eligible, Criterion A and Criterion D for significance as prehistoric canal and artifacts
27	Buckeye Canal, AZ T:10:82(ASM)	Historic site	Maricopa County, AZ	SHPO	20 miles, NRHP-eligible, Criterion A for significance as water conduit
28	Roosevelt Canal, AZ T:10:83(ASM)	Historic site	City of Buckeye, Maricopa County, AZ	SHPO	45 miles, NRHP-eligible, Criterion A for significance as water conduit
Yavapai County					
	None found				

SOURCE: Archaeological Consulting Services and Ryden Architects 2017. *Cultural Resource Technical Report for the I-11 (Nogales to Wickenburg) Tier 1 EIS*.

4.4 Assessment of Use of Section 4(f) Properties

After identifying the Section 4(f) properties in the Study Area, FHWA determined whether and to what extent each Build Corridor Alternative has the potential to incorporate land from each property. To make this determination, protected properties were identified that are partially or entirely within one or more of the 2,000-foot-wide Build Corridor Alternatives.

Then FHWA examined the potential to implement the project within each Build Corridor Alternative without permanently incorporating land from each protected property. In this process, FHWA considered three methods to avoid permanently using each property. All three would apply professional engineering judgment and consideration of other natural and built environment opportunities and constraints and are described as follows:

- **Accommodate in the corridor** – Provide an alignment within the 2,000-foot-wide Build Corridor Alternative that avoids the protected property.
- **Shift the corridor** – Shift the 2,000-foot-wide Build Corridor Alternative away from the protected property to accommodate the project without using land from the protected property.
- **Grade-separate the corridor** – In the case of linear properties (such as trails, historic canals and historic railroads), and clusters of historic properties (such as the historic districts in Downtown Tucson), a 2,000-foot-wide Build Corridor Alternative would cross over or under the protected property (such as on an elevated structure or depressed roadway section) without using land from the protected property.

FHWA also determined that, for some properties in the Study Area, no use would occur. For all other properties protected by Section 4(f), the potential use of a protected property is evaluated by defining the type of use according to the definitions and criteria described in the Section 4(f) regulations (23 CFR 774 et seq.), as summarized in Section 4.2.2.

4.4.1 No Build Alternative

The No Build Alternative represents the existing transportation system, along with committed improvement projects that are programmed for funding. Within the Study Area, the 2018-2022 Five-Year Transportation Facilities Construction Program identified several capacity improvements programmed and funded for construction on the interstate and state highway system within the Study Area by 2022. The No Build Alternative includes new capacity (additional lanes) on I-10 between Tucson and Casa Grande and conversion of US 93 to a four-lane divided highway for a 3-mile segment through Wickenburg, as shown on **Figure 2-6** (No Build Alternative Capacity Improvements). Other improvements are programmed in the following locations:

- I-10: SR 85 to Verrado Way (Maricopa County)
- I-10: Ina Road to Ruthrauff Road (Pima County);
- I-10: SR 87 to Picacho (Pinal County);
- I-10: Earley Road to I-8 (Pinal County); and
- US 93: Tegner Drive to SR 89.



1 The No Build Alternative will avoid the use of Section 4(f) properties as part of I-11.

2 **4.4.2 Build Corridor Alternatives – No Use**

3 **4.4.2.1 Section 4(f) Properties Outside Build Corridor Alternatives (No Use)**

4 There are 81 properties that fall within the Study Area but outside of all of the 2,000-foot-wide
5 Build Corridor Alternatives. These properties would not be directly used under any alternative.

6 **Table 4-3** (Section 4(f) Properties Outside the Build Corridors) lists these properties.

Table 4-3 Section 4(f) Properties Outside the Build Corridors Where No Use Would Occur

Number on Figure 4-4	Property Name
Parks, Recreation Lands, Wildlife and Waterfowl Refuges	
2	Nogales Recreation Area and existing/planned critical habitat areas (portion of Coronado National Forest)
3	Tubac Presidio State Historic Park
4	Historic Hacienda de la Canoa (Raul M. Grijalva Canoa Ranch Conservation Park)
5	Canoa Preserve Park
6	Quail Creek Veterans Municipal Park
7	Parque Los Arroyos
9	Sahuarita Lake Park
10	North Santa Cruz Park
11	Summit Park
12	Star Valley Park
13	Lawrence Park
14	Mission Ridge Park
15	Ebonee Marie Moody Park
17	Mission Manor Park
18	CSM Martin “Gunny” Barreras Memorial Park (formerly Sunnyside Park)
19	Branding Iron Park
20	Oak Tree Park
21	Winston Reynolds – Manzanita District Park
24	Robles Pass at Tucson Mountain Park
26	Tucson Mountain Park
27	John F. Kennedy Park
28	St. John’s School Skate Park
32	Vista Del Pueblo Park
33	Ormsby Park
34	Ochoa Park



Table 4-3 Section 4(f) Properties Outside Build Corridors Where No Use Would Occur (Continued)

Number on Figure 4-4	Property Name
35	Santa Rita Park
36	Tumamoc Preserve
37	Sentinel Peak Park
38	Verdugo Park
39	Santa Rosa Park
40	Parque De Orlando Y Diego Mendoza
43	Rosendo S. Perez Park
44	La Pilita
45	El Tiradito Wishing Shrine
47	La Placita Park
48	Viente De Agosto Park
50	Sunset Park
51	El Presidio Park
52	Jacome Plaza
53	Christopher Franklin Carroll Centennial Park
54	Presidio San Augustin Del Tucson
55	Alene Dunlap Smith Garden
58	Greasewood Park
60	Feliz Paseos Park
61	Joachim Murrieta Park
63	Manuel Valenzuela Alvarez Park
64	Saguaro National Park
65	Juhan Park
66	Silverbell Golf Course
67	Jacobs Park
68	Sweetwater Preserve
70	Christopher Columbus Park
71	Flowing Wells Park
72	Dan Felix Memorial Park (formerly Peglar Wash Park)
73	Pima Prickly Park
75	Richardson Park
77	Ann Day Community Park (formerly Northwest Park)
78	Northwest YMCA Community Center
80	Denny Dunn Park
81	Crossroads at Silverbell District Park



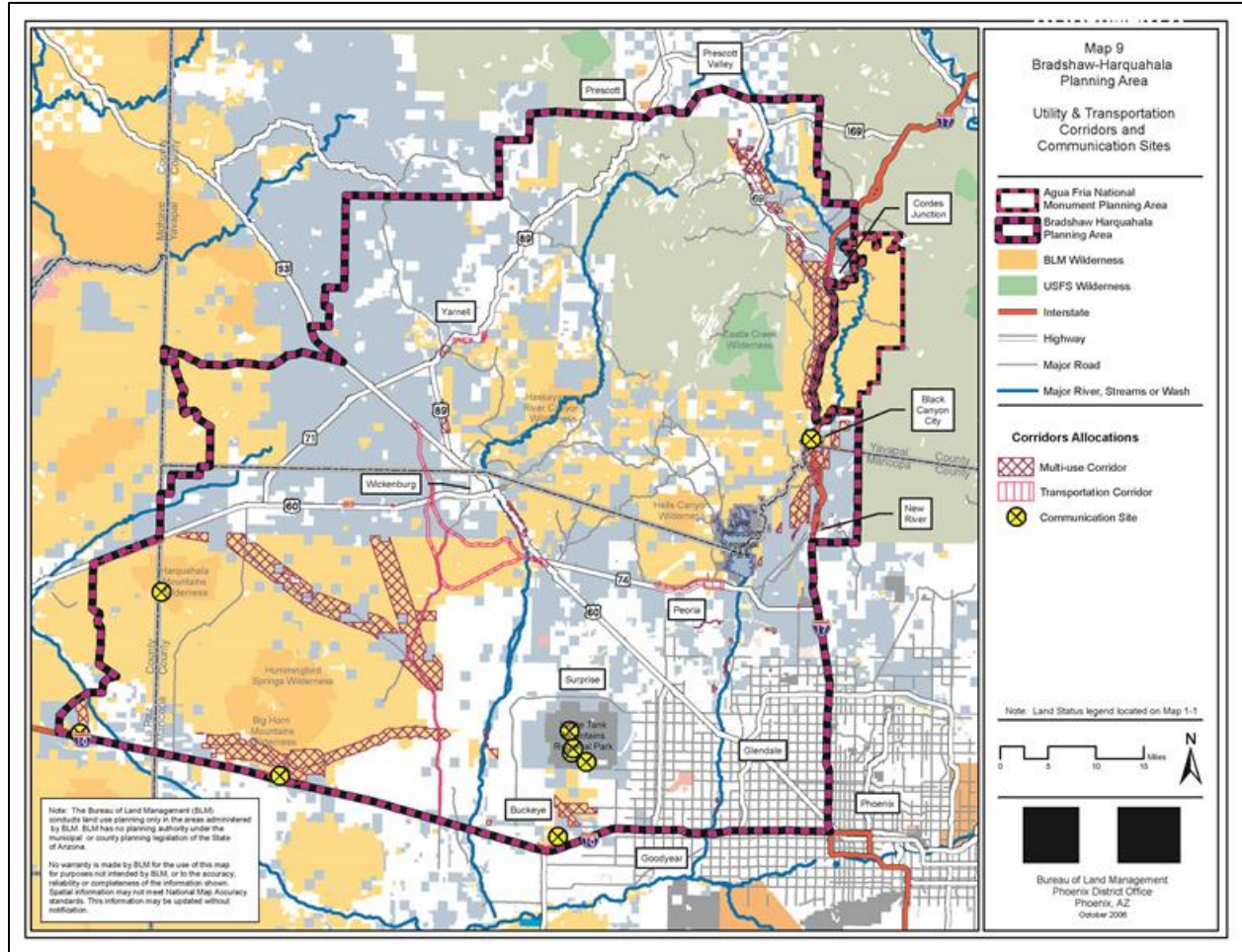
Table 4-3 Section 4(f) Properties Outside Build Corridors Where No Use Would Occur (Continued)

Number on Figure 4-4	Property Name
82	Continental Reserve Community Park
83	Sunset Pointe Park
84	El Rio Neighborhood Park
86	Santa Cruz River Park
87	Ora Mae Harn Park
88	Tortolita Preserve
89	San Lucas Community Park
90	Anza Park
94	Butterfield Pass Trail segment
95	Arlington Wildlife Area
96	Powers Butte Wildlife Area
99	Foothills Community Park
100	White Tank Mountain Regional Park
100a	Skyline Regional Park
101	Vulture Mountains RMZ
103	Wishing Well Park
104	Hassayampa River Walk
105	Coffinger Park
106	Constellation Park
Historic Sites	
38	Tumamoc Preserve
15	Ronstadt-Sims Warehouse
20	Southern Pacific Railroad – Phoenix Main Line (Wellton-Phoenix-Eloy Spur (AZ T:10:84(ASM)))

Among these properties is the BLM-owned Vulture Mountains RMZ. BLM is the official with jurisdiction over the property, which consists of approximately 70,000 acres of land south of Wickenburg, Arizona. Activities on the land are guided by two primary planning documents: the 2010 Bradshaw-Harquahala Resource Management Plan (RMP) and the 2012 RMZ Plan. The RMP is relevant to I-11 because it identifies how and where activities can occur on the Vulture Mountains RMZ property; the RMZ is relevant to I-11 because it provides the framework for implementing activities. The relevant aspects of each plan are briefly described as follows:

- Bradshaw-Harquahala RMP** – The RMP provides guidance to the Hassayampa Field Office of the BLM regarding current and future management decisions for Vulture Mountains RMZ. The RMP designates a number of multi-use corridors, including the north-south multi-use corridor that crosses the western portion of the Vulture Mountains RMZ property (**Figure 4-5** [Bradshaw-Harquahala Planning Area Map]). Multi-use corridors are defined in the RMP as

- 1 being for major utilities and regionally significant transportation uses. The RMP specifies
- 2 that BLM will coordinate with ADOT in advancing such transportation uses in multi-use
- 3 corridors.
- 4 FHWA has determined on the basis of the RMP that Section 4(f) does not apply to the multi-use
- 5 corridor that crosses the Vulture Mountains RMZ because the purpose of the multi-use corridor
- 6 is to co-locate utilities and transportation infrastructure (**Figure 4-6** [Build Corridor Alternatives
- 7 near Vulture Mountains RMZ]). BLM concurred with FHWA's determination on April 30, 2018
- 8 (**Appendix F**).



SOURCE: BLM, *Agua Fria National Monument and Bradshaw-Harquahala Resource Management Plan/Record of Decision*. April 22, 2010.

Figure 4-5 Bradshaw-Harquahala Planning Area Map

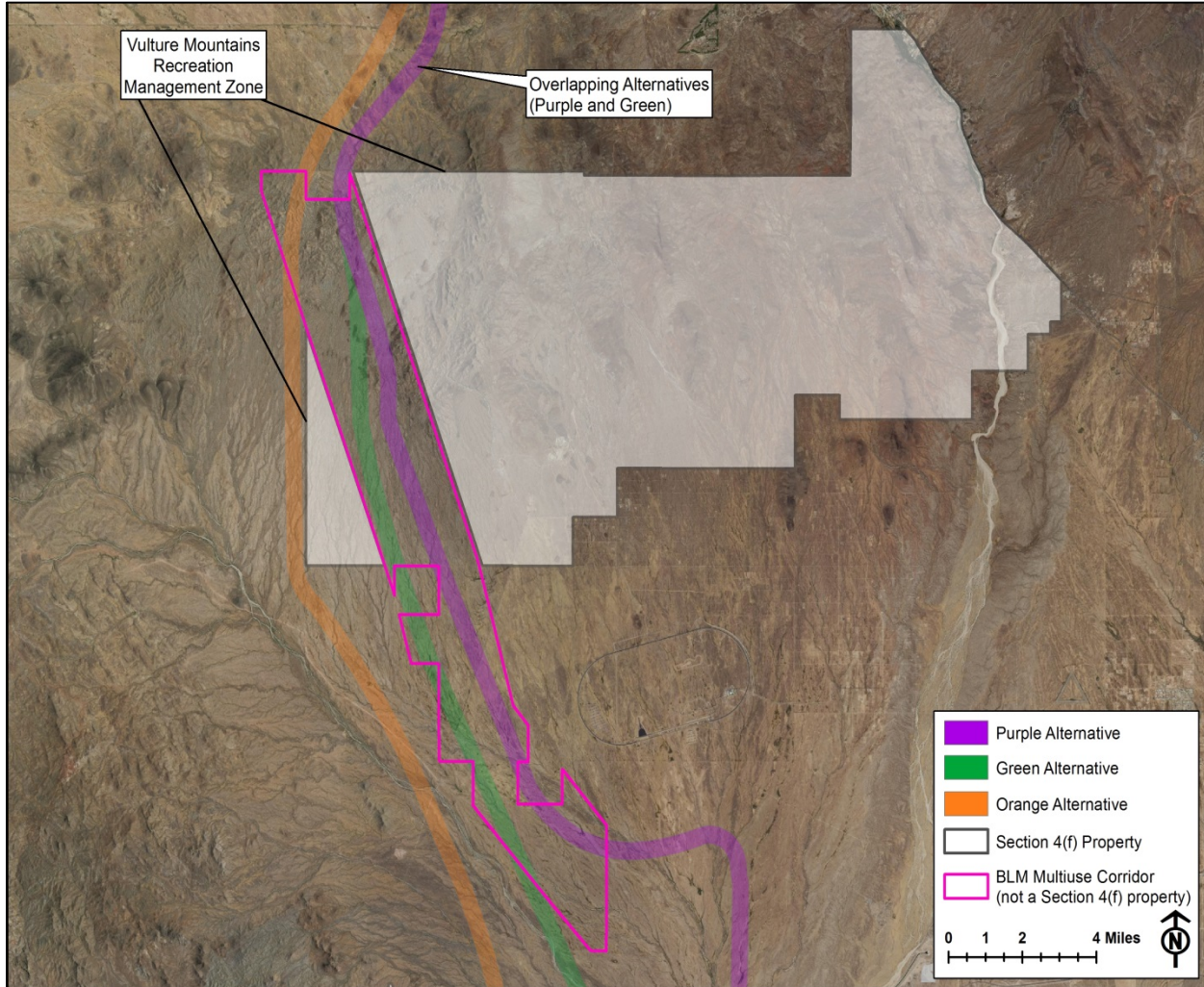


Figure 4-6 Build Corridor Alternatives near Vulture Mountains RMZ



FHWA, ADOT, and BLM initiated coordination regarding Vulture Mountains RMZ during scoping for I-11. During development and evaluation of the alternative corridors, FHWA and ADOT continued to coordinate with BLM in regard to Vulture Mountains RMZ. In this coordination, corridor alignments inside and outside the multi-use corridor were discussed. The BLM discouraged alignments across the property and outside the multi-use corridor, noting the mission of the property to protect natural resources and provide recreation opportunities (see **Table 4-7** [Summary of Comments from Officials with Jurisdiction over Section 4(f) Properties] [located at the end of this chapter] and **Appendix F**).

Through coordination with BLM, FHWA and ADOT developed Options X and U, Corridor Options that would be located within the multi-use corridor across the Vulture Mountains RMZ property. Options X and U, when applied to the Purple and Green Alternatives, would provide the opportunity for these alternatives to avoid a use of the Vulture Mountains RMZ. In addition, and consistent with 23 CFR 774.7(e)(1), opportunities to minimize harm to the property at subsequent stages in the project development process (for example, Tier 2), are not precluded. At this preliminary level of planning, FHWA and ADOT have identified no engineering or environmental constraints that would obstruct or preclude the ability to provide a highway alignment that achieves general engineering design standards in the multi-use corridor. As a result of being able to avoid Vulture Mountains RMZ, no use of the property as defined by Section 4(f) would occur as a result of I-11.

The Orange Alternative (Option S) would be aligned west of and adjacent to the Vulture Mountains RMZ property such that no use of the Vulture Mountains RMZ property would occur. The BLM has stated its preference for Option S in its April 30, 2018, letter to FHWA (**Appendix F**). Consistent with 23 CFR 774.7(e)(1), opportunities to minimize harm to the property at subsequent stages in the project development process (for example, Tier 2), are not precluded. At this preliminary level of planning, FHWA and ADOT have identified no engineering or environmental constraints that would obstruct or preclude the ability to provide a highway alignment that achieves general engineering design standards west of and adjacent to the Vulture Mountains RMZ property.

4.4.2.2 Section 4(f) Properties in Build Corridors

There are 42 properties partially or entirely within one or more Build Corridor Alternatives. **Table 4-4** (Section 4(f) Properties within the Build Corridors) lists these properties and identifies the applicable corridor(s). The acreage of each property in a corridor is quantified along with the percentage of the total property in the corridor. **Figure 4-7** (Section 4(f) Properties in Build Corridor Alternatives – South Section), **Figure 4-8** (Section 4(f) Properties in Build Corridor Alternatives – Central Section), and **Figure 4-9** (Section 4(f) Properties in Build Corridor Alternatives – North Section) show the locations of the properties in relation to the Build Corridors.

Table 4-4 Section 4(f) Properties within the Build Corridors (Potential Use)

Map #	Property Name	Property Area/Percentage Inside Corridor (acres or miles [%])			Existing Property Acreage (miles for trails/green ways)	Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative		
Parks, Recreation Areas, and Wildlife and Waterfowl Areas						
Multiple Counties						
1	Juan Bautista de Anza National Historic Trail	5 miles (13%)	12 miles (30%)	24 miles (60%)	40 miles in segments	Crosses corridors (Purple, Green, and Orange)
Pima County						
8	Anamax Park	0	37 acres (88%)	33 acres (79%)	42 acres	Mostly in corridors (Green and Orange)
16	Pima Community College, Desert Vista Campus	0	0	5 acres (100%)	5	In corridor (Orange)
22	TMC	453 acres ⁽¹⁾ (15%)	453 acres ⁽¹⁾ (15%)	0	2,958	Partly in corridors (Purple and Green)
23	Santa Cruz River Park	0	0	131 acres (29%)	459 acres	In corridor (Orange)
25	La Mar Park	0	0	3 acres (100%)	3	In corridor (Orange)
29	Julian Wash Greenway	0	0	0.58 mile (4%)	14 miles	Partly in corridor (Orange)
30	Julian Wash Archaeological Park	0	0	15.8 (97%)	16.2	Mostly in corridor (Orange)
31	El Paso and Southwestern Greenway (Planned Trail)	0	0	3 miles (75%)	4 miles	Crosses corridor (Orange)
41	El Paso and Southwestern Greenway (Existing Trail)	0	0	0.2 mile (100%)	0.2 mile	Crosses corridor (Orange)

Table 4-4 Section 4(f) Properties within Build Corridors (Potential Use) (Continued)

Map #	Property Name	Property Area/Percentage Inside Corridor (acres or miles (%))			Existing Property Acreage (miles for trails/green ways)	Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative		
42	El Parque De San Cosme	0	0	1 acre (100%)	1	In corridor (Orange)
46	Garden of Gethsemane	0	0	1.3 acres (100%)	1.3	In corridor (Orange)
49	Bonita Park	0	0	1.4 acres (100%)	1.4	All within corridor (Orange)
56, 57	David G. Herrera and Ramon Quiroz Park (formerly Oury Park)	0	0	7 acres (100%)	7 acres	In corridor (Orange)
59	Estevan Park	0	0	2.3 acres (28%)	8	Partly in corridor (Orange)
62	Francesco Elias Esquer Park	0	0	0.9 acre (14%)	6	Partly in corridor (Orange)
69	Sweetwater Wetlands Park	0	0	0.9 acre (2%)	58	Partly in corridor (Orange)
74	Rillito River Park	0	0	5 (83%)	6	Mostly in corridor (Orange)
76	Ted Walker Park	0	0	42 acres (69%)	61	Partly in corridor (Orange)
79	Canada Del Oro Christine Taylor Green Memorial River Park	0	0	1.5 (6%)	26	Partly in corridor (Orange)
85	Rillito Vista Park	0	0	2 acres (100%)	2	In corridor (Orange)

Table 4-4 Section 4(f) Properties within Build Corridors (Potential Use) (Continued)

Map #	Property Name	Property Area/Percentage Inside Corridor (acres or miles (%))			Existing Property Acreage (miles for trails/green ways)	Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative		
89	San Lucas Community Park	0	0	5 acres (36%)	14	Partly in corridor (Orange)
Pinal County						
91	Picacho Peak State Park	173 acres (5%)	0	173 acres (5%)	3,747 acres	Partly in corridors (Purple and Orange)
92	Pinal County West/Kortsen Park	0	0	48 acres (30%)	160 acres	Partly in corridor (Orange)
93	Palo Verde Regional Park (Pinal County Parks)	305 acres (1%)	305 acres (1%)	427 acres (2%)	22,810 acres for recreation	Partly in corridors (Purple, Green, and Orange)
Maricopa County						
99	Buckeye Hills Regional Park	0	184 acres (4%)	345 acres (7%)	4,648 acres	Partly in corridors (Green and Orange)
98	Robbins Butte Wildlife Area	0	0, or minimal	0, or minimal	5,676	Green and Orange Alternatives can likely be accommodated within existing SR 85 ROW
98a	PLO 1015 Lands and adjacent AGFD Parcels	42 acres (0.6 %)	32 acres (0.5 acres)	32 acres (0.5 acres)	6,906 acres	Green or Orange Alternatives can likely be accommodated within existing SR 85 ROW; Purple is a new crossing

Table 4-4 Section 4(f) Properties within Build Corridors (Potential Use) (Continued)

Map #	Property Name	Property Area/Percentage Inside Corridor (acres or miles (%))			Existing Property Acreage (miles for trails/green ways)	Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative		
Historic Sites						
Multiple Counties						
13	Southern Pacific Railroad – Phoenix Mainline (Wellton-Phoenix-Eloy Spur (AZ T:10:84(ASM)))	10 miles (4%)	10 miles (4%)	10 miles (4%)	250	Crosses corridors (Purple, Green, and Orange)
18	Arizona Southern Railroad Company – railroad grade AZ AA:10:19(ASM)	1 mile (6%)	0.4 mile (2%)	1 mile (6%)	17	Crosses corridors (Purple, Green, and Orange)
Santa Cruz County						
1	New Mexico-Arizona Railroad: Nogales Branch, AZ EE:4:43(ASM)	0	0	4 acres (100%)	4	In corridor (Orange)
2	Otero Cemetery, near Palo Parado interchange, AZ DD:8:165(ASM)	0.2 acre (100%)	0.2 acres (100%)	0.2 acre (100%)	0.2	In corridors (Purple, Green, and Orange)
3, 4	Tumacacori National Monument and Museum (National Historical Park)	4 acres (1%)	4 acres (1%)	4 acres (1%)	360 acres	Partly in corridors (Purple, Green, and Orange)

Table 4-4 Section 4(f) Properties within Build Corridors (Potential Use) (Continued)

Map #	Property Name	Property Area/Percentage Inside Corridor (acres or miles (%))			Existing Property Acreage (miles for trails/green ways)	Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative		
Pima County						
5	Canoa Ranch Rural Historic District (Hacienda de la Canoa, Raul M. Grijalva Canoa Ranch Conservation Park and Canoa Ranch Rural Historic District)	0	422 acres (9%)	422 acres (9%)	4,700	Partly in corridors (Green and Orange)
6	Agustin del Tucson Mission site, AZ BB:13:6(ASM)	0	0	6.2 acres (3%)	194	Partly in corridor (Orange)
7	Barrio El Hoyo Historic District	0	0	8 acres (44%)	18	Partly in corridor (Orange)
8	Barrio El Membrillo Historic District	0	0	5 acres (100%)	5	In corridor (Orange)
9	El Paso and Southwestern Railroad District	0	0	42 acres (88%)	48	In corridor (Orange)
10	Menlo Park Historic District	0	0	3 acres (1%)	221	Partly in corridor (Orange)
11	Levi H. Manning House	0	0	3 acres (100%)	3	In corridor (Orange)
12	Barrio El Presidio Historic District	0	0	3 acres (6%)	48	Partly in corridor (Orange)
14	Barrio Anita Historic District	0	0	46 acres (85%)	54	Partly in corridor (Orange)

Table 4-4 Section 4(f) Properties within Build Corridors (Potential Use) (Continued)

Map #	Property Name	Property Area/Percentage Inside Corridor (acres or miles (%))			Existing Property Acreage (miles for trails/green ways)	Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative		
16	USDA Plant Materials Center	0	0	6 acres (75%)	8	Partly in corridor (Orange)
17	Cortaro Farms/Cortaro-Marana Irrigation District Canal	0.2 mile (1%)	0	12 miles (86%)	14	Crosses corridor (Purple); partly within corridor (Orange)
Pinal County						
19	Picacho Pass Skirmish Site and Overland Mail Company Station	35 acres (5%)	0	35 acres (5%)	724	Partly in corridors (Purple and Orange)
Maricopa County						
21	Casa Grande Canal, AZ AA:3:209(ASM)	1 mile (3%)	1 mile (3%)	1 mile (3%)	29	Crosses corridors (Purple, Green, and Orange)
22	Gila Bend Canal, AZ Z:2:66(ASM)	0	0	0.2 mile ($<1\%$)	35	Crosses corridor (Orange)
23	Butterfield Overland Mail Stage Route (Gila Trail Archaeological Site (AZ T:15:32(ASM)))	0.4 mile (2%)	0.4 miles (2%)	0.4 mile (2%)	25	Crosses corridors (Purple, Green, and Orange)
24	Wide Trail Site, AZ T:14:28(ASM)	0	0	6.8 acres (98%)	6.9	Mostly in corridor (Orange)
25	Three prehistoric trails, AZ T:14:94(ASM)	0	0	3.2 acres (100%)	3.2	In corridor (Orange)
26	Prehistoric artifacts and canal, AZ T:10:59(ASM)	0	1.7 acres (30%)	1.7 acres (30%)	5.6	Partly in corridors (Green and Orange)

Table 4-4 Section 4(f) Properties within Build Corridors (Potential Use) (Continued)

Map #	Property Name	Property Area/Percentage Inside Corridor (acres or miles (%))			Existing Property Acreage (miles for trails/green ways)	Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative		
27	Buckeye Canal, AZ T:10:82(ASM)	1 mile (6%)	1 mile (6%)	0.4 mile (2%)	20	Crosses corridors (Purple, Green, and Orange)
28	Roosevelt Canal, AZ T:10:83(ASM)	0	0	0.4 mile (1%)	45	Crosses corridor (Orange)
Numbers of Properties:						
Total Properties partly or entirely within each corridor		7	10	41		
Total corridor crossings of properties (trails, canals and railroads)		7	6	11		

SOURCE: AECOM 2017.

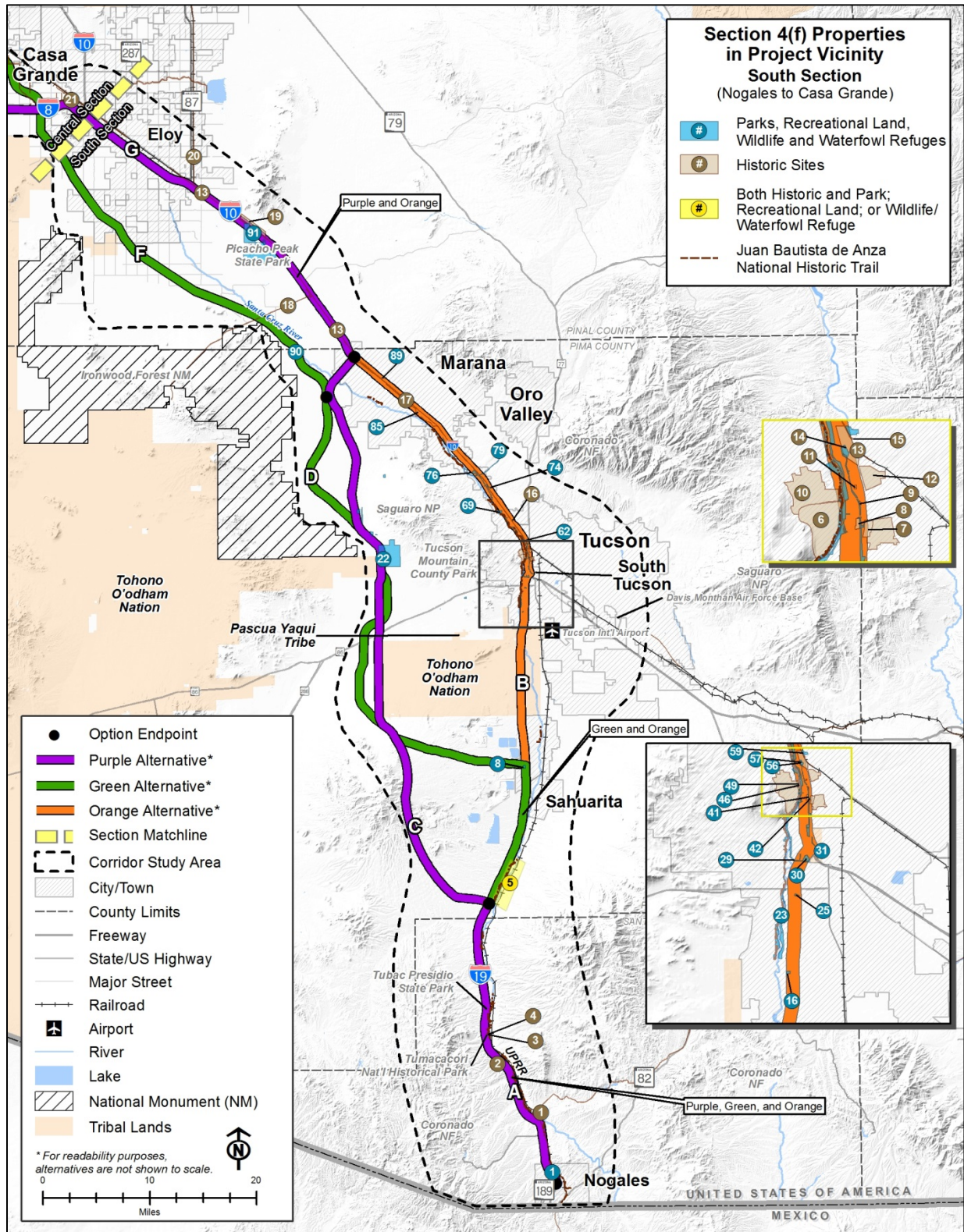


Figure 4-7 Section 4(f) Properties in Build Corridor Alternatives – South Section

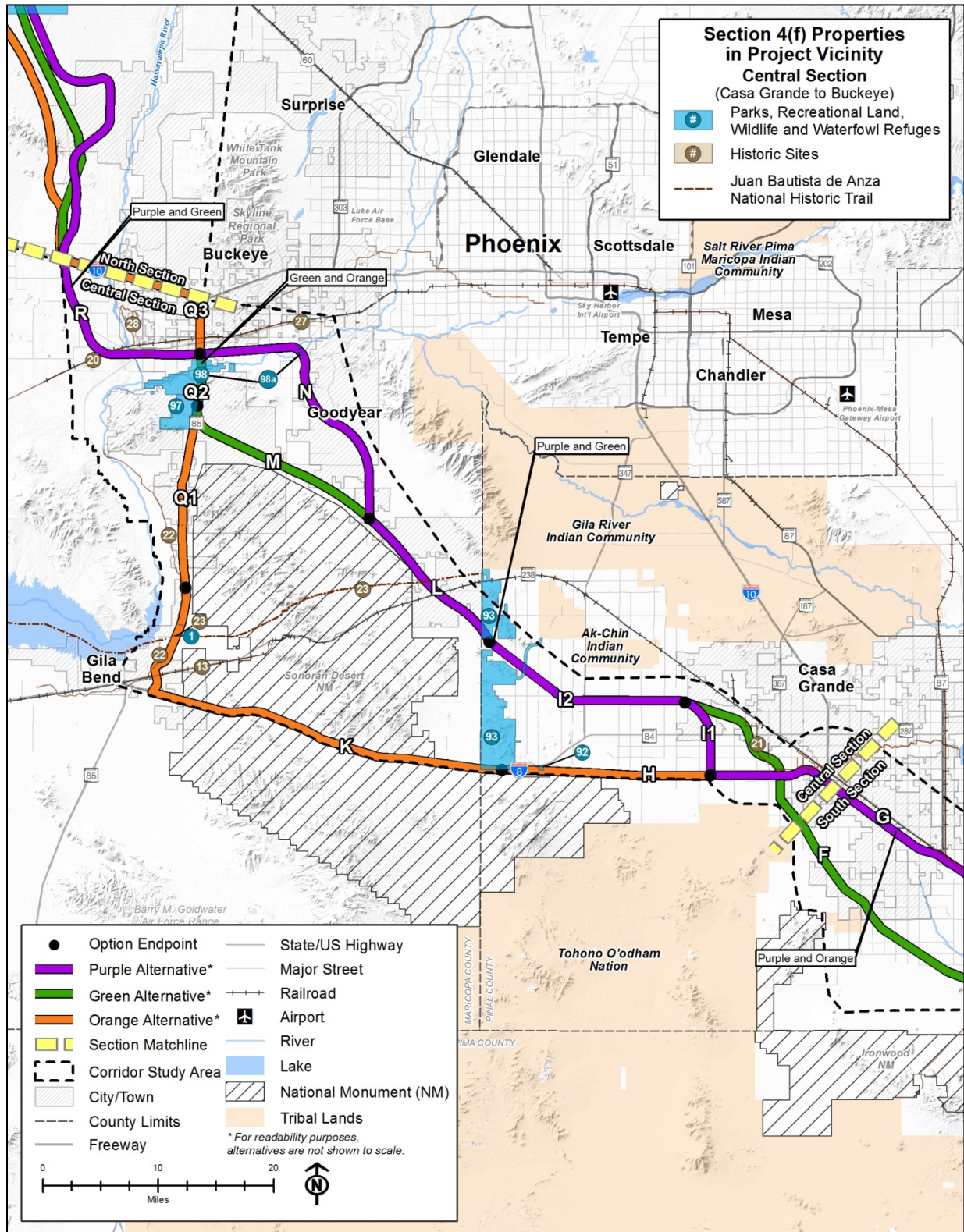


Figure 4-8 Section 4(f) Properties in Build Corridor Alternatives – Central Section

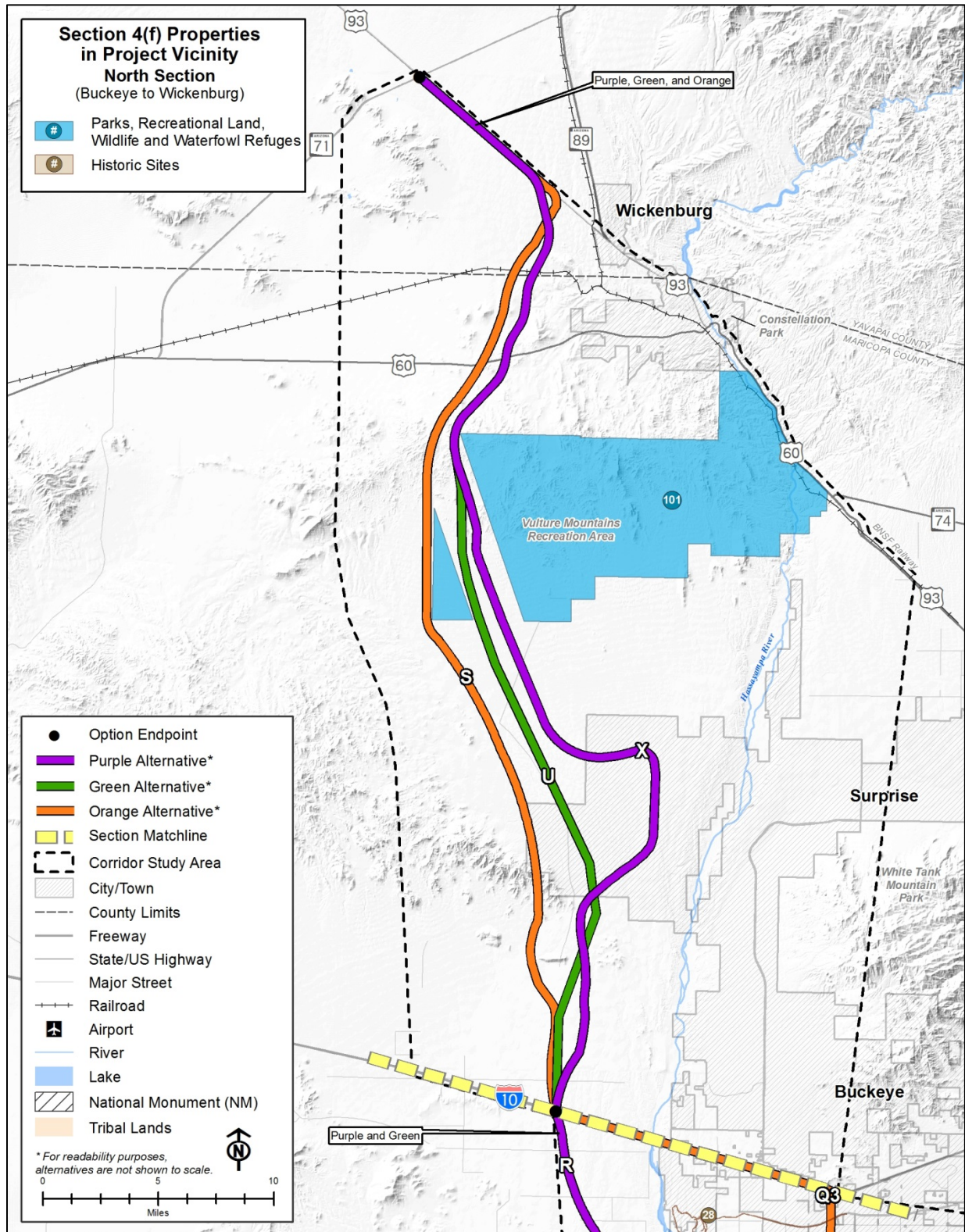


Figure 4-9 Section 4(f) Properties in Build Corridor Alternatives – North Section



The potential for use of Section 4(f) properties prompted FHWA and ADOT to assess whether, in the context of professional engineering judgment and the findings of the Draft Tier 1 EIS, permanent incorporation of land from the protected property can be avoided by alignment shifts and design changes described in this section.² This assessment was performed in accordance with the regulations of Section 4(f) regarding first-tier analysis (23 CFR 774.7(e)(1)). Specifically, FHWA and ADOT “applied all possible planning to minimize harm to the extent that the level of detail available at the first-tier EIS stage allows” in order for a preliminary Section 4(f) approval to be made.

In this assessment, FHWA and ADOT evaluated the following three methods to avoid Section 4(f) properties:

- **Accommodate in the corridor** – For properties partially or entirely within a Build Corridor Alternative, provide space for an approximately 400-foot-wide linear roadway ROW within the 2,000-foot-wide Build Corridor Alternative while avoiding the protected property.
- **Shift the corridor** – For properties that cannot be avoided by the previous method, shift the 2,000-foot-wide Build Corridor Alternative away from the protected property in order to accommodate the project and avoid the protected property.
- **Grade-separate the corridor** – In the case of linear properties (such as trails, historic canals and historic railroads) that are within a 2,000-foot-wide Build Corridor Alternative, the corridor would cross over or under the protected property (such as on an elevated structure or depressed roadway section) to avoid the protected property.

The results of this evaluation are summarized in **Table 4-5** (Summary of Use by Build Corridor Alternatives) and are described in the subsections that follow the table. During Tier 2 studies, the 2,000-foot width of a selected Build Corridor Alternative would be refined to a specific roadway alignment. At that time, the commitments made in this Preliminary Draft Section 4(f) Evaluation (such as accommodate in the corridor, shift the corridor, and grade-separate the corridor) would be included in the alignment design. Potential impacts identified in this Preliminary Draft Section 4(f) Evaluation may be avoided or minimized when a specific roadway alignment is identified. At that time, the Section 4(f) Evaluations will analyze the specific roadway alignment for potential uses of Section 4(f)-protected properties including historic sites determined to be eligible during the Section 106 process.

The Section 4(f) properties listed in **Table 4-5** (Summary of Use by Build Corridor Alternatives) that are to be avoided may be impacted if additional Section 4(f) properties area discovered during the Tier 2 process.

² An alignment shift is the rerouting of a portion of I-11 to a different alignment within the 2,000-foot-wide corridor to avoid the potential use of a specific property. A design change is a modification of the proposed design in a manner that would avoid impacts.

Table 4-5 Summary of Use by Build Corridor Alternatives

Map #	Property Name	Summary of Use Findings			Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative	
Parks, Recreation Areas, and Wildlife and Waterfowl Areas					
Multiple Counties					
1	Juan Bautista de Anza National Historic Trail	No use – grade-separate	No use – grade-separate	No use – grade-separate	Crosses corridors (Purple, Green, and Orange)
Pima County					
8	Anamax Park	No use – outside corridor	No use – shift corridor	No use – shift corridor	Mostly in corridors (Green and Orange)
16	Pima Community College, Desert Vista Campus	No use – outside corridor	No use – outside corridor	No use – accommodate	In corridor (Orange)
22	TMC	Use – net benefit	Use – net benefit	No use – outside corridor	Partly in corridors (Purple and Green)
23	Santa Cruz River Park	No use – outside corridor	No use – outside corridor	Potential use	In corridor (Orange)
25	La Mar Park	No use – outside corridor	No use – outside corridor	No use – accommodate	In corridor (Orange)
29	Julian Wash Greenway	No use – outside corridor	No use – outside corridor	No use – grade-separate	Partly in corridor (Orange)
30	Julian Wash Archaeological Park	No use – outside corridor	No use – outside corridor	No use – accommodate	Mostly in corridor (Orange)
31	El Paso and Southwestern Greenway (Planned Trail)	No use – outside corridor	No use – outside corridor	No use – grade-separate	Crosses corridor (Orange)
41	El Paso and Southwestern Greenway (Existing Trail)	No use – outside corridor	No use – outside corridor	Potential use	Crosses corridor (Orange)

Table 4-5 Summary of Use by Build Corridor Alternatives (Continued)

Map #	Property Name	Summary of Use Findings			Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative	
42	El Parque De San Cosme	No use – outside corridor	No use – outside corridor	No use-accommodate	In corridor (Orange)
46	Garden of Gethsemane	No use – outside corridor	No use – outside corridor	No use-accommodate	In corridor (Orange)
49	Bonita Park	No use – outside corridor	No use – outside corridor	No use -accommodate	All within corridor (Orange)
56, 57	David G. Herrera and Ramon Quiroz Park (formerly Oury Park)	No use – outside corridor	No use – outside corridor	Potential use	In corridor (Orange)
59	Estevan Park	No use – outside corridor	No use – outside corridor	No use-accommodate	Partly in corridor (Orange)
62	Francesco Elias Esquer Park	No use – outside corridor	No use – outside corridor	No use –accommodate	Partly in corridor (Orange)
69	Sweetwater Wetlands Park	No use – outside corridor	No use – outside corridor	No use –accommodate	Partly in corridor (Orange)
74	Rillito River Park	No use – outside corridor	No use – outside corridor	No use –accommodate; grade-separate	Mostly in corridor (Orange)
76	Ted Walker Park	No use – outside corridor	No use – outside corridor	No use –accommodate	Partly in corridor (Orange)
79	Canada Del Oro Christine Taylor Green Memorial River Park	No use – outside corridor	No use – outside corridor	No use –accommodate	Partly in corridor (Orange)
85	Rillito Vista Park	No use – outside corridor	No use – outside corridor	No use –accommodate	In corridor (Orange)
89	San Lucas Community Park	No use – outside corridor	No use – outside corridor	No use –accommodate	Partly in corridor (Orange)

Table 4-5 Summary of Use by Build Corridor Alternatives (Continued)

Map #	Property Name	Summary of Use Findings			Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative	
Pinal County					
91	Picacho Peak State Park	No use – accommodate	No use – outside corridor	No use – accommodate	Partly in corridors (Purple and Orange)
92	Pinal County West/Kortsen Park	No use – outside corridor	No use – outside corridor	No use – accommodate	Partly in corridor (Orange)
93	Palo Verde Regional Park (Pinal County Parks)	No use – shift corridor; grade separate	No use – shift corridor; grade separate	No use – accommodate	Partly in corridors (Purple, Green, and Orange)
Maricopa County					
97	Buckeye Hills Regional Park	No use – outside corridor	No use – accommodate	No use – accommodate	Partly in corridors (Green and Orange)
98	Robbins Butte Wildlife Area	No use – outside corridor	No use, or possible <i>de minimis</i> use	No use, or possible <i>de minimis</i> use	Green and Orange Alternatives can likely be accommodated within the existing SR 85 right-of-way (ROW)
98a	PLO 1015 lands and adjacent AGFD Parcels	No use - accommodate	No use – accommodate	No use – accommodate	Partly in corridors (Purple, Green, or Orange)
Historic Sites					
Multiple Counties					
13	Southern Pacific Railroad – Phoenix Mainline (Wellton-Phoenix-Eloy Spur (AZ T:10:84(ASM)))	No use – grade-separate	No use – grade-separate	No use – grade-separate	Crosses corridors (Purple, Green, and Orange)
18	Arizona Southern Railroad Company – railroad grade AZ AA:10:19(ASM)	No use – grade-separate	No use – grade-separate	No use – grade-separate	Crosses corridors (Purple, Green, and Orange)

Table 4-5 Summary of Use by Build Corridor Alternatives (Continued)

Map #	Property Name	Summary of Use Findings			Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative	
Santa Cruz County					
1	New Mexico-Arizona Railroad: Nogales Branch, AZ EE:4:43(ASM)	No use – outside corridor	No use – outside corridor	No use – grade-separate	Crosses corridor (Orange)
2	Otero Cemetery, near Palo Parado interchange, AZ DD:8:165(ASM)	No use – accommodate	No use – accommodate	No use – accommodate	In corridors (Purple, Green, and Orange)
3, 4	Tumacacori National Monument and Museum (National Historical Park)	No use – accommodate	No use – accommodate	No use – accommodate	Partly in corridors (Purple, Green, and Orange)
Pima County					
5	Canoa Ranch Rural Historic District (Hacienda de la Canoa, Raul M. Grijalva Canoa Ranch Conservation Park and Canoa Ranch Rural Historic District)	No use – outside corridor	No use – accommodate	No use – accommodate	Partly in corridors (Green and Orange)
6	Agustin del Tucson Mission site, AZ BB:13:6(ASM)	No use – outside corridor	No use – outside corridor	No use – accommodate	Partly in corridor (Orange)
7	Barrio El Hoyo Historic District	No use – outside corridor	No use – outside corridor	No use-accommodate	Partly in corridor (Orange)
8	Barrio El Membrillo Historic District	No use – outside corridor	No use – outside corridor	Potential use	In corridor (Orange)
9	El Paso and Southwestern Railroad District	No use – outside corridor	No use – outside corridor	Potential use	In corridor (Orange)

Table 4-5 Summary of Use by Build Corridor Alternatives (Continued)

Map #	Property Name	Summary of Use Findings			Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative	
10	Menlo Park Historic District	No use – outside corridor	No use – outside corridor	No use - accommodate	Partly in corridor (Orange)
11	Levi H. Manning House	No use – outside corridor	No use – outside corridor	Potential use	In corridor (Orange)
12	Barrio El Presidio Historic District	No use – outside corridor	No use – outside corridor	No use – accommodate	Partly in corridor (Orange)
14	Barrio Anita Historic District	No use – outside corridor	No use – outside corridor	Potential use	Partly in corridor (Orange)
16	USDA Plant Materials Center	No use – outside corridor	No use – outside corridor	No use – accommodate	Partly in corridor (Orange)
17	Cortaro Farms/Cortaro-Marana Irrigation District Canal	No use – grade-separate	No use – outside corridor	No use – grade-separate	Crosses corridor (Purple); partly within corridor (Orange)
Pinal County					
19	Picacho Pass Skirmish Site and Overland Mail Company Station	No use – accommodate	No use – outside corridor	No use – accommodate	Partly in corridors (Purple and Orange)
Maricopa County					
21	Casa Grande Canal, AZ AA:3:209(ASM)	No use – grade-separate	No use – grade-separate	No use – grade-separate	Crosses corridors (Purple, Green, and Orange)
22	Gila Bend Canal, AZ Z:2:66(ASM)	No use – outside corridor	No use – outside corridor	No use – grade-separate	Crosses corridor (Orange)
23	Butterfield Overland Mail Stage Route (Gila Trail Archaeological Site (AZ T:15:32(ASM)))	No use – grade-separate	No use – grade-separate	No use – grade-separate	Crosses corridors (Purple, Green, and Orange)

Table 4-5 Summary of Use by Build Corridor Alternatives (Continued)

Map #	Property Name	Summary of Use Findings			Applicable Corridor
		Purple Alternative	Green Alternative	Orange Alternative	
24	Wide Trail Site, AZ T:14:28(ASM)	No use – outside corridor	No use – outside corridor	No use – accommodate	Mostly in corridor (Orange)
25	Three prehistoric trails, AZ T:14:94(ASM)	No use – outside corridor	No use – outside corridor	No use – accommodate	In corridor (Orange)
26	Prehistoric artifacts and canal, AZ T:10:59(ASM)	No use – outside corridor	No use – accommodate	No use – accommodate	Partly in corridors (Green and Orange)
27	Buckeye Canal, AZ T:10:82(ASM)	No use – grade-separate	No use – grade-separate	No use – grade-separate	Crosses corridors (Purple, Green, and Orange)
28	Roosevelt Canal, AZ T:10:83(ASM)	No use – outside corridor	No use – outside corridor	No use – grade-separate	Crosses corridor (Orange)
Numbers of Properties:					
No use		53	51	45	
Use – Net Benefit		1	1	0	
Potential Use (including possible De Minimis)		0	1	8	

NOTES:

Accommodate in the corridor – Provide space for a minimum of a 400-foot-wide linear roadway ROW within the 2,000-foot-wide Build Corridor Alternative while avoiding the protected property.

Shift the corridor – Shift the 2,000-foot-wide Build Corridor Alternative away from the protected property in order to accommodate the project and avoid the protected property.

Grade-separate the corridor – The corridor would cross over or under the protected property (such as on an elevated structure or depressed roadway section) to avoid the protected property.

Net benefit – Preserve and enhance the features, functions and values of the property.

SOURCE: AECOM 2017.



4.4.2.3 Accommodate in the Corridor

For Section 4(f) properties that occur partially or entirely within a Build Corridor Alternative, as indicated in **Table 4-5** (Summary of Use by Build Corridor Alternatives), FHWA examined the corridor in the area of each of these properties and evaluated the:

- Type, configuration and extent of the property within the corridor;
- General highway design requirements that would apply to I-11, including allowance for a 400-foot ROW width; and
- Other, non-Section 4(f) opportunities and constraints in the property area that were identified by the Draft Tier 1 EIS.

This assessment determined that 53 Section 4(f) properties can be accommodated in the Purple Alternative; 51 properties can be accommodated in the Green Alternative; and 45 properties can be accommodated in the Orange Alternative. For each property, FHWA identified the opportunity during Tier 2 studies to accommodate a 400-foot-wide ROW for I-11 within each Build Corridor Alternative while avoiding the Section 4(f) property that occurs within the corridor (**Table 4-5** [Summary of Use by Build Corridor Alternatives]). The appropriateness and compatibility of avoiding each Section 4(f) property by the future Project design would be evaluated and determined during Tier 2 studies in coordination with the officials with jurisdiction. In accordance with 23 CFR 774.3(c), FHWA will determine least overall harm to Section 4(f) properties during Tier 2 studies by balancing Section 4(f) as well as non-Section 4(f) (other natural and built environment) factors. Consistent with 23 CFR 774.7(e)(1), opportunities to minimize harm to the property at subsequent stages in the project development process (for example, Tier 2) are not precluded by this Tier 1 evaluation. Based on the this Draft Section 4(f) evaluation, the land area occupied by each property and other environmental constraints would not obstruct or preclude the ability to provide a highway alignment that achieves general engineering design standards in the portion of the corridor outside the boundaries of the properties. As a result of the ability to avoid these properties, FHWA commits that no use of the accommodated properties as defined by Section 4(f) would occur as a result of I-11.

Figures 4-10 through 4-26 show each Section 4(f) property that can be avoided through accommodation in a Build Corridor Alternative.³

³ Archaeological sites are not included in the graphics because that information is confidential in order to protect the sites.

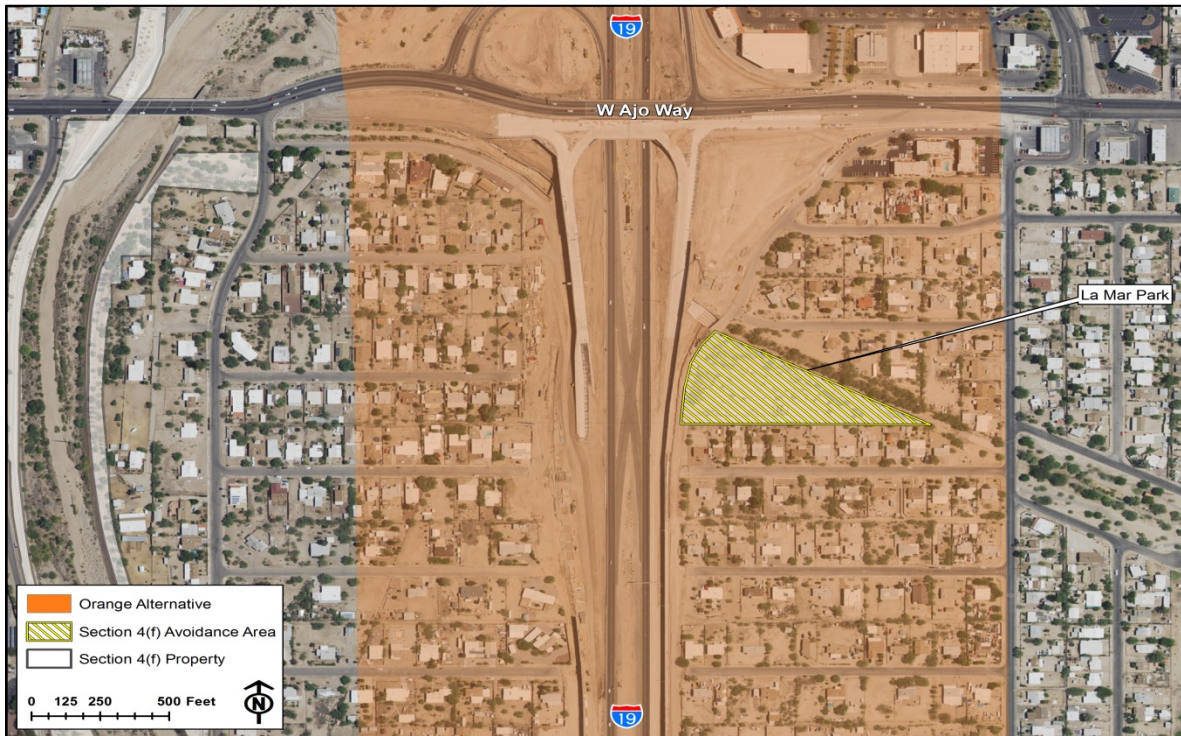


Figure 4-10 La Mar Park – Orange Alternative (Accommodate in the Corridor)

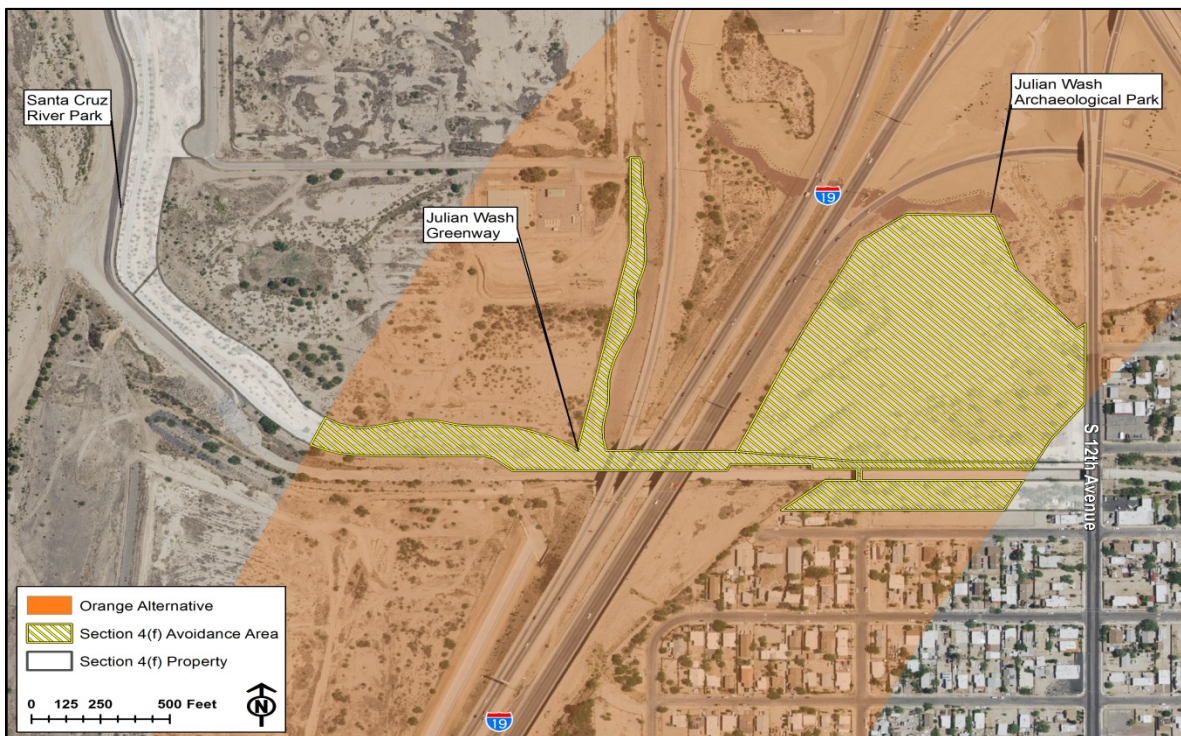


Figure 4-11 Julian Wash Greenway and Archaeological Park – Orange Alternative (Accommodate in the Corridor)



Figure 4-12 Francisco Elias Esquer Park – Orange Alternative (Accommodate in the Corridor)



Figure 4-13 Sweetwater Wetlands Park and US Department of Agriculture Plant Materials Center – Orange Alternative (Accommodate in the Corridor)

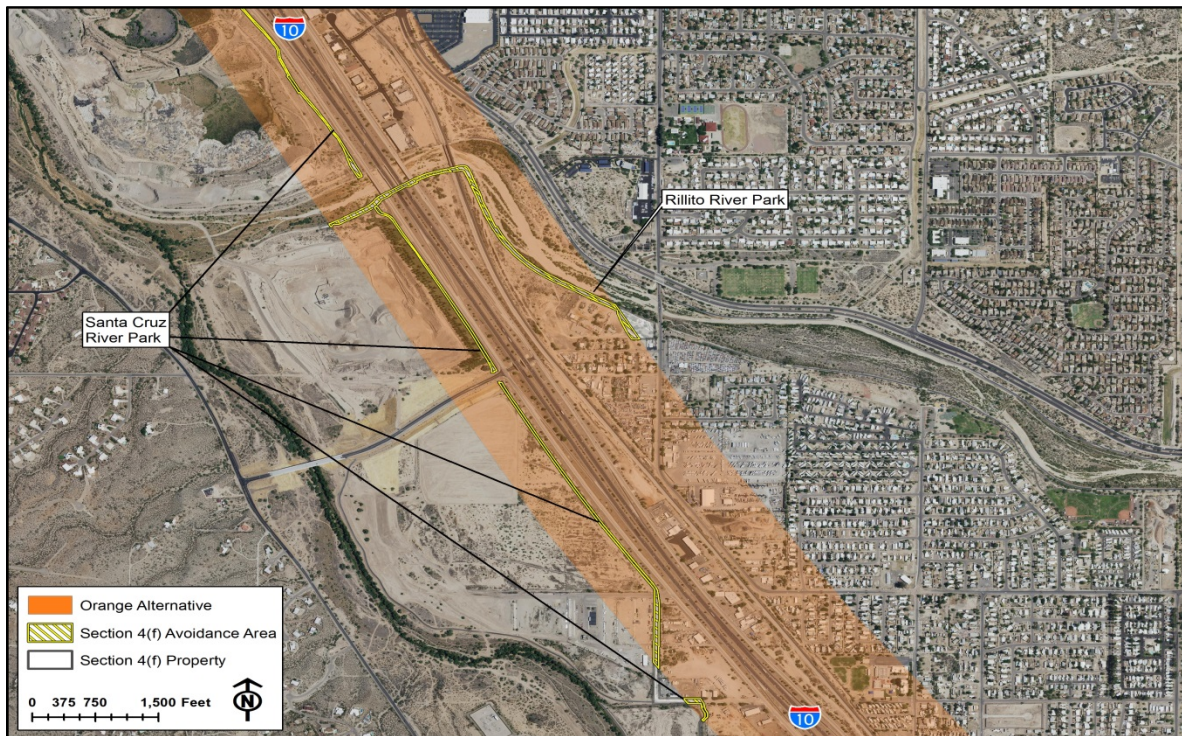


Figure 4-14 Rillito River Park – Orange Alternative (Accommodate in the Corridor)

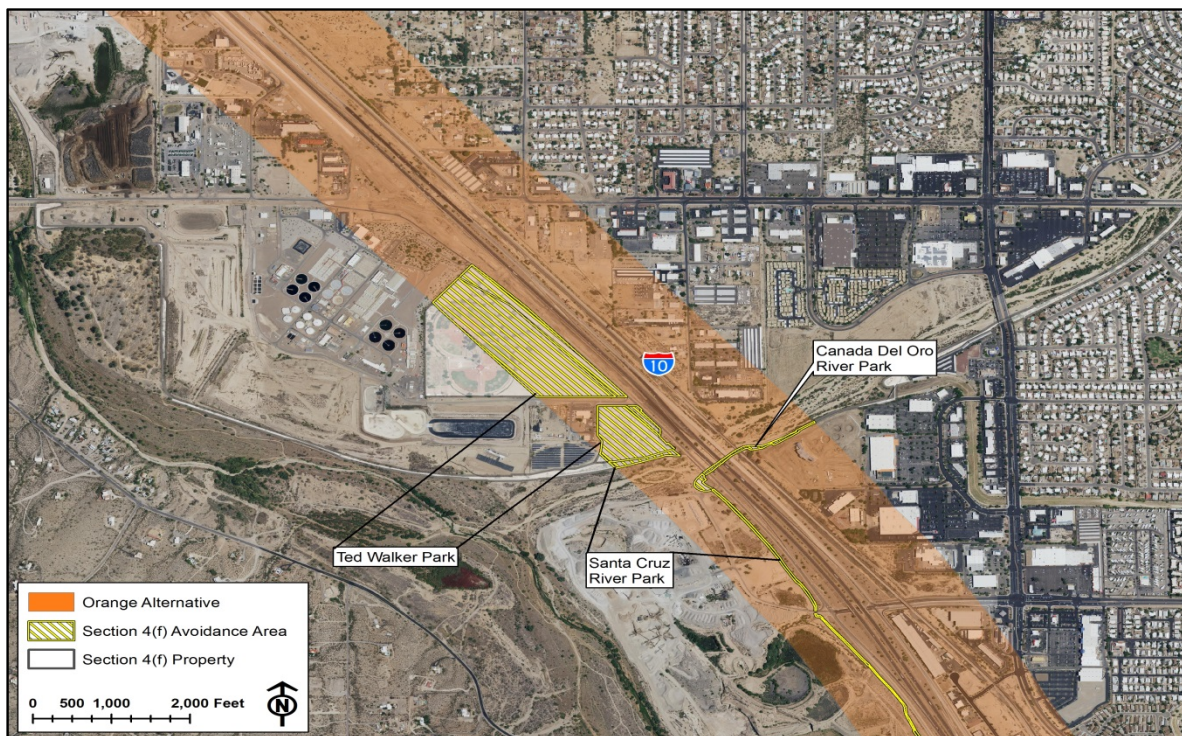
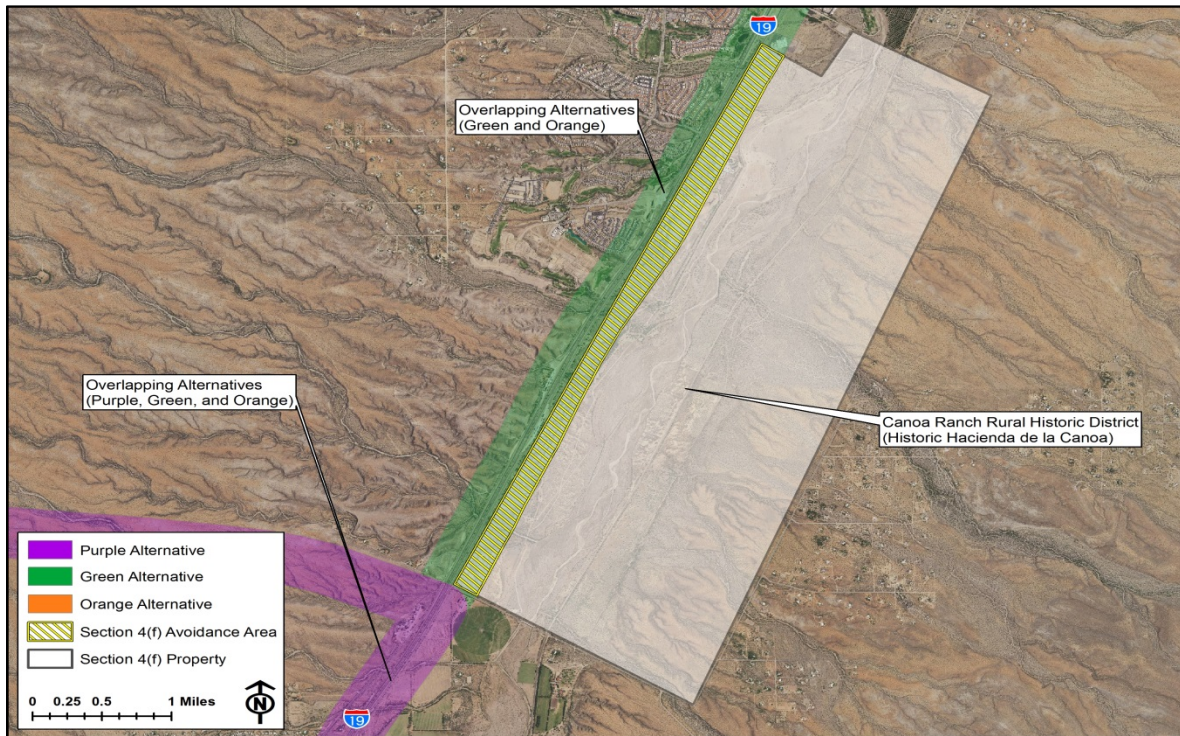


Figure 4-15 Canada Del Oro River Park, Ted Walker Park, and Santa Cruz River Park – Orange Alternative (Accommodate in the Corridor)



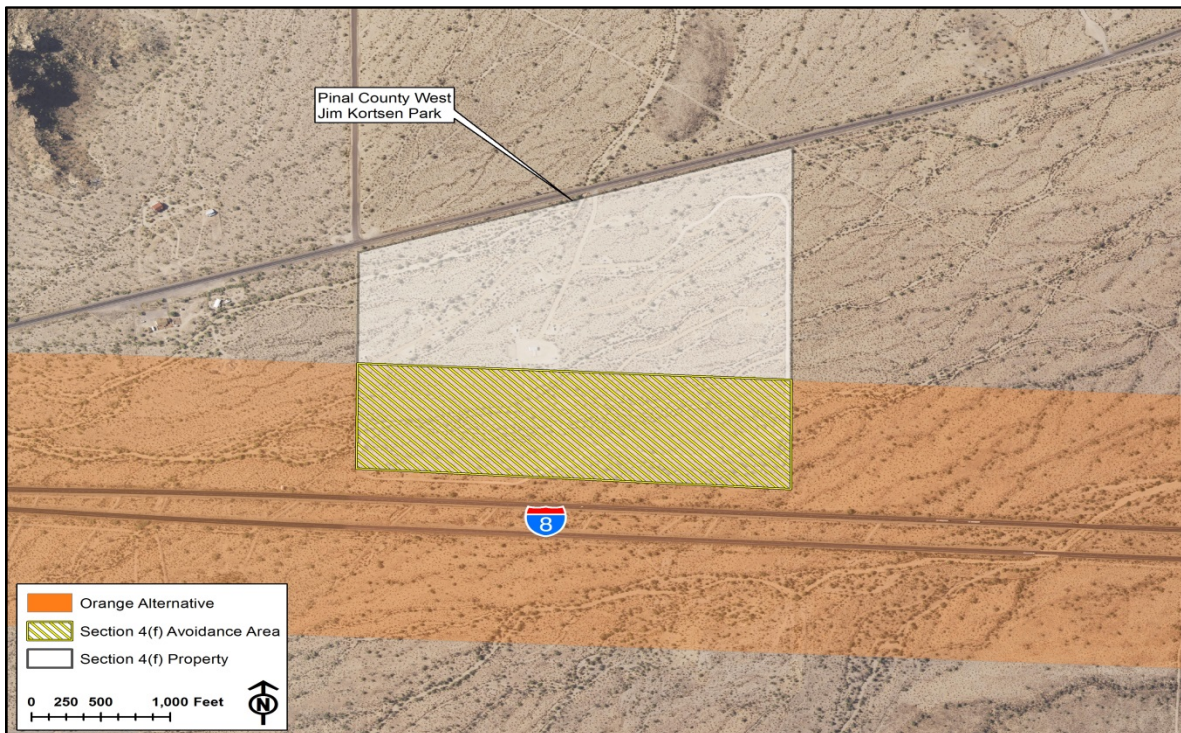
**Figure 4-16 Canoa Ranch Rural Historic District
(Historic Hacienda de la Canoa) – Green and Orange Alternatives
(Accommodate in the Corridor)**



**Figure 4-17 Rillito Vista Park – Orange Alternative
(Accommodate in the Corridor)**



**Figure 4-18 San Lucas Community Park – Orange Alternative
(Accommodate in the Corridor)**



**Figure 4-19 Pinal County West Jim Kortsen Park – Orange Alternative
(Accommodate in the Corridor)**

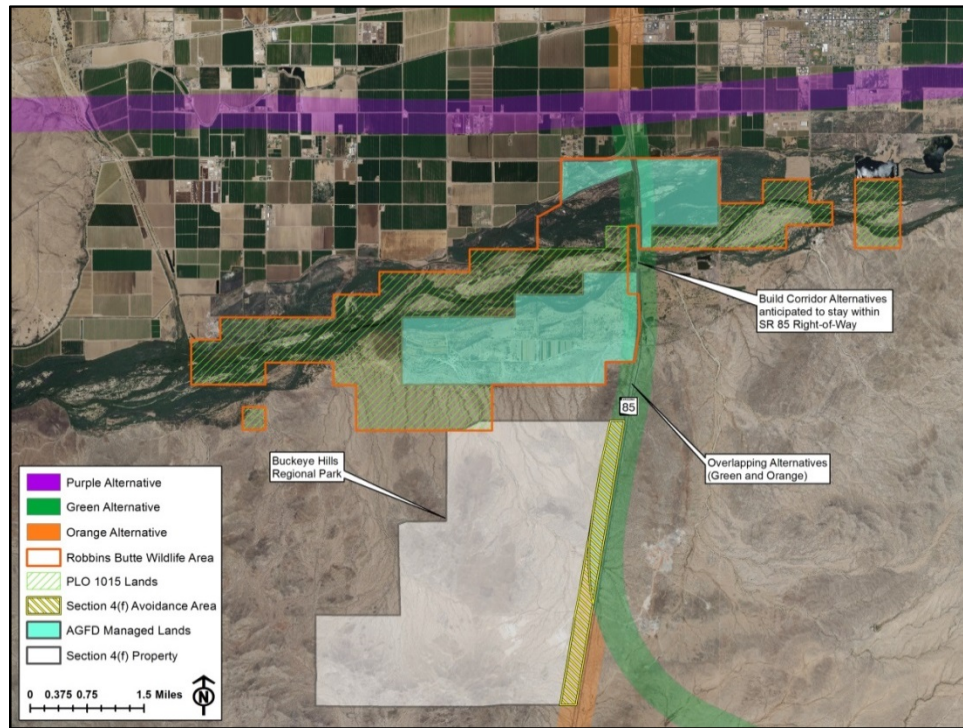


Figure 4-20 Buckeye Hills Regional Park, Robbins Butte Wildlife Area, and PLO 1015 Lands – Green or Orange Alternative (Accommodate in the Corridor)

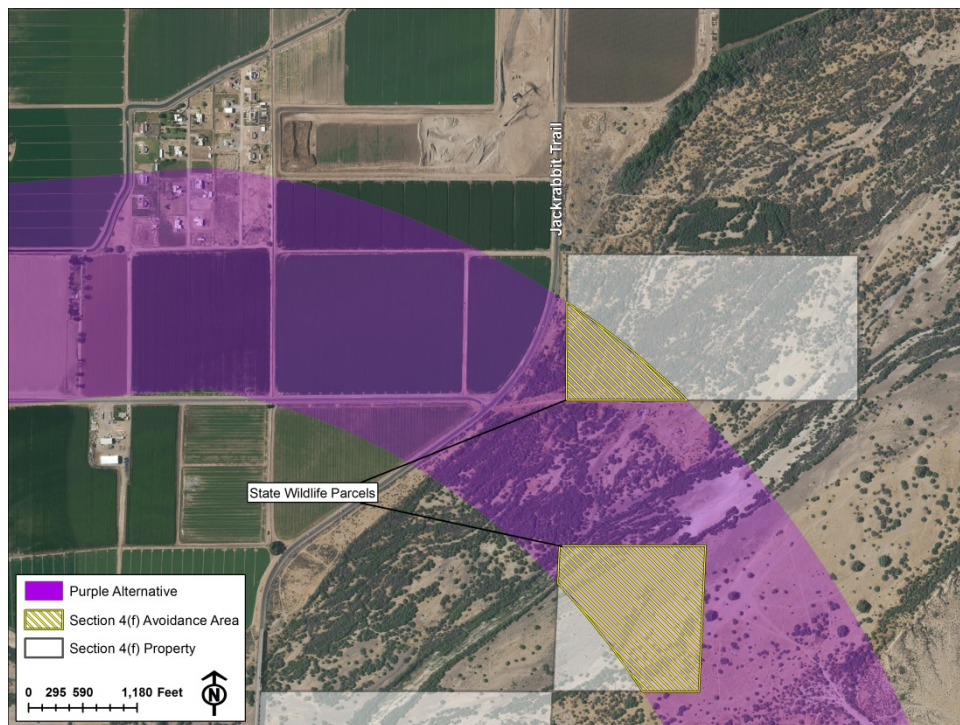
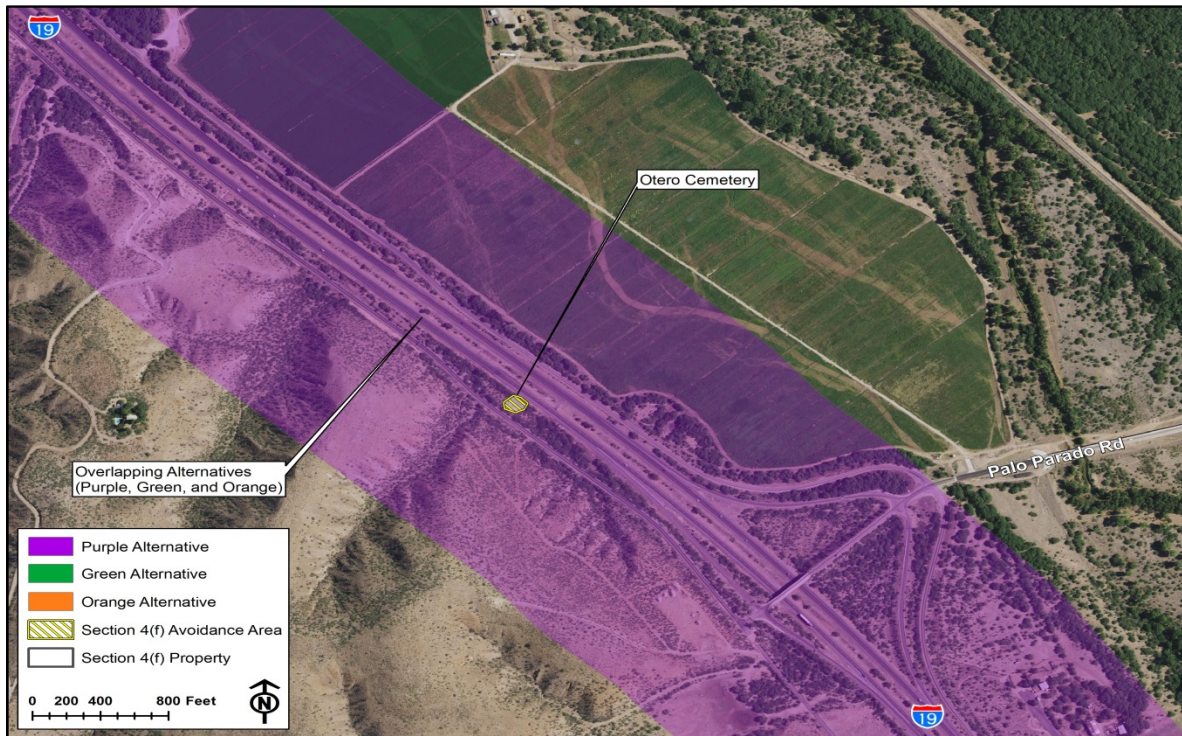
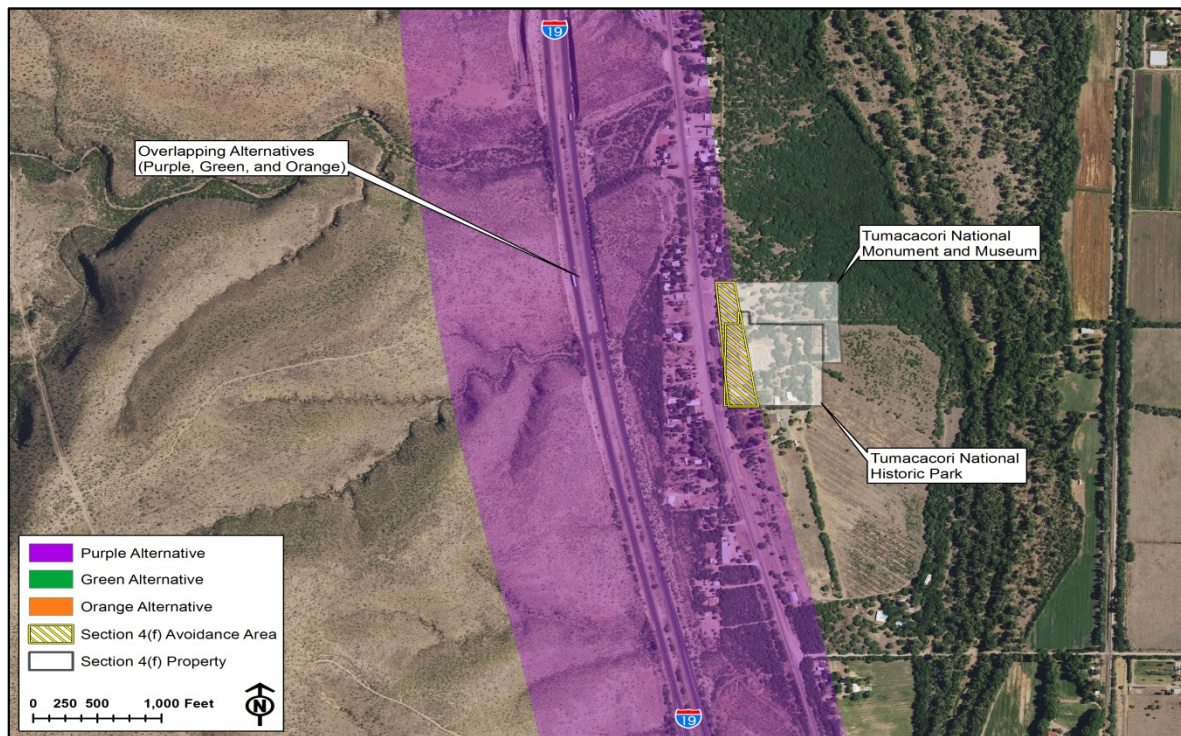


Figure 4-21 PLO 1015 Land Parcels – Purple Alternative (Accommodate in the Corridor)



**Figure 4-22 Otero Cemetery – Purple, Green, or Orange Alternative
(Accommodate in the Corridor)**



**Figure 4-23 Tumacacori National Historic Park and Tumacacori National
Monument and Museum – Purple, Green, or Orange Alternative
(Accommodate in the Corridor)**

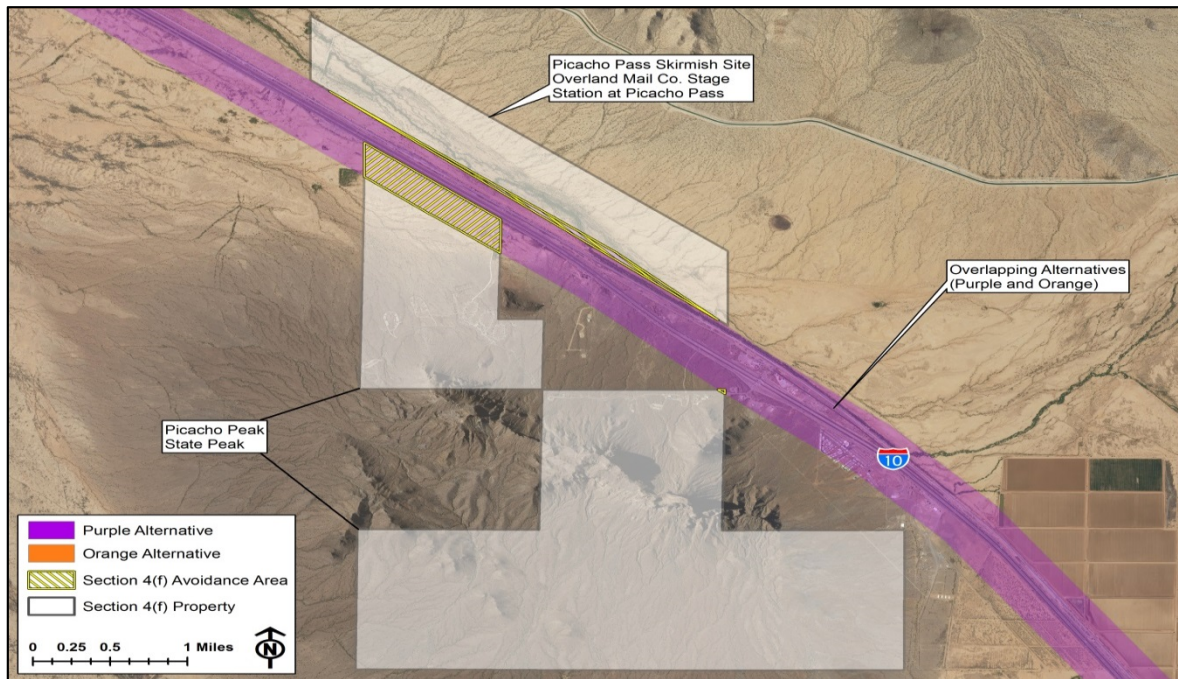
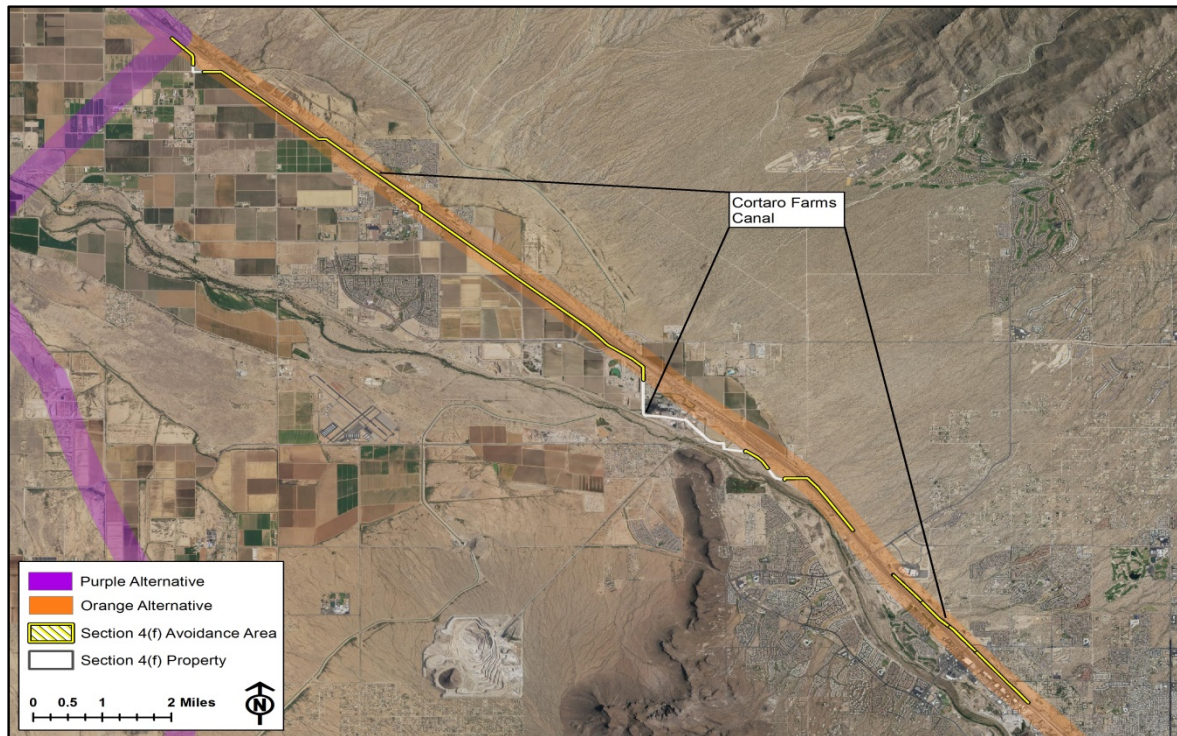


Figure 4-24 Picacho Peak State Park and Picacho Pass Skirmish Site Overland Mail Co. Stage Station at Picacho Pass – Purple or Orange Alternative (Accommodate in the Corridor)



Figure 4-25 Pima Community College Desert Vista Campus – Orange Alternative (Accommodate in the Corridor)



**Figure 4-26 Cortaro Farms Canal – Orange Alternative
(Grade-Separate the Corridor)**

4.4.2.4 Shift the Corridor

FHWA and ADOT identified an opportunity to avoid two properties by shifting the corridor to provide the 400-foot-wide ROW allowance for I-11 outside the boundaries of these properties:

- Palo Verde Regional Park – The property occupies portions of the Purple and Green Alternatives and would obstruct or preclude the ability to provide a highway alignment in that portion of each corridor. To avoid Palo Verde Regional Park, FHWA and ADOT would shift the corridor as shown on **Figure 4-27** (Palo Verde Regional Park – Recommended, Purple, or Green Alternative [Shift the Corridor]).
- Anamax Park – The property occupies portions of the Green and Orange Alternatives and would obstruct or preclude the ability to provide a highway alignment in those portions of each corridor. In these cases, to avoid Anamax Park, FHWA and ADOT would shift the corridor to the east, as shown on **Figure 4-28** (Anamax Park – Recommended, Green, or Orange Alternative [Shift the Corridor]).

In addition, consistent with 23 CFR 774.7(e)(1), opportunities to minimize harm to the properties at subsequent stages in the project development process (for example, Tier 2), are not precluded. The land area occupied by each property and other environmental constraints would not obstruct or preclude the ability to provide a highway alignment that achieves general engineering design standards in the shifted portion of the corridor. As a result of the ability to avoid these properties, FHWA commits that no use of Palo Verde Regional Park and Anamax Park as defined by Section 4(f) would occur as a result of I-11.

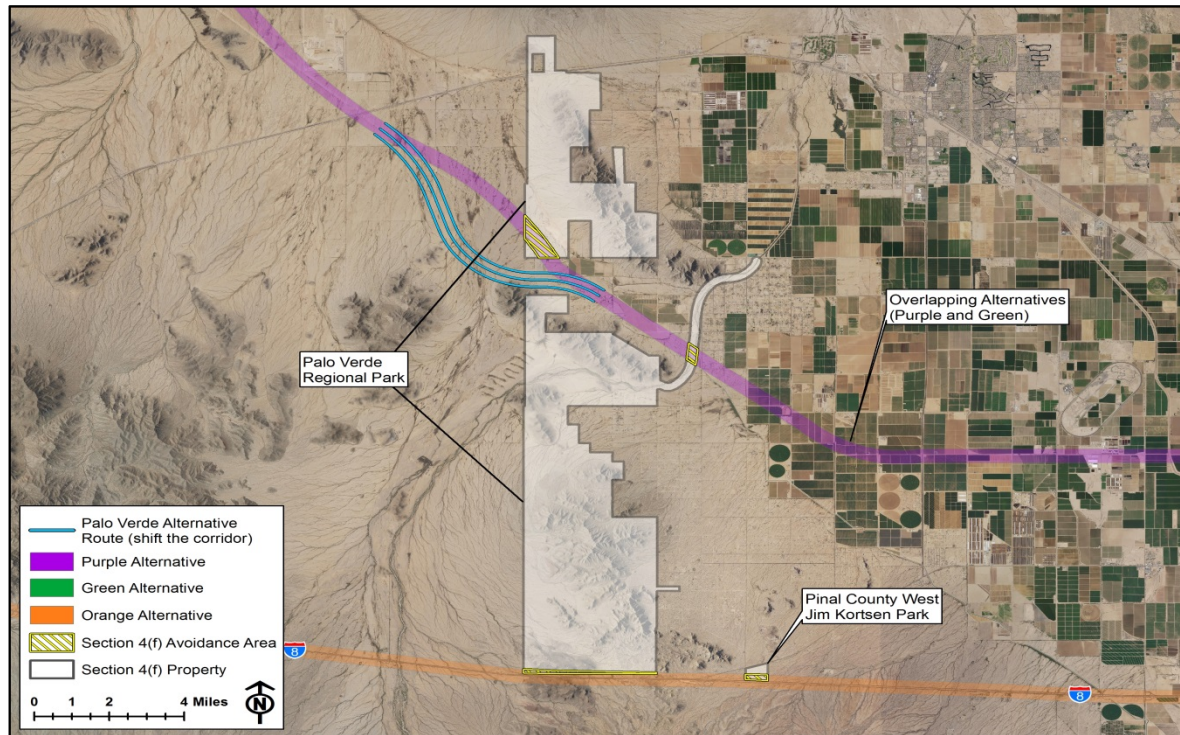


Figure 4-27 Palo Verde Regional Park – Recommended, Purple, or Green Alternative (Shift the Corridor)

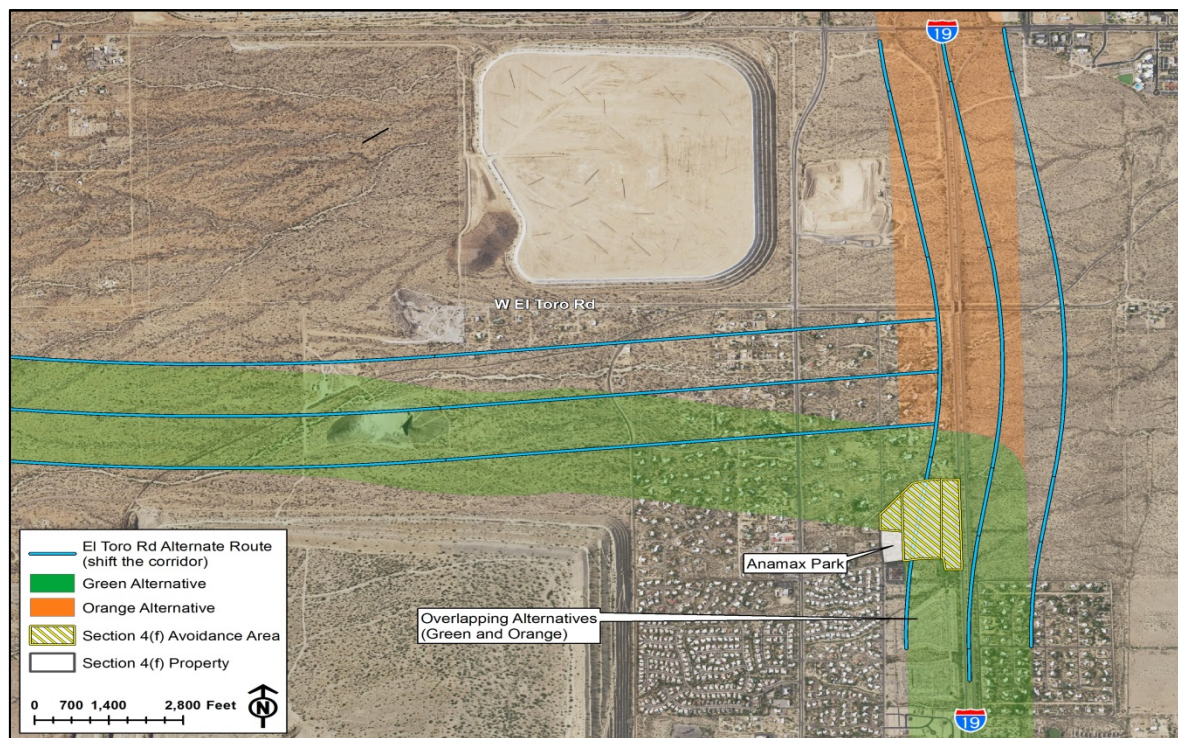


Figure 4-28 Anamax Park – Recommended, Green, or Orange Alternative (Shift the Corridor)



4.4.2.5 Grade-Separate the Corridor

Linear Properties: Trails, Historic Canals, and Historic Railroads

Thirteen Section 4(f)-protected trails, historic canals and railroads cross each Build Corridor Alternative: built segments of the Juan Bautista de Anza National Historic Trail, Julian Wash Greenway, El Paso and Southwestern Greenway (existing and planned), Rillito River Park, , Southern Pacific Railroad, Arizona Southern Railroad, New Mexico-Arizona Railroad: Nogales Branch, Cortaro Farms/Cortaro-Marana Irrigation District Canal, Casa Grande Canal, Gila Bend Canal, Butterfield Overland Mail Stage Route, Buckeye Canal, and Roosevelt Canal.

Figures 4-10 through 4-28 show the typical linear configuration of these properties (except archaeological sites) in relation to the Build Corridor Alternatives. These properties can be avoided through grade-separation or other means. Elevating the roadway corridor on a structure that passes over and spans the linear property or depressing the roadway corridor under a structure that carries the property over the roadway would eliminate the need to incorporate land from the Section 4(f) property. In addition, grade separation would preserve the activities, features, and attributes of the property that qualify it for protection under Section 4(f).

The land area occupied by each property and other environmental constraints would not obstruct or preclude the ability to provide a highway alignment that achieves general engineering design standards in a grade-separated alignment while avoiding each linear property. As a result of the ability to avoid these properties, FHWA commits that no use of the linear properties as defined by Section 4(f) would occur as a result of I-11.

4.4.3 Build Corridor Alternatives – Use Evaluation

The Preliminary Draft Section 4(f) Evaluation has identified the potential for use of the following Section 4(f) properties by the Build Corridor Alternatives, as shown in **Table 4-4**:

- Robbins Butte Wildlife Area (Green and Orange Alternatives)
- Downtown Tucson properties (Orange Alternative)
- TMC (Purple and Green Alternatives)

During Tier 2 studies, historic and archaeological resources will be surveyed, Section 106 consultation will be undertaken, and a Final Section 4(f) Evaluation will be conducted. The findings of this Draft Section 4(f) Evaluation could be refined during Tier 2 if additional Section 4(f) resources are identified at that time. Tier 2 activities will include examination of means to avoid, mitigate, and/or minimize harm to protected resources.

An evaluation of each property is provided in the following subsections, including analyses of avoidance and all possible planning to minimize harm to the level that this first-tier EIS stage allows.

4.4.3.1 Robbins Butte Wildlife Area – No Use or Possible De Minimis Use (Green and Orange Alternatives)

The Robbins Butte Wildlife Area consists of multiple parcels of undeveloped land along both sides of SR 85 at the existing Gila River crossing (**Figure 4-20** [Buckeye Hills Regional Park and Robbins Butte Wildlife Area – Green or Orange Alternative]). The land is preserved and managed for wildlife and wildlife habitat by the Arizona Game and Fish Department (AGFD).



The preserved wildlife habitats are the features, attributes, or activities that qualify the property for protection under Section 4(f).

The Green and Orange Alternatives are aligned along SR 85 at the Gila River Crossing. Preliminary analysis indicates the existing SR 85 ROW (**Appendix E1**) is wide enough to accommodate the proposed I-11 highway cross-section. Increased traffic could increase the likelihood of wildlife collisions, noise and light pollution, and runoff.

Based on the preliminary analysis, it will be possible for FHWA to make a finding of no use or, at most, a finding of *de minimis* use for this property after consultation with the official with jurisdiction.

4.4.3.2 Downtown Tucson Parcels – Possible Individual Uses (Orange Alternative)

Identification of Section 4(f) Properties

More than 20 historic properties and parks fall within the Orange Alternative in the Downtown Tucson area, as shown on **Figure 4-7** (Section 4(f) Properties in Build Corridor Alternatives – South Section). These properties are protected by Section 4(f). **Table 4-1** (Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area) describes the features and attributes of each property.

Proposed Use of Section 4(f) Properties

To accommodate 2040 traffic demands, the Orange Alternative would expand I-10 from 8 lanes to 12 to 14 lanes from the I-19 interchange to Prince Road. The Orange Alternative would require an estimated 120 feet of additional ROW. The 120 feet could be on either side of the existing I-10 ROW, all on the east side of I-10, or all on the west side of I-10. In Downtown Tucson, I-10 is surrounded by dense, established historic communities. Properties protected by Section 4(f) are in close proximity to one another and to I-10, as shown on **Figure 4-29** (Downtown Tucson Section 4(f) Properties – Orange Alternative). It is not possible to widen I-10 without impacting Section 4(f) properties.

The Orange Alternative could potentially impact (use) seven properties protected by Section 4(f) as shown on **Figure 4-29** (Downtown Tucson Section 4(f) Properties – Orange Alternative) and **Table 4-5** (Summary of Use by Build Corridor Alternatives). The seven Section 4(f) properties are:

- Barrio El Membrillo Historic District
- Barrio Anita Historic District
- Levi H. Manning House
- David G. Herrera and Ramon Quiroz Park (formerly Oury Park)
- El Paso and Southwestern Railroad District
- Santa Cruz River Park
- El Paso and Southwestern Greenway (existing trail)

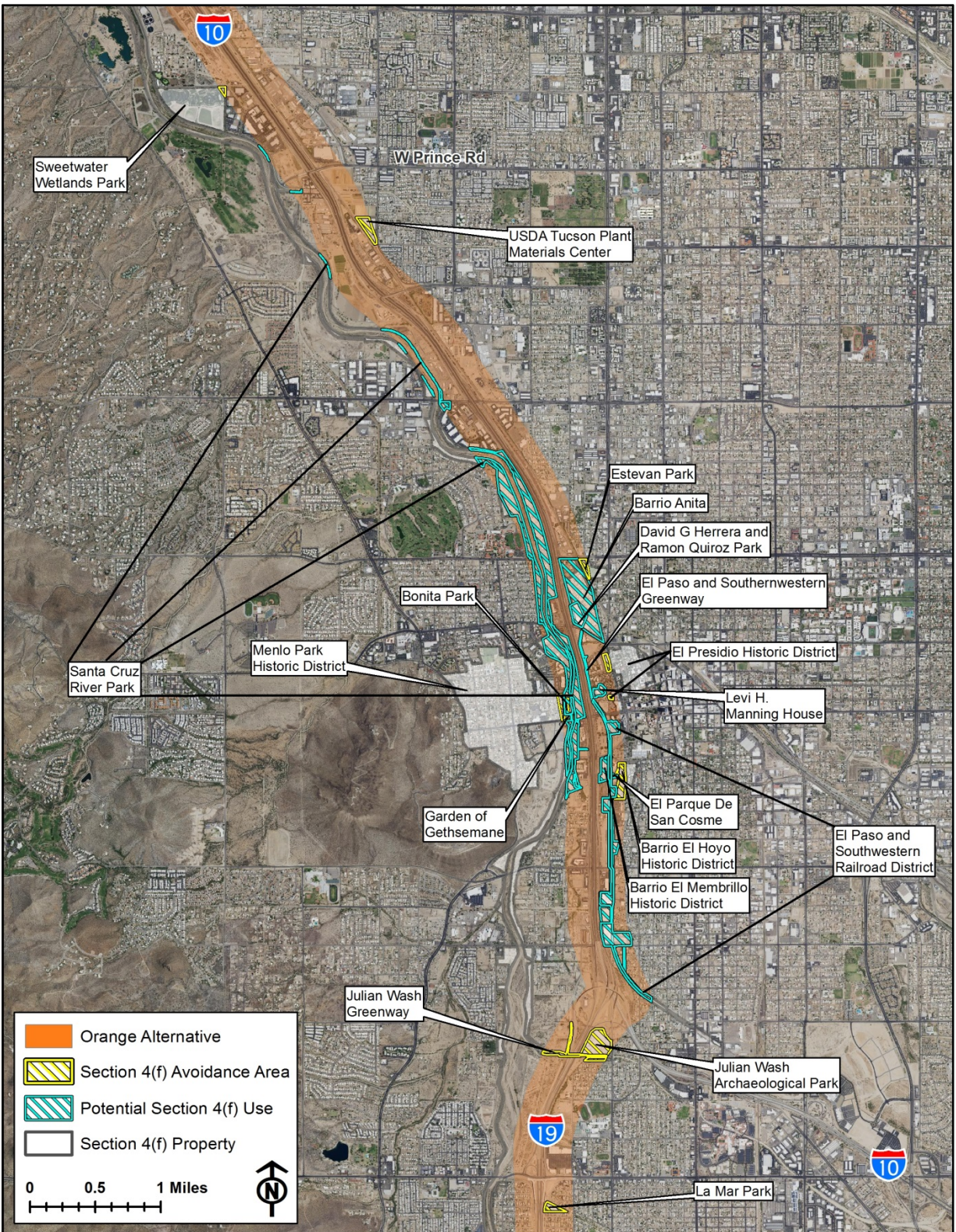


Figure 4-29 Downtown Tucson Section 4(f) Properties – Orange Alternative



Table 3.7-10 (Potential Levels of Impacts on Historic Districts and Buildings) in **Chapter 3** (Affected Environment and Environmental Consequences) describes impacts to historic properties by the Orange Alternative. The Orange Alternative could require:

- Removal of at least one historic residential structure adjacent to I-10 in Barrio Anita,
- Removal of two to four contributing structures in the Barrio El Membrillo Historic District (of about 10 surviving contributing residences) or possible removal of the entire district,
- Acquisition of Levi H. Manning House land,
- Demolition of a portion of the existing roundhouse , acquisition of portions of the El Paso and Southwestern Railroad District,
- Acquisition of parts of the Santa Cruz River Park,
- Acquisition of a portion of the David G. Herrera and Ramon Quiroz Park, a contributing element to the Barrio Anita Historic District, and
- Acquisition and demolition of the El Paso and Southwestern Greenway (existing trail).

The Orange Alternative will have findings of adverse effects under Section 106 of the NHPA and would permanently use Section 4(f) properties. Additional impacts to non-recorded historic properties are described in **Chapter 3** (including three residential structures, the University of Arizona Agriculture Center, and Hotel Tucson).

Avoidance Alternatives

The following analysis examines property-specific avoidance alternatives for the Orange Alternative through Downtown Tucson, including alignment shifts and design changes as specified in FHWA's Section 4(f) Policy Paper (FHWA 2012).

Alignment Shifts

An alignment shift moves the roadway alignment to avoid the Section 4(f) property. In Downtown Tucson, and as shown on **Figure 4-29** (Downtown Tucson Section 4(f) Properties – Orange Alternative), Section 4(f) properties are present on both the east and west sides of the I-10 corridor, with some properties immediately adjacent to the I-10 ROW on opposing sides of the roadway. Shifting the alignment of I-11 to one side of I-10 or the other would result in using Section 4(f) properties; avoiding Section 4(f) properties altogether by shifting the alignment is not possible. As a result, alignment shifts do not result in an avoidance alternative in Downtown Tucson.

Design Changes – Elevated Structure

FHWA and ADOT evaluated the feasibility of elevating I-11 in Downtown Tucson to avoid impacting Section 4(f) properties. Two structures would elevate I-11 above I-10 for about six miles. The elevated lanes would operate as express lanes, meaning drivers could not exit onto local streets at the I-11 level. Under this scenario, it could be possible to keep I-11 within the existing I-10 ROW. Access ramps between the I-10, I-11, I-19, Prince Road, and the local street network would require additional ROW.

Although the elevated express lanes could avoid direct impacts on adjacent Section 4(f) properties, noise and visual impacts would result in adverse effects to historic buildings and structures. Deep excavations for the elevated structure foundations would impact archaeological



resources. For these reasons, an elevated express lanes alternative through Downtown Tucson is not an avoidance alternative. The elevated alternative also would impact businesses and residences that are not protected by Section 4(f) and would add \$1 billion to the overall capital cost of the Orange Alternative

Design Changes – Tunnel

FHWA and ADOT also analyzed the feasibility of tunneling I-11 from the I-19 interchange to Prince Road (about four to six miles). The new I-11 lanes would be directly under I-10, which would avoid potential visual and noise impacts. However, the tunnel would impact archeological sites. The tunnel would require reconfiguring the I-19 interchange to allow access into the tunnel.

The cost estimate for tunneling the I-11 is approximately \$3.5 to \$5.1 billion. The cost of widening I-10 at grade is estimated at \$240 million. Even if a tunneling option could be designed that would completely avoid Section 4(f) properties, this option would have an extraordinary cost and would not be prudent (Avoidance Analysis Factor 4).

Mitigation and Measures to Minimize Harm

If the Orange Alternative is selected, alternatives that cause the least harm to Section 4(f) properties in downtown Tucson will be further analyzed.

If the Orange Alternative is selected, the Tier 2 analysis will include the following strategies to minimize impacts to Section 4(f) properties in Downtown Tucson:

- Avoid Menlo Park Historic District, Bonita Park, Garden of Gethsemane, El Parque De San Cosme, and Barrio El Hoyo Historic District
- Design modifications to avoid or minimize the use of Section 4(f) properties
- Replacement of land and facilities of comparable value and function
- Compensation
- Restoration, preservation, interpretation, and recordation of impacted historic structures and properties (Historic American Buildings Survey/Historic Architectural and Engineering Record)
- Mitigation developed in coordination with the officials with jurisdiction over parks and recreation areas
- Consideration of the views of the official(s) with jurisdiction
- Consideration of impacts and benefits to non-Section 4(f) resources (such as the natural and built environment)

Coordination and Public Involvement

FHWA and ADOT initiated coordination with SHPO about the downtown Tucson properties during the EIS scoping process. SHPO concurred that the Orange Alternative would have adverse effects to multiple historic and Section 4(f) properties (FHWA letter dated November 12, 2018 with concurrence from SHPO on November 23, 2018). If the Orange Alternative is selected, FHWA will further evaluate the potential for use of Section 4(f) properties in downtown Tucson, coordinate with officials with jurisdiction, and prepare a final Section 4(f) Evaluation for the downtown Tucson properties during the Tier 2 analysis.



Throughout the scoping and outreach process, the study team received input from members of the public in Pima County expressing opposition to the I-11 Corridor. FHWA and ADOT invited the US Institute for Environmental Conflict Resolution to facilitate a discussion in Pima County regarding the I-11 Tier 1 EIS. The US Institute is a program of the Udall Foundation and exists to assist parties in resolving environmental, public lands, and natural resource conflicts nationwide that involve federal agencies or interests. The purpose of the discussion was to gain a better understanding of the values and interests of the communities in Pima County that the I-11 corridor could impact. The stakeholders were divided into two groups based on the communities they were representing: downtown Tucson and Avra Valley. During the discussions, stakeholders had the opportunity to identify community-specific issues and concerns that could inform the decision-making process.

The downtown Tucson stakeholder group noted several adverse impacts the I-11 could have on their community, including:

- Demolishing culturally significant historic resources and buildings;
- Causing further separation of the unique culture and history of the neighborhood;
- Altering the sense of place in downtown Tucson; and
- Creating economic hardships for nearby businesses.

4.4.3.3 Tucson Mitigation Corridor – Nationwide Programmatic Section 4(f) Evaluation (Net Benefit) (Purple and Green Alternatives)

Identification of the Section 4(f) Property

The TMC (**Figure 4-30** [Tucson Mitigation Corridor – Purple or Green [CAP Design Option] Alternative]) is a 2,514-acre property owned and managed by the US Department of the Interior, Reclamation. The TMC was established in 1990 as a commitment made by Reclamation with USFWS, AGFD, and Pima County in the EIS for the CAP. The four parties signed a cooperative agreement to manage the TMC property in accordance with a Master Management Plan that prohibits future development other than existing wildlife habitat improvements. This agreement is intended to preserve habitat from urbanization while maintaining an open wildlife movement corridor. Accordingly, Reclamation identified the TMC as a property protected by Section 4(f) in its July 8, 2016, letter to ADOT during scoping (**Appendix F**).

The CAP canal is a water conveyance canal that crosses the TMC from north to south. The CAP canal underwent its own NEPA process, during which time the importance of providing wildlife connectivity across the TMC was echoed by the public. To maintain a functional wildlife movement corridor across the CAP canal on the TMC property, Reclamation installed seven concrete pipe sections (also known as siphons) under washes, keeping the surface intact for wildlife to use. Providing the siphons was critical to obtaining public acceptance of the CAP alignment. Since installation, Reclamation and its partners have observed wildlife using the siphon crossings to migrate across the TMC between the Ironwood Forest National Monument and SNP.

Proposed Use of Section 4(f) Property

In the Preliminary Draft Section 4(f) Evaluation, the Purple or Green Alternatives (Options C and D) would incorporate a portion of TMC land, thereby using the TMC property. The 2,000-foot-wide corridors of each Build Corridor Alternative would be aligned along Sandario Road, which parallels the western boundary of the property in a north-to-south orientation.

- 1 Additional ROW would be required beyond the approximately 80-foot ROW of Sandario Road to
- 2 accommodate I-11 and Sandario Road. As a result, I-11 would potentially use approximately
- 3 453 acres (15 percent) of the TMC property along the length of the TMC's western boundary
- 4 (Section 4.4.1).

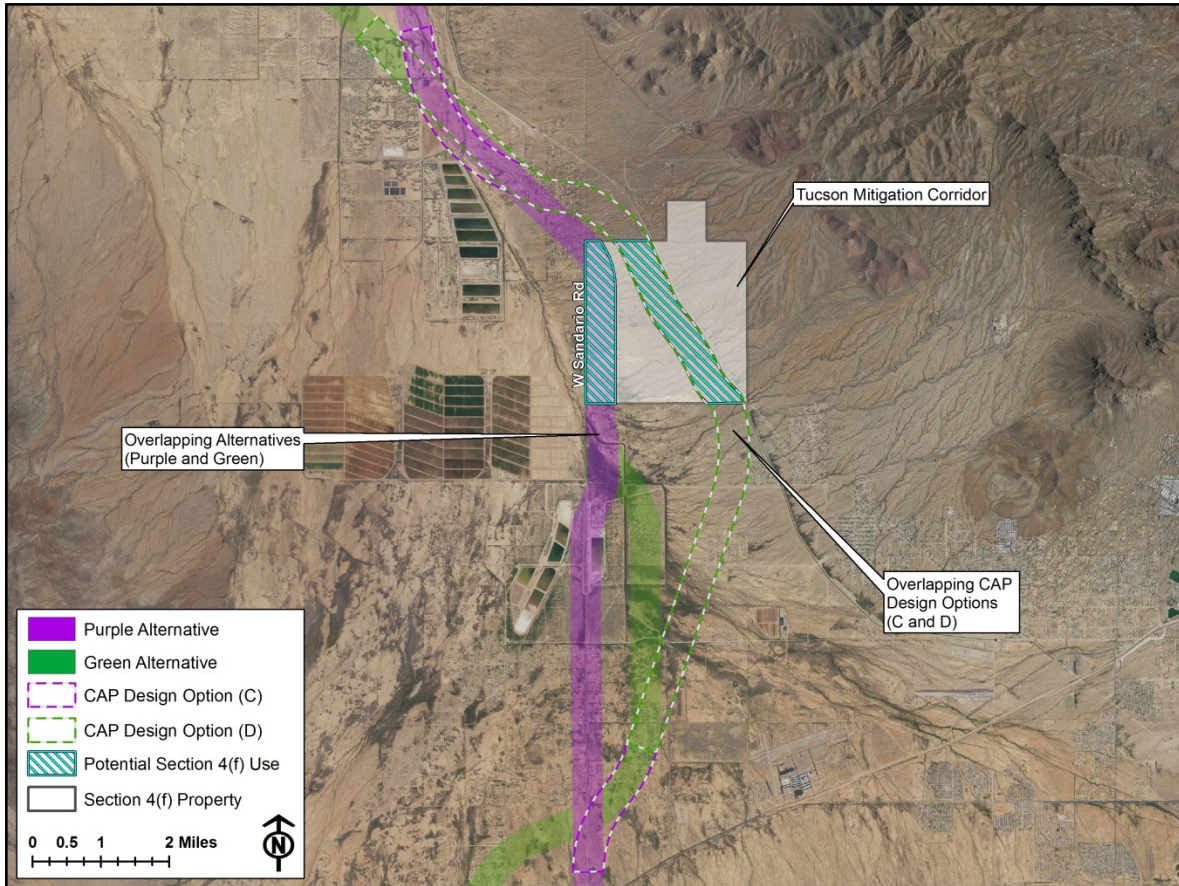


Figure 4-30 Tucson Mitigation Corridor – Purple or Green (CAP Design Option) Alternative

5 **Avoidance Analysis**

6 The property-specific avoidance analysis for the TMC applied the feasible and prudent criteria
7 specified by 23 CFR § 774.17 and summarized below. An alternative that potentially uses a
8 Section 4(f) property is not an avoidance alternative. An alternative is determined feasible if it
9 could be built as a matter of sound engineering judgment. Under 23 CFR § 774.17, factors are
10 defined for determining that alternatives are not prudent. An alternative would not be prudent for
11 any of the following reasons:

- 12 • **Factor 1** – It would compromise the project to a degree that it is unreasonable to proceed
- 13 with the project in light of its stated purpose and need.
- 14 • **Factor 2** – It would result in unacceptable safety or operational problems.



- **Factor 3** – After reasonable mitigation, it would still cause one or more of the following:
 - Severe social, economic, or environmental impacts
 - Severe disruption to established communities
 - Severe, disproportionate impacts on low-income or minority populations
 - Severe impacts on environmental resources protected under other federal statutes
- **Factor 4** – It would result in additional construction, maintenance, or operational costs of an extraordinary magnitude.
- **Factor 5** – It would cause other unique problems or unusual factors.
- **Factor 6** – It would involve multiple issues from Factors 1 through 5 that, while individually minor, could cumulatively cause unique problems or impacts of extraordinary magnitude.

The property-specific avoidance analysis for the TMC assesses whether, in the context of professional engineering judgment and the findings of the Draft Tier 1 EIS, permanent incorporation of land from the TMC property potentially can be avoided by the No Build Alternative (do nothing) and two property-specific avoidance strategies identified in FHWA's guidance paper titled *Section 4(f) Evaluation and Approval for Transportation Projects That Have a Net Benefit to a Section 4(f) Property*. The two avoidance strategies are (1) improve the transportation facility without using a Section 4(f) property and (2) build the transportation facility at a location that does not require the use of the Section 4(f) property. The results of the avoidance analysis for the TMC property are presented below.

Do Nothing

The do nothing or No Build Alternative is described in Section 2.3.1 and Section 4.4.1. The No Build Alternative is expected to avoid potential use of Section 4(f) properties. However, the No Build Alternative is not a prudent avoidance alternative under Factor 1. Specifically, and as described in **Chapter 6** (Recommended Alternative), the No Build Alternative would compromise the project to such a degree that it would be unreasonable to proceed in light of the I-11 Purpose and Need. The No Build Alternative would not achieve the I-11 Purpose and Need, as it would not provide a high-priority, high-capacity, access-controlled transportation corridor; would not support improved regional mobility for people, goods, and Homeland Security; and would not enhance access to the high-capacity transportation network to support economic vitality. Under the No Build Alternative, travel between Nogales and Wickenburg would occur on various existing corridors, such as I-19, I-10, SR 101L, SR 202L, SR 303L, I-17, SR 74, and US 60.

Improve an Existing Transportation Facility Without Use of a Section 4(f) Property

The Orange Alternative is co-located with I-10 in the Tucson area. The Orange Alternative would avoid the TMC, but would impact more Section (f) properties than the Purple and Green Alternatives. The Orange Alternative is not an avoidance alternative.

The Purple, Green, and Orange Alternatives are the outcome of an alternatives analysis that examined opportunities to avoid Section 4(f) and non-Section 4(f) properties (**Chapter 2** [Alternatives Considered]). During that alternatives analysis, the following designs were examined:



- Alignment west of the TMC property within the Sandario Road ROW – Sandario Road runs parallel to the western boundary of the TMC. The ROW is 80 feet wide and contains Sandario Road, a two-lane, two-way road. An 80-foot-wide ROW is not wide enough to accommodate the proposed 400-foot ROW for I-11 by itself or along with existing Sandario Road. Additional ROW would be needed to accommodate I-11 and retain the traffic movements provided by Sandario Road.

FHWA and ADOT considered whether I-11 and Sandario Road could be accommodated in the ROW by creating a three-level structure in the ROW with Sandario Road at grade, with one direction of I-11 on a second level and the other direction of I-11 on a third level. While the width of the ROW potentially could accommodate such an arrangement, the design of a multilevel structure over a distance of approximately 2.0 miles (the length of the TMC's western boundary) would require extensive entrance and exit structures and provisions for emergency access. The structures would extend impacts beyond the TMC area to an unreasonable degree. Wildlife connectivity would be disrupted at the entrance and exit structures. The structures would be substantially more visually invasive than an at-grade highway. Also, the multi-level structure would not be desirable with respect to maintenance and future expansion (Factors 1 and 2). Thus, while a multilevel structure may be feasible, it is not prudent.

Build the Transportation Facility in a Location without Use of a Section 4(f) Property

All of the Build Corridor Alternatives impact Section 4(f) properties. The Orange Alternative would avoid the TMC Section 4(f) property but would impact Section 4(f) properties that are clustered in Downtown Tucson. FHWA and ADOT considered the following designs to avoid Section 4(f) properties.

- Corridor east of the TMC – The TMC is bordered on the east by the TMC and to the north by SNP (both Section 4(f) properties). Therefore an alignment to the east of the TMC is not an avoidance alternative.
- Corridor west of Sandario Road – The Tohono O'odham Nation owns most of the land west of Sandario Road. Early coordination with the Tohono O'odham Nation determined that the Tribe did not want the project on their sovereign lands. **Appendix F** provides the resolution passed by the Schuk Toak District of the Tohono O'odham Nation, which states that the Garcia Strip Community in the Schuk Toak District of the Tohono O'odham Nation opposes a project alignment on or near their community on the eastern boundary of the Tohono O'odham Nation property west of Sandario Road. Therefore a corridor west of Sandario Road is not feasible.
- Elevated Structure – Placing I-11 on an elevated structure over the TMC would allow space for wildlife movements across and underneath the roadway facility. Supporting columns would be required at intervals across the property to support the elevated structure. Sandario Road would remain a barrier to wildlife movements. The elevated structure option would not provide a net benefit to wildlife movements.
- Tunneling – Placing I-11 in a tunnel under the TMC or under Sandario Road would reduce the amount of land incorporated from the TMC property. Tunneling activities would impact historic and archaeological sites on the TMC property. Although tunneling could maintain wildlife connectivity at the ground level on the TMC property, Sandario Road would remain a barrier to wildlife movements. The tunnel option would not provide a net benefit to wildlife movement. In addition, a tunnel of this magnitude would cost more than \$1 billion in



comparison to \$100 million for the at-grade options. Therefore this option is not prudent due to cost.

During Tier 2 studies, the 2,000-foot width of a selected Build Corridor Alternative would be refined to a specific roadway alignment. Potential impacts identified in this Preliminary Draft Section 4(f) Evaluation may be avoided or minimized when a specific roadway alignment is identified. At that time, the Section 4(f) Evaluations will analyze the specific roadway alignment for potential uses of Section 4(f) protected properties.

Mitigation and Measures to Minimize Harm

FHWA and ADOT are coordinating with Reclamation in regard to the TMC property. Reclamation is the official with jurisdiction over the TMC property because, using the definition provided in 23 CFR 774.17, Reclamation is the agency that owns and administers the TMC property and it is the sole agency that is empowered to represent Reclamation on matters related to the TMC property.

Early coordination between FHWA, ADOT, and Reclamation and input received from the public identified an opportunity to refine the alignment of the Purple and Green Alternatives on the TMC property. Because the purpose of the TMC is to enable wildlife movements across the property, FHWA and ADOT coordinated with Reclamation on developing a conceptual roadway ROW width and alignment designs that would minimize impacts to wildlife movements. Concepts considered included use of the existing Sandario Road ROW with additional ROW from the TMC property (as originally designed) or alignment of I-11 alongside the existing CAP canal that crosses the TMC in a southeast to northwest direction. The CAP canal is a water conveyance system that has been fitted with wildlife crossing areas, which reduce the barrier effect to wildlife movements that the system could otherwise have. A summary of FHWA, Reclamation, and ADOT coordination in regard to these concepts is described as follows:

- Alignment Co-located with Existing Sandario Road – Co-locating I-11 with Sandario Road and using the Sandario Road ROW for a portion of the I-11 ROW needs would reduce the amount of TMC land that would be needed for I-11 compared with a stand-alone alignment across the property. However, Reclamation is concerned not only with the property impacts at that location but also with the potential negative effects of I-11, Sandario Road and the CAP canal on wildlife movements. Specifically, each existing linear facility (Sandario Road and the CAP canal) has some barrier effect on wildlife movements across the property. Placing I-11 along Sandario Road would add at-grade interstate highway infrastructure (additional travel lanes and barrier dividers), thereby increasing the barrier effect at the Sandario Road location. Reclamation indicated that I-11/Sandario Road and the CAP canal would form two parallel linear systems that would negatively affect wildlife movements to a greater extent than exists today.
- Alignment Along the West Side of the CAP Canal, Existing Sandario Road – Because of Reclamation's concerns about co-locating I-11 with Sandario Road, FHWA, ADOT, and Reclamation worked together to develop a concept that would place I-11 along the west side of and parallel to the CAP canal. An alignment on the east side of the CAP canal is infeasible because of the sloping condition of the land. The west side alignment would consolidate the two linear systems in one general location. The concept for I-11 would include wildlife crossing areas that are in line with the existing CAP siphon crossings. Reclamation prefers this alignment of I-11 along the CAP canal because, although land from the TMC would be required for I-11, the alignment would consolidate the I-11 and CAP infrastructure in one general location. However, Reclamation was concerned about the



negative effects on wildlife movements that would be caused by retaining existing Sandario Road in its current location and the I-11/CAP corridors.

- Alignment Along the West Side of the CAP Canal, with Mitigation – Based on these concerns, FHWA, ADOT, and Reclamation worked together to develop the following mitigation concepts to relocate Sandario Road and reduce the barrier effect of the I-11/CAP canal corridors:
 - Remove and reclaim Sandario Road. As identified in Reclamation’s June 8, 2018, letter (**Appendix F**), ADOT would terminate Sandario Road at the northern and southern border of the TMC (about a 2-mile section of road) using cul-de-sacs. ADOT would remove the abandoned section of the road and any fencing or other features that are a wildlife barrier, and reclaim the ROW with native habitat. The design would remove barriers for wildlife while ensuring local access is maintained.
 - Sandario Road is managed by Pima County. The ownership of the road is half Pima County and half Tohono O’odham Nation. Pima County has a maintenance easement on the tribal land. Relocating Sandario Road would be undertaken as an integral part of the proposed project if the Purple or Green Alternative were to be selected. During Tier 2 study, FHWA and ADOT would undertake coordination with Reclamation, the Tohono O’odham Nation, Pima County, the public, and others as part of identifying a specific design and construction plan for relocating Sandario Road, assessing potential benefits and impacts, and developing appropriate mitigation.
 - I-11 Wildlife Crossings. ADOT would incorporate eight wildlife crossing areas into the I-11 and Sandario Road design such that the crossings are in line with the existing CAP canal siphons crossing. By removing Sandario Road, co-aligning I-11 alongside the CAP canal, and co-aligning wildlife crossing areas, the barrier effect formed by existing Sandario Road would be removed. Reclamation supports this mitigation measure as it would have the beneficial effect of removing the barrier effect caused by existing Sandario Road, thereby encouraging and enhancing conditions for wildlife movements across the TMC. Reclamation also supports this mitigation measure because it will consolidate the I-11/CAP canal infrastructure in one location and reduce the potential barrier effect I-11 could cause on the TMC property. As stated in their letter of June 8, 2018, this will encourage and enhance conditions for wildlife movements across the TMC.

As a result of this coordination activity, FHWA and ADOT have added the I-11 alignment along the CAP canal with mitigation (removed and reclaimed Sandario Road and co-aligned wildlife crossings with the CAP canal) as the CAP Design Option in the Draft Tier 1 EIS.

If the Purple or Green Alternative is selected, FHWA and ADOT propose and commit to including the CAP Design Option plus additional mitigation to provide a net benefit to the features and values of the TMC. The above mitigation measures and additional commitments to the proposed measures are summarized below:

1. Wildlife Studies Prior to Tier 2 Process. FHWA and ADOT will coordinate with AGFD and USFWS, as recognized wildlife authorities, on determining the studies required to understand east-west wildlife movement needs (both on and off the Tucson Mitigation Corridor [TMC]) within Avra Valley. These studies will gather baseline wildlife data, including evaluation of historic and current movement data, and surveys of existing populations. Using the baseline data, the studies will identify the extent, location, requirements, target species, and expected benefits of additional wildlife movement areas, supporting structures, and



other mitigation measures. Finally, the studies will identify an approach for perpetual management and protection of any acquired lands as well as any adaptive management thresholds and likely actions. Identification of the entity responsible for management and agreements with that entity would take place during the Tier 2 process. FHWA and ADOT will fund and facilitate the implementation of the identified wildlife studies prior to the initiation of the Tier 2 process so that the results can be used to inform the I-11 design.

2. Mitigation Recommended in Wildlife Studies Including Additional Wildlife Corridor. As part of the Tier 2 design, FHWA and ADOT would use the results of the wildlife studies, in consultation with AGFD, USFWS, and the TMC Working Group, to identify wildlife movement areas, supporting structures, and other mitigation measures to incorporate into the I-11 Corridor. Mitigation measures may be located outside the TMC, but will be located between the Tucson Mountains and the Roskrige Mountains to the west, and they will support the purpose of the TMC.

3. Land Replacement. FHWA and ADOT would transfer any lands acquired for TMC mitigation to an entity that would protect the lands for wildlife and wildlife movement purposes. FHWA and ADOT would consult with the TMC partners to jointly identify and agree on the appropriate entity

4. Relocate and Reclaim Sandario Road. ADOT would relocate Sandario Road to coincide with the new I-11 alignment. ADOT would remove and reclaim about a 2-mile section of the old road with native vegetation. The design would remove barriers for wildlife (including the road and associated roadway fencing) while maintaining any necessary local access.

5. Wildlife Crossings Concurrent with CAP Canal Wildlife Crossings. ADOT would place wildlife crossings on I-11 that align with CAP siphon crossings in the TMC, and would place one wildlife crossing immediately north of the TMC (a total of seven crossings). The purpose of the I-11 wildlife crossings is to provide continuity to the existing CAP wildlife crossings (siphons) and minimize impacts to wildlife movements between the Tucson Mountains and Roskrige Mountains.

6. Design Standards. Reclamation and the Central Arizona Water Conservation District (CAWCD) have design standards for facilities that encroach on CAP lands. ADOT would comply with these standards where I-11 crosses CAP lands or is adjacent to the CAP facility.

7. No Interchanges in the TMC. ADOT would prohibit exits and interchanges on I-11 within the TMC.

8. No Interchanges between West Snyder Hill Road and West Manville Road. To maximize the effectiveness of the TMC mitigation measures, ADOT would not build exits or interchanges on I-11 between West Snyder Hill Road and West Manville Road. The direct distance between these two roads is approximately 9 miles.

9. Minimize Width of I-11 in TMC. Within appropriate interstate design standards, ADOT would minimize the width of I-11 through the TMC. The design would occur during Tier 2.

10. Land Use Planning. Understanding the potential for indirect and cumulative land use effects from the I-11 project, ADOT would be an active partner in a broader effort with Metropolitan Planning Organizations, local jurisdictions, resource agencies, and private stakeholders to cooperatively plan development in the I-11 corridor. The effort would coordinate wildlife



connectivity, local land use planning, and context-sensitive design for the I-11 facility. The White Tanks Conservancy may be a model for this type of effort. Coordination with Pima County on the implementation of the Sonoran Desert Conservation Plan also could be part of the effort.

Additional mitigation measures that would reduce the impact to sensitive resources in the vicinity of the TMC that are discussed elsewhere in the EIS are:

- Lighting Compliant with Dark Skies. Roadway lighting would be compatible with dark skies objectives and lighting would be limited to be consistent with land use and development patterns at the time of the I-11 implementation.
- Visual Screening. The roadway would be designed in such a way as to screen the facility from sensitive viewpoints in the area. The design would use various measures, such as vegetation, berms, and topography or partial depression of the roadway, to accomplish this. The screening also would reduce noise impacts.

Coordination and Public Involvement

FHWA and ADOT coordinated with Reclamation and TMC management partners in each phase of alternatives development and evaluation, beginning with scoping and continuing through development and evaluation of the Build Corridor Alternatives. Specifically, and as described in Section 4.4.2, Reclamation identified the TMC as a property protected by Section 4(f) in their July 8, 2016 letter (**Appendix F**). FHWA confirms this status. Subsequent coordination meetings between FHWA, ADOT, and Reclamation in 2017 and 2018 included discussion of the merits and flaws associated with aligning the Build Corridor Alternatives along Sandario Road or along the CAP canal, and relocating Sandario Road and co-aligning the I-11/CAP canal wildlife crossings. In all such discussions, minimizing impacts to wildlife movements was the primary concern of all parties.

This detailed coordination work was critical to identifying and resolving concerns regarding the ability of the TMC property to continue achieving its mission of enabling wildlife movements. The meeting memoranda found in **Appendix F** of the Draft Tier 1 EIS provide evidence of the coordination activities. Circulation of the Draft Tier 1 EIS and Preliminary Draft Section 4(f) Evaluation during the public comment period will give the public an opportunity to review and comment upon the activities and findings related to the TMC property.

FHWA and ADOT invited the US Institute for Environmental Conflict Resolution to facilitate a discussion in Pima County regarding the I-11 Tier 1 EIS. The US Institute is a program of the Udall Foundation and exists to assist parties in resolving environmental, public lands, and natural resource conflicts nationwide that involve federal agencies or interests. The purpose of the discussion was to gain a better understanding of the values and interests of the communities in Pima County that the I-11 corridor could impact. During the meetings, Avra Valley stakeholders identified community-specific issues and concerns that could inform the decision-making process.

The Avra Valley stakeholder group noted several adverse impacts the I-11 could have on their community, including:

- Impacted viewsheds;
- Loss of community cohesion;



- 1 • Fragmentation of wildlife connectivity; and
- 2 • Potential contamination of the City of Tucson's aquifer and SAVSARP and CAVSARP
- 3 recharge basins.
- 4 Stakeholders from the Avra Valley stakeholder group meetings proposed different strategies to
- 5 mitigate these concerns, including co-locating with the CAP Canal.

6 **Determination of Net Benefit**

7 The purpose of the TMC and the function that qualifies the TMC for Section 4(f) protection is
8 wildlife refuge and movement. The Purple and Green Alternatives directly impact (use) the
9 TMC, and wildlife mitigation measures are incorporated into these alternatives' corridors. The
10 mitigation measures are aimed at protecting and enhancing wildlife connectivity and movements
11 across the newly introduced I-11 project. The mitigation measures reflect and expand upon
12 those outlined in Reclamation's letter of June 8, 2018.

13 ADOT and FHWA will continue to coordinate with Reclamation and the TMC management
14 partners throughout the Tier 1 EIS process to determine if the identified process and mitigation
15 strategies will improve wildlife connectivity for the TMC and result in a net benefit. FHWA is
16 making a preliminary Section 4(f) evaluation in the Tier 1 Draft EIS and after public comment,
17 will make a preliminary net benefit determination in the Tier 1 EIS ROD. A Final Section 4(f)
18 Evaluation and net benefit determination will be made during the Tier 2 environmental process,
19 after wildlife studies have been completed and specific mitigation measures finalized.

20 **4.4.4 Constructive Use**

21 **4.4.4.1 Regulatory Context**

22 The requirements of 23 CFR 774.15 describe the conditions in which a constructive use could
23 occur:

24 "A constructive use occurs when the transportation project does not incorporate land from a
25 Section 4(f) property, but the project's proximity impacts are so severe that the protected
26 activities, features, or attributes that qualify the property for protection under Section 4(f) are
27 substantially impaired. Substantial impairment occurs only when the protected activities,
28 features, or attributes of the property are substantially diminished."

29 Substantial impairment is a high threshold; an impact does not rise to the level of being so
30 severe unless specific criteria are achieved. FHWA has determined that a constructive use
31 occurs when (23 CFR 774.15(e)):

- 32 "(1) The projected noise level increase attributable to the project substantially interferes with
- 33 the use and enjoyment of a noise-sensitive facility of a property protected by
- 34 Section 4(f), such as:
 - 35 (i) Hearing the performances at an outdoor amphitheater;
 - 36 (ii) Sleeping in the sleeping area of a campground;
 - 37 (iii) Enjoyment of a historic site where a quiet setting is a generally recognized feature or
 - 38 attribute of the site's significance;
 - 39 (iv) Enjoyment of an urban park where serenity and quiet are significant attributes; or



(v) Viewing wildlife in an area of a wildlife and waterfowl refuge intended for such viewing.

(2) The proximity of the proposed project substantially impairs esthetic features or attributes of a property protected by Section 4(f), where such features or attributes are considered important contributing elements to the value of the property. Examples of substantial impairment to visual or esthetic qualities would be the location of a proposed transportation facility in such proximity that it obstructs or eliminates the primary views of an architecturally significant historical building, or substantially detracts from the setting of a Section 4(f) property which derives its value in substantial part due to its setting;

(3) The project results in a restriction of access which substantially diminishes the utility of a significant publicly owned park, recreation area, or a historic site;

(4) The vibration impact from construction or operation of the project substantially impairs the use of a Section 4(f) property, such as projected vibration levels that are great enough to physically damage a historic building or substantially diminish the utility of the building, unless the damage is repaired and fully restored consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties, i.e., the integrity of the contributing features must be returned to a condition which is substantially similar to that which existed prior to the project; or

(5) The ecological intrusion of the project substantially diminishes the value of wildlife habitat in a wildlife and waterfowl refuge adjacent to the project, substantially interferes with the access to a wildlife and waterfowl refuge when such access is necessary for established wildlife migration or critical life cycle processes, or substantially reduces the wildlife use of a wildlife and waterfowl refuge."

FHWA has determined that a constructive use does not occur when (23 CFR 774.15(f)):

"(1) Compliance with the requirements of 36 CFR 800.5 for proximity impacts of the proposed action, on a site listed on or eligible for the National Register, results in an agreement of 'no historic properties affected' or 'no adverse effect';

(2) The impacts of projected traffic noise levels of the proposed highway project on a noise-sensitive activity do not exceed the FHWA noise abatement criteria as contained in Table 1 in part 772 of this chapter, or the projected operational noise levels of the proposed transit project do not exceed the noise impact criteria for a Section 4(f) activity in the FTA [Federal Transportation Administration] guidelines for transit noise and vibration impact assessment;

(3) The projected noise levels exceed the relevant threshold in paragraph (f)(2) of this section because of high existing noise, but the increase in the projected noise levels if the proposed project is constructed, when compared with the projected noise levels if the project is not built, is barely perceptible (3 dBA or less);

(4) There are proximity impacts to a Section 4(f) property, but a governmental agency's right-of-way acquisition or adoption of project location, or the Administration's approval of a final environmental document, established the location for the proposed transportation project before the designation, establishment, or change in the significance of the property. However, if it is reasonably foreseeable that a property would qualify as eligible for the National Register prior to the start of construction, then the property should be treated as a historic site for the purposes of this section; or



- (5) Overall (combined) proximity impacts caused by a proposed project do not substantially impair the activities, features, or attributes that qualify a property for protection under Section 4(f);
- (6) Proximity impacts will be mitigated to a condition equivalent to, or better than, that which would occur if the project were not built, as determined after consultation with the official(s) with jurisdiction;
- (7) Change in accessibility will not substantially diminish the utilization of the Section 4(f) property; or
- (8) Vibration levels from project construction activities are mitigated, through advance planning and monitoring of the activities, to levels that do not cause a substantial impairment of protected activities, features, or attributes of the Section 4(f) property.”

4.4.4.2 Tucson Mountain Park and SNP Assessment

Based on comments from Reclamation, FHWA assessed the potential for constructive use on Tucson Mountain Park and SNP. **Appendix F** provides the detailed constructive use assessment.

Noise and visual impacts, combined, would impact the visitor experience at Tucson Mountain Park and SNP. However, according to FHWA policy and practice on constructive use, these combined impacts would not be so severe as to substantially impair or diminish the attributes that qualify the parks for protection under Section 4(f). The attributes of each property are listed in **Table 4-1** (Parks, Recreation Areas, and Wildlife/Waterfowl Refuges Protected by Section 4(f) in the Study Area) and **Table 4-2** (Historic Sites Protected by Section 4(f) in the Project Corridors) in Section 4.3. Specifically, noise levels with I-11 are predicted to be less than the applicable FHWA noise abatement threshold at SNP and Tucson Mountain Park. Also, ADOT has committed to mitigate impacts on night skies by complying with dark skies ordinances and by limiting lighting, if necessary.

4.4.4.3 Public Land Order (PLO) 1015 Lands and Adjacent AGFD Parcels Assessment

Originally the jurisdiction of the BLM, the PLO 1015 lands were withdrawn from BLM jurisdiction in 1954 under Public Land Order 1015 and “reserved under the jurisdiction of the USFWS for wildlife refuge purposes.” The PLO 1015 lands are owned/administered by USFWS, but managed by AGFD. The USFWS considers the PLO 1015 lands to be in a special category of lands called “Coordination areas” under the National Wildlife Refuge Act. The adjacent AGFD parcels are in furtherance of the USFWS/AGFD Cooperative Agreement from 1954, clause 7.

FHWA and ADOT assessed the potential for the Project to cause a constructive use on the PLO 1015 lands. The assessment focuses on PLO 1015 lands on either side of the Purple Alternative corridor (Figure 4-21). **Appendix F** provides the detailed constructive use assessment.

Based on the assessment, FHWA has determined that, if the Purple Alternative is selected, the proximity effects of I-11 to PLO 1015 lands would not be so severe that the protected activities, features or attributes that qualify the properties for protection under Section 4(f) would be substantially impaired. No constructive use of PLO 1015 lands or adjacent AGFD parcels would occur as a result of the Project.



4.5 Summary of Findings

FHWA evaluated a hybrid of the three Build Corridor Alternatives (the Recommended Alternative) as a result of the technical analyses in the Tier 1 EIS and input received from agencies, Tribes and the public. The Recommended Build Corridor Alternative is presented in **Chapter 6** (Recommended Alternative). It consists of the elements of the Build Corridor Alternatives would best achieve the I-11 Purpose and Need while avoiding or minimizing impacts on Section 4(f) properties.

The Recommended Alternative would have a proposed net benefit to one Section 4(f) property (TMC). The Purple Alternative would have a proposed net benefit to one Section 4(f) property (TMC). The Green Alternative would have a proposed net benefit to the TMC and would a result in No Use or at most, a *de minimis* use to Robbins Butte Wildlife Area. Based on preliminary design, the Orange Alternative would impact seven Section 4(f) properties in downtown Tucson.

Table 4-6 (Summary of Potential Section 4(f) Uses by Build Corridor Alternative) summarizes the impacts to Section 4(f) properties for the Build Corridor Alternatives.

Table 4-6 Summary of Potential Section 4(f) Uses by Build Corridor Alternative

Alternative	Potential Uses of Section 4(f) Properties	Ability to Mitigate Adverse Impacts to Section 4(f) Properties	Severity of Remaining Harm to Section 4(f) Properties
Purple with CAP Design Option	TMC: new linear surface structure (highway alignment) across TMC property; impact to wildlife movements and connectivity	TMC: The CAP Design Option with additional mitigation strategies could result in a net benefit. Options such as tunneling and elevating I-11 over the TMC may mitigate impacts, but would not result in a net benefit.	TMC Goal: Achieve a net benefit to wildlife connectivity for the TMC compared to existing conditions.
Green Alternative with CAP Design Option	TMC: new linear surface structure (highway alignment) across TMC property; impact to wildlife movements and connectivity Robbins Butte: No use or <i>de minimis</i> use	TMC: The CAP Design Option with additional mitigation strategies could result in a net benefit. Options such as tunneling and elevating I-11 over the TMC may mitigate impacts, but would not result in a net benefit. Robbins Butte: Design goal is to accommodate I-11 cross-section in existing SR 85 ROW	TMC Goal: Achieve a net benefit to wildlife connectivity for the TMC compared to existing conditions. Robbins Butte: No use or <i>de minimis</i> use
Orange Alternative	Downtown Tucson: Impacts to seven Section 4(f) properties Robbins Butte: No use or <i>de minimis</i> use	Downtown Tucson: Low potential to mitigate impacts. Elevating the new I-11 lanes would adversely affect Section 4(f) properties. Tunneling the new I-11 lanes would impact underground archaeological resources and is not prudent due to cost. Robbins Butte: Design goal is to accommodate I-11 cross-section in existing SR 85 ROW	Downtown Tucson: Impacts to seven Section 4(f) properties. Robbins Butte: No use or <i>de minimis</i> use
Recommended Alternative (includes the CAP Design Option)	TMC: new linear surface structure (highway alignment) across TMC property; impact to wildlife movements and connectivity	TMC: The CAP Design Option with additional mitigation strategies could result in a net benefit. Options such as tunneling and elevating I-11 over the TMC may mitigate impacts, but would not result in a net benefit.	TMC Goal: Achieve a net benefit to wildlife connectivity for the TMC compared to existing conditions.

4.6 Coordination

FHWA and ADOT initiated pre-scoping coordination with federal, state, and local officials with jurisdiction in spring 2016 as part of preparing for the NEPA process. FHWA and ADOT met periodically with officials to share I-11 project information and seek input. **Table 4-7** (Summary of Comments from Officials with Jurisdiction over Section 4(f) Properties) lists the officials with jurisdiction over the Section 4(f) properties identified in this chapter, and summarizes the comments each official provided during coordination activities that are relevant to Section 4(f). Correspondence from officials with jurisdiction that is relevant to the Section 4(f) Evaluation is provided in **Appendix F** of this Draft Tier 1 EIS. The dialogue between FHWA, ADOT and the officials with jurisdiction was used in this Preliminary Draft Section 4(f) Evaluation to identify properties that are protected by Section 4(f), assess potential use of the properties by the Build Alternatives, determine potential means to avoid or minimize potential use of Section 4(f)-protected properties, and generally identify measures to minimize harm.

FHWA considered the input from officials with jurisdiction in the development and refinement of the Build Corridor Alternatives. For example, and as described in Section 4.4.3, FHWA and ADOT worked with Reclamation to align the Purple and Green Alternatives alongside the CAP canal on the TMC property as well as relocate and co-align Sandario Road with I-11. By relocating Sandario Road, co-aligning Sandario Road and I-11 alongside the CAP canal, and co-aligning wildlife crossing areas, the barrier effect formed by existing Sandario Road would be removed. Reclamation supports this mitigation measure as it would have the beneficial effect of removing the barrier effect caused by existing Sandario Road, thereby encouraging and enhancing conditions for wildlife movements across the TMC. Furthermore, Reclamation supports this mitigation measure, as it will consolidate the I-11/CAP canal infrastructure in one location and reduce the potential barrier effect I-11 could cause on the TMC property. As stated in their letter of June 8, 2018, co-alignment of the I-11, Sandario Road, and CAP canal crossings will provide the benefit of encouraging and enhancing conditions for wildlife movements across the TMC.

FHWA and ADOT anticipate coordinating with other officials with jurisdiction over Section 4(f) properties where a project use has been identified in this evaluation. Such coordination will occur during the Final Tier 1 EIS and during Tier 2 study. Coordination will focus on examining ways to avoid or minimize uses of the Section 4(f) properties, and on identifying appropriate mitigation.

This coordination activity will enable FHWA to make determinations of potential use and complete the Final Section 4(f) Evaluation as required to satisfy the requirements of Section 4(f) during Tier 1. During Tier 2, coordination activity will enable FHWA to make project-level determinations of use and complete Draft and Final Section 4(f) Evaluations.



Table 4-7 Summary of Comments from Officials with Jurisdiction Over Section 4(f) Properties

Agency/Entity	Comment Date (Context)	Summary of Comments Related to Section 4(f) Properties
Federal Agencies		
NPS	March 14-15, 2016	<ul style="list-style-type: none">NPS comments on concerns related to SNP.
	April 8, 2016 (CA Meeting)	<ul style="list-style-type: none">Concerned with I-11 on west side of SNP; possible impairment due to designated wilderness, night sky, noise levels, fragmentation, impairment of wildlife movements.Potential impacts to the Anza Recreation Trail, Anza Auto Tour Route.Potential impacts to numerous historic and archaeological sites (named).
	June 15, 2016	<ul style="list-style-type: none">Acceptance letter to become a Cooperating Agency.Expressed concern for all National Parks and National Monuments within the Project Area for I-11.
	July 11, 2016	<ul style="list-style-type: none">Comments on the Notice of Intent (NOI) regarding encroachment on SNP through a Corridor Option bisecting Avra Valley which will be built with the intention of being a multiuse corridor. Irreparable damage to the park and surround area for future generations may occur.Other concerns include the Juan Bautista de Anza National Historic Trail and various National Historic Landmarks.
	June 2, 2017	<ul style="list-style-type: none">Expectation of severe and widespread impacts of Project on SNP and Saguaro Wilderness due to alignments through Avra Valley: plant and animal habitat fragmentation and loss, as well as proximity effects to air quality, noise, viewsheds, and night skies.Evaluate mitigation efficacy plan.
	August 31, 2017	<ul style="list-style-type: none">NPS comments on the Annotated Outline and Methodology Report.
	December 19, 2017	<ul style="list-style-type: none">Meeting notes discussing viewshed, noise, and air quality impacts to areas around the SNP.
	August 10, 2018	<ul style="list-style-type: none">Environmental and user experience impacts to SNP.
BLM	July 13, 2016 (CA Meeting)	<ul style="list-style-type: none">Project infrastructure would be incompatible with the national monument and wilderness designations (Sonoran Desert National Monument, Ironwood Forest National Monument, Anza National Historic Trail corridor).
	February 24, 2017	<ul style="list-style-type: none">Prefer alternatives west of Vulture Mountains RMZ, or in the VMRA multi-use corridor.VMRA is a Section 4(f).Alignment outside the multi-use corridor would require amending the Resource Management Plan for the property.
	May 12, 2017	<ul style="list-style-type: none">Avoid Vulture Mountains RMZ, Area of Critical Environmental Concern, wildlife habitat and other sensitive and natural resources in the area; co-location with power infrastructure in the designated multi-use corridor in the Cooperative Recreation Management Area could reduce impacts.



Table 4-7 Summary of Comments from Officials with Jurisdiction Over Section 4(f) Properties (Continued)

Agency/Entity	Comment Date (Context)	Summary of Comments Related to Section 4(f) Properties
BLM (Con't)	April 12, 2018	<ul style="list-style-type: none"> FHWA letter to BLM Hassayampa Field Office, Phoenix District regarding Vulture Mountains RMZ and the utilization of the multiuse corridor by the future I-11.
	September 7, 2018	<ul style="list-style-type: none"> Refer to BLM recreation feature as the Vulture Mountains RMZ instead of the Vulture Mountains Cooperative Management Recreation Area. Mitigate possible impacts to the race course.
Reclamation	April 20, 2016 (CA Meeting)	<ul style="list-style-type: none"> Alignment in TMC would contradict TMC goals of re-connecting wildlife habitat across the Avra Valley; language that established TMC will help determine if it qualifies as a Section 4(f) property. Barrier effect of the Project on wildlife connectivity despite recent investment in wildlife crossings of the CAP canal. Effect of Avra Valley alignment on Tumamoc Preserve lands that were set aside to preserve formerly designated endangered Tumamoc globeberry (<i>Tumamoca macdougallii</i>)
	July 8, 2016 (Scoping comments letter)	<ul style="list-style-type: none"> TMC is protected for preservation of wildlife habitat and movements. TMC is protected by Section 4(f) because it was acquired for mitigation purposes. Canal siphon crossings provide wildlife movement across the CAP canal. Concern that I-11 would fragment habitat and/or be a barrier to wildlife movement through the TMC or elsewhere in Avra Valley. Archaeological sites on the TMC. Globeberry habitat and individuals to be avoided. Concern for project-related noise and lighting impacts on wildlife connectivity. Concern for induced growth and development due to project in Avra Valley and the TMC.
	November 3, 2016 (CA Meeting)	<ul style="list-style-type: none"> Need to clarify language regarding the designation of the land associated with the TMC.
	September 18, 2017	<ul style="list-style-type: none"> On-going coordination to study I-11 Corridor Options in the vicinity of the TMC. Importance of maintaining already-established, well-used wildlife crossings near canal siphons. Noise concerns. Warrant for mitigation for loss of habitat. Effects on existing trails and future trail planning.
	March 5, 2018	<ul style="list-style-type: none"> Reclamation preference to align I-11 alongside CAP canal, matching wildlife crossings to existing canal siphon crossings) to maintain wildlife connectivity. Reclamation preference is to relocate Sandario Road to reduce barriers to wildlife movements. Potential for future environmental studies to identify wildlife corridors.

Table 4-7 Summary of Comments from Officials with Jurisdiction Over Section 4(f) Properties (Continued)

Reclamation (Con't)	June 8, 2018	<ul style="list-style-type: none"> Reclamation input and consultation on a Section 4(f) evaluation for the TMC.
	August 9, 2018	<ul style="list-style-type: none"> Requirements to reach a net benefit for the TMC.
	October 18, 2018	<ul style="list-style-type: none"> Preliminary concurrence with mitigation commitments to meet net benefit for TMC. Reclamation would provide final concurrent on net benefit during Tier 2.
US Fish and Wildlife Service	December 3, 2018	<ul style="list-style-type: none"> The PLO 1015 lands are owned/administered by USFWS, but managed by AGFD. The PLO 1015 lands are National Wildlife Refuge Act lands (special category of lands called "Coordination Areas"). The AGFD parcels that are adjacent or near in furtherance of the DOI/AGFD Cooperative Agreement from 1954, clause #7 also are Wildlife Refuge lands.
	January 3, 2018	<ul style="list-style-type: none"> Consultation email regarding findings of Section 4(f) constructive use evaluation of PLO 1015 lands.
AGFD	July 8, 2016 (CA Meeting)	<ul style="list-style-type: none"> General comment: agency is interested in habitat and wildlife connectivity.
	February 1, 2017 letter	<ul style="list-style-type: none"> The Department provided a list of properties it owns or manages in the I-11 Study Area, along with a status of each.
	February 1, 2017 (letter)	<ul style="list-style-type: none"> "The Department's position is that the publicly-owned portions of the Tucson Mountain Wildlife Area, comprising the Tucson Mountain District of SNP, Tucson Mountain Park, and the TMC, qualify as a Section 4(f) property in the category of a significant state recreation area and state wildlife refuge..." The Department also provided its position regarding Tucson Mountain Wildlife Area, Arlington Wildlife Area, and Powers Butte Wildlife Area.
	March 7, 2017	<ul style="list-style-type: none"> Email and Meeting notes discussing the AGFD GIS Data provided for the Alternatives Selection Report and Tier 1 EIS.
	June 1 2017	<ul style="list-style-type: none"> Avoid Vulture Mountain and Avra Valley areas because of high habitat quality and sensitive biological resources. Concern for habitat fragmentation and loss. Consider indirect impacts of I-11 proximity to natural resources.
	August 7, 2018	<ul style="list-style-type: none"> Impacts to outdoor recreation user experience and revenue generation. Applicability of Section 4(f) to PLO 1015 lands and determining owner or official with jurisdiction.
	December 18, 2018	<ul style="list-style-type: none"> The AGFD parcels that are adjacent to or near the PLO 1015 lands also are wildlife refuges and are in furtherance of the DOI/AGFD Cooperative Agreement from 1954, clause #7.

Table 4-7 Summary of Comments from Officials with Jurisdiction Over Section 4(f) Properties (Continued)

Arizona State SHPO	April 27, 2016 (Pre-scoping)	<ul style="list-style-type: none"> SHPO suggested that at least 3 categories of sensitivity be considered. Potential historic bottlenecks within the Study Area include Gila River and Ironwood/Picacho Peak areas. Documentation of the specific De Anza Trail location varies and locations of passes, watering holes, and other features provide the best indication of the historic location. Tribal trails cross the Study Area.
	June 7, 2016	<ul style="list-style-type: none"> Preserve historic resources by using existing transportation infrastructure where possible.
	April 16, 2018	<ul style="list-style-type: none"> Concern over prehistoric and historic sites and districts being disrupted by the need to widen I-10 as well as the possible disturbance to unknown historical sites in unsurveyed areas (rural) where the alternatives could be placed.
	November 7, 2018	<ul style="list-style-type: none"> Concurrence with adverse impacts from the Orange Alternative historic and Section 4(f) properties in downtown Tucson.
Maricopa County	April 6, 2016 (Pre-scoping)	<ul style="list-style-type: none"> Proposed Maricopa Association of Governments Hassayampa alignment effects on Vulture Mountains RMZ: existing and planned off-highway vehicle recreation area, campground, day use area, trail system, east/west recreation opportunities, access, wildlife connectivity. Hassayampa River Preserve impacts to land, wildlife/wildlife connectivity, and noise (traffic). County is looking at acquiring a piece of the Hassayampa River preserve as well. Raptor nesting at Vulture Peak Area of Critical Environmental Concern (BLM).
	July 7, 2016	<ul style="list-style-type: none"> Concerns for probable conflicts with local traffic, recreation, and usage of areas in and around Vulture Mine Road. Wildlife habitat and connectivity and neighborhood cohesion are areas of potential impacts. Impacts to local FRSs and Dams need to be considered. Possible impacts to the Loop 303 Outfall Drainage Channel which could negatively affect flooding retention and floodplains in the area. Considerations should be made for air quality and the Maricopa Regional trail.
	May 16, 2017	<ul style="list-style-type: none"> Concerned about potential Impacts to the County's lands in the Vulture Mountains RMZ.
Pinal County	May 31, 2017	<ul style="list-style-type: none"> Impacts to the following properties are of concern: Palo Verde Regional Park, Anza National Historic Trail Corridor, and several planned regional trail and open space corridors.



**Table 4-7 Summary of Comments from Officials with Jurisdiction Over
Section 4(f) Properties (Continued)**

City of Tucson	August 19, 2016 (106 Consulting Party Acceptance)	<ul style="list-style-type: none">Historic properties, including archaeological sites and Traditional Cultural Properties, are within the project Area of Potential Effects within the City of Tucson and City-owned lands outside the city limits.
Pima County	December 3, 2019	<ul style="list-style-type: none">Section 4(f) evaluation and constructive use assessment of Tucson Mountain Park.

1 4.7 Future Tier 2 Analysis

2 As set forth in 23 CFR 774.7(e)(1), FHWA will complete a Final Section 4(f) Evaluation and
3 Final Nationwide Programmatic Section 4(f) Evaluation (Net Benefit) during future Tier 2
4 analyses. At that time, FHWA will make final determinations of use, assess avoidance and least
5 harm as warranted, and identify additional specific measures to minimize harm.



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5 COORDINATION AND OUTREACH

Coordination and outreach are fundamental components of effective transportation planning. The environmental review process for the Interstate 11 (I-11) Corridor officially began when Federal Highway Administration (FHWA) filed a Notice of Intent (NOI) to prepare a Tier 1 Environmental Impact Statement (EIS) in the Federal Register on May 20, 2016. The environmental review process complies with the National Environmental Policy Act of 1969 (NEPA) and promotes informed decision-making by considering potential social, economic, and environmental impacts. Throughout the development of this Tier 1 EIS, FHWA and Arizona Department of Transportation (ADOT) will continue to engage federal, state, regional, county, local, and Tribal governments with a defined interest in the I-11 Corridor, as well as the general public, key stakeholders, and other interested parties. This chapter is a summary of outreach and engagement activities.

5.1 Agency Coordination

NEPA requires agencies to consider the environmental impacts of their actions, document their analysis, and make this analysis available to agencies, Tribal governments, and the public for review prior to taking action. NEPA also requires federal agencies to use an interdisciplinary approach as they plan and make decisions that may affect the environment, working collaboratively with other agencies that have jurisdiction or special expertise regarding the issues that are relevant to the project under consideration. This includes distribution of public notice of hearings and public meetings to agencies and the availability of environmental documents to inform those persons and agencies that may be interested or affected.

5.1.1 Regulatory Requirements

Under Section 6002 of the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU), agencies are responsible for identifying any issues of concern regarding potential environmental, social, or economic impacts that could substantially delay or prevent an agency from granting a permit or other approval needed for the project. Section 6002 is intended to ensure that agencies are fully engaged in the scoping of the project and decisions regarding alternatives to be evaluated in detail in the NEPA analysis. An agency's role related to their areas of expertise may include the following:

- Provide meaningful and early input to the methodologies and level of detail required in the alternatives analysis and environmental studies;
- Identify issues that could substantially delay or prevent granting of permits/approvals;
- Identify opportunities for collaboration, including attending coordination meetings and joint field reviews, as appropriate; and
- Provide timely review and comment on preliminary environmental documents to reflect the views and concerns of their respective agencies on the adequacy of the documents, alternatives considered, and anticipated impacts and mitigation.



1 *Moving Ahead for Progress in the 21st Century Act* (MAP-21), signed into law in July 2012,
2 amended SAFETEA-LU by providing additional guidance on agency participation in the NEPA
3 process. MAP-21 requires Cooperating and Participating Agencies to carry out their obligations
4 under applicable laws concurrently with the lead agency's environmental review process, unless
5 doing so would impair their ability to conduct needed analysis or otherwise carry out those
6 obligations.

7 Enacted in 2015, the *Fixing America's Surface Transportation Act* builds on the requirements in
8 SAFETEA-LU and MAP-21 in an effort to accelerate the environmental review process for
9 surface transportation projects. It strives to institutionalize best practices and expedite complex
10 infrastructure projects without undermining critical environmental laws or opportunities for public
11 engagement. Further, the *Fixing America's Surface Transportation Act* clarifies that an agency
12 participating in the environmental review process shall:

- 13 • Provide comments, responses, studies, or methodologies on those areas within the special
14 expertise or jurisdiction of the agency; and
- 15 • Use the process to address any environmental issues of concern to the agency.

16 To the maximum extent practicable and consistent with applicable law, each agency receiving
17 an opportunity for involvement shall limit the comments of the agency to subject matter areas
18 within the special expertise or jurisdiction of the agency. The Federal Lead Agency will consider
19 and respond to comments received from agencies on matters within the special expertise or
20 jurisdiction of those agencies.

21 **5.1.2 Roles and Responsibilities**

22 FHWA and ADOT requested local and federal agencies and Tribal governments participate in
23 the environmental review process by inviting them to be a Cooperating Agency or a
24 Participating Agency under NEPA guidelines. In addition, agencies and others were invited to
25 participate as consulting parties under Section 106 of the National Historic Preservation Act
26 (see Section 3.7, Archaeological, Historical, Architectural, Cultural Resources). **Table 5-1**
27 (Agency Roles and Responsibilities) lists the type of agency roles with regard to the NEPA
28 process.

29 Cooperating Agencies are, by definition in Title 40 Code of Federal Regulations (CFR) 1508.5
30 and 23 CFR 771.111(d), federal agencies with jurisdiction by law or special expertise with
31 respect to any environmental impact involved in the study. Other agencies or Tribal
32 governments of similar qualifications also may qualify if FHWA concurs. Cooperating Agencies
33 have a slightly greater degree of responsibility and involvement in the environmental review
34 process than Participating Agencies.

Table 5-1 Agency Roles and Responsibilities

Agency Designation	Roles and Responsibilities
Lead Federal Agency (FHWA)	Designated to supervise the preparation of the environmental analysis and is responsible for implementing NEPA, including compliance with regulatory requirements, legal sufficiency of the Tier 1 EIS, and ensuring opportunities for public and agency involvement.
Local Sponsor (ADOT)	Serves as project sponsor. Shares in the responsibility to manage the coordination process, prepares the Tier 1 EIS, and provides opportunities for public and participating/cooperating agency involvement.
Cooperating Agency	Participates early and regularly in the NEPA process and provide comments and guidance so that the Tier 1 EIS satisfies each agency's requirements. Participates in developing the Purpose and Need and alternatives, and in the scoping process. Develops information and analysis or provide staff support, participates in public involvement activities, reviews draft environmental documents, and provides comments.
Participating Agency	Participates early and regularly throughout the study process by providing meaningful input on the purpose and need, range of alternatives, and methodologies to evaluate impacts to respective jurisdictional resource(s); participates in the public outreach process; identifies issues of concern regarding potential environmental or socioeconomic impacts; provides timely input on unresolved issues; and comments on the Draft and Final Tier 1 EIS during the circulation and availability period.

NOTES: ADOT = Arizona Department of Transportation, EIS = Environmental Impact Statement, FHWA = Federal Highway Administration, NEPA = National Environmental Policy Act

- 1 The I-11 Cooperating Agencies were requested to provide the following during the development
- 2 of the Draft Tier 1 EIS on areas within the special expertise or jurisdiction of the agency:
- 3 • Meaningful and early input on the I-11 Purpose and Need, range of alternatives,
- 4 methodologies, and level of detail required to evaluate impacts to the agency's jurisdictional
- 5 resource(s);
- 6 • Attendance at monthly in-person coordination meetings, including access via
- 7 teleconference;
- 8 • Timely reviews and written comments on the NEPA documents that explain the views and
- 9 concerns of the agency on the adequacy of the document, anticipated impacts, and
- 10 mitigation strategies relevant to each agency's area of special expertise;
- 11 • Identification of the impacts and important issues to be addressed in the Draft Tier 1 EIS
- 12 pertaining to the intersection of the alternatives with the agency's jurisdictional resource(s);
- 13 and
- 14 • Make available the necessary professional staff to assist in the Draft Tier 1 EIS process and
- 15 development of all technical documents.



Table 5-2 (Cooperating Agencies) lists the ten federal agencies invited to be a Cooperating Agency, along with their response to the invitation. Of those, eight federal agencies accepted the invitation, and one federal agency opted to be a Participating Agency instead (Western Area Power Administration [Western]). Two state agencies, Arizona Game and Fish Department (AGFD) and Arizona State Land Department (ASLD), requested status as a Cooperating Agency due to jurisdiction by Arizona State law. AGFD was accepted as a Cooperating Agency based on their jurisdictional authority and State Trust responsibility for the management of Arizona's wildlife resources and special expertise regarding wildlife resources within the I-11 Corridor Study Area (Study Area). FHWA denied the request of ASLD due to jurisdictional authority and a lack of special expertise with respect to environmental impacts. As such, there are a total of nine Cooperating Agencies. Agency responses to invitation letters and scoping input are appended to the *Scoping Summary Report*, which is provided in **Appendix G**.

Table 5-2 Cooperating Agencies

Agency	Response to Invitation
Federal	
Bureau of Land Management (BLM)	Accepted
Federal Aviation Administration (FAA)	Accepted
Federal Railroad Administration (FRA)	Accepted
National Park Service (NPS)	Accepted
United States (US) Army Corps of Engineers (USACE)	Requested to be a Cooperating Agency on 10/25/2018; Accepted by FHWA
US Bureau of Reclamation (Reclamation)	Accepted
US Environmental Protection Agency (USEPA)	Accepted
US Fish and Wildlife Service (USFWS)	Accepted
US Forest Service (USFS), Coronado National Forest	Accepted
Western Area Power Administration	Opted to be Participating Agency
State	
AGFD	Invited as Participating Agency; accepted as Cooperating Agency upon request

A total of 69 agencies were invited to be a Participating Agency, and ultimately 51 agencies accepted. For those agencies that did not respond, FHWA and ADOT followed up with those agencies on their participation and a summary of the follow up is noted in the table. Participating Agencies, as defined in SAFETEA-LU, can be federal, state, regional, county, and local agencies, as well as Tribal governments that may have an interest in I-11. Participating Agencies are listed in **Table 5-3** (Participating Agencies). Agency responses to invitation letters and scoping input are appended to the *Scoping Summary Report*, which is provided in **Appendix G**.



Table 5-3 Participating Agencies

Agency	Response to Invitation
Federal	
Bureau of Indian Affairs	Accepted
Federal Emergency Management Agency (FEMA)	Accepted
Federal Transit Administration (FTA)	Followed up on 10/14/2016 (phone) and 10/25/2016 (phone); No Response
USACE	Accepted on June 20, 2016; Requested Cooperating Agency status change on 10/25/2018; Accepted by the FHWA
US Air Force, Davis-Monthan Air Force Base	Declined
US Air Force, Luke Air Force Base	Followed up on 10/14/2016 (phone) and 10/25/2016 (email); No Response
US Customs and Border Protection	Accepted
US Department of Agriculture (USDA)	Accepted
Western Area Power Administration	Invited as Cooperating Agency; Opted to be Participating Agency
State	
Arizona Air National Guard	Followed up on 10/14/2016 (phone); No Response
Arizona Corporation Commission	Accepted
Arizona Department of Corrections	Accepted
Arizona Department of Environmental Quality (ADEQ)	Accepted
Arizona Department of Public Safety	Accepted
Arizona Department of Water Resources	Followed up on 10/14/2016 (phone); No Response
AGFD	Requested to be Cooperating Agency
ASLD	Accepted
Arizona State Parks	Accepted
Arizona State Historic Preservation Office	Accepted
Regional	
Central Arizona Governments	Accepted
Central Yavapai Metropolitan Planning Organization	Accepted
Northern Arizona Council of Governments	Followed up on 10/17/2016 (phone); No Response
Maricopa Association of Governments (MAG)	Accepted
Pima Association of Governments (PAG)	Accepted
South Eastern Arizona Governments Organization (SEAGO)	Accepted
Sun Corridor Metropolitan Planning Organization (SCMPO)	Accepted



Table 5-3 Participating Agencies (Continued)

Agency	Response to Invitation
County	
Maricopa County	Accepted
Flood Control District of Maricopa County	Accepted
Pima County	Accepted
Pima County Flood Control	Accepted
Pinal County	Accepted
Pinal County Flood Control District	Accepted
Santa Cruz County	Accepted
Santa Cruz County Flood Control District	Followed up on 10/17/2016 (phone and email); No Response
Yavapai County	Accepted
Yavapai County Flood Control	Accepted
Local	
City of Buckeye	Accepted
City of Casa Grande	Accepted
City of Eloy	Accepted
City of Goodyear	Accepted
City of Maricopa	Accepted
City of Nogales	Accepted
City of South Tucson	Accepted
City of Surprise	Accepted
City of Tucson	Accepted
Town of Gila Bend	Accepted
Town of Marana	Accepted
Town of Oro Valley	Accepted
Town of Sahuarita	Accepted
Town of Wickenburg	Accepted
Utility	
Arizona Public Service	Followed up on 10/17/2016 (phone and email); No Response
Buckeye Water Conservation and Drainage District	Followed up on 10/17/2016 (phone); No Response
Central Arizona Irrigation and Drainage District	Accepted
Central Arizona Project	Followed up on 10/17/2016 (phone); No Response
Cortaro-Marana Irrigation District	Accepted
Greene Reservoir Flood Control District	Accepted
Maricopa Flood Control District	Accepted



Table 5-3 Participating Agencies (Continued)

Agency	Response to Invitation
Maricopa-Stanfield Irrigation and Drainage District	Followed up on 10/18/2016 (phone); No Response
Roosevelt Irrigation District	Followed up on 10/18/2016 (phone); No Response
San Carlos Irrigation and Drainage District	Accepted
Salt River Project	Accepted
Trico Electric Cooperative	Accepted
Silverbell Irrigation and Drainage District	Followed up on 10/18/2016 (phone and email); No Response
UNS Energy Corporation/Tucson Electric Power	Accepted
Tribal	
Ak-Chin Indian Community	Accepted
Gila River Indian Community	Followed up on 11/17/2016 (email); No Response
Pascua Yaqui Tribe	Accepted
Tohono O'odham Nation	Followed up on 11/14/2016 (email); Response pending Tribal Council approval with no further response

5.1.3 Agency Coordination Opportunities

Throughout the development of materials to support the decision-making process under NEPA, FHWA and ADOT requested, documented, and incorporated input from agencies. Coordination with agencies occurred regularly throughout the project and at key milestones. Major outreach opportunities are summarized in **Table 5-4** (Agency Coordination Opportunities) and further described below.

Pre-scoping Activities. FHWA and ADOT offered pre-scoping opportunities to elicit information, issues, and concerns and discuss the Tier 1 EIS process with the agencies and other key stakeholders in advance of formal scoping for the environmental review process. Approximately 50 pre-scoping meetings were held with federal, state, regional, county, local, and Tribal governments, as well as other stakeholders. Other stakeholders included Union Pacific Railroad, Burlington Northern Santa Fe Railroad (BNSF), Nature Conservancy, and utility companies within the Study Area. All agencies and stakeholders were encouraged to participate in the study and submit formal written comments during the subsequent official scoping period. They were informed that information and input shared during pre-scoping meetings or other prior studies did not replace the official scoping period and comments submitted.

Table 5-4 Agency Coordination Opportunities

Agency Coordination	Dates	Purpose and Outcomes
Pre-scoping Meetings	March – May 2016	Meet with representative from over 50 agency and private stakeholders to obtain early information on key issues and concerns, as well as disseminate information about the Tier 1 EIS process.
Project Management Team Meetings	Monthly, January – December 2016 and Bimonthly, January 2017 – present	Convene ADOT, FHWA, and Metropolitan Planning Organizations (MPOs) to discuss project status and coordinate on related projects or pertinent issues.
Cooperating Agency Meetings	Monthly, September 2016 – present	Convene ADOT, FHWA, and Cooperating Agencies to discuss project status, coordinate on related projects or pertinent issues, and review draft project materials.
Milestone Agency Meetings	May and June, 2016 May 2017	Participating and Cooperating Agencies were invited to Agency Coordination Meetings at key milestones.
Executive Leadership Team	Quarterly, May 2016 – present	Executive-level meetings to discuss project status, upcoming outreach activities, and outstanding issues among ADOT, FHWA, and MPO leadership.
Individual Agency Meetings	Throughout entire process	Individual meetings were conducted with individual agencies or Tribes as requested or in response to project issues.
Stakeholder Meetings	Throughout entire process	Individual meetings were conducted with stakeholders, including local municipalities/agencies, landowners, and non-governmental organizations, as requested or in response to project issues.
Draft Document Reviews	November 2016 – November 2017	Cooperating and Participating Agencies provided input on the materials to support the NEPA process, including: <ul style="list-style-type: none"> • Public Outreach and Agency Coordination Plan • Scoping Summary Report • I-11 Purpose and Need Memorandum • Alternatives Selection Report Evaluation Methodology and Criteria Report • 2017 Agency and Public Information Meeting Summary Report • Alternatives Selection Report • Tier 1 EIS Annotated Outline and Methodology • Memorandum regarding Reasonably Foreseeable Future Actions for the analysis of indirect and cumulative impacts in the Tier 1 EIS
Input on Administrative Draft Tier 1 EIS	July – August 2018	Cooperating Agencies reviewed and provided input prior to public distribution.
Input on Draft Tier 1 EIS	April – May 2019	All agencies may provide input on Draft Tier 1 EIS during the public review period.

NOTES: ADOT = Arizona Department of Transportation, FHWA = Federal Highway Administration, EIS = Environmental Impact Statement, NEPA = National Environmental Policy Act, MPOs = metropolitan planning organizations



Project Management Team Meetings. FHWA, ADOT, and representatives of each MPO and Council of Governments throughout the Study Area met regularly throughout the study process to discuss project status and obtain feedback on current planning activities. MPOs were often requested to report back to their local member agencies (cities, towns, and counties) to resolve issues or obtain additional data. The MPOs and Council of Governments involved included MAG, PAG, SCMPO, and SEAGO.

Coordination Meetings with Cooperating and Participating Agencies. Cooperating Agencies met monthly beginning in September 2016 to discuss project status and obtain timely input on issues. Meetings were conducted with Participating Agencies at project milestones and as needed or requested with individual agencies throughout the study process. Individual meetings were conducted with individual agencies or Tribes as requested or in response to project issues.

Executive Leadership Team Meetings. Key project staff met with the Executive Leadership Team quarterly to keep them apprised of project status and outstanding issues. This Team included executive leadership from ADOT, FHWA, MAG, PAG, SCMPO, and SEAGO and provided collaborative guidance and direction on key decision points throughout the planning process.

Input at Key Milestones. Scoping and Agency Meetings and Public Information Meetings were held in June 2016 and May 2017, respectively (see Section 5.3). During these periods, both public meetings and agency-specific meetings were conducted in multiple locations. In addition, Cooperating and Participating Agencies also had the opportunity to review and provide input on key documents prior to finalization, as listed in **Table 5-4** (Agency Coordination Opportunities). The Cooperating Agencies also provided input on the Administrative Draft Tier 1 EIS prior to finalization for public review.

5.2 Public Outreach

The public outreach component of the study is designed to engage, inform, and receive input from the public for consideration during the environmental review process. The public is defined as those communities, elected representatives, interested stakeholders, businesses, individuals, and civic organizations with an interest in, and who might be affected by, the I-11 Corridor. ADOT encourages robust public involvement that includes diverse groups of people statewide whose voices and viewpoints provide valuable insight during the decision-making process.

5.2.1 Regulatory Requirements

Public outreach and planning for the study is conducted in compliance with federal requirements (Title 40 CFR 1506.6). These federal requirements state that public participation enables all interested parties to have the opportunity to provide input and comment during the decision-making process and be made aware of study developments. In addition, ADOT's *Public Involvement Plan* provides guidance, techniques, and examples for interacting with, informing, and involving all members of the public throughout the transportation planning, design, construction, and operation process. It helps ensure that the public involvement process for ADOT projects occurs in accordance with Title VI of the Civil Rights Act of 1964, the Americans with Disabilities Act (ADA), and other federal mandates for Environmental Justice and Limited-English Proficiency (LEP) populations in Arizona.

Public involvement plays an important role in NEPA. The public is invited to participate in the environmental review process by receiving study information, attending public meetings, and submitting comments to FHWA, the federal lead agency, and ADOT, the local project sponsor. Public comments provide valuable information on issues to be addressed as part of the environmental analyses. Throughout the development of the alternatives and the Draft Tier 1 EIS, FHWA and ADOT requested and documented input from the public, which was incorporated into the decisionmaking process.

5.2.2 Outreach Opportunities

Since the initiation of the NEPA process with the publication of the NOI in the Federal Register on May 20, 2016, a variety of resources have been made available for the public to stay informed about the project and provide the opportunity to provide comments at any time. These include:

- E-mail and newspaper notifications of upcoming meetings and project updates.
- An online database to submit comments and join an interested parties contact list.
- An online map tool to submit corridor alternative or location specific comments (available during the Alternatives Selection Report outreach period of April – June 2017).
- Dedicated I-11 Tier 1 EIS Study website to provide all public documents, meeting materials, and opportunities for online surveys and to e-mail questions or comments (online tool available for translation of website).
- Public meetings in May 2016 and May 2017 to solicit input, with Spanish translation services and other reasonable accommodations as needed, such as sign language interpreters, court reporters, and other knowledgeable professional staff.
- A bilingual telephone hotline in English and Spanish.
- A dedicated public information officer, who was included on the Project Team.
- US Institute for Environmental Conflict Resolution (US Institute) facilitated stakeholder engagement meetings (described in more detail in Section 5.3.3).
- News releases.
- GovDelivery e-mail notifications.
- Social media: ADOT's Twitter, Facebook, and blog.
- Project videos.
- Media interviews and information for newspaper, radio, TV, and online stories.
- Letters to elected officials.

5.2.3 Title VI, Environmental Justice, and Limited English Proficiency

Various federal laws and executive orders have been enacted to protect low-income and minority populations. Title VI of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color, or national origin, including individuals with LEP. The intent of consideration for individuals with LEP is to ensure they are provided “meaningful access” to information regarding government programs or services, and a failure to address this could potentially constitute



discrimination. (Section 3.5, Community Resources, Title VI, and Environmental Justice, and **Appendix E5** contain more detail on these populations as well as tabular demographic data.).

Executive Order 13166 requires federal agencies to assess and address the needs of otherwise eligible persons seeking access to federally conducted programs and activities who, due to LEP, cannot fully and equally participate in or benefit from those programs and activities. According to the Department of Justice, *“Individuals who do not speak English as their primary language and who have a limited ability to read, speak, write, or understand English can be limited English proficient, or ‘LEP.’ These individuals may be entitled [to] language assistance with respect to a particular type or service, benefit, or encounter.”* The Department of Justice LEP Guidance, in turn, advises each federal department or agency to *“take reasonable steps to ensure ‘meaningful’ access [to LEP individuals] to the information and services they provide”* (US Department of Justice 2015).

In addition to regulations related to LEP, ADOT’s standard procedures for public involvement require census data be analyzed to identify the most prominent languages that are spoken within the Study Area and determine the translation needs for the project (see **Appendix E5** for the census data). The census data indicated that translation of the Spanish language would be necessary throughout the public involvement process.

In the context of transportation, effective and equitable decision-making depends upon understanding and properly addressing the unique needs of different socioeconomic groups. One of the fundamental principles of the US Department of Transportation Environmental Justice Strategy is *“[t]o ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.”* To ensure that everyone received an equal opportunity to participate, ADOT and FHWA has taken several measures to meet the intent, guidelines, and requirements of Title VI, environmental justice, and LEP. The following standards were in place for each public meeting:

- An ADOT Communications team representative attended the public meetings and made available provided information about the public’s rights to ADOT’s nondiscrimination programs. “Your Rights Under Title VI” brochures (in both English and Spanish) were provided to attendees.
- In order to meet the federal requirement to collect demographic data of meeting attendees, the opportunity was provided for attendees to complete the voluntary “Title VI Self Identification Survey” card.
- The opportunity to request accommodations and modifications under the ADA was provided in all public meeting advertising.
- Spanish translation was available at each meeting with other translation services available upon request.

Following an evaluation of the Study Area’s demographic data related to Title VI, LEP, and environmental justice, ADOT and FHWA identified techniques to address and reduce linguistic, cultural, institutional, geographic, and other barriers to meaningful participation. Those techniques included:

- Translating all public involvement materials (included newspaper advertisements) into Spanish, as well as other languages, such as Chinese, upon request.
- Providing Spanish interpretation at all public meetings and hearings, as well as other languages upon request.



- Adding an automatic online translator to the study website, allowing translation of website text into approximately 100 languages, including Chinese and Vietnamese for populations found within the Study Area.
 - Including Spanish-language graphics for download on the study website, as well as other languages upon request.
 - Establishing a bilingual study hotline both in English and Spanish (1-844-544-8049).
 - Integrating elected officials, intergovernmental liaisons, and special interest groups into the process.
 - Coordinating, implementing, and documenting communications protocols with the four adjacent and 22 statewide Tribal governments.
 - Using advertising and graphics to reach broader audiences.
 - Holding public meetings in locations throughout the I-11 Corridor and Study Area that are easily accessible and ADA compliant.
 - Holding public meetings along transit lines for those who are transit dependent.
 - Providing reasonable accommodations such as for sign-language interpreters upon request.
- Exhibits of bilingual meeting notifications and materials are included in **Appendix G**, which includes the *Scoping Summary Report* and the *Agency and Public Information Meetings Summary Report*. Many of these overlap with tools that also reach the public at large, with a goal of providing access so everyone can participate.

5.3 Key Outreach and Coordination Milestones

Agency, Tribal, and public comment opportunities have continued throughout the NEPA process, since the publication of the NOI in May 2016. Two sets of agency and public information meetings have occurred at key milestone periods prior to development of the Draft Tier 1 EIS, including Scoping (May - July 2016) and Information Meetings related to the analysis of alternatives to carry forward into the Draft Tier 1 EIS (April - June 2017). Each outreach effort is further described below.

5.3.1 Scoping

Scoping is an initial step in the environmental review process under NEPA. The Council on Environmental Quality's NEPA Regulations (40 CFR § 1501.7) state that the federal lead agency should engage in scoping to provide an early and open process to determine the scope, or range, of issues to be addressed and identify the significant issues related to a proposed action.

Scoping serves the following purposes at the beginning of the environmental review process:

- Informs the agencies, public, and Tribal communities about the study process and intent;
- Connects previous planning decisions with current study development;



- 1 • Seeks early input from the agencies, public, and Tribal communities on:
 - 2 – Purpose and Need,
 - 3 – alternatives to be studied,
 - 4 – impacts to be evaluated, and
 - 5 – evaluation criteria and methodology to be used;
- 6 • Looks for opportunities to streamline the study process and collaborate with partners; and
- 7 • Establishes a decision-making framework, including agency participation and
- 8 responsibilities.

9 The 45-day scoping period was held from May 23 to July 8, 2016. Notifications of the study,
10 open house dates, and comment opportunities were advertised via the NOI, ADOT press
11 releases, a newsletter e-mailed to ADOT's expansive mailing list, and newspaper
12 advertisements in 14 Study Area publications.

13 At the time of the scoping period, a preliminary Study Area had been identified and was
14 presented at the public meetings. Meeting attendees were provided a presentation on the
15 anticipated study process and the opportunity to interact directly with ADOT, FHWA, and
16 members of the Project Team to ask questions and discuss concerns. Large maps of the Study
17 Area were made available for review, and written comments that referred to specific locations
18 were encouraged as these would be included in the official record of the scoping period. All
19 public meeting materials were available online, and comments could be submitted online or by
20 e-mail, letter, or voicemail. All comments received are documented in their original form in the
21 *Scoping Summary Report (Appendix G)*, which also includes copies of meeting materials and
22 detailed information on notifications of the scoping period.

23 5.3.1.1 Agency Scoping

24 Three scoping meetings were held throughout the Study Area to solicit comments from
25 agencies. Each agency scoping meeting included a presentation by ADOT, followed by a
26 facilitated session for questions and comments. A webinar was available for agency staff unable
27 to attend the meetings in person. Agency scoping meeting information is listed in **Table 5-5**
28 (Agency Scoping Meetings [June 2016]).

Table 5-5 Agency Scoping Meetings (June 2016)

Date and Time	Location
June 7, 2016 1:30 to 3:30 p.m.	Leadership and Employee Engagement Conference Room 2739 East Washington Street Phoenix, AZ
June 8, 2016 1:30 to 3 p.m.	Dorothy Powell Senior Adult Center 405 East 6th Street Casa Grande, AZ
June 22, 2016 10 to 11:30 a.m.	Pima Association of Governments 1 East Broadway Boulevard #401 Tucson, AZ



The written and verbal comments received from agencies and Tribal communities included common themes on potential corridor alternatives, environmental resources, and other issue areas. Common themes included:

- A preference for corridor alternatives on existing freeways versus new corridors;
- Development of a reasonable range of alternatives and consideration of a multimodal corridor;
- Ensure consistency with existing and proposed local and regional plans, environmental documents, and master planned community plans;
- Incorporate the highest levels of environmental design and energy efficiency;
- Develop I-11 Purpose and Need;
- Study opportunities to foster economic development;
- Protection environmentally sensitive resources including:
 - parklands, preserves, and recreation areas,
 - historic and archaeological resources,
 - wildlife habitat, corridors, and wilderness areas,
 - endangered species and critical habitat,
 - National forests and “roadless areas,”
 - water resources and flood control structures,
 - air quality, and
 - noise impacts;
- Consideration of cumulative impacts and growth-related indirect impacts, including impacts to:
 - local traffic and access,
 - residents and businesses, including displacement of communities and downtown areas,
 - local economic development,
 - environmentally sensitive resources, and
 - habitat connectivity and fragmentation;
- Assessment of impacts to environmental justice communities;
- Maintenance of connectivity between regional trails and parks;
- Consideration of general support for the project as a critical multimodal facility for the region; and
- Provision of early and frequent coordination with agencies and Tribal communities.

The agency scoping meeting materials, sign-in sheets, and specific agency comments are provided in the *Scoping Summary Report* in **Appendix G**. This report was posted for public information in January 2017 at i11study.com/Arizona/Meetings.asp. The report includes copies of the agency scoping meeting notes and written comments submitted by the agencies and Tribal communities (ADOT 2017a).



1 **5.3.1.2 Public Scoping**

2 Six public scoping meetings were held throughout the Study Area, as listed in **Table 5-6** (Public
3 Scoping Meetings [June 2016]). ADOT issued news releases, advertised in Study Area
4 newspapers, posted an announcement of the meetings on the I-11 website, sent e-mail blasts to
5 stakeholders, and ran radio advertisements on one Tribal community radio station. The same
6 presentation was made at each location.

Table 5-6 Public Scoping Meetings (June 2016)

Meeting Date and Time	Location
June 8, 2016 4 to 6:30 p.m.	Dorothy Powell Senior Adult Center 405 East 6th Street Casa Grande, AZ
June 15, 2016 4 to 6:30 p.m.	City of Buckeye Community Center 201 East Centre Avenue Buckeye, AZ
June 21, 2016 4 to 6:30 p.m.	Nogales High School Cafeteria 1905 North Apache Boulevard Nogales, AZ
June 22, 2016 4 to 6:30 p.m.	Arizona Riverpark Inn 777 West Cushing Street Tucson, AZ
June 23, 2016 4 to 6:30 p.m.	Marana Middle School Gymnasium 11285 West Grier Road Marana, AZ
June 29, 2016 4 to 6:30 p.m.	Wickenburg Community Center 160 North Valentine Street Wickenburg, AZ

7 The public submitted 834 comments during the scoping period by way of:

- 8 • Comment form provided at scoping meetings (or mailed after meeting);
- 9 • Verbal transcription at scoping meetings by a court reporter;
- 10 • Comments written directly on maps at scoping meetings;
- 11 • Online survey on study website (i11study.com/Arizona);
- 12 • E-mail at I-11ADOTStudy@hdrinc.com;
- 13 • Mail to Interstate 11 Tier 1 EIS Study Team c/o ADOT Communications,
- 14 1655 W. Jackson St., MD 26F, Phoenix, AZ 85007; and
- 15 • Voicemail on toll free hotline at 1-844-544-8049 (bilingual).

16 A majority of the comments were received through the online survey and comment form, which
17 asked the same six questions. The questions included a series of potential issues or impact
18 areas in which to provide a priority ranking (1 to 5), with 1 being the most important and 5 being
19 the least important. The following is a summary of the respondents' ranking results for the
20 potential issues and impacts for Questions 1 through 4.



- 1 • **Question 1** (Problems Experienced Today): Most important occurring or anticipated
2 problems voiced by participants are to relieve regional congestion; improve travel time and
3 reliability, followed closely by improving freight travel and reliability; and reducing
4 bottlenecks on existing freeways.
- 5 • **Question 2** (Importance of What I-11 Should Be or Accommodate): I-11 Corridor should
6 enhance or expand an existing highway/freeway.
- 7 • **Question 3** (Importance of Human Environmental Factors): Most important human
8 environmental factor to consider is land use, followed by neighborhoods, diverse
9 communities, and residences.
- 10 • **Question 4** (Importance of Natural Environmental Factors): Most important consideration
11 related to the natural environment is water resources, followed closely by biological
12 resources (plants, wildlife, habitat).
- 13 • **Question 5** of the online survey and comment form asked people to write in comments
14 which identify the areas or resources within the Study Area they feel must be avoided or are
15 important to consider. The comments fell into five major categories, as summarized below.

16 Environmental Considerations

- 17 – Concern regarding impacts to environment, specifically potential irreparable damage to
18 the Sonoran Desert.
 - 19 ▪ Minimize disturbances to undeveloped lands.
 - 20 ▪ Avoid parks and conservation management areas.
 - 21 ▪ Specific concerns in the Avra Valley.
- 22 – General considerations, such as impacts to neighborhoods, dust storms, hunting areas,
23 and cattle operations.
- 24 – Corridor Alternative Planning.
 - 25 ▪ Support for I-11 as a separate facility.
 - 26 ▪ Improve existing freeways and interstates (e.g., Interstate 10 [I-10], Interstate 8 [I-8],
27 Interstate 19 [I-19]).
 - 28 ▪ Spot improvement suggestions and considerations.
 - 29 ▪ Future connectivity considerations.
- 30 – General comments, such as questions regarding potential property impacts, impacts to
31 other transportation facilities, and opposition to CANAMEX.
- 32 – Multimodal Considerations.
 - 33 ▪ Freeways are an outdated model to transportation congestion.
 - 34 ▪ Accommodate rail and utilities within corridor alternatives.
 - 35 ▪ Support for light rail and passenger rail as an alternative to an interstate.
 - 36 ▪ Freight considerations.
 - 37 ▪ Improve freight travel and reliability.
 - 38 ▪ Utilize dedicated truck lanes.
 - 39 ▪ Rail is faster and less congestive.



Economic Considerations

- Concern regarding property values and increased heavy truck traffic.
- Concern that I-11 will hurt tourism and decrease the number of existing jobs.
- Concern that I-11 is an example of “crony capitalism.”
- Use I-11 to grow business development in area just south of Casa Grande and I-10.
- I-11 will bring economic benefit to the state and surrounding communities.

Other General Comments

- Requests for presentation materials.
- Requests for information/addition to mailing list.
- Concern I-11 corridor will be used for sex-trafficking crimes.
- I-11 is not needed; project wastes money.
- Scope will bloom out of control because of influential parties whose money and voices are louder.
- Address external factors that impact the existing infrastructure specifically increase of shipping containers from Mexico into Arizona.
 - I-11 should not be built if it uproots people from their homes and jobs.
 - I-11 Corridor would primarily benefit corporate and business interests and politicians.
- **Question 6** of the online survey and comment form asked about preferences for receiving information about the study. Accordingly, a significant majority of respondents prefer to receive study information by e-mail.

A complete summary of the scoping process and a compilation of the public scoping comments can be found in the *Scoping Summary Report* (ADOT 2017a) in **Appendix G**.

5.3.2 Agency and Public Information Meetings

The second major set of information meetings was held in May 2017. The purpose of these meetings was to provide an update on project progress, solicit input on preliminary recommendations for alternatives to carry forward into the Draft Tier 1 EIS, and continue to collect information on key issues to be evaluated in the Draft Tier 1 EIS. Similar to the scoping meetings, these public meetings were conducted throughout the Study Area to understand and obtain the unique concerns in each area.

At the time of these meetings, ADOT and FHWA had identified a preliminary set of alternatives and some recommendations regarding options to be carried forward into the Draft Tier 1 EIS, as shown in **Figure 2-6**. The screening process is described in further detail in **Chapter 2**. The outreach during this period was intended to provide feedback on initial screening results that would be incorporated into subsequent decision making process, as documented in the *Alternatives Selection Report* (ADOT 2017c).

At these meetings, a presentation was made to provide an update on project progress and inform the meeting attendees about methods for commenting. An open house followed the presentation to enable attendees to interact directly with ADOT and FHWA. Alternatives

information as displayed on **Figure 5-2** (Online Comment Tool – Comment Map Page) was provided in large map format to allow attendees to write comments directly on the maps. An online mapping tool was available at public meeting locations and also was accessible online to the public through the public review period. In addition, a court reporter was present to transcribe individuals' verbal comments. Comments also could be submitted outside of the meetings using the online tool/website, e-mail, letter, or voicemail.

Additional information on the meetings that occurred during this period is summarized below. Further detail is provided in the *Agency and Public Information Meeting Summary Report* which documents the methods, meetings, and materials used to solicit feedback, as well as the comments and input received from the agencies, Tribal governments, and the public during the approximately 30-day comment period from April 28, 2017 to June 2, 2017 (ADOT 2017b). The summary report is publicly available online at i11study.com/Arizona/Documents.asp. It also is included in **Appendix G**.

5.3.2.1 Agency Meetings

FHWA and ADOT held four agency meetings to solicit comments from Cooperating and Participating Agencies and Tribal governments. Meetings were held in Tucson, Marana, Casa Grande, and Avondale. One of the four meetings also was conducted as an online webinar for those unable to participate in person. Details on the meeting dates, times, locations, and attendance are presented in **Table 5-7** (Agency Meetings [May 2017]).

Table 5-7 Agency Meetings (May 2017)

Meeting Date and Time	Location	Agencies Represented	Agency Staff Attended
Tucson May 2, 2017 10 AM to 12 PM	PAG, Large Conference Room 1 East Broadway Boulevard #401, Tucson, AZ	7 ⁽¹⁾	14
Marana (Webinar) May 3, 2017 1 to 3 PM	Town of Marana City Council Chambers 11555 W. Civic Center Dr., Marana, AZ	8 ⁽²⁾	12
Casa Grande May 10, 2017 10 AM to 12 PM	Peart Center 350 E. 6th St., Casa Grande, AZ	5 ⁽³⁾	7
Avondale May 16, 2017 10 AM to 12 PM	Estrella Mountain Community College – Komatke Hall – Plaza Gallery Room 3000 N. Dysart Rd., Avondale, AZ	5 ⁽⁴⁾	7

(1) City of Tucson, PAG, Pima County (City Manager's Office, Planning, and Transportation), Tucson Electric Power, and Tucson Water.

(2) AGFD, BLM, USEPA, Western, Town of Oro Valley, Town of Marana, ASLD, NPS.

(3) AGFD, City of Casa Grande, City of Maricopa, Greene Reservoir Flood Control District, SCMPD.

(4) BLM, Flood Control District of Maricopa County, Maricopa County Air Quality Department, Maricopa County Parks and Recreation Department, USACE.

(5) AGFD and BLM were present at multiple meetings.



The written comments received from the agencies and Tribal governments addressed potential corridor alternatives, environmental resources, and other issue areas. The following is an overview of common themes, with details from each individual agency provided thereafter.

- Supportive of the alternatives that utilize existing corridors (e.g., I-10, I-8, State Route [SR] 85, etc.) to avoid environmental impacts in new areas.
- Supportive of recommendations to eliminate certain Corridor Options that were poorer performers against the screening criteria.
- Concern regarding the level of impacts associated with alternatives through the Avra Valley in Pima County, Arizona.
- Opposed to alternatives that would impact sensitive environmental areas, city infrastructure, and culturally significant areas.

Arizona Game and Fish Department

- Pleased to see that Options V, O, and P alternatives will not be advanced.
- Pleased to see that a connection is being evaluated between Options E and F (Santa Cruz floodplain) and Option B (I-10).

Bureau of Land Management

- Would prefer complete avoidance of the Vulture Mountain Recreation Area.
- Acknowledges the viability of Options S, T, and U, although better supports Option S or a potential hybrid of Options S and T. Co-locating Option U with existing electrical transmission facilities would consolidate disturbance and potential impacts of that Corridor Option.
- Would prefer to eliminate Options V and W.

City of Tucson

- Options C and D are seen to impact the City of Tucson Water Properties and Facilities within the Avra Valley. Tucson provided data and other information to the study team to assess potential for impacts. Indicated a preference for utilizing I-10 (Option B).

National Park Service

- Requests that an analysis of impacts from additional facilities, such as freight rail, passenger rail, and utilities be utilized as part of the current process in determining routes.
- Strongly prefer that I-11 utilize the existing I-10 corridor (Option B).

Pima Natural Resource Conservation District

- Opposed to Options C, D, E, and F.
- Environmental Impacts – concerned that these alternatives would cause residential displacements; bring increases in noise, light, and air pollution in the northern end of the Avra Valley; and negatively impact outdoor recreation and environmental resources.
- Local Sentiment – Pima County voters approved an open space bond and the Sonoran Desert Conservation Plan. The citizens did this knowing that their taxes would be significantly higher because of it and the proposed CANAMEX (I-11) section through Avra



Valley violates the values of the Pima County residents. It is incompatible both ecologically and from a quality of life perspective within a rural setting. In addition, rural lands that had been eligible for zoning changes may no longer qualify.

Pima County – Administrators Office

- Any future I-11 Corridor would terminate at the Nogales Mariposa Point of Entry. As such, there are two fundamental routes to get there through Pima County: 1) along the I-10 /I-19 corridors or 2) a new route generally through the Avra Valley. Both have advantages and disadvantages. If the existing interstate route is selected, roadway widening would be required with associated costs and urban socioeconomic impacts related to noise, access, and public safety.
- The route through the Avra Valley developed by Pima County (generally Option D) considers both cultural and environmental features and avoids Reclamation lands with the exception of the area east of the Tohono O'odham Nation. If the Avra Valley route is selected, significant environmental mitigation would be required to ensure the route does not induce urban sprawl and mitigates for impacts to wildlife.

Pinal County

- Pinal County prefers the alignment of the proposed corridor as reflected on both the Pinal Regionally Significant Routes for Safety and Mobility, and the Pinal Regional Transportation Authority Plans (Option I).
- It is suggested that the Pinal County Open Space and Trails Master Plan be included in the review and assessment of the I-11 routes. This review should include but not be limited to, the following elements: the Palo Verde Regional Park, the proposed Juan Bautista de Anza National Historic Trail corridor, and several sections of the planned regional trail and open space corridors in the vicinity to potential corridor alignments.

Town of Wickenburg

- The community voiced opposition to a downtown corridor through Wickenburg (Option W), with a preferred route to intersect US 60 west of the Wickenburg Airport (approximate milepost 101) and follow natural terrain to US 93 (approximate milepost 189) as noted in the Town Council Resolution No. 2043.

United States Corps of Engineers

- Options O, P, and N are not preferable due to the potential to impact intermittent and perennial reaches of the Gila River. Where avoidance is not feasible, the team should demonstrate that the Preferred Alternative is the Least Environmental Damaging Practicable Alternative.
- Options A, B, G, H, K, Q1, and Q2 that utilize existing corridors in proximity to Waters of the US are generally preferred over developing corridors, with the exception of Option W near Wickenburg, which should be carefully evaluated due to the potential to impact the resources associated with the Hassayampa River.
- USACE is currently undertaking the *Lower Santa Cruz River Flood Risk Management Feasibility Study* in Pinal County and would like to continue to coordinate information between the two studies.



5.3.2.2 Public Information Meetings

Six public information meetings were held throughout the Study Area from May 2 to May 16, 2017. Public meetings were held in Casa Grande, Buckeye, Nogales, Tucson, Marana, and Wickenburg to promote easy access for the public and to increase the potential for diverse participation (**Table 5-8** [Public Information Meetings {May 2017}]). In total, 608 people attended the public information meetings.

During these meetings, ADOT provided a study update, sought input on the alternatives screening process, and recommended a range of reasonable alternatives to advance into the Draft Tier 1 EIS for further study. Each public meeting was conducted in an open house format, including an approximately 30-minute presentation on study background, status, methodology, and next steps. During the open house portions of the meetings (before and after the presentation), study team members were available to talk with attendees and answer their questions. Various commenting methods were made available (comment form, speak to staff, court reporter, online mapping tool, add comments to roll-plot maps); the comment form and mapping tool were available online for those unable to attend in person.

A Spanish language interpreter was available at each of the six meetings. The interpreter provided oral translation of the meeting materials and presentation into Spanish for attendees requesting assistance. A court reporter also was in attendance at each meeting to transcribe individual oral comments on the alternatives, process, and study in general.

Table 5-8 Public Information Meetings (May 2017)

Meeting Date and Time	Location
May 2, 2017 5 to 7 p.m.	Arizona Riverpark Inn 777 West Cushing Street Tucson, AZ
May 3, 2017 5 to 7 p.m.	Marana Middle School 11285 West Grier Road Marana, AZ
May 4, 2017 5 to 7 p.m.	Nogales High School 1905 North Apache Boulevard Nogales, AZ
May 11, 2017 5 to 7 p.m.	Dorothy Powell Senior Adult Center 405 E. 6th St. Casa Grande, AZ
May 12, 2017 5 to 7 p.m.	Wickenburg Community Center 160 North Valentine Street Wickenburg, AZ
May 16, 2017 5 to 7 p.m.	Buckeye Community Center 201 E. Centre Ave. Buckeye, AZ

1 5.3.2.3 Online Mapping and Comment Tool

2 As an adjunct to the public meetings, an online mapping and comment tool was developed to
3 facilitate public input. On April 28, 2017, the online comment tool was launched. The online tool
4 was a mobile-compatible map which mirrored the structure of the hard copy comment form
5 distributed at the public meetings. The online comment map identified the proposed corridor
6 alternatives and provided multiple options for the public to submit comments: area-specific,
7 corridor-specific, and/or general comments. An environmental data layer could be turned on and
8 off to display sensitive environmental features. **Figure 5-1** (Online Comment Tool – Welcome
9 Page) shows the welcome page for the online comment tool, which provided an introduction to
10 the map tool and instructions on how to submit a comment. **Figure 5-2** (Online Comment Tool –
11 Comment Map Page) shows a screenshot of the online comment tool's map page.

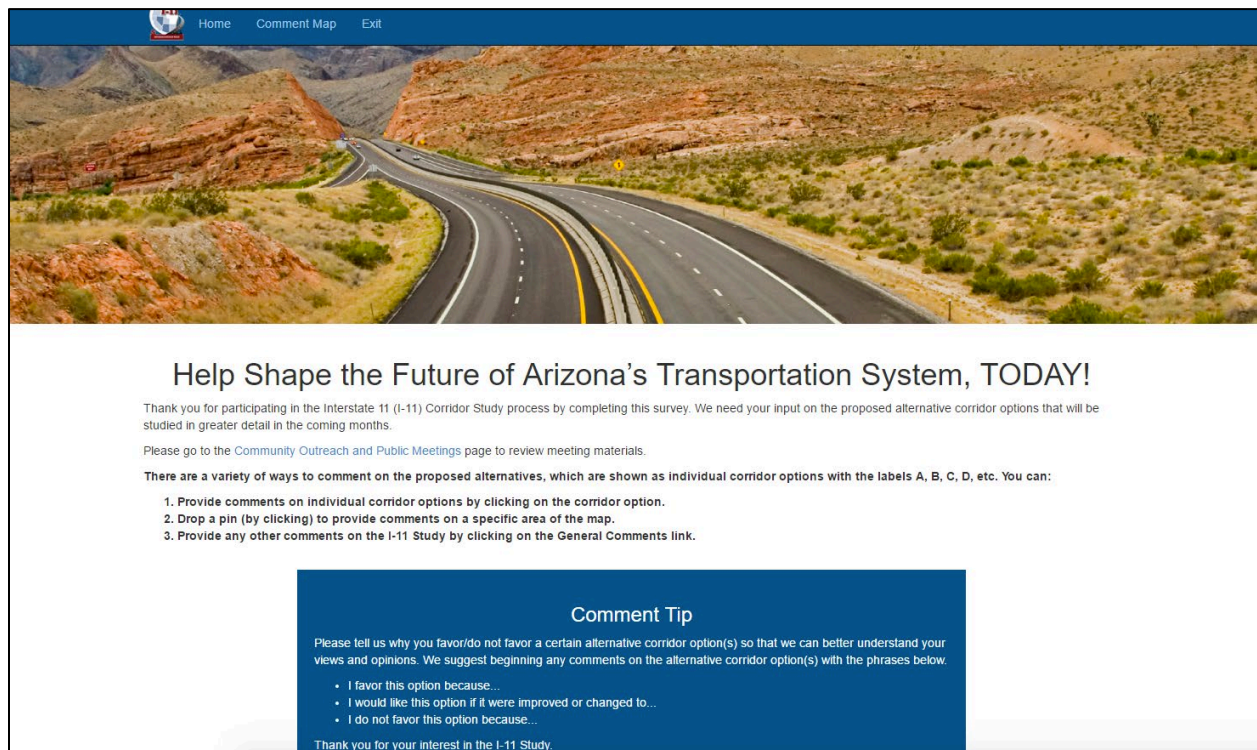


Figure 5-1 Online Comment Tool – Welcome Page

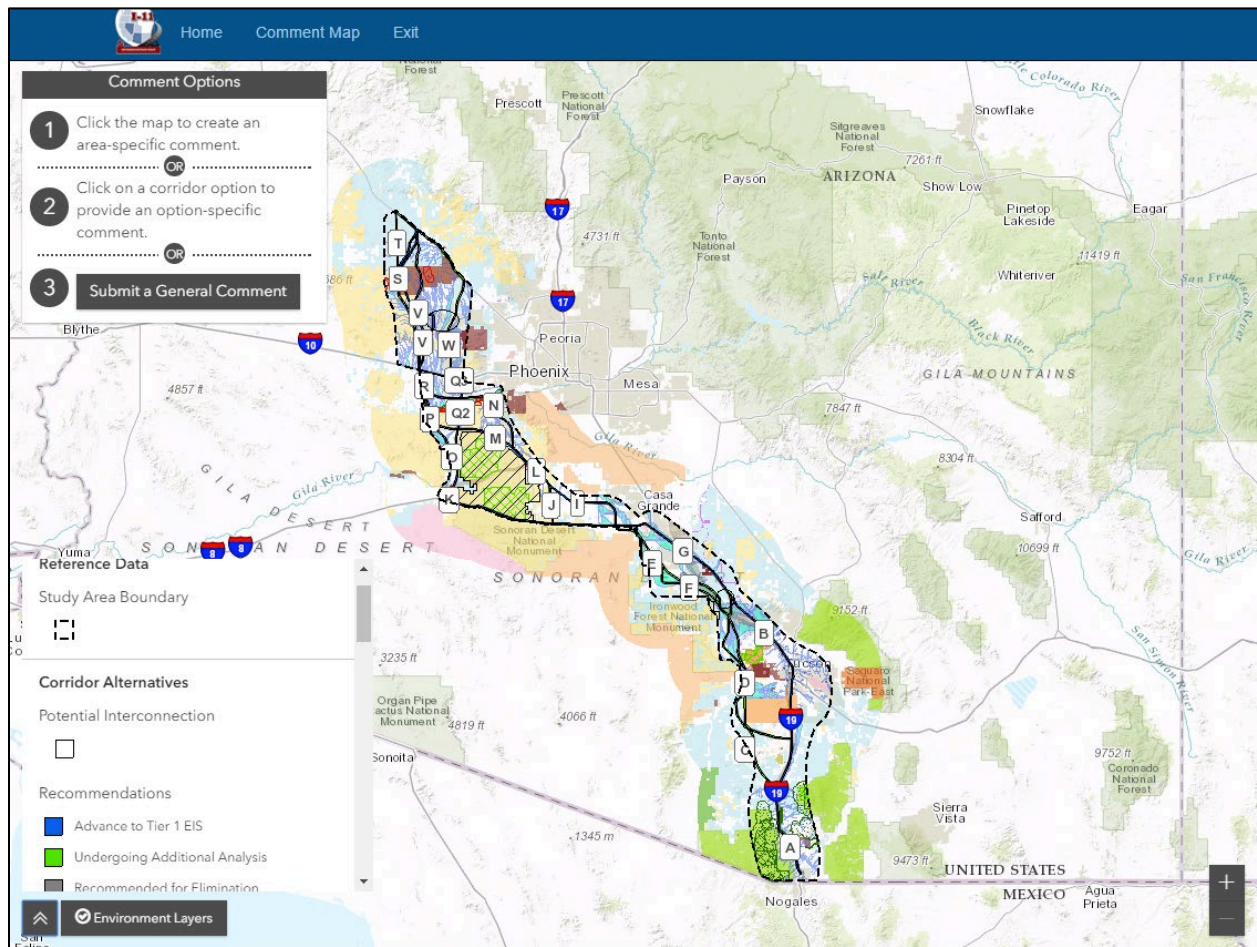


Figure 5-2 Online Comment Tool – Comment Map Page

1 5.3.2.4 Public Information Meeting Comments

2 In total, 2,302 public comments were received, with the majority of the comments received
 3 through the online survey, e-mails, and mail. The online comment map tool garnered the largest
 4 number of comments (1,165). Outreach participants were offered the opportunity to provide
 5 comments on specific Corridor Options within the Study Area.

6 Most respondents support improving and using the existing roadway infrastructure, such as
 7 I-10, I-8, and I-19 and other state routes to minimize and avoid negative impacts to the natural
 8 environment. Those in favor of a new roadway cited congestion on existing highways. While a
 9 number of location-specific concerns were identified, no constraints or resources previously
 10 unknown to the project team were identified. Both online and hard-copy comment forms also
 11 sought input specific to the Corridor Options under consideration. A summary of the most
 12 common and substantive comments received from the public is provided in this section. A
 13 complete compilation of the public comments found in the *Agency and Public Information*
 14 *Meeting Summary Report* (ADOT 2017b).



Corridor Options

- Support for I-11 as a separate facility.
 - Use as an alternative route around Tucson and Phoenix.
 - Use the alignment of Sandario Road and San Joaquin Road in Avra Valley (along Options C and D).
- Improve existing freeways and interstates (e.g., I-10, I-8, I-19).
 - Widen and improve existing I-19.
 - Double-deck I-10 through Tucson and widen elsewhere where needed.
 - Concern regarding the environmental impacts of a new interstate corridor through Avra Valley.
 - Improve SR 85 to I-8 as a more direct route.
- Spot improvement suggestions and considerations.
 - Route I-11 south to Maricopa, then east to Chandler and then parallel SR 87, then SR 287 to SR 79 to Tucson, would solve problems for Pinal County and support future growth.
 - Route I-11 out of Nogales avoiding Tucson and Phoenix areas.
 - Route I-11 from Nogales to the northwest through the tribal lands straight to Gila Bend and from there proceed north to Wickenburg, avoids duplication of I-19 and I-10.
 - Along SR 189 in Nogales (Option A), do not move forward with the flyover at Mariposa Road, instead route from DeConcini Road Port of Entry to connect at Ruby Road.
- Future connectivity considerations.
 - Consider using another port of entry further west as the start of I-11 and not Nogales.
- Multiple comments favor new alignments further to the west in the North Section, especially west of Wickenburg.

Congestion

- Favor diverting large, heavy-duty truck traffic away from urban areas to decrease congestion and traffic impacts.
- Oppose new roadway as a means to decrease traffic congestion as it will only relocate negative noise and air quality impacts to a new area.

Environmental Considerations

- Concern regarding impacts to the environment, specifically potential irreparable damage to Sonoran Desert.
 - Concern regarding negative environmental impacts to historical and archeological sites.
 - Concern for habitats, habitat linkages, and wildlife migration corridors.
 - Concern for impacts to environmental sustainability, wilderness, air quality, riparian habitat along the Santa Cruz River, Hassayampa River, Gila River, washes, visual



viewsheds, dark skies and light emissions to Kitt Peak Observatory, noise, water quality, tribal lands, and floodplains.

- Minimize and avoid negative impacts to farmland or agricultural lands.
- Minimize disturbances to undeveloped lands and natural resource areas.
- Consider the biological and ecological diversity of the Sonoran Desert.
- Minimize the dependency on fossil fuels and use alternative modes or technology.
- Avoid parks, forests, monuments, and tribal lands.
 - Avoid Coronado National Forest.
 - Protect Saguaro National Park West.
 - Avoid National Monuments, National Parks, and cultural resources; specific mention of Vulture Mountains Recreation Area, Ironwood Forest National Monument, Tohono O'odham Nation, Tucson Mountain District of Saguaro National Park, Tucson Mountain County Park, and Arizona-Sonora Desert Museum.
- Concern regarding socioeconomic impacts.
 - Concerns regarding property values, right-of-way acquisitions, and residential and commercial business relocations.
 - Concern that I-11 will hurt tourism and decrease the number of existing jobs.
 - Concern that I-11 is an example of developers and politicians having a major influence on transportation decisions.
 - Use I-11 to grow business development in the area just south of Casa Grande and I-10.
 - I-11 will bring economic benefit to state and surrounding communities.
 - Avoidance of Tucson and Phoenix metropolitan areas will decrease existing business and revenues.

Safety and Security

- I-11 opens the door for increase in drug trafficking, gun runners, and other illegal activities, and will impact highway patrol and control of highways.
- Favor maintaining large, heavy truck traffic on a separate roadway system to decrease the number of traffic accidents.
- Consider installing dust storm avoidance monitoring technology along I-11 Corridor.
- Obtain regulations information for heavy, high, wide, and long loads that would be traveling this Corridor. Use overpasses, variable messaging signs, and safety pullouts to reach out to the heavy haul industry to accommodate requirements.

5.3.3 Additional Stakeholder Meetings

Throughout the scoping and outreach process, the Project Team received input from members of the public in Pima County expressing opposition to the I-11 Corridor. FHWA and ADOT invited the US Institute to facilitate a discussion in Pima County regarding the Draft I-11 Tier 1 EIS, to allow the study partners the opportunity to better understand the values, interests, and

1 characteristics most important to these community stakeholders. The US Institute is a program
2 of the Udall Foundation and exists to assist parties in resolving environmental, public lands, and
3 natural resource conflicts nationwide that involve federal agencies or interests. Two stakeholder
4 groups participated in a series of six stakeholder engagement meetings (three meetings per
5 group) between March and April 2018 with the objective of facilitating discussions with the Pima
6 County community to identify issues and concerns to inform the decision-making process. The
7 US Institute is a third-party, neutral facilitator and it prepared the final report documenting this
8 meeting process, which is included in **Appendix H**. Documentation of each meeting, including
9 summary highlights and fact sheets, as well as the final report, are available for public review on
10 the i11study.com website.

11 To fill the group rosters for the engagement meetings, an invitation letter was circulated to
12 63 organizations in the Pima County area on December 12, 2017. The list of organizations was
13 generated from the interested stakeholders list previously collected during the I-11 Tier 1 EIS
14 Study. In addition, the letter requested that the invitation be circulated to other interested
15 stakeholder organizations. Following this process, two groups of individuals were rostered from
16 nominations submitted. The final list of participating organizations is provided below (**Table 5-9**
17 [Stakeholder Groups]), broken out as Stakeholder Group B and Group C/D. All community
18 members that expressed interest in this process were invited to participate either in person at
19 the meetings, or on the ADOT website designated for stakeholder input. The names of the
20 groups refers to the Corridor Options that the stakeholder groups are more closely associated
21 with or interested in.

Table 5-9 Stakeholder Groups

Group B	Group C/D
Barrio Hollywood Neighborhood Association	Altar Valley School District
Coalition for Sonoran Desert Protection	Arizona Heritage Alliance
Drachman Institute	Arizona-Sonora Desert Museum
Erickson Terrascope	Avra Valley Coalition
FBM Sales	Avra Water Co-Op
Friends of Ironwood Forest	Caterpillar
I-10 Self Storage	Coalition for Sonoran Desert Protection
Menlo Park Neighborhood Association	Columbine Enterprises
Northwest Fire District	Drachman Institute
Peach Properties HM Inc.	Freeport McMoRan
SALC	Friends of Ironwood Forest
Sonoran Institute	Friends of Saguaro National Park
Statistical Research Inc.	Marana Chamber of Commerce
Sun Corridor Inc.	Marana Unified School District
Tucson Audubon Society	National Parks Conservation Association
Tucson Historic Preservation Foundation	Northwest Fire District
Tucson Metro Chamber	Sonoran Institute
---	Tucson Metro Chamber



The primary goals of the first meeting was to provide the stakeholders with background information on the project vision, history, and current proposed Corridor Options, as well as to understand the stakeholders' key perspectives on the I-11 Corridor. The primary goals of the second meeting were to work collaboratively with the stakeholders to identify the values, interests, and characteristics the stakeholders believed were important to consider in decision making, and to explore the pros and cons associated with those specifics. Stakeholder concerns mainly focused around wildlife connectivity, cultural and historic resources, community cohesion, and viewsheds. At the third meeting, the agenda focused on the discussion of options related to identify key themes (i.e., viewsheds, wildlife connectivity, community cohesion, etc.). Stakeholders were asked to provide pros and cons of each of the Corridor Options. Some of the ideas that were discussed included design concepts and mitigation strategies that could be implemented to minimize the adverse effects that the transportation corridor could have on their communities. These include:

- Fund ongoing maintenance to reduce spread of buffalo grass (an invasive non-native plant species);
- Create both overpasses and underpasses for wildlife connectivity;
- Protect the aquifer and City of Tucson's aquifer recharge facilities in Avra Valley;
- Limit on/off ramps to minimize development around the highway;
- Limit highway lighting to reduce light pollution;
- Create a bike path that runs parallel with the freeway;
- Use berms and depressions to protect viewsheds;
- Align with the Central Arizona Project canal and pair with existing wildlife crossings; and
- Consider putting the freeway underground as much as possible.

5.4 Tribal Engagement

ADOT and FHWA are committed to maintaining government-to-government relations with Native American Tribes for projects that may affect Tribal rights and resources. Tribal coordination continues to be an integral part of this study. Tribes were invited to attend agency and stakeholder meetings throughout the process (2016 Scoping; 2017 Agency and Public Information Meetings as described above). The Ak-Chin Indian Community, Gila River Indian Community, Pascua Yaqui Tribe, and Tohono O'odham Nation were engaged as Participating Agencies throughout the planning process. A series of smaller meetings also have occurred with the Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, Tohono O'odham Nation, Pascua Yaqui Tribe, and other Tribal governments that requested individual meetings. Input received during these meetings has led to new data sources, refined Corridor Options, and general consensus with the direction of the Study's findings to date. Typically, information is exchanged in person at the meetings, but several Tribal formal resolutions have been submitted for the Study record.

Tribal coordination meetings generally include elected officials and staff members from transportation, community development, agriculture and natural resources, planning and zoning, and/or economic development.



1 **Table 5-10** (Tribal Engagement) lists the major points of Tribal coordination that occurred
2 between March 2016 and April 2018. Input from Tribes also includes several formal resolutions
3 and letters received by the Project Team, which are listed and summarized in Section 5.5
4 (immediately following **Table 5-10**). In addition, consultation activities in accordance with
5 Section 106 of the National Historic Preservation Act are ongoing as described in **Chapter 3**,
6 Section 3.7.

Table 5-10 Tribal Engagement

Date	Engagement Activity	Outcome/Activity
21 Mar 2016	Pre-scoping letters to 16 Tribes	Letter offered early consultation meetings to discuss projects and opportunities for upcoming consultation. ⁽¹⁾
9 Apr 2016	Pre-scoping presentation to San Xavier District-Tohono O'odham Nation; presentation at District offices in Tucson, AZ at a Saturday Tribal Community (public) meeting	General overview of the I-11 project.
22 Apr 2016	Meeting with Four Southern Tribes Cultural Resource Working Group ⁽²⁾	Provided overview of the I-11 project; Tribes verbally confirmed participation as Section 106 consulting parties.
25 Apr 2016	Meeting with Gila River Indian Community Tribal Historic Preservation Office and Cultural Resource Management Program	Provided overview of the I-11 project.
10 May 2016	Pre-scoping meeting with Ak-Chin Indian Community leadership; meeting at Ak-Chin Indian Community offices in Maricopa, AZ	General overview of the I-11 project.
11 May 2016	Telephone conversation with the Director of Facilities Management with the Pascua Yaqui Tribe	General overview of the I-11 project.
26 Jun 2016	Garcia Strip Community of the Schuk Toak District of the Tohono O'odham Nation Resolution GS-06-26-16 #1	Resolution opposing the I-11 Tier 1 EIS Corridor Study within the Garcia Strip Community of the Schuk Toak District.
27 Jun 2016	General overview meeting with Tohono O'odham Nation Tribal chairman and leadership in Sells, AZ (during official scoping period)	General overview of the I-11 project.
27 Jun 2016	General overview meeting with Tohono O'odham Nation Agriculture and Natural Resources Committee in Sells, AZ (during official scoping period)	General overview of the I-11 project.
14 Jul 2016	General overview meeting with Pascua Yaqui Tribal leadership at Pascua Yaqui offices in Tucson, AZ	General overview of the I-11 project.
1 Sep 2016	Update meeting with San Xavier District-Tohono O'odham Nation leadership at District offices in Tucson, AZ	General overview of the I-11 project.



Table 5-10 Tribal Engagement (Continued)

25 Apr 2016	I-11 project meeting with Four Southern Tribes cultural resource representatives meeting at Gila River Indian Community Tribal Historic Preservation Office in Sacaton, AZ	Presented Section 106 methodology and archaeological site density maps and requested information about areas that should be avoided.
8 Nov 2016	Meeting with Tohono O'odham Nation at San Xavier District offices in Tucson, AZ	Presented Section 106 methodology and archaeological site density maps and requested information about areas that should be avoided.
9 Nov 2016	Meeting with Ak-Chin Indian Community and Salt River Pima-Maricopa Indian Communities at ADOT offices in Phoenix, AZ	Presented archaeological site density maps and requested information about areas that should be avoided.
17 Nov 2016	Sif Oidak District of the Tohono O'odham Nation Council Resolution SODC 16-145	Resolution supporting the I-11 Tier 1 EIS Corridor Study within the Sif Oidak District.
28 Nov 2016	Meeting with Gila River Indian Community Tribal Historic Preservation Officer at Gila River Indian Community in Sacaton, AZ	Meeting conducted to follow-up on agency scoping meeting. Provided overview of Section 106 process to date and distributed archaeological site density maps.
27 Dec 2016	I-11 meeting with Four Southern Tribes cultural resource representatives at Casa Grande Public Library in Casa Grande, AZ	Provided update on project.
11 Jan 2017	Letter of opposition to the I-11 Corridor in or near the San Xavier District of the Tohono O'odham Nation	San Xavier District Chairman signed letter of opposition (letter erroneously dated 2016) to the I-11 Corridor.
11 Feb 2017	Schuk Toak District of the Tohono O'odham Nation Resolution ST-02-11-17-019	Resolution opposing the I-11 Tier 1 EIS Corridor Study in or near the Garcia Strip Community of the Schuk Toak District.
14 Feb 2017	General update meeting with San Xavier District-Tohono O'odham Nation leadership at District offices in Tucson, AZ	Provided description of study process, scoping activities, and issues and concerns; discussed future meeting opportunities and communications.
15 Feb 2017	General update meeting with Fort Yuma-Quechan leadership at Tribal offices in Winterhaven, CA	Provided an update of the I-11 project.
06 Mar 2017	ADOT response letter to San Xavier District of the Tohono O'odham Nation	Provided responses to San Xavier District's January 11, 2017 I-11 letter of opposition (letter erroneously dated 2016).
20 Apr 2017	I-11 meeting with Four Southern Tribes cultural resource representatives at Casa Grande Public Library in Casa Grande, AZ	Ongoing Section 106 consultation. Provided an update of the I-11 project, including a preview of information to be presented at the May public meetings.



Table 5-10 Tribal Engagement (Continued)

27 Apr 2017	Letter sent to Section 106 consulting parties	Letter inviting Section 106 consulting parties to attend public meetings scheduled May 2 through May 16, 2017.
8 May 2017	Meeting with Fort Yuma Quechan Tribe Tribal council in Winterhaven, CA	Provided Fort Yuma Quechan Tribe with a project status update for new Tribal Council members and Tribal Cultural Resources Committee.
20 May 2017	General update meeting with Schuk Toak District of the Tohono O'odham Nation at the Schuk Toak District offices in Haivana Nakya, AZ	Provided an update of the I-11 project.
23 May 2017	General update meeting with Sif Oidak District of the Tohono O'odham Nation at Sif Oidak District offices in North Komelik, AZ	Presented overview of I-11 study as third agenda item at Sif Oidak District Council meeting.
13 Jun 2017	Meeting with Ak-Chin Indian Community Tribal Council and leadership at Ak-Chin Indian Community offices in Maricopa, AZ	Provided general I-11 update meeting for Ak-Chin Indian Community Tribal council members and planning and environmental leadership staff.
27 Jun 2017	Meeting with Four Southern Tribes cultural resource representatives at Casa Grande Public Library in Casa Grande, AZ	Reviewed preliminary alternatives information.
26 Sept 2017	General update meeting with Tohono O'odham Nation	Provided an update of the I-11 project.
24 Oct 2017	General update meeting with Four Southern Tribes cultural resource representatives	Provided an update of the I-11 project.
9 Nov 2017	Meeting with Ak-Chin Indian Community and Salt River Pima-Maricopa Indian Community	Provided general I-11 update and reviewed the Study Area.
12 Dec 2017	Meeting with Four Southern Tribes cultural resource representatives	Provided general I-11 update and discussed Programmatic Agreement.
30 Jan 2018	Meeting with Four Southern Tribes cultural resource representatives	Provided general I-11 update and further discussion of Programmatic Agreement.

Table 5-10 Tribal Engagement (Continued)

17 Apr 2018	Meeting with San Xavier District of Tohono O'odham Nation	Provided general I-11 update.
14 May 2018	Letter sent to 22 Tribes	Provided general I-11 update and requested input on public involvement opportunities during the Draft Tier 1 EIS public review period.
17 Dec 2018	Meeting with Chairman, Planning Department leadership, and Transportation Department leadership	Provided general I-11 update

- (1) Letters sent to the following Tribes: Yavapai-Prescott Indian Tribe, Yavapai-Apache Nation, White Mountain Apache Tribe, San Xavier District-Tohono O'odham Nation, Tonto Apache Tribe, Salt River Pima-Maricopa Indian Community, San Juan Southern Paiute Tribe, San Carlos Apache Tribe, Pueblo of Zuni, Pascua Yaqui Tribe, Navajo Nation, Moapa Band of Paiute Indians, Kaibab Band of Paiute Indians, Hualapai Tribe, Havasupai Tribe, Hopi Tribe, Gila River Indian Community, Fort Yuma-Quechan Tribe, Fort McDowell Yavapai Nation, Fort Mojave Indian Tribe, Colorado River Indian Tribes, Cocopah Indian Tribe, Chemehuevi Indian Tribe, and Ak-Chin Indian Community.
- (2) The Four Southern Tribes include the Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation.

ADOT = Arizona Department of Transportation, AZ = Arizona, EIS = Environmental Impact Statement

1 Specific input received during the Tribal meetings included the following:

2 **Fort Yuma Quechan Tribe**

- 3 • Concern regarding mitigation under Section 106 in terms of respecting Tribal objections
4 and/or holding ADOT and FHWA accountable for the artifacts that are found.

5 **Four Southern Tribes**

- 6 • Noted areas that should be avoided by Build Corridor Alternatives due to sensitivity.

7 **Sif Oidak District, Tohono O'odham Nation**

- 8 • The Sif Oidak District is interested in a traffic interchange closer to the District that would
9 allow for easier transportation access and increased economic development opportunities.

10 **Schuk Toak District, Tohono O'odham Nation**

- 11 • Concern over impacts to homes within the District and wildlife and drainage, as well as the
12 proximity of Options C and D to Tohono O'odham Nation lands.

13 **5.5 Resolutions and Letters**

14 Resolutions and formal letters from local and Tribal governments, MPOs, and Councils of
15 Government were received by ADOT and FHWA throughout the Tier 1 EIS process. These are
16 provided in **Appendix H**. The following provides a summary of the items received.

- 17 • **San Xavier District of the Tohono O'odham Nation:** On January 11, 2016, the San Xavier
18 District of the Tohono O'odham Nation submitted a letter to ADOT opposing the I-11
19 transportation corridor alignment that is adjacent to the lands of the San Xavier District.



- 1 • **Garcia Strip Community of the Schuk Toak District of the Tohono O’odham Nation:**
2 On June 26, 2016, the Garcia Strip Community adopted Resolution No. GS-06-26-16 #1
3 opposing “*the construction of the Interstate-11 Corridor on or near the Garcia Strip*
4 *Community.*” The land that would be affected within the Garcia Strip Community contains
5 flood plains and sacred sites that have “*already been reduced*” by other projects.
- 6 • **Sif Oidak District Council of the Tohono O’odham Nation:** On November 17, 2016, the
7 Sif Oidak District Council adopted Resolution No. SODC 16-145 supporting the I-11 Tier 1
8 EIS study.
- 9 • **Schuk Toak District of the Tohono O’odham Nation:** On February 11, 2017, the Schuk
10 Toak District Council adopted resolution No. ST-02-11-17-019, opposing “*the construction of*
11 *the I-11 Corridor on or near the Garcia Strip Community.*”
- 12 • **SCNPO:** On January 9, 2018, SCMPO submitted a letter of support to ADOT for the I-11
13 Tier 1 EIS Study. SCMPO specifically supports Options I1 and I2 because the alignment is a
14 “*vital project for the Region.*”
- 15 • **Pinal County Board of Supervisors:** On January 10, 2018, Chairman Stephen Miller
16 submitted a letter of support for the I-11 Tier 1 EIS Study on behalf of the Pinal County
17 Board of Supervisors. The Pinal County Board of Supervisors’ supports Options I2 and I1 in
18 order to “*promote freight movement, link communities, and enhance job growth*” within Pinal
19 County.
- 20 • **City of Eloy:** On January 22, 2018, Eloy’s mayor submitted a letter of support to ADOT for
21 the I-11 Tier 1 EIS Study. The City of Eloy is “*fully committed to right-of-way preservation for*
22 *the West Pinal Freeway project.*”
- 23 • **Central Arizona Governments Regional Council (CAG):** On January 31, 2018, CAG
24 submitted a letter of support for the I-11 Tier 1 EIS Study to ADOT. CAG has programmed
25 “[*right-of-way preservation for the West Pinal Freeway*]” as part of the Pinal Regional
26 Transportation Plan. The West Pinal Freeway is CAG’s preferred alignment for I-11.
- 27 • **City of Casa Grande:** On February 5, 2018, the Casa Grande City Council adopted
28 Resolution No. 5082, “*endorsing and supporting*” the I-11 Tier 1 EIS Study. Resolution
29 No. 5082 specifically supports Options I1 and I2 to address the growing transportation
30 needs in Casa Grande and Pinal County.
- 31 • **City of Maricopa:** Maricopa’s mayor submitted a letter of support to ADOT for the I-11 Tier
32 1 EIS Study. The City supports Options I2 and I1 because Maricopa is a “*fast growing*
33 *community*” and “*transportation infrastructure is crucial*” to development and growth within
34 the community.”
- 35 • **Town of Wickenburg:** On May 1, 2017, the Town of Wickenburg adopted Resolution
36 No. 2043 supporting the Sonoran Institute’s I-11 Design Report, which brings together the
37 ideas generated by the Wickenburg community during a design workshop led by the
38 Sonoran Institute. The letter and report state opposition to an alignment through downtown
39 Wickenburg and a preference for an alignment which intersects US 60 west of the
40 Wickenburg Municipal Airport.
41 On February 20, 2018, the Town adopted Resolution No. 2112 supporting a preferred
42 alignment for I-11. The preferred alternative will benefit the Town of Wickenburg by
43 supporting “*future economic development, ease of annexation of public utilities, [and]*
44 *mitigation of sound pollution.*” In addition, on March 28, 2018, the Town Manager submitted
45 letters to Governor Ducey, ADOT, MAG, as well as several Representatives from the



1 Arizona State House of Representatives, Senators from the Arizona State Senate, US
2 Senators, and Congressman from the US House of Representatives, and several Maricopa
3 County Supervisors to express their support of the preferred alternative route that will
4 support “*Wickenburg’s future sustainability.*”

- 5 • **Tohono O’odham Nation Office of the Chairman and Vice Chairman:** On February 28,
6 2018, the Tohono O’odham Nation Office of the Chairman and Vice Chairman submitted a
7 letter to FHWA to express their opposition to the I-11 project. Tohono O’odham Nation “*does*
8 *not support a route that would go through district lands*” but is open to discussing alternative
9 routes.
- 10 • **Two (of five) Pima County Board of Supervisor members:** In an undated letter
11 transmitted to the Project Team on December 13, 2018, Supervisor Richard Elias and
12 Supervisor Sharon Bronson reaffirmed support of a 2007 resolution (unrelated to I-11) that
13 opposed construction of an interstate highway through Sonoran Desert areas. The letter also
14 includes a stated opposition against new freeway through Avra Valley.

15 5.6 Draft Tier 1 EIS Public Hearing Process

16 During the Draft Tier 1 EIS agency and public review period, public hearings will be held to
17 present the results of the Draft Tier 1 EIS and formally record all comments received. Additional
18 outreach efforts to solicit comments will include coordination and meetings with agencies, the
19 public, and Tribal entities. All comments received will be reviewed, documented, and responded
20 to as part of the preparation of, and will be contained within, the Final Tier 1 EIS.

21 Following the close of the public review period on the Draft Tier 1 EIS, FHWA and ADOT will
22 prepare a Final Tier 1 EIS. The subsequent Final Tier 1 EIS will consider input received and
23 affirm or modify the Recommended Alternative in identifying an agency-Preferred Alternative.

24 Following a 30-day public review period for the Final Tier 1 EIS, FHWA will issue a Record of
25 Decision that presents the Selected Alternative; describes the basis for the decision; and
26 provides strategies to avoid and minimize environmental impacts.



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6 RECOMMENDED ALTERNATIVE

The Federal Highway Administration (FHWA) and Arizona Department of Transportation (ADOT) evaluated alternatives to determine a recommendation for the Interstate 11 (I-11) Corridor Study Area (Study Area) between Nogales and Wickenburg by considering the following:

- How effectively does each alternative meet the I-11 Purpose and Need?
- What are the differentiating and substantive impacts?
- Can the impacts be avoided, minimized, or mitigated?

The Recommended Alternative represents the preliminary findings of FHWA and ADOT based on the Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS) resource analyses and agency, Tribal, and public input to date. As illustrated on **Figure 6-1** (Tier 1 EIS Decision Steps), the Recommended Alternative is presented for public review and comment as part of the Draft Tier 1 EIS. The subsequent Final Tier 1 EIS will consider input received and will affirm or modify the Recommended Alternative in identifying a Preferred Alternative. Ultimately, the Record of Decision (ROD) will affirm a Selected Alternative.

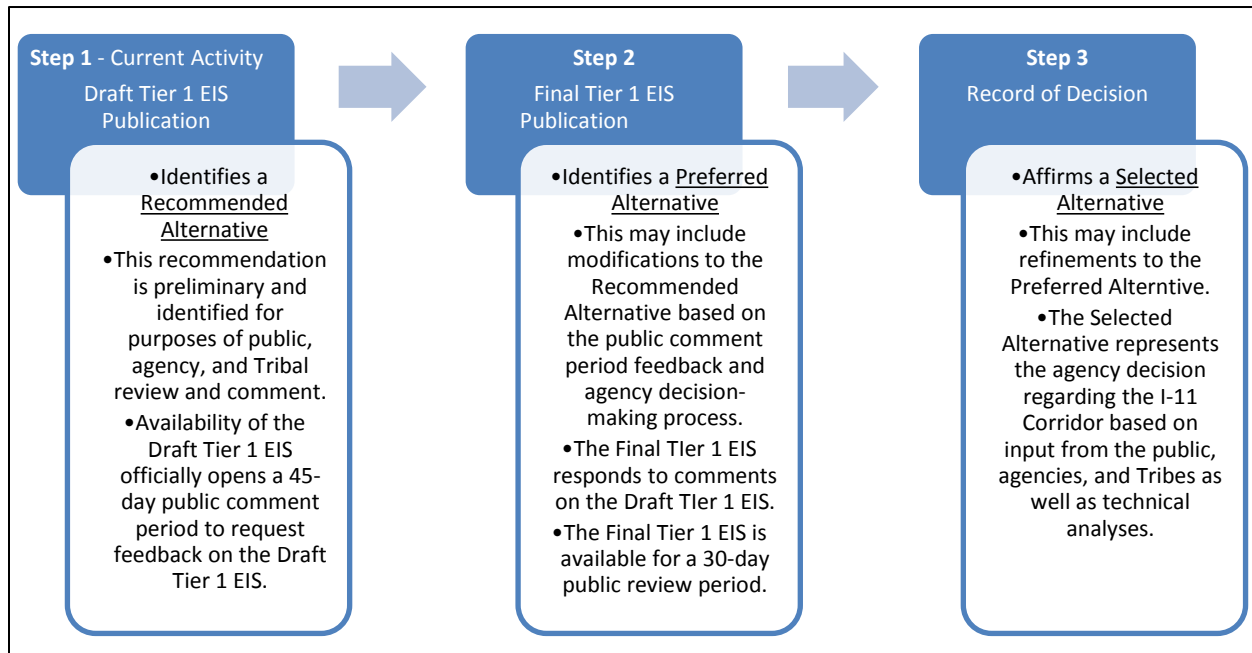


Figure 6-1 Tier 1 EIS Decision Steps



6.1 Purpose and Need

The Project Team developed metrics for each of the five key elements of the I-11 Purpose and Need, introduced in **Table 1-6** (Purpose and Need Metrics). The alternatives were evaluated using these metrics to determine how effectively they address the transportation needs in the Study Area. The results of this evaluation are described below and summarized in **Table 6-1** (Considerations in Meeting the I-11 Purpose and Need).

6.1.1 Population and Employment Growth

The highest absolute and percentage growth in the Study Area is forecasted to occur by 2040 in western Maricopa County (population growth of 259 percent, employment growth of 248 percent) and Pinal County (population growth of 80 percent, employment growth of 234 percent). The three Build Corridor Alternatives would improve infrastructure capacity in those areas. The Purple and Green Alternatives would best serve areas of concentrated growth (Casa Grande, Goodyear, Buckeye, and Wickenburg), whereas the No Build Alternative would not appreciably expand service to meet projected demand. Under the No Build Alternative, the rate of growth may contribute to increasing congestion and travel time reliability issues, and exacerbate lack of connectivity as employment and commerce patterns shift, especially in the Phoenix and Tucson metropolitan areas.

6.1.2 Traffic Growth and Travel Time Reliability

Both the Purple and Green Alternatives reduce 2040 travel time from Nogales to Wickenburg compared to the No Build Alternative by an estimated 54 and 60 minutes, respectively. These routes would attract or divert traffic from existing roadways. This traffic diversion to the Purple and Green Alternatives would reduce congestion and improve travel time reliability on existing roadways. The Orange Alternative reduces 2040 travel time from Nogales to Wickenburg by 31 minutes. The Orange Alternative provides the longest end-to-end 2040 travel time primarily due to the fact that it has the longest travel distance of the three Build Corridor Alternatives.

Under both the Purple and Green Alternatives, I-11 would achieve level of service (LOS) C or better throughout the corridor. For Option B, co-locating I-11 with existing facilities would require additional capacity on the following highway segments in order to achieve LOS C in rural areas and LOS D in urban areas (see **Appendix E1** [Conceptual Drawings]):

- I-19 from Sahuarita to I-10
- I-10 from I-19 to the Pima/Pinal county line
- SR 85 from the Gila River to I-10
- I-10 from SR 85 to 355th Avenue

Through the urban Tucson area, this translates to a need for two to three additional lanes in each direction under the Orange Alternative.

Table 6-1 Considerations in Meeting the I-11 Purpose and Need

Key Metrics		Alternatives			
Purpose and Need	Metric	No Build	Purple	Green	Orange
How effectively does each alternative meet the I-11 Purpose and Need?					
<ul style="list-style-type: none"> Need: Population and Employment Growth High-growth areas need access to the high-capacity, access-controlled transportation network. Purpose: Provide a high-priority, high-capacity, access-controlled transportation corridor to serve population and employment growth. 	Provides access to planned growth areas.	Does not serve highest growth area (western Maricopa County, within the Study Area)	The greatest areas of population and employment growth within the Study Area are expected in Pinal and western Maricopa counties, which the Purple Alternative serves best (Casa Grande, Goodyear, Buckeye, and Wickenburg).	The Green Alternative serves anticipated growth well, but does not provide as much access to the Goodyear/State Route (SR) 303L area as the Purple Alternative.	The Orange Alternative best responds to continued population and employment growth in the South Section; however, less growth is anticipated in the Tucson urbanized area compared to other portions of the Study Area.
<ul style="list-style-type: none"> Need: Traffic Growth and Travel Time Reliability Increased traffic growth reduces travel time reliability due to unpredictable freeway conditions that impede travel flows, hindering the ability to efficiently move people and goods around and between metropolitan areas. Purpose: Support improved regional mobility for people and goods to reduce congestion and improve travel efficiency. 	Reduces travel time for long-distance traffic (2040 travel time from Nogales to Wickenburg in minutes).	297 minutes	243 (54-minute savings)	237 (60-minute savings)	266 (31 minute savings)
	Achieves level of service (LOS) C or better in rural areas, and LOS D or better in urban areas (Tucson) on I-11.	LOS F on existing roads in some areas	LOS C or better on I-11	LOS C or better on I-11	LOS C in rural areas outside of Tucson LOS D on I-11 in urban areas (Tucson)
<ul style="list-style-type: none"> Need: System Linkages and Regional Mobility The lack of a north-south interstate freeway link in the Intermountain West constrains trade, reduces access for economic development, and inhibits efficient mobility. Purpose: Connect metropolitan areas and markets in the Intermountain West with Mexico and Canada through a continuous, high-capacity transportation corridor. 	Effectively attracts/diverts traffic from existing roadways, as measured by: Percent increase in vehicle miles traveled (VMT) in the study area compared to the No Build Alternative Percent Increase in truck VMT in the study area compared to the No Build Alternative	No diversion of passenger vehicles or trucks.	5.4% increase in combined passenger vehicles and truck VMT; 21.3% increase in truck VMT versus No Build Alternative.	4.0% increase in combined passenger vehicles and truck VMT; 15.9% increase in truck VMT versus No Build Alternative.	1.5% increase in combined passenger vehicles and truck VMT; 2.2% increase in truck VMT versus No Build
<ul style="list-style-type: none"> Need: Access to Economic Activity Centers Efficient freeway access and connectivity to major economic activity centers are required to operate in a competitive economic market. Purpose: Enhance access to the high-capacity transportation network to support economic vitality. 	Serves key economic centers (number of economic activity centers).	Serves 8 existing centers in the Study Area	14, including 7 existing centers (primarily located along I-10) and 7 emerging centers	10, including 6 existing centers (primarily located along I-10) and 4 emerging centers	15, including 8 existing centers (primarily located along I-10) and 7 emerging centers
<ul style="list-style-type: none"> Need: Homeland Security and National Defense Alternate interstate freeway routes help alleviate congestion and prevent bottlenecks during emergency situations. These routes may be parallel or may generally serve the same major origin and destination points, with local or regional roads connecting the freeway routes in various places. Purpose: Provide alternate regional routes to facilitate efficient mobility for emergency evacuation and defense access. 	Provides an alternate regional route to an existing interstate route.	No	Yes for 7 out of 9 segments	Yes for 8 out of 9 segments	Yes for 1 out of 9 segments



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6.1.3 System Linkages and Regional Mobility

A key purpose of the I-11 system linkage is to support efficient commercial and trade traffic. The three Build Corridor Alternatives would create a high-capacity transportation connection from Mexico to the I-11 improvements north of Wickenburg along United States (US) 93 and into Nevada. Under the No Build Alternative, there would be no continuous high-capacity transportation connection between I-10 in Buckeye and US 93 in Wickenburg. Modeling for 2040 conditions suggests that the Purple Alternative could attract the highest increase in automobile and truck (trade-related) VMT over the No Build Alternative.

6.1.4 Access to Economic Activity Centers

The interstate highway system plays a critical role in connecting and providing access to employment hubs within the broader population base. The Purple and Orange Alternatives best serve existing and emerging economic activity centers within the Study Area. Most existing and several emerging centers are located along the I-10 corridor, as good transportation access is a key asset to major industries. However, continued growth and congestion on existing interstate facilities could eventually hinder accessibility.

6.1.5 Homeland Security and National Defense

Congestion on I-10 and existing interstate freeways and state routes may prevent efficient and safe emergency evacuation and defense access. Regional route redundancy, including alternate interstate freeway routes, would facilitate efficient mobility, alleviate congestion, and prevent bottlenecks during emergencies and incidents. The metric for evaluating this element of the I-11 Purpose and Need is whether the alternative provides an alternate high-capacity interstate route where one does not exist already. Both the Purple and Green Alternatives respond to this need best in the South and Central Sections, where these alternatives are composed primarily of new corridors. The primary difference between the Purple and Green Alternatives is in Pinal County, where the Green Alternative includes a new corridor (Option F), while the Purple Alternative calls for co-location with I-10 (Option G).

None of the Build Corridor Alternatives performs well according to this metric in southern Santa Cruz County, where use of I-19 is the only Build Corridor Alternative. In the North Section, all Build Corridor Alternatives represent a new interstate transportation corridor where there is currently no high-capacity transportation facility.

The No Build Alternative would not provide an alternative regional route. This alternative would not address homeland security, national defense, or incident management needs.

6.2 Differentiating and Substantive Impacts

The three Build Corridor Alternatives were developed to address the transportation needs in the Study Area. As detailed in the previous section, each alternative performs differently in relation to the metrics used to evaluate the I-11 Purpose and Need. In determining a recommendation for this Draft Tier 1 EIS, the next layer of evaluation considers the impacts described in **Chapter 3** (Affected Environment and Environmental Consequences) and identifies the differences between the alternatives. Section 6.2 is organized based on the key decision points



1 that emerged from the detailed EIS analysis. Each subsection below details the adverse
2 impacts and beneficial effects considered in identifying the Recommended Alternative.

3 **6.2.1 I-19: Nogales to Sahuarita**

4 The Recommended Alternative uses Option A, which is included in all three Build Corridor
5 Alternatives and follows the existing I-19 corridor. During the *I-11 and Intermountain West*
6 *Corridor Study*, it was determined that Nogales formed the best connection point into Mexico
7 along the southern Arizona border. Current and projected travel demand modeling suggests that
8 existing I-19 will continue to operate at an acceptable level of service through 2040. If needed,
9 future capacity improvements could be accommodated within the existing ADOT right-of-way
10 (ROW), avoiding or minimizing impacts.

11 The existing I-10 corridor provides access to the economic activity centers and high-growth
12 areas in Santa Cruz County. It will serve long-distance truck traffic moving to and from the
13 Mariposa Port of Entry. Due to steep terrain and lands designated as roadless or protected
14 open space, an alternate corridor is not feasible in the vicinity.

15 As part of the preliminary Section 4(f) evaluation, properties that would be afforded protection
16 under Section 4(f) were identified within the 2,000-foot-wide Project Area along I-19. FHWA has
17 identified the opportunity to accommodate the I-11 facility without incorporating land from any
18 Section 4(f) properties. These properties are included in the Recommended Alternative as a
19 committed “4(f) avoidance areas,” and the specific alignment and design of I-11 would be
20 developed to avoid them. See **Chapter 4** (Preliminary Draft Section 4(f) Evaluation) for more
21 information.

22 ***Option A (Recommended) provides access to high-growth areas, achieves LOS C***
23 ***throughout the I-11 Corridor, and serves key economic centers while avoiding impacts to***
24 ***sensitive environmental resources.***

25 **6.2.2 Sahuarita to Marana**

26 One of the decision points for the Recommended Alternative is to pursue the use of existing
27 facilities (Orange Alternative, Option B) or a new corridor (Purple and Green Alternatives,
28 Options C or D) between Sahuarita and Marana in Pima County. The Recommended
29 Alternative uses new corridor Option D (Green Alternative) between Sahuarita and Marana. The
30 new corridor provides an alternate regional route to facilitate efficient mobility for emergency
31 evacuation and defense access compared to the congested I-19/I-10 corridor through Tucson.
32 Option D is part of the end-to-end alternative that reduces travel time for long-distance traffic
33 between Nogales and Wickenburg and achieves LOS C or better throughout the I-11 Corridor. It
34 will serve planned growth areas and key economic centers as well as attract and divert traffic,
35 including trucks, from existing roadways. The Orange Alternative would serve a higher number
36 of economic activity centers.

37 All of the Build Corridor Alternatives considered in this Draft Tier 1 EIS would result in adverse
38 impacts, so potential mitigation strategies were considered in identifying the recommendation
39 for this Draft Tier 1 EIS. While use of existing corridors would minimize new disturbances to
40 environmental resources, all of the Build Corridor Alternatives would still require additional
41 capacity on I-10 to accommodate the I-11 facility. This would result in unmitigable impacts on
42 historic districts, archaeological resources, and the communities in Downtown Tucson.

The new Corridor Options provide an alternate route for emergency and incident management, but would further fragment wildlife habitat and impact the endangered Pima pineapple cactus (PPC) (*Coryphantha scheeri* var. *robustispina*) and several other protected species. The Purple and Green Alternatives also are located closer to Tucson Mountain Park, the Tucson Mitigation Corridor (TMC), and Saguaro National Park (SNP) –West and designated wilderness within the park). A new interstate in this area would result in varying degrees of change in noise, light, air quality, and visual character for SNP-West, Tucson Mountain Park, and the TMC. After careful consideration, FHWA and ADOT determined Orange Alternative impacts are unmitigable, whereas impacts under the Purple and Green Alternatives could be mitigated. This Draft Tier 1 EIS identifies effective mitigation strategies to avoid, minimize, and mitigate these impacts, and if a Build Corridor Alternative is selected, it will be included in the ROD for the Tier 1 EIS. As future projects move I-11 forward into more detailed design, those efforts would continue in a more detailed manner when the specific alignment of I-11 is developed.

Community Impacts: Option D would avoid impacts in downtown Tucson, but would impact the rural communities of Avra Valley and Picture Rocks. downtown Tucson is an urban area with a high concentration of low-income and minority individuals, and the Orange Alternative would impact these communities. The adverse effects on the low-income and minority populations in Tucson have the potential to exceed those borne by non-environmental justice populations. By contrast, demographic data indicate that Avra Valley and Picture Rocks communities do not contain low-income or minority populations. While Option D is located in close proximity to the Tohono O’odham Nation, it is not located on Tribal land and would not require any relocations or displacements on Tribal land. Section 3.5 (Communities, Community Resources, and Environmental Justice) provides more detail on the effects to communities and environmental justice populations.

Historic Districts and Archaeological Resources: Option D through the Avra Valley area generally has a low potential for direct impacts on archaeological sites, historic structures, and historic districts and buildings; however, there are a few spot locations that have a moderate potential for direct impacts. Based on known surveys, Option B in Downtown Tucson has a high potential for direct impacts on archeological sites and historic districts and buildings due to the greater density of historic properties in downtown Tucson, and there are a few spot locations with low to moderate potential. FHWA anticipates, and the State Historic Preservation Office concurs, that the Orange Alternative would result in findings of adverse effect under Section 106 for multiple historic properties in downtown Tucson. These adverse effects would be unmitigable. Section 3.7 (Cultural Resources) provides more detail on the assessment of the potential to affect cultural resources.

Economic Development Benefits: The connection of Option D with I-19 in the Sahuarita area would serve key southern Arizona economic activity centers. This connection would serve the aerospace, defense, manufacturing, and logistics industries in the region’s two largest employment areas: Tucson International Airport and the University of Arizona Tech Park. Both are located within the Sonoran Corridor economic development zone. This zone, which stretches from I-19 to I-10 south of the Tucson metropolitan core, is expected to continue to evolve into a dense cluster of industrial uses. In past studies ADOT identified this zone as a major freight focus area. As an import center, this is where products entering the country from Mexico are prepared for inland distribution. As freight-related industries continue to locate here, the volume of truck traffic leaving the area for points east or west on I-10 will continue to grow. Option D may attract some freight traffic to the new corridor, possibly improving travel time reliability due to less daily congestion.



Option D also offers an opportunity for the Sonoran Corridor transportation study to evaluate alternatives that connect to an I-11 Build Corridor Alternative. The Sonoran Corridor is currently under analysis in a separate Tier 1 EIS study effort and is looking at alternatives that provide a high-capacity transportation facility connecting I-19 and I-10 through this economic activity area. A seamless connection of the Sonoran Corridor and I-11 would enhance regional mobility and the functionality of both transportation facilities. Option D is consistent with some of the Sonoran Corridor alternatives still under development. The Sonoran Corridor Tier 1 EIS is considering the I-11 connection as part of its process.

Separation from Tribal Lands: Compared to Option B and Option C, Option D provides the largest separation between I-11 and Tribal lands. The need for I-11 to stay off Tribal lands is a key theme in the input from Tribal stakeholders, who have expressed a preference for Build Corridor Alternatives that stay as far as possible away from Tribal lands. **Chapter 5** (Coordination and Outreach) documents Tribal input in more detail. Option B along I-19 extends through a permanent transportation easement within the San Xavier District of the Tohono O'odham Nation (see **Appendix I** (I-19 through San Xavier [Tohono O'odham Nation])). Option C of the Purple Alternative is located along the western boundary of the San Xavier District, putting I-11 immediately adjacent to Tribal lands. The Central Arizona Project (CAP) Design Option would provide a greater separation from the Schuk Toak District of the Tohono O'odham Nation than the original alignments of Options C and D along Sandario Road.

Section 4(f) Analysis – Tucson Mitigation Corridor: The purpose and function of the TMC is protection of wildlife movement. The TMC facilitates east-west wildlife movement between large habitat blocks to the east (SNP- West, Tucson Mountain Park) and west (Ironwood Forest National Monument). Option D would introduce a new linear facility onto the TMC. The Purple and Green Alternatives would directly impact the TMC, which would be a permanent use under Section 4(f), and mitigation strategies to address the effects to wildlife connectivity will be incorporated into the Recommended Alternative. The mitigation strategies reflect and expand upon those outlined in input received from the Bureau of Reclamation (Reclamation), see Reclamation's letter dated June 8, 2018, in **Appendix F**. FHWA and ADOT will continue coordination with Reclamation, with the goal of reaching a net benefit finding in which the existing function of the TMC is maintained and enhanced.

In order to design effective mitigation, studies to better understand wildlife movement needs in Avra Valley would be conducted. These studies will be developed and completed prior to the Tier 2 analysis to ensure adequate data are available for that process.

Section 4(f) Analysis – Downtown Tucson: Historic districts in downtown Tucson are partially or entirely within the 2,000-foot-wide Project Area for Option B, with buildings immediately abutting both sides of I-10. Option B will require construction of additional capacity on I-10, which will impact historic districts, historic structures, and parks. The adverse impacts to the historic districts and structures in downtown Tucson are unmitigable. The avoidance analysis considered alignment shifts and design changes (including an elevated structure and tunneling below I-10). No feasible and prudent avoidance alternative to the permanent use of these historic districts could be identified. See **Chapter 4** (Preliminary Draft Section 4(f) Evaluation) for more detail on the Section 4(f) analysis.

Option D (Recommended) is part of an end-to-end alternative that reduces travel time between Nogales and Wickenburg compared to the No Build Alternative and achieves LOS C or better throughout the I-11 Corridor. It attracts and diverts traffic from existing roadways. Option D provides an alternate regional route to I-10, facilitating efficient



mobility for emergency evacuation and defense access. It avoids unmitigable impacts to communities as well as historic districts and structures (Section 4(f) resources) in Downtown Tucson). The CAP Design Option and a number of additional mitigation strategies were developed to address impacts to the TMC.

6.2.3 Marana to Casa Grande

The Recommended Alternative uses Option F west of I-10 (Green Alternative), which continues the northwest trajectory of Option D, crossing I-8 in the vicinity of Chuichu Road. Option F provides an alternate regional route to alleviate congestion and prevent bottlenecks during emergency situations where there currently is no alternative route to I-10. It will attract and divert traffic from existing roadways, and is part of the end-to-end alternative that will reduce travel time between Nogales and Wickenburg compared to the No Build Alternative.

Option G would use the existing I-10 corridor, which has sufficient capacity for projected future traffic volumes with I-11. However, Option G but would not supply the alternate route that Option F would in an area where incidents and closures often occur and where there is a limited transportation network off the interstate.

I-10 is a transcontinental corridor, and it is the only high-capacity transportation connection between Arizona's two largest population centers—Phoenix and Tucson. This is a high volume highway that frequently experiences crashes and other incidents that delay travel. Events that cause highway closures generally happen at random and with very little or no warning. In the event of a full highway closure, mobility delays are not only inconvenient, they present safety hazards for first responders and can have economic impacts to the trucking and freight industry.

Building redundancy into the transportation network is a key response strategy to facilitate efficient mobility for emergency evacuation and defense access. Alternate routes provide the opportunity to manage traffic demand during weather events and incidents and can serve as an evacuation route during natural disasters.

Option F provides access to planned growth areas in Marana, Eloy, and Casa Grande. It extends through areas that are vacant or agricultural today but that contain planned growth areas around Marana and Eloy. The development of a new high-capacity transportation facility connecting these growth areas is consistent with local and county-level planning. Option F also serves several key economic activity centers that span the area between Pinal Airpark (a transportation logistics zone) in the south end and Casa Grande in the north end.

Sensitive Environmental Resources: Option F is parallel to the Santa Cruz River and extends through sensitive environmental resources, notably the river's floodplains and riparian habitat. Throughout the remainder of Option F, land use is generally undeveloped and agricultural. Impacts to these resources would be minimized and mitigated through Tier 2 design considerations, such as conveyance structures for floodwaters, wildlife connectivity, and habitat impacts.

Connection to I-10: The Marana area offers an opportunity to connect the new corridor formed by Options D and F. The Recommended Alternative includes this connector. The connector uses a portion of the Purple Alternative, where Option C connects to I-10. The connection benefits long-distance traffic as well as provides a crossover point between I-11 and I-10 during incident management and emergency response.



Option F (Recommended) is part of an end-to-end alternative that reduces travel time between Nogales and Wickenburg compared to the No Build Alternative and achieves LOS C or better throughout I-11. As an alternate regional route, Option F (Recommended) will provide access to planned growth areas and serve key economic centers in Marana, Eloy, and Casa Grande. Option F will attract and divert traffic away from existing roadways. It is consistent with local and county-level planning and commits to mitigation measures to minimize the impacts of the new alignment on floodplains.

6.2.4 Casa Grande to Buckeye

The Recommended Alternative uses Options I2, L, N, and R (Green and Purple Alternatives) to form a new corridor in western Maricopa County. The new corridor provides an alternate regional route, reduces travel time for long-distance traffic between Nogales and Wickenburg, provides access to planned growth areas, and serves key economic activity centers.

There is currently no direct connection between western Pinal and Maricopa counties. Current route options between these areas require travel on I-8 and SR 85 or travel on I-10 through Phoenix. The new corridor extends between Casa Grande in western Pinal County and Buckeye in western Maricopa County, providing a transportation facility directly connecting those areas. Travel distance between Casa Grande and Buckeye would be shorter, which would reduce end-to-end travel time between Nogales and Wickenburg.

While use of existing I-8 and SR 85 (Options H, K, and Q) would minimize disturbance to environmental resources, the traffic analysis indicates this route is underutilized. Under the No Build Alternative, traffic heading northwest of Phoenix (Wickenburg, Kingman, and Las Vegas) generally stays on I-10 through Phoenix, diverting northwest via various regional connections (e.g., US 60, SR 101L, and SR 303L) rather than using I-8 and SR 85, which is the defined (by roadway signage) "Phoenix Bypass Route." The Recommended Alternative is a more direct route between western Pinal County and western Maricopa County, and offers long-distance travelers an opportunity to avoid the congestion in Phoenix. Based on an analysis of VMT for this new corridor, it effectively attracts and diverts long distance truck traffic away from existing roadways, whereas the Orange Alternative, which co-locates I-11 with I-8 and SR 85, does not.

The community of Mobile is a growth area located along SR 238 near the Pinal-Maricopa county line. While rural in nature today, Mobile is planned to evolve into a large economic activity center in the future (Amaranth). This growth is dependent on north-south transportation access to the rest of the City of Goodyear in western Maricopa County. The Recommended Alternative would provide this connectivity and, as a high-capacity interstate corridor, would enhance opportunities for intermodal development to take advantage of the community's location along the Union Pacific Railroad mainline corridor.

The Sun Corridor Metropolitan Planning Organization and Pinal County have formally supported the West Pinal Freeway, a proposed regional high-capacity transportation facility for this region that would provide a direct connection to Maricopa County. Options I1 and I2 comprise the proposed West Pinal Freeway. Transportation framework studies conducted by the Maricopa Association of Governments also propose a high-capacity transportation facility (the Hassayampa Freeway) in the general location of Option L.

Option L is partially adjacent to the Sonoran Desert National Monument within a Bureau of Land Management (BLM)-designated multi-use corridor. The new Option L corridor is consistent with BLM's infrastructure planning in the vicinity of the Sonoran Desert National Monument (SDNM).

The BLM has identified a series of multi-use utility corridors, which are defined corridor ROWs for transportation and energy transmission facilities and which represent BLM's preferred routing of such facilities through their lands. One such route exists on portions of the north and east side of the SDNM where major power and underground pipeline infrastructure already exists. Developers have proposed the Sonoran Valley Parkway facility within this utility corridor as well. The primary purpose of the parkway is to connect the main portion of the City of Goodyear with newly annexed lands in Mobile. BLM was the lead agency in completing an EIS for the establishment of the parkway's ROW. While the general location is similar to Option L, the parkway is intended for local travel and emergency response services. Consolidating both the parkway and I-11 within the same BLM multi-use corridor would be compatible with its intended use and would minimize the number of new linear transportation facilities through this environmentally sensitive area.

Further north, the Recommended Alternative traverses the Goodyear in a manner that is generally consistent with proposed high-capacity transportation facilities: SR 303L south extension and SR 30. The location of Option N is a key system linkage in a new regional transportation facility, providing access and linking planned communities and economic activity centers.

The Recommended Alternative would further fragment wildlife habitat within the Gila Bend-Sierra Estrella Linkage, which connects two large wildland blocks located on the Gila River Indian Community and the SDNM. Through coordination with the Arizona Game and Fish Department (AGFD), BLM, and other stakeholders to determine data needs and study design in advance of Tier 2 studies, ADOT will fund and facilitate wildlife connectivity studies to identify effective mitigation strategies during Tier 2 studies to avoid, minimize, or mitigate the impacts on wildlife connectivity. If a Build Corridor Alternative is selected, these mitigation strategies will be included in the ROD for the Tier 1 EIS. As future projects move the I-11 corridor forward into more detailed design, those efforts would continue in a more detailed manner as the specific alignment of I-11 is developed.

Current I-11 planning has identified environmental constraints regarding a crossing of the Gila River in this vicinity. These constraints include sensitive riparian and wildlife resources, higher potential for cultural resources to be present, and proposed critical habitat for the western yellow-billed cuckoo (*Coccyzus americanus*). East of SR 85, Option N would require a new crossing of the Gila River. West of SR 85, the general location of Option R west of SR 85 was placed north of the Gila River in order to avoid and minimize impacts to the river. Mitigation strategies are identified to avoid or minimize the potential for impacts along Option R. If a Build Corridor Alternative is selected, these mitigation strategies also would be included in the Record of Decision for the Tier 1 EIS. All mitigation strategies identified in this Draft Tier 1 EIS would be further explored in the Tier 2 environmental review as the specific alignment and design are developed.

Options I2, L, N, and R (Recommended) comprise a new corridor that is an alternate regional route in an area where there are no high-capacity transportation facilities. This corridor would provide access to planned growth areas and serve key economic centers in western Maricopa and Pinal counties. The new corridor would reduce travel time for long-distance traffic from Nogales to Wickenburg, achieve LOS C throughout I-11, and effectively attract and divert traffic from existing roadways. It also is consistent with local and county plans. The Recommended Alternative includes mitigation strategies developed to address the impacts of a new Gila River crossing.



6.2.5 Buckeye to Wickenburg

The Recommended Alternative uses a hybrid combination of Options U (Green Alternative) and X (Purple Alternative). Extending north from I-10, the Recommended Alternative follows Option U for approximately 15 miles. Option U provides the most direct route north in this area.

Approximately 5 miles south of the Vulture Mountains Recreation Area (VMRA), the Recommended Alternative transitions to Option X. This segment of Option X generally follows an existing transmission line corridor within a BLM-designated multi-use utility corridor through the VMRA. The area within the BLM multi-use corridor is already disturbed from the overhead power transmission line and off-highway vehicle use. Use of the multi-use corridor would consolidate the number of linear facilities through the VMRA.

FHWA has determined that the use of the multi-use corridor through the VMRA would satisfy the Joint Development criteria of 23 Code of Federal Regulations 774.11 (Applicability), and thus Section 4(f) requirements would not apply. See **Chapter 4** (Preliminary Draft Section 4(f) Evaluation) for more information. FHWA and ADOT would continue to work with BLM and Maricopa County throughout the Tier 2 environmental review process to identify appropriate, site-specific mitigation.

North of the VMRA, Option X crosses US 60 west of Wickenburg Municipal Airport. This corridor location provides access to both the planned Forepaugh development area and Wickenburg Municipal Airport. From there, the Recommended Alternative follows relatively flat terrain to connect with US 93 west of the developed areas surrounding Wickenburg. The general location of the connection on point with US 93 was placed to provide distance from existing residential development.

Hybrid Option U/X provides an alternate regional route and access to planned growth areas, reduces travel time for long-distance traffic between Nogales and Wickenburg, and meets LOS C on I-11. It will effectively attract and divert traffic from existing roadways and serve key economic centers in the Hassayampa Valley and western Maricopa County. It is consistent with local land use and transportation plans and includes measures to mitigate impacts to VMRA.

6.2.6 Additional Areas of Analysis

The Recommended Alternative includes 3 areas that were not part of the 2,000-foot-wide Project Area for the Build Alternatives evaluated in Chapter 3. These areas are shown on **Figure 6-2** (Recommended Alternative) and described below.

- Anamax Park: Required to avoid a Section 4(f) resource. This area lies outside of the evaluated Project Area for the Green and Orange Alternatives.
- Proposed Palo Verde Regional Park: Required to avoid a Section 4(f) resource. This area lies outside of the evaluated Project Area for the Purple Alternative
- U/X Connector: The Hybrid Option U/X requires a 1.25-mile-long connection between the Green Alternative (Option U) and the Purple Alternative (Option X). This connection lies outside of the evaluated Project Area for the Purple and Green Alternatives.

The Project Team conducted a preliminary evaluation of the potential for the corridor shifts to change the impact analysis documented in Chapter 3. The results are summarized in **Table 6-2**

- 1 (Potential for Change in Impact Analysis from Corridor Shifts). A detailed evaluation of the
- 2 revised will be documented in the Final Tier 1 EIS.

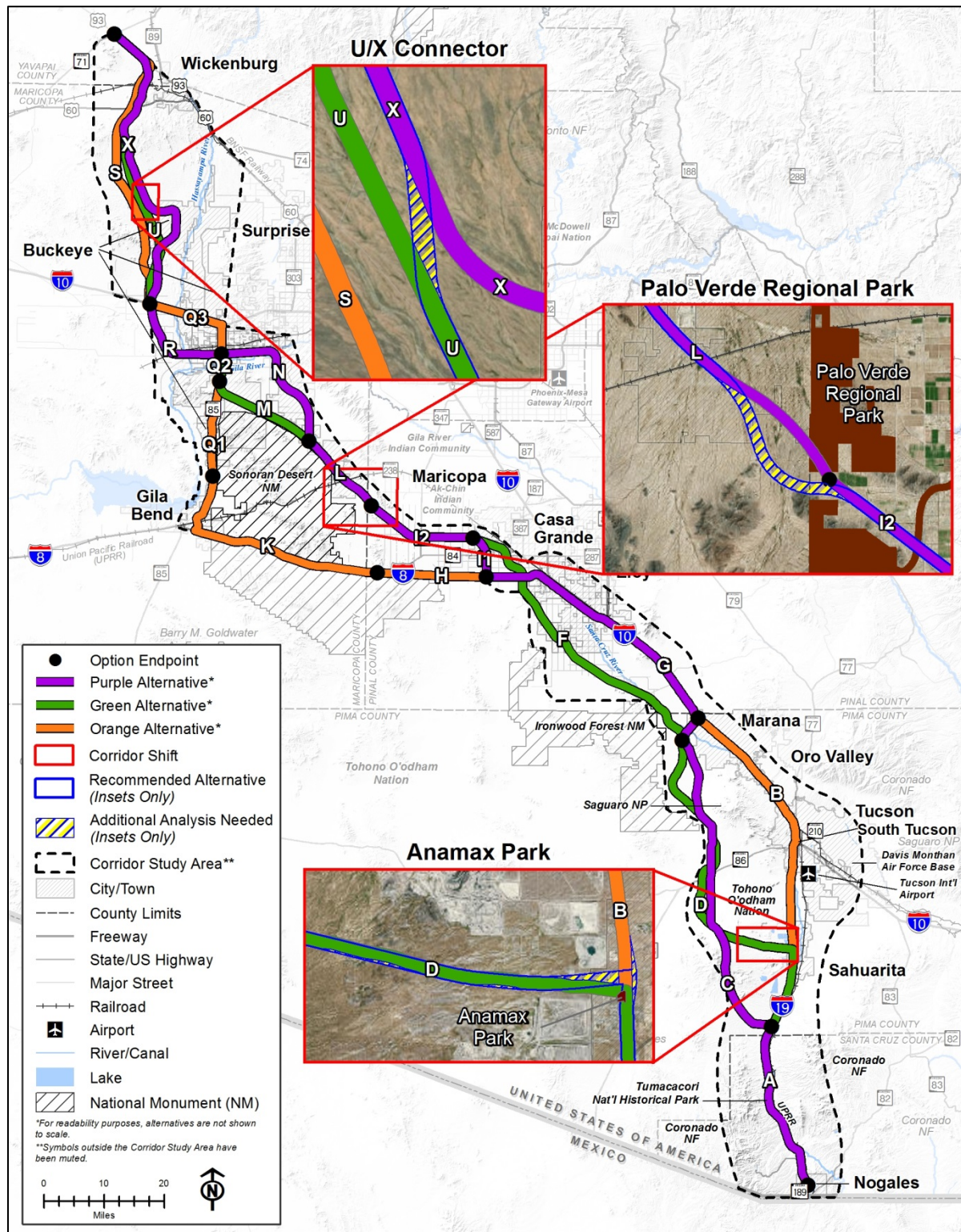


Figure 6-2 Corridor Shifts

Table 6-2 Potential for Change in Impact Analysis from Corridor Shifts

Land Use	<i>Land Ownership:</i> Avoids Anamax Park, eliminating the potential for impacts to local/state park lands. No other changes in potential impacts to land ownership are expected.	<i>Land Ownership:</i> Avoids impacts to the Palo Verde Park, but would increase the potential impacts to BLM lands.	<i>Land Ownership:</i> Avoids impacts to the adjacent State Trust Lands, and keep the corridor on BLM lands.
	<i>Existing Land Use:</i> Marginally reduces residential and mixed uses and adds vacant lands.	<i>Existing Land Use:</i> Marginally reduces recreational/open space and adds vacant lands.	<i>Existing Land Use:</i> No change.
	<i>Future Land Use:</i> No change.	<i>Future Land Use:</i> Marginally reduces potential for impacts to commercial land uses.	<i>Future Land Use:</i> No change.
Recreation	Avoids the Anamax Park. No other changes in potential for impacts to recreational areas.	Avoids Palo Verde Regional Park. The portion of Palo Verde Regional Park that remains in the Project Area is part of a recreation trail and is planned to be grade separated from the I-11 corridor. No other changes in potential impacts to recreational areas.	No change.
Community Resources, Title VI and Environmental Justice	<ul style="list-style-type: none"> • Avoids Anamax Park, a community resource. • Transfers potential for impacts from one residential neighborhood to another that is closer to El Toro Rd. • Reduces community fragmentation by shifting the corridor closer to the northern limits of the neighborhood. No change to EJ or Title VI.	<ul style="list-style-type: none"> • Limited number of residences at this location. Potential for impacts are similar to original analysis. • Avoids 2 farms. • Avoids an electrical substation. No change to EJ or Title VI.	No change. No community resources or residences at this location.
Economics	No change.	No change.	No change.

Table 6-2 Potential for Change in Impact Analysis from Corridor Shifts (Continued)

Cultural Resources	<p><i>Archaeological Sites:</i></p> <ul style="list-style-type: none"> • 1 recorded archaeological site: Indian Kitchen [AZ DD:4:123(ASM)] is no longer in the Project Area • Added 3 archaeological sites: AZ EE:1:5, 220, and 227(ASM) (1 determined to be NRHP ineligible, 1 recommended ineligible, and 1 unevaluated) <p>No change. Potential for impacts remains low to moderate.</p>	<p><i>Archaeological Sites:</i></p> <ul style="list-style-type: none"> • Added 1 site: AZ T:16:159(ASM) (NRHP eligibility unevaluated) <p>No change. Potential for impacts remains low.</p>	<p><i>Archaeological Sites:</i></p> <ul style="list-style-type: none"> • No prior surveys <p>No change. Potential for impacts remains low.</p>
	<p><i>Historic Districts and Buildings:</i></p> <ul style="list-style-type: none"> • No NRHP-listed or previously determined eligible historic districts and buildings. • 4 unrecorded historic-period properties (3 preliminarily evaluated as possibly NRHP eligible and 1 as not eligible) are no longer in the Project Area. • Added 6 unrecorded historic-period properties preliminarily evaluated as possibly NRHP eligible. 	<p><i>Historic Districts and Buildings:</i></p> <p>No change. There are no buildings in shifted corridor or modified portion of original corridor.</p>	<p><i>Historic Districts and Buildings:</i></p> <p>No change. There are no buildings in the additional analysis area.</p>
	<p><i>Traditional Cultural Resources:</i></p> <p>No change. None identified in the vicinity.</p>	<p><i>Traditional Cultural Resources:</i></p> <p>No change. None identified in the vicinity.</p>	<p><i>Traditional Cultural Resources:</i></p> <p>No change. None identified in the vicinity.</p>
Visual Resources	No change.	No change.	No change.
Hazardous Materials	No Change. The shifted corridor crosses some scattered residential properties, undeveloped/vacant land, and railroad ROW. It is unlikely there would be additional major hazardous materials sites or facilities. The potential impact is low.	No change. The shifted corridor crosses undeveloped and vacant land. It is unlikely there would be additional major hazardous materials sites or facilities. The potential impact is low.	No change. The additional analysis area crosses undeveloped and vacant land. It is unlikely there would be additional major hazardous materials sites or facilities. The potential impact is low.
Geo/Soils/Farmland	No change.	No change.	No change.

Table 6-2 Potential for Change in Impact Analysis from Corridor Shifts (Continued)

Water	<ul style="list-style-type: none"> • No additional sensitive waters, impaired waters, streams, or floodplains in the shifted corridor. • 1 additional groundwater well in the shifted corridor. • Approximately 19 additional acres of NWI-mapped Riverine area in the shifted corridor 	<ul style="list-style-type: none"> • No additional sensitive waters, impaired waters, or wells in the shifted corridor. • Approximately 3,106 additional linear feet of Waterman Wash in the shifted corridor. • Approximately 14 additional acres of NWI-mapped Riverine area in the shifted corridor. • Approximately 174 additional acres of FEMA-mapped ZONE A floodplains in the shifted corridor. 	<ul style="list-style-type: none"> • No additional sensitive waters, impaired waters, or wells in the additional analysis area. • Approximately 702 additional linear feet of Powerline Wash in the additional analysis area. • Approximately 2 additional acres of NWI-mapped Riverine area in the additional analysis area. • Approximately 21 additional acres of FEMA-mapped floodplains (15 acres of Zone A and 6 acres of Zone AE) and one Regulatory Floodway in the additional analysis.
Biological Resources	<i>Biotic Communities:</i> No change.	<i>Biotic Communities:</i> No change.	<i>Biotic Communities:</i> No change.
	<i>Riparian Areas:</i> No change.	<i>Riparian Areas:</i> No change.	<i>Riparian Areas:</i> No change.
	<i>SERI:</i> No change.	<i>SERI:</i> No change.	<i>SERI:</i> No change.
	<i>Invasive Species:</i> No change.	<i>Invasive Species:</i> No change.	<i>Invasive Species:</i> No change.
	<i>Threatened and Endangered Species:</i> Adds a small amount semidesert grassland east of I-19 that is potentially occupied by Pima pineapple cactus.	<i>Threatened and Endangered Species:</i> No change.	<i>Threatened and Endangered Species:</i> No change.

1 Based on the preliminary analysis, the corridor shift to avoid Anamax Park is the only location
2 where there is the potential for differentiating impacts. The results indicate the presence of 6
3 unrecorded, historic-period properties that are possibly NRHP eligible in adjusted corridor.
4 There is no indication of a possible historic district at this location. If at Tier 2 determines the
5 identified properties are protected under Section 4(f) a highway could still be placed in the
6 northern portion of the east-west corridor, where there is 310-foot gap between the properties
7 (see **Figure 6-3**).

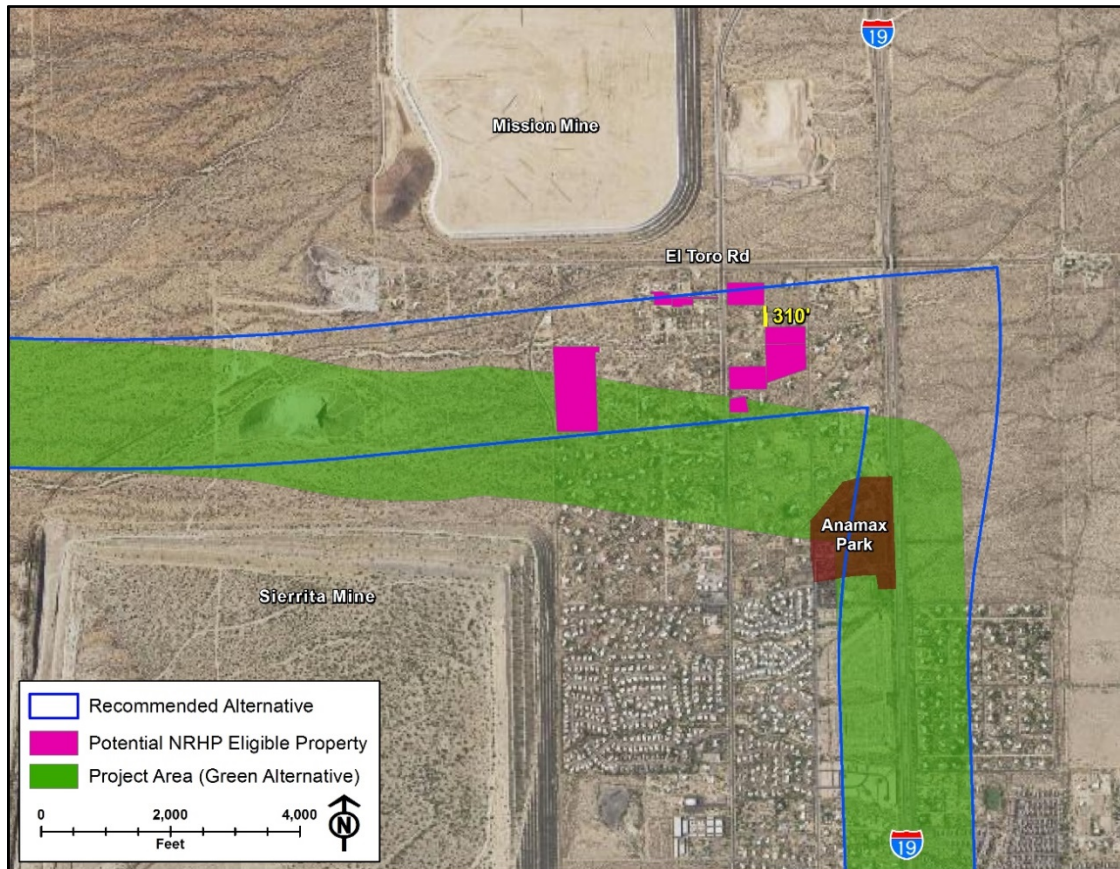


Figure 6-3 Anamax Corridor Shift

8 There are no other potential impacts within the shifted Project Area that would prompt FHWA
9 and ADOT to modify the Recommended Alternative.

10 **6.3 Recommended Alternative**

11 FHWA and ADOT identified a Recommended Alternative that best meets the I-11 Purpose and
12 Need while minimizing the potential for adverse impacts. The Recommended Alternative is
13 based primarily on the Purple and Green Alternatives, but it is a hybrid alignment (i.e., a
14 combination of Corridor Options from the Build Corridor Alternatives) to reduce or avoid adverse
15 effects. **Table 6-3** (Recommended Alternative) lists the Corridor Options that comprise the
16 Recommended Alternative, which is illustrated on **Figure 6-4** (Recommended Alternative).



Table 6-3 Recommended Alternative

Option	Build Corridor Alternative	Description
A	Common to All Build Corridor Alternatives	Co-located with Interstate 10 (I-10) and I-19.
D, with CAP Design Option	Green Alternative	Uses the CAP Design Option parallel to the CAP canal, which was a design option for both the Purple and Green Alternatives. Includes connection between I-10 and Marana.
F	Green Alternative	New corridor west of I-10, connects to I-8 and extends north along Chuichu Road.
I2	Common to Purple and Green Alternatives	Extends west along Barnes Road, then northwest towards Goodyear.
L	Common to Purple and Green Alternatives	New corridor parallel to the SDNM; co-located with a portion of the proposed Hassayampa Freeway in prior studies.
N	Purple Alternative	New corridor follows proposed State Route (SR) 303L south extension and proposed SR 30 west (from SR 303L to SR 85).
R	Common to Purple and Green Alternatives	New corridor crosses SR 85 and veers north to intersect I-10 at 363rd Avenue.
U	Green Alternative	Option U from I-10 to a point just south of the VMRA.
X	Purple Alternative	Follows an existing transmission line corridor through the VMRA to US 93

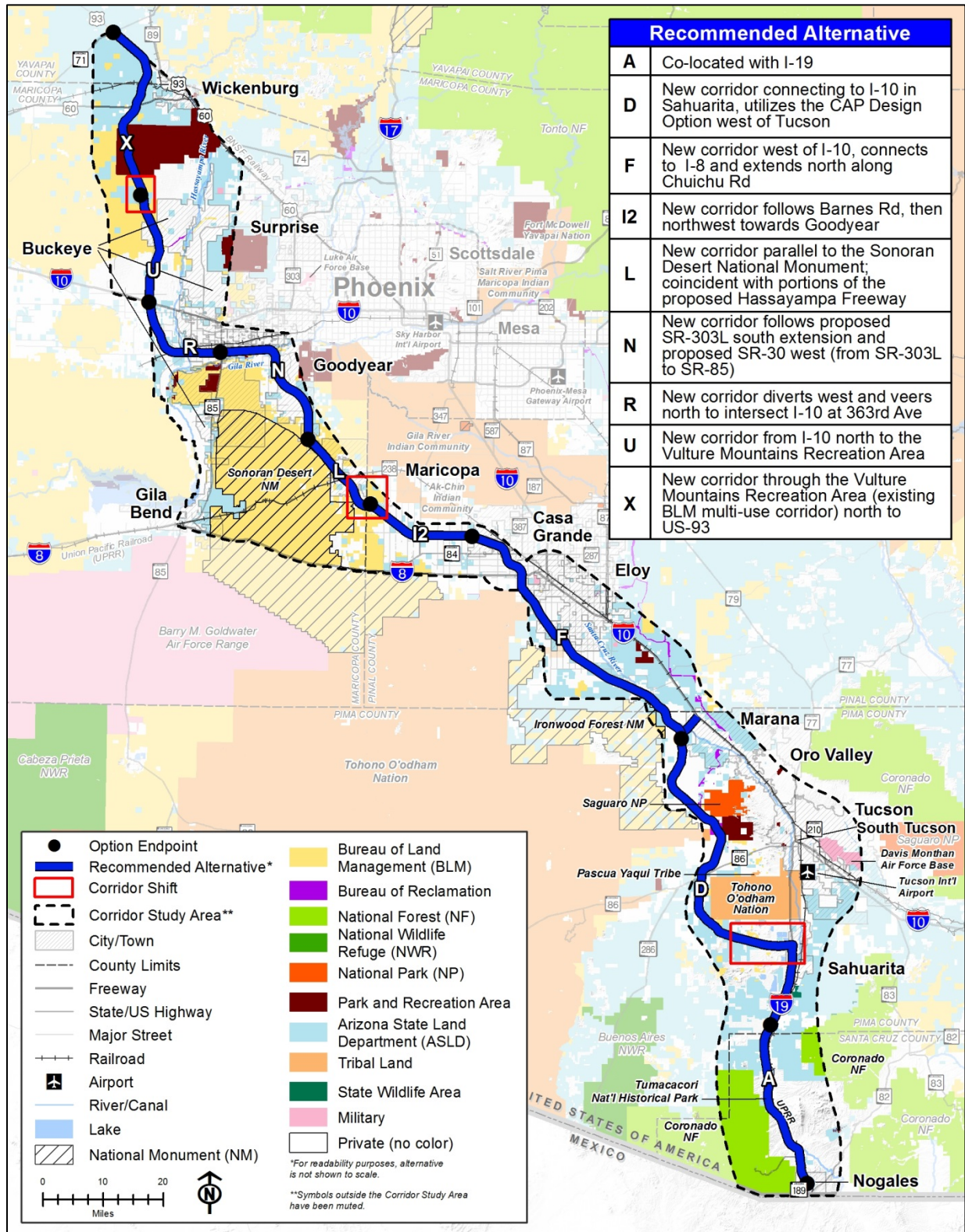


Figure 6-4 Recommended Alternative



6.4 Impact Avoidance, Minimization, and Mitigation

During the alternatives development and screening process, the alternatives were placed with the intent of avoiding major environmental impacts, including designated national monuments, national parks, and wilderness areas. This Draft Tier 1 EIS includes a detailed analysis of the beneficial transportation effects and adverse environmental impacts on a wide variety of resources. Section 3.2 (Summary of Key Environmental Impacts) provides a high-level summary of the key differentiating and substantive impacts by Corridor Option. These factors contributed to the identification of the Recommended Alternative by identifying opportunities to avoid, minimize, or mitigate potential adverse impacts.

The No Build Alternative and all the Build Corridor Alternatives have sensitive resource areas. Throughout **Chapter 3** (Affected Environment and Environmental Consequences) and **Chapter 4** (Preliminary Draft Section 4(f) Evaluation) of this Draft Tier 1 EIS, strategies are recommended that could be implemented in the development of I-11 that would avoid, minimize, and mitigate adverse effects. This section compiles the strategies that apply to the Recommended Alternative. The mitigation strategy discussion for this Draft Tier 1 EIS focuses on planning-level efforts. As I-11 moves forward, Tier 2 studies will identify project-level mitigation measures, including those necessary to minimize the short-term and temporary effects of construction activities.

Table 6-4 (Corridor-Wide Mitigation Strategies) outlines the general mitigation strategies that would be implemented throughout I-11 by type of resource. **Table 6-5** (Location-Specific Mitigation Strategies) identifies more location-specific mitigation strategies.

Table 6-4 Corridor Wide Mitigation Strategies

Resource Area	Corridor-Wide Mitigation Strategies
All	<ul style="list-style-type: none"> Each Build Corridor Alternative is 2,000 feet wide, and the assumed cross section for the future alignment would be a maximum of 400 feet wide. The use of a broad, 2,000-foot-wide Project Area in the Tier 1 analysis gives FHWA and ADOT the flexibility to identify and refine the specific roadway alignment within the corridor if a Build Corridor Alternative is ultimately selected. At that time, development of the specific alignment and more detailed design would provide an opportunity to avoid or minimize impacts to the natural and human environment.
Transportation	<ul style="list-style-type: none"> Beneficial effects on the transportation system have been identified, and no mitigation strategies are proposed for this Tier 1 level analysis. <i>Tier 2 studies would address more specific considerations, such as continued coordination with local and county transportation agencies and development of a traffic management plan and the effects.</i>
Land Use and Section 6(f)	<ul style="list-style-type: none"> Participate in coordination with local government entities as appropriate to minimize the potential for land use conflicts. <i>Tier 2 studies would address more specific mitigation considerations, such as the acquisition of properties and conversion of land to transportation uses.</i>
Recreation	<ul style="list-style-type: none"> Design the specific alignment of I-11 to allow for maintenance of access to recreation areas and to provide connectivity between recreation areas, which will connect divided recreation areas Evaluate access route considerations for Saguaro National Park- West and Tucson Mountain Park due to the closure of Sandario Road. Consider providing connectivity between the two segments of the proposed Palo Verde Regional Park to minimize permanent impacts. <i>Tier 2 studies would address more specific mitigation considerations, such as construction timing, construction phasing, and pedestrian trail crossings.</i>
Community Impacts and Environmental Justice	<ul style="list-style-type: none"> Throughout the Tier 1 EIS process, FHWA and ADOT worked to engage diverse populations in public participation efforts. Prior to the release of this Draft Tier 1 EIS, two rounds of focused public engagement were held during the scoping and alternatives analysis phases to facilitate public understanding of the study process, key milestones, and decision points. In addition to public engagement efforts, the Project Team has continuously accepted input from the public via mail, e-mail, and a bilingual telephone hotline. <i>Tier 2 studies would address more specific mitigation considerations, such as placing the alignment to avoid and minimize impacts to communities, consideration of features such as pedestrian overpasses to maintain neighborhood connections, and continued characterization of community demographics in order to identify environmental justice populations.</i>

Table 6-4 Corridor Wide Mitigation Strategies (Continued)

Economics	<ul style="list-style-type: none"> Mitigation measures related to coordinated land use planning and the prohibition of interchanges in the Avra Valley area also address and mitigate economic impacts (see Section 4(f) mitigation strategies). <i>Tier 2 studies would address more specific impacts and mitigation considerations, including use of an updated travel demand model with current population and employment projections, addressing the spacing and number of interchanges, and a more detailed analysis of the impacts to businesses, including loss of access.</i>
Cultural Resources	<ul style="list-style-type: none"> FHWA will execute a Programmatic Agreement (PA) pursuant to Section 106 of National Historic Preservation Act to stipulate procedures for assessing effects of Tier 2 projects on properties listed in or eligible for the NRHP. The PA will stipulate procedures for developing and implementing measures to avoid or minimize adverse effects or mitigate any unavoidable adverse effects as each Tier 2 project is planned. The stipulations of the current draft PA (see Appendix E7.2) address specific requirements for further studies of cultural resources, which would occur during Tier 2. FHWA is continuing to work with the Section 106 consulting parties and will execute the PA prior to issuing a ROD for the Tier 1 EIS process. <i>Tier 2 studies would continue to execute the stipulations of the PA, which includes further detailed study to identify cultural resources in the Study Area.</i>
Noise	<ul style="list-style-type: none"> Undeveloped lands within the Study Area have been identified and categorized based on zoning, and are documented in Appendix E8 of this Draft Tier 1 EIS. This information is available to local and regional jurisdictions for their use in planning for noise-compatible land uses and buffer areas in the vicinity of the I-11 Project Area. <i>Tier 2 studies would address more specific mitigation considerations, such as a traffic noise impact and abatement analysis based upon the alignment and design of I-11. Mitigation measures considered during Tier 2 studies include noise walls, earthen berms, acquisition of a buffer zone, traffic management measures, and refinement of the horizontal and/or vertical alignment.</i>
Visual and Aesthetics	<ul style="list-style-type: none"> ADOT will comply with applicable local and county ordinances related to dark skies and employ best management practices in minimizing the impact of fugitive light on the night sky along I-11. <i>Tier 2 studies would address more specific mitigation considerations, such as the minimization of earthwork and grading and development of landscape design plans for visually sensitive areas.</i>
Air Quality	<ul style="list-style-type: none"> Mitigation measures related to the prohibition of interchanges in the Avra Valley area also mitigate air quality impacts (see Section 4(f) mitigation strategies). <i>Tier 2 studies would include project-level air quality analyses and address more specific mitigation considerations, including methods to minimize the impact of construction activities on air quality.</i>

Table 6-4 Corridor Wide Mitigation Strategies (Continued)

Hazardous Materials	<ul style="list-style-type: none"> Mitigation measures related to the prohibition of interchanges in the Avra Valley area also mitigate hazardous materials impacts (see Section 4(f) mitigation strategies). <i>Tier 2 studies would conduct updated searches of regulatory databases to reflect most recent records and address more specific avoidance and mitigation concerns, such as Phase 1 Site Assessments and development of a health and safety plan during construction.</i>
Geology, Soils, and Prime and Unique Farmlands: Geology	<ul style="list-style-type: none"> Topography was considered during the alternatives development process to minimize the potential need for cut (excavation) and fill (building up embankments). <i>Tier 2 studies would include formal coordination with the Natural Resources Conservation Service as part of compliance with the Farmland Protection Policy Act, as appropriate, and address site-specific mitigation measures, such as avoidance of land subsidence areas, earth fissures, slope design, geotechnical considerations, erosion control, and development of a reclamation and revegetation plan.</i>
Water Resources	<ul style="list-style-type: none"> Alternatives were developed to have a more perpendicular crossing of major watercourses and floodplains. Known wetlands were avoided to the extent possible. <i>Tier 2 studies would address more specific mitigation considerations, such as designing the future construction footprint to minimize its impact on sensitive water resources to the extent possible, obtain Clean Water Act Section 401, 402, and 404 permits and certifications, as needed, and development of stormwater pollution prevention plans employing best management practices which minimize impacts to water quality.</i>
Biological Resources	<ul style="list-style-type: none"> ADOT will participate, support and commit to long-term noxious weed management efforts. To effectively combat noxious and invasive weeds, a coordinated effort across federal, state and local levels is required. Noxious and invasive weed control on BLM or US Forest Service (USFS) lands would occur in accordance with previously approved Environmental Assessments. Long-term management of noxious and invasive weeds would be necessary to minimize indirect and cumulative effects to the Pima pineapple cactus and its habitat. Designated Critical Habitat were considered during the alternatives development phase of the Tier 1 EIS and avoided to the extent possible. Structures designed to enhance wildlife connectivity, such as wildlife overpasses and underpasses, and fencing to funnel wildlife to these structures, would be implemented as determined by wildlife studies and agency coordination. ADOT will conduct a thorough habitat assessment in all areas which have potential habitat for Endangered Species Act-listed species and avoid, minimize, and mitigate impacts. ADOT will conduct consultation with the US Fish and Wildlife Service (USFWS), as appropriate. Efforts will be made to avoid impacts to the Pima pineapple cactus by minimizing the construction footprint through quality Pima pineapple cactus habitat, survey suitable habitat, translocating individuals, implementing long-term control of noxious

Table 6-4 Corridor Wide Mitigation Strategies (Continued)

	<p>and invasive weeds; and negotiating compensatory mitigation with USFWS, as needed.</p> <ul style="list-style-type: none"> • Additional components of the strategy to mitigate biological resources and wildlife connectivity impacts are location-specific in nature and are listed in Table 6-4 (Location-Specific Mitigation Strategies). • <i>Tier 2 studies would address more specific mitigation considerations, such as habitat assessments, species-specific field surveys, vegetation removal, and control of noxious and invasive species during construction.</i>
Section 4(f) Resources	<ul style="list-style-type: none"> • Avoid Section 4(f) properties in the Recommended Alternative Corridor (unless new properties are discovered during Tier 2 that would impact this decision), with the exception of the TMC discussed in 6-4 (Location-Specific Mitigation Strategies). An inventory of known Section 4(f) resources are listed in Table 4-5. Specifically, shift the 2,000-foot-wide corridor to avoid Anamax Park and Palo Verde Regional Park. • <i>As set forth in 23 CFR 774.7(e)(1), FHWA would complete a Final Section 4(f) Evaluation during future Tier 2 studies. At that time, FHWA would focus on making final determinations of use, assessing avoidance and least harm as warranted, and identifying specific measures to minimize harm. The results of the detailed Tier 2 cultural resources studies and surveys would be assessed to determine if there are any additional Section 4(f) properties.</i>

Table 6-5 Location-Specific Mitigation Strategies

Corridor Location	Location-Specific Mitigation Strategies
Option A: I-19 Nogales to Sahuarita	<ul style="list-style-type: none"> • Avoid widening I-19 to the east along the Santa Cruz River and impacting Southwestern willow flycatcher, yellow-billed cuckoo and their critical habitat; Gila topminnow; and Northern Mexican gartersnake habitat; conduct pre-construction surveys where appropriate; and consult with USFWS, as needed. (Section 3.14 [Biological Resources]) • Minimize the construction footprint to the extent possible and improve or construct wildlife crossings which jaguar and ocelots will use. (Section 3.14 [Biological Resources]) • Minimize construction footprint through quality PPC habitat, survey suitable habitat one year prior to Tier 2 process to inform design, implement long-term control of noxious weeds; and negotiate compensatory mitigation with USFWS, as needed. (Section 3.14 [Biological Resources]) • Avoid or minimize impacts to riparian corridor along the Santa Cruz River. Assess the need for potential additional wildlife crossings and implement where warranted to preserve wildlife movement. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement. (Section 3.14 [Biological Resources]) • Avoid or minimize impacts to the Tumacacori-Santa Rita and Santa Rita-Sierrita Linkages. Assess whether recommendations provided in the specific or county linkage reports can be used to improve or construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement. (Section 3.14 [Biological Resources])
Option D with CAP Design Option: Sahuarita to Marana	<ul style="list-style-type: none"> • Minimize construction footprint through quality PPC habitat, survey suitable habitat one year prior to Tier 2 process to inform design, implement long-term control of noxious weeds; and negotiate compensatory mitigation with USFWS, as needed. (Section 3.14 [Biological Resources]) • Avoid critical and occupied habitat of the Chiricahua leopard frog, which occurs adjacent to the southern end of Option D. (Section 3.14 [Biological Resources]) • Avoid or minimize impacts to the Santa Rita-Sierrita and Coyote-Ironwood-Tucson Linkages. Assess whether recommendations provided in the specific or county linkage reports can be used to improve or construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement. (Section 3.14 [Biological Resources])

Table 6-5 Location-Specific Mitigation Strategies (Continued)

Option D with CAP Design Option: Sahuarita to Marana (continued)	<ul style="list-style-type: none"> • Coordinate with Reclamation to achieve a net benefit for wildlife connectivity for the TMC, a Section 4(f) resource. Preliminary mitigation actions and strategies to achieve a net benefit include: <ol style="list-style-type: none"> 1. Wildlife Studies Prior to Tier 2 Process. FHWA and ADOT will coordinate with AGFD and USFWS, as recognized wildlife authorities, on what studies are needed to understand east-west wildlife movement needs (both on and off the TMC) within Avra Valley. These studies will gather baseline wildlife data, including evaluation of historic and current movement data, and surveys of existing populations. Using the baseline data, the studies will identify the extent, location, requirements, target species, and expected benefits of additional wildlife movement areas, supporting structures, and other mitigation measures. Finally, the studies will identify an approach for perpetual management and protection of any acquired lands, as well as any adaptive management thresholds and likely actions. Identification of the entity responsible for management and agreements with that entity would occur during the Tier 2 process. FHWA and ADOT will fund and facilitate the implementation of the identified wildlife studies prior to the initiation of the Tier 2 process so that the results inform project design. 2. Mitigation Recommended in Wildlife Studies Including Additional Wildlife Corridor. As part of the Tier 2 design FHWA and ADOT would use the results of the wildlife studies, in consultation with AGFD, USFWS, and the TMC Working Group, to identify wildlife movement areas, supporting structures, and other mitigation measures to incorporate into the I-11 project. Mitigation measures may be located outside the TMC, but will be located between the Tucson Mountains and the Roskrige Mountains to the west and will support the purpose of the TMC. 3. Land Replacement. FHWA and ADOT would transfer any lands acquired for TMC mitigation to an entity that would protect the lands for wildlife and wildlife movement purposes. FHWA and ADOT would consult with the TMC partners to jointly identify and agree on the appropriate entity. 4. Relocate and Reclaim Sandario Road. ADOT would relocate Sandario Road to coincide with the new I-11 alignment. ADOT would remove and reclaim about a 2-mile section of the old road with native vegetation. The design would remove barriers for wildlife (including the road and associated roadway fencing) while maintaining any necessary local access. 5. Wildlife Crossings Concurrent with CAP Canal Wildlife Crossings. ADOT would place wildlife crossings on I-11 that align with CAP siphon crossings in the TMC and one immediately north of the TMC (a total of seven crossings). The purpose of the I-11 wildlife crossings is to provide continuity to the existing CAP wildlife crossings (siphons) and minimize impacts to wildlife movements between the Tucson Mountains and Roskrige Mountains. 6. Design Standards. The Reclamation and the Central Arizona Water Conservation District have design standards for facilities that encroach on CAP lands. ADOT would comply with these standards where I-11 crosses CAP lands or is adjacent to the CAP facility.

Table 6-5 Location-Specific Mitigation Strategies (Continued)

Option D with CAP Design Option: Sahuarita to Marana (continued)	<p>7. No Interchanges in the TMC. ADOT would prohibit exits and interchanges on I-11 within the TMC.</p> <p>8. No Interchanges. Between West Snyder Hill Road and West Manville Road. To maximize the effectiveness of the TMC mitigation measures, ADOT would not build exits or interchanges on I-11 between West Snyder Hill Road and West Manville Road. The direct distance between these two roads is approximately 9 miles.</p> <p>9. Minimize Width of I-11 in TMC. Within appropriate interstate design standards, ADOT would minimize the width of I-11 through the TMC. The design would occur during Tier 2.</p> <p>10. Land Use Planning. Understanding the potential for indirect and cumulative land use effects from the I-11 project, ADOT would be an active partner in a broader effort with Metropolitan Planning Organizations, local jurisdictions, resource agencies, and private stakeholders to cooperatively plan development in the I-11 Project Area. The effort would coordinate wildlife connectivity, local land use planning, and context sensitive design for the I-11 facility. The White Tanks Conservancy may be a model for this type of effort. Coordination with Pima County on the implementation of the Sonoran Desert Conservation Plan also could be part of the effort.</p>
Option F: Marana to Casa Grande	<ul style="list-style-type: none"> • Avoid or minimize impacts to the Santa Cruz River along Option F; conduct two breeding seasons of pre-construction surveys for the yellow-billed cuckoo; implement seasonal restrictions, and consult with USFWS, as needed. • Avoid or minimize impacts to the Coyote-Ironwood-Tucson and Ironwood-Picacho Linkages. Assess whether recommendations provided in the specific or county linkage reports can be used to improve or construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement.
Options I2, L, N, and R: Casa Grande to Buckeye	<ul style="list-style-type: none"> • Avoid or minimize impacts to the Gila Bend-Sierra Estrella Linkage. Assess whether recommendations provided in the specific or county linkage reports can be used to improve or construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement. • Minimize the footprint of the bridge crossing the Gila River to the extent possible; conduct two breeding seasons of pre-construction surveys for the yellow-billed cuckoo, southwestern willow flycatcher, and Yuma Ridgeway's rail in suitable habitat; implement seasonal restrictions and consult with the USFWS, as needed. • Avoid or minimize impacts to the riparian corridor along the Gila River and within the Gila River floodplain. The need for potential additional wildlife crossings would be assessed to preserve wildlife movement, Coordination with relevant agencies would occur to implement modifications that will enhance wildlife movement.

Table 6-5 Location-Specific Mitigation Strategies (Continued)

Corridor Location	Location-Specific Mitigation Strategies
Options U and X: Buckeye to Wickenburg	<ul style="list-style-type: none"> • Avoid or minimize impacts to the White Tanks-Belmonts-Vultures-Hieroglyphics and Wickenburg-Hassayampa Linkages. Assess whether recommendations provided in the specific or county linkage reports can be used to improve and construct wildlife crossings in these linkages. Coordinate with relevant agencies to implement modifications that will enhance wildlife movement. • Maintain corridor permeability for OHV race course in VMRA.



6.5 Implementation and Phasing

At this time, no funding has been identified to construct I-11. If FHWA and ADOT select a build alternative in the ROD, the build alternative would be implemented in segments as funding is available. A preliminary phased implementation plan will be included in the Final Tier 1 EIS.

In order to advance a segment of a Selected Alternative to Tier 2 analysis, logical termini and independent utility must be demonstrated. Segments of independent utility are portions of a project that may be constructed without other construction projects or linkages; are not dependent upon other segments of the project to demonstrate improvements to the transportation system; and would be considered complete and separate projects. Project segments may be prioritized according to:

- Stakeholder collaboration and feedback.
- Integration into the current network and addressing areas with the greatest transportation and redundancy needs.
- Leveraging current and planned investments.
- Availability of funding.
- Ability to accommodate the full I-11 build configuration, by acquiring ROW and preserving access control.

In addition, phasing may refer to the type of roadway project or improvement. Initial segments may entail intersection improvements, additional access controls, or construction of a two-lane or four-lane divided roadway that is later upgraded to interstate standards.

6.5.1 Funding and Financing Considerations

The implementation of the corridor could entail federal, state, or local funding, tolling, or private-public partnerships.

From the perspective of federal funding, the 2015 Fixing America's Surface Transportation Act or "FAST Act" authorizes money each year for all the state highway programs combined. That amount is divided among the states, and then each state's allocation is divided among different regions of the state.

The Transportation Infrastructure Finance and Innovation Act is a federal credit program, not a grant program, requiring projects to generate their own revenue streams through user charges or other dedicated funding sources. Grant Anticipation Revenue Vehicles Bonds are debt financing instruments that permit an issuer to pledge future federal highway funds to repay investors.

Public-Private Partnerships assist transportation and other government agencies through collaborative funding and financing techniques that share risks and rewards for infrastructure investments. Many Public-Private Partnership projects apply alternative delivery techniques such as design/build strategies to reduce costs and accelerate schedules. Public-Private Partnerships project also may apply managed lane or toll road methods to provide funding for the project.



Federal discretionary grants, such as the Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants Program and the Infrastructure for Rebuilding America Grant Program, are competitive and use established criteria to select the best possible projects for this funding.

State Infrastructure Banks are infrastructure investment funds that are established and administered by states. State Infrastructure Banks operate in a similar manner to a private bank, and have the ability to offer loans and credit assistance to public and private sponsors of Title 23 highway construction projects. Loans and credit assistance must be repaid to the State Infrastructure Bank.

6.5.2 Next Steps

Next steps are:

Solicit Input on Draft Tier 1 EIS

This Draft Tier 1 EIS was issued to solicit input on the Build Corridor Alternatives and the Recommended Alternative from agencies, Tribes, and the public. Comments received on this Draft Tier 1 EIS during the public review period will be used to inform a Preferred Alternative and prepare a Final Tier 1 EIS. All responses to comments will be documented in the Final Tier 1 EIS.

Evaluate Public Feedback, Identify Preferred Alternative, and Publish Final Tier 1 EIS

The next step in the I-11 Corridor NEPA process is the development of a Final Tier 1 EIS (**Figure 6-1**). After considering all of the comments received, FHWA and ADOT will identify a Preferred Alternative in the Final Tier 1 EIS that may affirm or modify the Recommended Alternative. The public issuance of the Final Tier 1 EIS with a Preferred Alternative will initiate a 30-day public review period.

Record of Decision

Following the public review period for the Final Tier 1 EIS, FHWA and ADOT will publish a ROD that affirms a Selected Alternative. Because this is a Tier 1 NEPA document, mitigation measures in the ROD represent commitments that shall be implemented in Tier 2 projects within the I-11 corridor.

Tier 2 Studies

If a Build Corridor is selected, it would be further evaluated and refined during future Tier 2 analysis. Preliminary design would be conducted at that time, and the higher level of detail would enable more site-specific environmental analyses and development of site-specific mitigation measures. The specific class of NEPA analysis for a logical Tier 2 segment would be defined based on the nature of the project and as determined by the lead agency. Continuing coordination with the Tribes, public, and agencies would occur prior to and during Tier 2, project-level analysis.

If the No Build is selected, no project would occur.