FHWA-AZ-EIS-19-01-D

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

Volume I – Cover through Section 3.9, Visual and Aesthetics

March 2019

U.S. Department of Transportation Federal Highway Administration

ADOT

Federal Aid No. 999-M(161)S
ADOT Project No. 999 SW 0 M5180 01P

This page intentionally left blank

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

FEDERAL AVIATION ADMINISTRATION
(Cooperating Agency),

FEDERAL RAILROAD ADMINISTRATION
(Cooperating Agency),

NATIONAL PARK SERVICE
(Cooperating Agency),

US ARMY CORPS OF ENGINEERS
(Cooperating Agency),

US BUREAU OF LAND MANAGEMENT
(Cooperating Agency),

US BUREAU OF RECLAMATION
(Cooperating Agency),

US ENVIRONMENTAL PROTECTION AGENCY
(Cooperating Agency),

US FISH AND WILDLIFE SERVICE
(Cooperating Agency),

US FOREST SERVICE, CORONADO NATIONAL FOREST
(Cooperating Agency), and

ARZIONA GAME AND FISH DEPARTMENT
(Cooperating Agency)

John S. Halikowski, Director
Arizona Department of Transportation

3-19-19
Date of Approval

ADOT

Karla S. Petty, Division Administrator
Federal Highway Administration, Arizona

3-19-19
Date of Approval

U.S. Department of Transportation
Federal Highway Administration

This page intentionally left blank

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.

Title VI of the Civil Rights Act of 1964 and the Americans with Disabilities Act

Pursuant to Title VI of the Civil Rights Act of 1964, the Americans with Disabilities Act (ADA) and other nondiscrimination laws and authorities, ADOT does not discriminate on the basis of race, color, national origin, sex, age, or disability. Persons that require a reasonable accommodation based on language or disability should contact Laura Douglas, ADOT Community Relations Project Manager, at 602.712.7683 or ldouglas@azdot.gov. Requests should be made as early as possible to ensure the State has an opportunity to address the accommodation.

De acuerdo con el Título VI de la Ley de Derechos Civiles de 1964, la Ley de Estadounidenses con Discapacidades (ADA por sus siglas en inglés) y otras normas y leyes antidiscriminatorias, el Departamento de Transporte de Arizona (ADOT) no discrimina por motivos de raza, color, origen nacional, sexo, edad o discapacidad. Las personas que requieran asistencia (dentro de lo razonable) ya sea por el idioma o discapacidad deben ponerse en contacto con la Laura Douglas al 602.712.7683 o ldouglas@azdot.gov. Las solicitudes deben hacerse lo más antes posible para asegurar que el Estado tenga la oportunidad de hacer los arreglos necesarios.

U.S. Department of Transportation Federal Highway Administration ADOT

This page intentionally left blank

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

This page intentionally left blank

Table of Contents

List of Appendices

List of Tables

List of Figures

This page intentionally left blank

Acronyms and Abbreviations

$\mu g/m^3$	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
ºC	degrees Celsius
ºF	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 an 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

ES1 EXECUTIVE SUMMARY

The Federal Highway Administration (FHWA) and Arizona Department of Transportation (ADOT) are conducting the environmental review process for the Interstate 11 (I-11) Corridor from Nogales to Wickenburg, Arizona. This Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS) has been prepared as part of this process in accordance with the National Environmental Policy Act (NEPA) and other regulatory requirements. FHWA is the Federal Lead Agency and ADOT is the local project sponsor under NEPA. As the federal lead agency, FHWA is responsible for compliance with NEPA and related statutes.

ES1.1 Project Background

The concept of a high-capacity, north-south interstate freeway facility connecting Canada and Mexico through the western United States (US) has been considered for more than 20 years. It was initially identified as the CANAMEX trade corridor in the 1991 Intermodal Surface Transportation Efficiency Act, established under the North American Free Trade Agreement in 1993, and defined by the US Congress in the 1995 National Highway Systems Designation Act (Public Law 104-59). CANAMEX was designated as High-Priority Corridor #26 in the National Highway System, recognizing the importance of the corridor to the nation's economy, defense, and mobility.

This NEPA process builds upon the prior *I-11 and Intermountain West Corridor Study* (IWCS), a multimodal planning effort completed in 2014 that involved ADOT, Nevada Department of Transportation (NDOT), FHWA, Federal Railroad Administration (FRA), Maricopa Association of Governments (MAG), Regional Transportation Commission of Southern Nevada (RTC), and other key stakeholders. The IWCS identified the I-11 Corridor as a critical piece of multimodal infrastructure that would diversify, support, and connect the economies of Arizona and Nevada.

In December 2015, the US Congress approved the Fixing America's Surface Transportation Act (FAST Act), which is a 5-year legislation plan to improve the nation's surface transportation infrastructure. The FAST Act formally designates I-11 as an interstate freeway throughout Arizona, reinforcing ADOT's overall concept for I-11 that emerged from the IWCS study. This Draft Tier 1 EIS is the next step in the continuum of project development activities for the I-11 Corridor between Nogales and Wickenburg.

ES1.2 Scope of this Draft Tier 1 EIS

FHWA is following a tiered environmental process, and a Tier 1 EIS will be completed during this phase of study. The Tier 1 EIS process is an effective method for managing the NEPA process across a large geographic area such as the I-11 Project Area. It allows the NEPA process to move forward prior to the identification of funding and lays the groundwork for where the corridor would be located.

A Tier 1 EIS provides a programmatic approach for identifying existing and future conditions and evaluating the comprehensive effects of I-11 on the region. The decision made at the conclusion of the Tier 1 EIS process will select either: (1) a 2,000-foot-wide Build Corridor Alternative that would advance to further design and Tier 2 NEPA analysis or (2) the No Build Alternative. If a Build Corridor Alternative advances, the process would require Tier 2 environmental studies to

determine the specific alignment of the I-11 Corridor. These studies would include more detailed design and traffic interchange locations, and they also would evaluate more specific project-level issues, such as individual property impacts and specific mitigation measures. **Figure ES-1** (Tier 1 versus Tier 2 Level of Detail) illustrates the difference in study approach between Tier 1 and Tier 2. Future Tier 2 environmental studies could occur as funding is available for further study and construction to address the construction of interim facilities prior to a full interstate facility or to implement I-11 in shorter independent phases.

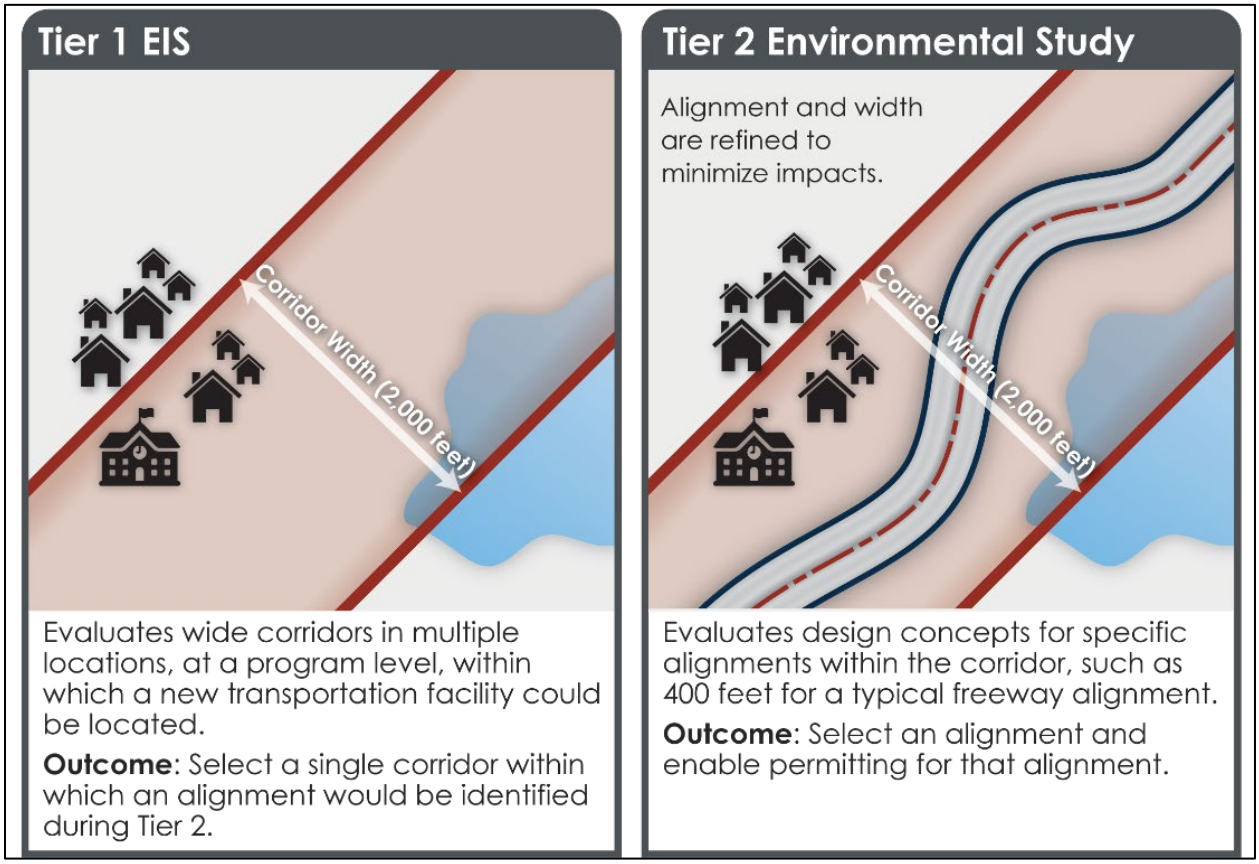


Figure ES-1 Tier 1 versus Tier 2 Level of Detail

As I-11 is intended to extend from Mexico to Canada, highway, rail, and utilities may be located in the same corridor. The analysis in this Draft Tier 1 EIS considers available space within an assumed typical cross-section—space that may be used for rail or utility co-location if this infrastructure is implemented in the future. The planning for any future rail or utility infrastructure co-located with I-11 would need to include a separate environmental review process.

This Draft Tier 1 EIS identifies a Recommended Alternative. Agency, Tribal, and public input on the Draft Tier 1 EIS that is received during the public review period will be considered in determining the Preferred Alternative, which will be described in the Final Tier 1 EIS. Following a 30-day review of the Final Tier 1 EIS, FHWA will issue a Record of Decision (ROD) that presents the Selected Alternative, describes the basis for the decision, and provides commitments and presents strategies to avoid and minimize environmental impacts. **Figure ES-2** (I-11 Tier 1 EIS Process) outlines the schedule for the key milestones in the NEPA process.

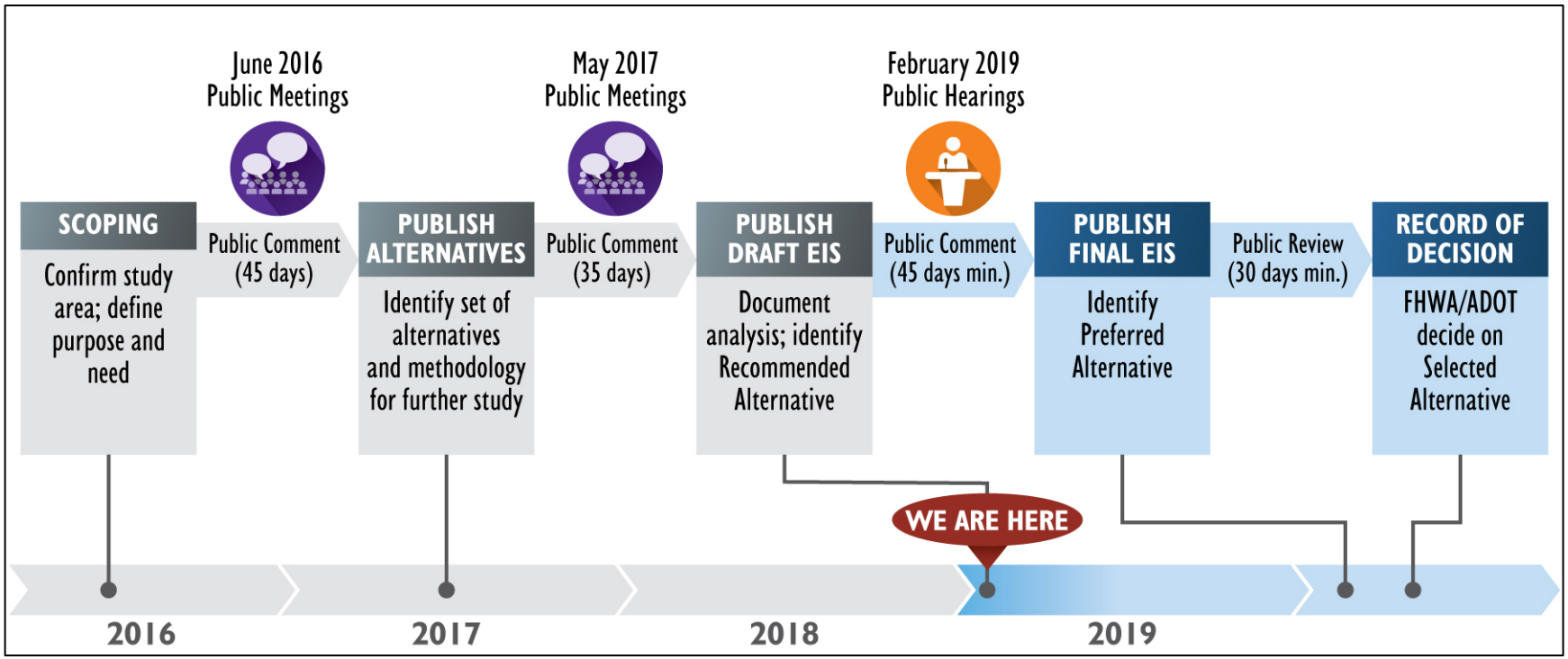


Figure ES-2 I-11 Tier 1 EIS Process

ES1.3 Project Study Area

This Draft Tier 1 EIS studies the I-11 Corridor in Arizona for approximately 280 miles between Nogales and Wickenburg, as shown on **Figure ES-3** (I-11 Corridor Study Area). It examines and evaluates the No Build Alternative as well as a 2,000-foot-wide Project Area for three Build Corridor Alternatives within which the I-11 alignment could be located. The No Build Alternative represents the existing transportation network plus the committed projects that are programmed for funding.

The I-11 Corridor Study Area (Study Area) extends into five counties (Santa Cruz, Pima, Pinal, Maricopa, and Yavapai); 13 municipalities (Nogales, Sahuarita, South Tucson, Tucson, Oro Valley, Marana, Eloy, Casa Grande, Gila Bend, Goodyear, Buckeye, Surprise, and Wickenburg); and two Tribal communities (Tohono O'odham Nation and Pascua Yaqui Tribe).

The initial Study Area boundary represented the outer limits of the range of feasible Build Corridor Alternatives recommended for further study in the IWCS, as vetted through that study's stakeholder team and public outreach process. Minor revisions were made to the boundary in response to input received during the scoping process that initiated the Tier 1 EIS in May 2016. These refinements included widening the Study Area west of State Route (SR) 85 to allow a wider range of alternatives to be considered in this area of sensitive environmental resources associated with the Sonoran Desert National Monument, Gila River, and other topographical and hydrological constraints. The refinements also included extending the northern terminus to the US 93/SR 71 intersection to allow a wider range of connectivity options into US 93. During scoping, the southern boundary of the Study Area was confirmed as the I-19/SR 189 interchange in Nogales, where improvements to address the connection to the Sonora-Arizona border are planned.

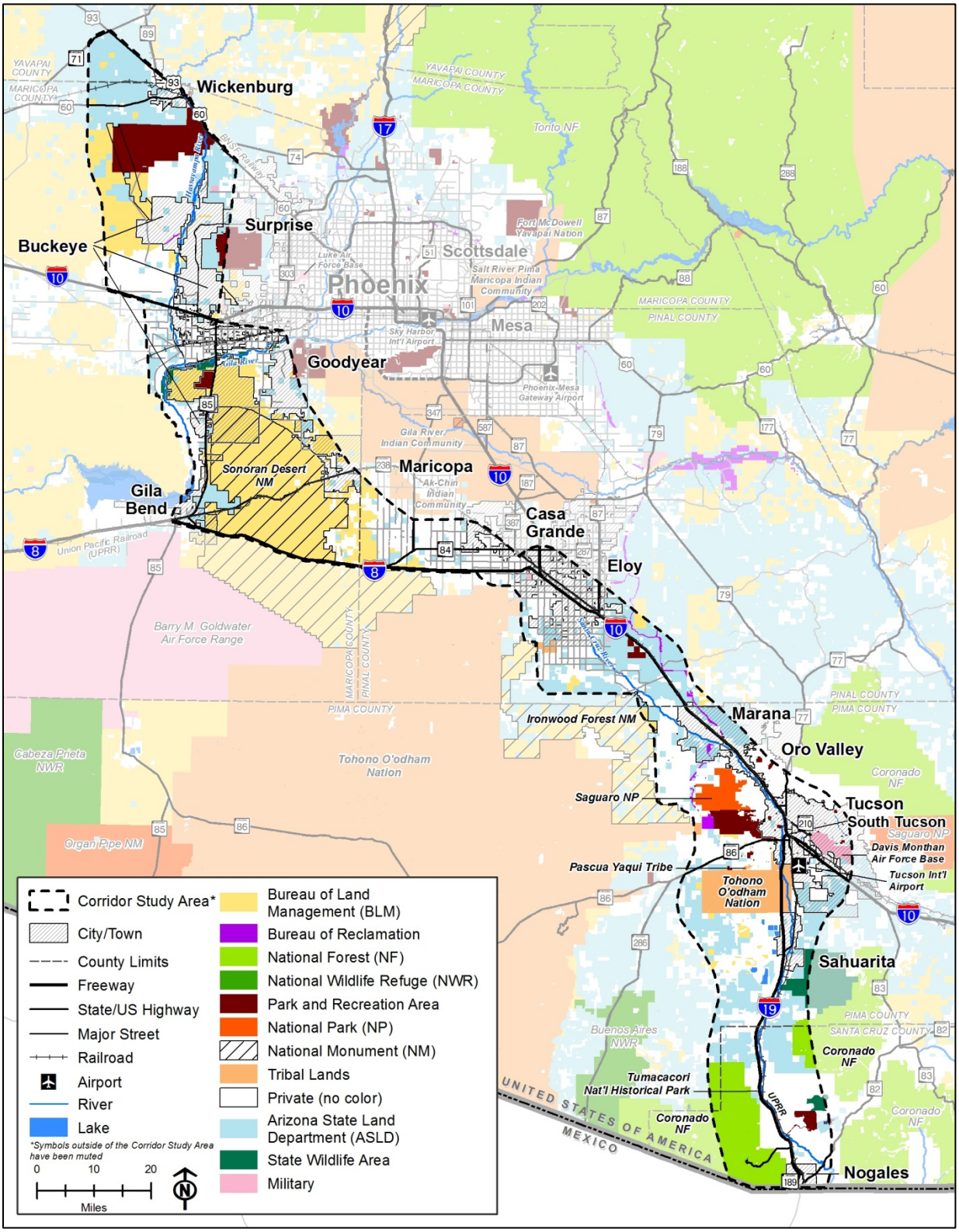


Figure ES-3 I-11 Corridor Study Area

ES1.4 Need for the Proposed Facility

The assessment of needs associated with I-11 from Nogales to Wickenburg builds upon the IWCS and its accompanying Planning and Environmental Linkages document (NDOT and ADOT 2014). Key transportation-related problems and issues in the Study Area were identified based on a combination of previous studies and input from agency coordination and public involvement during the I-11 Corridor Study scoping process. The problems, issues, and opportunities identified in the Study Area include:

- **Population and employment growth**: High-growth areas need access to the high-capacity, access-controlled transportation network.
- **Traffic growth and travel time reliability:** Increased traffic growth reduces travel time reliability due to unpredictable freeway conditions that impede travel flows and hinder the ability to move people and goods around and between metropolitan areas efficiently.
- **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.
- **Access to economic activity centers:** Efficient freeway access and connectivity to major economic activity centers are required for operations in a competitive economic market.
- **Homeland security and national defense:** Alternate interstate freeway routes and regional route redundancy 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 freeways.

ES1.5 Purpose of the Proposed Facility

Given the need for greater connectivity and travel time reliability as population and employment continue to increase in the Study Area, the purpose of the I-11 corridor is to:

- Provide a high-priority, high-capacity, access-controlled transportation corridor to serve population and employment growth.
- Support improved regional mobility for people and goods to reduce congestion and improve travel efficiency.
- Connect metropolitan areas and markets in the Intermountain West to Mexico and Canada through a continuous high-capacity transportation corridor.
- Enhance access to the high-capacity transportation network to support economic vitality.
- Provide for regional route redundancy to facilitate efficient mobility for emergency evacuation and defense access.

For additional information on the I-11 Purpose and Need, see **Chapter 1** (Purpose and Need) of the Draft Tier 1 EIS.

ES1.6 Alternatives Considered

ES1.6.1 Alternatives Analysis Process

FHWA and ADOT conducted a robust alternatives analysis process to identify an initial range of corridor alternatives that meet the I-11 Purpose and Need, and screened those options to determine a reasonable range of alternatives to carry forward for further analysis in this Tier 1 EIS.

The initial set of Corridor Options was identified within the Study Area based on several key factors:

- **Prior studies.** The 2014 IWCS encompassed a broad study area for the Intermountain West region from Mexico to Canada. The purpose of the IWCS was to determine whether sufficient justification exists for a new high-priority, high-capacity transportation corridor and if so, to establish the likely potential routes, focusing on connections within Arizona and Nevada. The recommendations of this study provided preliminary Corridor Options for this phase of study. In addition, state, regional, and local plans have considered the need and potential location for major transportation facilities in Arizona, and these recommendations also were incorporated into the initial set of possibilities.
- **Input received during scoping from agencies, Tribes, and the public.** The Study Area was presented for input during a scoping period, which included public meetings, in May and June 2016. The scoping period resulted in input on potential corridor location preferences, issues to be considered, and constraints or sensitive areas.
- **Technical Analysis.** The technical analysis considered both engineering and environmental factors. A software tool was used to map potential routes based on engineering design criteria, sensitive environmental resources, and topographical constraints. This analysis was meant to identify additional reasonable corridor alternatives that had not already been studied or recommended, and to validate or optimize previously suggested routes.

The Corridor Options that emerged from these sources were subject to a screening process that was based on an established set of criteria: (1) the Purpose and Need for I-11; (2) general engineering requirements; and (3) environmental considerations. Environmental considerations included avoiding designated protected areas that may preclude implementation of I-11 or have other fatal flaws (e.g., national parks and monuments, sovereign Tribal lands, designated wilderness or critical habitat, and designated roadless areas). Environmental considerations also included minimizing impacts in other areas that are considered sensitive but do not have fatal flaws (e.g., floodplains and potential wetlands). As part of this process, the evaluation criteria and methodology were reviewed by the study's stakeholder partners (Cooperating Agencies, Participating Agencies).

In May 2017, FHWA and ADOT presented the preliminary results of the screening process to the public, cooperating and participating agencies, and Tribes at a series of agency and public information meetings. Based on the analysis and input, FHWA and ADOT eliminated certain Corridor Options from further consideration. All remaining Corridor Options were retained for further evaluation. The remaining Corridor Options provided the building blocks for the Build Corridor Alternatives from Nogales to Wickenburg. This process is described in **Chapter 2** (Alternatives Considered) of the Draft Tier 1 EIS, and also is documented in more detail in the *Alternatives Selection Report* approved by ADOT in December 2017.

ES1.6.2 Alternatives Evaluated in this Tier 1 EIS

ES1.6.2.1 Build Corridor Alternatives

The Project Team assembled Corridor Options to create end-to-end alignments from Nogales to Wickenburg and tested different combinations of them using the Arizona Statewide Travel Demand Model to form alternatives that respond best to transportation needs. All Corridor Options remaining after the screening process are represented in the end-to-end alternatives. Corridor Options were slightly modified to better avoid constraints, such as Tribal land, or to respond to engineering criteria. The Project Team added a connection to I-10 in Marana to form a continuous route.

The Draft Tier 1 EIS evaluates three end-to-end Build Corridor Alternatives and a No Build Alternative, which are listed in **Table ES-1** (Corridor Options in Each Build Corridor Alternative) and shown on **Figure ES-4** (Build Corridor Alternatives). They represent the range of viewpoints voiced during the study to date, from supporting the development of a new corridor to using existing corridors as much as possible. The Options are organized by South, Central, and North Sections for ease of organization; these sections are not relevant to phasing.

Table ES-1 Corridor Options in Each Build Corridor Alternative

Section	Purple Alternative	Green Alternative	Orange Alternative
Theme	Blend of new corridors and existing facilities	Primarily new corridors	Primarily existing facilities
South Section	A	A	A
	C	D	B
	G	F	G
Central Section	I1	I2	H
	I2	L	K
	L	M	Q1
	N	Q2	Q2
	R	R	Q3
North Section	X	U	S
Total Alternative Length	271 miles	268 miles	280 miles
New Lane Miles	758	930	415

The detailed analysis in this Draft Tier 1 EIS considers both the end-to-end Build Corridor Alternatives and the individual Corridor Options in a way that enables FHWA to recommend a hybrid of the Build Corridor Alternatives, if appropriate, in this Draft Tier 1 EIS. FHWA and ADOT could opt to combine components of the Build Corridor Alternatives into a hybrid (i.e., a combination of Options from the Purple, Green, and Orange Alternatives) if the Tier 1 EIS analysis suggests the hybrid would avoid, minimize, or mitigate adverse environmental impacts while still meeting the I-11 Purpose and Need.

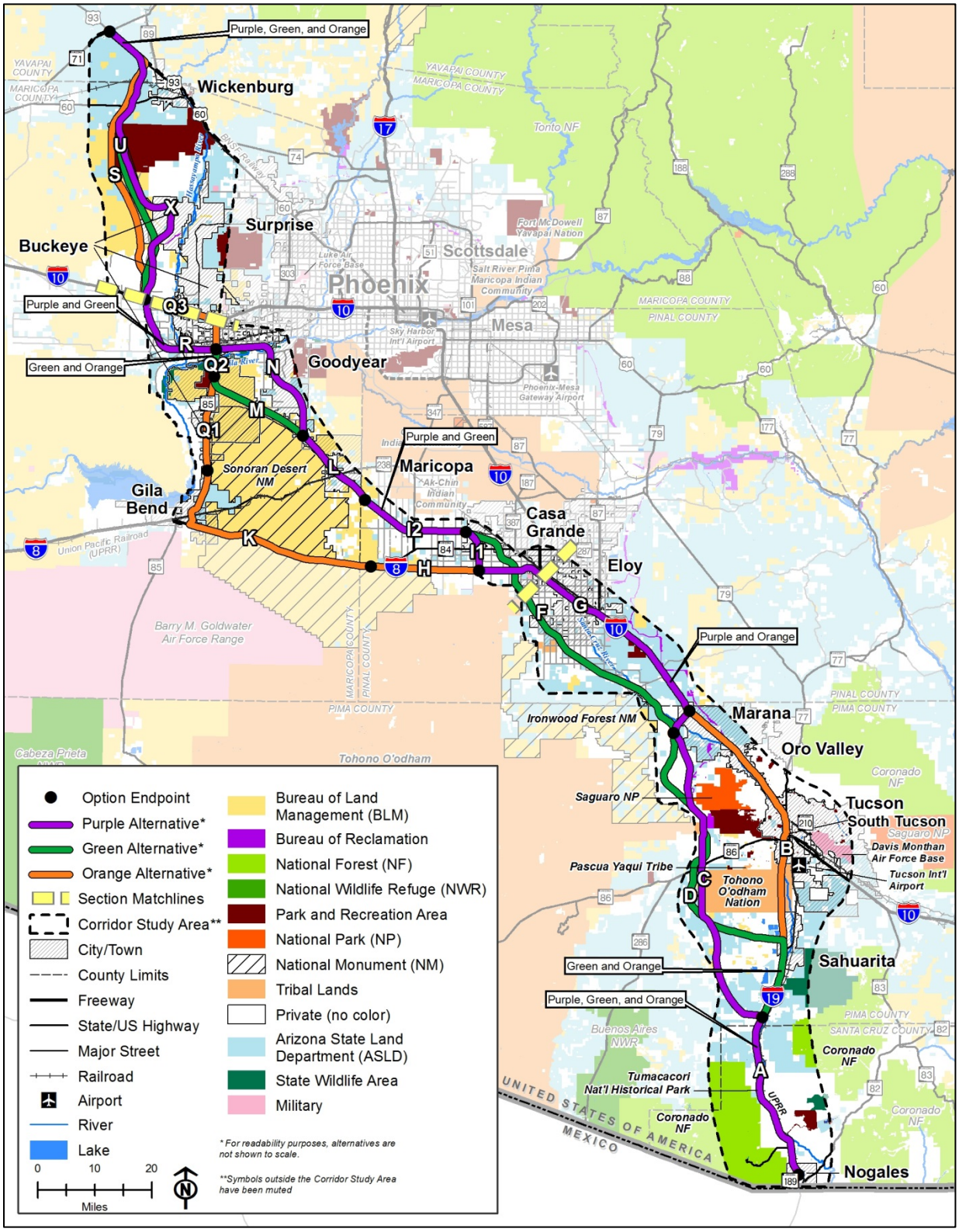


Figure ES-4 Build Corridor Alternatives

The Build Corridor Alternatives have several common features.

- Each Build Corridor Alternative is a 2,000-foot-wide corridor within which a future alignment would be located. Future Tier 2 studies would place the specific alignment of the I-11 facility somewhere within the 2,000-foot-wide corridor. A future I-11 facility is expected to be approximately 400 feet wide. The level of analysis for the Draft Tier 1 EIS is qualitative and programmatic, reflecting the broad definition of the corridor, while the future Tier 2 environmental review would consider specific alignments for more detailed review (**Figure ES-1** [Tier 1 versus Tier 2 Level of Detail]).
- Specific interchange locations are not identified in this Draft Tier 1 EIS. However, the Arizona Statewide Travel Demand Model includes interchange assumptions based on current regional transportation plan networks that would warrant connections to a new high-capacity transportation facility. These potential interchange locations were considered in the analysis of indirect and cumulative impacts.
- All Build Corridor Alternatives would be implemented in phases, as discussed further in **Chapter 6** (Recommended Alternative).

ES1.6.2.2 No Build Alternative

A No Build Alternative serves as a baseline for comparison to the Build Corridor Alternatives, and is evaluated as a separate alternative in the Tier 1 EIS. The No Build Alternative represents the existing transportation system along with committed improvement projects that are programmed for funding (shown on **Figure ES-5** [No Build Alternative]). The No Build Alternative would add new capacity to I-10 between Tucson and Casa Grande, and would convert US 93 to a four-lane divided highway for a short 3-mile segment through Wickenburg. These programmed improvements are listed in the federally approved *State Transportation Improvement Program*. Projects in this program are consistent with the statewide long-range transportation plan and metropolitan transportation improvement programs. Under the No Build scenario, travelers between Nogales and Wickenburg would use the existing corridors of I-19 and I-10 within the Study Area, along with a connection to Wickenburg via the Phoenix metropolitan area, which could take many routes, depending on traveler preference (e.g., SR 101L, SR 202L, SR 303L, I-17, SR 74, and US 60).

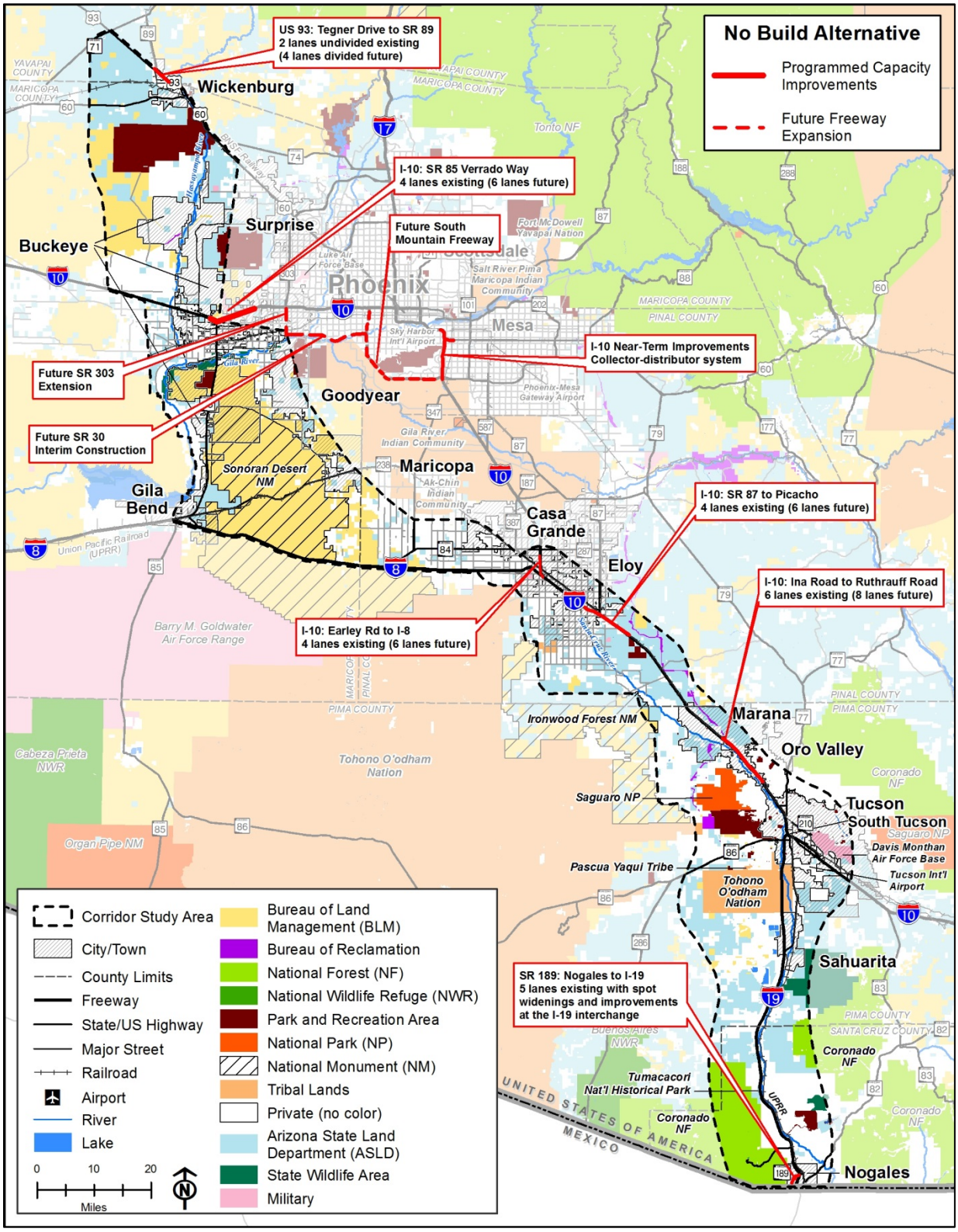


Figure ES-5 No Build Alternative

ES1.7 Summary of the Key Environmental Factors

Each alternative includes sensitive resource areas that were considered. **Chapter 3** (Affected Environment and Environmental Consequences) of this Draft Tier 1 EIS analyzes the following topic areas:

- Land Use
- Recreation
- Social Resources and Environmental Justice
- Economic Impacts
- Historical, Archaeological, or Cultural Resources
- Noise and Vibration
- Visual and Aesthetic
- Air Quality
- Hazardous Materials
- Geology, Soils, and Prime Farmlands
- Water Resources
- Biological Resources
- Construction-Related Impacts
- Unavoidable Adverse Impacts
- Indirect and Cumulative Effects

Since this is a Tier 1 EIS, the analysis primarily relies on existing data and considers a 2,000-foot-wide corridor within which an alignment may be located (the Project Area). Although the specific alignment has not been determined, the analysis identifies the resources that are present; characterizes the potential for impacts on these resources; broadly assesses the potential to avoid, minimize, or mitigate impacts; and may identify programmatic-level mitigation strategies. The Tier 1 EIS also identifies additional detailed analysis that would be needed during the Tier 2 phase of the environmental review process.

A Preliminary Draft Section 4(f) Evaluation was prepared to comply with Section 4(f) of the US Department of Transportation Act of 1966 (49 United States Code 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 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 EIS approach. The Preliminary Draft Section 4(f) Evaluation, which is provided in **Chapter 4** (Preliminary Draft Section 4(f) Evaluation), identifies properties that are afforded protection by Section 4(f) and evaluates the potential use of these properties by the Build Corridor Alternatives.

The tables in Section 3.2 (Summary of Key Environmental Impacts) provide a high-level summary of the key environmental considerations of the No Build Alternative and the three Build Corridor Alternatives. These summaries highlight location-specific considerations where there

are opportunities to avoid, minimize, and mitigate potential adverse impacts. These location-specific considerations contributed to the identification of the Recommended Alternative.

ES1.8 Agency, Tribal, and Public Coordination and Outreach

Consultation and coordination are fundamental components of the NEPA process. ADOT and FHWA have undertaken continuous outreach efforts throughout the scoping process, alternatives development, and preparation of the Draft Tier 1 EIS document.

ES1.8.1 Key Milestones for Coordination and Outreach

The agency, Tribal, and public outreach component of the study is ongoing and seeks to engage, inform, and receive input for consideration during the environmental review process. The public is defined as those communities, elected representatives, interested stakeholders, businesses, civic organizations, and environmental justice populations with an interest in I-11. Prior to scoping, approximately 50 “pre-scoping” meetings were conducted with federal, state, and local agencies as well as Tribes to enable small group discussions about critical issues, needs, and concerns.

A Notice of Intent (NOI) to prepare a Tier 1 EIS for the I-11 Corridor was published in the Federal Register on May 20, 2016. General information regarding the proposed action was shared, along with notification of the scoping process and related meetings and input opportunities. As part of the NOI, FHWA, and ADOT invited all interested individuals, organizations, public agencies, and Native American Tribes to comment on the scope of the Tier 1 EIS, including the I-11 Purpose and Need, the alternatives to be studied, the impacts to be evaluated, and the evaluation methods to be used. The formal scoping period spanned 45 days from publication of the NOI through July 8, 2016. The *Scoping Summary Report* (**Appendix G**) documents the following activities that took place and the feedback received during this period:

- Six public meetings were held in total, with one in Casa Grande, Buckeye, Nogales, Tucson, Marana, and Wickenburg, Arizona. The total number of attendees was 540.
- Three agency meetings were held in total, with one in Phoenix, Casa Grande, and Tucson, Arizona. The 47 attendees represented 23 agencies.
- Advertisements and public notifications were issued to advise interested parties on how to participate in scoping activities or provide comments.
- A study website provided background information and posted study updates. Individuals may submit comments, and all study documents will be posted.
- The total number of written comments received via email or online submittal, letter, or comment forms distributed at meetings was 834.

A second major set of agency and public 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 Tier 1 EIS, and continue to collect information on key issues. Similar to the scoping meetings, these public meetings were conducted throughout the Study Area to gain an understanding of the unique concerns in each area. The outreach during this period was intended to provide feedback on the initial screening results that would be incorporated into the subsequent decision-making process, as documented in the *Alternatives Selection Report*.

The feedback received during the public review period from April 28 through June 2, 2017, is documented in the *Agency and Public Information Meeting Summary Report* (**Appendix G**). During this period:

- Six public meetings in total were held, with one in Tucson, Marana, Nogales, Casa Grande, Wickenburg, and Buckeye, Arizona. The total number of attendees was 608.
- Four agency meetings in total were held, with one in Tucson, Marana, Casa Grande, and Avondale, Arizona. The 40 attendees represented 24 agencies.
- Advertisements, media interviews, radio broadcasts, social media posts, and other public notifications were issued to advise interested parties on how to participate in public meetings or provide comments.
- A study website was maintained and all meeting information was posted.
- Members of the public were able to view the alternatives and provide map-based comments; through an online comment tool.
- The total number of comments received via letter, email, comment form, online comment map tool, verbal transcription at a public meeting, or voicemail was 2,302.

FHWA and ADOT encourage and welcome public input throughout the NEPA process and will continue to provide input feedback opportunities via an information phone line and the study website or by letter and email.

In November 2017, FHWA and ADOT invited a third-party, neutral facilitator, the US Institute for Environmental Conflict Resolution (US Institute), to facilitate a discussion in Pima County regarding the I-11 Tier 1 EIS, to augment the ongoing public involvement effort. Three stakeholder engagement meetings were conducted between March and April 2018 to foster productive community conversations in Pima County to inform the decision-making process. The US Institute prepared the report documenting these stakeholder meetings, which is included as **Appendix H**.

ES1.8.2 Cooperating and Participating Agencies

FHWA and ADOT requested federal, state, and local agencies as well as Tribal governments to participate in the environmental review process by inviting them to be a Cooperating Agency or a Participating Agency under the NEPA guidelines.

Cooperating Agencies are, by definition in Title 40 CFR 1508.5 and 23 CFR 771.111(d), federal agencies with jurisdiction by law or special expertise with respect to any environmental impact involved in the study. Other agencies or Tribal governments of similar qualifications also may qualify, if FHWA concurs. The following 10 agencies opted to be engaged as Cooperating Agencies:

- Federal Aviation Administration (FAA)
- Federal Railroad Administration (FRA)
- National Park Service (NPS)
- US Army Corps of Engineers (USACE)
- US Bureau of Land Management (BLM)

- US Bureau of Reclamation (Reclamation)
- US Environmental Protection Agency (USEPA)
- US Fish and Wildlife Service (USFWS)
- US Forest Service, Coronado National Forest (USFS)
- Arizona Game and Fish Department (AGFD)

The Cooperating Agencies have met regularly (generally monthly) since 2016. FHWA and ADOT provide updates on the study process, and discussion of project issues occurs at these monthly and individual agency meetings. Cooperating Agencies also may review and comment on the Draft Tier 1 EIS and other supporting documentation related to the I-11 corridor at these meetings.

Sixty-seven agencies were invited to be a Participating Agency, and ultimately 51 opted to participate as a Participating Agency. Participating Agencies, as defined in the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users*, can be federal, state, regional, county, or local agencies as well as Tribal governments that may have an interest in I-11. **Chapter 5** (Coordination and Outreach) includes a list of Participating Agencies. Throughout the study process**,** meetings were conducted with Participating Agencies at project milestones, as needed, or requested with individual agencies. Individual meetings were conducted with individual agencies or Tribes as requested or in response to project issues.

ES1.8.3 Tribal Outreach

ADOT and FHWA are committed to maintaining government-to-government relations with Native American Tribes for projects in which Tribes may have an interest. Tribal coordination continues to be an integral part of this study. While Tribes have been invited to attend agency and stakeholder meetings throughout the process (2016 Scoping and 2017 Agency and Public Information Meetings as described above), a series of smaller meetings have been held 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, helped refine Corridor Options, and helped to achieve general consensus on the direction of the study's findings to date. Typically, information is exchanged in person at the meetings, but several formal Tribal resolutions have been submitted for the study record.

Tribal coordination meetings generally include elected officials and staff members from transportation, community development, planning and zoning, agriculture and natural resources, and/or economic development. In addition, consultation activities in accordance with Section 106 of the National Historic Preservation Act are ongoing, as described in Section 3.7 (Archaeological, Historical, Architectural, Cultural Resources).

ES1.8.4 Continuing Coordination and Outreach

The issuance of the Draft Tier 1 EIS initiates a 56-day public review and comment period. Within this period, FHWA and ADOT will conduct public hearings to solicit comments on the Draft Tier 1 EIS. All comments received will be reviewed and documented, and will be responded to as part of the preparation of the Final Tier 1 EIS. Section ES1.10 below provides additional information about the public review period.

ES1.9 Recommended Alternative

FHWA and ADOT evaluated alternatives to determine a recommendation for I-11 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 EIS resource analyses and agency, Tribal, and public input to date. As illustrated on **Figure ES-6** (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 ROD will affirm a Selected Alternative.

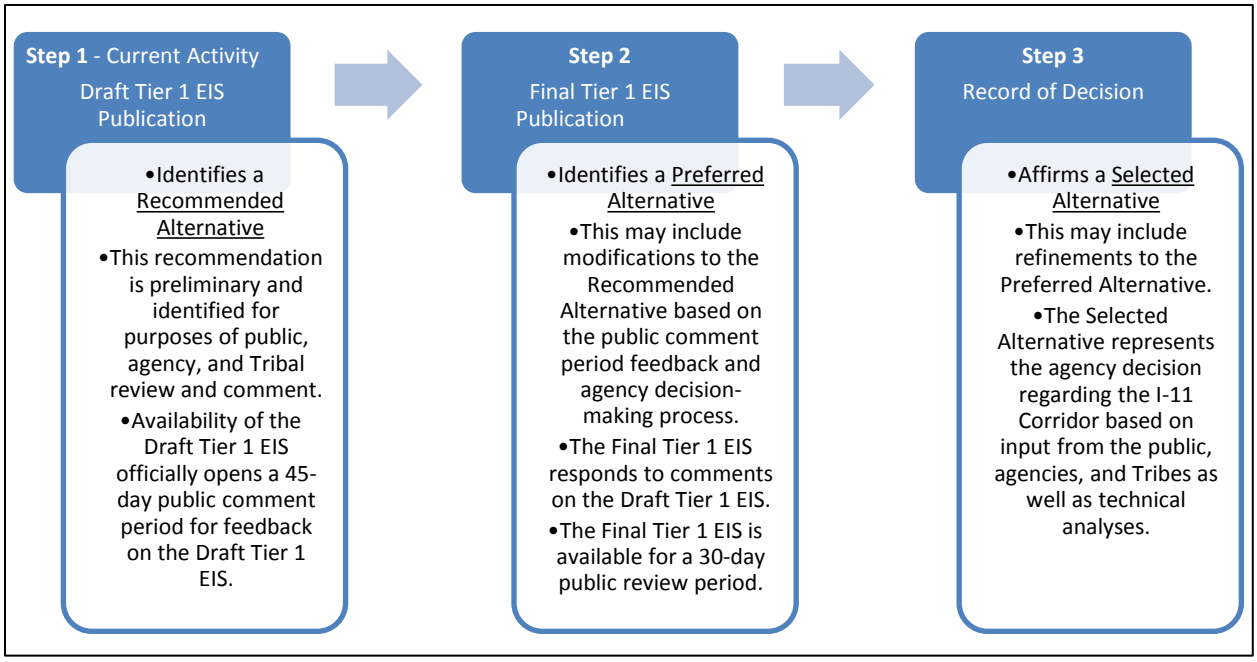


Figure ES-6 Tier 1 EIS Decision Steps

ES1.9.1 How effectively does each alternative meet the Purpose and Need?

The Project Team evaluated the proposed corridors for I-11 according to how they would meet the I-11 Purpose and Need, using metrics the team developed for this analysis. The results of this analysis are summarized below. Further detail is contained in **Chapter 2** (Alternatives Considered) and **Chapter 6** (Recommended Alternative).

ES1.9.1.1 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.

ES1.9.1.2 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.

ES1.9.1.3 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 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) vehicle miles traveled (VMT) over the No Build Alternative.

ES1.9.1.4 Access to Economic Activity Centers and Tourist Attractions

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. **Figure ES-7** (Economic Centers 2040) illustrates the current and emerging economic centers, for horizon year 2040, within the Study Area.

ES1.9.1.5 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 existing 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 and would not address homeland security, national defense, or incident management needs.

ES1.9.2 Recommended Alternative Identified

FHWA and ADOT identified a Recommended Alternative that best meets the I-11 Purpose and Need while minimizing the potential for adverse impacts. The Recommended Alternative is based primarily on the Purple and Green Alternatives, but it is a hybrid alignment (i.e., a combination of Corridor Options from the Build Corridor Alternatives) in an effort to reduce or avoid adverse effects. **Table ES-2** (Recommended Alternative) lists the Corridor Options that comprise the Recommended Alternative, which is illustrated on **Figure ES-8** (Recommended Alternative). A comprehensive analysis of the differentiating and substantive impacts is included in **Chapter 6** (Recommended Alternative).

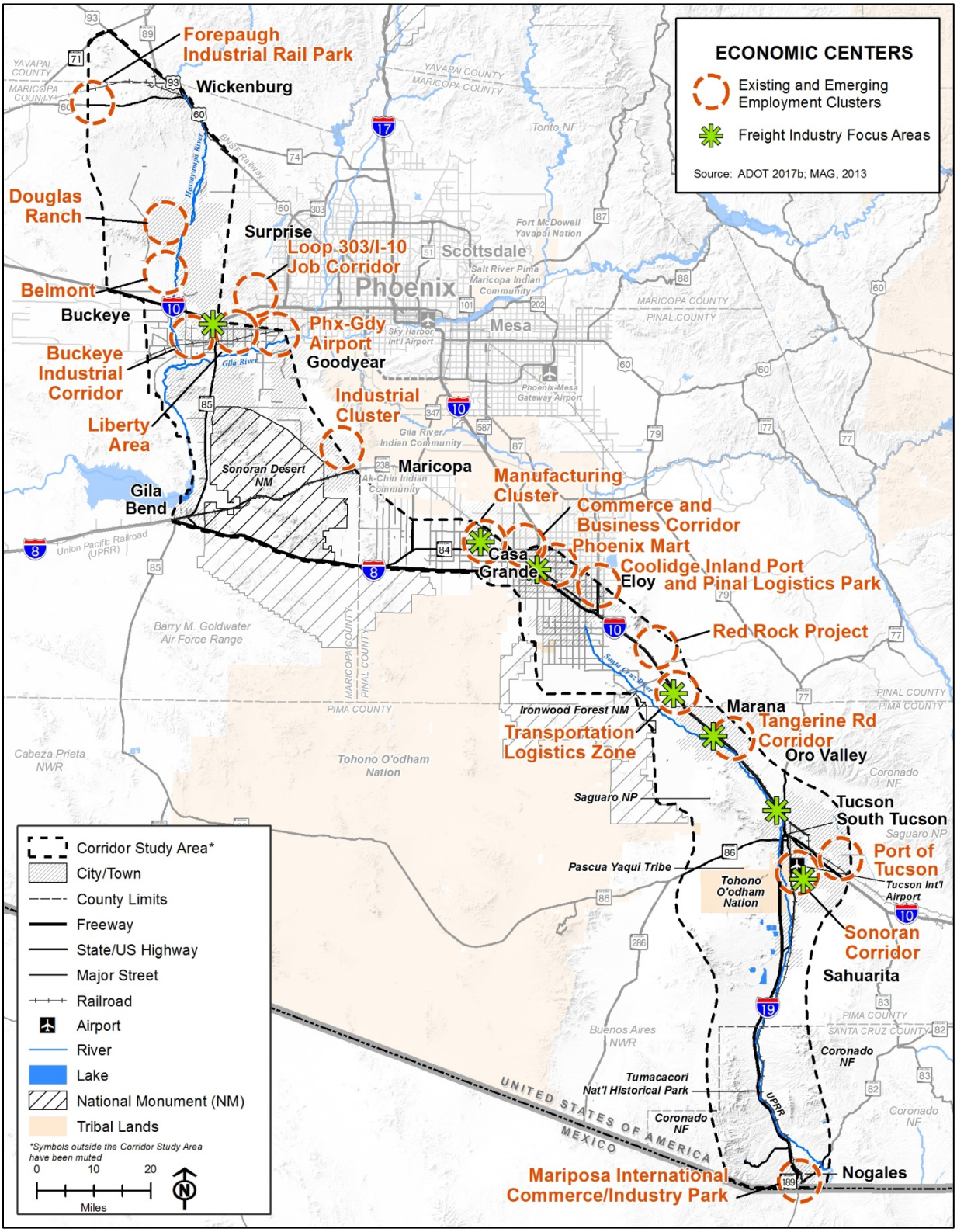


Figure ES-7 Economic Centers 2040

Table ES-2 Recommended Alternative

Option	Build Corridor Alternative	Description	Summary Rationale for Recommendation
A	Common to All Build Corridor Alternatives	From Nogales to Sahuarita, I-11 would be co-located with I-10 and I-19.	Option A provides access to high-growth areas, achieves LOS C throughout the I-11 corridor, and serves key economic centers while avoiding impacts to sensitive environmental resources.
D, with Central Arizona Project (CAP) Design Option	Green Alternative	From Sahuarita to Marana, I-11 would follow a new transportation corridor west of Tucson that uses a design option parallel to the CAP canal. It also includes a connection to I-10 in Marana.	Option D 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 Project Area. It attracts/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 non-mitigatable impacts to communities as well as historic districts and structures (Section (4f) resources) in downtown Tucson. The CAP Design Option and a number of additional mitigation strategies were developed to address impacts to the Tucson Mitigation Corridor.
F	Green Alternative	From Marana to Casa Grande, I-11 would follow a new transportation corridor west of I-10. It connects to I-8 and extends north along Chuichu Road.	Option F 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 Project Area. It provides an alternate regional route that will provide access to planned growth areas and serve key economic centers in Marana, Eloy, and Casa Grande. Option F will attract/divert traffic away from existing roadways. It is consistent with local and county-level planning and commits to mitigation measures to minimize impacts of new alignment on floodplains.

Table ES-2 Recommended Alternative (Continued)

Option	Build Corridor Alternative	Description	Summary Rationale for Recommendation
I2, L, N, and R	Purple and Green Alternatives	From Casa Grande in western Pinal County to Buckeye in western Maricopa County, I-11 would follow a new transportation corridor: • Option I2 extends west along Barnes Road, then heads northwest towards Goodyear • Option L is parallel to the Sonoran Desert National Monument and is co-located with a portion of the proposed Hassayampa Freeway • Option N follows the proposed SR 303L south extension and the proposed SR 30 • Option R crosses SR 85 and then veers north to intersect I-10 near 363rd Avenue	Options I2, L, N, and R comprise a new corridor that is an alternate regional route in an area where there are no high-capacity transportation facilities. It provides access to planned growth areas and serves key economic centers in western Maricopa and Pinal Counties. The new corridor reduces travel time for long-distance traffic from Nogales to Wickenburg, achieves LOS C throughout the I-11 Project Area, and effectively attracts/diverts traffic from existing roadways. It is consistent with local and county level plans. The Recommended Alternative includes mitigation strategies developed to address the impacts of a new Gila River crossing.
Hybrid Option U/X	Purple and Green Alternatives	From western Maricopa County to Wickenburg, I-11 would follow a new transportation corridor which is a hybrid of the Purple and Green Alternatives: • Option U extends north from I-10 for approximately 15 miles • Approximately 5 miles south of the Vulture Mountains Recreation Area (VMRA), the Recommended Alternative transitions from Option U to Option X. • Option X follows an existing transmission line corridor through the VMRA north to US 93.	Hybrid Option U/X is a new corridor that 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 throughout the I-11 Project Area. It will effectively attract/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.

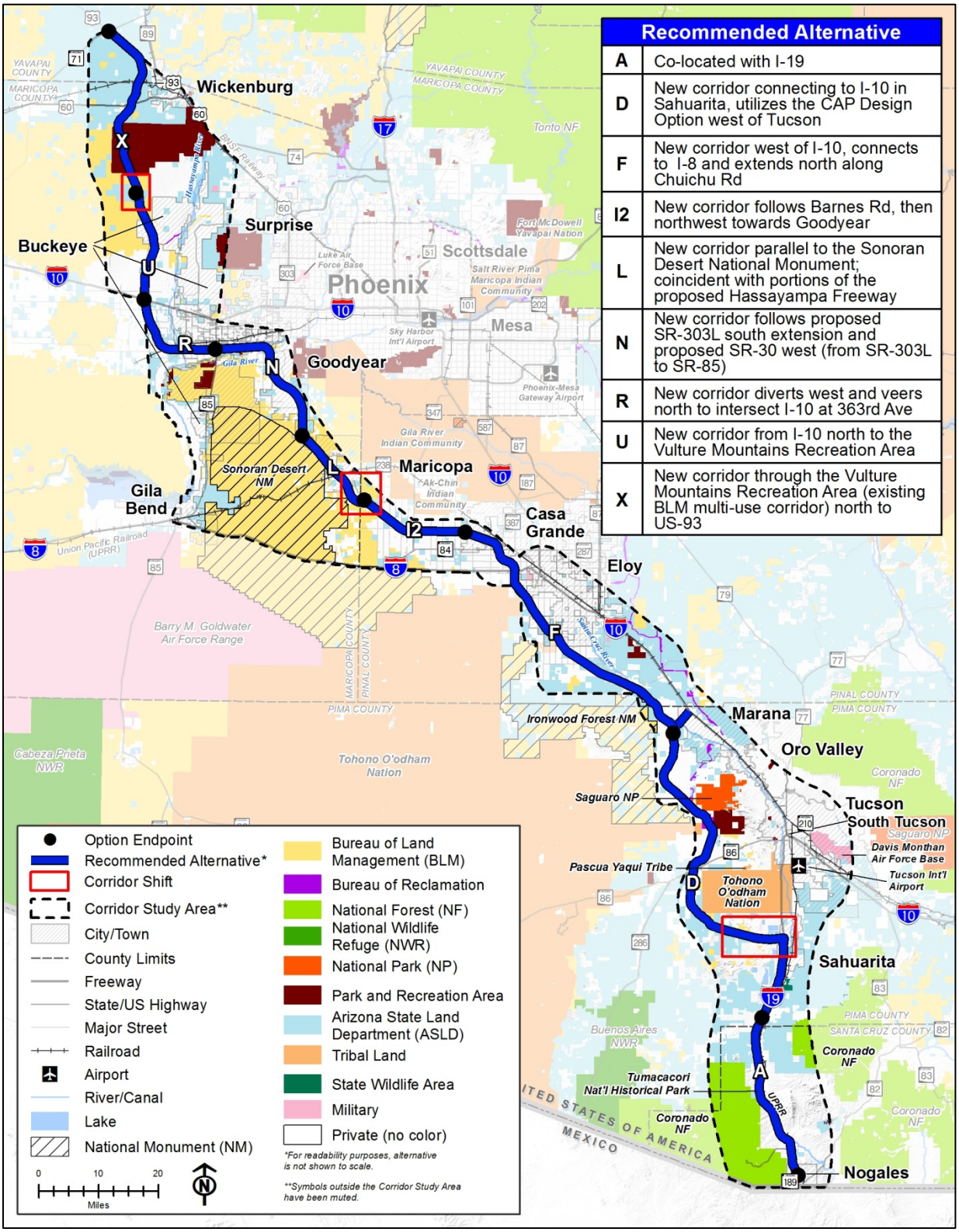


Figure ES-8 Recommended Alternative

ES1.9.3 Mitigating Potential Impacts

In addition to intentionally avoiding national monuments, national parks, wilderness areas, and Tribal lands, the Recommended Alternative includes mitigation measures such as:

- Avoiding or minimizing impacts to wildlife linkage areas
- Wildlife crossings and fencing, specifically 7 crossings in Avra Valley near the TMC
- Minimizing construction footprint through quality Pima pineapple cactus, other Endangered Species habitat, and the TMC
- Prohibiting interchanges in Avra Valley between West Snyder Hill and West Manville roads
- Minimizing construction footprint on Gila River and the Santa Cruz River
- Avoiding or minimizing impacts to parks, recreations areas, wildlife refuges, and historic resources (Section 4f resources), with the exception of the TMC
- Minimizing fugitive light impacts on dark skies
- Landscape designs to minimize visual impacts
- Maintaining local connectivity across I-11

ES1.10 Next Steps

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.

The next step in the I-11 Corridor NEPA process is the development of a Final Tier 1 EIS. 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. A preliminary phased implementation plan will be included in the Final Tier 1 EIS. The public issuance of the Final Tier 1 EIS with a Preferred Alternative will initiate a 30-day public review period.

Following a 30-day public review period for the Final Tier 1 EIS, FHWA will issue a ROD that presents a Selected Alternative, describes the basis for the decision, and provides strategies to avoid and minimize environmental impacts. 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.

If a Build Corridor Alternative is the Selected Alternative, it would be further evaluated and refined during future Tier 2 studies. During Tier 2 studies, it is anticipated that phased near-term projects or segments would be further developed as independent projects based on the phased implementation plan presented in the Final Tier 1 EIS. Tier 2 NEPA documents would include site-specific, quantitative analysis of effects and provide avoidance, minimization, and mitigation measures tailored for each project. 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.

This page intentionally left blank

1 PURPOSE AND NEED

1.1 Introduction

The Federal Highway Administration (FHWA) and Arizona Department of Transportation (ADOT) are conducting the environmental review process for the Interstate 11 (I-11) Corridor from Nogales to Wickenburg, Arizona. An Alternatives Selection Report and Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS) were prepared as part of this process in accordance with the National Environmental Policy Act of 1969 (NEPA) and other regulatory requirements. FHWA is the federal lead agency and ADOT is the local project sponsor under NEPA.

1.1.1 Tiered EIS

FHWA is responsible for compliance with NEPA and related statutes. FHWA is following a tiered environmental process, and a Tier 1 EIS will be completed during this I-11 Corridor Study. The Tier 1 EIS is an effective method for managing the NEPA process across a large geographic area, such as the I-11 Corridor. It allows the NEPA process to move forward with no identified funding, laying the groundwork for where the corridor would be located.

A Tier 1 EIS consists of a programmatic approach for identifying existing and future conditions and evaluating the comprehensive effects of the project on the region. The decision to be made at the conclusion of the Tier 1 EIS process would be to select a 2,000-foot-wide Build Corridor Alternative that would advance to further design and Tier 2 NEPA analysis, or to select the No Build Alternative. Tier 2 environmental studies would be required to determine the specific alignment of I-11, including design details and traffic interchange locations, and would evaluate more specific project-level issues, such as individual property impacts and mitigation. Tier 2 environmental studies could occur in phases, breaking up the 280-mile-long Nogales to Wickenburg corridor into interim projects or shorter segments, as funding becomes available for further study and construction.

1.1.2 Project Development Status

In December 2015, the United States (US) Congress approved the *Fixing America's Surface Transportation Act* (FAST Act), which is 5-year legislation to improve the nation's surface transportation infrastructure. The FAST Act formally designates I-11 as an interstate freeway throughout Arizona that replaces the corridor formerly known as CANAMEX (defined as High Priority Corridor #26).

This NEPA process builds upon the prior *I-11 and Intermountain West Corridor Study* (IWCS), a multimodal planning effort completed in 2014 that involved ADOT, Nevada Department of Transportation (NDOT), FHWA, Federal Railroad Administration (FRA), Maricopa Association of Governments (MAG), Regional Transportation Commission of Southern Nevada (RTC), and other key stakeholders. The IWCS identified the I-11 Corridor as a critical piece of multimodal infrastructure that would diversify, support, and connect the economies of Arizona and Nevada, and that would be a smaller segment of the larger north-south transportation corridor linking the US to Mexico and Canada. More information on the IWCS is available online at i11study.com.

Based on the regional perspective of need established in the IWCS, several different studies are advancing shorter segments of the I-11 Corridor in the southwest, addressing both regional transportation needs and the national corridor need established in the IWCS.

NDOT, in conjunction with RTC, is advancing two segments of I-11 in Nevada. The first is a two-phased construction project known as the I-11 Boulder City Bypass connecting US 95/US 93 southeast of Las Vegas with the Hoover Dam Bypass Bridge, which is expected to be fully open to traffic by the end of 2018 (NDOT 2017). The second is a Planning and Environmental Linkages (PEL) study for the segment between the northwest edge of the Las Vegas metropolitan area and I-80 in western Nevada. The I-11 Corridor in northern Nevada generally follows US 95. However, the primary purpose of the PEL study is to determine the most reasonable connection with I-80, and the study will evaluate corridor options between Reno/Sparks and the area north of Fallon, Nevada. A PEL study often precedes NEPA to advance high-level corridor planning for a broad study area, such as this 450-mile span.

This Draft Tier 1 EIS is the next step in the continuum of project development activities for the I-11 Corridor between Nogales and Wickenburg, which extends approximately 280 miles, as shown on **Figure 1-1** (State of Arizona, USA) and **Figure 1-2** (I-11 Corridor Study Area Evolution). It evaluates the No Build Alternative as well as the 2,000-foot-wide corridors under consideration for the location of I-11. Future Tier 2 environmental studies would determine the specific location of the I-11 alignment. The No Build Alternative, which is described in more detail in **Chapter 2** (Alternatives Considered), represents the existing transportation network along with the committed projects that are programmed for funding.

This chapter explains the background context of this project and provides the Purpose and Need for pursuing the proposed action of implementing an I-11 Corridor between Nogales and Wickenburg. The *Purpose and Need Memorandum* (ADOT 2017a) provides additional technical information and is available on the project website: i11study.com/.

1.2 Background

The concept of a high-capacity, north-south interstate freeway facility connecting Canada and Mexico through the western US has been considered for more than 25 years. It was initially identified as the CANAMEX trade corridor in the 1991 Intermodal Surface Transportation Efficiency Act, established under the North American Free Trade Agreement in 1993, and defined by Congress in the 1995 National Highway Systems Designation Act (Public Law 104-59). CANAMEX was designated as High Priority Corridor #26 in the National Highway System, recognizing the importance of the corridor to the nation's economy, defense, and mobility.

In 2014, NDOT and ADOT jointly completed the IWCS that encompassed a broad study area for the Intermountain West region from Mexico to Canada. The purpose of the IWCS was to determine whether sufficient justification exists for a new high-capacity, high-priority transportation corridor and, if so, to identify potential routes. The study established the corridor vision, developed justification, and defined an implementation plan to move forward. It was intended to provide an overview of the corridor opportunities within the two states and a foundation for subsequent alternative and environmental studies.

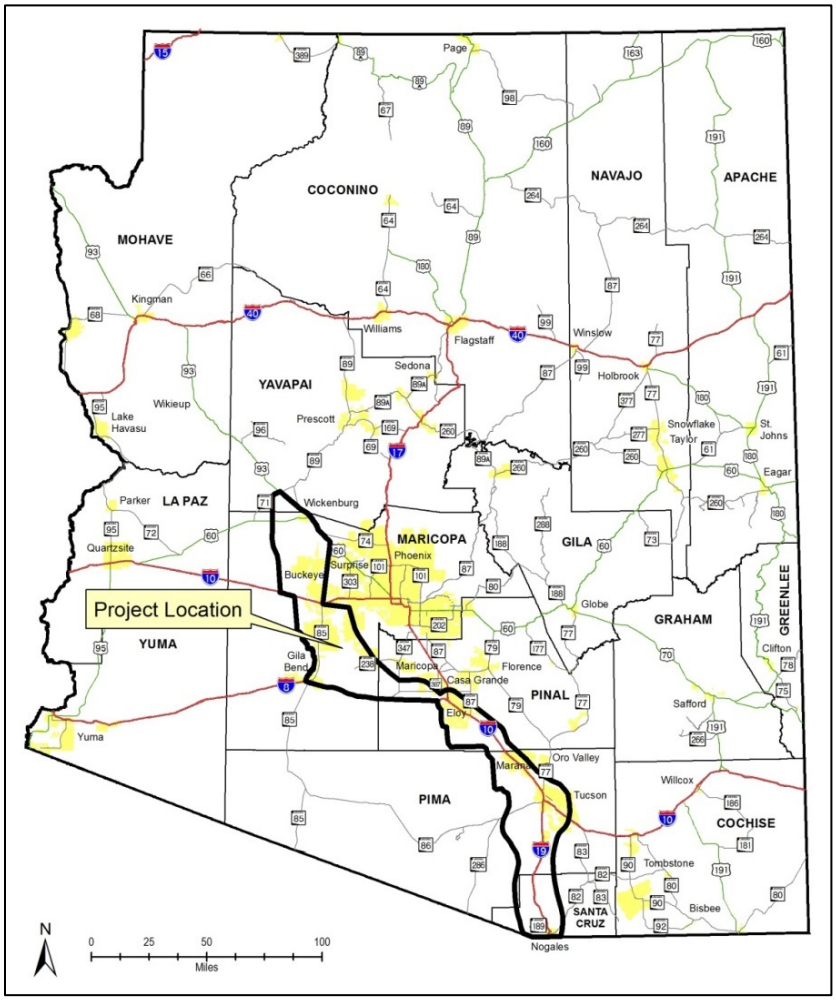


Figure 1-1 State of Arizona, USA

NDOT and ADOT engaged the public and stakeholders throughout the IWCS. The study included a high-level environmental review of Build Corridor Alternatives through FHWA's PEL process. This effort resulted in the definition of a set of feasible corridors to advance into future planning and/or environmental studies, with the intent that these studies would occur via individual studies on components of the overall corridor (such as this Draft Tier 1 EIS). Each proposed segment from the IWCS includes logical beginning and ending points to allow future studies to advance as needed without requiring completion of an adjacent segment. Accordingly, the IWCS provided the initial basis for the I-11 Corridor Study Area (Study Area) for this Tier 1 EIS process.

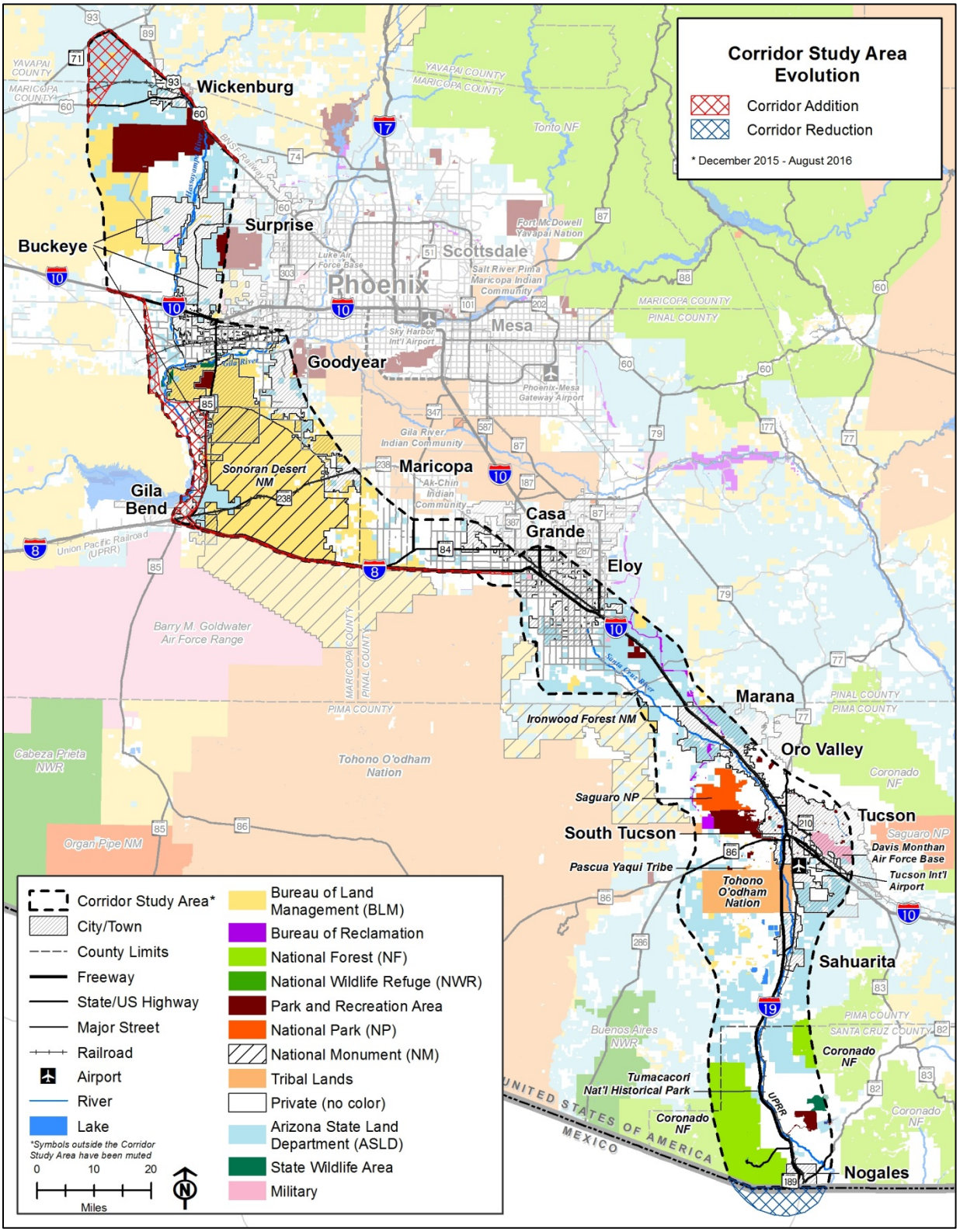


Figure 1-2 I-11 Corridor Study Area Evolution

1.3 Study Area

Figure 1-2 (I-11 Corridor Study Area Evolution) depicts the Study Area for this Draft Tier 1 EIS. The initial Study Area boundary represented the outer limits of the range of feasible Build Corridor Alternatives recommended for further study in the IWCS, as vetted through that study's stakeholder team and public outreach process. Minor revisions were made to the boundary in response to input received during the scoping process that initiated the Draft Tier 1 EIS in May 2016. These refinements included widening the Study Area west of State Route (SR) 85 to allow a wider range of alternatives to be considered in this area of sensitive environmental resources associated with the Sonoran Desert National Monument, Gila River, and other topographical/ hydrological constraints; and extending the northern terminus to the US 93/SR 71 intersection to allow a wider range of connectivity options into US 93. During scoping, the southern boundary of the Study Area was confirmed as the I-19/SR 189 interchange in Nogales, where improvements to address the connection to the Sonora-Arizona border are planned. The Study Area contains a wide enough buffer around Tribal lands to ensure alternatives can be reasonably developed off Tribal lands, which are sovereign nations that did not give FHWA and ADOT permission to assess routes on their lands.

Figure 1-2 (I-11 Corridor Study Area Evolution) shows the existing transportation network, municipalities, and major public and private land ownership in the Study Area. The Study Area extends approximately 280 miles from Nogales to Wickenburg, traversing five counties (Santa Cruz, Pima, Pinal, Maricopa, and Yavapai); 13 municipalities (Nogales, Sahuarita, South Tucson, Tucson, Oro Valley, Marana, Eloy, Casa Grande, Gila Bend, Goodyear, Buckeye, Surprise, and Wickenburg); and two Tribal communities (Tohono O'odham Nation and Pascua Yaqui).

Existing interstate freeways in the Study Area include I-19 from Nogales to Tucson, I-10 from Tucson to Casa Grande, I-8 from Casa Grande to Gila Bend, and I-10 from Buckeye to Tonopah. US 60 and US 93 border the northern end of the Study Area. The state highway network also contains:

- SRs 82 and 189 in Nogales
- SRs 77, 86, and 210 near Tucson
- SRs 84, 87, 287, and 347 near Casa Grande
- SR 238 near the Sonoran Desert National Monument
- SR 85 between Gila Bend and Buckeye
- SRs 71 and 89 near Wickenburg

The Union Pacific Railroad runs adjacent to I-19 (Nogales Subdivision) and I-10 (Sunset Corridor) in the southern end of the Study Area, before turning west toward Gila Bend along SR 238. The BNSF Railway parallels US 60 in the northern portion of the Study Area to Wickenburg (Phoenix Subdivision, also referred to as the "Peavine Corridor").

The Study Area includes a mix of privately owned properties, military (US Department of Defense), and Tribal lands, as well as lands owned or managed by the Arizona State Land Department (ASLD), Bureau of Land Management (BLM), Bureau of Reclamation (Reclamation), National Park Service (NPS), US Fish and Wildlife Service (USFWS) National

Wildlife Refuges, and US Forest Service (USFS). Tribal lands within the Study Area include lands owned by the Tohono O'odham Nation and Pascua Yaqui. While these lands are physically within the Study Area, the Tohono O'odham Nation and Pascua Yaqui did not grant permission to study transportation corridors on them, and therefore alternatives were not identified on Tribal lands. State Wildlife Areas are managed or deeded to the Arizona Game and Fish Department (AGFD), conveyed by various landowners, including but not limited to the ASLD, BLM, Reclamation, USFS, and private landowners. Major rivers in the Study Area include the Santa Cruz from Nogales to Casa Grande, the Gila from Gila Bend to Goodyear, and the Hassayampa from Buckeye to Wickenburg.

1.4 Prior Studies

The I-11 Corridor was identified as a critical need in statewide plans, regional transportation plans, and municipal planning documents. These prior studies and plans provide insight into the issues and needs identified by ADOT, regional agencies, and local communities and lay the groundwork for the concept of a new interstate in Arizona.

The 2014 IWCS directly investigated the problems and possible solutions that inform the Purpose and Need for the I-11 Corridor. This study incorporated the findings of many prior regional and statewide plans and confirmed the need and provided justification for advancing I-11. This background planning context is summarized in **Chapter 2** (Alternatives Considered), as well as in the full *Purpose and Need Memorandum*, available on the study website (i11study.com/Arizona/PDF/I-11-Purpose-and-Need-Memorandum-022417.pdf).

The 2014 IWCS, which is the foundational study providing context to this Draft Tier 1 EIS, stated that the overall purpose of the I-11 Corridor is to:

> *Provide an access-controlled, north-south transportation corridor that will connect important metropolitan areas and markets in the Intermountain West with Mexico and Canada to support improved regional mobility for people and freight, and provide enhanced opportunities for trade and economic development.* (NDOT and ADOT 2014a)

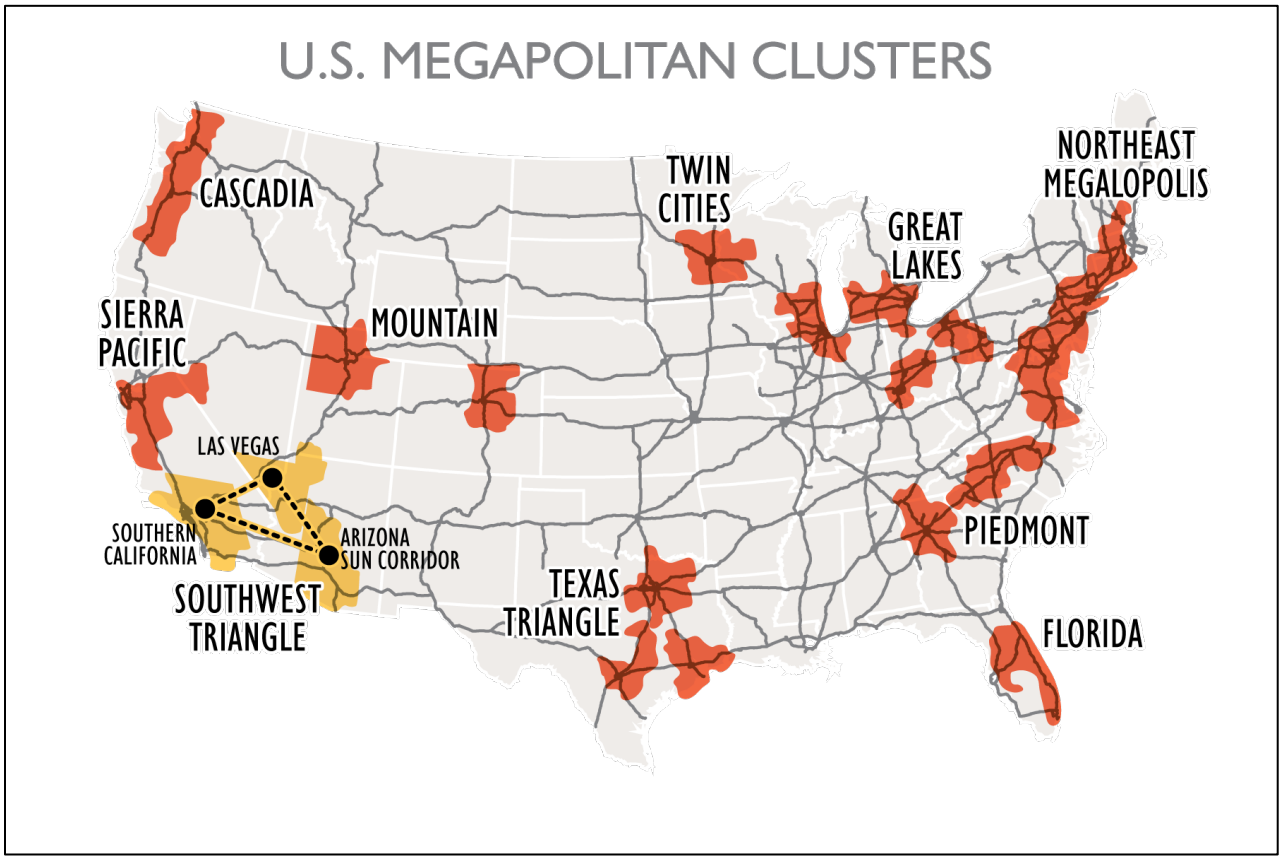
The IWCS demonstrated that improving connectivity, access, and travel time reliability through an I-11 Corridor could expand opportunities for economic growth in Arizona (NDOT and ADOT 2014b). This is a key priority of the Governor's Office. It is consistent with ADOT's mission and vision of creating a transportation system for Arizona that improves the quality of life (azdot.gov/about/inside-adot/MissionandVision), and it is compatible with one of the major tenets of the FAST Act, which is to create jobs and support economic growth (FHWA 2016).

The IWCS concluded that the I-11 Corridor would:

- **Connect regional economies to each other and global markets.** The megapolitan areas in the greater southwestern US – Southern California, Las Vegas, and the Phoenix/Tucson metropolitan areas (the Arizona Sun Corridor) – have expanded and are interlinked, forming the Southwest Triangle Megaregion shown on **Figure 1-3** (Southwest Triangle within Megapolitan America). The increased mobility of workers and goods between the cities of these megapolitan areas would enable greater collaboration, flexibility, and innovation, which would lead to a more diverse and stable economy built on technology, innovation, and high-value manufacturing. The Interstate Highway System is much sparser in the west than the east, especially regarding north-south linkages. Only three north-south interstates exist in the western US: I-5, I-15, and I-25. The I-11 Corridor would create a key parallel high-capacity

transportation facility in the Intermountain West, filling a gap in the national transportation system.

- **Create opportunities for integrated manufacturing.** The I-11 Corridor is positioned to support and promote economic activity related to the current and emerging manufacturing and trade relationship with Mexico. Efficient transportation links with Mexico would create opportunities for specialized manufacturing in the US, supported by Mexican production. Each country would be able to leverage its inherent competitive advantages.



SOURCE: NDOT and ADOT 2014a; Nelson and Lang 2011.

Figure 1-3 Southwest Triangle within Megapolitan America

- **Advance statewide economic development initiatives.** Agencies and communities in Arizona formulated economic development initiatives, recognizing the importance of creating high-wage jobs, leveraging existing statewide assets, and improving the foundations that support economic development, such as the construction of efficient transportation infrastructure. To compete nationally and internationally, Arizona communities have advanced economic development initiatives focused on building the economy and targeting specific industry clusters − many of which directly depend on good transportation infrastructure.

The IWCS demonstrated the need for the I-11 Corridor as a means to enhance regional, national, and international mobility by:

- Improving long-distance travel time reliability;

- Providing key facilities in the national Interstate Highway System where a gap currently exists;
- Serving emerging trade patterns of integrated manufacturing between North American countries;
- Connecting communities; and
- Providing capacity to accommodate future growth in commerce.

The IWCS indicated that overall congestion in the Southwest Triangle is increasing. This area is on a trajectory to be economically the strongest American region that maintains linkages to the world's fastest emerging economies in Asia and Latin America. The transportation network in this region was developed decades ago to serve the economic, population, and mobility needs at that time – east-west movements of people and goods between Southern California and the rest of the country. The current need is increasingly reflecting north-south demands due to integrated manufacturing between the US and Mexico as well as the increased demand as Mexican ports increasingly function as alternative ports for foreign goods to enter North American markets. Currently, the ports of Los Angeles and Long Beach are the key ports for trade with Asia, but expansion possibilities are constrained by adjacent urban development, and the increasingly congested I-5 in California may stimulate demand for additional north-south routes, such as the I-11 Corridor, to accommodate the movement of freight (NDOT and ADOT 2014b).

1.4.1 Multimodal Considerations

The 2016 progress update of the Arizona *Long Range Transportation Plan* suggested that the economic outlook of Arizona would outpace the US in terms of jobs, population, and real income growth (ADOT 2016a). This economic growth would result in demands on the multimodal transportation system. Rail facilities and services already exist within the Study Area, or were examined as part of the *Arizona Passenger Rail Corridor Study*, *State Rail Plan Update*, and *State Freight Plan*. These independent study efforts identified objectives for passenger and freight rail service within or near the Study Area. The Draft Tier 1 EIS does not re-evaluate these study outcomes, although the potential for incorporating other transportation modes into the I-11 Corridor was considered as part of both IWCS and the scoping and alternatives development process.

Throughout the IWCS, NDOT and ADOT engaged utility and energy industry stakeholders and invited them to provide data and share options and ideas on decision points. As part of this effort, a Utility/Energy Focus Group was established early in the process to frame the discussion of multimodal needs and opportunities. The discussions highlighted the point that utility providers typically only invest in additional infrastructure as demand merits. The participants indicated that no long-range utility or energy plans currently exist, nor do utility or energy expansion needs exist. However, long-term flexibility of a common or consolidated corridor should be considered (NDOT and ADOT 2013).

Prior to and during scoping, FHWA and ADOT re-engaged with Class I railroads and utility providers within the Study Area. This outreach did not identify specific needs or proposals to include as part of the I-11 Build Corridor Alternatives. Large portions of the Study Area are already served by Class I railroads, and freight capacity improvements (such as double-tracking Union Pacific Railroad's Sunset Route) have been recently completed. ADOT and the FRA recently completed the *Arizona Passenger Rail Corridor Study*, a Tier 1 EIS that outlined an

approach to implementing intercity passenger rail between Tucson and Phoenix. FHWA and ADOT will continue to coordinate with stakeholders to ensure that a multimodal facility (i.e., rail and utility) is allowable within the I-11 Corridor in the future, to the maximum extent feasible.

1.5 Need for Proposed Facility

The assessment of needs associated with the I-11 Corridor from Nogales to Wickenburg builds upon the IWCS and its accompanying PEL (NDOT and ADOT 2014a). Key transportation-related problems and issues in the Study Area were identified based on a combination of previous studies and input from agency coordination and public involvement during the I-11 Corridor Study scoping process. The problems, issues, and opportunities identified in the Study Area are:

- **Population and employment growth**: High-growth areas need access to the high-capacity, access-controlled transportation network.
- **Traffic growth and travel time reliability:** Increased traffic growth reduces travel time reliability due to unpredictable freeway conditions that impede travel flows, and hinder the ability to move people and goods around and between metropolitan areas efficiently.
- **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.
- **Access to economic activity centers:** Efficient freeway access and connectivity to major economic activity centers are required to operate in a competitive economic market.
- **Homeland security and national defense:** Alternate interstate freeway routes and regional route redundancy 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 freeways.

1.5.1 Population and Employment Growth

Table 1-1 (Population and Employment Growth, 2015 to 2040 [No Build Alternative]) shows anticipated growth in the Study Area. **Figure 1-4** (Population Density 2015 and 2040 and Planned High-Growth Areas) and **Figure 1-5** (Employment Density 2015 and 2040 and Planned High-Growth Areas) compare actual population and employment for 2015 and projections for 2040. The projections are from the Arizona Statewide Travel Demand Model, which forecasts future conditions based on data from the state's metropolitan planning organizations and the Arizona State Demographer's Office. **Figures 1-4** and **1-5** also show the areas where local municipalities are planning for high growth (in pink). The growth areas were determined based on municipal general and county comprehensive plans, and supported by interviews with local planning and economic development staff. High-capacity, access-controlled facilities are needed to serve these high-growth areas.

Within the Maricopa County portion of the Study Area, population and employment are projected to increase by 259 percent (+247,000) and 248 percent (+34,900) from 2015 to 2040, respectively. During that same time period, employment within the Pinal County portion of the Study Area is projected to have similar high-growth rates at 234 percent (+34,000). Pima County would have the greatest growth in both population (+219,500) and employment (+120,400).

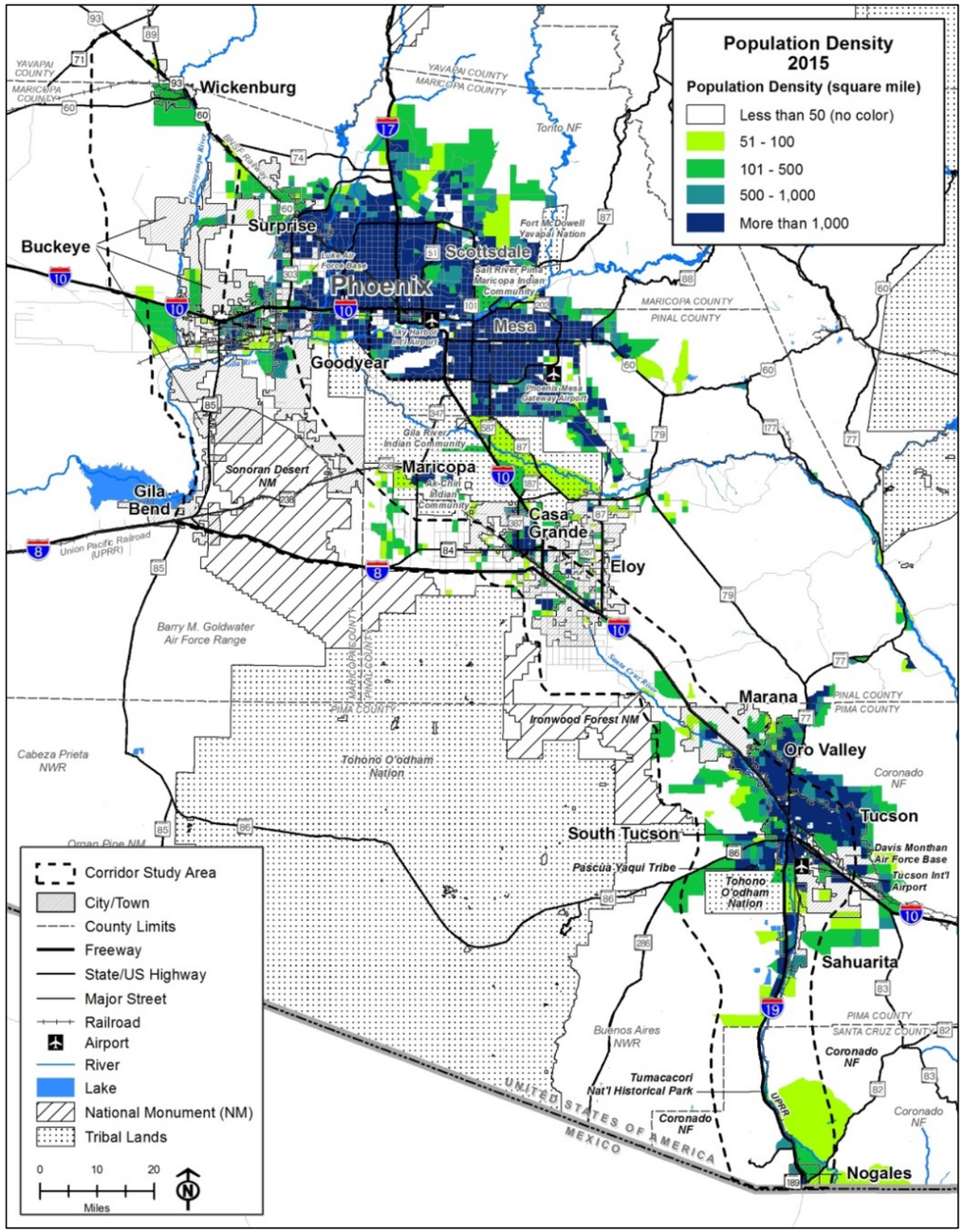
In 2015, the Study Area contained approximately 370,000 jobs, or about 15 percent of all employment in Arizona (ADOT 2017b). This share is projected to grow to 23 percent of the state's employment by 2040. Nogales, Tucson, Casa Grande, Goodyear, Buckeye, Wickenburg, and other communities will contribute to this employment growth. The I-11 Corridor would improve access to this employment base on the regional transportation system.

Agriculture, manufacturing, and mining were the leading economic sectors in the Study Area in 2015. However, a greater percentage of employment is expected in the construction, health services, retail, and wholesale trade sectors by 2040, with manufacturing jobs projected to grow by 23 percent.

Table 1-1 Population and Employment Growth, 2015 to 2040

County	Population							
	County Totals				Within Study Area			
	2015	2040	Growth	% Growth	2015	2040	Growth	% Growth
Santa Cruz	49,500	71,000	+21,500	43	47,000	54,400	+7,400	16
Pima	1,007,300	1,343,000	+335,700	33	838,700	1,048,800	+219,500	25
Pinal	369,100	851,000	+481,900	131	56,200	101,200	+45,000	80
Maricopa	4,110,600	6,077,000	+1,966,400	48	95,400	342,400	+247,000	259
Yavapai	218,500	317,000	+98,500	45	400	600	+200	50
Total	5,755,000	8,659,000	2,904,000		1,037,700	1,547,400	519,100	
County	**Employment**							
	County Totals				Within Study Area			
	2015	2040	Growth	% Growth	2015	2040	Growth	% Growth
Santa Cruz	13,400	20,000	+6,600	49	13,000	16,300	+3,300	25
Pima	351,800	495,600	+143,800	41	328,500	448,900	+120,400	38
Pinal	54,000	294,000	+240,000	444	14,500	48,500	+34,000	234
Maricopa	1,732,600	2,777,800	+1,045,200	60	14,100	49,000	+34,900	248
Yavapai	57,200	87,100	+29,900	52	20	40	+20	50
Total	2,209,000	3,674,500	1,465,500		370,120	562,740	192,620	

SOURCE: ADOT 2017b.



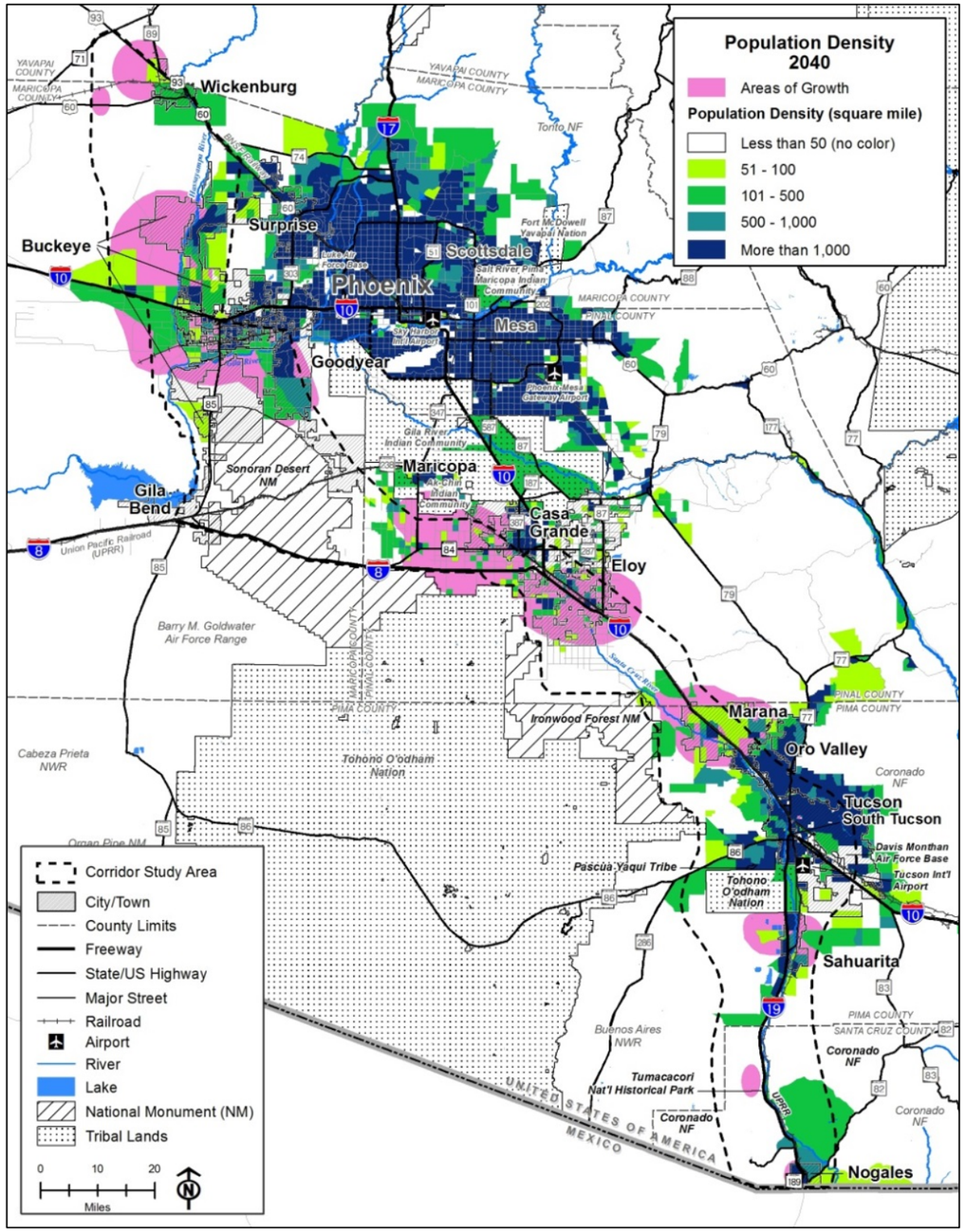
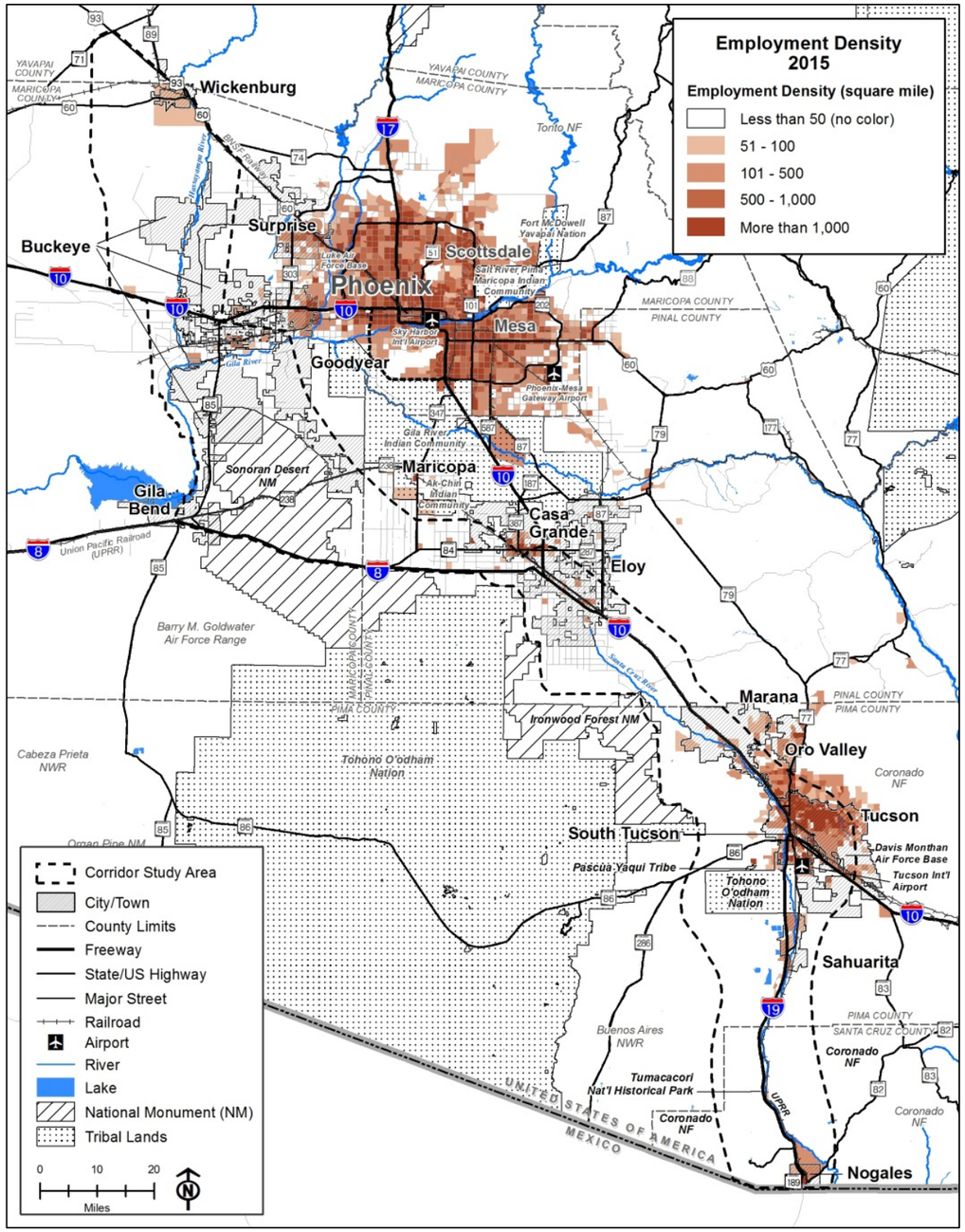


Figure 1-4 Population Density 2015 and 2040 and Planned High-Growth Areas



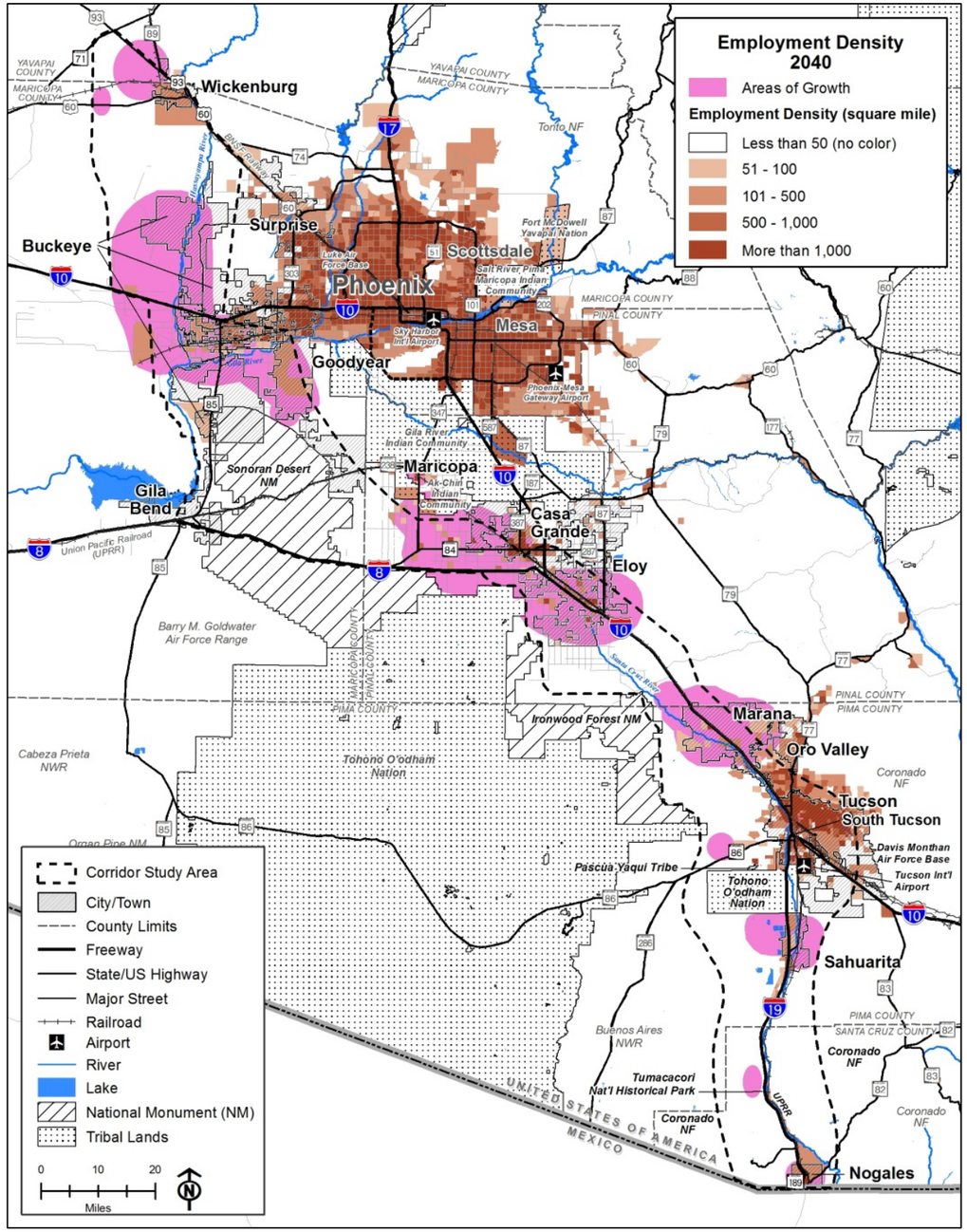


Figure 1-5 Employment Density 2015 and 2040 and Planned High-Growth Areas

1.5.2 Traffic Growth and Travel Time Reliability

Already, travel demand levels on the interstate freeway facilities within the Study Area cause congestion that reduces travel time reliability during peak and non-peak periods. Other contributors include unpredictable freeway conditions that impede travel flows (e.g., road restrictions or closures due to crashes, work zones, oversized vehicles, and isolated weather events such as dust storms, flooding, and wildfires). Over the next 20 years, interstate congestion and travel time reliability are expected to worsen due to population and employment growth inside and outside the Study Area, the increase in truck traffic, and the growth of international trade.

Table 1-2 (Average Weekday Traffic and Level of Service, 2015 and 2040 [No Build Alternative]) provides level of service (LOS) information for an average weekday between specific city pairs and indicates that existing freeways within the Study Area were generally operating at LOS C or better in 2015. This information reflects the future committed highway network, which is the existing highway network plus capacity improvements identified in the ADOT 2017-2021 Five-Year Transportation Facilities Construction Program (ADOT 2016b).

Table 1-2 Average Weekday Traffic and Level of Service, 2015 and 2040 (No Build Alternative)

Facility	City Pair	Lanes	Average Weekday Traffic[1]	Level of Service
2015				
I-19	Nogales–Tucson	4	19,000	A
I-10	Tucson–Casa Grande [2] [3]	4 to 8	60,000	C
I-8	Casa Grande–Gila Bend	4	8,000	A
I-10	Casa Grande–Phoenix (at SR 347) [4]	4	56,000	C to D
SR 85	Gila Bend–I-10	4	14,000	A
2040				
I-19	Nogales–Tucson [3] [4]	4 to 6	24,200-135,400	C to F
I-10	Tucson–Casa Grande [2] [3] [4]	6 to 8	63,600-254,300	C to F
I-8	Casa Grande–Gila Bend [4]	4	7,700-26,800	B to C
I-10	Casa Grande–Phoenix (at SR 347) [3] [4]	4 to 6	95,400	C to F
SR 85	Gila Bend–I-10 [4]	4	14,300-60,900	C to F

(1) March 2015 weekday traffic counts from ADOT Transportation Management System. Rounded to nearest thousand.
(2) This represents an average condition of 60 miles of I-10 between I-19 and I-8, which includes the Tucson central business district.
(3) The number of travel lanes varies across this segment.
(4) LOS varies across this segment.

SOURCES: ADOT 2017b; Transportation Research Board 2010.

Some portions of I-10 near Phoenix and Tucson experienced worse traffic conditions, as compared to the rest of the corridor. The levels of service for freeways are defined on **Figure 1-6** (Levels of Service for Freeways). Freeway quality of service is graded using six letters "A" through "F," with LOS A being the best and LOS F being the worst. LOS C is generally considered to be a satisfactory level in rural areas, while LOS D is considered satisfactory for urban areas. By 2040, traffic operations on both urban and rural segments of I-10 would deteriorate due to the increased travel demand in the Study Area. For example, the segment of I-10 between Casa Grande and the southern edge of the Phoenix metropolitan area is projected to operate at LOS C to LOS F in 2040. The Tucson to Casa Grande segment also would experience an increase in traffic congestion, with LOS ranging from LOS C to LOS F by 2040. These projected levels of service are at the poor end of the traffic flow condition scale (as illustrated on **Figure 1-6**), and indicate expected delays and the need for transportation improvements to increase travel efficiency.

Figure 1-7 (Peak Period Travel Time Ratings, 2015) shows the current 2015 travel time ratings for all traffic in the Study Area. This travel time index calculates the ratio of the average peak period travel time to the free-flow travel time, representing recurring delay along the corridor that is ranked poor, fair, or good. A "good" travel time rating means travel speeds are close to the posted speed limit, whereas a "poor" rating means travel speeds are much slower than the posted speed limit. Overall traffic mobility is affected by congestion concentrated in the Phoenix and Tucson urbanized areas, resulting in poor travel time ratings. Poor travel times also were found at the junctions of I-19/I-10, I-10/I-8, I-8/SR 84, I-8/SR 85/SR 238, and I-10/SR 85.

Figure 1-8 (Average Weekday Level of Service, 2040) shows future weekday levels of service in the Study Area by 2040. LOS F traffic conditions are projected to occur throughout the I-10 corridor between Casa Grande and Phoenix, between Phoenix and Buckeye, and in the Tucson metropolitan area. US 60 shows LOS F from Phoenix to Wickenburg. LOS F represents the worst traffic conditions, and when LOS F is projected, transportation agencies typically add highway capacity to improve traffic operations, decrease congestion, and enhance travel time reliability.

Input from freight shippers and receivers to the *Arizona State Freight Plan* (ADOT 2017c) affirmed that they are largely satisfied with the current performance of the transportation system, with the exception of recurring congestion and bottlenecks in urban centers – particularly in Phoenix and on I-10 between Phoenix and Tucson. Stakeholders indicated that for Arizona to maintain and enhance its competitiveness in this area, it must develop policies and projects that maintain system reliability through measures that either improve travel time reliability or provide capacity additions (ADOT 2017c).

LEVELS OF SERVICE
for Freeways

Level of Service	Flow Conditions	Operating Speed (mph)	Technical Descriptions
A		70	Highest quality of service. Traffic flows freely with little or no restrictions on speed or maneuverability. **No delays**
B		70	Traffic is stable and flows freely. The ability to maneuver in traffic is only slightly restricted. **No delays**
C		67	Few restrictions on speed. Freedom to maneuver is restricted. Drivers must be more careful making lane changes. **Minimal delays**
D		62	Speeds decline slightly and density increases. Freedom to maneuver is noticeably limited. **Minimal delays**
E		53	Vehicles are closely spaced, with little room to maneuver. Driver comfort is poor. **Significant delays**
F		<53	Very congested traffic with traffic jams, especially in areas where vehicles have to merge. **Considerable delays**

Figure 1-6 Levels of Service for Freeways

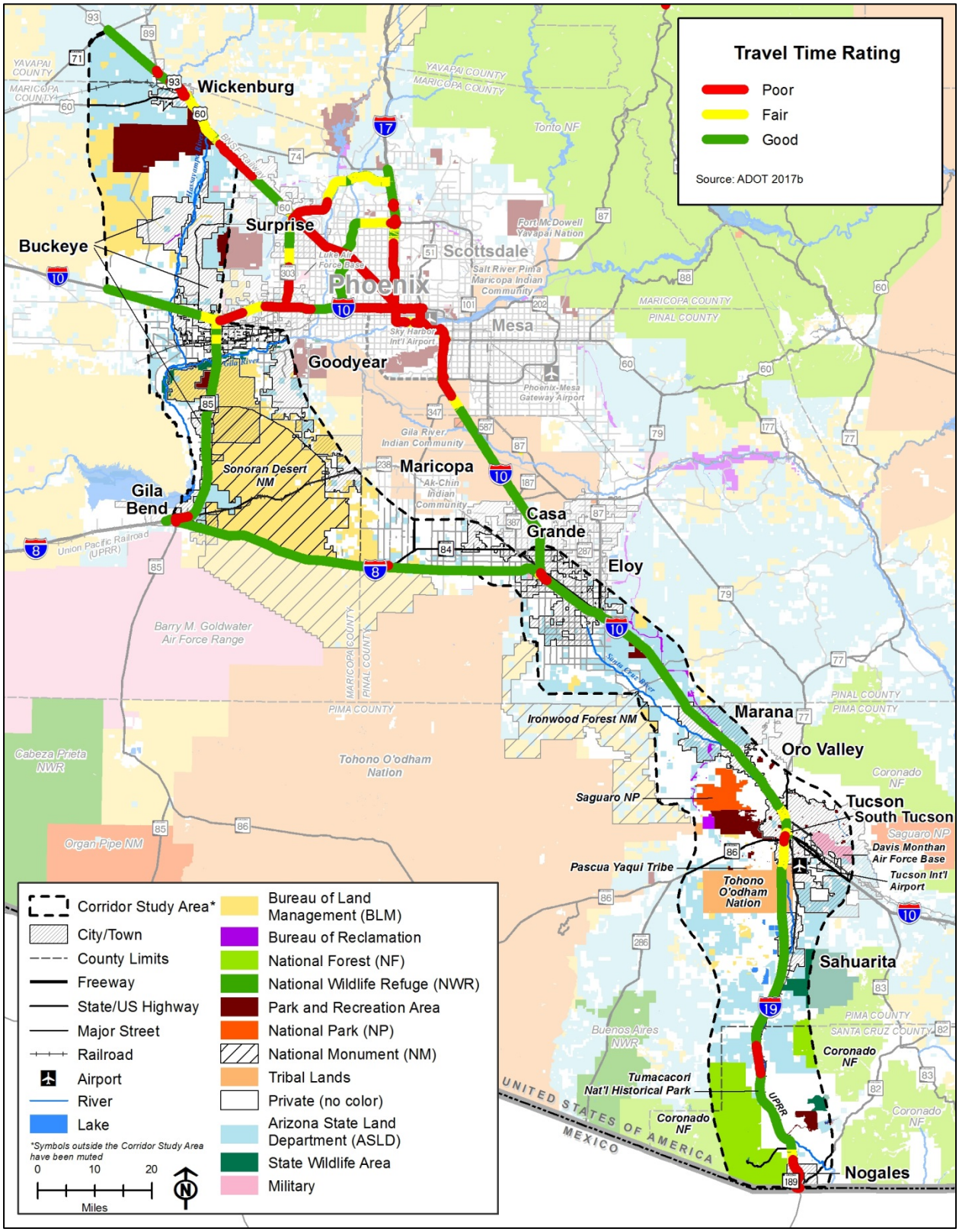


Figure 1-7 Peak Period Travel Time Ratings, 2015

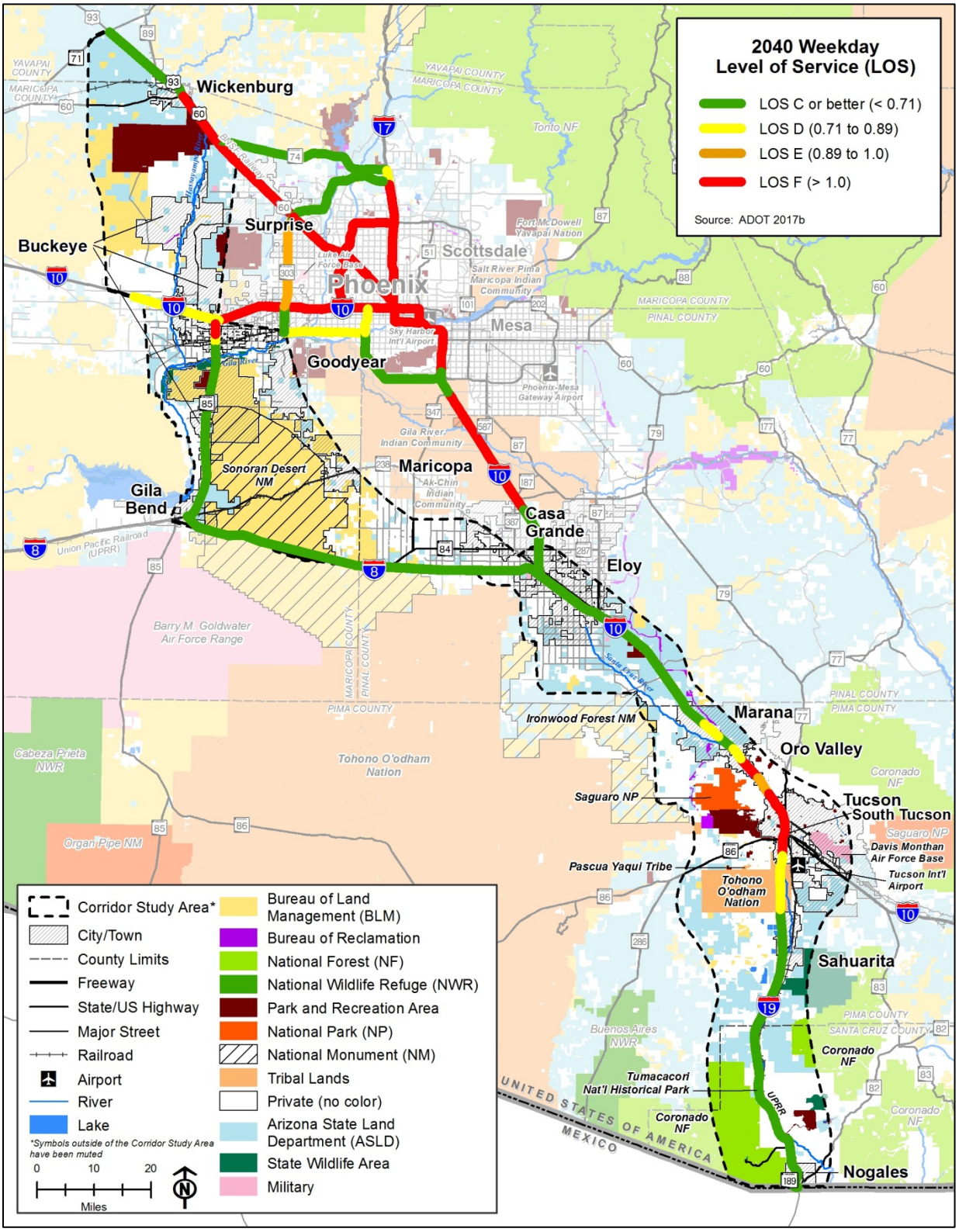


Figure 1-8 Average Weekday Level of Service, 2040

Table 1-3 (Peak Period Travel Times from Nogales to Wickenburg in Afternoon, 2015 and 2040 [No Build Alternative]) presents a comparison of peak period travel times for various trips between Nogales and Wickenburg (3 p.m. to 6 p.m.). Travel times would increase overall by approximately 90 minutes, and average speeds would decrease by as much as 19 miles per hour (mph) between Nogales and Wickenburg by 2040 due to the growing congestion along existing freeways and arterials. This information includes local, regional, and long-distance personal vehicle and truck activity, including freight movements to and from Arizona to Mexico and the west coast.

Table 1-3 Peak Period Travel Times from Nogales to Wickenburg in Afternoon, 2015 and 2040 (No Build Alternative)

Trips Between Nogales and Wickenburg [1]	Northbound			Southbound		
	Distance (miles)	Travel Time [2] (minutes)	Average Speed (mph)	Distance (miles)	Travel Time [1] (minutes)	Average Speed (mph)
2015						
I-19/I-10/I-17/SR 74/US 60/US 93	244	235	62	244	240	61
I-19/I-10/US 60/US 93	232	240	58	232	260	54
I-19/I-10/I-8/SR 85/I-10/SR 303L/US 60/US 93	275	250	66	275	250	66
I-19/I-10/L101/US 60/US 93	238	235	61	238	250	57
I-19/I-10/L303/US 60/US 93	243	230	63	243	240	61
2040						
I-19/I-10/I-17/SR 74/US 60/US 93	248	331	45	246	347	43
I-19/I-10/US 60/US 93	235	343	41	234	358	39
I-19/I-10/I-8/SR 85/I-10/SR 303L/US 60/US 93	279	329	51	278	335	50
I-19/I-10/L202/I-10/ L101/US 60/US 93 [3]	241	326	44	240	340	42
I-19/I-10/L202/I-10/ L303/US 60/US 93 [3]	246	320	46	245	332	44
I-19/I-10/L101/US 60/US 93	242	342	44	240	355	41
I-19/I-10/L303/US 60/US 93	246	335	44	245	348	42

(1) LOS and travel time rating are shown for these trips on **Figure 1-6, Figure 1-7,** and **Figure 1-8**, respectively; however, travel time rating data are not available along SR 74.
(2) Travel times based on Google estimates for a 4 p.m. departure on March 18, 2015.
(3) Reflects 2040 travel times for a route that includes the South Mountain Freeway (L202), not built in 2015.
SOURCE: ADOT 2017b; Google Maps 2015.

Table 1-4 (Peak Period Travel Times for City Pairs in Afternoon, 2015 and 2040) provides a closer look at the travel times between cities within the Study Area and confirms that travel times would continue to worsen over the 25-year period. Increased travel times will result in higher costs not only in terms of the value of time for passengers and cargo, but also in increased fuel consumption resulting from vehicles idling in traffic. The slowest 2015 peak

period travel speeds were between Casa Grande and Phoenix in the evening, with average speeds of 43 mph for northbound vehicles and 38 mph for southbound vehicles. Future travel times show that the slowest 2040 peak period travel speeds would occur between Phoenix and Wickenburg, with average speeds at 38 mph heading northbound and 35 mph heading southbound. Southbound trips between Phoenix and Wickenburg also show the greatest decline, from 57 mph in 2015 to 35 mph in 2040.

Table 1-4 Peak Period Travel Times for City Pairs in Afternoon, 2015 and 2040 (No Build Alternative)

City Pair	Northbound			Southbound		
	Distance (miles)	Travel Time (minutes)	Average Speed (mph)	Distance (miles)	Travel Time (minutes)	Average Speed (mph)
2015						
Nogales – Tucson	66	68	58	66	68	58
Tucson – Casa Grande	66	68	58	66	65	61
Casa Grande – Phoenix	50	70	43	50	80	38
Phoenix – Wickenburg	65	85	46	65	68	57
Casa Grande – Wickenburg	116	145	48	114	140	50
2040						
Nogales – Tucson	65	68	60	65	70	56
Tucson – Casa Grande	67	83	48	66	77	51
Casa Grande – Phoenix	54	70	46	54	80	42
Phoenix – Wickenburg	67	106	38	67	115	35
Casa Grande – Wickenburg	120	167	43	143	168	51

NOTE: Travel times based on Google estimates for a 4 p.m. departure on March 18, 2015.
SOURCE: Google Maps 2015, ADOT 2017b.

Under a No Build scenario, the travel time between Casa Grande and Wickenburg through the Phoenix metropolitan core would substantially increase between 2015 and 2040. Because of congestion in the Phoenix area, some traffic between Casa Grande and Wickenburg may divert west to less congested alternate routes, such as I-8 and SR 85. Travel forecasts suggest that long-distance truck traffic and long-distance passenger vehicle traffic would be less likely to divert to longer routes. However, local and regional passenger vehicle traffic may divert to longer but less congested alternate routes.

Figure 1-9 (Peak Period Travel Speeds in the Afternoon, 2015 and 2040) illustrates estimated speeds in 2015 and 2040. This illustration shows that longer alternate routes to the west using I-8, SR 85, Sun Valley Parkway, and Vulture Mine Road would have faster speeds, resulting in shorter travel times, than routes through the Phoenix metropolitan core. However, travel times and LOS would then deteriorate on these alternate routes.

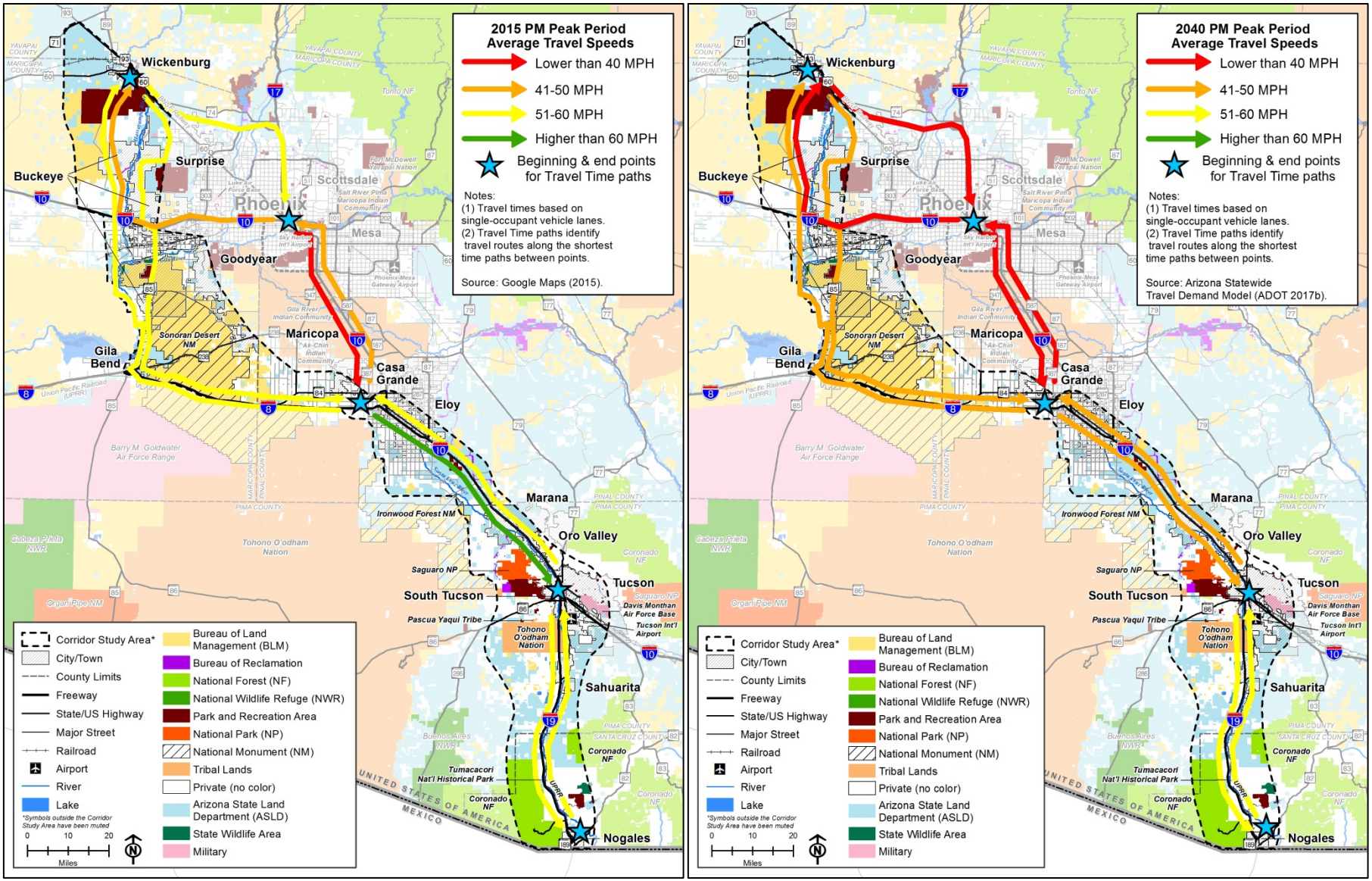


Figure 1-9 Peak Period Travel Speeds in the Afternoon, 2015 and 2040

Highways in the Study Area are subject to unpredictable bottlenecks due to crashes and weather events that can impede travel flows (e.g., road restrictions or closures due to crashes, work zones, and isolated weather events such as dust storms, flooding, and wildfires). Most locations have no comparable alternate routes. Notable hot spots with crash rates that are above average include, but are not limited to, central Tucson, SR 85 south of I-10, most highways approaching or within the Phoenix metropolitan core, and US 60 and US 93 northwest of the Hassayampa River. The lack of redundancy in route options in times of highway closures or severe bottlenecks is a major factor that contributes to deterioration in travel times and LOS.

1.5.3 System Linkages and Regional Mobility

The lack of a north-south interstate freeway link in the Intermountain West inhibits efficient freight movement and access to economic activity centers, thus limiting trade opportunities. Congress recognized this need and designated I-11 as a High Priority Corridor (ADOT 2014). I-11 is a component of the CANAMEX corridor, which was originally designated by the US Congress as a key trade corridor to support the nation's economy, defense, and mobility. **Figure 1-10** (FHWA High Priority Corridors in the Western US) illustrates the designated corridors relative to the Study Area.

As shown on **Figure 1-10** (FHWA High Priority Corridors in the Western US), the Intermountain West has a large gap in north-south interstate connectivity. From the southern to northern US borders, east-west interstates are spaced approximately 100 to 200 miles apart, whereas the gap between I-5 and I-15 can be wider than 500 miles. The west in general and the southwest region in particular, are underserved by north-south interstate freeway capacity. I-85 and I-81 in the eastern US serve as a critical redundancy to the I-95 coastal interstate. This capacity enables a logistics (i.e., planning and control of the flow of goods and materials), supply chain, and manufacturing capacity to emerge for a wide-array of products.

Mexico is Arizona's number one trade partner (University of Arizona 2017). Trade generated between Arizona and Mexico has steadily increased from $14 billion in 2013 to $15.7 billion in 2016 (Arizona Commerce Authority 2014; Arizona-Mexico Commission 2017). Economic development initiatives underway in Arizona focus on this interaction with Mexico to create high-value manufactured goods. These initiatives rely on a connected system of high-quality freeways for the mobility of raw materials, finished products, and workers.

The reliability of freight movement will play a major role in deciding how goods are moved from international manufacturers to markets throughout the Intermountain West. Currently, a continuous north-south high-capacity transportation facility does not exist due to gaps in the system. Continuing transportation investments to improve system linkages and access are critical. Worsened congestion and poor travel time reliability on the interstate freeway system would adversely affect economic competitiveness.

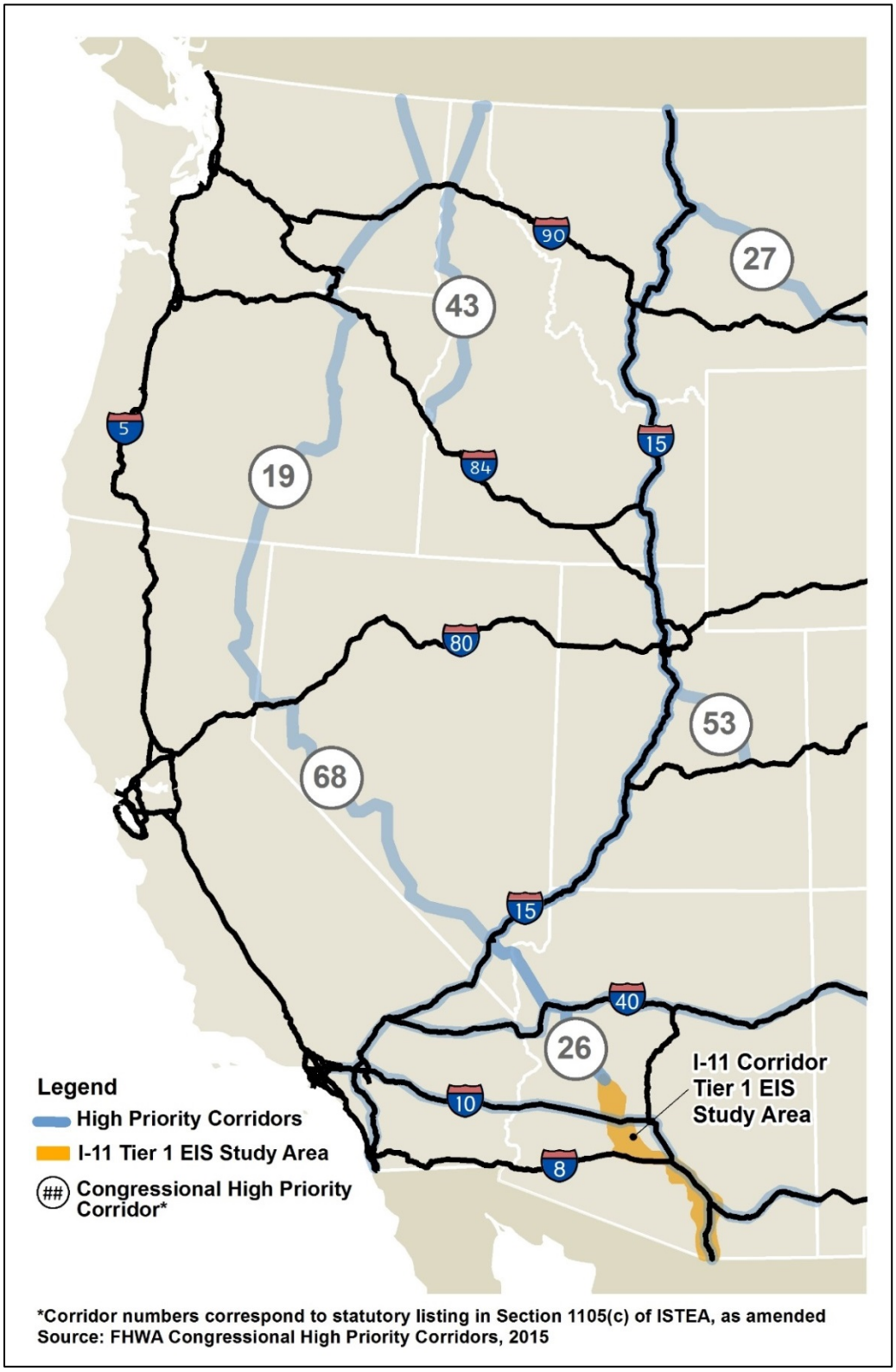


Figure 1-10 FHWA High Priority Corridors in the Western US

Thus, adding capacity to the west with the I-11 Corridor would enhance regional mobility and create transportation linkages with intersecting interstates. I-11 also would create comparable supply chain and trade links between the interior west and Mexico, as illustrated in **Figure 1-11** (Integrated Manufacturing in the Southwest US). This, when coupled with the high levels of congestion in Southern California (specifically the I-5 corridor, which is vulnerable to natural disasters and extended closures, closing as recently as early September 2018 for 6 days due a raging fire in California's Shasta-Trinity National Forest and requiring a more than 70-mile detour route), suggests that a north-south corridor in the Intermountain West could become the corridor of choice for trade-related traffic to and from Mexico, particularly as nearshoring is expected to increase.

Nearshoring refers to the trend of moving manufactured goods production to Mexico from Asia and the Pacific Rim (NDOT and ADOT 2013). It is a growing trend to address rising labor costs in emerging countries, increased shipping times and costs, and shifting consumer expectations for reduced time to market. With the desire for supply chain reliability to support just-in-time delivery in integrated manufacturing and distribution systems, a new or upgraded corridor in the Intermountain West becomes more attractive and would result in a more competitive economic market for Arizona (NDOT and ADOT 2013). As the ports of Los Angeles and Long Beach become increasingly busier and the north-south freeways in California become more congested, demand for alternative north-south routes to accommodate the movement of freight will increase.

Table 1-5 (State-to-State Daily Freight Truck Flows, 2013 and 2040) shows the state-to-state freight truck flows that could use the I-11 Corridor. Export cargo values from Arizona to Mexico are forecast to more than triple from 2013 to 2040. The Arizona to Nevada market is a fast-growing one, with daily freight truck units projected to increase 175 percent between 2013 and 2040 (Transearch 2013).

Table 1-5 State-to-State Daily Freight Truck Flows, 2013 and 2040

State Pair	Cargo Value (1,000s) (1)			Daily Freight Truck Units (1)		
	2013	2040	% Change	2013	2040	% Change
Arizona – Mexico	$13,971	$61,781	342%	137	492	259%
Arizona – Nevada	$10,521	$24,390	132%	680	1,870	175%
Arizona – Idaho	$2,610	$15,828	506%	100	223	123%
Arizona – Canada	$1,255	$4,598	266%	18	62	244%
Nevada – Mexico	$543	$3,060	464%	3	13	333%
Idaho – Mexico	$41	$157	283%	2	7	250%

(1) Annual flows converted to daily estimates by assuming 300 days per year.
SOURCE: Transearch 2013.

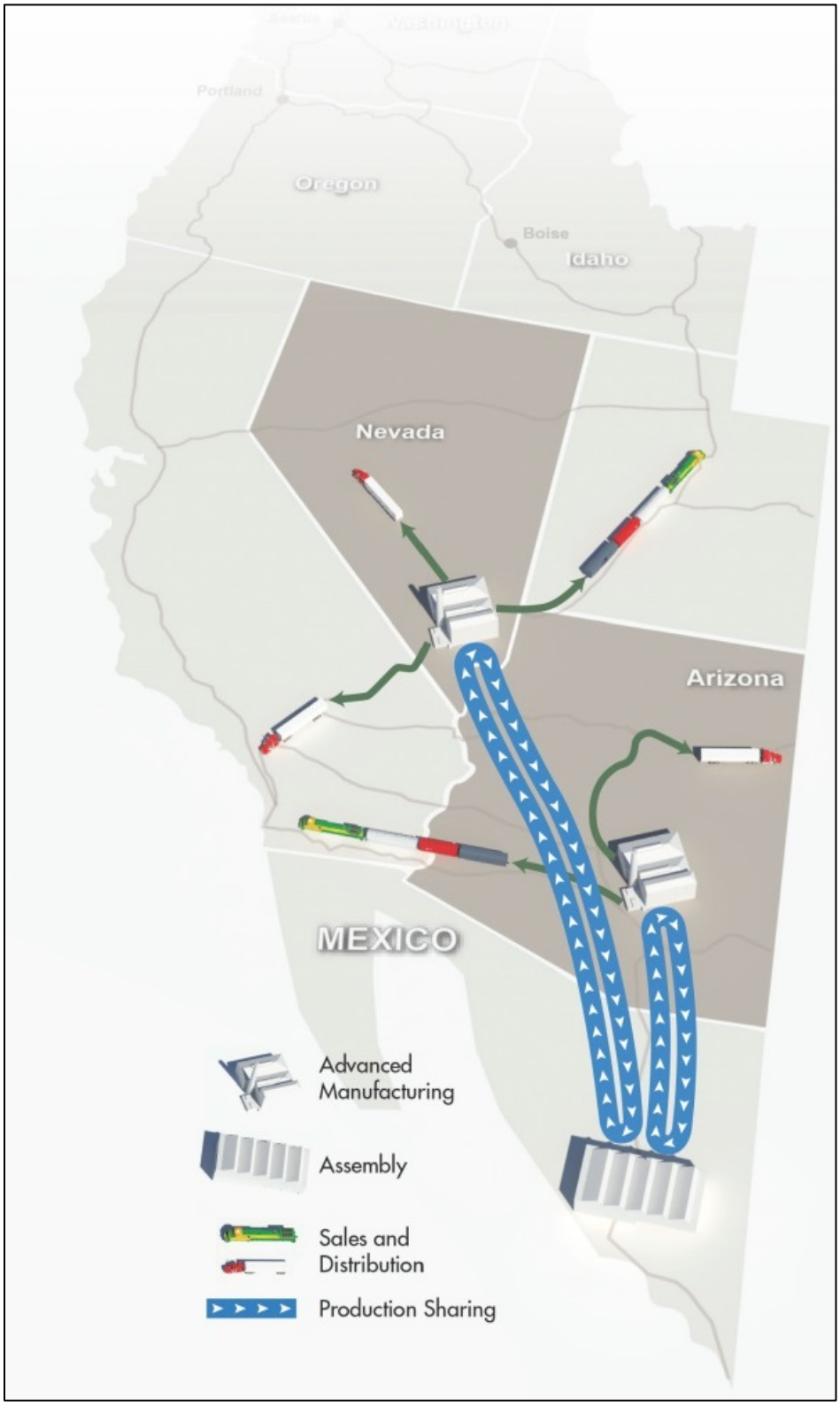


Figure 1-11 Integrated Manufacturing in the Southwest US

1.5.4 Access to Economic Activity Centers

An interstate freeway facility would provide improved access and connectivity to major employment areas, economic development opportunities, warehouse/distribution facilities, and airports, all of which depend upon freeway access to operate in a competitive economic market. A high-capacity transportation facility connecting Nogales, Wickenburg, and other destinations in between would make long-distance travel quicker, easier, and more direct. Improved interstate freeway access would serve the existing and emerging economic centers in the Study Area, which are shown on **Figure 1-12** (Economic Centers and Employment Densities, 2040).

1.5.5 Homeland Security and National Defense

The original interstate freeways (the National System of Interstate and Defense Highways) were planned in part as a primary element of the national defense system. A fundamental purpose was to provide ground transportation for military supplies and troop deployments. The I-11 Corridor may become an element of the Strategic Highway Network (STRAHNET), which is designated by FHWA in coordination with the US Department of Defense. STRAHNET designation is given to roads that provide defense access, continuity, and emergency capabilities for movement of personnel and equipment in peacetime and wartime. The STRAHNET system is 62,700 miles, which includes the 47,000-mile interstate system and 15,800 miles of other important public highways (FHWA 2004).

Congestion on I-10 and other 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. Higher-risk facilities, such as the Palo Verde Nuclear Generating Station, support the need for an improved interstate freeway system with alternate routes in case of an emergency evacuation. Military facilities in the Phoenix and Tucson areas would benefit from alternate routes for transporting personnel and equipment.

1.6 Purpose of Proposed Facility

Given the need for greater connectivity and travel time reliability as population and employment continue to increase in the Study Area, the purpose of the I-11 Corridor is to:

- Provide a high-priority, high-capacity, access-controlled transportation corridor to serve population and employment growth.
- Support improved regional mobility for people and goods to reduce congestion and improve travel efficiency.
- Connect metropolitan areas and markets in the Intermountain West with Mexico and Canada through a continuous, high-capacity transportation corridor.
- Enhance access to the high-capacity transportation network to support economic vitality.
- Provide for alternate regional routes to facilitate efficient mobility for emergency evacuation and defense access.

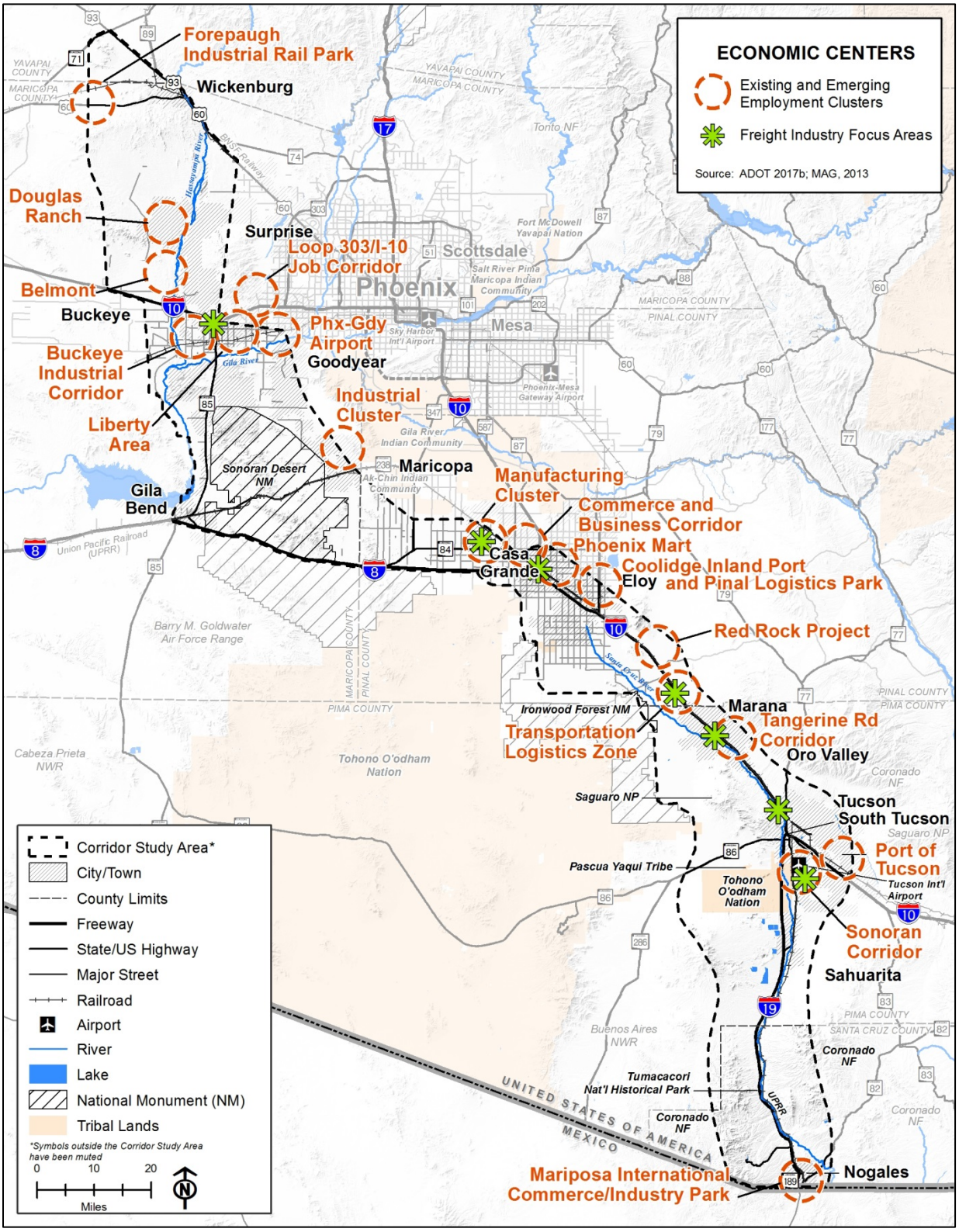


Figure 1-12 Economic Centers and Employment Densities, 2040

1.7 Purpose and Need Metrics

The Project Team developed metrics to evaluate how well alternative corridors would meet the I-11 Purpose and Need. These metrics are shown in **Table 1-6** (Purpose and Need Metrics).

1.8 Other Desirable Outcomes

Cooperating agencies and project stakeholders identified desirable outcomes for I-11 in addition to the purpose and need metrics above. They are:

- Provide the opportunity for multimodal use as the need arises in the future.
- Support the protection of sensitive tourist attractions in accordance with applicable plans and policies.
- Support the protection of the environment and cultural resources in accordance with applicable plans and policies.
- Support coordination with other federal and state agencies to maintain the integrity of wildlife movement.

These desirable outcomes were considered in the development of the alternatives (described in **Chapter 2** [Alternatives Considered]) and in the evaluation of the corridors (described in **Chapter 3** [Affected Environment and Environmental Consequences]).

Table 1-6 Purpose and Need Metrics

Need	Purpose	Metric
Population and Employment Growth: High-growth areas need access to the high-capacity, access controlled transportation network.	Provide a high-priority, high-capacity, access-controlled transportation corridor to serve population and employment growth.	Provides access to planned growth areas.
Traffic Growth and Travel Time Reliability: Increased traffic growth reduces travel time reliability due to unpredictable freeway conditions that impede travel flows and hinder the ability to move people and goods around and between metropolitan areas efficiently.	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). Achieves LOS C or better in rural areas and LOS D or better in urban areas (Tucson) on I-11.
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.	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.
Access to Economic Activity Centers: Efficient freeway access and connectivity to major economic activity centers are required to operate in a competitive economic market.	Enhance access to the high-capacity transportation network to support economic vitality.	Serves key economic centers (number of economic activity centers).
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.	Provide for alternate regional routes to facilitate efficient mobility for emergency evacuation and defense access.	Provides an alternate regional route to existing interstate route.

2 ALTERNATIVES CONSIDERED

This chapter discusses the alternatives development and screening process conducted to arrive at alternatives to be evaluated in detail in this Tier I Environmental Impact Statement (EIS).

For More Information On:
- Alternatives Selection Report
- Purpose and Need
- Intermountain West Corridor Study

Please Visit i11study.com/

2.1 Recommendations from Prior Plans and Studies

Recommendations for major transportation corridors in prior plans and studies were a primary input into the initial alternatives for the Interstate 11 (I-11) Corridor. In addition to the 2014 *I-11 and Intermountain West Corridor Study* (IWCS) described in **Chapter 1** (Purpose and Need), new major (high-capacity) transportation facilities have been identified as a critical need in various statewide plans, regional transportation plans, and municipal planning documents. **Figure 2-1** (Related Planning Recommendations in I-11 Corridor Study Area) is a composite of potential freeway corridors, passenger rail corridors, and freight focus areas that are identified in various planning documents. Key plans and documents that relate to I-11 Corridor planning include:

- ***Statewide Transportation Planning Framework Program*** (Arizona Department of Transportation [ADOT] 2010) was Arizona's first multimodal vision for 2050. It considered all surface modes and fully integrated principles of Smart Growth, environmental stewardship, responsible economic growth, and Tribal participation to address projected population growth and collaboratively identify priorities and strategies for meeting infrastructure needs as part of a comprehensive 2050 vision. A new interstate corridor (I-11) is shown extending from Pinal County to the Arizona-Nevada state line, traversing the Phoenix metropolitan area to the south and west and utilizing the United States (US) 93 corridor to the Hoover Dam Bypass. The potential to accommodate express bus (or other high-capacity transit) is illustrated along this corridor, as well as potential future high-speed rail.
- ***Arizona's Key Commerce Corridors Report*** (ADOT 2014) supports transportation improvements to enhance economic development. The report outlines six key transportation corridors "…where improvements to the transportation infrastructure support the greatest potential commercial and economic benefits." Three of the Key Commerce Corridors are located in the I-11 Corridor Study Area (Study Area) (ADOT 2014):
  - I-19 from Nogales to Tucson
  - I-10 from Tucson to Phoenix
  - I-11 from Phoenix to Las Vegas
- ***Arizona State Freight Plan*** (ADOT 2017b) is Arizona's 5-year State Freight Plan. This plan fulfills the federal requirements for state freight plans embodied in the Fixing America's Surface Transportation Act. One of the key strategies is to implement freight transportation system improvements to bolster the performance of Key Commerce Corridors, which include I-19, I-10, and I-11. In addition, improvements are intended to address the transportation performance needs of the freight sectors that drive the state's long-term economic competitiveness.

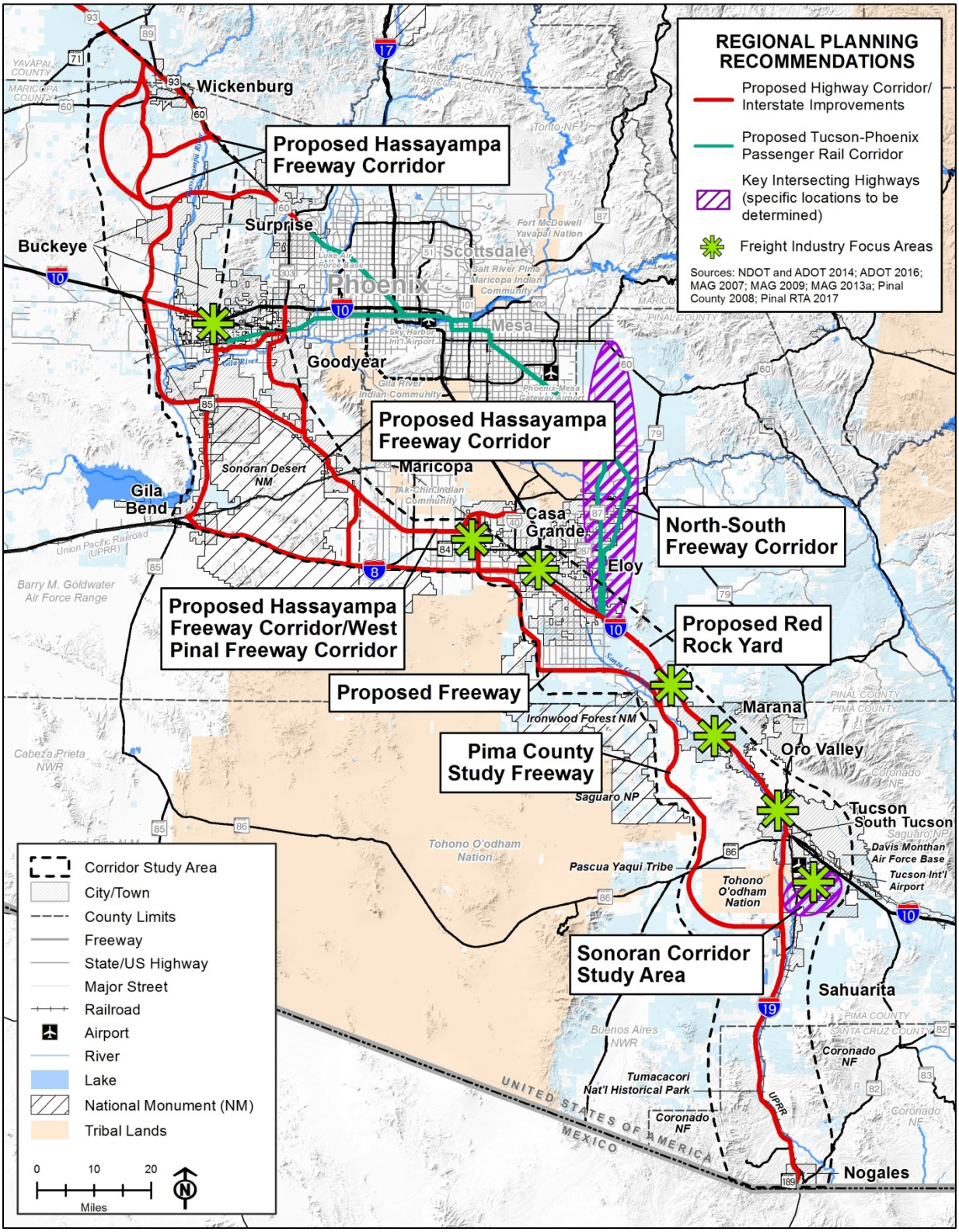


Figure 2-1 Related Planning Recommendations in I-11 Corridor Study Area

1

- ***Pima Association of Governments (PAG) Regionally Significant Corridors Study*** (2014) is a technical assessment of existing, planned, and proposed major transportation corridors in and around the PAG region that would achieve broad regional objectives. A regionally significant corridor is identified within the Study Area, but no specific alignment has been determined in Pima County (PAG 2014).
- ***Pinal Regional Transportation Plan*** (2017) includes a high-capacity route between the Pinal-Maricopa county line and I-8 to promote freight movement, link communities, and strengthen economic development and job growth countywide (Pinal Regional Transportation Authority 2017). This proposed West Pinal Freeway corridor has been supported as a potential I-11 route by resolutions of the cities of Maricopa and Eloy, Pinal County, and the Sun Corridor Metropolitan Planning Organization.
- ***Pinal County Regionally Significant Routes for Safety and Mobility*** (2008) provides a system of higher-capacity routes to improve safety, access, and mobility throughout the county, as well as connections to adjacent counties. These routes were formed through a partnership with federal, state, county, local, Tribal, and private stakeholders. An alternate route to I-10, which is designated as a "new corridor" and "under analysis," generally runs from I-8 to I-10 on the west, connecting Arica Road and Baumgartner Road. A map update to the *Pinal County Regionally Significant Routes for Safety and Mobility* was completed in 2017 (Pinal County 2008).
- ***Maricopa Association of Government's (MAG's) Regional Framework Studies*** established a network of freeways, parkways, and arterial streets in high-growth areas. The *I-10/Hassayampa Valley Regional Transportation Framework Study* (MAG 2007) and the *I-8 and I-10/Hidden Valley Regional Transportation Framework Study* (MAG 2009) established the Hassayampa Freeway corridor from Casa Grande to Wickenburg, which provided an alternate route to bypass the congested Phoenix metropolitan core. The Hassayampa Freeway corridor in Maricopa County would connect with the West Pinal Freeway corridor in Pinal County, as shown on **Figure 2-1** (Related Planning Recommendations in I-11 Corridor Study Area).
- ***MAG Freight Transportation Framework Study*** (MAG 2013a) described the I-11 Corridor as the "cornerstone for seamless and efficient transportation of goods, services, people, and information between Canada, Mexico, and the United States." This was a joint effort conducted on behalf of the metropolitan planning organizations spanning the Tucson to Phoenix corridor, also known as the Sun Corridor. The goal was to plan the appropriate transportation infrastructure to attract freight-related economic development by taking advantage of the Sun Corridor's prime location to serve the West Coast, Intermountain West, and Mexican deep-water ports within a day's truck drive. **Figure 2-1** (Related Planning Recommendations in I-11 Corridor Study Area) shows the freight industry focus areas that were identified in the study (MAG 2013a).
- ***ADOT and Federal Railroad Association (FRA) Passenger Rail Study*** (ADOT 2016) establishes a need for increased capacity in transportation infrastructure between Tucson and Phoenix, the two largest metropolitan areas in Arizona. The study discusses how the only existing route between Phoenix and Tucson, the I-10, experiences "severe congestion" and "traffic jams of increasing frequency and duration." A Tier 1 EIS process resulted in a Record of Decision that selected a rail corridor for passenger service to help meet the anticipated increase in demand for trips between the two urban areas (ADOT 2016).

- ***I-11 and Intermountain West Corridor Study* (IWCS) (2014)** was a multimodal planning effort that involved ADOT, Nevada Department of Transportation (NDOT), Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), Maricopa Association of Governments (MAG), the Regional Transportation Commission of Southern Nevada (RTC), and other key stakeholders. As discussed in detail in **Chapter 1**, the IWCS evaluated likely potential routes for a new high-priority, high-capacity transportation corridor.

Additional discussion of relevant plans and projects is provided in the *Purpose and Need Memorandum* (ADOT 2017a), which can be found on the project website at i11study.com.

2.2 Alternatives Development Process

This section summarizes the alternatives development process, which narrowed down a range of suggested options to a reasonable range to carry forward for detailed evaluation in this Draft Tier 1 EIS.

2.2.1 Development of Corridor Options

The Project Team, composed of FHWA, ADOT, and their consultant team, developed a range of corridor options within the Study Area. The range of options was based on:

- **Prior Studies:** The prior studies listed above informed the study area and options. Specifically, the IWCS encompassed a broad Study Area for the Intermountain West region from Mexico to Canada and identified likely potential routes, focusing on connections within Arizona and Nevada. The IWCS evaluated a wide range of corridors from Casa Grande to Wickenburg, including options through central Phoenix. The most feasible candidates were located west of the Phoenix metropolitan area and were recommended for further study. These corridors formed the initial Corridor Options of this study. The study analyzed connection points to Mexico, including ports of entry from San Luis to Douglas, and concluded that Nogales was the best point of entry due to a reciprocal interstate-level highway and freight rail corridor in Mexico.
- **Agency Scoping Input:** The 2016 scoping process and comments are documented in the *Scoping Summary Report* (see **Appendix G**). Agencies commented on the potential Build Corridor Alternatives, opportunities or concerns, and constraint areas (ADOT 2017c). Preferences for Corridor Options were made both to advocate for staying on existing freeways (I-19, I-10, I-8, and State Route [SR] 85) as well as for supplementing the existing network with the following new proposed corridors (**Figure 2-2** [Agency Scoping Feedback on Build Corridor Alternative Preferences, 2016]):
  - Pima County west Tucson route
  - Eloy/Pinal County route west of I-10
  - West Pinal route north of I-8
  - Hassayampa Freeway route
  - SR 303L south extension west of Vulture Mountains route

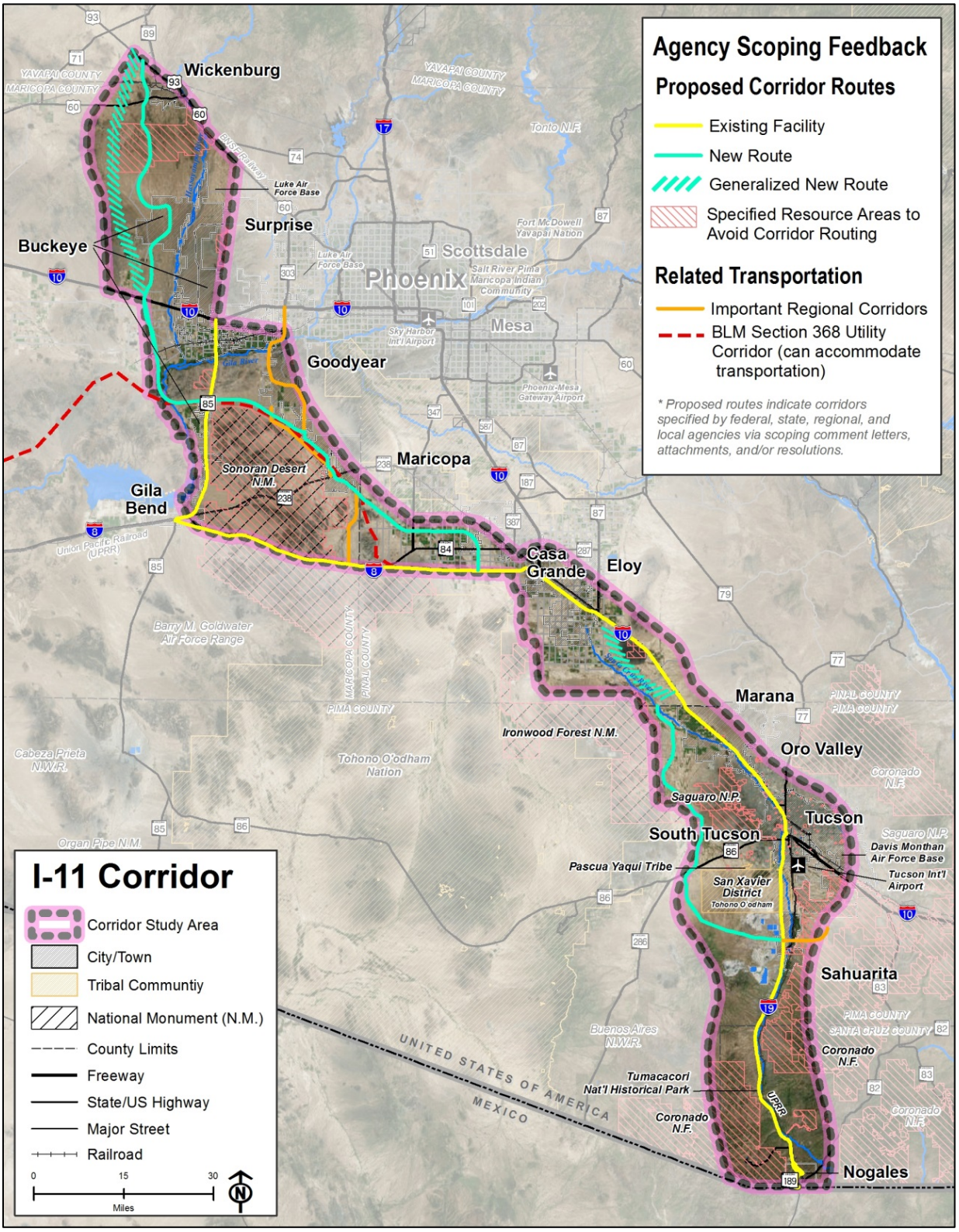


Figure 2-2 Agency Scoping Feedback on Build Corridor Alternative Preferences, 2016

Common feedback themes included:

- Ensure consistency with existing and proposed local and regional plans, environmental documents, and master-planned community plans
- Study opportunities to foster economic development
- Protect environmentally sensitive resources
- Consider wildlife connectivity between public lands and other protected open space
- Consider co-locating I-11 with existing transportation routes
- Consider supplementing the regional transportation network with new routes

- **Public Input:** During the 2016 scoping period, the public commented on potential corridors, opportunities or concerns, and constraint areas (ADOT 2017c). **Figure 2-3** (Public Scoping Feedback on Build Corridor Alternative Preferences, 2016) illustrates common themes. Red areas indicate positive support to study corridors. Red areas do not reflect exact alignments or routing; for example, the large red swath surrounding I-19 reflects a high interest in co-locating I-11 with I-19. Common feedback themes included:
  - Preferences for both improving existing freeways and interstates and constructing I-11 as a separate/new facility; desire to co-locate I-11 with other existing linear infrastructure corridors (e.g., transmission lines).
  - Concern regarding impacts to the Sonoran Desert environment.
  - Concern regarding impacts to rural communities.
  - Desire to avoid parks and conservation management areas (maintain habitat and open space), while still preserving opportunities for recreational visitor use (e.g., hiking, hunting, camping).
  - Consideration of emergency access, such as the effect of dust storms and crashes on interstate mobility.
  - Desire for economic benefits to the surrounding communities.
- **Tribal Coordination:** FHWA and ADOT met regularly with Tribal Nations who expressed interest in the project. FHWA and ADOT convened project-specific meetings with Tribal government representatives and also presented at established district or Tribal meetings. Tribal input factored into the development and evaluation of the Build Corridor Alternatives. Section 3.7 (Archeological, Historical, Architectural, Cultural Resources) provides more information on consultation under Section 106 of the National Historic Preservation Act (NHPA), and **Chapter 5** (Coordination and Outreach) provides additional details on Tribal coordination.
- **Technical Analysis:** A software tool was used to develop potential routes based on engineering design criteria, sensitive environmental resources, and topographical constraints, such as:
  - Engineering geometry should accommodate 75 miles per hour (mph) design speed; grade and other geometry inputs to meet ADOT design criteria for an interstate freeway.
  - Should be able to co-locate rail facilities in the future.

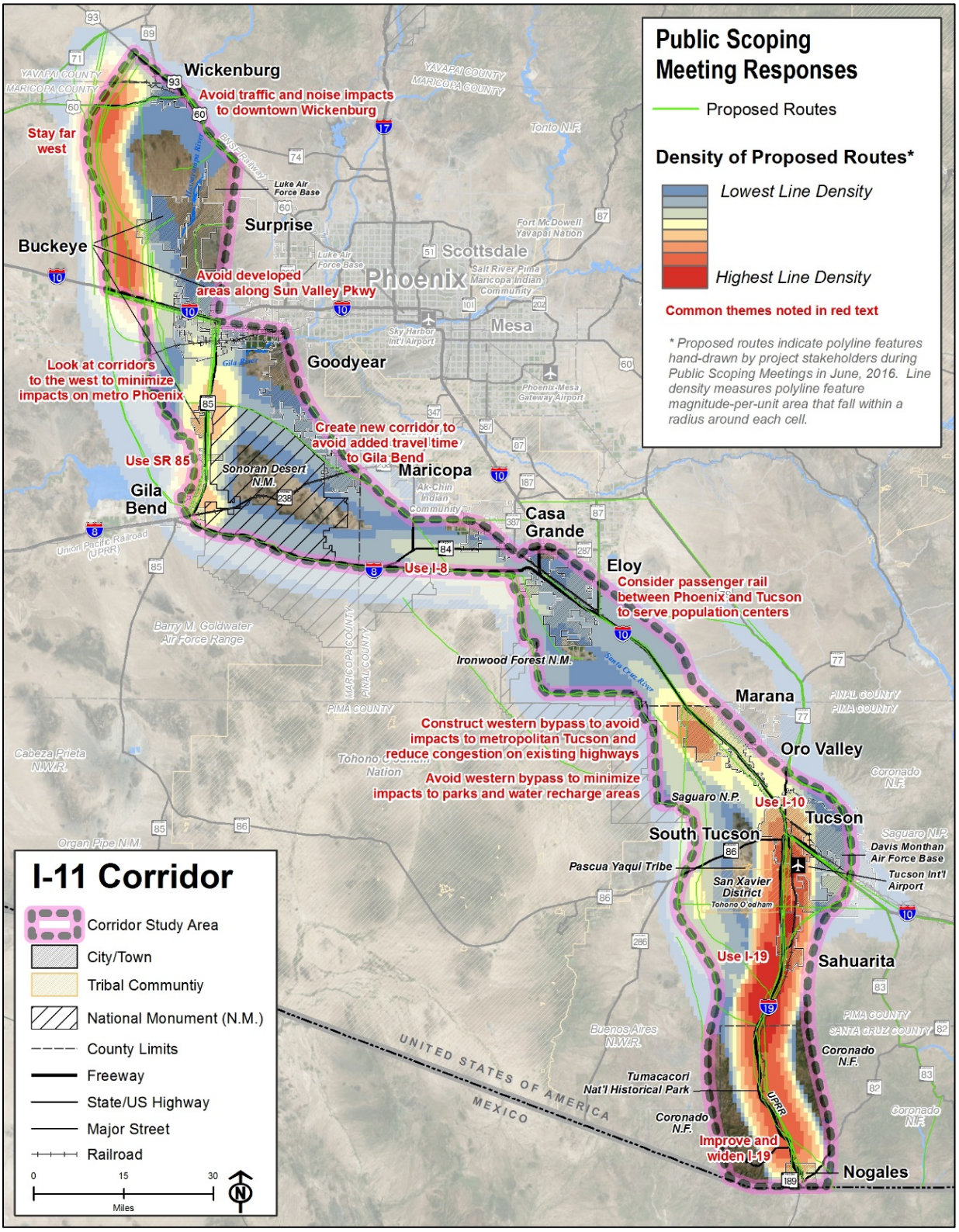


Figure 2-3 Public Scoping Feedback on Build Corridor Alternative Preferences, 2016

- Should avoid direct use of specially designated lands and protected resources, such as national parks, national monuments, wildernesses, areas of critical environmental concern, roadless areas, critical habitat, wetlands, and lakes.
- Should avoid use of Tribal community lands, which are subject to Tribal sovereignty.
- Should avoid or minimize use of Section 4(f) properties, such as publicly owned parks, recreation areas, and wildlife and waterfowl refuges. **Chapter 4** (Preliminary Draft Section 4(f) Evaluation) provides more information on Section 4(f).
- Minimize potential for construction within 100-year floodplains and floodways.
- Minimize potential to impact existing development.

2.2.2 Range of Corridor Options

The range of Corridor Options is shown on **Figure 2-4** (Range of Corridor Options). The Project Team divided the Study Area into three sections for analysis: South, Central, and North. The Project Team evaluated the initial range of Corridor Options for their ability to meet purpose and need (serve population and employment growth, improve system linkages and interstate mobility, serve economic activity centers) and to avoid sensitive environmental resources. Evaluation criteria included: Population and Employment Growth, Traffic Growth and Travel Time Reliability, System Linkages and Regional Mobility, and Homeland Security and National Defense.

In May 2017, FHWA and ADOT presented the preliminary results of the screening process to cooperating and participating agencies, Tribes, and the public at a series of agency and public information meetings. Based on the analysis and input, FHWA and ADOT eliminated certain Corridor Options from further consideration; these are shown in gray on **Figure 2-4** (Range of Corridor Options). All remaining Corridor Options were retained for further evaluation.

The Alternatives Selection Report Evaluation Methodology and Criteria Report are found at i11study.com/Arizona/Documents.asp.

Public meeting materials and the meeting summary report are available on the study website (at i11study.com/Arizona/Meetings.asp and i11study.com/Arizona/Documents.asp, respectively). They also are included in **Appendix G**.

2.2.3 Corridor Options Eliminated from Further Consideration

The following discussion describes the rationale for eliminating Options from further consideration.

Option E – FHWA eliminated Option E because it was largely duplicative of Option F and with greater potential for impacts. Options E and F achieve the same mobility goal; however, Option E has a higher potential for impacts to the Santa Cruz River and its floodplain. Option E is longer than Option F, has greater travel times, and provides no mobility or environmental benefit. Pinal County identified a similar alignment to Option E in their planning documents, and indicated their intent was to have flexibility in the general location of the alignment. FHWA concluded that Options E and F met local planning goals equally; therefore, Option E was eliminated.

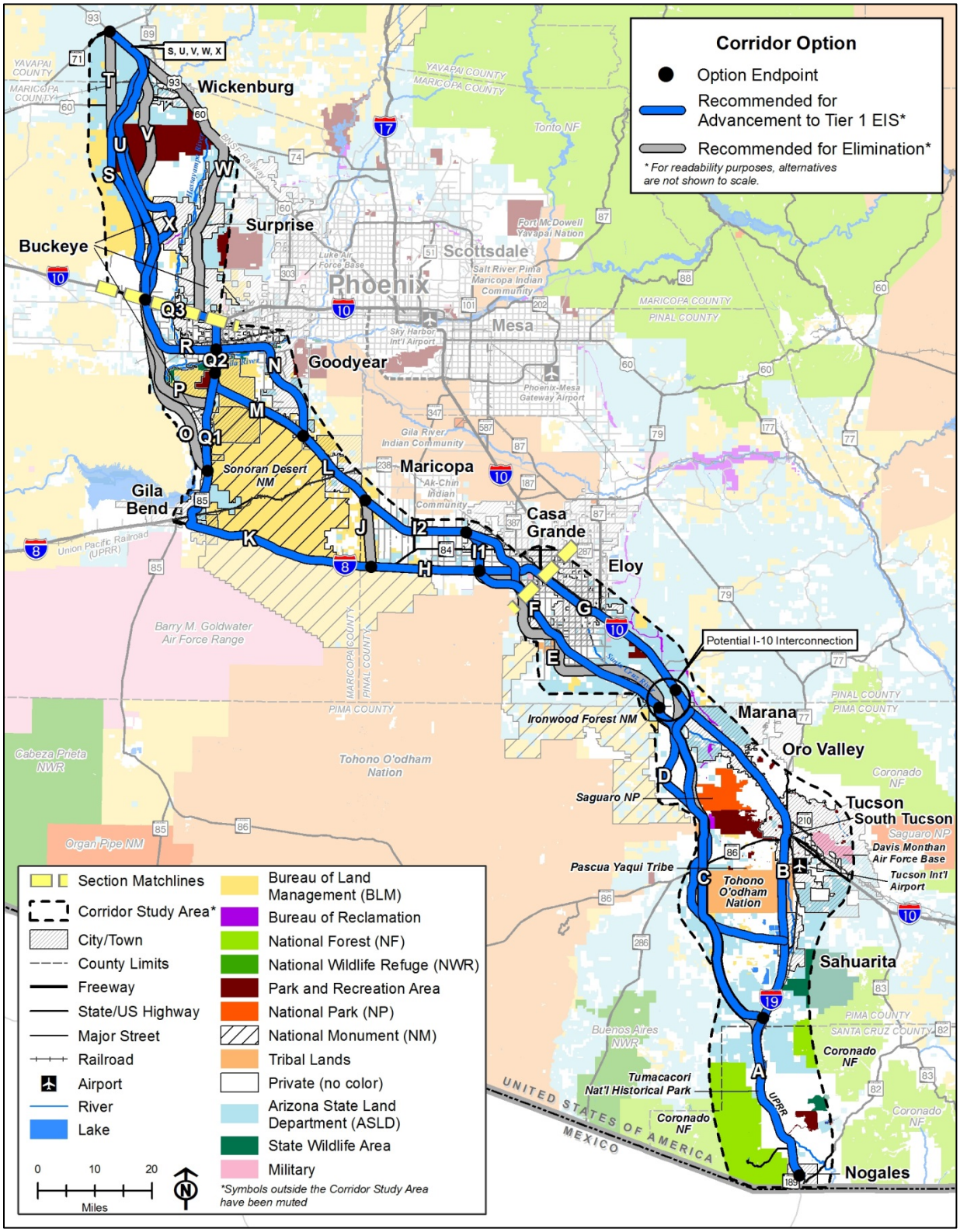


Figure 2-4 Range of Corridor Options

Option J – FHWA eliminated Option J because of its likelihood to impact a Section 4(f) property. Option J provides little mobility benefit and would go through the proposed Palo Verde Regional Park.

Options O and P – FHWA eliminated Options O and P because they are duplicative of other options, but with higher potential for impacts. Both Options O and P have high potential for impacts on sensitive environmental, historic, and cultural resources along the Gila River. The Options also are disfavored by Tribes. Options O and P would have greater potential for impact to critical habitat, an Important Bird Area, Arizona Game and Fish Department (AGFD) state wildlife areas, and the historic Gillespie Dam Bridge. Other reasonable alternatives would have fewer impacts are available that meet the mobility needs served by Options O and P.

Option T – FHWA eliminated Option T because it is largely duplicative of other options, does not perform as well as other options, and has feasibility and practicability concerns. Option T serves the same purpose as Options S and U (to provide system linkage to the northern terminus where none currently exists), but does not meet the criteria as well as other Options. Option T does not meet the Town of Wickenburg's goals of economic vitality and employment growth because it is too far from the town center as compared to Options S and U. Additionally, the terrain would be an impediment to implementation of I-11, calling its feasibility and practicability into question.

Option V – FHWA eliminated Option V because it is infeasible/impracticable. Option V traverses the Vulture Mountains Recreation Area (VMRA), a park protected by Section 4(f), as discussed in **Chapter 4** (Preliminary Draft Section 4(f) Evaluation). The lower portion of Option V was retained, but the northern portion through the VMRA was eliminated from further consideration. The resulting Option X uses the southern portion of Option V and then follows an existing power line corridor through the designated Bureau of Land Management (BLM) multi-use corridor.

Option W – FHWA eliminated Option W due to the potential for community and environmental impacts that would make it impracticable to pursue. Options W would be co-located with Sun Valley Parkway (directly north of I-10) and US 60. Both facilities are non-access controlled arterials (approximately 120 feet in right-of-way width) surrounded by built, under construction, or planned development. Co-location of an access-controlled freeway would cause major disruptions to adjacent urban developments, including the Town of Wickenburg.

Stakeholders voiced environmental concerns, including critical habitat issues along the Hassayampa River; impacts to the Hassayampa River Preserve; and major wash and alluvial floodplain issues between the river and White Tank Mountains. The Flood Control District of Maricopa County voiced concerns regarding the difficulty of crossing their large linear dam, which is located just north of I-10. Additionally, there are topographical issues with co-locating I-11 with US 60.

2.2.4 Modal Alternatives Considered and Eliminated from Further Consideration

Modal alternatives were considered but were not carried forward for detailed evaluation into the Draft Tier 1 EIS. As I-11 is intended to extend from Mexico to Canada, opportunities for highway, rail, and utilities may be located in the same corridor. The analysis in this Draft Tier 1 EIS considers available space, within an assumed typical cross section, that may be used for rail or utility co-location if this infrastructure is implemented in the future.

Rail facilities and services already exist within the Study Area and/or have been studied as part of several statewide planning efforts. In terms of freight rail, Union Pacific Railroad mainline and branch lines span the Study Area from Nogales to Casa Grande, with connections to Gila Bend as well as to Phoenix. A Burlington Northern Santa Fe Railroad (BNSF) branch line parallels US 93/US 60 into Phoenix, connecting at the same downtown Phoenix railyard as the Union Pacific Railroad corridors. MAG studied the opportunity to create a north-south linkage between the Union Pacific Railroad and BNSF corridors in the Hassayampa Valley (MAG 2013b). However, communication with the Class 1 railroads during scoping revealed that major capacity investments are already under way, and upon completion, Arizona freight rail corridors will have adequate rail capacity for the foreseeable future. The *Arizona State Freight Plan* and the *Arizona State Rail Plan* reiterate this and recommend continued coordination with the Class 1 railroads as they complete their capacity improvements.

The *Arizona Passenger Rail Corridor Study* was completed in 2016. A Final Tier 1 EIS and Record of Decision selected a proposed intercity passenger route connecting Tucson and Phoenix, with future opportunities to extend the route south to Nogales. The Selected Corridor Alternative would parallel I-10 to Eloy and then divert north, entering Phoenix from the east (ADOT 2016). With local and regional transit systems in place within the Study Area, additional passenger rail capacity is not warranted at this time. The FRA completed the *Southwest Multi-State Rail Planning Study* in 2014, which evaluated high-speed rail connections within the Intermountain West. The preliminary network vision proposed a high-speed connection from Phoenix to Los Angeles, with connectivity from Los Angeles to Las Vegas and points north in California (FRA 2014).

Major utility companies are participating in this Draft Tier 1 EIS as Participating Agencies. Many have been involved in I-11 planning efforts since the IWCS, which convened a Utility/Energy Focus Group to understand the long-term vision of utility corridor planning in Arizona and Nevada, and the opportunities for connectivity within the I-11 Corridor. Attending agencies communicated that they had no immediate needs, but that a sufficient right-of-way for long-term utility or energy expansion needs could create linear synergies, such as future cost efficiencies and mitigation of potential environmental impacts (NDOT and ADOT 2013).

Appendix E2 provides an inventory of freight, transit, and airport facilities.

2.3 End-to-End Build Corridor Alternatives

The Project Team assembled Corridor Options to create end-to-end alignments from Nogales to Wickenburg and tested different combinations of them, using the Arizona Statewide Travel Demand Model (Arizona Model) to form alternatives that respond best to transportation needs. Corridors were slightly modified to better avoid constraints, such as Tribal land, or to respond to engineering criteria. The Project Team added a connection to I-10 to form a continuous alignment, as shown on **Figure 2-5** (End-to-End Build Corridor Alternatives).

The alternatives development process resulted in three end-to-end Build Corridor Alternatives and a No Build Alternative to be evaluated in detail in the Draft Tier 1 EIS. The end-to-end alternatives include all corridor Options remaining after the screening process, as shown in **Table 2-1** (End-to-End Build Corridor Alternatives). They represent the range of viewpoints voiced during the study to date, from supporting the development of a new corridor to using existing corridors as much as possible.

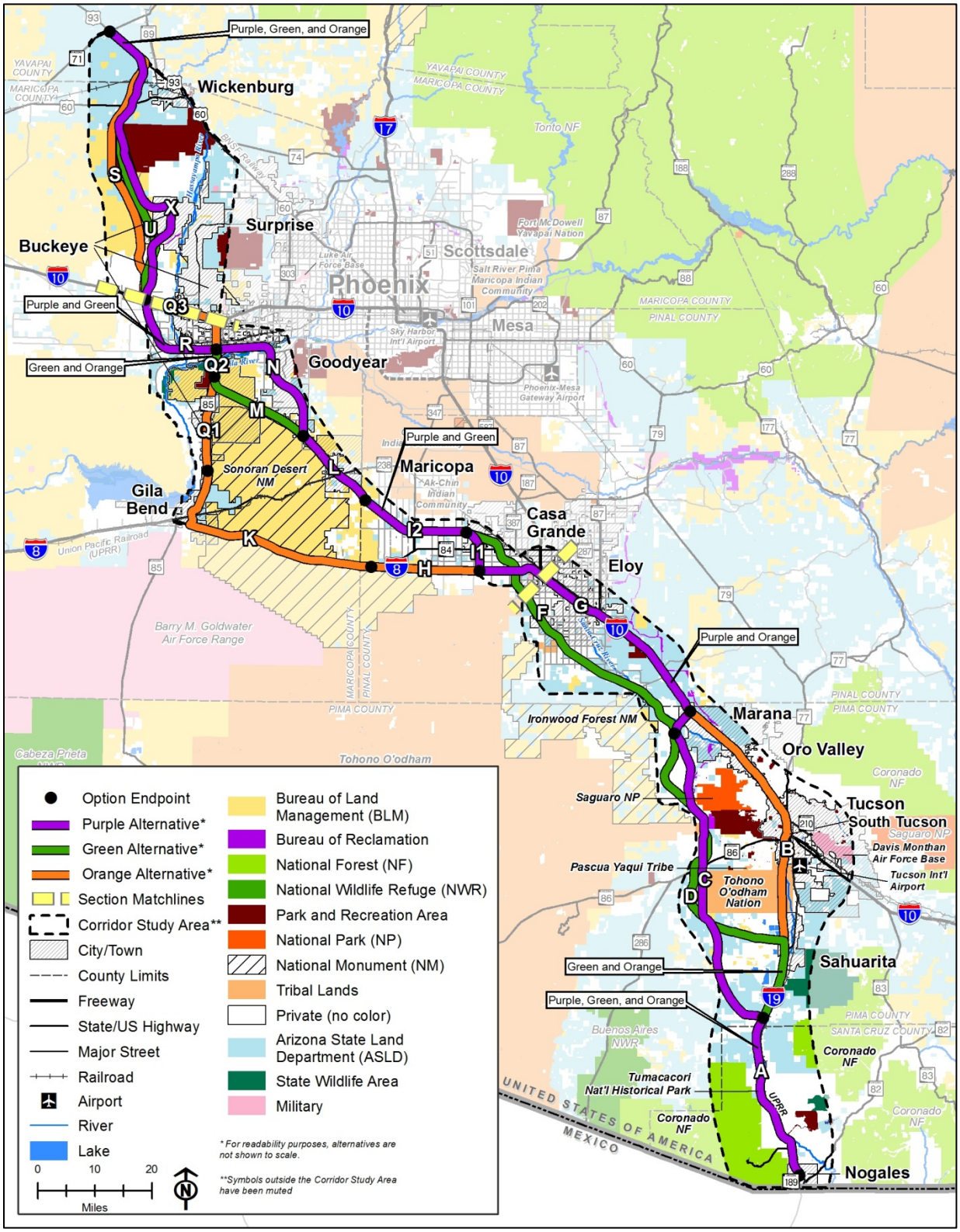


Figure 2-5 End-to-End Build Corridor Alternatives

Table 2-1 End-to-End Build Corridor Alternatives

Corridor Alternative Section	Purple Alternative	Green Alternative	Orange Alternative
South Section	A	A	A
	C	D	B
	G	F	G
Central Section	I1	I2	H
	I2	L	K
	L	M	Q1
	N	Q2	Q2
	R	R	Q3
North Section	X	U	S
Total Alternative Length	271 miles	268 miles	280 miles
New Lane Miles	758	930	415

Figure 2-5 (End-to-End Build Corridor Alternatives) illustrates the three Build Corridor Alternatives. **Chapter 3** (Affected Environment and Environmental Consequences) evaluates these alternatives and the No Build Alternative in detail.

The conclusions from the alternatives development phase did not carry any weight into the EIS, which put all the alternatives on an equal footing.

2.3.1 No Build Alternative

A No Build Alternative is the baseline for comparison to the Build Corridor Alternatives, and is evaluated as a full alternative in the Draft Tier 1 EIS. The No Build Alternative represents the existing transportation system, along with committed improvement projects that are programmed for funding. These improvements are represented in the federally approved *State Transportation Improvement Program*. Projects in this program are consistent with the statewide long-range transportation plan and metropolitan transportation improvement programs.

Under the No Build scenario, travel between Nogales and Wickenburg would use the existing corridors of I-19 and I-10 within the Study Area, along with a connection to Wickenburg via the Phoenix metropolitan area. This connection could take many routes, depending on traveler preference (e.g., SR 101L, SR 202L, SR 303L, I-17, SR 74, US 60). **Table 1-3** (Peak Period Travel Times from Nogales to Wickenburg in Afternoon, 2015 and 2040) in **Chapter 1** (Purpose and Need) provides the various routing options, distances, travel times, and average speeds. This information was generated by the Arizona Statewide Travel Model maintained by ADOT.

The Arizona Model was developed for the ADOT Travel Demand Modeling Group as a trip-based model to estimate the interaction between travel movements (passenger cars and trucks) and the statewide transportation network. The model supports numerous ADOT planning efforts and is updated periodically on a statewide basis to reflect such inputs as revised socioeconomic forecasts or updated transportation system configurations. The Arizona Model is a standard practice used on ADOT projects, and model inputs are not updated on a project basis.

The Arizona Model uses a traditional four-step forecasting approach based on trip generation, trip distribution, mode choice, and trip assignment. The Arizona Model analysis used 2040 socioeconomic forecasts developed by the State Demographer and a four-step modeling process to generate performance measures for the Study Area and broader state of Arizona No Build Alternative conditions. The Arizona Model assumes the current adopted future transportation network, which includes the capacity improvements identified in ADOT's and regional metropolitan planning organizations regional long-range transportation plans.

Socioeconomic projections in the Arizona Model do not incorporate or ensure water availability for future development. The State Demographer builds the statewide projections on the future land uses included in local General or Comprehensive Plans, which are put together before developers must prove a 100-year water supply under the Arizona Department of Water Resources' Assured Water Supply Program. Therefore, the amount and density of proposed residential development throughout the Study Area may not reflect the true availability of water, which in turn, can impact travel patterns, capacity, and needs.

Within the Study Area, the *2018-2022 Five-Year Transportation Facilities Construction Program* identified several capacity improvements programmed and funded for construction by 2022 on the interstate and state highway system within the Study Area. 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).

Under the No Build Alternative, capacity 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)
- US 93: Tegner Drive to SR 89

The No Build Alternative also assumes the implementation of projects outside of the Study Area that are regionally significant or particularly relevant to the I-11 Corridor, including the following:

- SR 303L: SR 30 to I-10 – The public comment period for the Draft Environmental Assessment and Initial Design Concept Report for the SR 303L extension project (I-10 and SR 30/Tres Rios Corridor) was in June and July of 2018. A Final Environmental Assessment and decision document are pending, as of the publication of this I-11 Corridor Draft Tier I EIS.
- Loop 202 South Mountain Freeway (SR 202L)
- Future SR 30/Tres Rios Corridor (from SR 303L to the South Mountain Freeway)
- I-10 Near-Term Improvements (e.g., Broadway curve improvements)
- SR 189: International Border to Grand Avenue

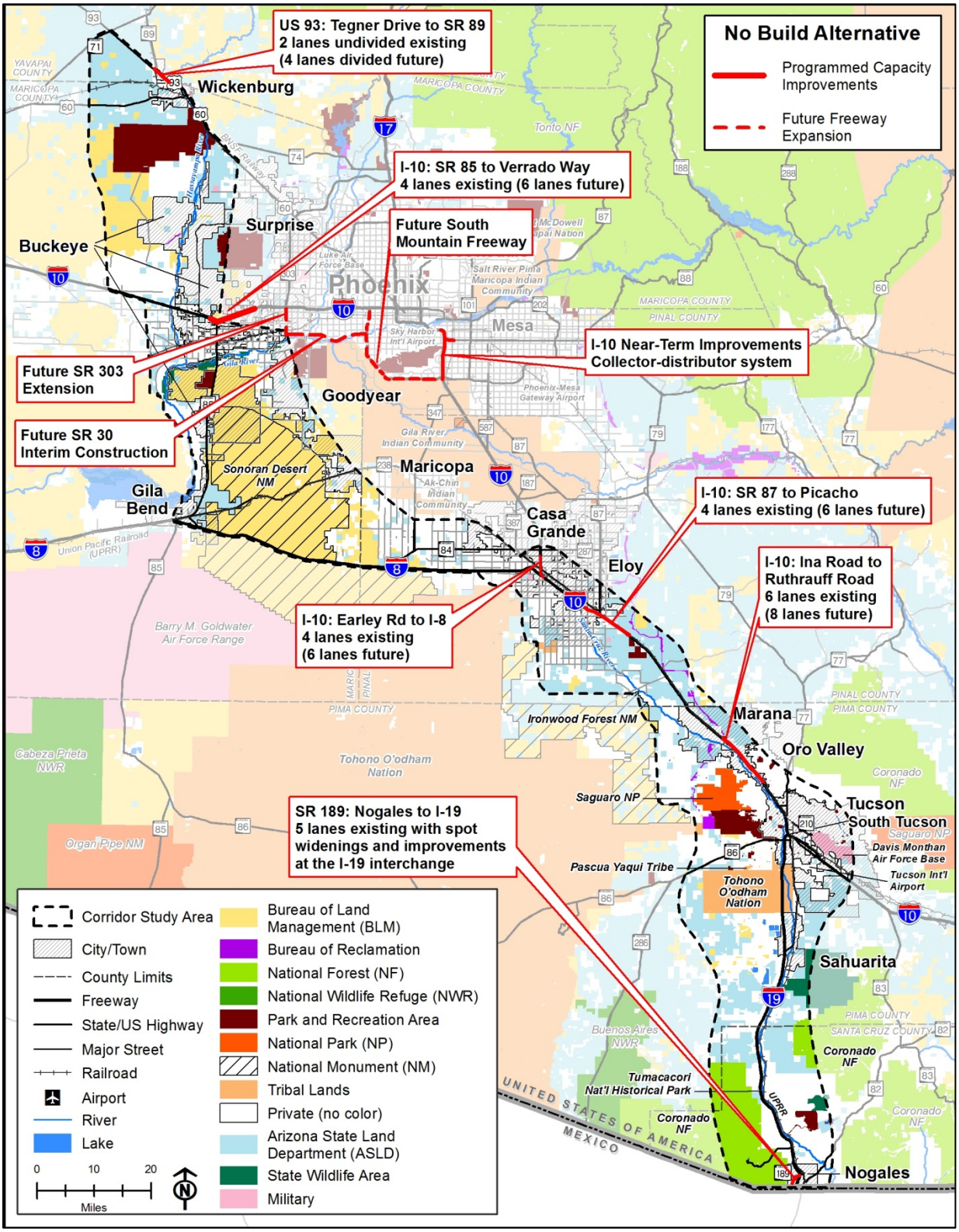


Figure 2-6 No Build Alternative Capacity Improvements

2.3.2 Build Corridor Alternatives

2.3.2.1 Assumptions Common to All Build Corridor Alternatives

The Build Corridor Alternatives have several common features.

- Each Build Corridor Alternative is a 2,000-foot-wide corridor within which a future alignment would be located. Future Tier 2 studies would place the specific alignment of the I-11 facility somewhere within the 2,000-foot-wide corridor. A future I-11 facility is expected to be approximately 400 feet wide. The level of analysis for the Draft Tier 1 EIS is qualitative and programmatic, reflecting the broad definition of the corridor, while the future Tier 2 environmental review would consider specific alignments for more detailed review (**Figure 2-7** [Tier 1 versus Tier 2 Level of Detail]).

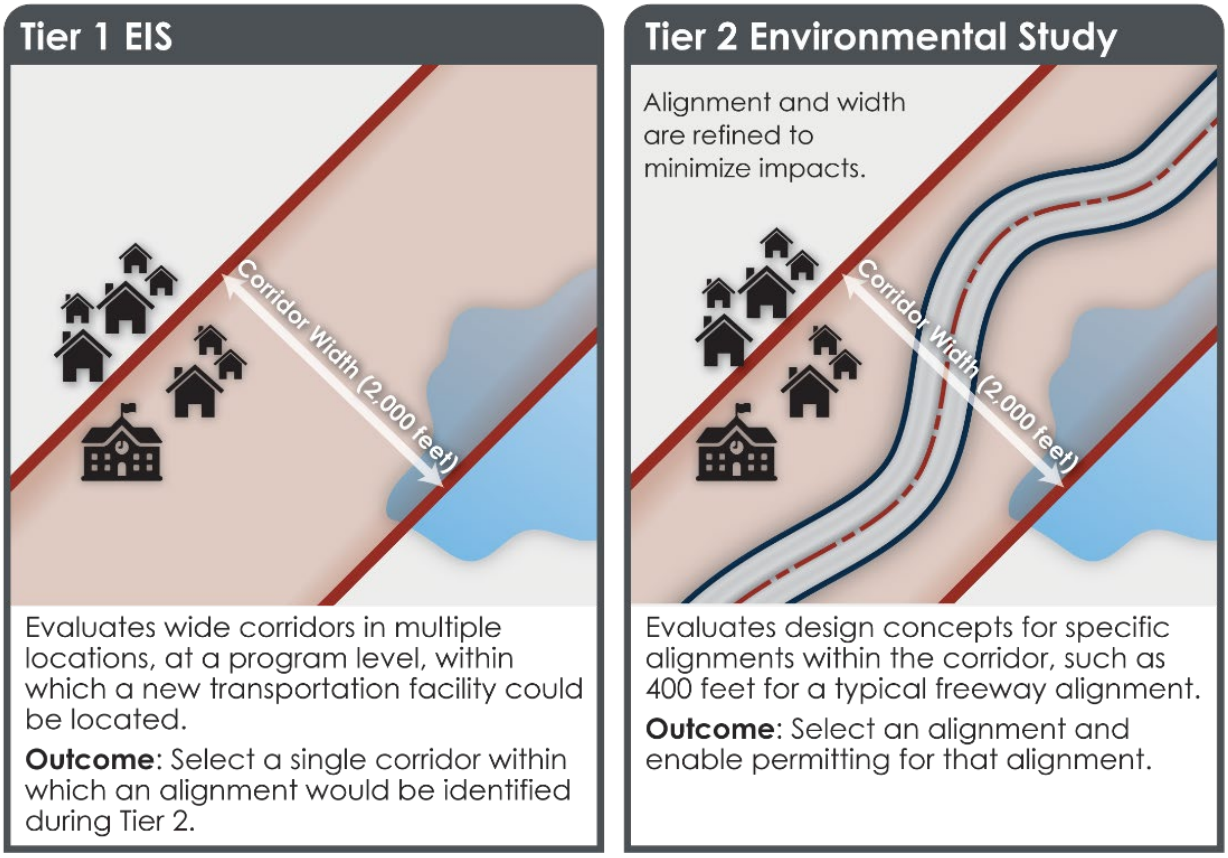


Figure 2-7 Tier 1 versus Tier 2 Level of Detail

- Specific interchange locations are not identified for the Build Corridor Alternatives. However, a set of potential interchange locations were assumed for purposes of this analysis based on the most current available transportation network in the Arizona Model. It is assumed the ultimate footprint of future interchanges would be contained within the 2,000-foot-wide Project Area of each Build Corridor Alternative.

- All Build Corridor Alternatives terminate at the SR 189 and I-19 traffic interchange in Nogales. The programmed improvements at the SR 189/I-19 interchange and improvements on SR 189 to the Mariposa port of entry at the US–Mexico border are assumed to occur prior to the I-11 implementation.
- All Build Corridor Alternatives would be phased, as discussed further in **Chapter 6** (Recommended Alternative).

2.3.2.2 Purple Alternative

The Purple Alternative is illustrated on **Figure 2-8** (Build Corridor Alternative: Purple). This alternative is a mix of existing and new Corridor Options.

This alternative originates at the SR 189/I-19 interchange in Nogales. It includes the following Corridor Options in the South Section:

Option A. Option A is co-located with I-19 from Nogales to the Santa Cruz/Pima County line, near the alignment of Elephant Head Road in Arivaca.

Option C. Option C is a new corridor that would divert west from I-19 near the Santa Cruz/Pima County line, using existing roadway alignments in some locations. A portion of Option C is co-located with the alignment of Sandario Road in the vicinity of the Tucson Mitigation Corridor (TMC), CAVSARP, SAVSARP, and Tohono O'odham Nation (San Xavier and Schuk Toak districts). No part of the Option C is on Tohono O'odham Nation land. Option C would tie back to I-10 in the Marana area.

Option C – Central Arizona Project (CAP) Design Option. The Preliminary Draft Section 4(f) Evaluation triggered consideration of additional Options across the TMC. The CAP Design Option is based on coordination with the Bureau of Reclamation (as the owner with jurisdiction of the Section 4(f) property). It closely parallels the CAP canal on its downslope (western) side across the TMC (see inset detail on **Figure 2-8** [Build Corridor Alternative: Purple]). Placing I-11 next to the CAP canal consolidates these two linear facilities. This would provide the opportunity to place wildlife crossings on I-11 that match up with each of the existing siphon crossings along the CAP canal. This Option could replace 11.3 miles of the original Option C between SR 86 and Mile Wide Road.

Option G. Option G is co-located with I-10 and a short portion of I-8 in Pinal County. The end point of Option G is near Montgomery Road on I-8.

Options I1 and I2. Option I is split into Options I1 and I2 in order to differentiate the portions that are contained in the Purple and the Green Alternatives. The Purple Alternative includes both Option I1 and I2. Option I1 generally follows the alignment of Montgomery Road north from I-8 to Barnes Road. Option I1 is consistent with the West Pinal corridor alignment identified in previous plans, such as the Pinal Regional Transportation Plan. Option I2 extends west along the alignment of Barnes Road, and then heads northwest near SR 347/Maricopa Road towards Goodyear.

Option L. Option L is a new corridor that parallels the east edge of the Sonoran Desert National Monument. This Option is co-located with a portion of the proposed Hassayampa Freeway corridor from the MAG *I-8 and I-10/Hidden Valley Regional Transportation Framework Study*, and is within a multi-use corridor designated by BLM.

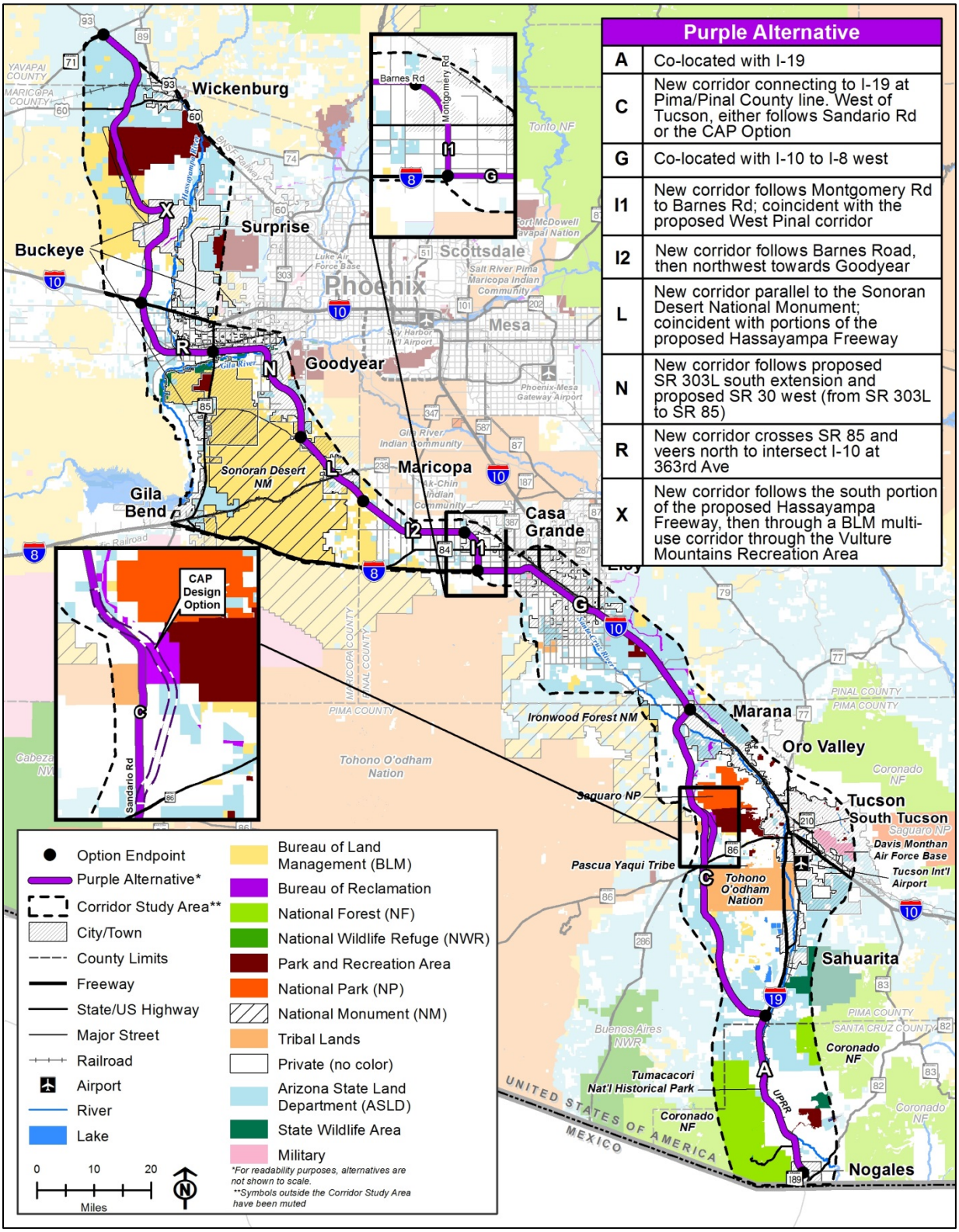


Figure 2-8 Build Corridor Alternative: Purple

Option N. Option N is a new corridor through Goodyear and Buckeye which follows the proposed SR 303L south extension and creates a new crossing the Gila River. The east-west portion of Option N is consistent with the planned alignment of SR 30/Tres Rios Corridor in the ADOT *Loop 303L from State Route 30 to Hassayampa Freeway* study.

Option R. Option R is a new corridor that extends west from SR 85 in south Buckeye and turns north to intersect I-10 at approximately milepost 100 (363rd Avenue).

Option X. North of I-10, Option X would follow the south portion of the proposed Hassayampa Freeway corridor from the MAG *I-10/Hassayampa Valley Regional Transportation Framework Study*. Option X crosses the VMRA through the eastern portion of a designated BLM multi-use utility corridor, parallel to an existing transmission line.

North of the VMRA, Option X connects to US 93 just northwest of Wickenburg. The route of Option X is consistent with the Town of Wickenburg's preferred routing, as identified in its May 2017 resolution. See **Chapter 5** (Coordination and Outreach) for more details on the Town of Wickenburg's May 2017 resolution, the full text of which is attached in **Appendix G**.

2.3.2.3 Green Alternative

The Green Alternative is illustrated on **Figure 2-9** (Build Corridor Alternative: Green). This alternative consists primarily of new Corridor Options (i.e., it is not co-located with existing transportation facilities). The Options for the Green Alternative include the following:

Option A. Option A is co-located with I-19 from Nogales to the Santa Cruz/Pima County line.

Option D. Option D is a new corridor following I-19 from near the Santa Cruz/Pima County line to Sahuarita. It diverts west from I-19 near El Toro Road in Sahuarita. The portion of this Option that crosses the TMC follows the alignment of Sandario Road and is the same as Option C (see inset map for the CAP Design Option on **Figure 2-9** [Build Corridor Alternative: Green]). No part of Option D is on Tohono O'odham Nation land.

Option D - CAP Design Option. The Preliminary Draft Section 4(f) Evaluation triggered consideration of additional Options across the TMC. The CAP Design Option is based on coordination with the Bureau of Reclamation (as the owner with jurisdiction of the Section 4(f) property). It closely parallels the CAP canal on its downslope (western) side across the TMC (see inset detail on **Figure 2-9** [Build Corridor Alternative: Green]). Placing I-11 next to the CAP canal consolidates these two linear facilities. This would provide the opportunity to place wildlife crossings on I-11 that match up with each of the existing siphon crossings along the CAP canal. This Option could replace 11.3 miles of the original Option C between SR 86 and Mile Wide Road.

Option F. Within Pinal County, Option F is a new corridor west of I-10 which crosses I-8 near Chuichu Road. Option F, as presented in the *Alternative Selection Report,* was extended north of I-8 through Casa Grande to connect with Option I2 at Barnes Road.

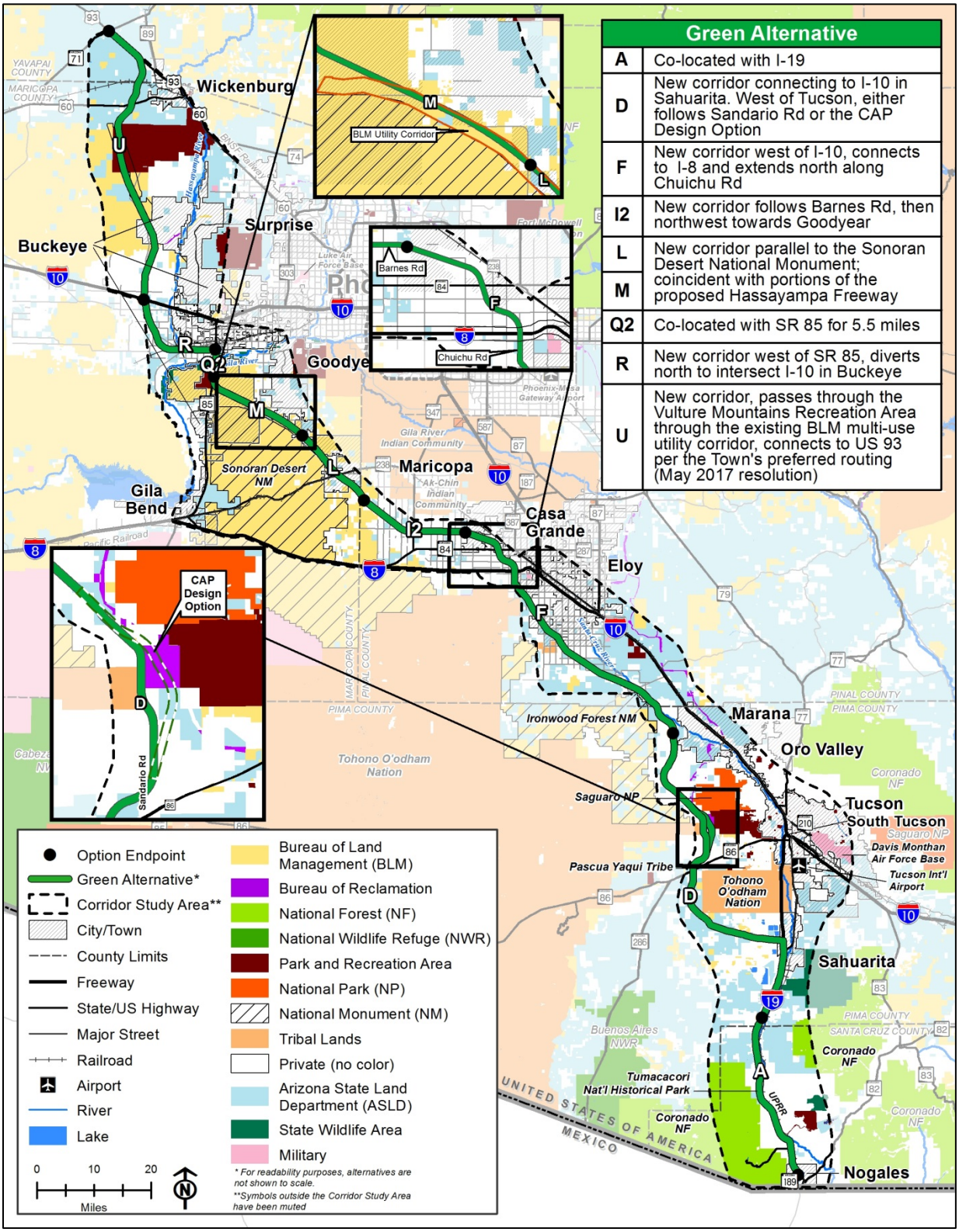


Figure 2-9 Build Corridor Alternative: Green

NOTE: With the extension of Option F north of I-8, connecting with a portion of Option I, Option I is now labeled as I1 and I2 to differentiate this intersection point.

Option I2. Option I2 is a new corridor that extends west along the alignment of Barnes Road, and then heads northwest near SR 347/Maricopa Road towards Goodyear.

Option L. Option L is a new diagonal corridor that parallels the eastern edge of the Sonoran Desert National Monument. This Option is co-located with a portion of the proposed Hassayampa Freeway corridor from the MAG *I-8 and I-10/Hidden Valley Regional Transportation Framework Study* and is within a BLM-designated multi-use corridor.

Option M. Option M is a new corridor that continues west from Option L within a BLM-designated multi-use corridor along the northeastern boundary of the Sonoran Desert National Monument. East of SR 85, Option M moves north to avoid an existing landfill and a power utility substation then connects with Option Q2 at SR 85.

Option Q2. Option Q2 is co-located with SR 85 and includes the existing crossing of the Gila River. Option Q2 would convert SR 85 (a four-lane divided highway) to an interstate facility for approximately 5 miles connecting with Option R approximately 5 miles south of I-10 on SR 85. This corridor is already planned to be a fully access-controlled freeway.

Option R. Option R is a new corridor that extends west from SR 85 in south Buckeye. It diverts north to intersect I-10 near milepost 100 (363rd Avenue).

Option U. Option U is a new corridor extending north of I-10 in western Maricopa County. This Option crosses the VMRA within a BLM-designated multi-use corridor and connects to US 93 just northwest of Wickenburg. The general location of Option U north of the VMRA is consistent with the Town of Wickenburg's preferred routing as identified in its May 2017 resolution. See **Chapter 5** (Coordination and Outreach) for more details on the Town of Wickenburg's May 2017 resolution, the full text of which is attached in **Appendix G**. Option U (Green Alternative) differs from the Purple Alternative (Option X) because it was developed based on the engineering inputs using the technical geographic information system (GIS)-based model.

2.3.2.4 Orange Alternative

The Orange Alternative is illustrated on **Figure 2-10** (Build Corridor Alternative: Orange). This alternative consists mostly of existing interstate and highway corridors and includes the following Options:

Option A. Option A is co-located with I-19 from Nogales to the Santa Cruz/Pima County line.

Option B. Option B is co-located with I-19 and I-10 through Pima County and the Tucson urban area. This section includes a portion of I-19 extending through the San Xavier District of the Tohono O'odham Nation, which is located on a perpetual transportation easement from the Tohono O'odham Nation. **Appendix I** provides the documentation for this easement. I-10 through central Tucson (between I-19 and Prince Road) is mostly elevated, with frontage roads and grade-separated railroad crossings, multiple-level sound walls, and landscaping.

Option G. Option G is co-located with I-10 and a short portion of I-8 in Pinal County, terminating near Montgomery Road on I-8.

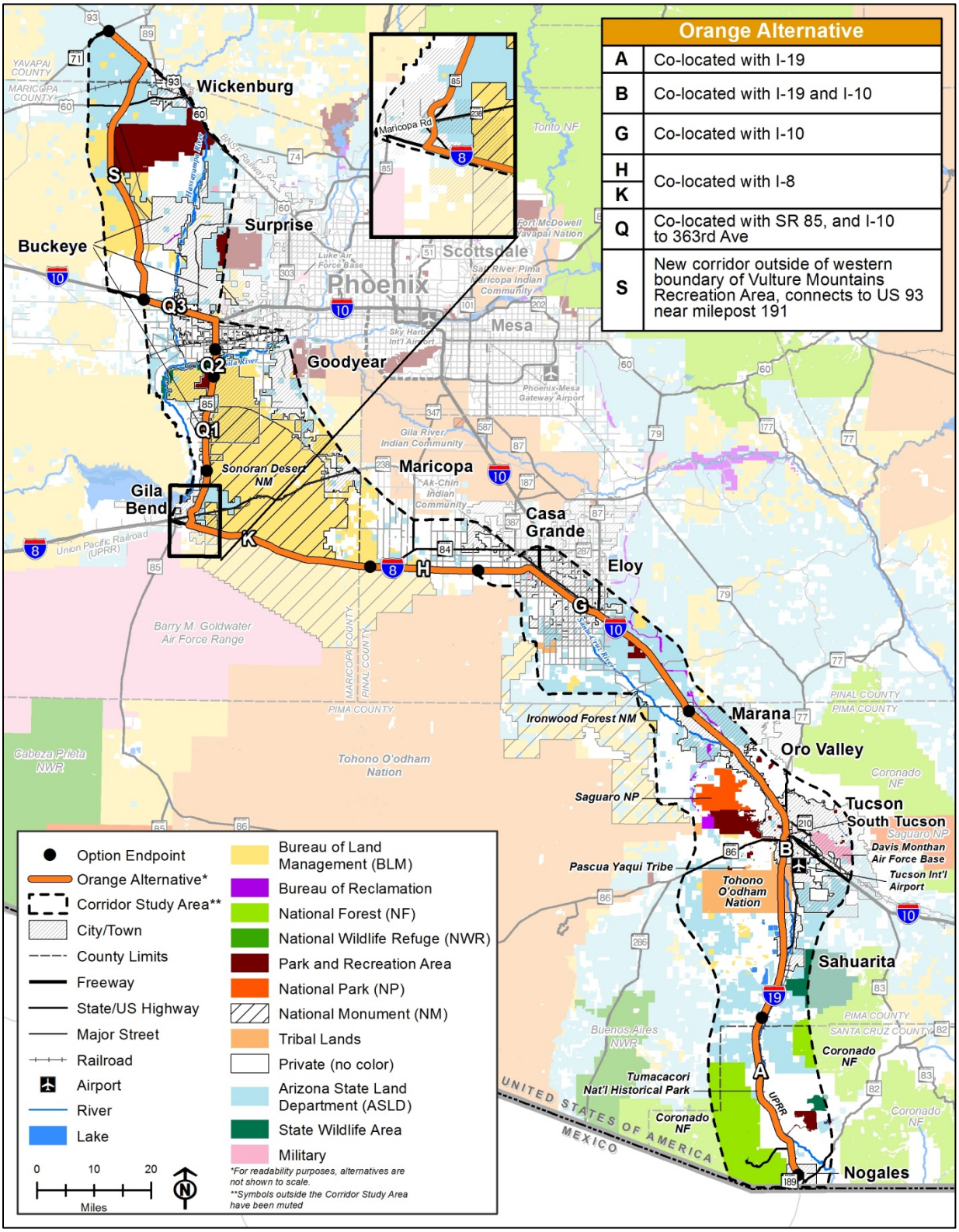


Figure 2-10 Build Corridor Alternative: Orange

Option H. Option H is co-located with I-8 west from Casa Grande (approximately Montgomery Road) to near the Pinal/Maricopa County line.

Option K. Option K is co-located with I-8 (between the Pinal/Maricopa County line and SR 85) and SR 85 (between I-8 and north of Fornes Road).

Option Q1. Option Q1 is co-located with SR 85 for approximately 16 miles, which is already planned for conversion to a fully access-controlled freeway.

Option Q2. Option Q2 is co-located with SR 85 for approximately 5 miles, which is already planned for conversion to a fully access-controlled freeway.

Option Q3. Option Q3 is co-located with SR 85 and I-10. The section of I-10 included in Option Q3 is approximately 12.5 miles long and extends between SR 85 and milepost 100 (363rd Avenue).

Option S. Option S is a new corridor in western Maricopa County extending north from 363rd Avenue on I-10. This Option is located adjacent to the western boundary of the VMRA, providing an Alternative that is outside the recreation area, and connects to US 93 just northwest of Wickenburg. Option S was identified based on the engineering inputs during the GIS-based model analysis.

2.4 Comparison of Alternatives

The following sections compare the alternatives according to how well they meet the I-11 Purpose and Need. **Table 2-2** (Comparison of New Lane Miles and Length) shows the number of new lane miles by Build Corridor Alternative. The Orange Alternative would be co-located with the greatest number of existing freeways and roads. The Green Alternative would create the most new corridors and would include the most new lane miles.

Table 2-2 Comparison of New Lane Miles and Length

Section	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Lane Miles in South Section	0	230	345	71
Lane Miles in Central Section	0	320	385	142
Lane Miles in North Section	0	208	200	202
End-to-End New Lane Miles Assumed in Arizona Travel Demand Model	**0**	**758**	**930**	**415**
Length (miles)	0	271	268	280

SOURCE: ADOT 2018. Travel Forecasting Methods and Analysis Report.

The project team identified the number of lanes needed to achieve the acceptable Level of Service (LOS), discussed further in this chapter. The number of lanes used in the Arizona Travel Demand Model was based on achieving the LOS threshold. Generally, four lanes were needed to meet the LOS threshold for new corridors. The specific number of lanes assumed in the travel demand model is shown on the cross sections in **Appendix E1**.

Potential impacts in this Tier I Draft EIS are based on a 2,000-foot-wide planning corridor, not the actual width of the highway project if it were constructed. The actual number of lanes, design configuration, and specific impacts would be determined in Tier 2 studies.

2.4.1 Population and Employment Growth

Table 2-3 (Comparison of Alternatives and Planned Growth Areas) summarizes how each alternative would serve areas planned for high growth.

Table 2-3 Comparison of Alternatives and Planned Growth Areas

Key Metrics		Alternatives			
Purpose and Need	**Metric**	**No Build**	**Purple**	**Green**	**Orange**
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, Wickenburg).	The Green Alternative serves anticipated growth well and provides more access in the Sahuarita area, but does not provide as much access to the Goodyear/State Route 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

Figure **2-11** (Planned Growth Areas and Build Corridor Alternatives) shows the Build Corridor Alternatives in relation to the planned growth areas. The figure shows the areas where local municipalities are planning for high growth in pink. The growth areas were determined based on municipal general and county comprehensive plans, and were supported by interviews with local planning and economic development staff.

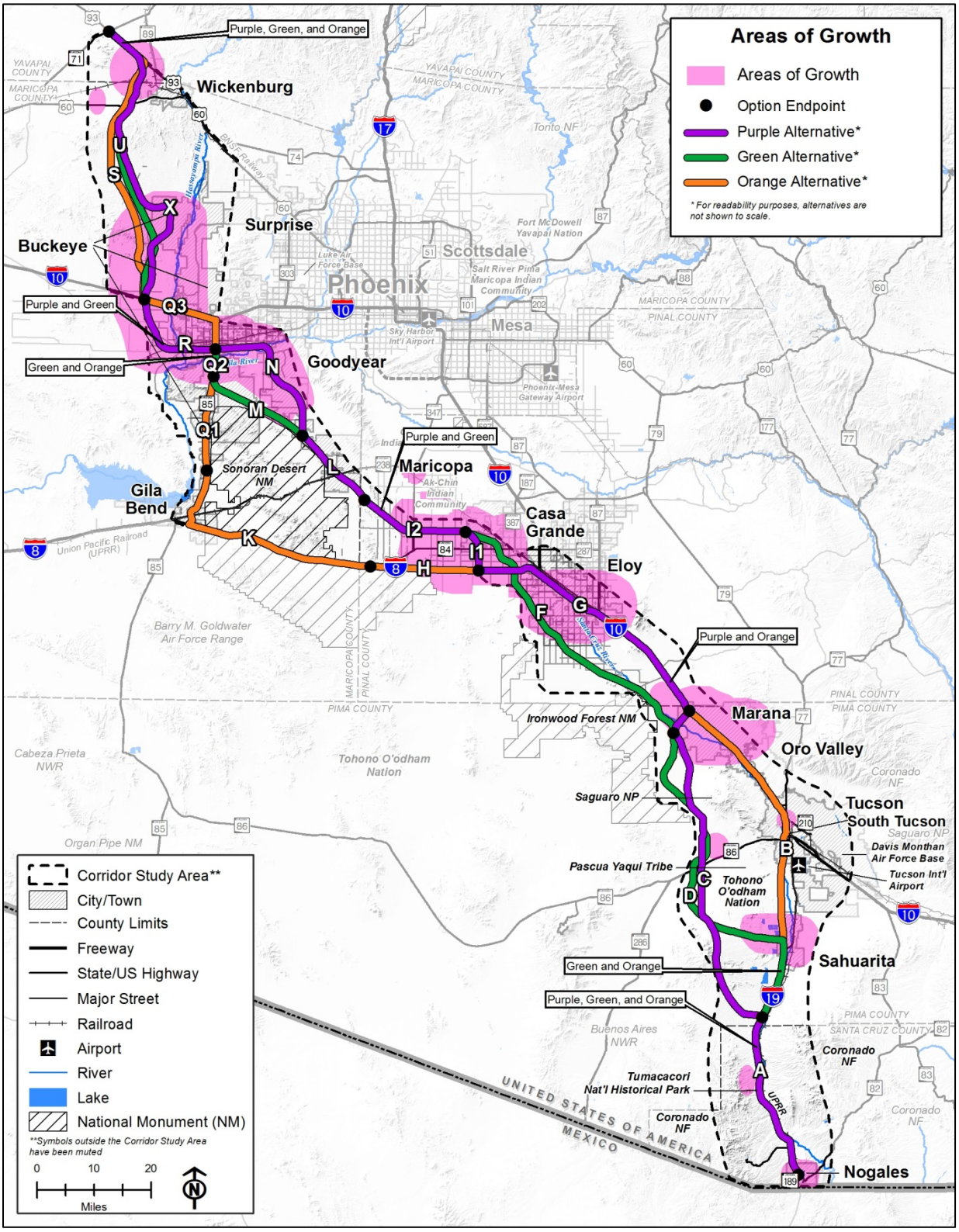


Figure 2-11 Planned Growth Areas and Build Corridor Alternatives

2.4.2 Traffic Growth and Travel Time Reliability

2.4.2.1 Travel Times

Figure 2-12 (2040 Travel Times in Minutes [Afternoon Peak Period]) presents travel times for the No Build Alternative and the Build Corridor Alternatives for 2040 afternoon peak period conditions (3 p.m. to 6 p.m.). All the Build Corridor Alternatives improve travel times. The Green Alternative has the fastest travel time between Nogales and Wickenburg, at 237 minutes, representing a 54-minute savings over No Build conditions. The Purple Alternative has the next fastest travel time, at 243 minutes.

Figure 2-13 (2040 Travel Times in Minutes for City Pairs [Afternoon Peak Period]) presents travel times for key city pairs in the Study Area.

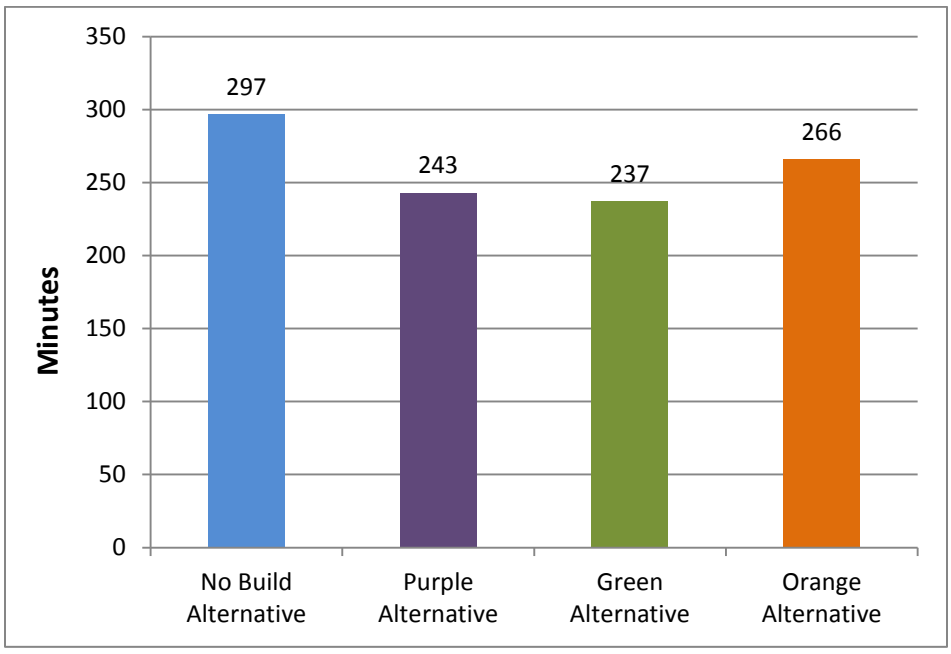


Figure 2-12 2040 Travel Times Nogales to Wickenburg (Afternoon Peak Period)

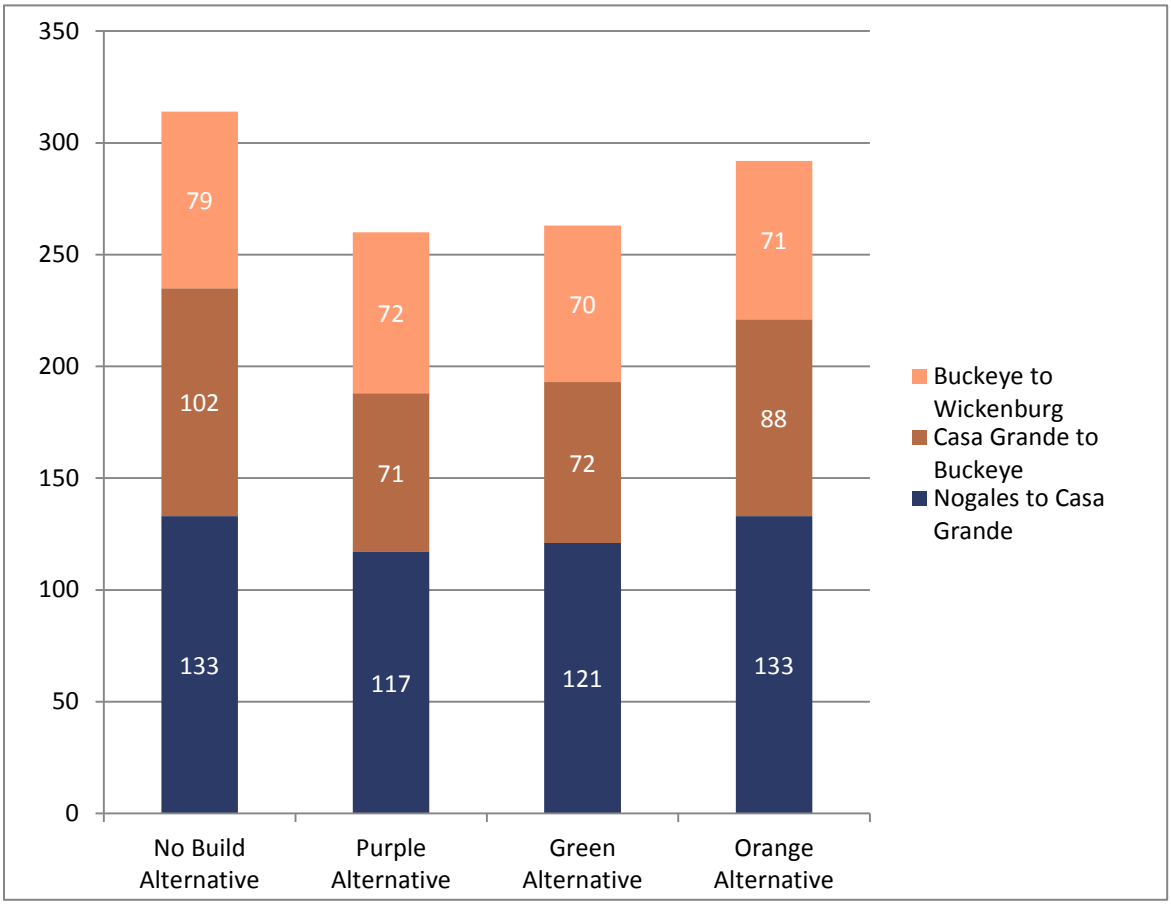


Figure 2-13 2040 Travel Times in Minutes for City Pairs (Afternoon Peak Period)

2.4.2.2 Level of Service

The Project Team defined a threshold for level of service (LOS) on I-11. The LOS threshold informed the number of lanes used for modeling the transportation performance of the Build Corridors in the Arizona Model. Generally, four lanes were determined to meet the need for new corridors. The number of lanes used in the travel demand model is shown on the cross sections in **Appendix E1**.

The LOS criteria are:

- Achieves LOS C or better on I-11 in in rural areas
- Achieves LOS D or better on I-11 in urban areas (Tucson)

The Purple and Green Alternatives achieve LOS C or better on the future I-11 facility. The Orange Alternative achieves LOS C or better except in downtown Tucson where it achieves LOS D. The LOS on existing roads is projected to range from LOS C to LOS F and is discussed in detail in **Chapter 1** (Purpose and Need).

Table 2-4 (Comparison of Travel Time and Level of Service [LOS]) compares the travel time and LOS for the No Build Alternative and the Build Corridor Alternatives.

Table 2-4 Comparison of Travel Time and Level of Service (LOS)

Key Metrics		Alternatives			
Purpose and Need	**Metric**	**No Build**	**Purple**	**Green**	**Orange**
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 minutes (54-minute savings over the No Build Alternative)	237 (60-minute savings over the No Build Alternative)	266 (31-minute savings over the No Build Alternative)
	Achieves 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	LOC C or better in rural areas outside of Tucson LOS D on I-11 in Tucson

2.4.3 System Linkages and Regional Mobility

2.4.3.1 Vehicles Miles Traveled

The Project Team used VMT to evaluate utilization of the I-11 Build Corridor Alternatives. Higher system VMT, when compared to the no build, means vehicles are driving further to take advantage of I-11 Corridor travel time savings. The Project Team used the Arizona Statewide Travel Demand Model to model vehicles miles traveled (VMT) in each section of the Study Area. As shown on **Table 2-5** (2040 Vehicle Miles Traveled), **Figure 2-14** (2040 Vehicle Miles Traveled for Passenger Cars and Trucks), and **Figure 2-15** (2040 Vehicle Miles Traveled for Trucks), there would be a negligible increase (less than 1 percent) in VMT in the South Section with the Build Corridor Alternatives. Even with the Build Corridor Alternatives, I-10 will continue to carry a significant amount of traffic through the Tucson area and will continue to be used as a primary connection to downtown Tucson. The Central Section would see the greatest changes in VMT for both passenger cars and trucks. The Purple Alternative would result in the biggest increase in VMT in the Central Section, with a 15 percent increase for passenger cars and a 117 percent increase for trucks. The Green Alternative also would result in substantial increases in VMT in the Central Section (11 percent for passenger cars and 85 percent for trucks). The North Section would see moderate increases in VMT for passenger cars (1 to 5 percent) and moderate to substantial increases in VMT for trucks (3.8 to 21.1 percent).

Table 2-5 2040 Vehicle Miles Traveled

Section	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Passenger Cars and Trucks				
South	30,088,800	30,255,800	30,126,400	30,301,100
Central	6,190,200	8,108,900	7,577,000	6,422,600
North	2,478,100	2,487,800	2,585,000	2,605,200
Total	38,757,100	40,852,500	40,288,400	39,328,900
Trucks				
South	4,175,200	4,196,000	4,177,300	4,211,800
Central	946,000	2,052,500	1,748,200	990,400
North	205,000	211,400	246,700	240,000
Total	5,326,200	6,459,900	6,172,200	5,442,200

SOURCE: ADOT 2018.

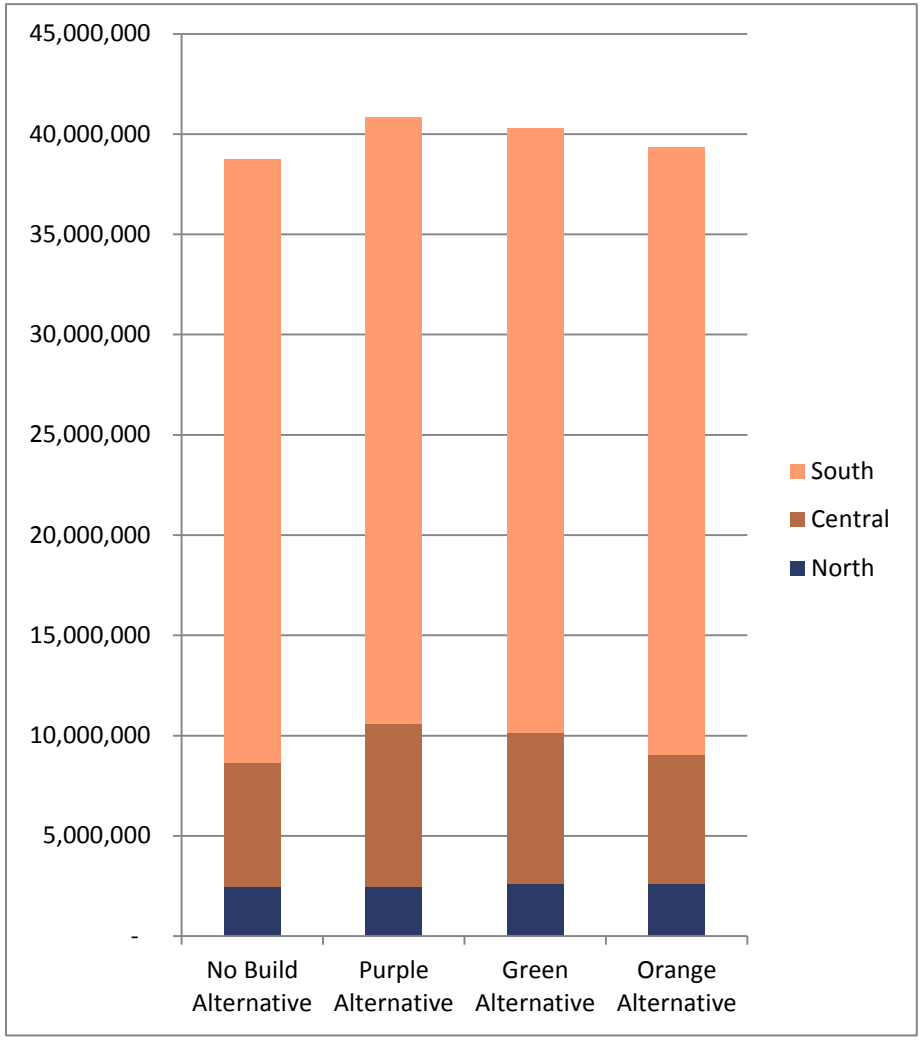


Figure 2-14 2040 Vehicle Miles Traveled for Passenger Cars and Trucks

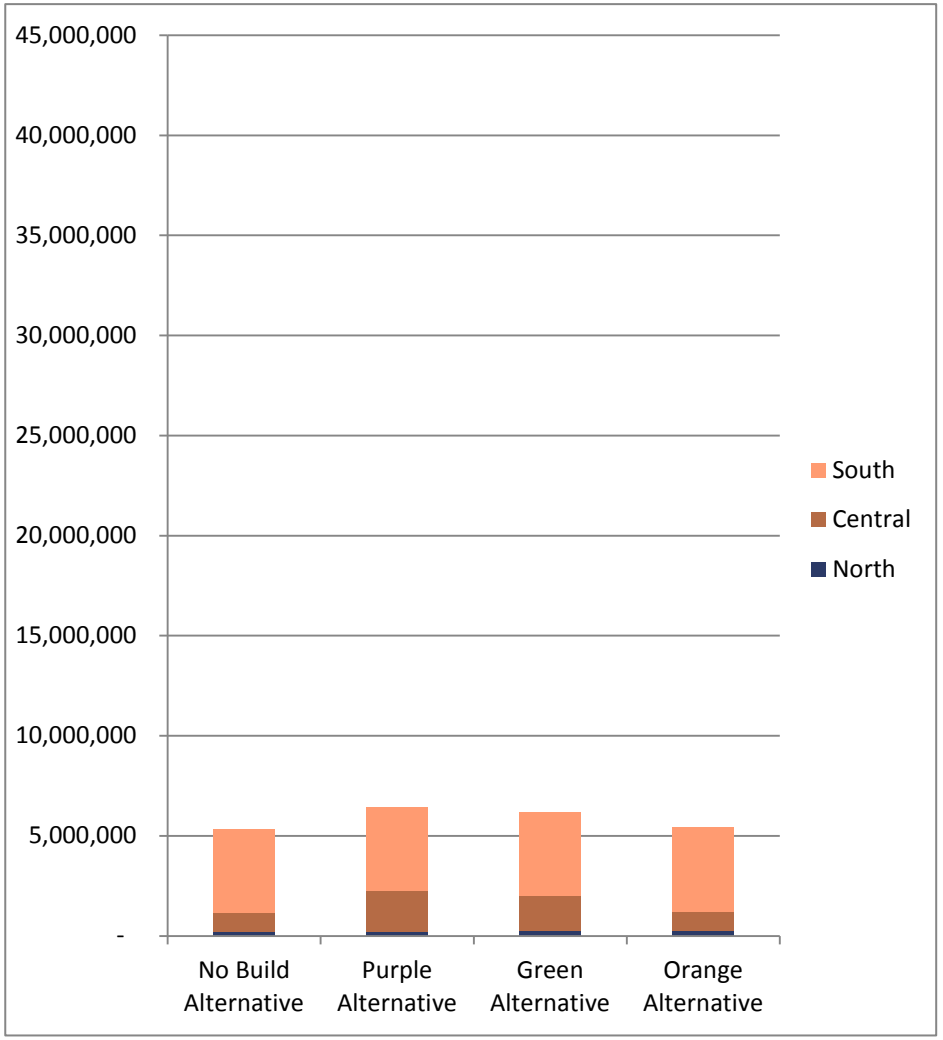


Figure 2-15 2040 Vehicle Miles Traveled for Trucks

2.4.3.2 Freight

The I-11 Corridor has been addressed in federal legislation as well as statewide and regional planning documents in an effort to respond to projected growth and support more robust north-south trade. Freight moving across the US–Mexico border is carried via truck or rail. The I-11 is positioned to take advantage of current developments in international trade, and offers the potential to accommodate new economic activity related to the emerging manufacturing and trade relationship with Mexico. **Appendix E2** provides an inventory of freight, transit, and airport**.**

The Purple Alternative generates the highest increase in truck-related VMT between Nogales and Wickenburg compared to the No Build Alternative (21 percent), followed by the Green Alternative (15 percent). The changes in VMT indicate the Purple and Green Alternatives may be able to attract freight traffic from established freight routes, likely due to the shorter distances and travel times and the increased reliability and speeds. Freight traffic flows are a function of the shortest and fastest path.

Table 2-6 (Comparison of Vehicle Miles Traveled) summarizes how well the alternatives perform in relation to attracting and diverting traffic from existing roadways.

Table 2-6 Comparison of Vehicle Miles Traveled

Key Metrics		Alternatives			
Purpose and Need	Metric	No Build	Purple	Green	Orange
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 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 vehicles or trucks.	5% increase in combined passenger vehicles and truck VMT. 21% increase in truck VMT over the No Build Alternative.	4% increase in combined passenger vehicles and truck VMT. 16% increase in truck VMT over the No Build Alternative.	2% increase in combined passenger vehicles and truck VMT. 2% increase in truck VMT over the No Build Alternative.

2.4.4 Access to Economic Activity Centers

Table 2-7 (Access to Economic Activity Centers) summarizes the number of key economic centers for the No Build Alternative and the Build Corridor Alternatives.

Table 2-7 Access to Economic Activity Centers

Key Metrics		Alternatives			
Purpose and Need	**Metrics**	**No Build**	**Purple**	**Green**	**Orange**
Need: Access to Economic Activity Centers: Efficient freeway access and connectivity to major economic activity centers is 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)	9 total - 5 existing centers 4 emerging centers I-10 and I-19	14 total - 7 existing centers primarily near I-10 7 emergency centers	10 total - 6 existing centers primarily near I-10 4 emerging centers	15 total - 8 existing centers primarily near I-10 7 emerging centers

Economic activity centers in relation to the Build Corridor Alternatives are shown on **Figure 2-16** (Economic Centers and Build Corridor Alternatives). The Orange Alternative provides the most access to economic activity centers, followed by the Purple Alternative.

2.4.5 Capital, Operations and Maintenance Costs

Capital costs were developed to compare the alternatives using 2017 dollars, and include ROW acquisition, materials, and construction. In addition, operations and maintenance costs were developed for each Build Corridor Alternative. The Orange Alternative (approximately $3.1 billion) is substantially less costly to build than the Green or Purple Alternatives (approximately $7.2 billion and $7.3 billion, respectively) because the Orange Alternative would use the most existing highway ROW and expand the most linear miles of existing highway infrastructure compared to the Purple and Green Alternatives that would require construction of more new highway infrastructure in new locations. **Table 2-8** (Summary of Capital Costs) provides a summary of the capital costs associated with each of the options that constitute the Purple, Green, and Orange Build Alternatives.

Table 2-8 Summary of Capital Costs

Option	Purple Build Alternative (A,C,G,I1,I2,L,N,R,V)	Green Build Alternative (A,D,F,I2,L,M,Q2,R,U)	Orange Build Alternative (A,B,G,H,K,Q,S)
A	$0	$0	$0
B			$585,899,000
C	$2,371,714,000		
D		$2,082,061,000	
F1		$1,117,072,000	
F2		$799,298,000	
G	$0		$0
H			$0
I1	$425,705,000		
I2	$233,464,000	$233,464,000	
K			$466,842,000
L	$252,613,000	$252,613,000	
M		$568,067,000	
N	$1,186,438,000		
Q1			$263,697,000
Q2a		$67,876,000	$67,876,000
Q2b		$242,124,000	$242,124,000
Q3a			$60,713,000
Q3b			$351,700,000
R	$796,206,000	$796,206,000	
S			$1,097,388,000
U		$1,113,019,000	
X	$1,148,697,000		
TOTAL COST	**$6,414,837,000**	**$7,271,800,000**	**$3,136,239,000**

Annual operations and maintenance (O&M) costs for each Build Corridor Alternative are shown in **Table 2-9** (Preliminary Cost Estimates for Build Corridor Alternatives). O&M costs were estimates using ADOT's latest fiscal year data for interstate highway maintenance cost per lane mile.

Table 2-9 Preliminary Cost Estimates for Build Corridor Alternatives

Alternative	Capital Cost (Billions)	Operations and Maintenance Cost (Millions)
Purple Alternative	$6.4	$23.1
Green Alternative	$7.3	$20.9
Orange Alternative	$3.1	$31.2

2.4.6 Homeland Security and National Defense

Table 2-10 (Alternate Routes to Existing Interstate Freeway) shows where each Build Corridor Alternative provides an alternate route to an existing interstate freeway. The Purple and Green Alternatives provide an alternate route to an existing interstate highway for most of their lengths. The Orange Alternative only provides an alternate route in the North Section.

Table 2-10 Alternate Routes to Existing Interstate Freeway

Key Metrics		Alternatives		
Purpose and Need	Section	Purple Alternate Route to Existing Interstate Freeway?	Green Alternate Route to Existing Interstate Freeway?	Orange Alternate Route to Existing Interstate Freeway?
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 for alternate regional routes to facilitate efficient mobility for emergency evacuation and defense access.	South Section	**A NO** (co-located with I-19)	**A NO** (co-located with I-19)	**A NO** (co-located with I-19)
		C YES	**D YES**	**B NO** (co-located with I-19/I-10)
		G NO (co-located with I-10)	**F YES**	**G NO** (co-located with I-10)
	Central Section	**I1 YES**	**I2 YES**	**H NO** (co-located with I-8)
		I2 YES (co-located with local arterials)	**L YES (co-located with local arterials)**	**K NO** (co-located with I-8)
		L YES	**M YES**	**Q1 NO** (co-located with SR 85)
		N YES	**Q2 YES** (co-located with SR 85)	**Q2 NO** (co-located with SR 85)
		R YES	**R YES**	**Q3 NO** (co-located with SR 85/I-10)
	North Section	**X YES**	**U YES**	**S YES**
	End-to-End	Yes for 7 out of 9 Options	Yes for 8 out of 9 Options	Yes for 1 out of 9 Options

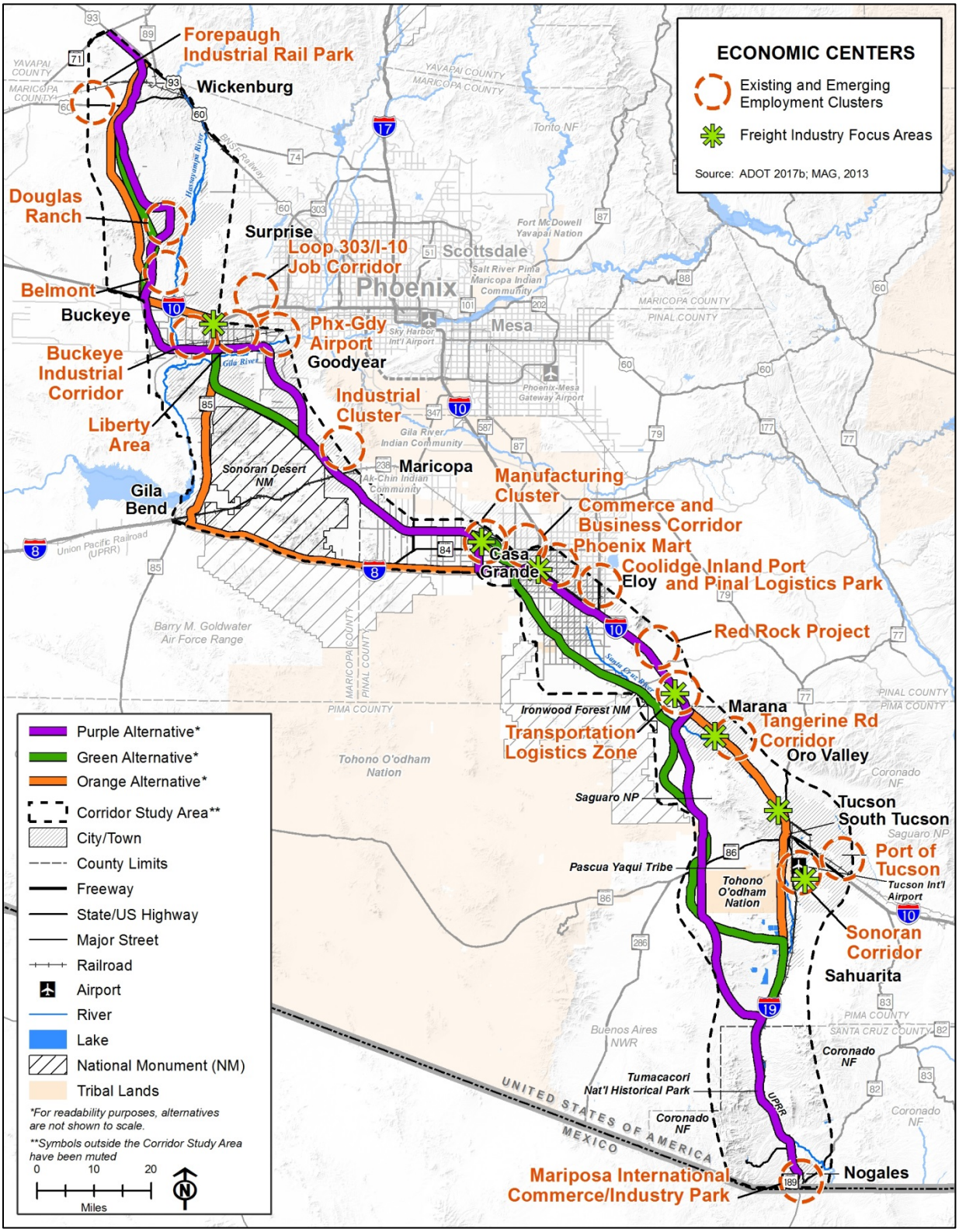


Figure 2-16 Economic Centers and Build Corridor Alternatives

Within the Study Area, there are few continuous north-south facilities. Existing and future congestion levels on I-19, I-10, and other major state roads may inhibit the ability to efficiently and safely move traffic during an incident. Alternate routes are a key response strategy to manage traffic demand during weather incidents or accidents and in cases of natural disasters, they may serve as evacuation routes. Major traffic crashes, emergency access needs, environmental disasters (e.g., dust storms, floods, wildfires), security-related issues, or other events could require full road closures. Alternate routes can strengthen defense movements, international traffic movement, and border security.

2.5 Future Corridor Opportunities

The last few years have seen a breakthrough for emerging transportation technologies, with policy frameworks adopted at both federal and state levels for autonomous vehicles. Emerging technologies can be divided into two categories: (1) technologies that are in fairly advanced stages of development and are likely to be available for mass consumption in the relatively near term (e.g., electric vehicles, autonomous vehicles); and (2) technologies that are in conceptual stages and will need more research and engineering before they become economically viable (e.g., Hyperloop).

These emerging technologies could change the operations of transportation systems globally, and will require advance thought and preparation to begin integrating the required systems into our existing and new infrastructure projects. This section outlines potential emerging transportation technologies that could eventually be integrated into the design of I-11.

The Draft Tier 1 EIS environmental resource analysis will not evaluate technologies that may use the transportation corridor. However, emerging technology trends, such as autonomous/connected vehicles and truck platooning, may impact traffic volumes, travel times, average speeds, and safety, which could impact the corridor footprint or defer some capacity improvements. Over time, statewide and regional travel demand models would need to be recalibrated to account for these travel trends. For example, if one of these emerging technologies becomes a dominant travel trend before I-11 is constructed, the Tier 2 environmental studies would update the approach and data regarding travel demand modeling and travel patterns.

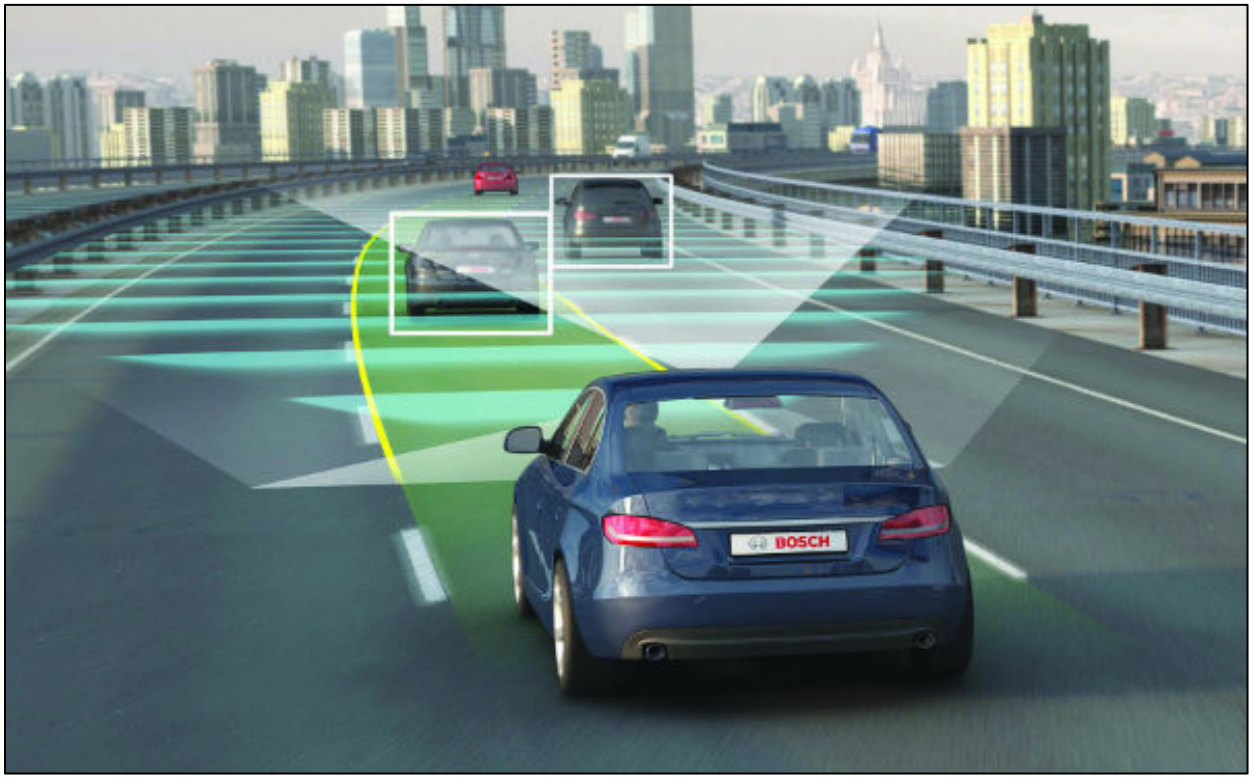
2.5.1 Autonomous Vehicles

Autonomous vehicles are vehicles that have the capability to operate without active physical control or monitoring by a human operator. Autonomous vehicles have the capability to make decisions based on information they are able to gather from the environment around them, either by onboard sensors or other communication devices outside the vehicle. This type of technology is expected to have major implications for safety, convenience, and the planning and design of the physical environment. The National Highway Traffic Safety Administration defines five levels of autonomy for vehicles, where level 0 has no automation and the driver is in complete control: The other levels are described as follows:

- **Levels 1 and 2**: These two levels have driver assist features that can assist with guidance and allow drivers to make better decisions.
- **Level 3**: The vehicle can be in full control for some situations but requires an operator to be able to take control at any time.

- **Levels 4 and 5**: The vehicle is in full control at these levels and can operate with or without occupants.

Currently, consumer vehicles have limited automated technologies integrated into their systems and generally operate at levels 1 and 2 of autonomy. Many manufacturers are testing level 3 technologies that allow the vehicle to be in full control in some circumstances, while an operator is available to take control. TuSimple, a company in Tucson, has been testing Level 4 Class 8 autonomous trucks since 2018 and recently began generating revenue hauling freight for commercial carriers in Arizona (Office of the Governor Doug Ducey 2018). Nikola Motor Company announced in 2018 that they will build a $1 billion hydrogen-electric semi-truck manufacturing operation in the central portion of the Study Area, which will manufacture level 5 autonomous trucks. The company plans to break ground in Coolidge, Arizona (Khairalla 2018).

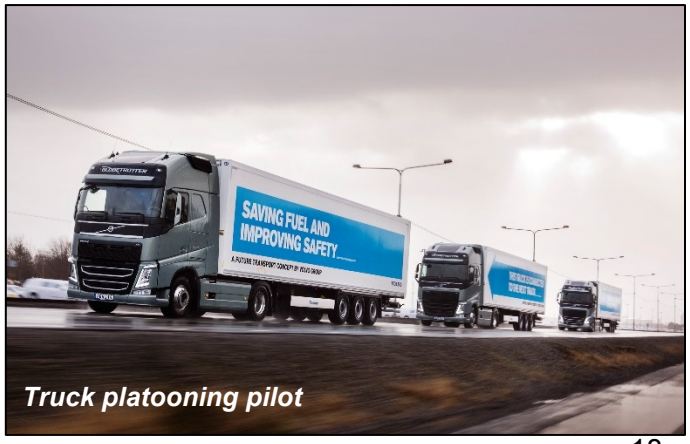


Many of the near-term goals for autonomous vehicles involve improving the safety of our transportation systems. Manufacturers are developing vehicle systems that include automated technologies to better control speed and vehicle positioning, and that also provide drivers with information on their surroundings. Many roadway owners (state departments of transportation) also are investigating improvements to their infrastructure to include devices that can communicate with vehicles to provide better information for driver decisions. This is the case within the Study Area. Recently investors have committed $80 million to build Belmont, a new "smart city," expected to feature accommodations for self-driving cars.

In the long term, autonomous technologies are anticipated to have a much larger impact on safety. The National Highway Traffic Safety Administration conducted a study and found that 94 percent of accidents were caused by human error, where mistakes that drivers made led directly to accidents. The American Automobile Association estimates that autonomous vehicles

could reduce accidents by 90 percent and save more than $190 billion in costs related to vehicle accidents by 2050. This is because vehicles will have more information from the onboard sensors as well as external communication devices that many roadway owners are aiming to install now to enable better and faster informed decisions.

2.5.2 Truck Platooning



Truck platooning pilot

Truck platooning refers to a number of trucks equipped with state-of-the-art driving support systems that allow the trucks to safely and closely follow each other. In this "platoon" the trucks communicate and are driven by smart technology.

Truck platooning, which is a variation of self-driving vehicle technology, adds vehicle-to-vehicle communications to enable Cooperative Adaptive Cruise Control, using the forward-looking radar sensors and electronic actuation of the engine and brakes of the conventional Adaptive Cruise Control system, and also adds vehicle-to-vehicle communications (using Dedicated Short Range Communications) that enable the implementation of a smoother, closer following vehicle control system. This system allows trucks to drive safely and smoothly at shorter gaps than they can under conventional manual driving. Potential benefits in efficiency include better utilization of the highway through increased throughput and improved fuel economy (and lower operating costs) due to the aerodynamic effects of closer vehicle spacing. This technology is in advanced stages of development and is being proposed for deployment in a few years. FHWA is currently investigating the technology, the perception of other road users, and the policy implications of truck platooning.

2.5.3 Electric Vehicle Infrastructure

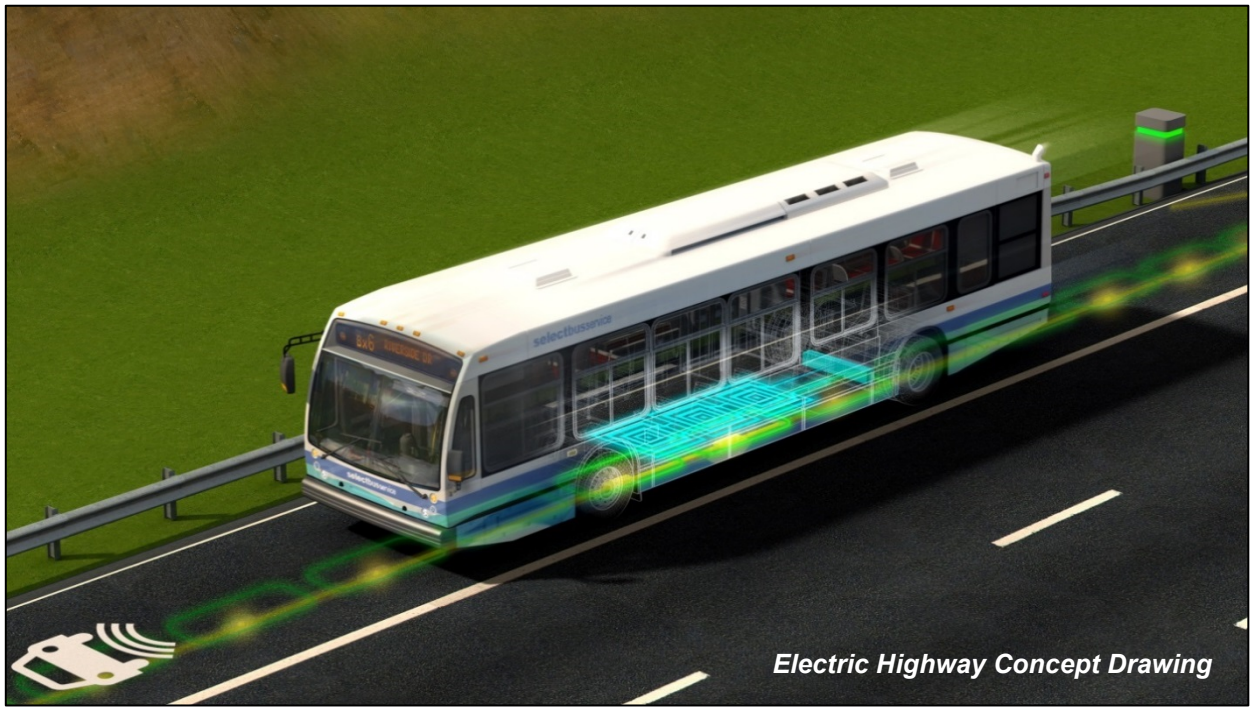
Electric vehicle adoption by consumers has dramatically increased in the last few years, owing to technology advancements and the reduction in the cost of batteries. Forecasts predict an increase in sales of electric vehicles from a record 1.1 million worldwide in 2017 to 11 million in 2025, and then a surge to 30 million in 2030 as they become cheaper to make than internal combustion engine cars. By 2050, 55 percent of all new car sales are predicted to be electric vehicles. Electric vehicle technology is being rapidly adopted in public transportation, with major transit agencies committing to fully electric bus fleets within the next decade.

City governments are already facing the challenge of quickly developing an Electric Vehicle Ecosystem (including facilities for plug-in charging, electric catenary, and other forms of vehicle powering technologies) while partnering with roadway owners, energy utility providers, technology developers, and operators.

FHWA established a national network of alternative fueling and charging infrastructure along national highway system corridors to support expansion of this technology. All interstate corridors in Arizona (including I-8, I-10, and I-19) are included in this national network of alternative fuel corridors.

2.5.4 Electrified Highways

The growth of electric vehicles has been limited by motorists' concerns over vehicle range and charging infrastructure. Inductive charging greatly reduces the need for large-sized batteries by providing a continuous electricity source in the pavement of a roadway. The system sets up an alternating electromagnetic field from which an induction coil harvests power. Technology advancements now make it possible to charge vehicles as they drive along the electric track at highway speeds. Pilot projects along test tracks in France and Israel have tested this technology and found it to be feasible. This technology allows the vehicles to charge the batteries as they drive, making it possible to make do with much smaller and more affordable batteries. Due to the high cost of installation of in-road electric infrastructure, this technology makes the most sense along high-traffic routes through a city.



Electric Highway Concept Drawing

2.5.5 Solar Roadways

Solar highways use the surface of the roadway to generate electricity using solar energy. The roadway is made of a transparent concrete on top, solar panels underneath, and an insulation material as the base. The energy generated from solar highways can be used to keep street lights running, provide power a snow-melting system, or can be fed back into the electricity grid. The solar roadway is prohibitively more expensive (approximately $75 per square foot) than a regular asphalt roadway (approximately $5 per square foot), and has therefore only been experimentally implemented as pilot projects in China and France.

This technology is under development by the US Department of Transportation (USDOT) and could pay for the cost of the solar panels, thereby creating a road that would pay for itself over time. Lights could be added to "paint" the road lines from beneath, lighting up the road for safer nighttime driving and easily allowing changes in striping to respond to construction activities, incidents, or demand-based changes to manage traffic during peak commuting periods. Alternatively, the road could change colors as a warning sign for wildlife crossings or for notification of emergency vehicles. As vehicle-to-infrastructure communication evolves, roadways may "speak" to cars to warn of oncoming obstacles, such as crashes or construction zones.

2.5.6 Hyperloop

Hyperloop operates in a tube with a low-pressure environment, allowing speeds of up to 600 mph. Hyperloop works by loading passenger and cargo into a pod that lifts above a track using magnetic levitation. It then accelerates gently and gradually, using an electric motor, gliding silently inside the low-pressure tube at extremely high speeds. A nearly 1-mile Hyperloop test track for SpaceX is being constructed in California. Hyperloop One in Nevada is developing another test track, focusing on eventually using the technology for long-distance travel (in excess of 300 miles). Arrivo, another company focusing on development of the Hyperloop technology, is developing a Colorado test track for transportation of passengers, vehicles, and freight pallets on pods for shorter regional distances.

The key advantages of the Hyperloop technology are the ability to travel at extremely high speeds, emissions-free transportation, and autonomous travel mode. This is a developing technology that is expected to continue to evolve over the next several years before it is commercially available for implementation along major transportation corridors. Hyperloop includes more stringent horizontal design criteria than roadways (e.g., much wider turning curvature), but also has the opportunity to run at ground level or be elevated on piers to more easily account for vertical grade differences over long distances.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

Chapter 3 presents the transportation, environmental, and economic effects of the three Build Corridor Alternatives (Purple, Green, and Orange), and the No Build Alternative. The Build Corridor Alternatives are composed of a set of Corridor Options in three generally defined sections (South, Central, and North) as described in **Chapter 2**. **Figure 2-5** (End-to-End Build Corridor Alternatives) and **Table 3.1-1** (Build Corridor Alternative, Section, and Option Organization) clarify the organization of the Corridor Options within Build Corridor Alternatives. The South, Central, and North Sections are used to organize discussions and maps, and are not used for decision making purposes. The labeling of the Corridor Options matches those used during the alternatives screening process documented in the *Alternatives Selection Report*.

The Corridor Options provide a consistent way to refer to the various subcomponents of the Build Corridor Alternatives, and also to optimize flexibility in determining recommendations. This means that the Recommended Alternative may be one of the defined alternatives (Purple Alternative, Green Alternative, Orange Alternative, or No Build Alternative), but a hybrid, a combination of the various Corridor Options.

Table 3.1-1 Build Corridor Alternative, Section, and Option Organization

Alternative and Geography	South Section			Central Section					North Section	Total Alternative Length
Purple Alternative	A	C	G	I1	I2	L	N	R	X	271 miles
Green Alternative	A	D	F	I2	L	M	Q2	R	U	268 miles
Orange Alternative	A	B	G	H	K	Q1	Q2	Q3	S	280 miles

3.1.1 Tier 1 Analysis

The Tier 1 analysis identifies and compares the potential impacts of the Build Corridor Alternatives and the No Build Alternative, as described in **Chapter 2**. The Build Corridor Alternatives have several common features.

- Each Build Corridor Alternative is a 2,000-foot-wide corridor, within which a future alignment would be located (**Figure 3.1-1**, Tier 1 vs Tier 2 Level of Detail). The assumed typical cross-section for the future alignment in the Tier 2 analyses would be approximately 400 feet wide. The specific alignment and width of the Interstate 11 (I-11) facility would be refined as part of the Tier 2 analyses. The analysis applied in Tier 1 is sufficient to compare overall alternatives in Tier 1, and the flexibility within the corridor would allow the development of

alignments during future Tier 2 analyses to respond to additional information available at that time.

- A typical cross-section was developed to inform the analysis for the Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS); future cross sections for a specific alignment may be refined in future Tier 2 analyses. In locations where a Corridor Option is intended to be co-located with an existing transportation facility, it is assumed that the implementation of the I-11 Corridor would result in capacity improvements as needed to meet Level of Service C (in rural areas) or D (in urban areas) for both the I-11 and the co-located facility. Assumptions regarding cross sections are provided in **Appendix E1**. Definitions of the levels of service are provided in **Chapter 1**, **Figure 1-6** (Levels of Service for Freeways).

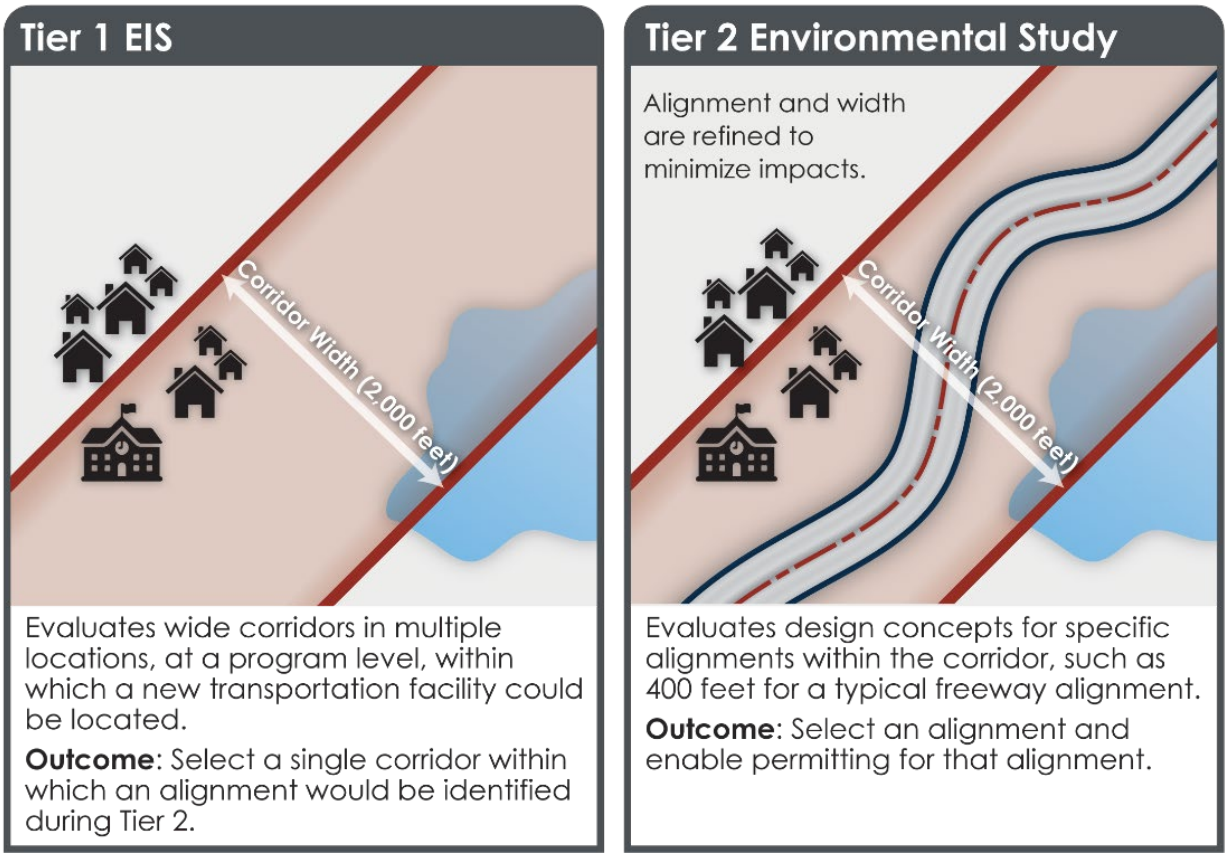


Figure 3.1-1 Tier 1 vs Tier 2 Level of Detail

- Specific interchange locations are not identified for the Build Corridor Alternatives. However, a set of potential interchange locations was assumed for purposes of this analysis based on the most current available transportation network in the Arizona Statewide Travel Demand Model (Arizona Model). It is assumed that interchange locations would be accommodated within the 2,000-foot-wide corridor.
- The level of analysis for the Draft Tier 1 EIS is qualitative and programmatic, reflecting the broad definition of the corridor for the Draft Tier 1 EIS. The analysis relies on readily available data, mapped information from resource and regulatory agencies, previously

completed environmental studies, and aerial imagery. Some technical efforts for the Draft Tier 1 EIS involved limited site visits and field work in selected areas.

3.1.2 Chapter 3 Section Organization

Each of the resource areas within **Chapter 3** are organized in seven parts:

1. **Regulatory Setting:** Identifies pertinent laws and regulations governing the management of the resource. In select cases where several topics within a resource are covered; such as Section 3.12, Geology, Soils, and Prime and Unique Farmland; the regulatory setting, methodology and affected environment may be discussed may be separated into several subtopics.
2. **Methodology:** Describes how the resource or topic was analyzed.
3. **Affected Environment:** Describes conditions of the resource in the Analysis Area today.
4. **Environmental Consequences:** Forward-looking analysis that identifies potential changes that would result from the implementation of the Build Corridor Alternatives or the No Build Alternative.
5. **Summary:** Identifies unique features and potential for impacts associated with each of the alterantives. These features differentiate between the alterantives and are used to identify the recommended alternative in **Chapter 6**.
6. **Potential Mitigation Strategies:** Defines strategies and best management practices to avoid and minimize impacts that can be identified at this level of analysis. As part of the future Tier 2 project level analyses, these strategies could be refined into formal project-level mitigation measures, as needed and appropriate. The Final EIS and Record of Decision may identify committed mitigation measures if the measures are required to advance the identification of the Preferred Alternative and Selected Alternative respectively.
7. **Future Tier 2 Analysis:** Identifies project-specific investigations that could be evaluated as part of the future Tier 2 analyses. Tier 2 analyses would include site-specific, quantitative evaluation of effects, defining avoidance and specific mitigation measures tailored for each project. All permitting activities are part of future Tier 2 analyses.
8. **Comprehensive Table of Potential Benefits and Impacts:** The environmental consequences are summarized in tabular format including major features and high level bullets identifying potential impacts. In order to provide a comprehensive summary of the impacts related to a particular resource, the tables also include indirect and cumulative impacts. Note that the full analysis for indirect and cumulative effects is included in Section 3.17.

This page intentionally left blank

3.2 Summary of Key Environmental Impacts

Each Build Corridor Alternative includes sensitive resource areas that were considered throughout **Chapter 3**. **Table 3.2-1** (Summary of Key Environmental Effects: Purple Alternative), **Table 3.2-2** (Summary of Key Environmental Effects: Green Alternative), and **Table 3.2-3** (Summary of Key Environmental Effects: Orange Alternative) provide a high-level summary of key considerations by Corridor Option to highlight more localized considerations that might be overlooked in an aggregate summary. These are the differentiating factors in comparing the three Build Corridor Alternatives against each other, by identifying locations where a particular option might provide better opportunities to avoid, minimize, or mitigate potential adverse impacts.

Table 3.2-1 Summary of Key Environmental Effects: Purple Alternative

Corridor Option	No Build Alternative	Purple Alternative
A	• No major capacity improvements anticipated. • I-19 is a pre-existing barrier to wildlife connectivity.	• Project Area includes a portion of Tumacacori National Historical Park; impacts avoidable if improvements are within existing Arizona Department of Transportation (ADOT) right-of-way or in close proximity of I-19. ADOT commits to avoiding this 4(f) property (see **Chapter 4**). • Communities of Nogales/Rio Rico area, Amado, and Arivaca have a high percentage of minority and low-income individuals; targeted outreach would occur to work with potentially affected communities and ensure Title VI compliance and full and fair participation during the Tier 2 environmental process for future improvements. • The Santa Cruz River, which is a potential water of the United States (US) and wetland, is parallel to I-19. Riparian area along the river also is an Important Bird Area and potential habitat for several threatened and endangered species; future activities may require site-specific mitigation. • Crosses through two wildlife linkages (Tumacacori-Santa Rita Linkage and Santa Rita-Sierrita Linkage) potentially affecting species isolation; mitigation strategies identified in Section 3.14.5. • High potential to impact endangered Pima pineapple cactus which could result in high level of compensatory mitigation; mitigation strategies identified in Section 3.14.5. • Project Area crosses approximately 28 miles of impaired waters including the Santa Cruz River, Potrero Creek, and Nogales Wash; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.
C	• No major transportation facility in the Project Area.	• Strong traffic modeling performance for long distance trips. • Crosses wildlife linkage area associated in Avra Valley; use of Central Arizona Project (CAP) Design Option would consolidate linear facilities on the Tucson Mitigation Corridor (TMC). Mitigation strategies proposed in Section 3.14.5 and **Chapter 4** proposed to address these impacts.

Table 3.2-1 Summary of Key Environmental Effects: Purple Alternative (Continued)

Corridor Option	No Build Alternative	Purple Alternative
C (Con't)	• No transportation related modification to the TMC, CAVSARP, or SAVSARP.	• TMC crossing represents a permanent use of 4(f) property; ongoing coordination with owner with jurisdiction. • High potential to impact endangered Pima pineapple cactus which could result in high level of compensatory mitigation; mitigation strategies identified in Section 3.14.5. • Potential for mostly low to moderate impact to archaeological sites and historic structures but high likelihood of impacts near crossing of Santa Cruz River and TMC; mitigation would occur in accordance with drafted Programmatic Agreement. • Communities adjacent to the Project Area in the Schuk Toak District of the Tohono O'odham Nation would be potentially affected; targeted outreach would occur to work these communities to ensure Title VI compliance and full and fair participation during Tier 2. • Project Area bisects Three Points and Picture Rocks communities; targeted outreach would occur to work with these communities to ensure Title VI compliance and full and fair participation during Tier 2. • Potential for substantial noise impacts (15-dBA increase from existing). • Potential for high overall visual impact from Saguaro National Park West-Tucson Mountain District because of high viewer sensitivity and superior, unobstructed views; site-specific mitigation measures would be identified during Tier 2 as described in Section 3.9.5. High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2 analysis. • Potential to impact visual resources, noise levels, and visitor experience for the Wilderness Area within Saguaro National Park West. • Cuts through Large Intact Block (LIB) Cluster 2, increasing species isolation; mitigation strategies identified in Section 3.14.5. • CAP Design Option would locate I-11 facility farther from groundwater recharge areas associated with SAVSARP and CAVSARP. • New construction could have impacts on sensitive water resources and ground water resources; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.

Table 3.2-1 Summary of Key Environmental Effects: Purple Alternative (Continued)

Corridor Option	No Build Alternative	Purple Alternative
CAP Design	• No major transportation facility in the Project Area through the TMC.	• Includes placement of concurrent wildlife crossings that match up with existing siphon crossings on the CAP canal. • Relocation and reclaiming of the current Sandario Road alignment to natural habitat would eliminate this barrier to wildlife movement on the TMC; alignment of wildlife structures with I-11 would avoid greater fragmentation of wildlife crossing areas. See **Chapter 4** for a more detailed analysis. • Farther from CAVSARP and SAVSARP properties. • Potential for substantial noise impacts (15-dBA increase from existing). • Potential to impact visual resources, noise levels, and visitor experience for the Wilderness Area within Saguaro National Park West. • Likely to avoid potential high impact on archaeological sites located on western portions of the TMC. • Continuing coordination with owner with jurisdiction regarding the application of a Net Benefit Programmatic Evaluation to the TMC, including studies to understand east-west wildlife movement needs within Avra Valley to inform the Tier 2 process.
G	• I-10: SR 87 to Picacho Road widening and realignment. • I-10 is a pre-existing barrier through Ironwood-Picacho Wildlife Linkage, potentially affecting species isolation.	• Better avoids impacts on Santa Cruz River in Pinal County. • Project Area includes a portion of Picacho Peak State Park and historic Picacho Pass Civil War Skirmish Site. Although not anticipated to be a 4(f) use, could result in indirect impacts. • Affected communities of Red Rock, Eloy, and Casa Grande have a high percentage of minority and low-income individuals; targeted outreach would occur to work with potentially affected communities to ensure Title VI compliance and full and fair participation during the Tier 2 environmental process for future improvements. • Would increase noise levels along the existing I-10 facility; potential noise impacts would occur as far out as 500 feet from the edge of the corridor ROW. • Project Area crosses floodplain, potential Waters of the US, and wetlands; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts. • Parallel to riparian habitat and wildlife linkage along the Santa Cruz River, which also is potential water of the US and wetlands; mitigation strategies present the opportunity to provide connectivity across the barrier presented by the existing I-10 facility. • Approximately 94 percent of the soils within Project Area mapped as prime and unique farmland; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts and coordination with Natural Resources Conservation Service (NRCS) would occur during Tier 2.

Table 3.2-1 Summary of Key Environmental Effects: Purple Alternative (Continued)

Corridor Option	No Build Alternative	Purple Alternative
G (Con't)		• Minimizes the creation of new barriers to wildlife movement if co-located with I-10.
I1	• No major transportation facility in the Project Area.	• Project Area bisects the communities of Casa Grande; targeted outreach would occur to work with potentially affected communities and ensure Title VI compliance and full and fair participation during Tier 2. • Consistent with local land use planning for the West Pinal Freeway. • Potential for substantial noise impacts (15-dBA increase from existing). • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2. • Approximately 99 percent of the soils in Project Area mapped as prime and unique farmland; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts and coordination with NRCS would occur during Tier 2.
I2	• No major transportation facility in the Project Area.	• Project Area bisects community west of Casa Grande; targeted outreach would occur to work with potentially affected communities and ensure Title VI compliance and full and fair participation during Tier 2. • Consistent with local land use planning for the West Pinal Freeway. • Moderate to low potential for impact to archaeological sites and historic structures; mitigation would occur in accordance with drafted Programmatic Agreement. • Potential for substantial noise impacts (15-dBA increase from existing). • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2. • Approximately 95 percent of the soils in Project Area mapped as prime and unique farmland; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts and coordination with NRCS would occur during Tier 2.
L	• No major transportation facility in the Project Area.	• Project Area includes a portion of Juan Bautista de Anza National Historic Trail Management Area; Tier 2 analysis would need to further analyze strategies to avoid, minimize, or mitigate impacts. • Low potential for impact to archaeological sites and historic structures except near Union Pacific Railroad and historic Butterfield Overland Mail Stage Route; mitigation would occur in accordance with drafted Programmatic Agreement. • Potential for substantial noise impacts (15-dBA increase from existing).

Table 3.2-1 Summary of Key Environmental Effects: Purple Alternative (Continued)

Corridor Option	No Build Alternative	Purple Alternative
L (Con't)		• Potential for visual impacts on users within Sonoran Desert National Monument and North Maricopa Mountains Wilderness due to the introduction of new dominant features; site-specific mitigation measures would be identified during Tier 2 as described in Section 3.9.5. • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2. • Cuts through Gila Bend-Sierra Estrella Wildlife Linkage and between LIB Clusters 6 and 7 would potentially increase species isolation; mitigation strategies identified in Section 3.14.5. • New construction could have impacts on sensitive water resources and ground water resources; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.
N	• No major transportation facility in the Project Area.	• Project Area bisects community of Buckeye where there is a high percentage of minority individuals; targeted outreach would occur to work with potentially affected communities and ensure Title VI compliance and full and fair participation during Tier 2. • Consistent with planning for future SR 30 and SR 303L corridors. • Moderate potential for impact to archaeological sites and historic structures along Gila River; mitigation would occur in accordance with drafted Programmatic Agreement. • Potential for substantial noise impacts (15-dBA increase from existing). • Approximately 83 percent of the soils in Project Area mapped as prime and unique farmland; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts and coordination with NRCS would occur during Tier 2. • A new crossing of the Gila River would be required in sensitive riparian habitat, potentially affecting threatened and endangered species; mitigation strategies identified in Section 3.14.5. • New construction could have impacts on sensitive water resources and ground water resources; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts. Potential to impact waters of the US and wetlands Gila River; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.
R	• No major transportation facility in the Project Area.	• Project Area bisects community of Buckeye where there is a high percentage of minority individuals; targeted outreach would occur to work with potentially affected communities and ensure Title VI compliance and full and fair participation during Tier 2. • Moderate potential for impact to archaeological sites and historic structures near confluence of Gila River and Hassayampa River; mitigation would occur in accordance with drafted Programmatic Agreement.

Table 3.2-1 Summary of Key Environmental Effects: Purple Alternative (Continued)

Corridor Option	No Build Alternative	Purple Alternative
R (Con't)		• Potential for substantial noise impacts (15-dBA increase from existing). • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2. • Project Area crosses approximately 0.8 mile of impaired waters and has potential to impact waters of the US and wetlands including Hassayampa River; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.
X	• No major transportation facility in the Project Area.	• Project Area crosses the Vulture Mountains Recreation Area (VMRA) within the Bureau of Land Management (BLM)-designated multi-use corridor. • Project Area bisects off-highway vehicle (OHV) race course within VMRA • Consistent with regional transportation planning and local land use planning in Buckeye. • Aligned with power lines through the BLM-designated multi-use corridor in the VMRA. • Potential for substantial noise impacts (15-dBA increase from existing). • New transportation facility may be visible from VMRA, but corridor views would be obstructed due to distance, intervening terrain, and vegetation screening. • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2. • Cuts through LIB Clusters 8 and 9 and 2 wildlife linkages (Wickenburg-Hassayampa Wildlife Linkage and White Tanks-Belmonts-Vultures Hieroglyphics Linkage) would potentially increase species isolation; mitigation strategies identified in Section 3.14.5. • New construction could have impacts on sensitive water resources and ground water resources; mitigation strategies would be applied to avoid, minimize, or mitigate potential.
Corridor Wide	• Most sensitive land uses on the corridor are predicted to be impacted by traffic noise.	• Most sensitive land uses on the corridor are predicted to be impacted by traffic noise. • Potential for air quality improvements as compared to the No Build.

ADOT = Arizona Department of Transportation, CAP = Central Arizona Project, CAVSARP = Central Avra Valley Storage and Recovery Project, dBA = A-weighted scale, I-10 = Interstate 10, I-19 = Interstate 19, LIB = Large Intact Block, NRCS = Natural Resources Conservation Service, ROW = right-of-way, SAVSARP = Southern Avra Valley Storage and Recovery Project, SR = State Route, TMC = Tucson Mitigation Corridor, US = United States, VMRA = Vulture Mountains Recreation Area.

Table 3.2-2 Summary of Key Environmental Effects: Green Alternative

Corridor Option	No Build Alternative	Green Alternative
A	• No major capacity improvements anticipated. • I-19 is a pre-existing barrier to wildlife connectivity.	• Project Area includes a portion of Tumacacori National Historical Park; impacts avoidable if improvements are within existing ADOT ROW or in close proximity of I-19. ADOT commits to avoiding this 4(f) property (see **Chapter 4**). • Communities of Nogales, Rio Rico, Amado, and Arivaca have high percentage of minority, low-income, and limited English proficient individuals; targeted outreach would occur to work with potentially affected communities and ensure Title VI compliance and full and fair participation during Tier 2. • Santa Cruz River, which is potential waters of the US and wetlands, is parallel to I-19. Riparian area along the River also is an Important Bird Area and potential habitat for several threatened and endangered species; future activities may require site-specific mitigation. • Crosses through two wildlife linkages (Tumacacori-Santa Rita Linkage and Santa Rita-Sierrita Linkage), potentially affecting species isolation; mitigation strategies identified in Section 3.14.5. • High potential to impact endangered Pima pineapple cactus which could result in high level of compensatory mitigation; mitigation strategies identified in Section 3.14.5. • Project Area crosses approximately 28 miles of impaired waters including Santa Cruz River, Potrero Creek, and Nogales Wash; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.

Table 3.2-2 Summary of Key Environmental Effects: Green Alternative (Continued)

Corridor Option	No Build Alternative	Green Alternative
D	• No major transportation facility in the Project Area. • No transportation related modification to the TMC, CAVSARP, or SAVSARP.	• Would directly connect to key economic activity centers south of the Tucson Airport, as well as the planned Sonoran Corridor. • Crosses wildlife linkage area associated in Avra Valley; use of CAP Design Option would consolidate linear facilities on the TMC. Mitigation strategies proposed in Section 3.14.5 and **Chapter 4** proposed to address these impacts. • TMC crossing represents permanent use of 4(f) property; ongoing coordination with owner with jurisdiction. • High potential to impact endangered Pima pineapple cactus which could result in high level of compensatory mitigation; mitigation strategies identified in Section 3.14.5. • Potential for mostly low to moderate impacts to archaeological sites and historic structures but high likelihood of impacts near crossing of Santa Cruz River and TMC; mitigation would occur in accordance with drafted Programmatic Agreement. • Communities adjacent to the Project Area in the Schuk Toak District of the Tohono O'odham Nation would be affected; targeted outreach would occur to work these communities to ensure Title VI compliance and full and fair participation during Tier 2. • Project Area bisects Three Points and Picture Rocks communities; targeted outreach would occur to work with potentially affected communities and ensure Title VI compliance and full and fair participation during the Tier 2. • Potential for substantial noise impacts (15-dBA increase from existing). • Potential for high overall visual impact from Saguaro National Park West-Tucson Mountain District because of high viewer sensitivity and superior, unobstructed views; site-specific mitigation measures would be identified during Tier 2 as described in Section 3.9.5. • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2 analysis. Cuts through LIB Cluster 2, increasing species isolation; mitigation strategies identified in Section 3.14.5. • Potential to impact visual resources, noise levels, and visitor experience for the Wilderness Area within Saguaro National Park West. • CAP Design Option would locate I-11 facility farther from groundwater recharge areas associated with SAVSARP and CAVSARP. Would not bisect ongoing mining operations. • New construction could have impacts on sensitive water resources and ground water resources; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.

Table 3.2-2 Summary of Key Environmental Effects: Green Alternative (Continued)

Corridor Option	No Build Alternative	Green Alternative
CAP Design	• No major transportation facility in the Project Area through the TMC.	• Includes placement of concurrent wildlife crossings that match up with existing siphon crossings on the CAP canal. • Relocation and reclaiming of the current Sandario Road alignment to natural habitat would eliminate this barrier to wildlife movement on the TMC; alignment of wildlife structures with I-11 would avoid greater fragmentation of wildlife crossing areas. See **Chapter 4** for a more detailed analysis. • Farther from CAVSARP and SAVSARP properties. • Potential for substantial noise impacts (15-dBA increase from existing). • Potential to impact visual resources, noise levels, and visitor experience for the Wilderness Area within Saguaro National Park West. • Likely to avoid potential high impact on archaeological sites located on western portions of the TMC. • Continuing coordination with owner with jurisdiction regarding the application of a Net Benefit Programmatic Evaluation to the TMC, including studies to understand east-west wildlife movement needs within Avra Valley to inform the Tier 2 process.
F	• No major transportation facility in the Project Area.	• Communities of Red Rock, Eloy, and Casa Grande have a high percentage of minority and/or low-income individuals; targeted outreach would occur to work with potentially communities and ensure Title VI compliance and full and fair participation during Tier 2. • Consistent with local transportation planning. • Potential for mostly low to moderate impacts to archaeological sites and historic structures but high likelihood of impacts in the vicinity of Santa Cruz River and on the Santa Cruz Flats; mitigation would occur in accordance with drafted Programmatic Agreement. • Potential for substantial noise impacts (15-dBA increase from existing). • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2 analysis. • Approximately 99 percent of the soils in Project Area mapped as prime and unique farmland; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts and coordination with NRCS would occur during Tier 2. • New barrier to wildlife connectivity through Ironwood-Picacho Wildlife Linkage; mitigation strategies identified.

Table 3.2-2 Summary of Key Environmental Effects: Green Alternative (Continued)

Corridor Option	No Build Alternative	Green Alternative
F (Con't)		• Parallel to riparian habitat and wildlife linkage along the Santa Cruz River, which also is potential water of the US and wetlands; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts. • Cuts through LIB Cluster 3 increasing species isolation; mitigation strategies identified in Section 3.14.5. • New construction could have impacts on sensitive water resources and ground water resources; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.
I2	• No major transportation facility in the Project Area.	• Project Area bisects a community west of Casa Grande that has a high percentage of minority individuals; targeted outreach would occur to work with potentially community to ensure Title VI compliance and full and fair participation during Tier 2. • Consistent with local land use planning for the West Pinal Freeway. • Moderate to low potential for impact to archaeological sites and historic structures; mitigation would occur in accordance with drafted Programmatic Agreement. • Potential for substantial noise impacts (15-dBA increase from existing). • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2. • Approximately 95 percent of the soils in Project Area mapped as prime and unique farmland; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts and coordination with NRCS would occur during Tier 2.
L	• No major transportation facility in the Project Area.	• Project Area includes a portion of Juan Bautista de Anza National Historic Trail Management Area; Tier 2 analysis would need to further analyze strategies to avoid, minimize, or mitigate impacts. • Low potential for impact to archaeological sites and historic structures except near Union Pacific Railroad and historic Butterfield Overland Mail Stage Route; mitigation would occur in accordance with drafted Programmatic Agreement. • Potential for substantial noise impacts (15-dBA increase from existing). • Potential for visual impacts on users within Sonoran Desert National Monument and North Maricopa Mountains Wilderness due to the introduction of new dominant features; site-specific mitigation measures would be identified during Tier 2 as described in Section 3.9.5. • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2.

Table 3.2-2 Summary of Key Environmental Effects: Green Alternative (Continued)

Corridor Option	No Build Alternative	Green Alternative
L (Con't)		• Cuts through Gila Bend-Sierra Estrella Wildlife Linkage and between LIB Clusters 6 and 7, potentially increasing species isolation; mitigation strategies identified in Section 3.14.5. • New construction could have impacts on sensitive water resources and ground water resources; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.
M	• No major transportation facility in the Project Area.	• Potential use of Robbins Butte Wildlife Area; possible determination of *de minimus* use would need to be confirmed during Tier 2. • Potential for substantial noise impacts (15-dBA increase from existing). • Potential for visual impacts on users within Sonoran Desert National Monument and North Maricopa Mountains Wilderness due to the introduction of new dominant features; site-specific mitigation measures would be identified during Tier 2 as described in Section 3.9.5. • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2. • Cuts through Buckeye Hills East-Sonoran Desert National Monument Wildlife Linkage and extends along perimeter of LIB Cluster 6, potentially increasing species isolation; mitigation strategies identified in Section 3.14.5. • New construction could have impacts on sensitive water resources and ground water resources; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.
Q2	• No major capacity improvements. • SR 85 cuts through LIB Cluster 6.	• Potential use of Robbins Butte Wildlife Area; possible determination of *de minimus* use would need to be confirmed during Tier 2. • Community of Buckeye has a high percentage of minority individuals; targeted outreach would occur to work with potentially affected community to ensure Title VI compliance and full and fair participation during Tier 2. • Gila River crossing on SR 85 would be modified to accommodate I-11 co-location. Modified Gila River crossing is sensitive riparian habitat, potentially affects threatened and endangered species. This also is an Important Bird Area. Mitigation strategies identified in Section 3.14.5, and future activities may require additional site-specific mitigation during Tier 2. • Project Area crosses approximately 1.7 miles of impaired waters including Gila River; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.

Table 3.2-2 Summary of Key Environmental Effects: Green Alternative (Continued)

Corridor Option	No Build Alternative	Green Alternative
R	• No major transportation facility in the Project Area.	• Project Area bisects the community of Buckeye, which has a high percentage of minority individuals. Targeted outreach would occur to work with potentially affected community to ensure Title VI compliance and full and fair participation during Tier 2. • Moderate potential for impact to archaeological sites and historic structures near confluence of Gila River and Hassayampa River; mitigation would occur in accordance with drafted Programmatic Agreement. • Potential for substantial noise impacts (15-dBA increase from existing). • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2. • Project Area crosses approximately 0.8 mile of impaired waters and has potential to impact waters of the US and wetlands including Hassayampa River; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.
U	• No major transportation facility in the Project Area.	• Project Area crosses the VMRA within the BLM-designated multi-use corridor. • Project Area bisects OHV race course within VMRA. • Potential for substantial noise impacts (15-dBA increase from existing). • New transportation facility may be visible from VMRA, but corridor views would be obstructed due to distance, intervening terrain, and vegetation screening. • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2. • Cuts through LIB Clusters 8 and 9 and 2 wildlife linkages (Wickenburg-Hassayampa Wildlife Linkage and White Tanks-Belmonts-Vultures Hieroglyphics Linkage), potentially increasing species isolation; mitigation strategies identified in Section 3.14.5. • Highest potential to impact waters of the US and wetlands: Powerline Wash, Jackrabbit Wash, and Phillips Wash; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.
Corridor Wide	• Most sensitive land uses on the corridor are predicted to be impacted by traffic noise.	• Most sensitive land uses on the corridor are predicted to be impacted by traffic noise. • Potential for air quality improvements as compared to the No Build.

ADOT = Arizona Department of Transportation, CAP = Central Arizona Project, CAVSARP = Central Avra Valley Storage and Recovery Project, dBA = A-weighted scale, I-10 = Interstate 10, I-19 = Interstate 19, LIB = Large Intact Block, NRCS = Natural Resources Conservation Service, ROW = right-of-way, SAVSARP = Southern Avra Valley Storage and Recovery Project, SR = State Route, TMC = Tucson Mitigation Corridor, US = United States, VMRA = Vulture Mountains Recreation Area.

Table 3.2-3 Summary of Key Environmental Effects: Orange Alternative

Corridor Option	No Build Alternative	Orange Alternative
A	• No major capacity improvements anticipated. • I-19 is a pre-existing barrier to wildlife connectivity.	• Project Area includes a portion of Tumacacori National Historical Park; impacts avoidable if improvements are within existing ADOT ROW or in close proximity of I-19. ADOT commits to avoiding this 4(f) property (see **Chapter 4**). • Communities of Nogales, Rio Rico, Amado, and Arivaca have high percentage of minority, low-income, and limited English proficient individuals; targeted outreach would occur to work with potentially affected communities and ensure Title VI compliance and full and fair participation during Tier 2. • Santa Cruz River, which is potential waters of the US and wetlands, is parallel to I-19. Riparian area along the river also is an Important Bird Area and potential habitat for several threatened and endangered species; future activities may require site-specific mitigation. • Crosses through two wildlife linkages (Tumacacori-Santa Rita Linkage and Santa Rita-Sierrita Linkage); mitigation strategies identified in Section 3.14.5 provide an opportunity to improve connectivity across the barrier presented by the existing I-10 facility. • High potential to impact endangered Pima pineapple cactus which could result in high level of compensatory mitigation; mitigation strategies identified in Section 3.14.5. • Project Area crosses approximately 28 miles of impaired waters including Santa Cruz River, Potrero Creek, and Nogales Wash; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.

Table 3.2-3 Summary of Key Environmental Effects: Orange Alternative (Continued)

Corridor Option	No Build Alternative	Orange Alternative
B	• I-10: Ina to Ruthrauff Road widening would occur. • Congestion would increase by 2040; Level of Service F is forecasted through downtown Tucson. • I-10 is a pre-existing barrier to wildlife connectivity, potentially affecting species isolation.	• Would connect key economic activity centers south of the Tucson Airport (the planned Sonoran Corridor economic growth area) to Tucson and areas north via existing I-10. • High potential for impacts on archaeological sites and direct and indirect impacts on historic properties and districts adjacent to the I-10 corridor; mitigation would occur in accordance with drafted Programmatic Agreement. • May require permanent use of properties protected under Section 4(f); Tier 2 analysis should further evaluate a potential use as design is refined and ADOT would coordinate with officials with jurisdiction. • Affected communities, including historic districts, in the Tucson urban corridor and San Xavier District of the Tohono O'odham Nation have a high percentage of minority, low-income, and limited English proficient individuals; targeted outreach would occur to work with these communities to ensure Title VI compliance and full and fair participation during Tier 2. • Santa Cruz River is parallel to and crosses I-19. Riparian area along the river is potential habitat for several threatened and endangered species; future activities may require site-specific mitigation. • Cuts through Tucson-Tortolita Santa Catalina Wildlife Linkage, potentially adding to the effect the I-10 corridor has on species isolation; mitigation strategies identified in Section 3.14.5. • Project Area crosses approximately 8 miles of impaired waters and has potential to impact waters of the US and wetlands; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts. • Project Area contains 133 groundwater wells.

Table 3.2-3 Summary of Key Environmental Effects: Orange Alternative (Continued)

Corridor Option	No Build Alternative	Orange Alternative
G	• I-10: SR 87 to Picacho Road widening and realignment. • I-10 is a pre-existing barrier through Ironwood-Picacho Wildlife Linkage, potentially affecting species isolation.	• Better avoids impacts on Santa Cruz River in Pinal County. • Project Area includes a portion of Picacho Peak State Park and historic Picacho Pass Civil War Skirmish Site. Although not anticipated to be a 4(f) use, could result in indirect impacts. • Affected communities of Red Rock, Eloy, and Casa Grande have a high percentage of minority and/or low-income individuals; targeted outreach would occur to work with potentially affected communities to ensure Title VI compliance and full and fair participation during the Tier 2 environmental process for future improvements. • Would increase noise levels along the existing I-10 facility; potential noise impacts would occur as far out as 500 feet from the edge of the corridor ROW. • Project Area crosses floodplain, potential Waters of the US, and wetlands; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts. • Parallel to riparian habitat and wildlife linkage along the Santa Cruz River, which also is potential water of the US and wetlands; mitigation strategies present the opportunity to provide connectivity across the barrier presented by the existing I-10 facility. • Approximately 94 percent of the soils within Project Area mapped as prime and unique farmland; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts and coordination with NRCS would occur during Tier 2. • Minimizes the creation of new barriers to wildlife movement if co-located with I-10.
H	• No major capacity improvements.	• Project Area includes a portion of Sonoran Desert National Monument; opportunities to avoid or minimize impacts if improvements are within existing ADOT ROW or in close proximity to I-8. • Affected communities west of Casa Grande have a high percentage of minority individuals; targeted outreach would occur to work with potentially affected communities to ensure Title VI compliance and full and fair participation during Tier 2.

Table 3.2-3 Summary of Key Environmental Effects: Orange Alternative (Continued)

Corridor Option	No Build Alternative	Orange Alternative
K	• No major capacity improvement. • I-8 continues to existing as barrier through LIB Cluster 5 and the Sonoran Desert National Monument, potentially affecting species isolation.	• Project Area includes a portion of Sonoran Desert National Monument; opportunities to avoid or minimize impacts if improvements are within existing ADOT ROW or in close proximity to I-8. • Affected community in Gila Bend has a high percentage of minority and/or low-income individuals; targeted outreach would occur to work with the community to ensure Title VI compliance and full and fair participation during Tier 2. • Potential for mostly low to moderate impacts to archaeological sites and historic structures but high likelihood of impacts near Gila Bend; mitigation would occur in accordance with drafted Programmatic Agreement. • Cuts through LIB Cluster 5 increasing species isolation; mitigation strategies identified in Section 3.14.5.
Q1	• No major capacity improvement • SR 85 cuts through 2 wildlife linkages and LIB Cluster 6.	• Potential use of Robbins Butte Wildlife Area; possible determination of *de minimus* use would need to be confirmed during Tier 2. • Affected communities in Gila Bend and Buckeye have a high percentage of minority and/or low-income individuals; targeted outreach would occur to work with the communities to ensure Title VI compliance and full and fair participation during Tier 2. • Cuts through two wildlife linkages (Gila Bend-Sierra Estrella Linkage and Buckeye Hills East Sonoran Desert National Monument Wildlife Linkage) and LIB Cluster 6; mitigation strategies identified in Section 3.14.5.
Q2	• No major capacity improvements. • SR 85 cuts through LIB Cluster 6.	• Potential use of Robbins Butte Wildlife Area; possible determination of *de minimus* use would need to be confirmed during Tier 2. • Community of Buckeye has a high percentage of minority individuals; targeted outreach would occur to work with potentially affected community to ensure Title VI compliance and full and fair participation during Tier 2. • Gila River crossing on SR 85 would be modified to accommodate I-11 co-location. Modified Gila River crossing is sensitive riparian habitat, potential affects to threatened and endangered species. This also is an Important Bird Area. Mitigation strategies identified in Section 3.14.5, and future activities may require additional site-specific mitigation during Tier 2. • Project Area crosses approximately 1.7 miles of impaired waters including Gila River; mitigation strategies would be applied to avoid, minimize, or mitigate potential impacts.

Table 3.2-3 Summary of Key Environmental Effects: Orange Alternative (Continued)

Corridor Option	No Build Alternative	Orange Alternative
Q3	• I-10: SR 85 Verrado Way widening. • Congestion to increase by 2040; Level of Service F is forecasted. • SR 85 cuts through LIB Cluster 6.	• Affected community in Buckeye has a high percentage of minority individuals; targeted outreach would occur to work with the community to ensure Title VI compliance and full and fair participation during Tier 2.
S	• No major transportation facility in the Project Area.	• Project Area is outside of Vulture Mountains Recreation Area. • Potential for substantial noise impacts (15-dBA increase from existing). • New transportation facility may be visible from Vulture Mountains Recreation Area, but corridor views would be obstructed due to distance, intervening terrain, and vegetation screening. • High degree of change for light pollution due to introduction of new light sources along new corridors in undeveloped areas; roadway lighting designs would be assessed as part of Tier 2 Crosses Bureau of Land Management Class II visual resource management area. • Cuts through LIB Clusters 8 and 9 and the Wickenburg-Hassayampa Wildlife Linkage, potentially increasing species isolation; mitigation strategies identified in Section 3.14.5.
Corridor Wide	• Most sensitive land uses on the corridor are predicted to be impacted by traffic noise.	• Most sensitive land uses on the corridor are predicted to be impacted by traffic noise. • Potential for air quality improvements as compared to the No Build.

ADOT = Arizona Department of Transportation, dBA = A-weighted scale, I-8 = Interstate 8, I-10 = Interstate 10, I-19 = Interstate 19, LIB = Large Intact Block, NRCS = Natural Resources Conservation Service, ROW = right-of-way, SR = State Route, US = United States.

3.3 Land Use and Section 6(f)

3.3.1 Land Use and Special Designated Lands

This section describes the existing and future (planned) land use, land use plans and policies, and any special designated lands within the Interstate 11 (I-11) Corridor Study Area (Study Area). The Study Area encompasses portions of the cities of Buckeye, Casa Grande, Eloy, Goodyear, Maricopa, Nogales, Surprise, South Tucson, and Tucson; portions of the towns of Gila Bend, Marana, Oro Valley, Sahuarita, and Wickenburg; and areas of unincorporated Maricopa, Pima, Pinal, Santa Cruz, and Yavapai counties.

3.3.1.1 Regulatory Setting

Arizona state law requires that communities update their general or comprehensive plan every 10 years (Arizona Revised Statutes §9-461.05 for incorporated municipalities; Arizona Revised Statutes §11-804 for counties). These plans establish a long-range blueprint, and goals and policies to guide future growth and development, mapping a future envisioned 20 or more years ahead. The Arizona Growing Smarter/Growing Smarter Plus state legislation outlines the statutory requirements of general and comprehensive plan documents. These requirements are based on population size and whether the jurisdiction is an incorporated municipality or county, dictating a minimum series of elements. An element is a specific section of the plan that discusses a particular planning topic, such as land use, transportation, housing, economic development, energy, and public services. All plans must present existing and planned land uses and transportation strategies as well as related regulations.

Each city and town regulates land planning within its municipal planning area, while counties are responsible for planning in the unincorporated areas. While both lay out circulation plans for their jurisdictions, metropolitan planning organizations lead multimodal transportation planning throughout urbanized areas, in collaboration with their member agencies, which typically include all cities, towns, counties, and Tribal governments within the planning area.

This land use section documents existing and planned land uses from available data and information provided by local governments. No formal local land use approvals would occur as the result of this Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS). The requirements for subsequent Tier 2 evaluations, including compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, are described further in Section 3.3.1.6.

From a land management perspective, each agency has varying laws and regulations governing use, management, land disposal, and protection of character and values. The potential direct impact to these lands will be discussed as well as the potential acres of land conversion under each of the Build Corridor Alternatives. However, until a specific alignment is selected in Tier 2 studies, these conversion impacts should be viewed as high-level estimates and do not reflect detailed calculations. As required, the Arizona Department of Transportation (ADOT) will pursue coordination and mitigation activities with individual agencies, such as development of Memoranda of Understanding, programmatic agreements, and updates to resource management plans, at the selection of a specific alignment in Tier 2 studies. See **Chapter 6** (Recommended Alternative) for further discussion of mitigation strategies.

3.3.1.2 Methodology

The planning process for the Draft Tier 1 EIS documents land use considerations at a programmatic level (qualitative) with respect to the impacts of an I-11 Corridor on existing and future land uses within the three Build Corridor Alternatives as well as the No Build Alternative. The Project Area for land use is the 2,000-foot-wide corridor for each Build Corridor Alternative. The analysis acknowledges that direct land use impacts would be different for Corridor Options that are co-located with existing corridors versus Corridor Options in undeveloped areas, but these differences are not reflected in the overall acreage calculations for the Corridor Options.

The adopted general or comprehensive plans within each jurisdiction were used as sources of information. Local plans and ordinances, along with private development plans, were consulted to establish the affected environment, environmental consequences, and proposed mitigation measures. Land use trends, goals, and objectives of relevant city, county, and regional plans were reviewed to determine if construction of I-11 would be consistent with these jurisdictions' applicable goals and policies; potential impacts to special land management designations also were reviewed. Other sources of information include Maricopa Association of Governments (MAG) and Pima Association of Governments (PAG) (their land use projections, various websites, and conversations with agency staff). Geographic information system (GIS) software was used to pinpoint land uses and land ownership in the Study Area and to measure the acreage of various land uses. Field verification was undertaken as needed to understand existing land uses.

It is important to acknowledge that land use planning is an ongoing activity. Therefore, information related to all of these land use topics will be updated during Tier 2 studies to maintain the most up-to-date information.

From a land management perspective, underlying land ownership patterns were analyzed for their potential impacts to federally and state-managed lands, in addition to related legislation or planning documents that might guide future development opportunities.

3.3.1.3 Affected Environment

The following sections provide summary-level findings. For the full land use inventory, see **Appendix E3**, Land Use and Section 6(f) Technical Memorandum.

Land Use Plans and Policy

Land use elements vary among the Study Area jurisdictions' general and comprehensive plans. Within the South Section, the Study Area encompasses portions of the planning areas of Nogales, Sahuarita, South Tucson, Tucson, Marana, Eloy, Pima County, and Pinal County. In the Central Section, the Study Area encompasses portions of the planning areas of Casa Grande, Gila Bend, Goodyear, Buckeye, Pinal County, and Maricopa County. The North Section includes portions of the planning areas of Buckeye, Wickenburg, Maricopa County, and Yavapai County.

Typically, land use goals relate to economic growth that takes advantage of transportation infrastructure while maintaining buffers between urban and rural land use and to development that occurs in a manner that is sensitive to the natural environment. In general, the transportation elements include goals related to improving circulation and reducing congestion, enhancing public transit, and creating alternatives to automobile transportation for localized travel. As a driver of growth, economic development initiatives respond to transportation

patterns, with other land uses planned in a compatible manner. For example, it is common for Study Area jurisdictions to plan major employment centers along high-capacity roadways, as industrial growth is anticipated near freeways, rail lines, and airports. Mixed-use development often surrounds these areas, with lower densities of residential growth more distant from these areas to avoid conflicts with noise and high volumes of traffic.

Many municipalities, including Pinal County, Casa Grande, Eloy, Goodyear, Buckeye, and Wickenburg, already incorporate some version of I-11 in their general or comprehensive plans,. These versions of I-11 often have multiple names, including the West Pinal Freeway (Options I1 and I2), Hassayampa Freeway (Options I1, I2, L, M, X), State Route (SR) 303L South Extension (north-south portion of Option N), and SR 30 (east-west portion of Option N and Option R).

Other municipal plans are focused on expansion of existing highways such as I-19, I-10, I-8, and SR 85 through their communities, (e.g., Nogales, Tucson, and Gila Bend). Several Study Area jurisdictions incorporate and acknowledge ongoing study processes for other intersecting high-capacity transportation corridors, such as the Sonoran Corridor and North-South Freeway. ADOT is considering both in current Draft Tier 1 EIS efforts. In all these scenarios, transportation-compatible land uses are planned in the vicinity of expected transportation corridors, and such land uses will provide a built environment that is well suited for a new or improved high-capacity transportation corridor. For more information on individual land use plans and policies and their relationship with the Build Corridor Alternatives, see **Appendix E3**, Land Use and Section 6(f) Technical Memorandum.

Existing Land Use

Most of the Study Area today consists of vacant or residential land, with large swaths of recreation, open space, or agricultural land and clusters of commercial and industrial development, generally along existing transportation corridors and at major transportation junctions. The following narrative summarizes existing land use patterns, as shown on **Figure 3.3-1** (Existing Land Use). Noted land use features are labeled for context. See **Appendix E3**, Land Use, for tabular descriptions of land use compositions and acreage breakdowns.

Please note that illustrated land uses reflect categorizations in municipal and county general and comprehensive plans. They are not always reflective of underlying land management patterns, which will be discussed further in the next section. Therefore, some areas that are managed as open space or recreation areas may not be reflected as such on **Figure 3.3-1** (Existing Land Use).

For the South and Central Sections, spatial data is unavailable for Pinal County (Options F, G, H, and I); for the North Section, data is unavailable for Yavapai County (northern portions of Options S, U, and X). Neither county maintains a database of existing land uses. For this analysis, a field survey and review of aerial photography assisted in the narrative.

Land uses within the South Section are primarily categorized as existing residential or vacant, with pockets of commercial development at traffic interchange locations and near major arterial intersections. A large cluster of mining activities, including the Mission and Sierrita Mines, exists south of the San Xavier District of the Tohono O'odham Nation. Two major Tucson water recovery properties are located north of SR 86 (CAVSARP/SAVSARP).Other industrial clusters are located near Pinal Airpark and between I-10 and the Union Pacific Railroad (UPRR) corridor in Eloy. The Tucson metropolitan area, especially along the I-10 and I-19 routes, is heavily built out, while the fringes of the urban environment are more sparsely populated, with clusters of

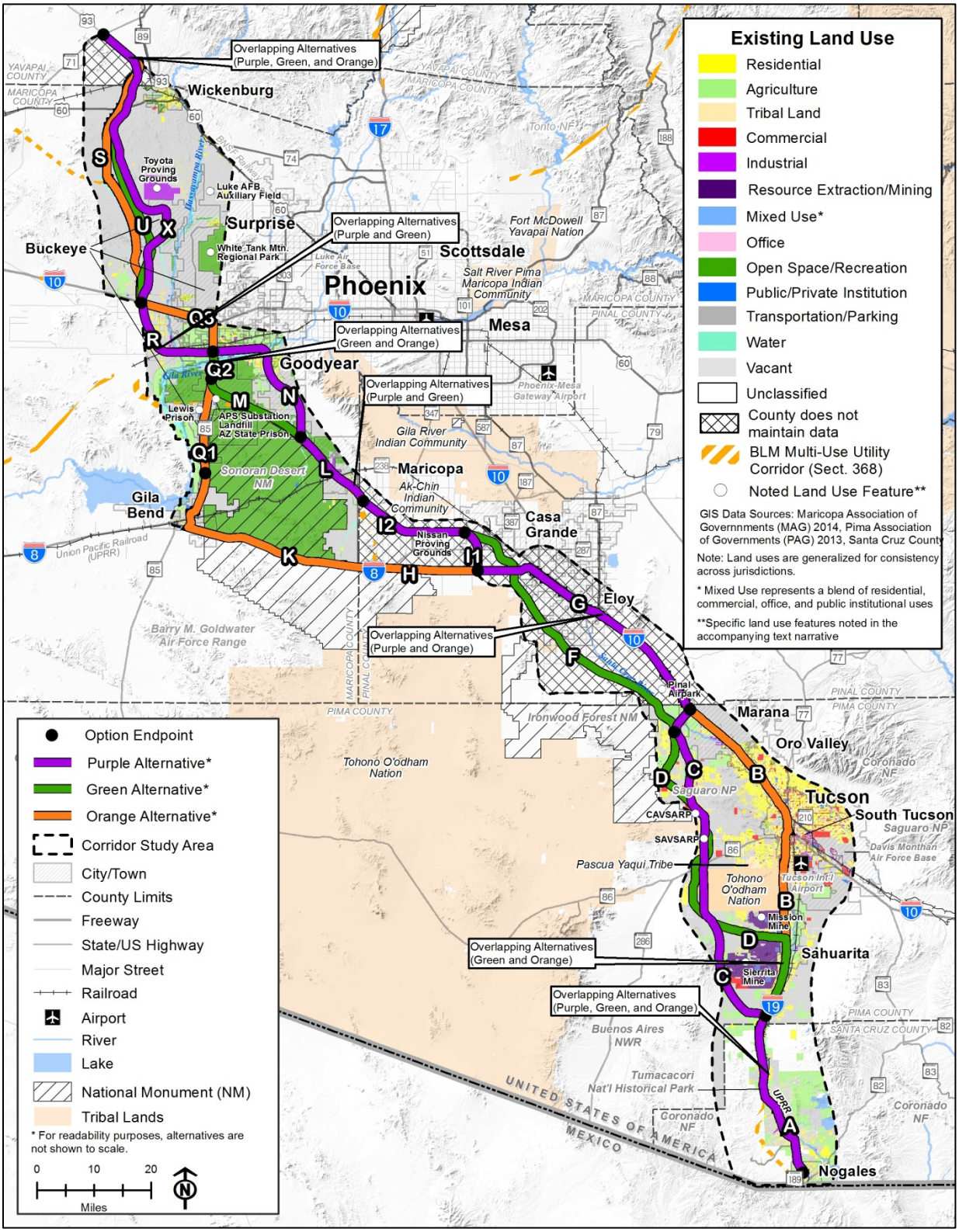


Figure 3.3-1 Existing Land Use

low-density residential housing, open space features, and vacant lands. Large clusters of open space and recreation uses, which are not illustrated in this categorization, are present in the South Section, namely Saguaro National Park (SNP), Tucson Mountain County Park, Tumacacori National Historical Park, Tubac Presidio State Historic Park, Ironwood Forest National Monument, and Picacho Peak State Park.

Land uses within the Central Section are primarily residential, recreation and open space, or vacant, with pockets of commercial and industrial development along existing corridors. This section's high degree of open space land uses is mostly due to the location of the Sonoran Desert National Monument (SDNM), which comprises more than half of the geographic area, several additional parks and recreation areas. Although not mapped, most of the Study Area in Pinal County is vacant and residential in nature, with large swaths of agricultural land and small clusters of commercial and industrial growth, including the Nissan Proving Grounds. Residential development in the Maricopa County portion is primarily clustered near Gila Bend (I-8/SR 85), Buckeye (SR 85/MC-85), and Goodyear (planned SR 303L South Extension).

Non-open-space areas of Maricopa County have a high amount of agricultural lands, mostly located near the Gila River corridor. A cluster of existing industrial and public institutional uses is located on SR 85 south of the Gila River (e.g., Arizona Public Service substation, prison complexes, and a large landfill facility).

Several portions of the Corridor Options run within Bureau of Land Management (BLM) multi-use utility corridors, which are defined corridor rights-of-way for transportation and energy transmission facilities. These multi-use utility corridors represent BLM's preferred routing of such facilities through their lands.

Lands within the North Section are primarily vacant, with some scattered low-density development. Within Maricopa County, major land use features include the Toyota Proving Grounds, White Tank Mountain Regional Park, agricultural and residential lands north of I-10, along with a mix of uses that comprise the Town of Wickenburg. Luke Air Force Base holds a small auxiliary field on the east side of the Hassayampa River. Yavapai County does not maintain an existing land use file, but currently this land is mostly vacant State Trust land. Large clusters of open space and recreation areas are located north of the Toyota Proving Grounds in the center of the Study Area (Vulture Mountains Recreation Area [VMRA], Hassayampa River Preserve), but they are not mapped.

Planned Land Use

Planned land uses in the Study Area reflect the 20-year future land use scenario envisioned in municipal and county general and comprehensive plans. Future land uses are speculative and development patterns can quickly change to respond to new opportunities and constraints, such as a new transportation corridor, changing demographics, or the attraction of a major employer. Additionally, planned land uses are the best vision of a comprehensive coordinated development pattern. However, that does not guarantee that uses will be developed precisely as planned or within the time period envisioned. Furthermore, new residential development in any of the state's five Active Management Areas (including portions of Maricopa, Pinal, Pima, Santa Cruz and Yavapai counties) must demonstrate a 100-year water supply under the Arizona Department of Water Resources' Assured Water Supply Program. This approval requires that new residential development meet five criteria (physical water availability, continuous water availability, legal water availability, water quality, and financial capability to construct water delivery/storage) and comes after the master-planning process (which is what is typically embedded in general and comprehensive plans as "planned land uses"), but before the

recording of plats or selling of parcels. Therefore, the amount and density of proposed residential development throughout the Study Area may not be reflective of the reality of water availability.

The following narrative summarizes the land uses planned in current general and comprehensive plans. However, several plans will be due for revision soon, and the current land use scenario could vary in the future. Planned land uses are illustrated on **Figure 3.3-2** (Planned Land Use). Noted land use features are labeled for context. See **Appendix E3**, Land Use and Section 6(f) Technical Memorandum, for tabular descriptions of land use compositions and acreage breakdowns. Section 3.3.1.4, Environmental Consequences, discusses the implications for specific Build Corridor Alternatives in more detail.

Approximately half of the land within the South Section is planned for residential growth of varying densities. The growth is generally concentrated within the jurisdictional boundaries of Tucson, Marana, Nogales, Sahuarita, and other smaller communities. Industrial land use is the second-largest category of land use, with most uses located around Tucson International Airport, northwest of Tucson and adjacent to SNP, and south of the Tohono O'odham Nation. Recreation and open space form the third-largest category of land use. The Tohono O'odham Nation occupies approximately 10 percent of the Study Area in this section. In addition, public and private institutional land uses are scattered throughout this area. Generally, land immediately adjacent to existing interstate corridors is planned to be used for industrial, commercial, and mixed-use development.

Planned land uses in the Central Section are largely dominated by recreation and open space land uses, owing largely to the SDNM and the proposed Palo Verde Regional Park, the Buckeye Hills Regional Park, and other active and passive open spaces scattered throughout the section. Residential land uses form the second largest land use category in this section and will continue to be generally concentrated within the communities of Buckeye, Casa Grande, Goodyear, and Gila Bend. A variety of industrial, office, commercial, and mixed uses are scattered throughout the Central Section.

Planned land uses in the North Section are primarily split between equal portions of recreational lands and open spaces (VMRA, White Tank Mountain Regional Park) and residential land uses. The Hassayampa River flows through the North Section, and together with various streams and washes, it constitutes approximately 2 percent of the land. Smaller commercial and industrial land uses are scattered throughout the section. Major large-scale master-planned communities in Buckeye and Maricopa County are designated as mixed use and are planned to include both residential and employment-generating land uses.

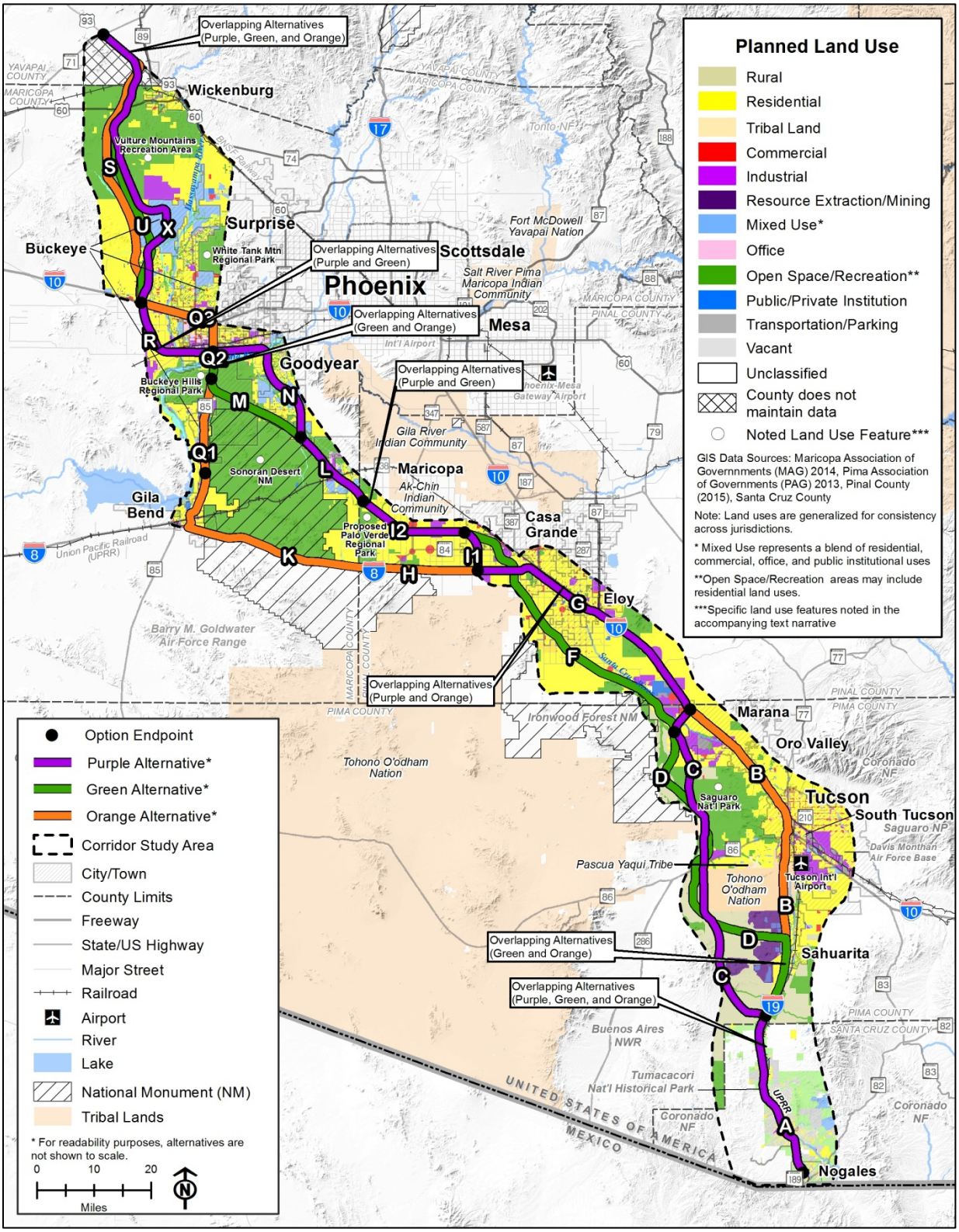


Figure 3.3-2 Planned Land Use

Master Planned Communities

The Study Area, specifically the Pinal County and Maricopa County portions, has been on the fringe of expanding Phoenix metropolitan development for more than a decade. There were more than 200 master-planned communities in various stages of planning, permitting, and construction when the Great Recession hit and most development paused. Several large communities are still planned and/or under development today, as shown on **Figure 3.3-4** (Major Study Area Master-Planned Communities).

Six large-scale communities form the primary clusters of new anticipated growth (Rancho Sahuarita in the South Section; Dreamport Villages, Amaranth, and Estrella in the Central Section; and Belmont and Douglas Ranch in the North Section). Generally permitted as a Planned Area Development, these master-planned communities tend to show up on general or comprehensive plan maps as either all residential or all mixed-use. And while they are typically predominantly residential with a mix of uses throughout, there is generally a thoughtful pattern to their layout, based more on performance standards than zoning. Communities of these sizes may take 25 to 30 or more years to build out, spanning multiple economic cycles and responding in like, which the Planned Area Development allows for. A generalized map of these community locations is illustrated on **Figure 3.3-4** (Major Study Area Master-Planned Communities). Please note that locations are approximate and do not illustrate parcel boundaries. See **Appendix E3**, Land Use and Section 6(f) Technical Memorandum, for more-detailed descriptions of future development opportunities.

Land Management and Special Designated Lands

This section discusses major land management in the Study Area and special designated lands, such as wildernesses, national monuments, areas of critical environmental concern (ACECs), designated roadless areas, and other deeded properties. Only about half the Study Area is private land, and differing land regulations apply to the use of the other lands for transportation purposes. Some land managers, like the Arizona State Land Department (ASLD), may see a new transportation corridor as a benefit and asset to their properties, providing access to developable, non-sensitive lands. Others may feel a high-capacity roadway would have negative impacts, such as increased traffic, noise, pollution, or wildlife connectivity and habitat fragmentation.

For example, several designated wildernesses exist within the Study Area, managed by various agencies but all subject to the Wilderness Act of 1964, which defines these areas as those with a minimal human footprint, opportunities for unconfined recreation; and educational, scientific, or historical value; and without enterprises or motorized travel within them. Ongoing coordination is required with all agencies to understand the consequences of locating a potential I-11 through or proximate to the properties under their jurisdiction.

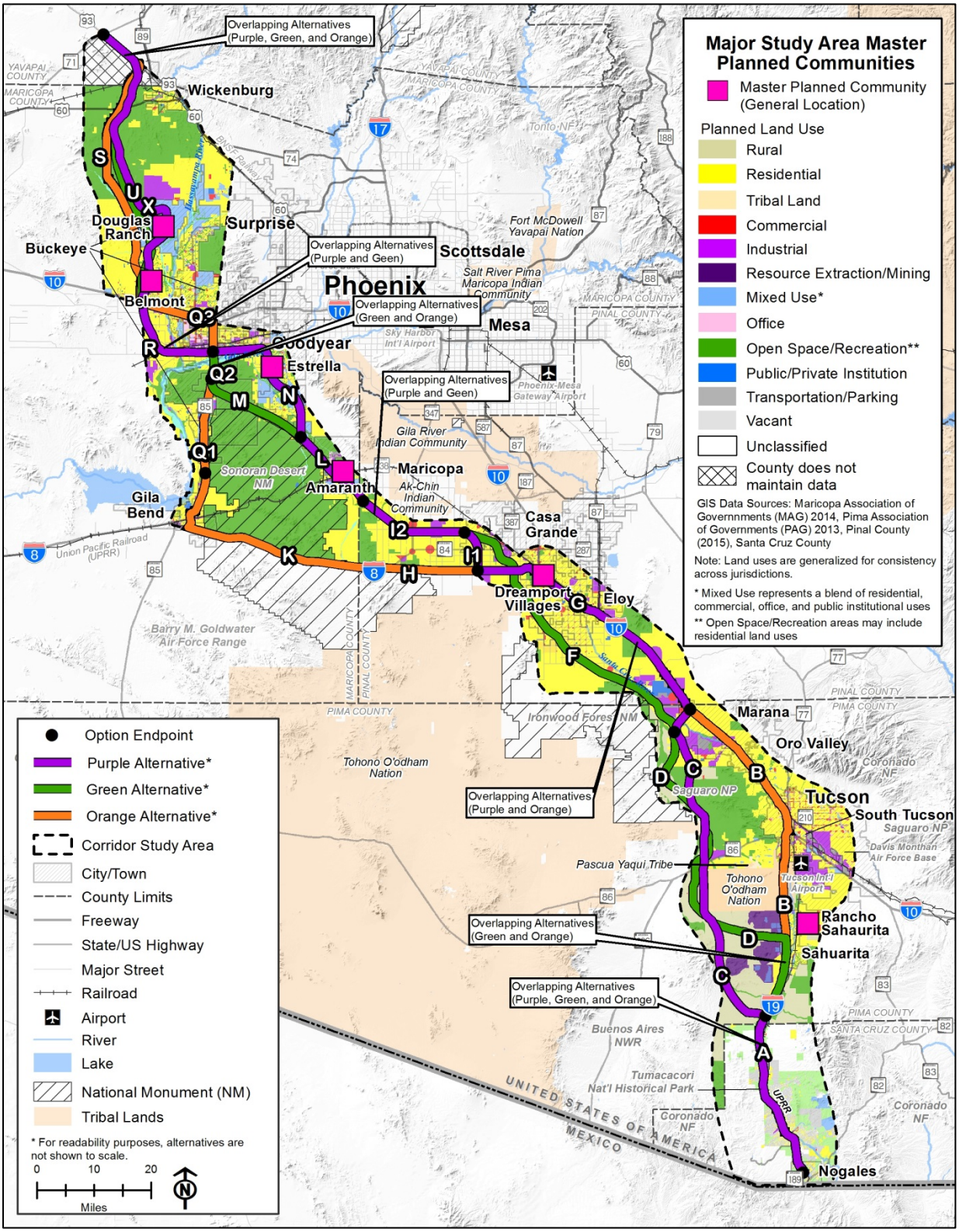


Figure 3.3-3 Major Study Area Master-Planned Communities

The following narrative summarizes major land management patterns, as shown on **Figure 3.3-5** (Land Management and Special Designated Lands). See **Appendix E3**, Land Use and Section 6(f) Technical Memorandum, for tabular descriptions of land management compositions and acreage breakdowns.

Slightly more than 50 percent of the South Section is private land and 25 percent is State Trust lands. Smaller parcels of land are managed by BLM, the Bureau of Reclamation (Reclamation), United States Forest Service (USFS), and National Park Service (NPS), and other parcels belong to the military or are state parks and Tribal lands. Roadless areas and wilderness are located within the USFS Coronado National Forest. These areas are generally on the edges of the Study Area and do not encroach upon existing highways. The largest cluster of protected lands is located west of metropolitan Tucson where SNP (NPS)/Saguaro Wilderness, Tucson Mountain Park (Pima County Parks), and the Tucson Mitigation Corridor (TMC) (Reclamation) sit adjacent to each other and near the Tohono O'odham Nation and Ironwood Forest National Monument (BLM), which mostly sits outside the Study Area except for a small portion near Marana.

Within the South Section, the Pima County Buffer Overlay Zone is a zoning overlay district within 1-mile of the surrounding public preserves. The purpose of this overlay is to preserve and protect the open space characteristics of lands that are in close proximity to public preserves, while also permitting reasonable economic use of the land. This is intended as a transition zone between the preserves and the more urban areas of the county. It does not discourage changes in the underlying zoning, but seeks to minimize impacts to wildlife movement and the visual aesthetics surrounding public preserves. Within the Study Area, this overlay zone applies to national, state, and county parks; wildernesses; national forests; national monuments; wildlife refuges; and other open space preservation areas (**Figure 3.3-5** [Land Management and Special Designated Lands]).

Generally, land directly adjacent to existing interstate corridors is either privately or state-owned, with the exception of the San Xavier District of the Tohono O'odham Nation, which spans about an 8-mile section of I-19 between Tucson and Sahuarita, and Picacho Peak State Park, which partially spans I-10 in its most northeastern corner.

Private land and BLM land are present in the Central Section. Most privately held land is located near the incorporated municipal areas (Casa Grande, Gila Bend, Goodyear, and Buckeye), while large pieces of contiguous BLM lands are present throughout most of the Maricopa County portion, including the SDNM and various wildernesses. Parcels of State Trust land are intermingled with the private land, along with small parcels of park and recreation areas west of SR 85 (e.g., Buckeye Hills Regional Park). The Gila River Terraces and Lower Gila Historic Trails ACEC is prevalent in linear blocks in the Study Area, spanning the Gila River on BLM lands from edge-to-edge of the Study Area, following the west edge of the Study Area along the river corridor down to Gila Bend. Several blocks of Arizona Game and Fish Department (AGFD) deeded lands are managed as state wildlife areas throughout the ACEC.

In the North Section, land within the City of Buckeye and the Town of Wickenburg planning areas is predominantly private land, State Trust land, and BLM land; some parcels of Reclamation land are located along the Central Arizona Project (CAP) canal. VMRA is located south of US 60 between Buckeye and Wickenburg, a 110-square-mile area owned by BLM and managed in cooperation with Maricopa County. The Vulture Mountains ACEC is within the VMRA. The Flood Control District of Maricopa County operates several flood-retardant

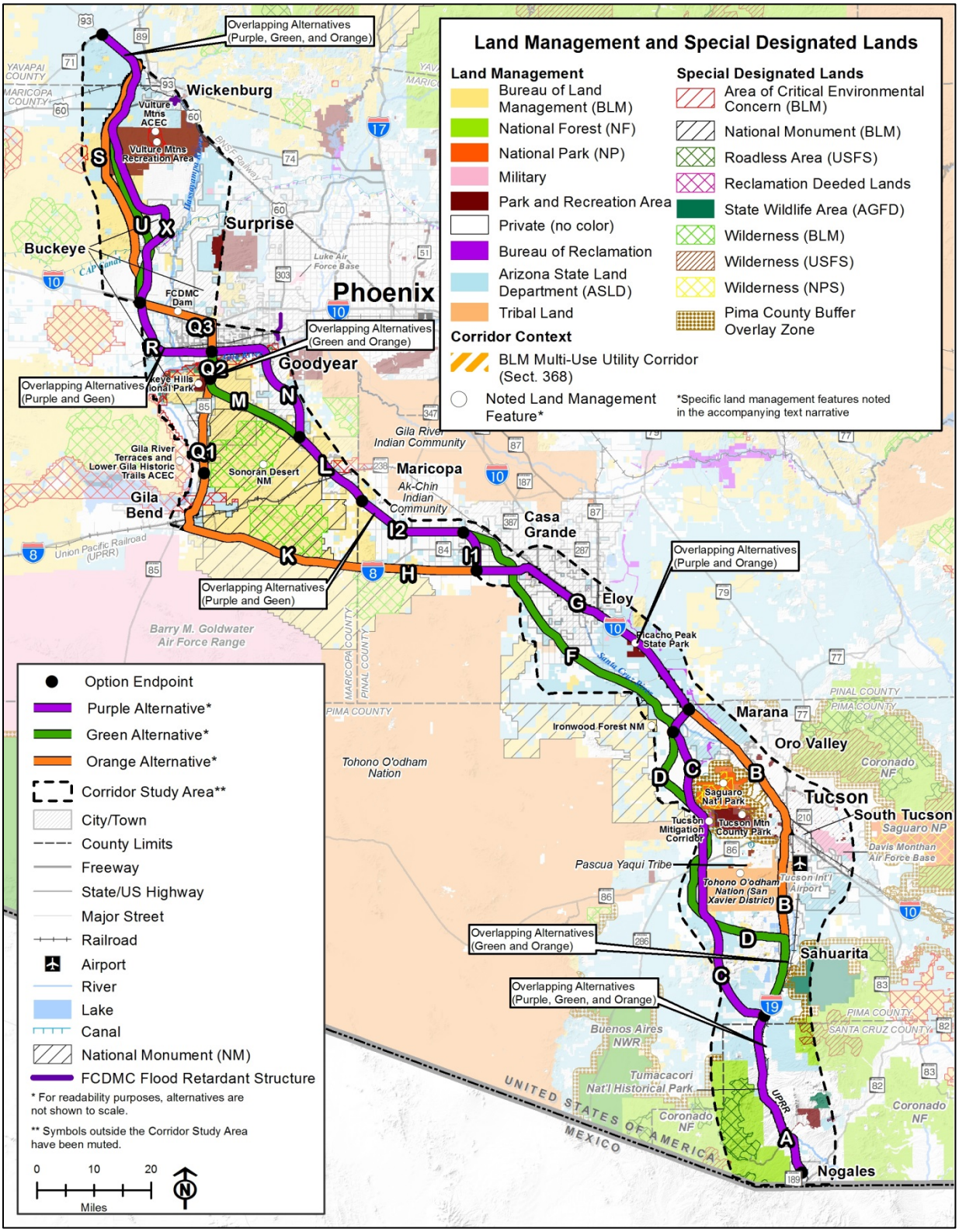


Figure 3.3-4 Land Management and Special Designated Lands

structures on the east side of the Study Area as well as an 8-mile dam to interrupt and redirect overland stormwater flows on the north side of I-10.

3.3.1.4 Environmental Consequences

At the Tier 1 EIS level, environmental consequences are evaluated within a 2,000-foot-wide Project Area for each Build Corridor Alternative. To accommodate a new transportation corridor, portions of the alternative may need to be rezoned through the local development process, which could alter adjacent planned land uses from what is envisioned today. A higher probability exists for changes to planned land uses or displacement of existing uses where new corridor development would occur, and new rights-of-way would need to be acquired. This would be the case under any of the Build Corridor Alternatives, and would be better understood during Tier 2 studies, which would include detailed analysis of right-of-way (ROW) impacts.

The I-11 transportation corridor ultimately could be located anywhere within the 2,000-foot-wide Project Area, and is expected to generally occupy approximately a 400-foot (or less, in the case of existing transportation facilities or other design commitments) ROW footprint. The Build Corridor Alternatives could make improvements within the existing and proposed rights-of-way, which could result in changes to existing land uses in newly acquired lands. Within the 2,000-foot-wide Project Area, specific land uses or properties that could be affected, and the extent to which they could be affected, cannot be adequately determined until Tier 2, when detailed alignments are identified.

Indirect land use impacts of the Build Corridor Alternatives have the potential to extend beyond the proposed ROW and might affect accessibility, community cohesion, economics, air quality, biology, noise, cultural, and visual resources, among others. Other sections of this Draft Tier 1 EIS discuss these impacts related to land use; see Section 3.17 (Indirect and Cumulative Effects).

Overall, the Build Corridor Alternatives are anticipated to benefit commercial, industrial, and related land uses by improving the capacity of the transportation system and retaining or granting new local access, especially to large regional facilities (e.g., shopping centers, business parks, and industrial parks) located near access points. Proposed improvements would reduce travel time and delay in urban areas, and shorten periods of congestion to make travel times more predictable. These transportation benefits would increase the prosperity and economic competitiveness of large employers and businesses while stimulating new economic development – both on existing and new corridors. Additionally, the development of new transportation junctions (i.e., intersection of I-11 with other high-capacity transportation facilities), could spur focused, economically productive uses, such as major employment centers, and meet the I-11 Purpose and Need.

This section will identify the key locations along each Build Corridor Alternative where major land use impacts are likely to occur due to creation of new transportation junctions or new development activity. This section also will identify planned land uses along the Build Corridor Alternatives that could be avoided when determining the recommended I-11 route.

Purple Alternative

The Purple Alternative is composed of Options A, C, G, I, L, N, R, and X. This alternative is a mix of existing and new corridor development.

Planned Land Use

Future land use designations were reviewed to quantify types of planned land uses within the Project Area that could be impacted (**Table 3.3-1** [Potential Planned Land Use Conversion Impacts – Purple Alternative]). Depending on the alignment location within the 2,000-foot-wide Project Area, which would be determined during Tier 2 environmental studies, consequences to planned land uses could vary. This analysis provides a qualitative assessment of which portions of the alternative are more likely to be impacted based on whether an Option provides the opportunity for co-location with an existing transportation facility; an assessment of areas within the Project Area that should be avoided, if possible; and a discussion of areas along the alternative that are more likely to benefit from I-11.

Table 3.3-1 Potential Planned Land Use Conversion Impacts (acres) – Purple Alternative

Planned Land Use	Corridor Option								Total	% Total
	A	C	G	I1/I2	L	N	R	X		
Residential	1,032	10,153 (1)	4,127	5,483	1,203	3,279	3,033	2,309	30,620	49
Agriculture	1,215	0	0	0	0	0	0	0	1,215	2
Tribal Lands	0	0	0	0	0	0	0	0	0	0
Commercial	483	212	1,938	262	39	166	269	363	3,732	6
Industrial	221	325	3,386	478	84	177	288	0	4,961	8
Mixed Use	298	22	0	0	912	1,546	520	2,668	5,966	9
Office	0	0	0	0	199	74	4	59	337	1
Recreation/Open Space	64	3,316 (1)	837	63	1,186	437	0	4,985	10,889	17
Public/Private Institutions	0	0	453	0	7	77	8	18	563	1
Transportation/Parking	0	11	207	0	15	144	123	86	586	1
Vacant (2)	1,479	0	0	0	0	0	0	0	1,479	2
Unclassified (2)	2,174	0	0	0	0	0	0	0	2,174	3
Waterbodies	0	0	0	0	3	305	34	55	397	1

(1) 9,722 acres residential and 3,479 acres recreation/open space if the CAP Design Option is selected.

(2) Per direction from Santa Cruz County, the same land uses are illustrated for existing and planned scenarios.

NOTE: Planned land uses are likely to evolve and change, depending on market demand and community needs. Acreages listed for the Project Area are based on current general or comprehensive plans and may not reflect actual land uses in the future.

Figure 3.3-6 (Planned Land Uses – Purple Alternative, South Section) displays planned land uses in the South Section; noted land use features are labeled for context.

New development is likely to occur at the new transportation junctions where Options A and C meet, just north of the Santa Cruz-Pima County line, as well as where I-11 would meet I-10 north of Marana, where Options C and G intersect. Both locations may attract development from convenience commercial to freight/industrial uses in the vicinity of the system interchanges, which would be deviations from planned residential growth. Along Option C, the CAP Design Option would traverse a similar mix of planned residential and open space/recreation lands. The major difference is that the CAP Design Option would avoid impacting properties associated with the City of Tucson's CAVSARP/SAVSARP facilities.

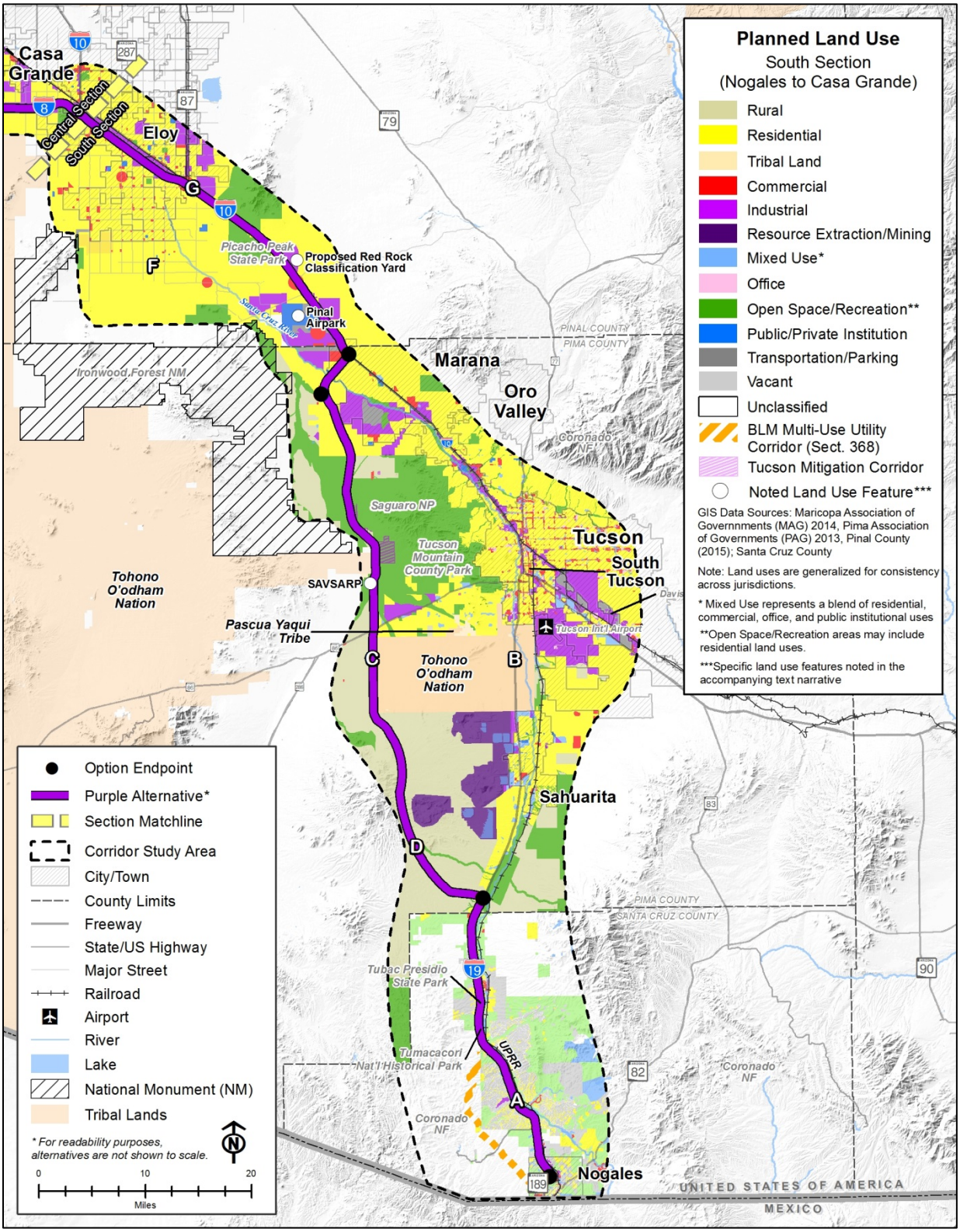


Figure 3.3-5 Planned Land Uses – Purple Alternative, South Section

The section of I-10 where Option G follows the existing I-10 from just north of the Pinal County/Pima County line to the I-8 interchange is already six lanes wide, and no major land use impacts are anticipated. Co-location of I-11 with I-10 could, however, increase the development potential of properties in and near the Pinal Airpark and UPRR's proposed Red Rock Classification Yard – both potentially major freight hubs that could take advantage of the interstate's transcontinental route and parallel Class 1 rail facility. These two developments would attract truck and other intermodal traffic.

Option G in the Central Section continues from I-10 to I-8, to approximately Montgomery Road. Increased development is expected surrounding the I-8/I-10 system interchange. As improvements to the interchange are already planned, minimal direct impacts to surrounding land uses are expected with the addition of I-11. However, new growth can be expected in Dreamport Villages, an entertainment and mixed-use village located west of I-10 where it spans I-8. New growth of the existing Phoenix Mart along Casa Grande La Palma Highway (SR 287), a distribution, warehousing, and business park attracting freight uses, also would be expected. **Figure 3.3-6** (Planned Land Uses – Purple Alternative, Central Section) displays planned land uses in the Central Section; noted land use features are labeled for context.

Today, Option I is almost entirely comprised of vacant and agricultural lands; however, it is mostly planned as future residential development. This Option also is the route of the proposed West Pinal Freeway (as documented in the *Pinal Regional Transportation Plan* and referenced in Section 3.3.1.3, Land Use Plans and Policies). Depending on the status of future land development and/or ROW set asides, residential impacts may or may not occur. Additionally, Option I skirts the southern edge of the Nissan Proving Grounds. In western Pinal County, Option I is expected to sit between two clusters of the proposed Palo Verde Regional Park.

Option L partially parallels the northeast edge of the SDNM and passes through large portions of planned residential and recreational/open space uses, which would likely be bifurcated by I-11. Planned uses near Mobile, which include smaller parcels of commercial, office, industrial, and mixed uses, could be impacted. Previous master-planning endeavors incorporated ROW for a new interstate-level facility through this community (Amaranth), so enhancement opportunities could be coordinated with ongoing development plans.

A large part of Option N traverses planned residential land within Goodyear (Estrella Master Planned Community, as shown on **Figure 3.3-7** (Planned Land Uses – Purple Alternative, Central Section) and discussed in Section 3.3.1.3, Master Planned Communities. Mixed uses also line the corridor, with clusters of commercial, industrial, and recreational/open space uses. Option N was identified as a freeway corridor within the Goodyear General Plan as well as the master plan for Estrella, and is unlikely to adversely impact planned land uses if it generally follows the same alignment as identified in the Goodyear General Plan. In this area, Option N would follow a potential Corridor Option under consideration for the proposed SR 303L South Extension (Rainbow Valley Alignment). Option N turns west immediately north of the Gila River. At this location, I-11 would connect with the future SR 30, which would create a major transportation junction that is likely to attract commercial and industrial activities in the vicinity, leading to potential changes to planned land uses, which are primarily residential.

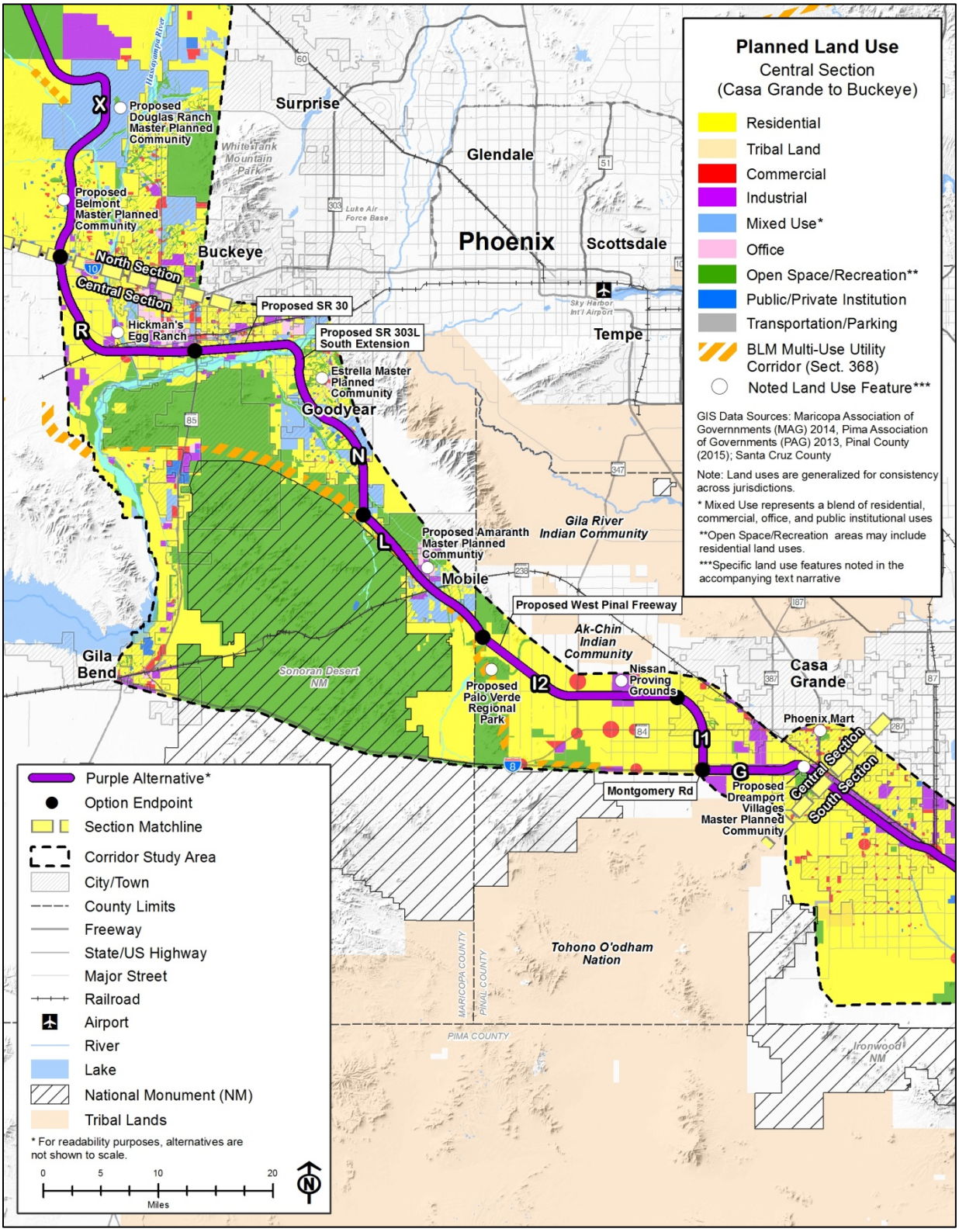


Figure 3.3-6 Planned Land Uses – Purple Alternative, Central Section

Option R consists of planned residential areas on the west side of Buckeye, along with a mix of industrial, mixed-use, and office uses, mostly closer to its junction with SR 85 or I-10. These uses generally include existing agricultural operations, including Hickman's Egg Ranch, which is located just north of the bend in Option R.

Figure 3.3-8 (Planned Land Uses – Purple Alternative, North Section) displays planned land uses in the North Section; noted land use features are labeled for context. This alternative follows Option X, which loops through the Belmont and Douglas Ranch master-planned communities and is consistent with the proposed Hassayampa Freeway corridor, which originated in the MAG *I-10/Hassayampa Valley Regional Transportation Framework Study.* This freeway corridor has been adopted in local circulation planning by the City of Buckeye and Maricopa County. As drawn, this corridor is ultimately planned to link with a proposed east-west freeway corridor north of and parallel to Bell Road (White Tanks Freeway). In this southern portion of the North Section, most of the Project Area is designated as planned mixed use. If it generally follows the same route as planned, minimal impacts are envisioned. Any deviations from this route would be less compatible with transportation and land use planning in Buckeye and Maricopa County. Closer to I-10, scattered areas of residential development exist today and are planned to be expanded, which could result in potential property takes. To the north, this alternative crosses the VMRA within a designated BLM multi-use utility corridor, paralleling an existing electric transmission line. North of this area, planned land uses are generally open space and recreation uses, with small pockets of residential development.

End-to-End Considerations

The Purple Alternative is not likely to cause major adverse effects to land uses along the corridor, and in many respects, responds to them. In many sections, this alternative mirrors a previously planned freeway facility, and therefore local planning efforts are already oriented around such a future transportation facility. Through some developed areas (e.g., Casa Grande, Mobile, Goodyear, and Buckeye), impacts may occur to the extent that I-11 would promote different, non-residential uses in areas planned for rural residential. The determination of likely impacts depends on the timing of I-11 construction versus the pace of future development in local communities.

New transportation junctions created with existing highways (e.g., I-19 south of Sahuarita, I-10 north of Marana, I-8 west of I-10, SR 85 south of I-10, and I-10 west of SR 85) may create opportunities for new development and growth along I-11.

Land Management and Special Designated Lands

Land management designations were reviewed to quantify land with special designations that are located within the Project Area and therefore could be impacted and converted to a transportation use (**Table 3.3-2** [Potential Land Management Conversion Impacts – Purple Alternative]. **Figure 3.3-9** [Land Management and Special Designated Lands – Purple Alternative]) displays Study Area land management patterns; noted features are labeled for context.

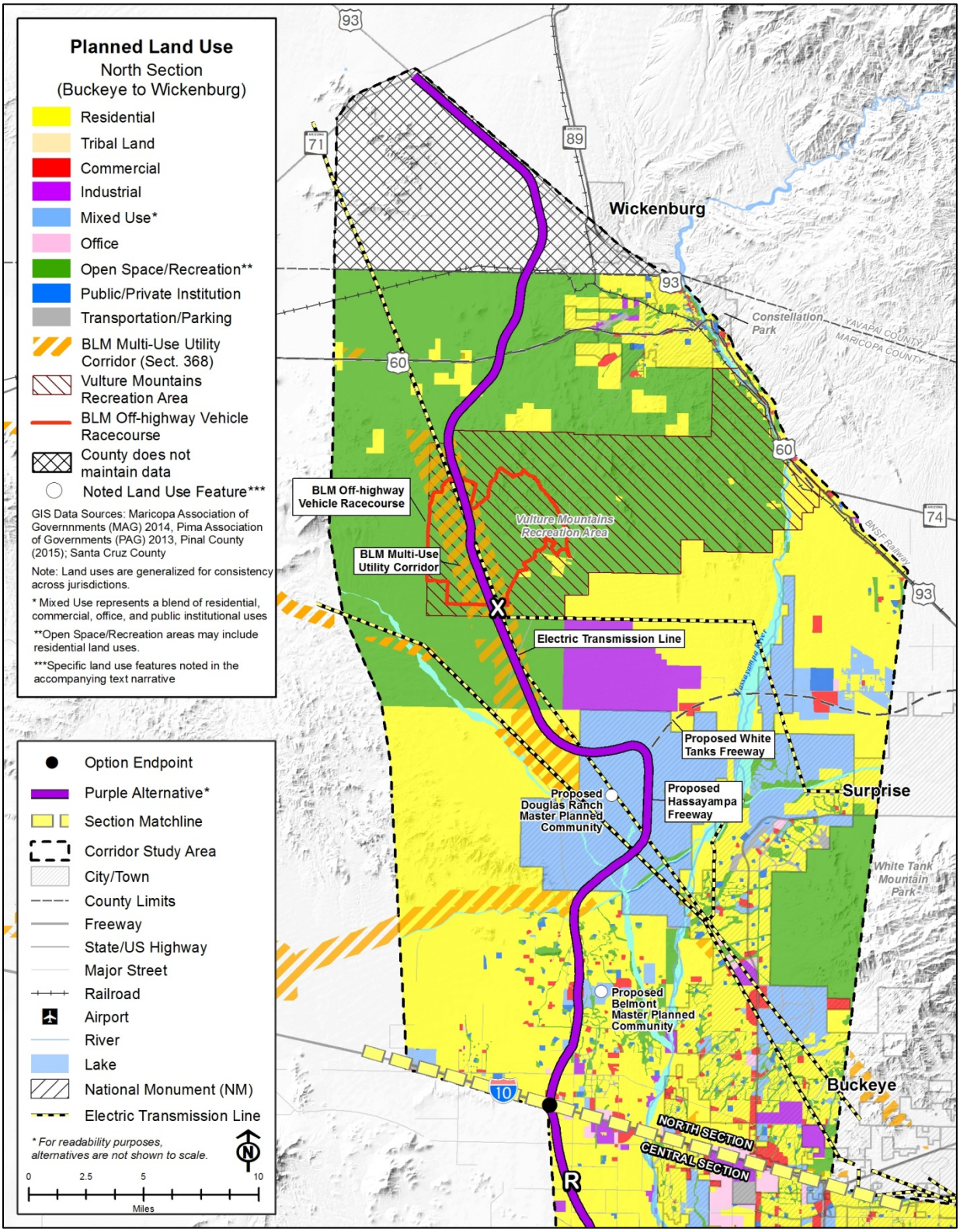


Figure 3.3-7 Planned Land Uses – Purple Alternative, North Section

Table 3.3-2 Potential Land Management Conversion Impacts (acres) – Purple Alternative

Land Management	Build Corridor Option								Total	% Total
	A	C	G	I1/I2	L	N	R	X		
BLM	0	528 (1)	0	0	1,387	198	67	3,741	5,921	9
National Forest	0	0	0	0	0	0	0	0	0	0
NPS	0	0	0	0	0	0	0	0	0	0
Military	0	0	0	0	0	0	0	0	0	0
Park and Recreation Area	0	0	202	0	0	0	0	1,913	2,115	3
Private Land	6,623	8,914 (1)	7,702	6,060	2,056	4,860	3,270	4,108	43,593	65
Reclamation	0	0	0	0	0	0	0	0	0	0
State Trust Land	331	4,659 (1)	3,026	224	203	1,147	899	5,377	15,866	23
Tribal Land	0	0	0	0	0	0	0	0	0	0
Area of Critical Environmental Concern (BLM)	0	0	0	0	610	243	0	0	853	
National Monument (BLM)	0	0	0	0	0	0	0	0	0	
Roadless Area (US Forest Service [USFS])	0	0	0	0	0	0	0	0	0	
Reclamation – Deeded Lands	0	453 (1)	0	0	0	0	0	0	453	
State Wildlife Area (AGFD)	0.5	0	0	0	0	42	0	0	43	
Wilderness (BLM)	0	0	0	0	0	0	0	0	0	
Wilderness (NPS)	0	0	0	0	0	0	0	0	0	
Wilderness (USFS)	0	0	0	0	0	0	0	0	0	

(1) 8,773 acres private land and 4,530 State Trust land if the CAP Design Option is selected; no changes in total acreage impacts to BLM and Reclamation deeded lands (TMC) if the CAP Design Option is selected.

(2) Percent totals are not included for Special Designated Lands, as these are overlays to the underlying ownership patterns and do not cover the entire Study Area.

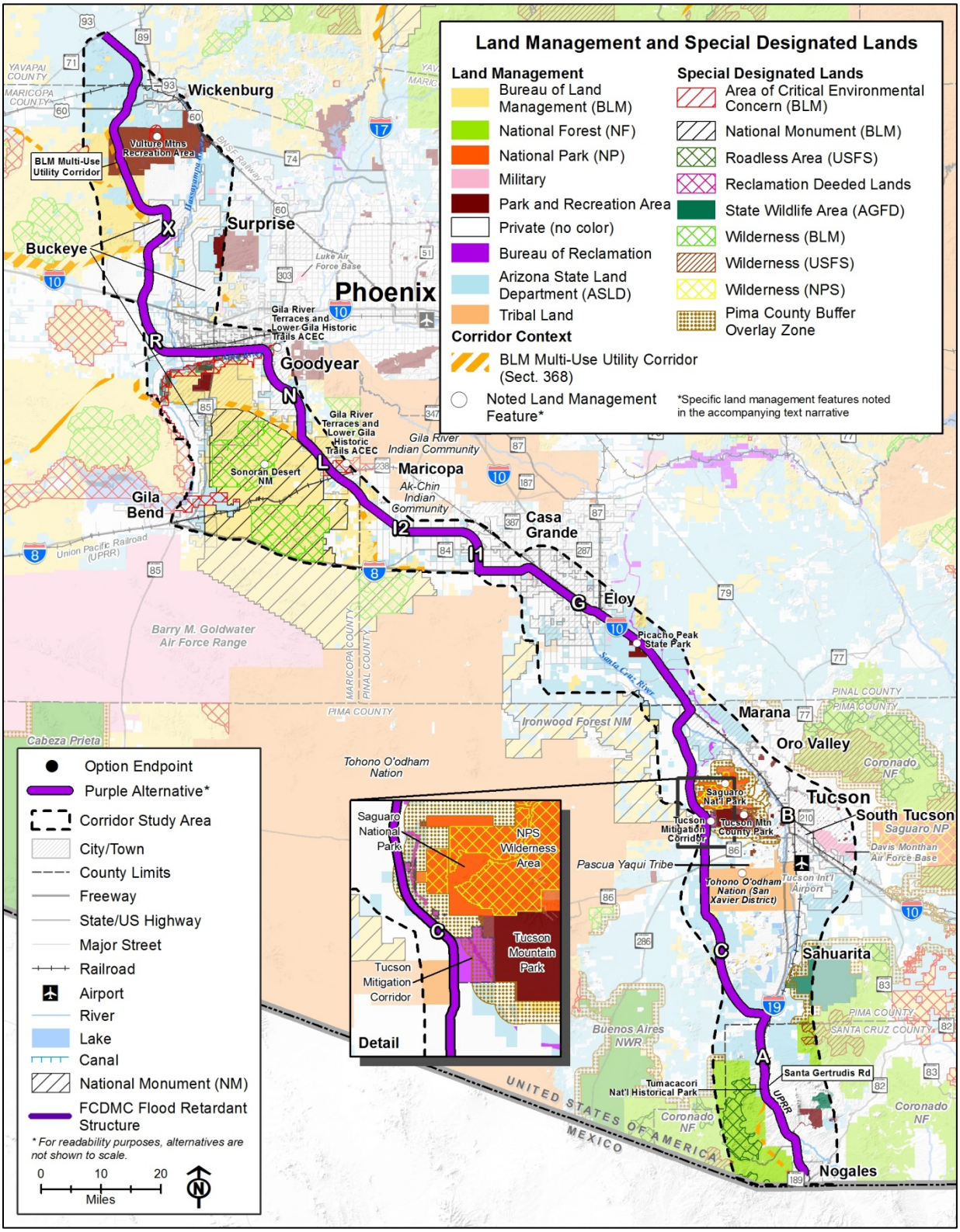


Figure 3.3-8 Land Management and Special Designated Lands – Purple Alternative

The Purple Alternative in the South Section is composed of Options A, C, and G. The majority of the land along Option A consists of private land, with the exception of 331 acres of State Trust land spanning the existing interstate in the vicinity of Santa Gertrudis Lane and Tumacacori National Historical Park. A portion of Tumacacori National Historical Park is within the eastern edge of the 2,000-foot-wide corridor.

Option C turns to the west of I-19 and I-10 in Pima County, and is a mix of private and State Trust lands, with a few parcels of BLM land and a cluster of special designated uses. Option C parallels the western edge of the Tohono O'odham Nation (San Xavier District), but no portion of the corridor is on Tribal land.

Due to the various special designated uses located in close vicinity along Option C, limited flexibility exists in terms of where I-11 could be located to avoid impacts to these lands (e.g., the TMC, SNP, and Tucson Mountain Park). Option C would traverse the TMC, along its western edge. The CAP Design Option also would traverse the TMC, paralleling the CAP canal. Additionally, Option C is located within close proximity to the Ironwood Forest National Monument, which is a Special Recreation Management Area. Selection of the Purple Alternative could potentially adversely impact recreational users. Also, Option C could intersect approximately 956 acres of the Pima County Buffer Overlay Zone.

Option G is a mix of State Trust land (more to the south) and private land (more to the north), with Picacho Peak State Park crossing I-10 in the Study Area at its northeastern edge for approximately 1.2 miles. Minimal impact to adjacent lands is expected, as both I-8 and I-10 are existing interstate highways, with no widening expected outside the existing ROW.

Option I in the Central Section is almost entirely comprised of private land, with the exception of a few parcels of State Trust lands. Private lands are likely to be most impacted by a new transportation corridor, depending on the pace of future urban development.

Option L parallels the northeast edge of the SDNM and is a mix of private, BLM, and State Trust lands. Short portions of Options L and N cross a portion of the Gila River Terraces and Lower Gila Historic Trails ACEC. Option L consists of private land, while Option N traverses private land and BLM lands in the area of the ACEC designation.

Option R is a mix of private land and State Trust lands, with small parcels of BLM land. Special designations are not present in this area.

Option X in the North Section traverses BLM, State Trust, and private lands. It cuts through the VMRA within a BLM multi-use utility corridor. This would create a direct impact on recreation lands, but may be mitigated in coordination with BLM. North of the recreation area and closer to Wickenburg, Option X is almost entirely on State Trust lands, where the development of I-11 may be considered a beneficial opportunity to generate value for trust beneficiaries.

End-to-End Considerations

The two primary areas with potential land conversion impacts on special designations along the Purple Alternative are in the vicinity of the TMC (South Section) and VMRA (North Section). Crossing these areas would be unavoidable under the Purple Alternative. These areas are discussed further in **Chapter 4** (Preliminary Draft Section 4(f) Evaluation. Section 3.17 (Indirect and Cumulative Effects) discusses direct and indirect impacts to the character of wilderness and recreation areas.

The Gila River in the Central Section and related ACEC lands would be crossed by the corridor, but related impacts may be avoided or minimized by locating the alignment away from sensitive resources within the 2,000-foot-wide Project Area. The ACEC designation only applies to BLM-managed lands. Impacts are most likely to occur on private and State Trust lands.

Green Alternative

The Green Alternative is composed of Options A, D, F, I, L, M, Q, R, and U. This alternative consists primarily of new Corridor Options (i.e., it is not co-located with existing transportation facilities).

Planned Land Use

Future land use designations were reviewed to quantify types of planned land uses within the Project Area that could be impacted (**Table 3.3-3** [Potential Planned Land Use Conversion Impacts – Green Alternative]). Depending on the alignment location within the 2,000-foot-wide Project Area, which would be determined during Tier 2 environmental studies, consequences to planned land uses could vary. This analysis provides a qualitative assessment of which portions of the alternative are more likely to be impacted based on whether an Option provides the opportunity to co-locate with an existing transportation facility; an assessment of areas within the Project Area that should be avoided, if possible; and a discussion of areas along the alternative that are more likely to benefit from I-11 construction.

Table 3.3-3 Potential Planned Land Use Conversion Impacts (acres) – Green Alternative

Planned Land Use	Corridor Option									Total	% Total
	A	D	F	I2	L	M	Q	R	U		
Residential	1,032	8,406 (1)	11,013	5,483	1,203	274	2,536	3,033	3,043	36,024	51
Agriculture	1,215	0	0	0	0	0	0	0	0	1,215	2
Tribal Lands	0	0	0	0	0	0	0	0	0	0	0
Commercial	483	0	102	262	39	0	1,739	269	167	3,061	4
Industrial	221	119	976	478	84	1	991	288	0	3,159	5
Mixed Use	298	0	0	0	912	13	471	520	958	3,171	5
Office	0	0	0	0	199	0	741	4	93	1,036	1
Recreation/Open Space	64	3,380 (1)	25	63	1,186	4,143	1,463	0	4,933	15,257	22
Public/Private Institutions	0	6	19	0	7	0	192	8	28	261	0
Transportation/Parking	0	0	2	0	15	35	2,614	123	79	2,869	4
Vacant (2)	1,479	0	0	0	0	0	0	0	0	1,479	2
Unclassified (2)	2,174	0	0	0	0	0	0	0	0	2,174	3
Waterbodies	0	0	0	0	3	14	266	34	86	402	1

(1) 8,136 acres residential and 3,303 acres recreation/open space if the CAP Design Option is selected.

(2) Per direction from Santa Cruz County, the same land uses are illustrated for existing and planned scenarios.

NOTE: Planned land uses are likely to evolve and change, depending on market demand and community needs. Acreages listed for the Project Area are based on current general or comprehensive plans and may not reflect actual land uses in the future.

Figure 3.3-10 (Planned Land Uses – Green Alternative, South Section) displays planned land uses in the South Section; noted land use features are labeled for context.

Options D and F generally are new corridors in Pima and Pinal counties. Option D turns west from I-19 near Sahuarita, traveling west and north. Most of this area is currently vacant, with scattered low-density residential development and several recreational areas and parklands. Impacts to planned uses along Option D could include changes to planned residential and open space clusters. Along Option D, the CAP Design Option would traverse a similar mix of planned residential and open space/recreation lands. The major difference is that the CAP Design Option would avoid impacting properties associated with the City of Tucson's SAVSARP facility. Additionally, Option D is located within close proximity to the Ironwood Forest National Monument, which is a Special Recreation Management Area. Selection of this alternative could potentially adversely impact recreational users.

Option F, continuing north from Option D in Pinal County, crossing I-8 at approximately Chuichu Road and connecting to Option I2 at Barnes Road, also mostly traverses land that is vacant today but that is planned for residential development in the future. Option F would travel directly west of the Pinal Airpark activity center, providing access to this industrial development cluster.

Figure 3.3-11 (Planned Land Uses – Green Alternative, Central Section) displays planned land uses in the Central Section; noted land use features are labeled for context. Like the Purple Alternative, the Green Alternative uses Options I2 and L through Pinal County and southeastern Maricopa County. Today, Option I consists almost entirely of vacant and agricultural lands; however, it is mostly planned as future residential development. Option I also is the route of the proposed West Pinal Freeway corridor (as documented in the *Pinal Regional Transportation Plan*, and referenced in Section 3.3.1.3, Land Use Plans and Policies). Depending on the status of future land development and/or ROW set asides, residential impacts may or may not occur. Additionally, Option I skirts the southern edge of the Nissan Proving Grounds. In western Pinal County, Option I is expected to sit between two clusters of the proposed Palo Verde Regional Park.

Option L partially parallels the northeast edge of the SDNM and passes through large portions of planned residential and recreational/open space uses, which would likely be bifurcated by the I-11. Planned uses near Mobile, which include smaller parcels of commercial, office, industrial, and mixed uses, could be impacted. Previous master-planning endeavors have incorporated ROW for a new interstate-level facility through this community (Amaranth), so enhancement opportunities, if coordinated with ongoing development plans, remain.

Option M is a continuation of Option L, paralleling the SDNM on the north side. Options I2, L, and M are consistent with the proposed Hassayampa Freeway corridor, which originated in the MAG *I-10/Hassayampa Valley Transportation Framework Study*. Much of Option M runs through planned recreational areas and open space, with minimal anticipated impact on residential, mixed-use, and transportation-related land uses. Where Option M meets Option Q at SR 85, it turns north to avoid impacts to an existing landfill, prison complex, power substation, and planned solar facility.

The southern half of Option Q2 is a short section of SR 85 that connects Options M and R and crosses the Gila River. New transportation junctions created with SR 85 may attract increased commercial or industrial development, especially at the junction of Options Q2 and R near MC-85, the UPRR Wellton Branch corridor, and a planned economic activity center in Buckeye, surrounding the municipal airport.

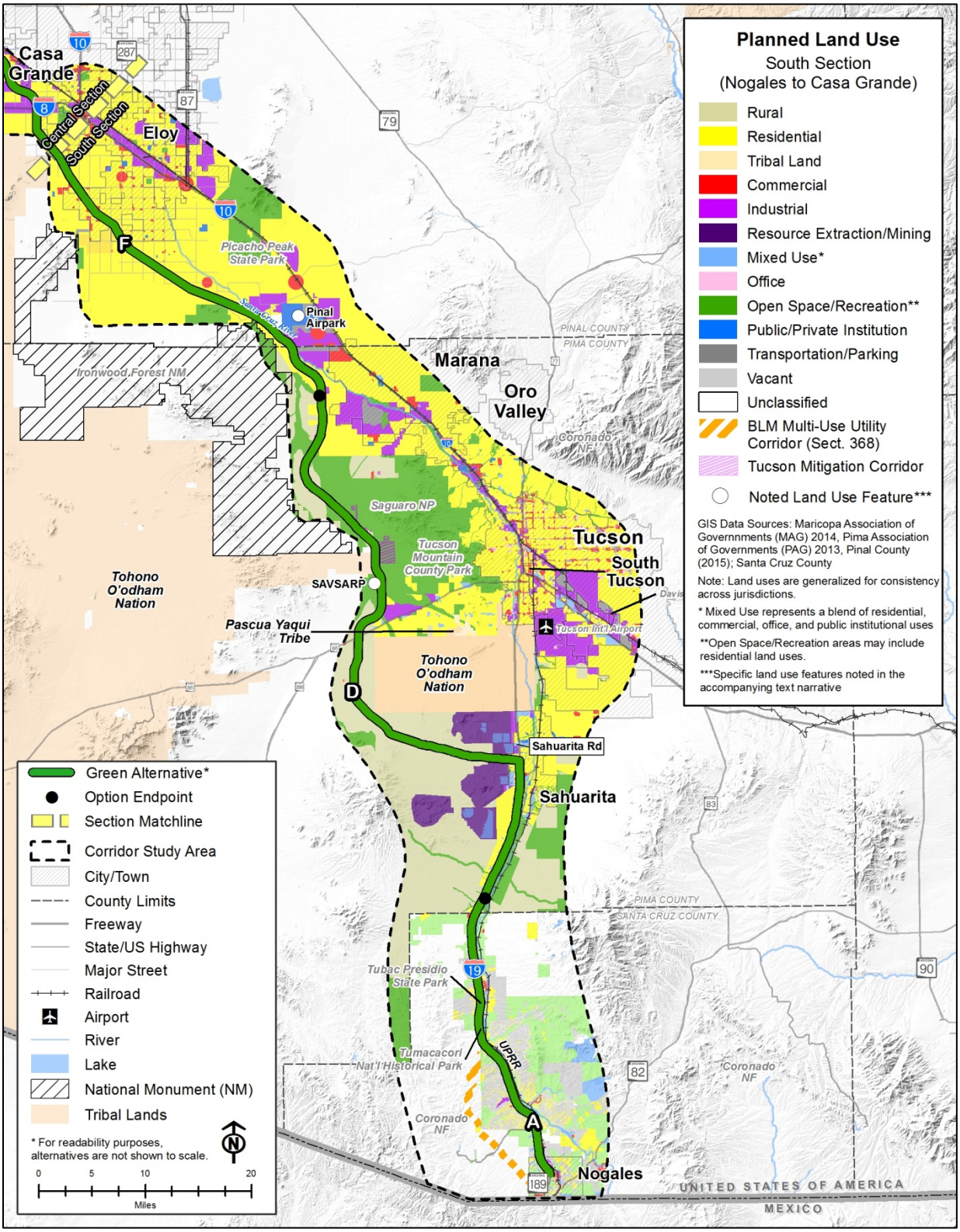


Figure 3.3-9 Planned Land Uses – Green Alternative, South Section

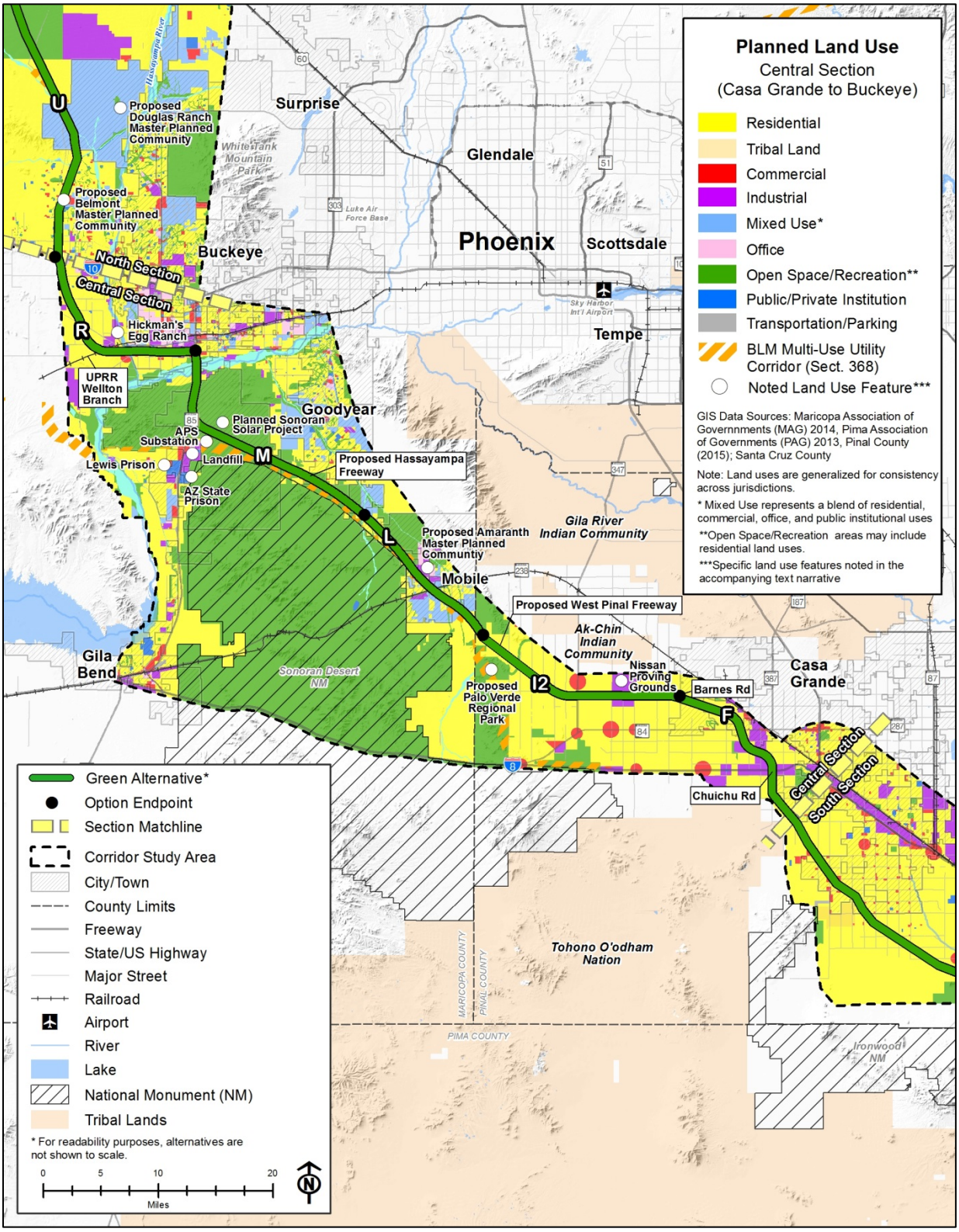


Figure 3.3-10 Planned Land Uses – Green Alternative, Central Section

Option R consists of planned residential areas on the west side of Buckeye, along with a mix of industrial, mixed-use, and office uses, mostly closer to its junction with SR 85 or I-10. These uses generally include existing agricultural operations, located just north of the bend in Option R.

Option U in the North Section is a continuation of Option R north of I-10. This Corridor Option crosses the VMRA on the western side of the BLM multi-use corridor. South of the recreation area, most of the land is vacant today, with scattered clusters of low-density development. Future plans are primarily for expanded residential development and clusters of mixed-use, commercial, and industrial development in the planned communities of Belmont and Douglas Ranch. This route does not follow any approved transportation corridor plans in either master-planned community. **Figure 3.3-12** (Planned Land Uses – Green Alternative, North Section) shows the planned land uses in the North Section; noted land use features are labeled for context.

North of the recreation area, Option U mostly traverses planned open space and recreation land. However, deviations in planned land uses may occur at its junctions with US 60, US 93, and the Arizona and California Railroad short line corridor, which could promote employment-generating land uses. Yavapai County does not maintain a plan for future land use in this area, but development patterns are expected to generally mirror Maricopa County's, with planned open space and residential development and clusters of commercial development along US 93.

End-to-End Considerations

The Green Alternative consists almost entirely of new corridor development. Today, much of the land along the proposed Project Area is vacant or sparsely developed, with clusters of low-density residential and commercial development. New transportation junctions may create opportunities for new urban development and growth along the alternative. However, the most likely anticipated impacts would be on planned residential land uses.

Land Management and Special Designated Lands

Land management designations were reviewed to quantify land with special designations that are located within the Project Area and therefore could be impacted and converted to a transportation use (**Table 3.3-4** [Potential Land Management Conversion Impacts – Green Alternative]). **Figure 3.3-13** (Land Management and Special Designated Lands – Green Alternative) displays land management patterns corridor-wide; noted features are labeled for context.

The Green Alternative in the South Section consists of Options A, D, and F. The majority of land along Option A is private land, with the exception of 331 acres of State Trust land spanning the existing interstate in the vicinity of Santa Gertrudis Lane and Tumacacori National Historical Park. A portion of Tumacacori National Historical Park is within the eastern edge of the 2,000-foot-wide Project Area.

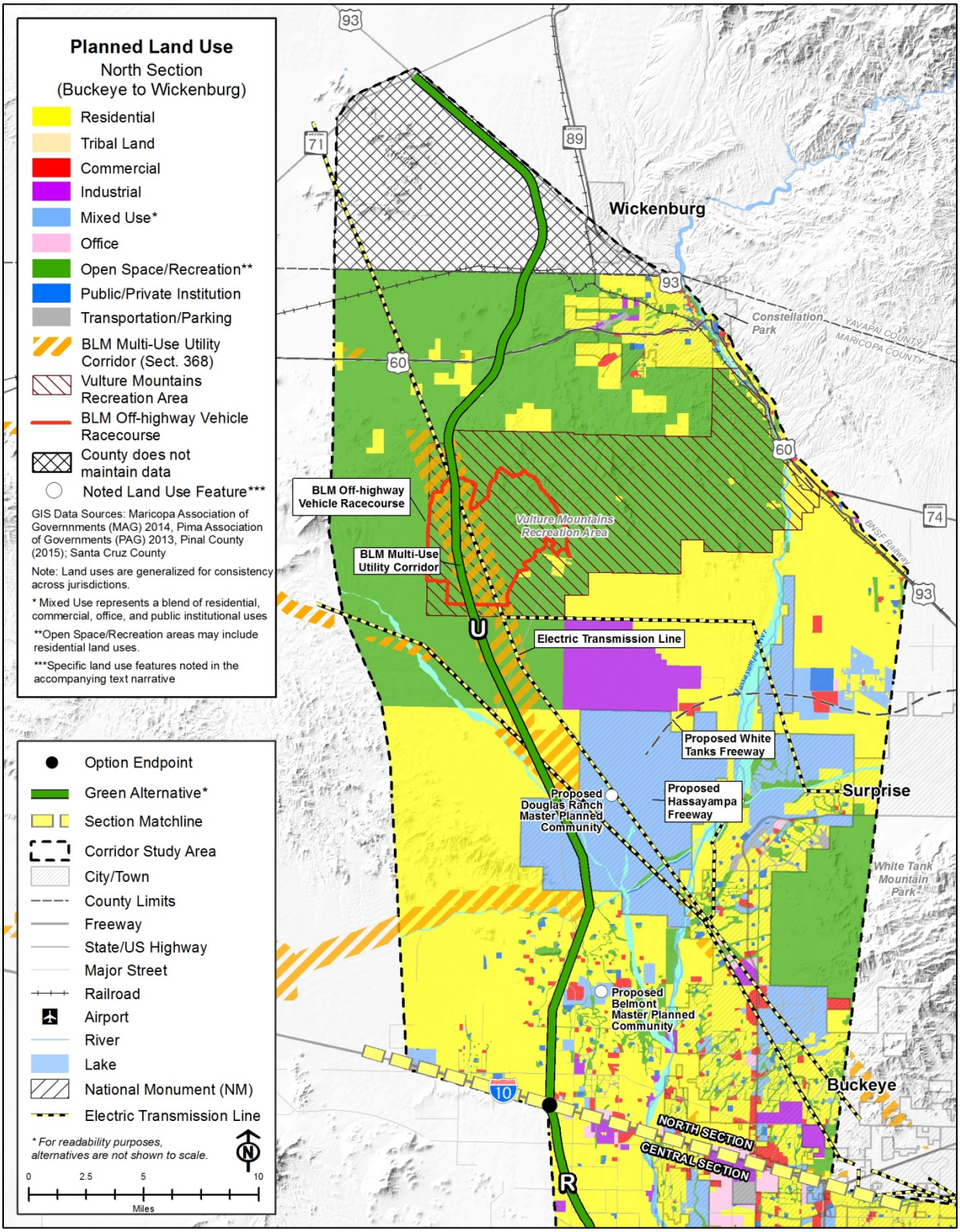


Figure 3.3-11 Planned Land Uses – Green Alternative, North Section

Table 3.3-4 Potential Land Management Conversion Impacts (acres) – Green Alternative

Land Management	Corridor Option									Total	% Total
	A	D	F	I2	L	M	Q	R	U		
BLM	0	600 (1)	0	0	1,387	4,109	1,366	67	3,830	11,359	15
National Forest	0	0	0	0	0	0	0	0	0	0	0
NPS	0	0	0	0	0	0	0	0	0	0	0
Military	0	0	0	0	0	0	0	0	0	0	0
Park and Recreation Area	0	0	0	0	0	83	375	0	1,856	2,314	3
Private Land	6,623	9,920 (1)	9,785	6,060	2,056	195	5,188	3,270	2,814	45,911	60
Reclamation	0	0	0	0	0	0	0	0	0	0	0
State Trust Land	331	5,007 (1)	2,546	224	203	92	2,106	899	5,427	16,835	22
Tribal Land	0	0	0	0	0	0	0	0	0	0	0
ACEC (BLM)	0	0	0	0	610	0	474	0	0	1,084	
National Monument (BLM)	0	0	0	0	0	0	0	0	0	0	
Roadless Area (USFS)	0	0	0	0	0	0	0	0	0	0	
Reclamation – Deeded Lands	0	452 (1)	0	0	0	0	0	0	0	452	
State Wildlife Area (AGFD)	0.5	0	0	0	0	0	278	0	0	279	
Wilderness (BLM)	0	0	0	0	0	0	0	0	0	0	
Wilderness (NPS)	0	0	0	0	0	0	0	0	0	0	
Wilderness (USFS)	0	0	0	0	0	0	0	0	0	0	

(1) 9,641 acres private land, 4,938 acres State Trust land, and 453 acres Reclamation deeded lands if the CAP Design Option is selected; no changes in total acreage impacts to BLM land if the CAP Design Option is selected.

(2) Percent totals are not included for Special Designated Lands, as these are overlays to the underlying ownership patterns and do not cover the entire Study Area.

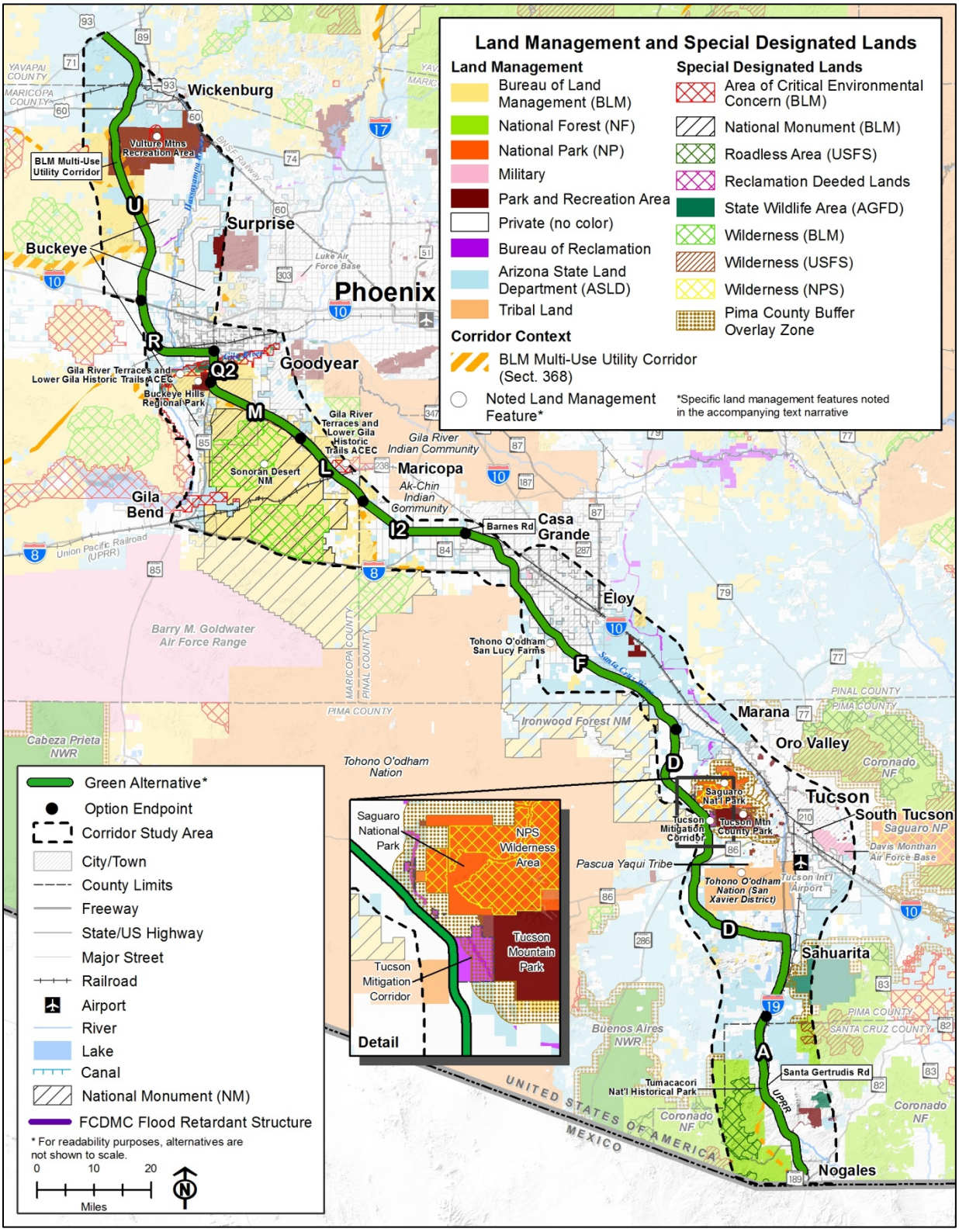


Figure 3.3-12 Land Management and Special Designated Lands – Green Alternative

Option D follows I-19 from near the Santa Cruz/Pima County line and diverts west from I-19 near El Toro Road in Sahuarita. Option D is a mix of private and State Trust lands, with a few parcels of BLM land and a cluster of special designated uses. Due to the various special designated uses located close to Option D, there is very limited flexibility in determining exactly where I-11 could be located to avoid any adverse impacts to these lands (e.g., TMC, SNP, and Tucson Mountain Park). The Project Area is proposed to traverse the TMC, coincident with its western edge. The CAP Design Option also would traverse the TMC, paralleling the CAP canal. North of this area, Option D is located close to the Ironwood Forest NM, but does not border or cross it. Additionally, Option D could intersect approximately 723 acres of the Pima County Buffer Overlay Zone.

Option F continues north from Option D in Pinal County, forming a new Corridor Option that generally parallels I-10 to the south and west by about 8 miles. It mostly traverses private land, but does traverse some larger blocks of State Trust land. Option F is located within close proximity to the Ironwood Forest National Monument, which is a Special Recreation Management Area. Selection of this Build Corridor Alternative could potentially adversely impact recreational users.

Near Eloy, the Corridor Option is located close to, but does not cross, the Tohono O'odham Nation San Lucy Farms, an agricultural operation. Option F crosses I-8 in the vicinity of Chuichu Road, forming a new corridor through Casa Grande and connecting with Option I2 at Barnes Road. Impacts to private lands and State Trust lands are expected.

Generally, the Project Area within the Central Section is a mix of BLM, State Trust, and private lands. Private lands are likely to be most impacted by a new transportation corridor, depending on the pace of future urban development.

The Option I2 Project Area consists almost entirely of private lands within Casa Grande. Options L and M generally parallel the northeast edge of the SDNM, within the BLM multi-use corridor, and pass through areas of BLM, State Trust, and private lands.

Similarly, most of the land along Option Q is private, State Trust, or BLM land. Near the junction with Option M, the Buckeye Hills Regional Park is located directly adjacent to the west side of SR 85 for 3 miles. To the north sits the Gila River Terraces and Lower Gila Historical Trails ACEC as well as the Robbins Butte Wildlife Area, which is located within the I-11 Project Area for 3 miles. These lands would be impacted if improvements are required outside the existing SR 85 ROW.

Option R is a mix of private and State Trust lands, with small parcels of BLM land. Special designations are not present in this area.

Option U in the North Section traverses BLM, State Trust, and private lands. It cuts through the VMRA within a BLM multi-use utility corridor. This would create a direct impact on recreation lands, but the impact may be mitigated in coordination with BLM. North of the recreation area and closer to Wickenburg, Option U is almost entirely on State Trust lands, and thus corridor development may be considered a beneficial opportunity to generate value for trust beneficiaries.

End-to-End Considerations

The two primary areas with potential land conversion impacts on special designations along the Green Alternative are in the vicinity of the TMC (South Section) and VMRA (North Section).

Crossing these areas would be unavoidable under the Green Alternative. These areas are discussed further in **Chapter 4** (Preliminary Draft Section 4(f) Evaluation). Direct and indirect impacts to the character of wilderness and recreation areas are discussed in Section 3.17 (Indirect and Cumulative Effects).

The Gila River in the Central Section and related ACEC lands would be crossed by I-11, but related impacts may be minimized through mitigation for improvements that occur within or near the existing SR 85 ROW. The ACEC designation only applies to BLM-managed lands. Impacts are most likely to occur on private and State Trust lands.

Orange Alternative

The Orange Alternative is composed of Options A, B, G, H, K, Q, and S. This alternative consists mostly of existing interstate and highway corridors.

Planned Land Use

Future land use designations were reviewed to quantify types of planned land uses within the Project Area that could be impacted (**Table 3.3-5** (Potential Planned Land Use Conversion Impacts – Orange Alternative). Depending on the alignment location or definition of improvements to existing facilities within the 2,000-foot-wide Project Area, which would be determined during Tier 2 environmental studies, consequences to planned land uses could vary. This analysis provides a qualitative assessment of which portions of the alternative are more likely to be impacted based on whether an Option could be co-located with an existing transportation facility; an assessment of areas within the Project Area that should be avoided, if possible; and a discussion of areas along the alternative that are more likely to benefit from I-11 construction.

Table 3.3-5 Potential Planned Land Use Conversion Impacts (acres) – Orange Alternative

Planned Land Use	Corridor Option							Total	% Total
	A	B	G	H	K	Q	S		
Residential	1,032	5,767	4,127	2,729	1,977	2,536	3,496	21,665	32
Agriculture	1,215	0	0	0	0	0	0	1,215	2
Tribal Lands	0	1,977	0	0	0	0	0	1,977	3
Commercial	483	809	1,938	947	730	1,739	198	6,845	10
Industrial	221	2,635	3,386	431	192	991	0	7,857	12
Mixed Use	298	647	0	0	0	471	552	1,969	3
Office	0	57	0	0	81	741	90	968	1
Recreation/Open Space	64	858	837	1,511	5,707	1,463	4,836	15,277	22
Public/Private Institutions	0	110	453	0	0	192	67	822	1
Transportation/Parking	0	1,333	207	0	1,304	2,614	26	5,484	8
Vacant (1)	1,479	0	0	0	0	0	0	1,479	2
Unclassified (1)	2,174	0	0	0	0	0	0	2,174	3
Waterbodies	0	0	0	0	45	266	109	420	1

(1) Per direction from Santa Cruz County, the same land uses are illustrated for existing and planned scenarios.

NOTE: Planned land uses are likely to evolve and change, depending on market demand and community needs. Acreages listed for the Project Area are based on current general or comprehensive plans and may not reflect actual land uses in the future.

Figure 3.3-14 (Planned Land Uses – Orange Alternative, South Section) displays planned land uses in the South Section; noted land use features are labeled for context. Options A, B, and G in the South Section are all existing interstate highways (I-19 and I-10). Option A in the South Section is a shared component of all three Build Corridor Alternatives.

Option B is composed of I-19 and I-10 in Pima County. I-19 passes through the San Xavier District of the Tohono O'odham Nation. As documented in **Appendix I**, ADOT has a perpetual transportation easement across the San Xavier District of the Tohono O'odham Nation for an approximately 8-mile stretch of I-19 south of the I-19/I-10- system interchange.

Through central Tucson, Option B consists of a mix of planned land uses, including residential, industrial, commercial, mixed-use, recreation/open space, public/private institutions, and transportation/parking. A variety of scenarios for capacity improvements could occur on I-10 to accommodate I-11 and forecasted traffic volumes (e.g., widening, elevated express lanes, or a collector-distributor system). In most of these scenarios, the configuration of travel lanes, auxiliary lanes, and frontage roads would be realigned, resulting in additional ROW needs of varying widths. This area is densely developed today, and plans for future growth would intensify existing land uses, increasing the land use impacts.

Where Option G follows the existing I-10 corridor from just north of the Pinal/Pima county line to the I-8 interchange, this portion of I-10 is already six lanes wide. Co-location of I-11 with I-10 could increase the development potential of properties in and near the Pinal Airpark and UPRR's proposed Red Rock Classification Yard, which are both potential major freight hubs that could take advantage of the interstate's transcontinental route and parallel Class 1 rail facility. These two developments would attract truck traffic and other intermodal traffic.

Figure 3.3-15 (Planned Land Uses – Orange Alternative, Central Section) displays planned land uses in the Central Section; noted land use features are labeled for context. Option H follows I-8 to approximately the Pinal/Maricopa county line. Much of the adjacent land today is vacant, but is planned for future residential development. Due to the available capacity, improvements to I-8 are expected to occur within the existing ROW, avoiding or minimizing impacts on adjacent uses within the Project Area.

The majority of Option K traverses the SDNM. Like Option H, improvements to I-8 are expected to occur within the existing ROW, avoiding or minimizing impacts on adjacent uses within the Project Area. A small portion of Option K would be constructed in Gila Bend to connect I-8 and SR 85. This new portion may affect future residential and commercial uses; however, Gila Bend's General Plan reflects construction of this route.

Option Q (1, 2, 3) – SR 85 from Gila Bend to I-10, including a 12-mile portion of I-10 to 363rd Avenue, contains a mix of planned residential, commercial, recreational/open space, and transportation-related land uses within the Project Area. Since the concept of this Option is to co-locate with I-10, improvements would be expected near the existing facility, and land uses have already developed that are consistent with a high-capacity roadway.

Figure 3.3-16 (Planned Land Uses – Orange Alternative, North Section) displays planned land uses in the North Section; noted land use features are labeled for context. Option S parallels the western boundary of the VMRA. South of the recreation area, most of the land is vacant today, with scattered clusters of low-density development.

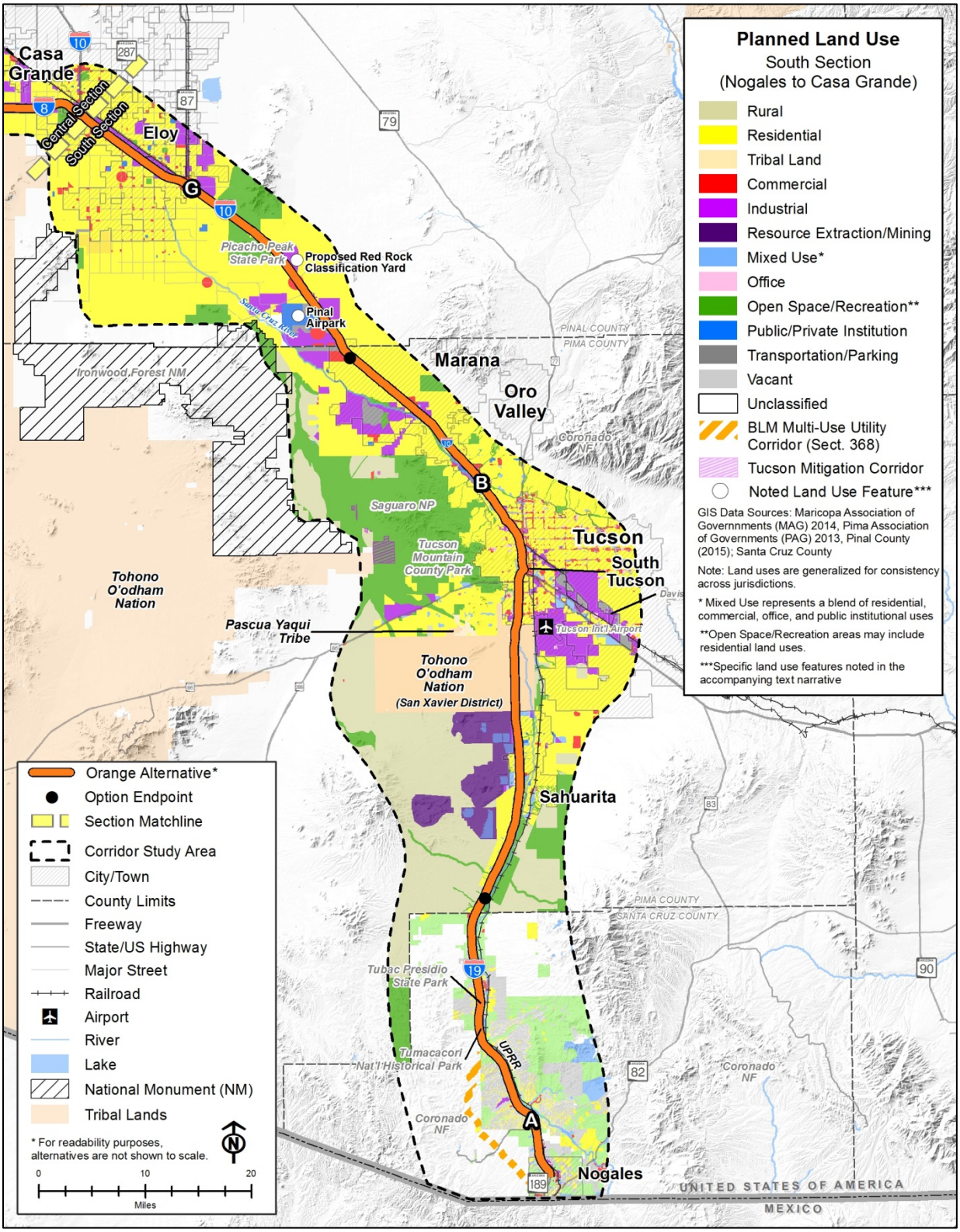


Figure 3.3-13 Planned Land Uses – Orange Alternative, South Section

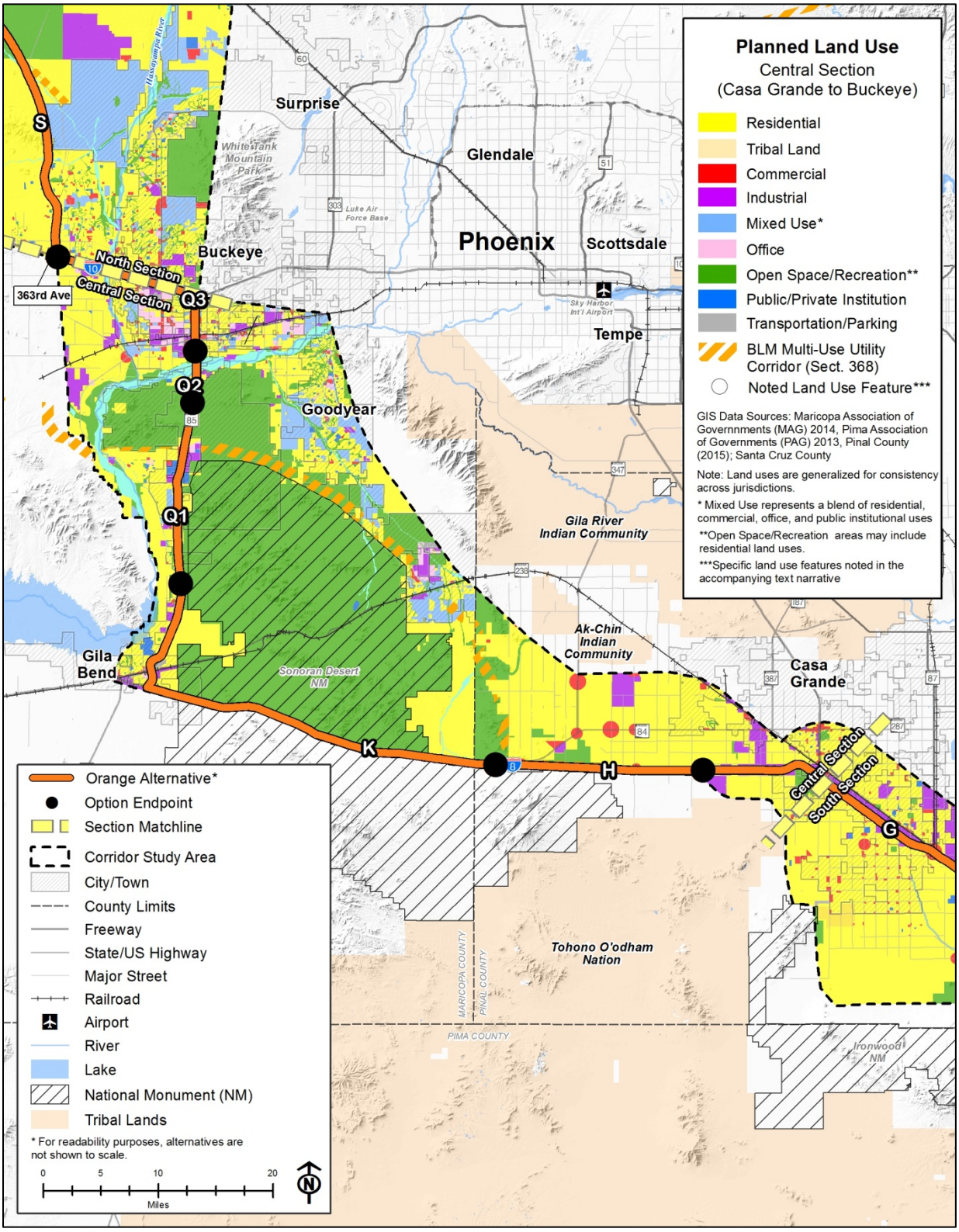


Figure 3.3-14 Planned Land Uses – Orange Alternative, Central Section

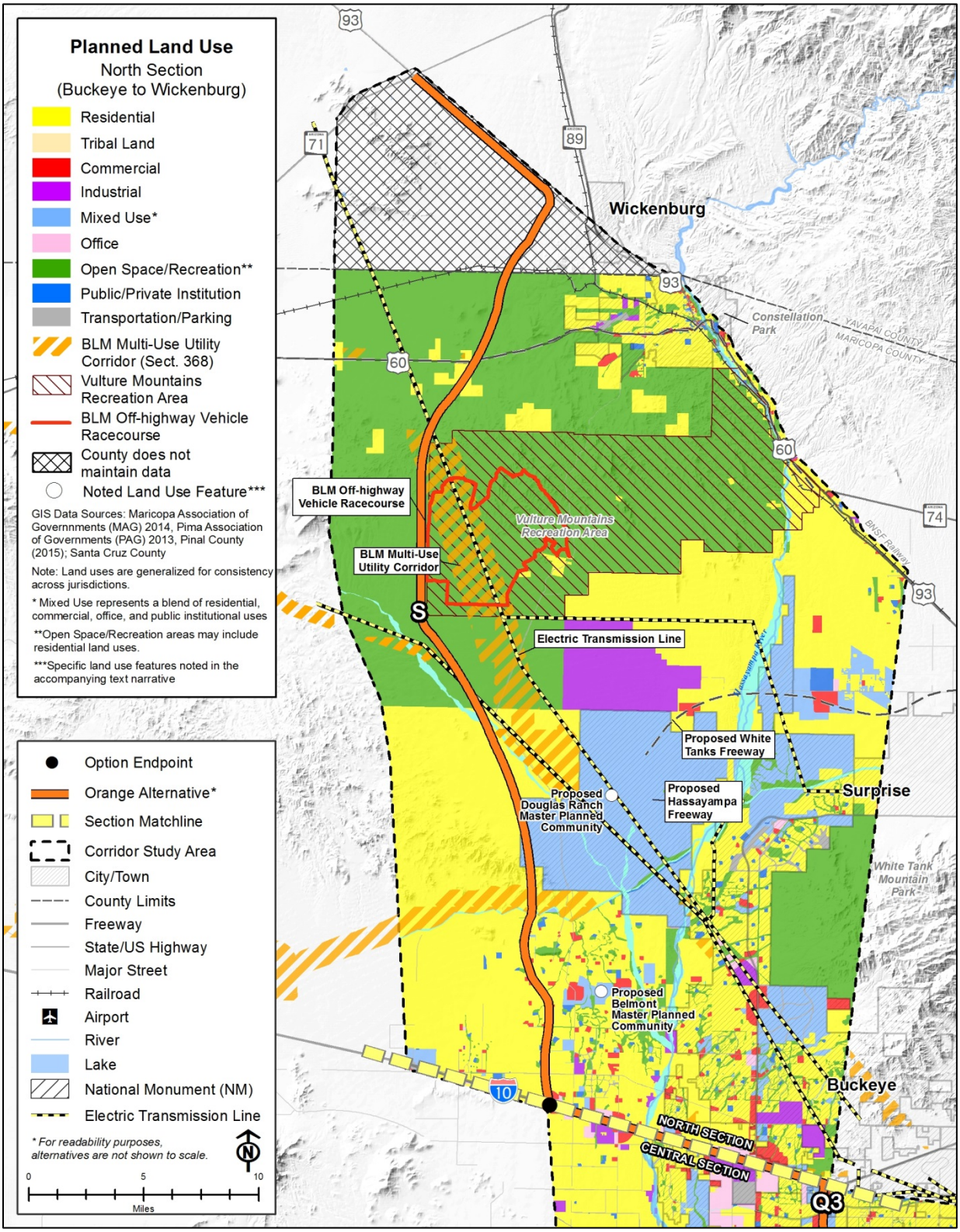


Figure 3.3-15 Planned Land Uses – Orange Alternative, North Section

Future plans in the vicinity of Option S are primarily for expanded residential development. North of the recreation area, this Corridor Option mostly traverses planned open space/recreation land, and slightly encroaches on the Vista Royale community. However, impacts could be avoided or minimized by maintaining a more western alignment within the Project Area during the Tier 2 detailed design.

Deviations in planned land uses may occur at the Option's junctions with US 60, US 93, and the Arizona and California Railroad short line corridor, which could encourage employment-generating land uses. Yavapai County does not maintain a plan for future land use in this area, but development patterns are expected to generally mirror Maricopa County's, with planned open space and residential development, and clusters of commercial development expected along US 93.

End-to-End Considerations

The Orange Alternative follows existing interstate or state highway corridors in the South and Central Sections. Where the Orange Alternative is to co-locate with existing roadway corridors, improvements would be expected near the existing facility and where land uses have already been developed consistent with a high-capacity roadway. Option B through central Tucson has the potential to cause land use impacts if additional ROW is required in this densely built area. In the North Section, Option S follows a new route between I-10 and US 93 and could impact the pattern of planned land uses, both in master-planned communities as previously discussed and in rural residential subdivisions.

Land Management and Special Designated Lands

Land management designations were reviewed to quantify lands with special designations that are located within the Project Area and therefore could be impacted and converted to a transportation use (**Table 3.3-6** [Potential Land Management Conversion Impacts – Orange Alternative]). **Figure 3.3-17** (Land Management and Special Designated Lands – Orange Alternative) illustrates land management patterns corridor-wide; noted features are labeled for context.

The Orange Alternative includes Options A, B, and G in the South Section. The majority of land along Option A consists of private land, with the exception of 331 acres of State Trust land spanning the existing interstate in the proximity of Santa Gertrudis Lane and Tumacacori National Historical Park.

Option B consists mostly of private land and State Trust land, with the exception of an approximate 8-mile easement on the San Xavier District of the Tohono O'odham Nation along I-19.

Option G is a mix of State Trust land (more to the south) and private land (more to the north), and Picacho Peak State Park is within the Project Area at its northeastern edge for approximately 1.2 miles. Given the available capacity on both I-8 and I-10, it is expected that additional impacts could be avoided or minimized.

Table 3.3-6 Potential Land Management Conversion Impacts (acres) – Orange Alternative

Land Management	Build Corridor Option							Total	% Total
	A	B	G	H	K	Q	S		
BLM	0	0	0	1,805	6,042	1,366	3,837	13,050	19
National Forest	0	0	0	0	0	0	0	0	0
NPS	0	0	0	0	0	0	0	0	0
Military	0	0	0	0	0	0	0	0	0
Park and Recreation Area	0	0	202	0	0	375	0	577	1
Private Land	6,623	11,892	7,702	2,220	1,786	5,188	2,382	37,793	56
Reclamation	0	0	0	0	0	0	0	0	0
State Trust Land	331	336	3,026	358	2,207	2,106	6,007	14,371	21
Tribal Land	0	1,977	0	0	0	0	0	1,977	3
ACEC (BLM)	0	0	0	0	507	474	0	981	
National Monument (BLM)	0	0	0	0	6,133 (2)	0	0	6,133	
Roadless Area (USFS)	0	0	0	0	0	0	0	0	
Reclamation – Deeded Lands	0	0	0	0	0	0	0	0	
State Wildlife Area (AGFD)	0.5	0	0	0	0	278	0	279	
Wilderness (BLM)	0	0	0	0	456	0	0	456	
Wilderness (NPS)	0	0	0	0	0	0	0	0	
Wilderness (USFS)	0	0	0	0	0	0	0	0	

(1) Percent totals are not included for Special Designated Lands, as these are overlays to the underlying ownership patterns and do not cover the entire Study Area.

(2) This acreage reflects what is present within the 2,000-foot-wide Project Area. However, assumptions on travel demand and typical sections were made as part of the analysis, and I-8 is not anticipated to be widened; therefore direct impacts on the SDNM are expected to be avoided or minimized. This is an inventory of the entire 2,000-foot-wide Project Area and does not reflect the actual amount of land that would be taken if Option K were to be selected.

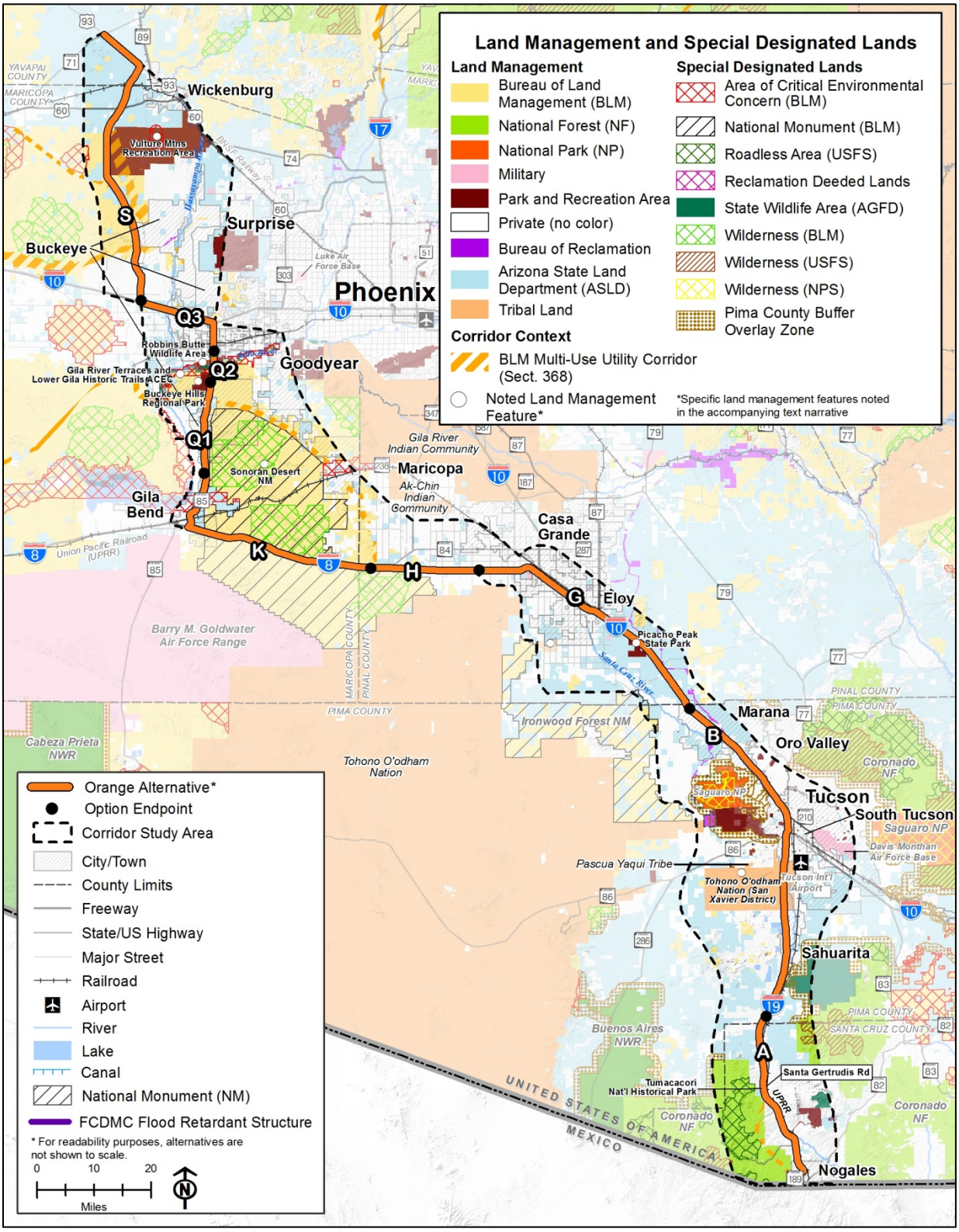


Figure 3.3-16 Land Management and Special Designated Lands – Orange Alternative

Options H, K, and Q in the Central Section involve existing routes, where planned improvements could occur largely within the existing rights-of-way. A new connection between I-8 and SR 85, planned east of Gila Bend, would require a new ROW. This connection traverses parcels of private land and State Trust land.

Option Q (1, 2, 3), SR 85, mostly consists of private, State Trust, or BLM land. The Buckeye Hills Regional Park is located directly adjacent to the west side of SR 85 for 3 miles. To the north sits the Gila River Terraces and Lower Gila Historical Trails ACEC as well as the Robbins Butte Wildlife Area, which is located within the Project Area for 3 miles. Since this Option is to co-locate with SR 85, improvements would be expected in proximity to the existing facility, and additional impacts could be avoided or minimized.

Option S in the North Section traverses BLM, State Trust, and private lands. Since it skirts the western boundary of the VMRA, direct impacts to the park property are not expected. North of the recreation area and closer to Wickenburg, the corridor is almost entirely on State Trust lands, where I-11 development may be considered a beneficial opportunity to generate value for trust beneficiaries.

End-to-End Considerations

The Orange Alternative generally follows existing interstate or state highway corridors in the South and Central Sections. The co-located portions of the Build Corridor Alternative would decrease the potential for additional impacts, to the extent ROW needs can be minimized.

The Gila River in the Central Section and related ACEC lands would be crossed by the alternative, but related impacts may be minimized through mitigation for improvements that occur within or near the existing SR 85 ROW. The ACEC designation only applies to BLM-managed lands. Impacts are most likely to occur on private and State Trust lands. See Section 3.17 (Indirect and Cumulative Effects) for a discussion of the direct and indirect impacts to the character of wilderness and recreation areas.

No Build Alternative

The No Build Alternative would include the programmed improvements to the regional transportation system that are in ADOT's federally approved 2018-2022 State Transportation Improvement Program. The No Build Alternative would be unresponsive to forecasted population and employment growth in the long term, which could lead to increased congestion on the highway system, increased travel times, and reduced efficiency in the movement of people and goods.

Additionally, the No Build Alternative would not reflect the long-term land use plans in long-range planning documents (general and comprehensive plans) that are oriented around proposed new highway corridors, such as the West Pinal Freeway, Hassayampa Freeway, SR 303L extension, and SR 30 extension (as discussed in Section 3.3.1.3, Land Use Plans and Policies). The No Build Alternative is not consistent with Study Area land use plans.

Planned Land Use

The No Build Alternative could inhibit planned future development areas by not providing access to the regional transportation system. Several Study Area master-planned communities include proposed freeway corridors in their long-term land use plans, for which land uses are organized around, but many of these are not reflected in the No Build Alternative (e.g., Hassayampa

Freeway, West Pinal Freeway, SR 303L Extension, SR 30). Planned land uses, especially in emerging economic activity centers, could be adversely affected by traffic congestion and travel delays.

Land Management and Special Designated Lands

The No Build Alternative would generally not directly impact land managers in the Study Area, as improvements are proposed to existing transportation facilities within or near current ROW boundaries.

3.3.2 Section 6(f)

3.3.2.1 Regulatory Setting

Section 6(f) of the Land and Water Conservation Fund Act (LWCFA) of 1965 (16 United States Code §§ 4601-4 to 4601-11, et seq.), administered by the Interagency Committee for Outdoor Recreation and the Department of the Interior's NPS, provides funding for acquiring property and developing public recreational facilities, and protects against the loss of that property to other uses. The LWCFA states, "No property acquired or developed with assistance under this section shall, without the approval of the Secretary (of the Department of the Interior), be converted to other than public outdoor recreation uses" (16 United States Code § 4601-8(f) (3)). Section 6(f) applies when a project proposes to convert property where Land and Water Conservation Grant Funds have been used to redevelop all or a portion of the property (36 Code of Federal Regulations § 59 et seq.). When property is converted, mitigation is required in the form of replacement property of at least equal recreation value.

3.3.2.2 Methodology

The evaluation of potential effects on properties protected by Section 6(f) began with identifying whether and where such properties are found within the Study Area. Tools used in making this determination included the LWCFA list of sites, found at: waso-lwcf.ncrc.nps.gov/public/index.cfm and projects.invw.org/data/lwcf/grants-az.html. The list of sites includes entries with park names as well as more generalized entries for property acquisitions. At this Tier 1 level, entries with park names were reviewed. During Tier 2 project level analysis, ADOT will coordinate with recipients of LWCFA monies regarding the more generalized entries to determine where the monies were applied and if I-11 has the potential to impact those protected properties.

The identified Section 6(f) properties were mapped using GIS software. The potential for each Build Corridor Alternative to impact Section 6(f) properties was preliminarily assessed by overlaying each Build Corridor Alternative on the Section 6(f) property layer, identifying where overlaps potentially could occur and calculating the overlaps to quantify the potential impact areas. Detailed analysis of co-located Corridor Options as well as Corridor Options that are not co-located is deferred to Tier 2.

3.3.2.3 Affected Environment

Twenty-two properties identified in the listing of Section 6(f)-encumbered properties are within the Study Area; they are listed in **Table 3.3-8** (Section 6(f) Properties) and shown in **Figure 3.3-17** (Section 6(f) Properties).

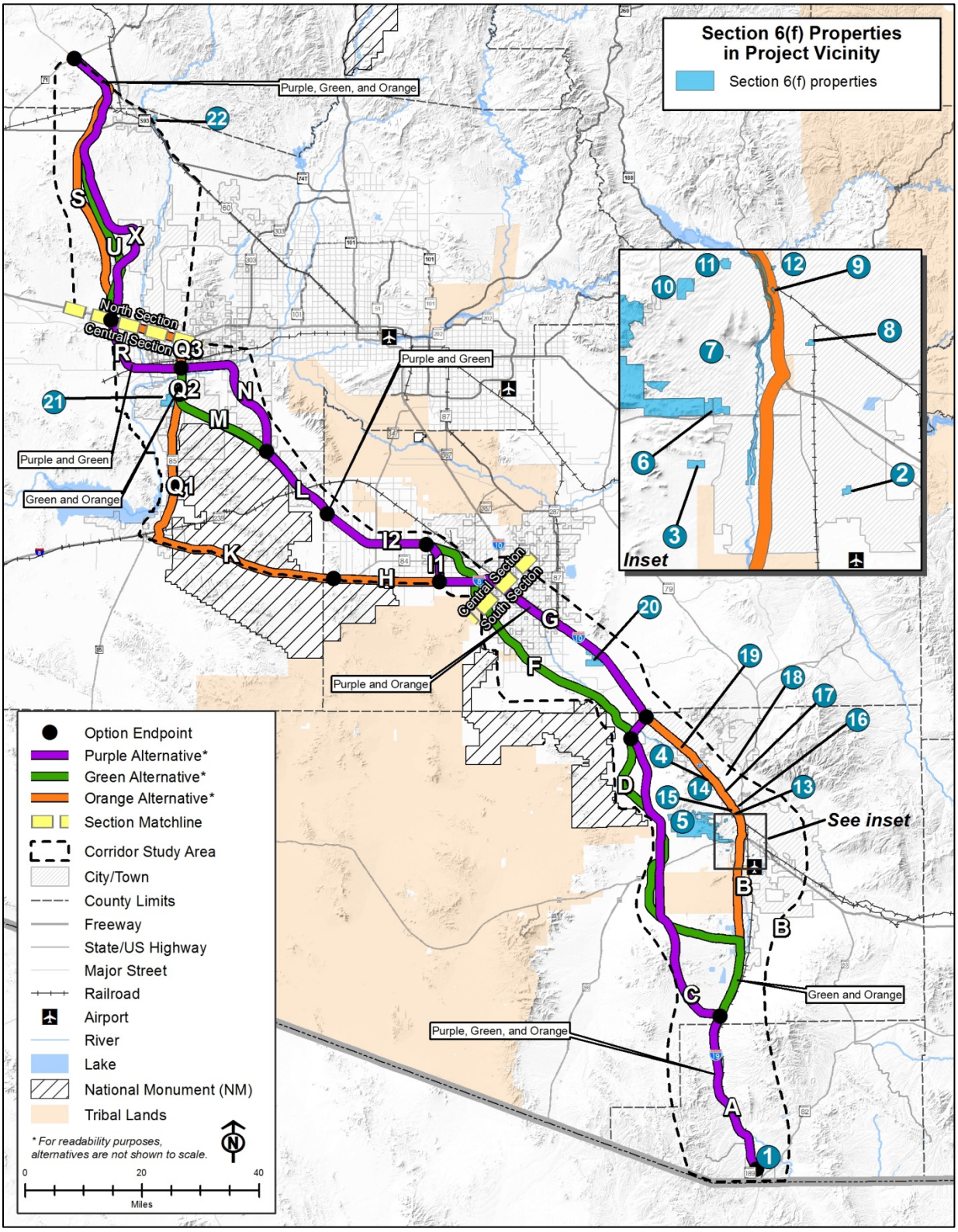


Figure 3.3-17 Section 6(f) Properties

Table 3.3-7 Section 6(f) Properties

1	Nogales Recreation Center	The City of Nogales Parks and Recreation Department owns and manages the Recreation Center at 1500 North Hohokam Drive, east of I-19 near the intersection of I-19 and East Calle Sonora/Mariposa Road. The Recreation Center, which was developed for active recreational activities, includes a community pool, tennis and basketball courts, lighted soccer fields, and on-site parking. It is adjacent to the ball fields of nearby Fleischer Park. The City obtained LWCFA monies in the 1960s, 1970s, and 1980s, and applied them to developing and maintaining the recreational facilities in the city, including the Recreation Center.
2	CSM Martin “Gunny” Barreras Memorial	The City of Tucson and Sunnyside Unified School District own and maintain this park, which features publicly accessible ball fields adjacent to the Sunnyside School. The City obtained LWCFA monies in 1976 for development of the park.
3	Winston Reynolds Manzanita District Park	Owned and maintained by Pima County, this is a 67-acre park with a publicly accessible community center and pool. Pima County obtained LWCFA monies in 1970 and 1978 for development of the park.
4	Santa Cruz River Park	The City of Tucson developed this park to provide trails and a disc golf course on the west bank of the Santa Cruz River north of El Rio Street. The City obtained LWCFA monies between 1975 and 1979 specifically to acquire the land and develop the park.
5	Tucson Mountain Park	Managed by Pima County, this park provides preserved land as well as passive and active recreational opportunities. Facilities include camping and picnicking areas, more than 62 miles of trails, shooting ranges, and an overlook. Pima County obtained LWCFA monies in 1979 to acquire land to expand the park.
6	John F. Kennedy Park	The City of Tucson developed this park to provide active recreation facilities, including a pool, ball fields, and play equipment. The park includes Kennedy Lake, an AGFD Community Fishing Program Water. The City obtained LWCFA monies in 1970 to develop the park.
7	Vista Del Pueblo Park	The City of Tucson developed Vista Del Pueblo Park as a neighborhood park with play equipment and passive recreation areas. The City obtained LWCFA monies in 1970 to develop the park.
8	Santa Rita Park	The City of Tucson owns and maintains this park, which features publicly accessible ball fields and a skate park. The City obtained LWCFA monies in 1984 for development of the park.
9	Oury Park	The City of Tucson developed Oury Park to provide active recreation facilities, including a pool, ballfields, and a recreation center. The City obtained LWCFA monies in 1971 to acquire land for the park.
10	Greasewood Park	The City of Tucson owns and maintains Greasewood Park, a 152-acre park that preserves the natural features of the property and is publicly accessible for orienteering. The City obtained LWCFA monies in 1984 for development of the park.
11	Joachim Murrieta Park	The City of Tucson owns and maintains this park, which features publicly-accessible ballfields. The City obtained LWCFA monies in 1971 for land acquisition, and again in 1972 and 1983 for development of the park.

Table 3.3-7 Section 6(f) Properties (Continued)

12	Francesco Elias Esquer Park	Owned and maintained by the City of Tucson, this park features a publicly-accessible playground and ramada. The City obtained LWCFA monies in 1972 for development of the park.
13	Manuel Valenzuela Alvarez Park	The City of Tucson owns and maintains this park, which features a publicly accessible playground. The City obtained LWCFA monies in 1971 for development of the park.
14	Juhan Park	The City of Tucson developed Juhan Park to provide ballfields. The City obtained LWCFA monies in 2008 to make improvements to the park.
15	Silverbell Golf Course	The City of Tucson developed Silverbell Golf Course to provide a publicly accessible golf facility. The City obtained LWCFA monies in 1976 to develop the property.
16	Jacobs Park	The City of Tucson owns and maintains Jacobs Park, which features publicly accessible ball fields, a pool, a picnic area, and a playground. The City obtained LWCFA monies in 1966 and 1970 for development of the park.
17	Flowing Wells Park	Pima County owns and maintains this 18-acre park, which features publicly accessible ball fields, a dog park, picnic areas, and playgrounds. Pima County obtained LWCFA monies in 1976 for development of the park.
18	Ann Day Community Park	Pima County owns and maintains Ann Day Community Park (formerly Northwest Park) in the City of Tucson, which features publicly accessible ball fields, a playground, a dog park, trails, and open space. Pima County obtained LWCFA monies in 1970 for development of the park.
19	Rillito Town Park	Pima County developed Rillito Town Park to provide ball courts and play equipment. The County obtained LWCFA monies in 1977 to develop the park.
20	Picacho Peak State Park	The 3,747 acres comprising Picacho State Park are located north of Tucson and adjacent to southbound I-10 at Exit 219 in Picacho. Opened in 1968 and managed by Arizona State Parks, the park includes the 1,500-foot Picacho Peak, which has been a landmark for travelers passing through the Pinal County area, including the DeAnza Expedition, the forty-niners, the Butterfield Overland Stage, and Union and Confederate troops during the Civil War. The land was acquired by the State of Arizona for a park because of its history, geology, and natural resources. Public use facilities in the park include camping areas, hiking trails, a visitor center, a playground, historical markers, and picnic areas. Arizona State Parks obtained LWCFA monies specifically for the park in 1967 and 1971. The department applied the 1967 funds to the development of the initial park facilities, and the 1971 funds to additional facility development and maintenance; no monies were applied to land purchase.
21	Buckeye Hills Regional Park	Maricopa County owns and manages Buckeye Hills Regional Park in the City of Buckeye. Consisting of approximately 4,747 acres, the public park is undeveloped and intended for the protection and enjoyment of the natural environment. The County obtained LWCFA monies in 1971.
22	Constellation Park	The Town of Wickenburg owns and manages this park, a publicly accessible recreational facility consisting of campgrounds, a rodeo ground, and a shooting range. Wickenburg acquired LWCFA monies in 1979 for development of these recreational uses of the park.

3.3.2.4 Environmental Consequences

Purple Alternative

Picacho Peak State Park – Option L would be aligned along I-10, resulting in approximately 173 acres of I-11 within and along the edge of Picacho Peak State Park in the South Section (also see the Section 4(f) Evaluation of Picacho Peak State Park). The Tier 2 analysis would need to evaluate the impacts to Section 6(f) resources associated with Picacho Peak State Park because the exact location of I-11 is unknown at this time.

Green Alternative

No portion of a Section 6(f) property falls within the Green Alternative in the South Section. Therefore, no portions of a Section 6(f) property would be converted to uses other than for public outdoor recreation under this Build Corridor Alternative.

Buckeye Hills Regional Park – Option M would be aligned along SR 85, resulting in approximately 184 acres of I-11 within and along the edge of Buckeye Hills Regional Park in the Central Section (also see the Section 4(f) Evaluation of Buckeye Hills Regional Park). The Tier 2 analysis would need to evaluate the impacts to Section 6(f) resources associated with Buckeye Hills Regional Park because the exact location of the I-11 facilities is unknown at this time

No portion of a Section 6(f) property falls within the Green Alternative in the North Section. Therefore, no portions of a Section 6(f) property would be converted to uses other than for public outdoor recreation under this Build Corridor Alternative.

Orange Alternative

Santa Cruz River Park – Approximately 131 acres of Santa Cruz River Park fall within Option B in the South Section of the Orange Alternative. Santa Cruz River Park parallels I-10, with a crossing in the Sahuarita area (also see Section 4(f) Evaluation). Impacts to Section 6(f) resources associated with Santa Cruz River Park cannot be determined because the exact location of the I-11 facilities is unknown at this time. The Tier 2 National Environmental Policy Act (NEPA) process would evaluate specific effects.

Oury Park – Approximately 7 acres of the Oury Park fall within Option B in the South Section of the Orange Alternative. Oury Park is entirely within the 2,000-foot-wide Project Area (also see Section 4(f) Evaluation). Impacts to Section 6(f) resources associated with Oury Park cannot be determined because the exact location of I-11 is unknown at this time. The Tier 2 NEPA process will evaluate specific project effects.

Francesco Elias Esquer Park – Approximately 0.9 acre of the Francesco Elias Esquer Park falls within Option B in the South Section of the Orange Alternative. The remaining 5.1 acres of Francesco Elias Esquer Park are outside the 2,000-foot-wide Project Area (also see Section 4(f) Evaluation). Impacts to Section 6(f) resources associated with Francesco Elias Esquer Park cannot be determined because the exact location of I-11 is unknown at this time. The Tier 2 NEPA process will evaluate specific project effects.

Rillito Town Park – Approximately 2 acres of Rillito Town Park (Rillito Vista Park) fall within Option B in the South Section of the Orange Alternative. The entirety of Rillito Town Park is

within the 2,000-foot-wide Project Area along I-10 (also see Section 4(f) Evaluation). Impacts to Section 6(f) resources associated with Rillito Town Park cannot be determined because the exact location of I-11 is unknown at this time. The Tier 2 NEPA process will evaluate specific project effects.

Picacho Peak State Park – Option L would be aligned along I-10 in the South Section, resulting in approximately 173 acres of the corridor within and along the edge of Picacho Peak State Park (also see the Section 4(f) Evaluation of Picacho Peak State Park). Impacts to Section 6(f) resources associated with Picacho Peak State Park cannot be determined because the exact location of the I-11 facilities is unknown at this time. The Tier 2 NEPA process would need to evaluate any impacts.

Buckeye Hills Regional Park – Approximately 114 acres of Buckeye Hills Regional Park fall within Option Q2 in the Central Section under the Orange Alternative. Impacts to Section 6(f) resources associated with Buckeye Hills Regional Park cannot be determined because the exact location of I-11 is unknown at this time. The Tier 2 NEPA process will evaluate specific project effects.

No portion of a Section 6(f) property falls within the Orange Alternative in the North Section. Therefore, no portions of a Section 6(f) property would be converted to uses other than public outdoor recreation under this Build Corridor Alternative.

No Build Alternative

The No Build Alternative would result in no change to an outdoor recreational use of a Section 6(f) property.

3.3.3 Summary

All of the Build Corridor Alternatives would have land use impacts, including the potential to encourage commercial and industrial development in locations near interchanges and to increase development density in those areas. The actual effects and their magnitude cannot be adequately determined at this time; they will largely depend on the timing of future construction and other factors, such as the overall rate of urban development within the Study Area. Many communities within the Study Area are planning for a high-capacity transportation facility that follows one of the Build Corridor Alternatives. In these situations, anticipated land use effects may be planned and compatible. In other situations, new development may be unplanned and incompatible.

The Green and Orange Alternatives would have similar impacts on Section 6(f) resources (Buckeye Hills Regional Park). The Purple Alternative would not affect Section 6(f) properties.

Table 3.3-8 (Summary of Potential Impacts to Land Use and Section 6(f) Properties) summarizes the key impact issues.

3.3.4 Potential Mitigation Strategies

Future construction of I-11 would result in physical impacts that could require mitigation. At this stage in the development of I-11, potential mitigation measures can only be identified in general terms, such as minimizing impacts to residential and sensitive environmental areas, until the definition of a specific alignment is defined during Tier 2 studies. During Tier 2, if property

acquisition is necessary, the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and the Civil Rights Act of 1964 would be followed. Additionally, the specific alignment and locations of traffic interchanges would be planned in coordination with local government entities and with public input to minimize the potential for land use conflicts and to develop appropriate mitigation specific to each location.

If a Selected Alternative encroaches upon specially designated BLM lands, during Tier 2 studies, ADOT may need to pursue an amendment to the applicable Resource Management Plans to grant ROW or otherwise permit construction of an interstate highway.

Understanding the potential for indirect and cumulative land use effects from I-11, 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 I-11. The White Tanks Conservancy may be a model for this type of effort, which also could include coordination with Pima County on the implementation of the Sonoran Desert Conservation Plan.

If I-11 advances into Tier 2 design and NEPA analysis, ADOT would examine ways to avoid or minimize impacts to Section 6(f) properties. Potential strategies ADOT could consider include, but are not limited to, defining alignments that do not use park properties and incorporating refinement details, such as using retaining walls to minimize the I-11 footprint.

As part of that effort, ADOT would continue coordinating with the agencies having jurisdiction over the potentially affected properties. If land from one or more properties cannot be avoided, Section 6(f) requires replacement of park land that is converted to a transportation use. The land must be equal to or greater in value than the impacted land in terms of its ability to serve as park land. To achieve this requirement, if park land cannot be avoided, ADOT's coordination activities would assist in ADOT's identification of replacement land.

3.3.5 Future Tier 2 Analysis

Future Tier 2 projects would address specific effects to property, zoning regulations, neighborhoods, or community facilities. The approach to determining acquisitions, easements, and displacements, including ownership (public or private), would be determined as part of the project-specific Tier 2 environmental study. Tier 2 projects also would address compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970; this compliance ensures that property owners (residential and business) receive fair market value for their property and relocation benefits, and that displaced persons receive fair and equitable treatment and do not suffer disproportionate injuries because of programs designed for overall public benefit.

The Federal Highway Administration (FHWA) would complete a Final Section 6(f) Evaluation during the future Tier 2 analysis. At that time, the FHWA would make the final determinations of I-11 impacts on protected properties, assessing the ability of the Selected Alternative to avoid or minimize impacts to protected properties and identifying specific mitigation measures to offset the remaining impacts. During the Tier 2 analysis, coordination with agencies with jurisdiction would focus on making final determinations of impact and identifying replacement land and other specific mitigation measures, as warranted.

Table 3.3-8 Summary of Potential Impacts to Land Use and Section 6(f) Properties

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Major Resource Features		Land use effects are assessed qualitatively in the Draft Tier 1 EIS. Overall, the Build Corridor Alternatives would benefit commercial, industrial, and related land uses by improving the capacity of the interstate highway system, and retaining or granting new local access, especially to large regional facilities located near freeway interchanges.		
Most Common Planned Land Uses within Project Area Potentially Affected	No I-11 impacts identified; existing conditions and baseline trends would continue.	• Residential (51%) • Recreation/Open Space (13%) • Mixed Use (10%) • Industrial (8%)	• Residential (51%) • Recreation/Open Space (22%) • Mixed Use (5%) • Industrial (5%)	• Residential (31%) • Recreation/Open Space (22%) • Industrial (12%) • Commercial (10%)
Overall Land Use Considerations	Because it only accommodates near-term planned improvements, the No Build Alternative would be unresponsive to forecasted population and employment growth in the long term, which could lead to increased congestion on the highway system, increased travel times, and reduced efficiency in the movement of people and goods.	Not likely to cause major adverse effects to land uses along the corridor because I-11 is generally consistent with adopted plans. Some impacts in developed areas may occur due to right-of-way acquisition. New transportation junctions may create opportunities for new development and growth along I-11, depending on the timing of construction and pace of development.	Similar to the Purple Alternative.	Impacts to planned land uses are expected to be less than the other Build Corridor Alternatives, since I-11 would likely be co-located with an existing facility under the Orange Alternative, where land uses have developed consistent with a roadway. Added traffic may increase the attractiveness of the route and desire for new goods and services.

Table 3.3-8 Summary of Potential Impacts to Land Use and Section 6(f) Properties (Continued)

Indirect Effects	Programmed transportation improvements plus projected population and employment growth could: • Reduce the availability of land that could be used for future parks, recreational facilities, and open space. • Increased use of parks, recreational facilities, and open space due to an increased population.	Land development induced by I-11 could: • 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, recreational facilities, and open space due to increased population. Could cause more pressure for open space protection if the Build Alternative results in induced growth in additional areas.	Similar to the Purple Alternative, except: • The resources present within the Project Area have greater potential to be indirectly affected by induced changes to land use and traffic.	Similar to the Green Alternative, except: More resources are present within the Project Area 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.
Cumulative Effects	Past, present, and reasonably foreseeable projects and planning could: • 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	Past, present, and reasonably foreseeable projects could: • Reduce the amount of land available for future parks, recreational facilities, or open space compared to the No Build Alternative.	Similar to the Purple Alternative.	Similar to the Purple Alternative, except: • Effects to specific parks, recreational facilities, or open space, but these are more likely to already be in the vicinity of an existing transportation use.

Table 3.3-8 Summary of Potential Impacts to Land Use and Section 6(f) Properties (Continued)

	provide protected land with recreational components in rural/undeveloped areas.			
Section 6(f) potential impacts	No I-11 impacts identified; No changes to outdoor recreational use of Section 6(f) properties.	No portion of a Section 6(f) property falls within the Purple Alternative.	Option M could result in a permanent loss of a portion of Buckeye Hills Regional Park. Because the exact location of the I-11 is unknown at this time, impacts to Section 6(f) resources associated with the Buckeye Hills Regional Park would need to be evaluated during Tier 2.	Option Q2 could result in a permanent loss of a portion of Buckeye Hills Regional Park. Because the exact location of the I-11 facility is unknown at this time, impacts to Section 6(f) resources associated with Buckeye Hills Regional Park would need to be evaluated during Tier 2.

This page intentionally left blank

3.4 Recreation

The section provides a description of the recreation sites and areas within the Interstate 11 (I-11) Corridor Study Area (Study Area); presents an overview of the regulations of federal, state, and local land management agencies that provide recreation opportunities; and describes direct effects to recreation sites/areas. Direct effects involving other environmental disciplines on recreation resources are discussed, as appropriate, in Section 3.3, Land Use; Section 3.9, Visual and Aesthetic Resources; and Section 3.14, Biological Resources. Recreation sites/areas that qualify as Section 4(f) are discussed in **Chapter 4**, and Section 6(f) resources are discussed in Section 3.3, Land Use.

3.4.1 Regulatory Setting

Many federal, state, and local agencies provide recreation opportunities and facilities in the Study Area, including United States Forest Service (USFS), Bureau of Land Management (BLM), National Park Service (NPS), Arizona Game and Fish Department (AGFD), Arizona State Parks and Trails, Arizona State Land Department (ASLD), and local and county governments. These entities provide and/or manage recreation activities on public lands with management plans developed as part of their guiding authority. **Table 3.4-1** (Agencies and Policies and Regulations for Managing Recreation) summarizes the policies and regulations for federal, state, and county/municipal agencies that manage recreation within the Study Area.

3.4.2 Methodology

The recreation analysis is focused on identifying publicly owned recreation sites/areas for which any portion is contained within the 2,000-foot-wide corridor, or which could be directly impacted by construction of I-11 due to proximity. Acreages of potential impacts are quantified for the recreation sites/areas within the 2,000-foot-wide corridor and are compared to the overall acreage of the recreation sites/areas. Context for the impacts to these recreational areas is obtained by considering the impact to the portion within the Build Corridor Alternative against the total area of the recreation site. The analysis does not address future refinements to the alignments to minimize impacts or address co-location with existing roadways. Those topics are part of potential mitigation strategies and future Tier 2 projects.

The Project Team identified recreation resources using a variety of public sources. Recreation information for public lands administered by the BLM, USFS, and NPS were identified from a review of available data in existing Resource Management Plans and websites. In addition, designated parks and open spaces on state, county, and municipal lands were identified from websites and the recreation and open space elements of comprehensive plans, general plans, and other land use management plans adopted by the State of Arizona, counties, and incorporated cities.

Recreation sites that currently exist, are under construction, or within a regulatory permitting stage are addressed. Although impacts to recreation on private property would likely occur from all alternatives, this analysis focuses on publicly-owned recreation areas. Identification of recreation opportunities on private lands would be addressed in Tier 2.

Table 3.4-1 Agencies and Policies and Regulations for Managing Recreation

Government	Agency	Policy or Regulation
Federal	BLM	Resource Management Plan for the Field Office, BLM Planning Area, or National Monument
Federal	USFS	National Forest Management Act of 1976 National Environmental Policy Act and other applicable legislation and regulations Wilderness Act (16 USC 1131) Land and Resource Management Plan
Federal	NPS	Legislation that created the park Foundation Document or General Management Plan NPS Organic Act (54 USC 100101(a), 100301 et seq.) NPS Management Polices 2006 Code of Federal Regulations Title 36 Parts 1-5 or Chapter 1 Parts 1-7 and 34 USC Titles 16, 18, 21 and 54 Park specific regulations within the Superintendent's Compendium
State	Arizona State Parks and Trails	2018-2022 Statewide Comprehensive Outdoor Recreation Plan Arizona Trails 2015 (statewide motorized and non-motorized trails plan)
State	AGFD	Management Plan for Robbins Butte Wildlife Area Property Purpose/Management Focus for Public Land Order 1015 lands
State	Arizona State Land Department (ASLD)	No specific management plans for State Trust lands within the analysis area.
Local	County Comprehensive Plans and Municipal General Plans	Local comprehensive plans include an element for parks, open space, or recreation that identify an overall vision or direction for recreation as it relates to community needs, and provides direction for specific facilities and opportunities.

AGFD = Arizona Game and Fish Department, ASLD = Arizona State Land Department, BLM = Bureau of Land Management, NPS = National Park Service, USC = United States Code, USFS = US Forest Service.

3.4.3 Affected Environment

The Study Area includes a variety of recreation sites/areas on federal lands managed by BLM, NPS, and USFS. These sites/areas include two National Monuments, one National Park, one National Historical Park (NHP), and one National Historic Trail (NHT). Recreation sites/areas on BLM lands include primarily trails, whereas the USFS and NPS areas contain more developed facilities, such as campgrounds and picnic areas. The Study Area also includes three designated wildernesses areas – two within the Sonoran Desert National Monument (SDNM) and one within Saguaro National Park (SNP). State lands and county and municipal parks also provide recreation opportunities, which typically have developed recreation facilities.

The following section describes existing recreation sites/areas in the Study Area from south to north. Additional information about recreation management areas, designated national trails,

and other recreation trails, state wildlife areas, and state parks is found in **Appendix E4**, Recreation Technical Memorandum.

3.4.3.1 Existing Recreation Sites/Areas

Within the South Section, numerous recreation opportunities are provided on federal lands managed by BLM, NPS, and USFS and include one National Monument, one National Park, one NHP, and one NHT. Recreation opportunities include off-highway vehicle use, hiking, biking, horseback riding, camping, hunting, sightseeing, target shooting, wildlife viewing, plant viewing, photography, birdwatching, visiting historic and archaeological sites, visiting fossil and geological resources, picnicking, scenic driving, cultural demonstrations, and scenic viewing. The Tucson Mountain District of the SNP includes trails, campground, a picnic area, and a visitor center.

The South Section also includes one state park managed by Arizona State Parks and Trails, and State Trust lands managed by the ASLD. Recreation opportunities on State Trust land include picnicking, hiking, wildlife viewing, and camping. Additional recreation activities are allowed on State Trust lands with a permit (e.g., hunting). There also are six AGFD-designated Game Management Units (GMUs) and one wildlife area. GMUs are hunting areas consisting of state, federal, military, and private land. Hunters must have written or verbal permission from private property owners to hunt on private property or to cross private property to reach State Trust lands.

Recreation opportunities are provided by the Town of Marana, and Town of Sahuarita, but majority of the local parks and trails in the Study Area are managed by the City of Tucson and Pima County. Parks within the Tucson metropolitan area generally provide a more urban recreation experience compared to regional parks located outside of Tucson.

Figure 3.4-1 (Recreation Sites in Project Vicinity – South Section) depicts the recreation sites/areas within the South Section of the Project Area. **Appendix E4** describes these sites/areas in greater detail.

Within the Central Section, the BLM provides numerous recreation opportunities on federal lands and include one National Monument, one Special Recreation Management Area (SRMA), one Extensive Recreation Management Area (ERMA), and one NHT. Recreation opportunities include off-highway vehicle use, hiking, biking, horseback riding, camping, hunting, sightseeing, target shooting, wildlife viewing, photography, visiting historic and archaeological sites, backpacking, star gazing, and picnicking.

The Central Section also includes the Robbins Butte Wildlife Area and Public Land Order 1015 lands managed by AGFD. State Trust lands in the Central Section provide recreation opportunities that primarily focus on waterfowl management, upland game bird management, hunting, bird watching, hiking, fishing, wildlife viewing, outdoor education, and other wildlife-oriented recreation uses. Additional recreation activities are allowed on State Trust lands with a permit (e.g., hunting). Land in the Central Section also is within five AGFD-designated GMUs and part of two wildlife areas.

Maricopa County maintains one regional park that provides a variety of developed recreation facilities. Pinal County currently provides recreation at one park and is in the process of developing a regional park.

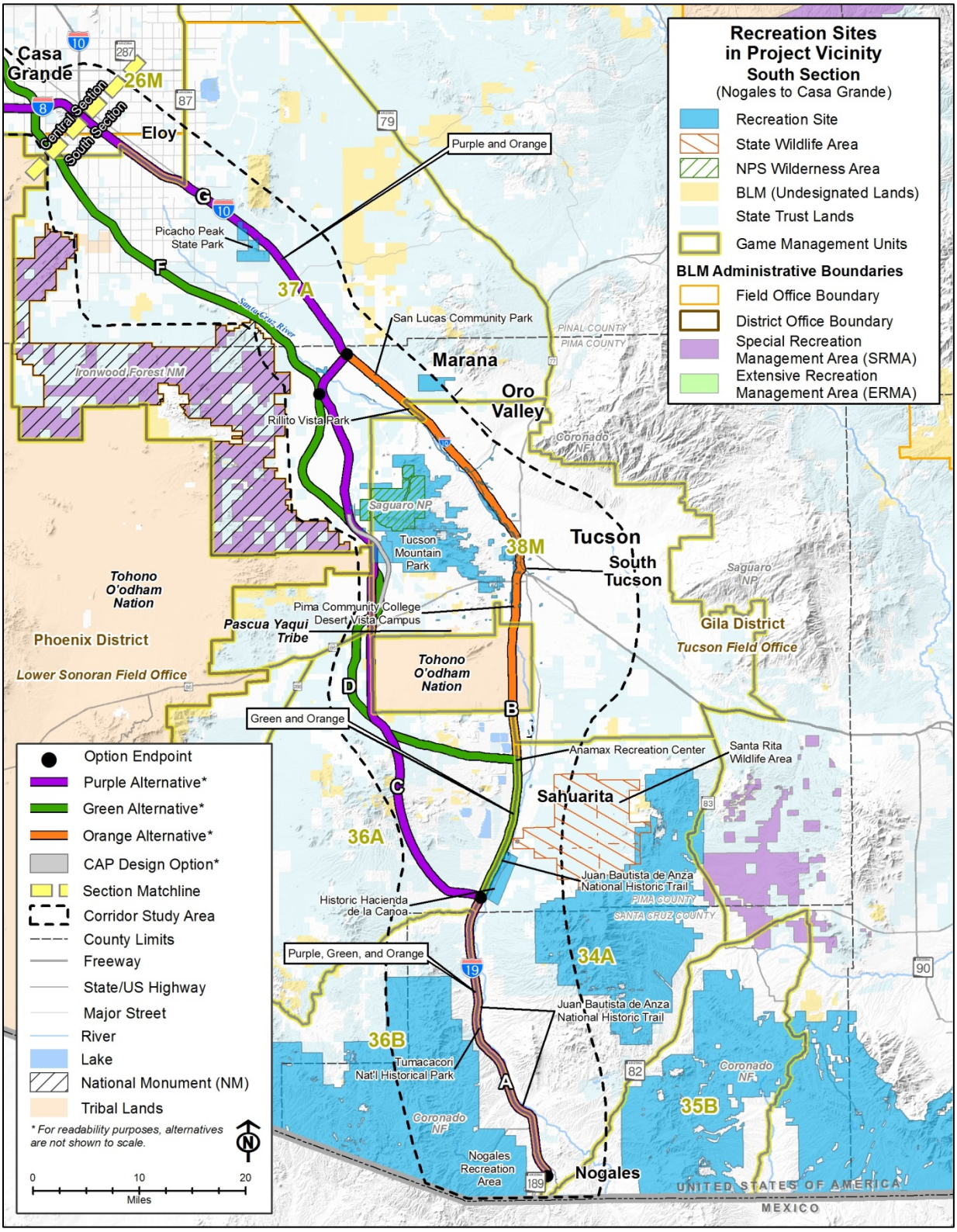


Figure 3.4-1 Recreation Sites in Project Vicinity – South Section

Figure 3.4-2 (Recreation Sites in Project Vicinity – Central Section) depicts the recreation sites/areas within the Central Section of the Project Area. **Appendix E4** describes these sites/areas in greater detail.

The BLM provides dispersed recreation opportunities on land it manages in the North Section as the Vulture Mountains Recreation Management Zone (RMZ), or Vulture Mountains Recreation Area (VMRA). This includes the Vulture Mine Off-Road Challenge Race Course for off-highway vehicles (OHV).The VMRA 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 North Section also includes State Trust lands managed by the ASLD. Recreation opportunities on these lands focus on hunting, wildlife viewing, and other wildlife-oriented recreation uses. However, additional recreation activities are allowed on State Trust lands with a permit (e.g., hunting). The North Section is within three AGFD-designated GMUs.

Figure 3.4-3, (Recreation Sites in Project Vicinity – North Section) depicts the recreation sites/areas within the North Section of the Project Area. **Appendix E4** describes these sites/areas in greater detail.

3.4.4 Environmental Consequences

This section analyzes the impacts that developing I-11 would have on recreation sites/areas. Detailed information, including a description of the impacts to each recreation site/area, along with the acreage of each recreation site/area by Corridor Option, is included in **Appendix E4.**

3.4.4.1 General Recreation Impacts Common to the Build Corridor Alternatives

I-11 would have temporary construction impacts and permanent impacts on federal, state, and local recreation resources and opportunities. The following discussion clarifies anticipated general impacts on recreation. These general impacts are common to the Build Corridor Alternatives. Construction impacts are addressed in Section 3.15.

Impacts on Recreation Land and Recreation Settings

Development of I-11 could result in the permanent loss of acreage for recreation opportunities, particularly along Corridor Options not co-located with an existing interstate. Arizona Department of Transportation (ADOT) and Federal Highway Administration (FHWA) are committed to coordinating with additional agencies to identify options that avoid, minimize, or mitigate the impacts. However, the exact nature of those options will not be developed until Tier 2.

Development of I-11 also would result in impacts to the setting of recreation and wilderness areas. Although recreation opportunities may continue to be available after the construction of I-11, the settings in which they occur could be affected visually or audibly, access to recreation areas may change, and ultimately some users may choose to recreate elsewhere. The change in setting from a natural or natural-appearing setting to a busy interstate could be noticeable for non-motorized recreation opportunities and for recreation experiences dependent upon quiet natural experiences. Potential impacts from increased noise, air pollution, light pollution, and scenic views may occur in federally designated wilderness areas.

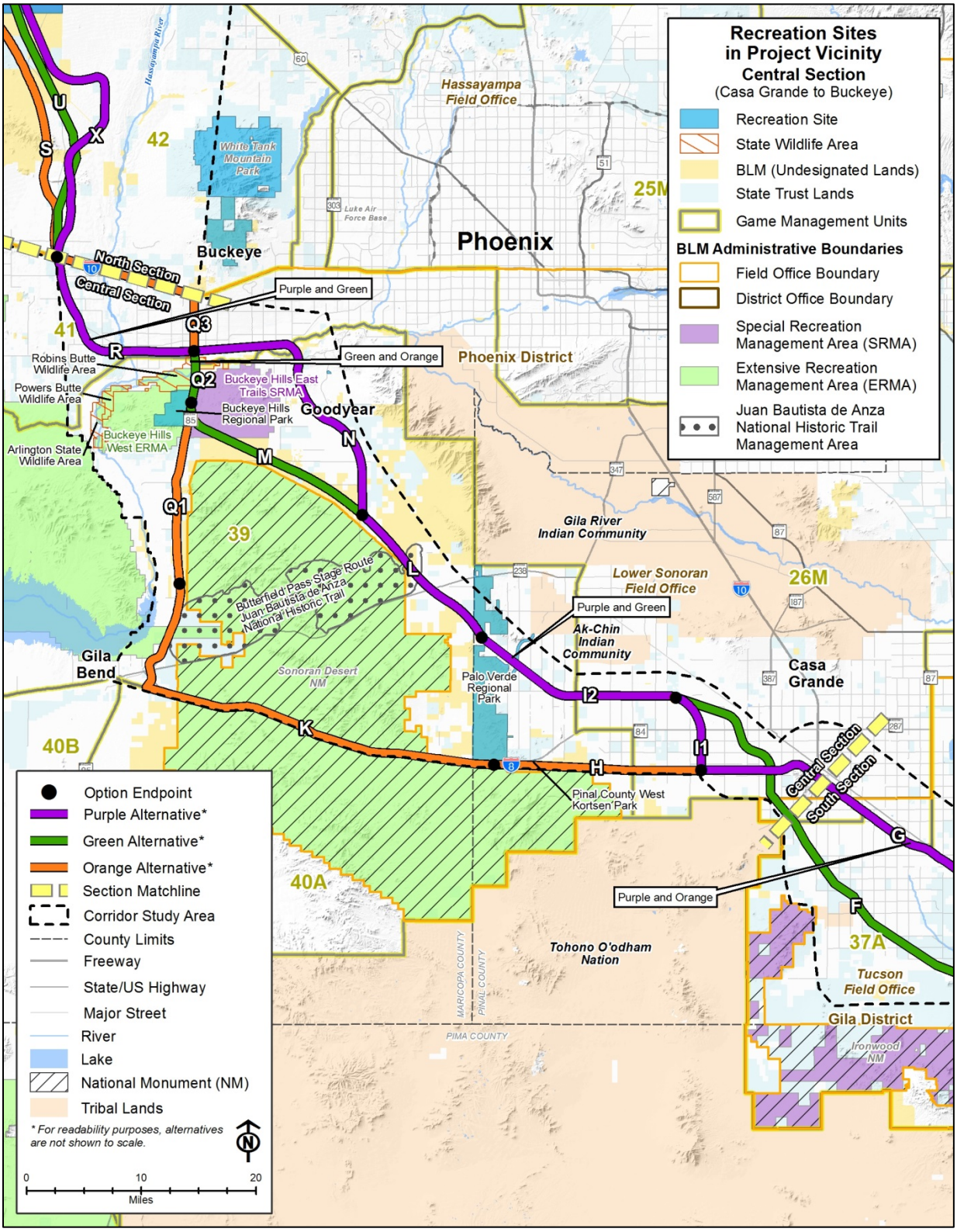


Figure 3.4-2 Recreation Sites in Project Vicinity – Central Section

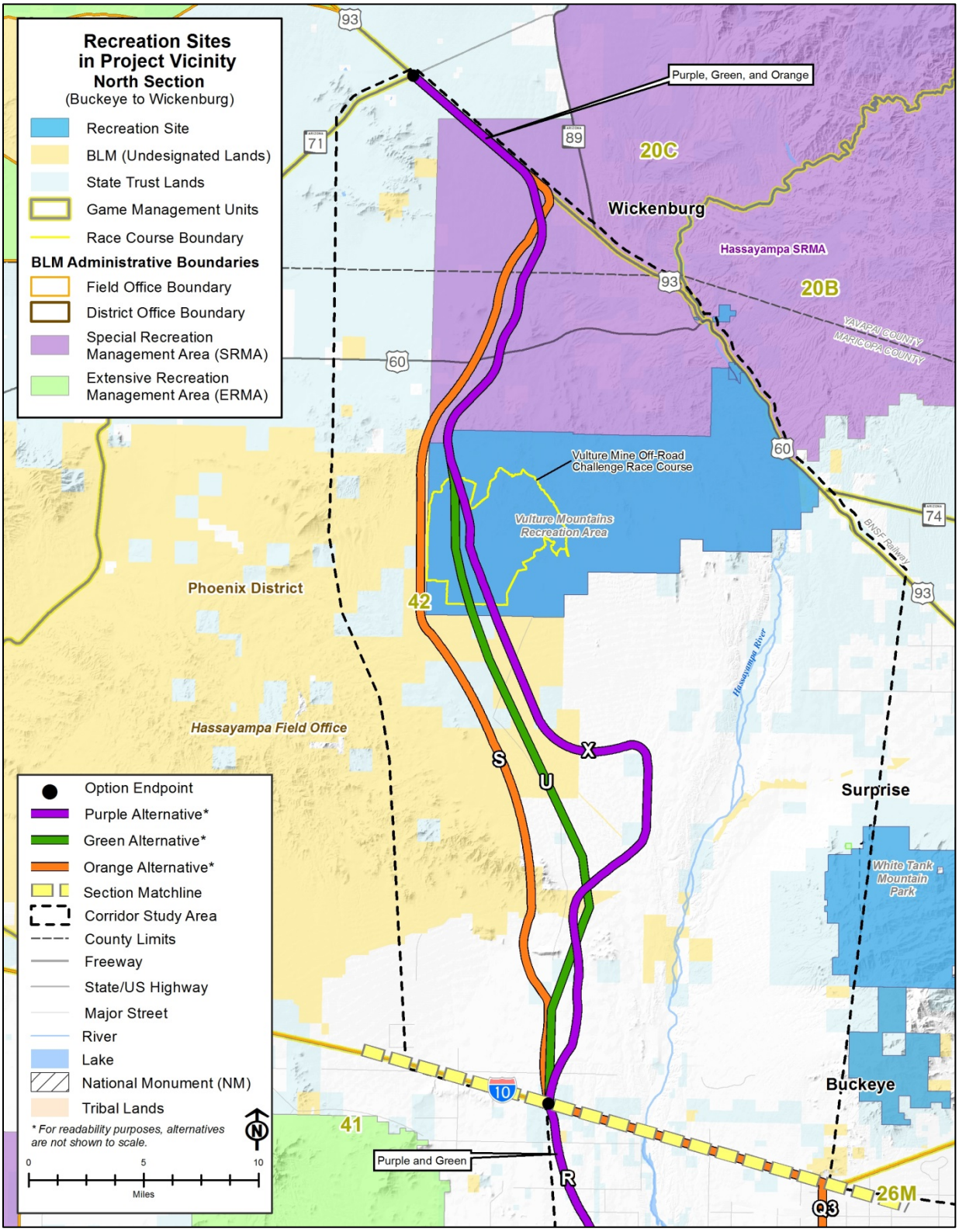


Figure 3.4-3 Recreation Sites in Project Vicinity – North Section

Impacts on Accessibility

Potentially both an impact and a benefit, the presence of I-11 could result in increased access to recreation sites/areas, which could increase recreation use and alter recreation experiences due to changes in setting (increased crowding, noise, loss of solitude, etc.).

Impacts to Recreation on State Trust Lands and GMUs

Permanent impacts to dispersed recreation on State Trust lands from development of I-11 would include reduced acreage for recreation opportunities, potential increase in access (and potentially use) of State Trust lands due to new road access, and alteration of the recreation setting to a more developed setting where I-11 would be visible or audible (see Sections 3.8 and 3.9 for more information about noise and visual impacts). Recreation experiences for users of existing State Trust lands would likely sustain more permanent change along Corridor Options not co-located within an existing interstate due to alterations to the recreation setting and potential changes in use levels due to increased access.

Permanent impacts from the development of I-11 within a given GMU could include:

- Loss of hunting areas due to taking of dedicated right-of-way for I-11;
- Potential long-term change in wildlife presence, and thus hunting locations;
- Potential increase in access to the GMU for both hunters and other recreationists due to new road access; and
- Alteration of the recreation setting to a more developed setting where I-11 would be visible or audible.

Adverse impacts to hunting would be more severe on GMU lands within Corridor Options not co-located with existing interstates; those recreation settings would sustain more change and would likely have higher wildlife displacement. Adverse impacts to hunting could affect recreation experience quality for hunters.

3.4.4.2 Purple Alternative

The Purple Alternative could result in potential impacts to six federal recreation resources, including undesignated BLM lands (managed by three different field offices), one BLM SRMA, one NHT, and one NHP. It would potentially impact recreation within four other federal recreation areas including the Nogales Recreation Area, Ironwood Forest National Monument, SNP, and SDNM, one state park, 10 GMUs, State Trust lands, a regional park, and a local recreation area. The Purple Alternative also may impact recreation at Tucson Mountain Park, although the interstate would not be physically located within this area.

The Purple Alternative would affect the fewest recreation areas/sites in the South and Central Sections, and could have fewer permanent and temporary impacts on the SDNM than the other alternatives. The main area affected in the Central Section would be the proposed Palo Verde Regional Park.

The Purple Alternative would affect the same number of federal, state, and local recreation areas as the other Corridor Alternatives in the North Section, although to a different extent. It would bisect the race course within VMRA.

Table 3.4-2 (Recreation Resources and Acreage within the Purple Alternative) provides a summary of the number of recreation resources and the acreage identified within the 2,000-foot-wide corridor for each Option. These sites may or may not be impacted by I-11 and additional recreation sites also may have air, noise, or visual impacts as further defined in the Indirect and Cumulative Effects, Section 3.17.

Table 3.4-2 Recreation Resources and Acreage within the Purple Alternative

Jurisdiction	Number of Sites/ Areas	Acres within Option								
		A	C	G	I1	I2	L	N	R	X
Federal	7	4	459	0	0	0	1,635	157	81	9,669
GMU	10	6,955	14,028	10,929	1,768	4,4515	4,478	6,205	4,236	13,277
State	2	224	4,597	2,446	1	237	192	1,259	904	1,410
Local	1	0	0	0	0	63	242	0	0	0

3.4.4.3 Green Alternative

The Green Alternative has the potential to impact eight federal recreation resources, including undesignated BLM lands (managed by three different field offices), two BLM SRMAs, one ERMA, one NHT, and one NHP. Despite not being physically located within these areas, the Green Alternative could impact recreation within four other federal recreation areas including the Nogales Recreation Area, Ironwood Forest National Monument, SNP, and SDNM. It could affect recreation at 10 GMUs, State Trust lands, one state wildlife area, four local parks, and one local recreation area. Similar to the Purple Alternative, the Green Alternative could impact recreation at Tucson Mountain Park, though the facility would not be physically located within this area.

The Green Alternative would have recreation impacts similar to the Purple Alternative relative to the options in the South Section, although it would have more impact on local recreation areas, particularly at the Anamax Recreation Center. The Green Alternative could affect recreation within the Buckeye Hills area (BLM SRMA and ERMA and a regional park) in the Central Section, which would be avoided by the Purple Alternative.

The Green Alternative would affect the same number of federal, state, and local recreation areas as the other Corridor Options in the North Section, although to a different extent. It would bisect the race course within VMRA. The Green Alternative would potentially have slightly less impact on the VMRA than the Purple Alternative in terms of acres.

Table 3.4-3 (Recreation Resources and Acreage within the Green Alternative) provides a summary of the number of recreation resources and the acreage identified within the 2,000-foot-wide corridor for each Option. These sites may or may not be impacted by the project and additional recreation sites also may have air, noise, or visual impacts as further defined in the Indirect and Cumulative Effects, Section 3.17.

Table 3.4-3 Recreation Resources and Acreage within the Green Alternative

Jurisdiction	Number of Sites/ Areas	Acres within Option								
		A	D	F	I2	L	M	Q2	R	U
Federal	9	4	564	0	0	1,635	4,120	510	3,103	9,732
GMU	10	6,955	12,271	12,331	4,515	4,478	4,478	1,101	4,236	12,226
State	2	224	5,019	2,077	237	192	92	361	0	1,507
Local	4	0	441	0	63	242	70	114	0	0

3.4.4.4 Orange Alternative

The Orange Alternative could impact seven federal recreation resources, including undesignated BLM lands (managed by two different field offices), two BLM SRMAs, one BLM ERMA, one National Monument, and one NHP. It also could impact the Nogales Recreation Area, despite not being physically located within this area, as well as recreation at one state park, 11 GMUs, State Trust lands, one state wildlife area, 21 local parks, three trails/greenways, and two local recreation areas.

Construction of the Orange Alternative has the potential to affect a much larger number of recreation areas/sites within the South Section but would result in fewer permanent impacts to recreation areas/sites because I-11 would be co-located with existing interstate facilities. Unlike the other alternatives, it would physically pass through the SDNM.

The Orange Alternative would affect the same number of federal, state, and local recreation areas as the other Corridor Options in the North Section, although to a different extent. The Green Alternative would have the least effect within the VMRA because it could pass beside this recreation area.

Table 3.4-4 (Recreation Resources and Acreage within the Orange Alternative) provides a summary of the number of recreation resources and the acreage or trail miles identified within the 2,000-foot-wide corridor by Option. These sites may or may not be impacted by the project and additional recreation sites also may have air, noise, or visual impacts as further defined in the Indirect and Cumulative Effects, Section 3.17.

Table 3.4-4 Recreation Resources and Acreage within the Orange Alternative

Jurisdiction	Number of Sites/ Areas	Acres within Option								
		A	B	G	H	K	Q1	Q2	Q3	S
Federal	7	4	0	0	638	6,403	832	269	2	7,812
GMU	11	6.955	12,210	10,929	4,383	10,036	3,860	1,101	4,197	12,070
State	3	224	138	2,446	207	1,936	1,548	361	647	2,248
Local	21	0	673	0	190	284	232	114	0	1
Local*	6	0	28*	0	0	0	0	0	0	0

* Denotes trail miles.

3.4.4.5 No Build Alternative

If the No Build Alternative is selected, I-11 would not be constructed and vehicles would continue to utilize the existing transportation network. Only programmed projects would be implemented under this alternative, including pavement preservation and other maintenance projects. The No Build Alternative would not result in impacts to recreation areas beyond those already identified improvement projects.

3.4.4.6 Summary

All the Build Corridor Alternatives would have similar overall impacts on recreation resources. The main types of permanent impacts include changes to the recreation setting, increased access to recreational areas, altered experience quality at recreation sites, and reduced acreage of recreation areas. **Table 3.4-5** (Summary of the Potential Impacts to Recreation) located at the end of this section, provides a summary of potential impacts. Additional information about indirect and cumulative effects can be found in Section 3.17.

The AGFD identified recreation resources as a priority for their agency. Moving forward, ADOT expects close coordination with AGFD as individual projects advance to the Tier 2 environmental process.

3.4.5 Potential Mitigation Strategies

There are several mitigation strategies that could be employed to minimize impacts to recreation. Potential mitigation should be based not only on the effect anticipated, but also on the characteristics of the specific resource affected.

Examples of potential mitigation strategies could include:

- Design or route modifications to avoid or minimize impacts on the recreation properties and use of recreation properties.
- Design the alignment to allow for maintenance of existing access to recreation areas and continue to provide connectivity between recreation areas/lands, including demonstrating how access to BLM, USFS, and other recreation lands would be provided during and after construction.
- Develop trail connections between portions of recreation areas that may be separated due to the new roadway.
- Construction modifications to avoid use or acquisition of recreation resources.
- Schedule construction to avoid peak recreation season and special events, including hunting and birdwatching seasons, when possible.
- Context-sensitive design in future stages of project development.
- Development of natural design features, such as earthen berms and vegetative plantings.
- Design features, such as fencing and designated crossings, to protect the safety of those using the recreation area and to provide continuity to divided recreation areas.
- Designate pedestrian crossings for trails.
- Traffic plans and details that avoid and minimize construction access limitations involving roads, including BLM designated routes that access recreation sites/areas, as well as

undesignated BLM lands to minimize the duration of access disruption and provide on-site and online information about alternative access options.

- Develop crossings to maintain permeability for OHV race course in VMRA.
- Address updated access routes to SNP and Tucson Mountain Park due to the relocation of Sandario Road on either end of the Tucson Mitigation Corridor as part of the Central Arizona Project Design Option.
- Establish connection between the two segments of the Palo Verde Regional Park to minimize permanent impacts.
- Schedule construction to avoid temporary closure of the entire Loop Trail at one time. At a minimum, one of the east-west connections of the Loop Trail should remain open.
- Provide information about trail closures and alternate trail options during closures on-site and online.
- Address noise policies through mitigations including potential use of temporary and permanent sound barriers (if not already present and warranted by ADOT regulation) adjacent to local parks along I-10 and I-19.
- Locate construction staging and laydown areas away from recreation sites to the extent possible.

3.4.6 Future Tier 2 Analysis

Tier 2 analyses would include a more detailed analysis of the following items:

- Updating the list of recreation sites/areas within the project-level Study Area;
- Refining the list of recreation sites impacted by the selected Build Corridor Alternative, if chosen, including identification of acres of potential impacts and impacts to specific access roads;
- Reviewing the current recreation planning documents applicable to the Study Area;
- Clarifying the potential construction and operation impacts to each site including ancillary facilities (intersections, laydown areas, etc.);
- Specifying the temporary and permanent impacts to each recreation site/area; and
- Identifying site-specific mitigation at individual recreation resources.
- An update of recreation sites/areas to include any new facilities built or moved to the permitting stage also would be included within the Tier 2 analysis.

Table 3.4-5 Summary of the Potential Impacts to Recreation

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Major Resource Features	No I-11 impacts identified; Existing conditions and baseline trends would continue; Other projects within the Study Area are subject to their own evaluation.	Potential to impact the Hassayampa SRMA, Juan Bautista de Anza NHT Management Area, Tumacacori NHP, Picacho Peak State Park, VMRA including the Vulture Mine Off-Road Challenge Race Course, and other recreation resources.	Potential to impact the Hassayampa SRMA, Tumacacori NHP, Juan Bautista de Anza NHT Management Area, Buckeye Hills East Trails SRMA, Robbins Butte Wildlife Area, Buckeye Hills Regional Park, Anamax Recreation Center, VMRA including the Vulture Mine Off-Road Challenge Race Course, and other recreation resources.	Potential to impact the SDNM, Hassayampa SRMA, Tumacacori NHP, Buckeye Hills East Trails SRMA, Robbins Butte Wildlife Area, Picacho Peak State Park, Buckeye Hills Regional Park, VMRA, and other recreation resources.
Federal Resources		BLM Undesignated Lands in the Tucson Field Office, Lower Sonoran Field Office, and Hassayampa Field Office; Hassayampa SRMA; VMRA; Tumacacori NHP; and Juan Bautista de Anza NHT Management Area.	BLM Undesignated Lands in the Tucson Field Office, Lower Sonoran Field Office, and Hassayampa Field Office; Hassayampa SRMA; Tumacacori NHP; Juan Bautista de Anza NHT Management Area; Buckeye Hills East Trails SRMA; and Buckeye Hills West ERMA.	BLM Undesignated Lands in the Lower Sonoran Field Office, and Hassayampa Field Office; SDNM; Hassayampa SRMA; VMRA; Tumacacori NHP; Buckeye Hills East Trails SRMA; and Buckeye Hills West ERMA.
State Resources		Numerous GMUs; State Trust Lands; and Picacho Peak State Park.	Numerous GMUs; State Trust Lands	Numerous GMUs; State Trust Lands; Robbins Butte Wildlife Area; Picacho Peak State Park.

Table 3.4-5 Summary of the Potential Impacts to Recreation (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Local Resources		Palo Verde Regional Park.	Palo Verde Regional Park and VMRMZ; Historic Hacienda de la Canoa (Raul M. Grijalva Canoa Ranch Conservation Park); Anamax Recreation Center; and Buckeye Hills Regional Park.	Oury Park; La Mar Park; El Parque De San Cosme; El Paso and Southwestern Greenway; Bonita Park; Garden of Gethsemane; Estevan Park; Francesco Elias Esquer Park; Julian Wash Greenway; Julian Wash Archaeological Park; Pima Community College, Desert Vista Campus; David G. Herrera and Raymond Quiroz Park; Historic Hacienda de la Canoa (Raul M. Grijalva Canoa Ranch Conservation Park); Santa Cruz River Park; Rillito River Park; The Loop; Sweetwater Wetlands Park; Ted Walker Park; Canada Del Oro River Park; Rillito Vista Park; San Lucas Community Park; Anamax Recreation Center; Palo Verde Regional Park; Pinal County West/Korsten Park; and Buckeye Hills Regional Park.

Table 3.4-5 Summary of the Potential Impacts to Recreation (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Indirect Effects	Programmed transportation improvements plus projected population and employment growth could: • 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 increased population. • 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.	Land development induced by the project could: • 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, 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. • 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	Similar to the Purple Alternative, except: • The resources present within the corridor have greater potential to be indirectly affected by induced changes to land use and traffic.	Similar to the Green Alternative, except: • 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 3.4-5 Summary of the Potential Impacts to Recreation (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
		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.		
Cumulative Effects	Past, present, and reasonably foreseeable projects and planning could: • 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	Past, present, and reasonably foreseeable projects could: • 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	Similar to the Purple Alternative.	Similar to the Purple Alternative, except: • 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 3.4-5 Summary of the Potential Impacts to Recreation (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
	recreation resources. • Change the existing and potential recreation opportunities, ability to reach recreation destinations, and experiences available within an area.	developments.		

This page intentionally left blank

3.5 Community Resources, Title VI, and Environmental Justice

This section addresses general community characteristics, community resources (major public services and amenities), and environmental justice. It provides an overview of the minority and low-income populations present within the Interstate 11 (I-11) Corridor Study Area (Study Area) and discusses the potential for disproportionate adverse effects on those populations. Strategies for mitigation and continuing targeted public engagement efforts are recommended for the future Tier 2 environmental review process.

Employment and other economic issues also are discussed in Section 3.6, Economics. In addition, this Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS)also considered potential impacts on traditional cultural properties, which are sites that have an association with cultural practices or beliefs of a living community, are rooted in the community's history, and are important to maintaining the continuing cultural identity of the community. Traditional cultural properties are addressed in Section 3.7, Cultural Resources.

3.5.1 Regulatory Setting

3.5.1.1 Community Characteristics and Resources

This section addresses how potential effects of the Build Corridor Alternatives and No Build Alternative relate to the people and communities within the Study Area. The evaluation followed the guidelines provided in the Federal Highway Administration's (FHWA's) *Community Impact Assessment: A Quick Reference for Transportation, 2018 Update* (United States Department of Transportation [USDOT] 2018).

3.5.1.2 Title VI and Environmental Justice

Arizona Department of Transportation (ADOT) and FHWA must comply with Title VI of the Civil Rights Act of 1964, which prohibits discrimination based upon race, color, and national origin. Specifically, 42 United States Code 2000d states that *"No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.*"

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, signed by the President on February 11, 1994 directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the human health or environment of low-income and minority populations to the greatest extent practicable and permitted by law (Federal Register 59, 1994).

Relevant laws, EOs, and guidance include:

- Title VI of the Civil Rights Act of 1964, the federal law that protects individuals and groups from discrimination on the basis of their race, color, and national origin in programs and activities that receive federal financial assistance.
- USDOT Order 5610.2 (a) *Final DOT Environmental Justice Order* (USDOT 2012).

- FHWA Order 6640.23A *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (FHWA 2012).
- FHWA *Environmental Justice Reference Guide* (FHWA 2015).
- USDOT *Environmental Justice Strategy* (USDOT 2016).

There are three fundamental environmental justice principles: (1) avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations; (2) ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and (3) prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

In accordance with FHWA Order 6640.23A, a disproportionately high and adverse effect on a minority or low-income population means the adverse effect is predominantly borne by such population or is appreciably more severe or greater in magnitude on the minority or low-income populations than the adverse effect suffered by the non-minority or non-low-income population. Fair distribution of the beneficial and adverse effects of the proposed action is the desired outcome.

3.5.1.3 Limited English Proficiency

EO 13166 *Improving Access to Services for Persons with Limited English Proficiency* provides guidance for ensuring adequate opportunities for participation in project processes by LEP populations in accordance with Department of Justice obligations (Federal Register 65, 2000). LEP populations include individuals who do not speak English as their primary language and who have a limited ability to read, speak, write, or understand English. Identifying LEP populations helps ensure that everyone has an equal opportunity to participate in the public process and that language barriers do not prevent certain groups from being able to provide their input about the Study Area.

3.5.2 Methodology

3.5.2.1 Community Characteristics and Resources

Communities were identified using Census Designated Places (CDPs), which are delineated by the US Census Bureau and defined as settled concentrations of populations in both incorporated and unincorporated areas that usually coincide with visible features or boundaries of an adjacent incorporated place (US Census Bureau 2017). The geographic extent of a CDP does not always correspond with the local understanding of the area or community with the same name. For example, the Avra Valley CDP is a smaller area than the 50-mile-long northwest-southeast valley at the foot of the Tucson Mountains that is sometimes referred to as Avra Valley. The analysis addresses community cohesion through the identification of CDPs that intersect with the Build Corridor Alternatives. Community cohesion and the potential for impacts were used as indicators in the evaluation of potential for disproportionate impacts.

The inventory of community resources, such as places of worship, libraries, and hospitals, indicates areas where clusters of these facilities occur. Community resources were identified within an Analysis Area encompassing the 2,000-foot-wide Project Area as well as a 2-mile buffer surrounding the centerline of the Corridor Options, and inventoried based upon the US Geological Survey Geographic Names Information System database with some spot checking

conducted using Google Earth. The effects analysis focused on identifying locations where the Corridor Options intersect or are relatively close to community resources. Use impacts to community resources are location specific, an inventory of individual facilities and their locations would not yield meaningful information until a specific alignment is identified, and details involving impacts of the actual construction footprint will be provided in Tier 2 analyses. Therefore, potential impacts to community facilities are described in a more generalized manner.

3.5.2.2 Title VI and Environmental Justice

US Census Bureau 2010 Decennial Census data was used to characterize the total population, race, and ethnicity demographics of the Study Area (US Census Bureau 2010). American Community Survey 5-year estimates for 2011 to 2015 were used to characterize income levels in the Study Area (US Census Bureay 2015a). County-level and statewide data were collected to provide a regional comparison, and data on both Census Tracts (CTs) and CDPs were evaluated. CTs are larger geographic county subdivisions that provide complete coverage of the Study Area and its populations. CDPs correspond better to the communities and geographies where people live. The combination of both data points provides complete statistical coverage of the Study Area, with the CDP data complimenting the CT data to provide information on the more densely populated areas.

The minority groups addressed in this study include Hispanic, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, some other race, and two or more races. Additional sub-categories based on national origin or primary language spoken may have been used, where appropriate, on either a national or a regional basis. Populations were defined as a group or groups of individuals who live in geographic proximity. Low-income individuals are people whose household income is at or below the poverty thresholds established by the US Census Bureau. The US Census Bureau thresholds provide the basis for the Department of Health and Human Services poverty guidelines, which are simplified and rounded from the US Census Bureau thresholds.

This Tier 1 programmatic analysis followed a more qualitative approach than a project-level environmental justice analysis by identifying locations where the Corridor Options extend through communities with a high concentration of minority or low-income individuals and the potential for the Build Corridor Alternatives to affect those communities. The potential for disproportionately high and adverse effects was evaluated by calculating the percentage of the Build Corridor Alternative which passes through those communities. Disproportionate effects can arise from any type of environmental impact, and no hard threshold was used to identify these areas. A full evaluation of adverse and potentially disproportionate impacts to minority and low-income populations requires detailed design information, such as specific alignment and a construction footprint, than is available during the Tier 1 analysis. Therefore, a comprehensive impact evaluation to identify and address disproportionate benefits and burdens in the various communities along the corridor, as well as their demographic character, will be necessary during Tier 2 analyses. Requirements for a full Environmental Justice analysis are described in more detail in Section 3.5.2 (Tier 2 Analyses).

3.5.2.3 Limited English Proficiency

In compliance with EO 13166, census data were consulted to identify to determine which languages are spoken in the Study Area. The American Community Survey gathers data on English proficiency by household. Persons with LEP are defined as individuals for whom English is not their primary language and who have a limited ability to read, write, speak, or understand

English. It includes people who reported to the US Census Bureau that they speak English less than very well, not well, or not at all (US Census Bureau 2015b).

3.5.3 Affected Environment

3.5.3.1 Community Characteristics and Resources

Community cohesion is generated and maintained by local residents and businesses. Cohesion can be increased through the creation of facilities that bring residents together such as a school, park, or social neighborhood businesses like a coffee shop. Cohesion can be lost when longtime residents or businesses move away or are displaced, or if a physical barrier is built, such as a new road or noise wall that divides a community.

Some communities may already be intersected by an existing roadway and may have already experienced a change in their community cohesion due to that existing roadway. The following descriptions are used to clarify how existing conditions in a community may relate to the potential for future community cohesion impacts within the Corridor Options of the Build Corridor Alternatives:

- **Corridor Option follows an existing major roadway:** This condition identifies communities that are already divided by an existing interstate or state highway. Due to the existing roadway and the characteristics of that roadway, a new barrier would not be created so new community cohesion impacts caused by a Build Corridor Alternative would be limited. However, other kinds of cohesion impacts could be caused by new roadway construction that displaces existing residences or businesses. These effects would be caused by the future construction footprint, which cannot be determined in detail at this time.
- **Corridor Option follows an existing regional or local roadway:** This category captures communities divided or bordered by all other roadway types such as local roads, county roads or two-lane state highways. Local community characteristics may be impacted to a greater degree by the barrier created by the Build Corridor Alternatives and there is potential for minimal to moderate impacts to community cohesion from displacement of residences and businesses.
- **Corridor Option does not follow an existing roadway:** In some locations, the Build Corridor Alternatives would create new transportation infrastructure. Impacts on adjacent communities would be based on whether residential areas are divided by the roadway or if the proximity to the new roadway creates neighborhood impacts such as displacement.

Incorporated communities within the South Section consist of the cities of Nogales, Tucson, and Eloy, and the towns of Sahuarita and Marana. Portions of the City of Eloy also are located within the Central Section, but most of the city lies within the South Section. As shown in **Figure 3.5-1** (Communities and Community Facilities – South Section Corridor Options), there are 28 CDPs within this area, which includes both incorporated and unincorporated areas. The five largest unincorporated communities (in land area) intersecting Build Corridor Alternatives in the South Section are Picture Rocks, Rio Rico, Red Rock, Three Points, and Green Valley.

The Avra Valley area is referred to in several sections throughout this Draft Tier 1 EIS. **Figure 3.5-1** (Communities and Community Facilities – South Section Corridor Options) also shows the extents of the valley landform referred to as Avra Valley, which extends as far north as the Samamiego Hills near Marana. The Avra Valley CDP, also shown in **Figure 3.5-1** Communities and Community Facilities – South Section Corridor Options) and referenced

throughout this section of the Draft Tier 1 EIS is a smaller geographic area with boundaries defined by the US Census Bureau for statistical purposes only.

Tribal communities in the South Section consist of the Tohono O'odham Nation and the Pascua Yaqui Tribe. Tohono O'odham Nation Tribal land within the Study Area includes both the San Xavier District and the Schuk Toak District. Resources or places of traditional cultural importance to tribal communities are located beyond their reservation boundaries. For example, the National Park Service (NPS) has identified ethnographic resources of importance to Tribes within the Saguaro National Monument, and FHWA and ADOT consultations with tribes identified other traditional cultural properties (see Section 3.7.3.3).

The downtown Tucson area is home to a number of historic neighborhoods. More detail on the history of these neighborhoods and specific historic resources within them can be found in Section 3.7, Archaeological, Historical, Architectural, and Cultural Resources. This analysis focuses on the neighborhoods that are located along I-10 and abut Option B. East of I-10 is Barrio El Membrillo, Barrio Santa Rosa, Barrio Viejo, El Presidio, and Barrio Anita. West of I-10 is Barrio Kroeger Lane, Menlo Park, and Barrio Hollywood (Downtown Tucson Partnership 2017).

Table 3.5-1 (Communities Intersected by the Build Corridor Alternatives in the South Section) identifies communities that are intersected by the Corridor Options in the South Section. Because Options A, B, and G follow I-19 and I-10, the communities along these Options are already bounded and divided by an existing interstate facility. The greatest concentration of community facilities is located near Options A and B along I-10 in the urban Tucson area. Public facilities along new Corridor Options C, D, and F are sparse due to the rural nature of those areas.

Incorporated communities within the Central Section consist of the cities of Casa Grande, Goodyear, Gila Bend, and Buckeye. As shown in **Figure 3.5-2** (Communities and Community Facilities – Central Section Corridor Option), there are three additional CDPs within the Central Section representing unincorporated areas: Arlington, Stanfield, and Tonopah. There are no Tribal communities located within the Central Section of the Study Area, although the Gila River Indian Community, Ak-Chin Indian Community, and Tohono O'odham Nation are located in close proximity to the Study Area, and resources or places of traditional cultural importance to those tribal communities are located beyond their reservation boundaries.

Table 3.5-2 (CDPs Intersected by the Build Corridor Alternatives in the Central Section) identifies communities and CDPs that are intersected by the Corridor Options in the Central Section. Because Options A, B, and G follow I-19 and I-10, the communities along these Options are already bordered or divided by an existing interstate facility.

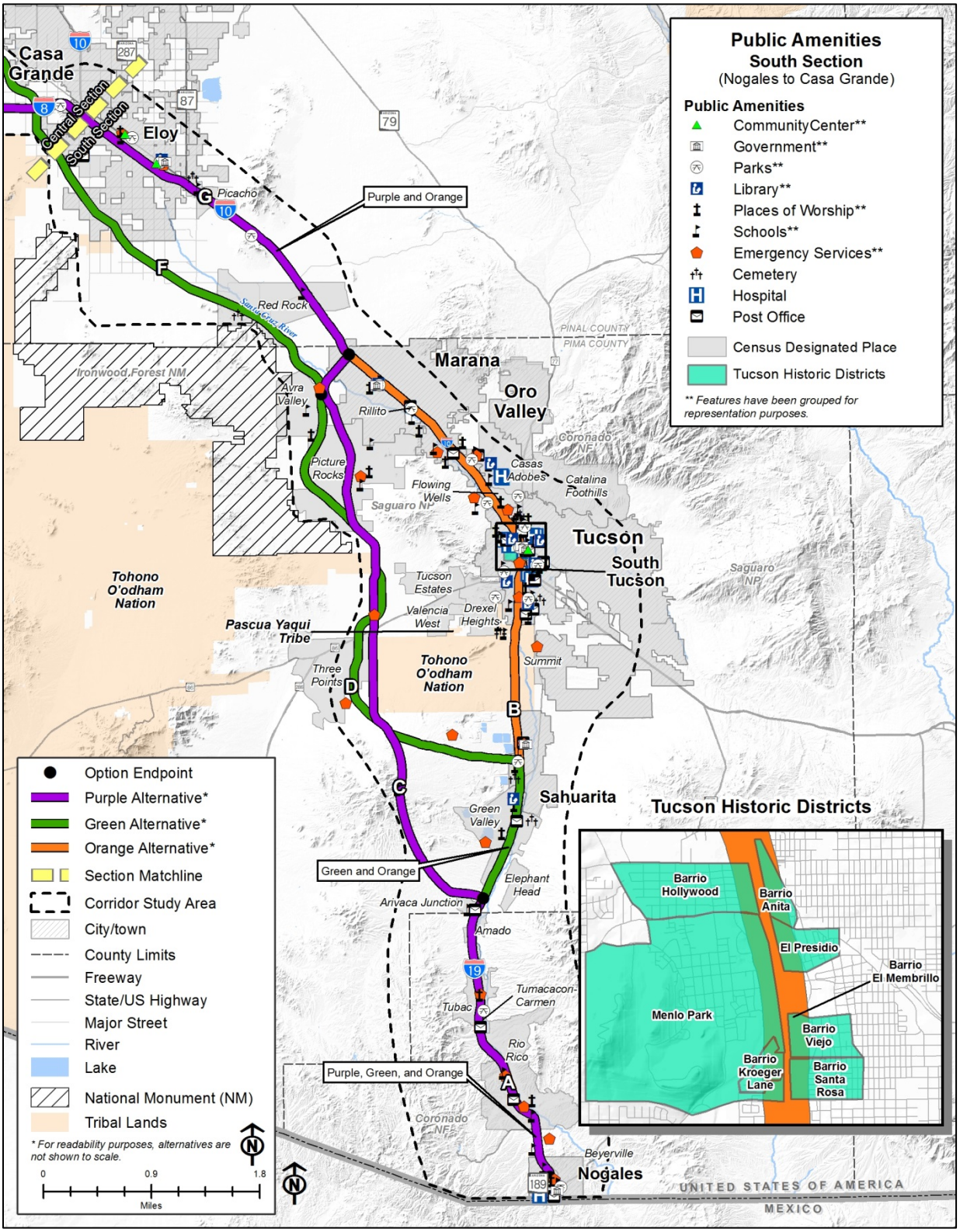


Figure 3.5-1 Communities and Community Facilities – South Section Corridor Options

Table 3.5-1 Communities Intersected by the Build Corridor Alternatives in the South Section

Option	Community or CDP	Build Corridor Alternative Description
A	Nogales City, Rio Rico CDP, Tumacacori-Carmen CDP, Tubac CDP, Amado CDP	Corridor follows existing roadway
A/C	Arivaca Junction CDP	Corridor follows existing roadway/does not follow existing roadway
B	Green Valley CDP, Sahuarita Town, South Tucson City, South Tucson City, Tucson City, Flowing Wells CDP, Casas Adobes CDP, Rillito CDP	Corridor follows existing roadway
B, G	Marana Town	Corridor follows existing roadway
C	Three Points CDP, Picture Rocks CDP	Corridor does not follow a roadway
C/G	Marana Town	Corridor does not follow a roadway
G	Red Rock CDP, Picacho CDP, Eloy City, Casa Grande City	Corridor follows existing roadway
D	Sahuarita Town, Three Points CDP, Picture Rocks CDP	Corridor does not follow a roadway
F	Avra Valley CDP, Red Rock CDP, Eloy City, Casa Grande City	Corridor does not follow a roadway
G	Red Rock CDP, Picacho CDP, Eloy City, Casa Grande City	Corridor follows existing roadway

SOURCE: US Census Bureau 2017.

Table 3.5-2 CDPs Intersected by the Build Corridor Alternatives in the Central Section

Option	Community or CDP	Build Corridor Alternative Description
I1, I2	Casa Grande City	Corridor follows existing roadway
K, Q1	Gila Bend	Corridor follows existing roadway
L, N	Goodyear City	Corridor does not follow a roadway
N, R	Buckeye City	Corridor does not follow a roadway
R	Arlington CDP	Corridor does not follow a roadway
L, M	Goodyear City	Corridor does not follow a roadway
M, Q2, R	Buckeye City	Corridor does not follow a roadway
Q1, Q2, Q3	Buckeye City	Corridor follows existing roadway

SOURCE: US Census Bureau 2017.

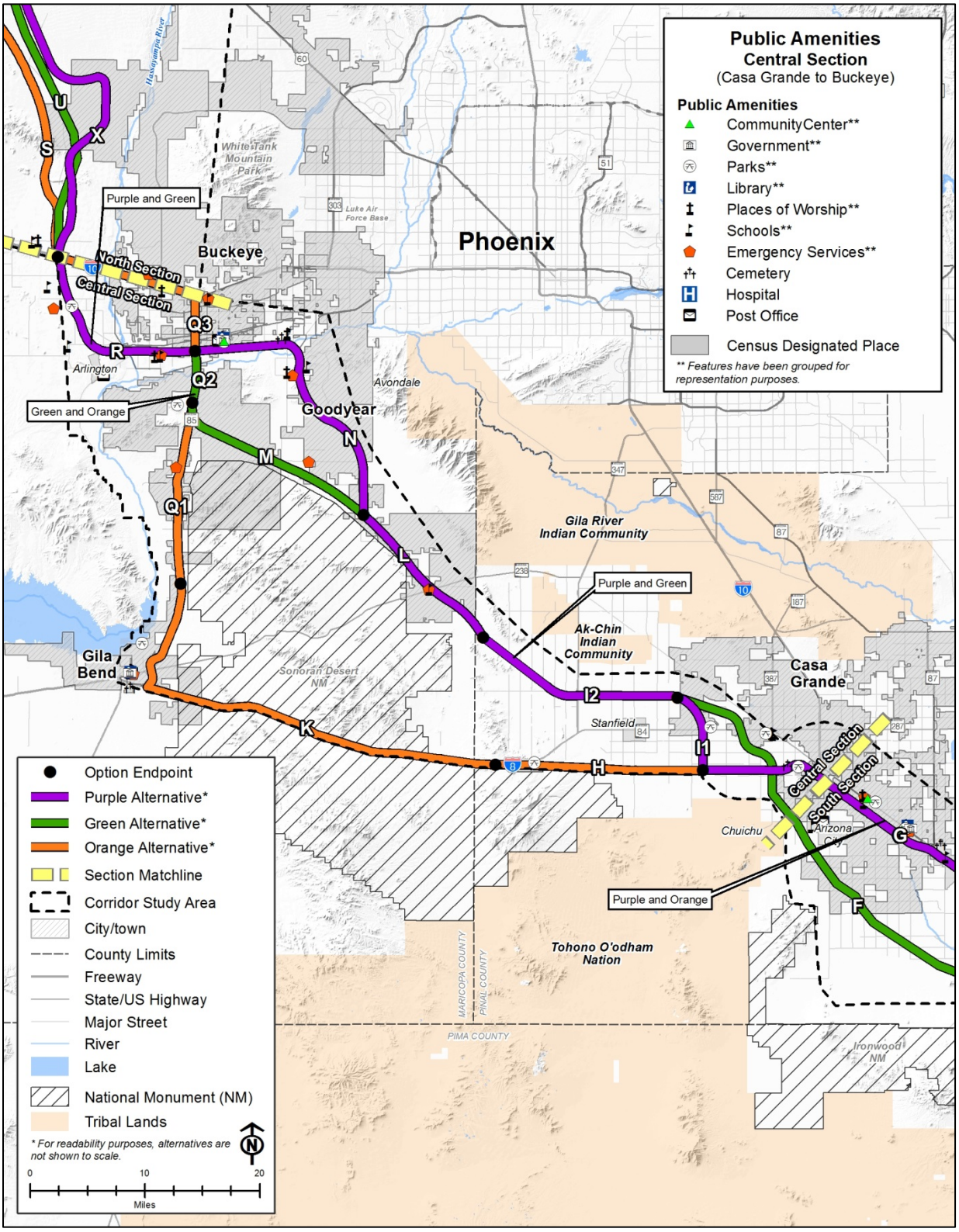


Figure 3.5-2 Communities and Community Facilities – Central Section Corridor Options

Community facilities located within the Central Section are concentrated along existing transportation facilities included in Options G, H, K, and Q. Community resources along the new Corridor Options F, I1, I2, M, N, and R are more sparse. Throughout the Central Section these resources occur at a lower density than in the South Section. There are no clustered concentrations of community facilities along the new Corridor Options H, I1, I2, and R, or along State Route (SR) 85 (Options Q1, Q2, and Q3).

There is a single clustered concentration of community facilities in Gila Bend near the intersection of Options K and Q1 consisting of several schools, emergency medical services, places of worship, a library, a cemetery, the town hall, and a post office. These facilities are not within the 2,000-foot-wide Project Area, but they are within 2 miles.

Along Option N, there are two clusters of community facilities west of Goodyear near Buckeye. The facilities include a school, an emergency medical services station, a place of worship, a sports center, a library, a park, and a post office. These facilities are located outside of the 2,000-foot-wide Project Area, but within one mile of the perimeter.

As shown in **Figure 3.5-3** (Communities and Community Facilities – North Section Corridor Options), incorporated communities within the North Section include the City of Buckeye, City of Surprise, and the Town of Wickenburg. A small portion of the Congress CDP extends into the Study Area and is intersected by the Build Corridor Alternatives. There are no Tribal communities located within the North Section of the Study Area, but resources or places of traditional cultural importance to tribal communities are located beyond their reservation boundaries.

Table 3.5-3 (Communities Intersected by the Build Corridor Alternatives in the North Section) identifies communities and CDPs that are intersected by the Corridor Options in the North Section. All three Build Corridor Alternatives in the North Section represent new transportation facilities north of I-10.

Table 3.5-3 Communities Intersected by the Build Corridor Alternatives in the North Section

Option	Community or CDP	Alignment Description
X	Congress CDP	Corridor follows existing roadway
U	Buckeye City	Corridor does not follow a roadway
U	Congress CDP	Corridor follows existing roadway
S	Buckeye City	Corridor does not follow a roadway
S	Congress CDP	Corridor follows existing roadway

SOURCE: US Census Bureau 2017.

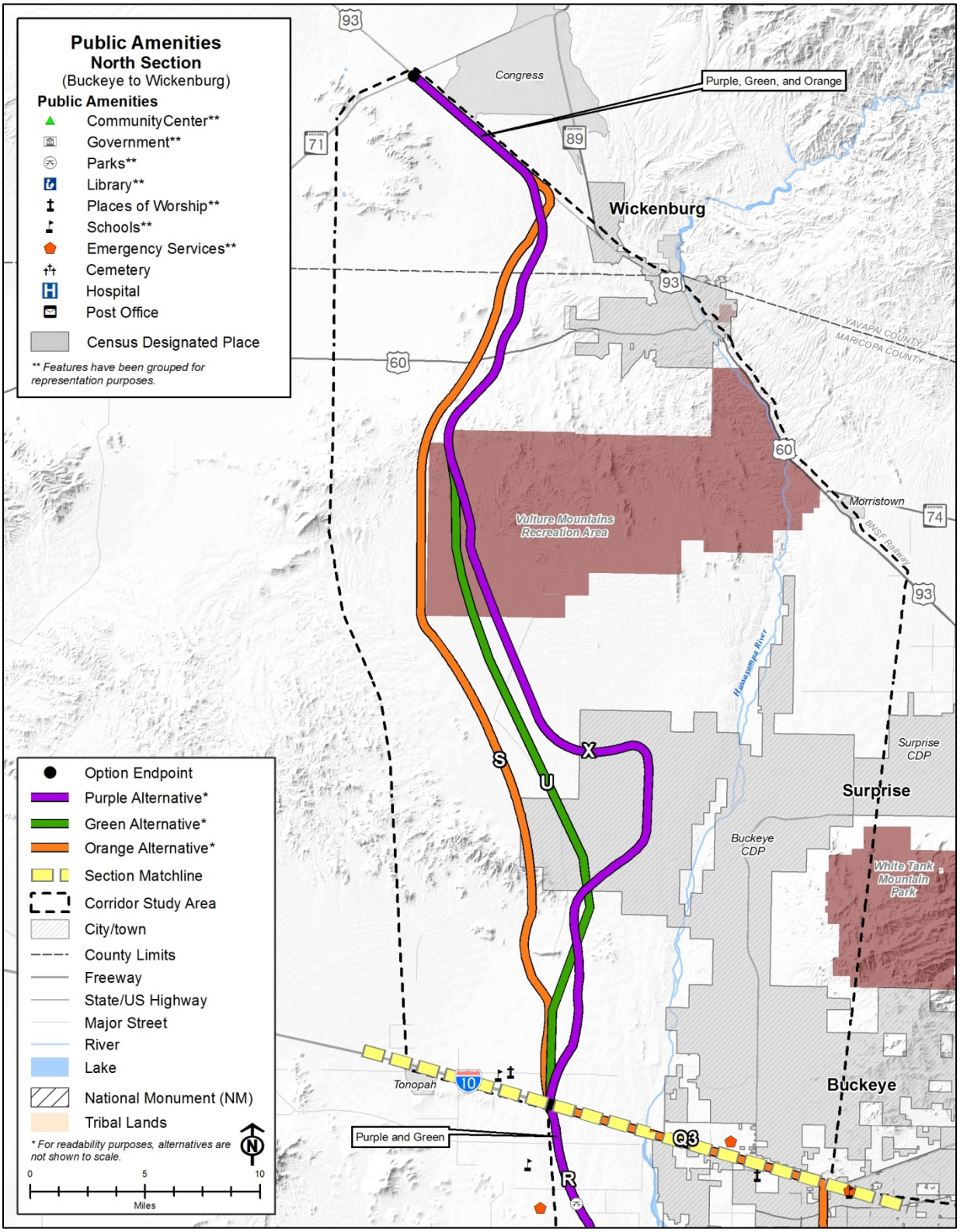


Figure 3.5-3 Communities and Community Facilities – North Section Corridor Options

There is one concentrated cluster of public amenities in this area, located immediately north of I-10 and approximately 1 to 2 miles west of the I-10 intersection of Options S, U, and X. These amenities are located outside of the 2,000-foot-wide Project Area of Options S, U, and X; there are no other public amenities located within 2 miles of these Options.

3.5.3.2 Title VI

Table 3.5-4 (Race and Ethnicity in the Study Area, County and Statewide Averages) is a comprehensive table listing demographic data on the race and ethnicity of the population within the Study Area. The demographics for the CDPs can be compared to county and statewide averages listed in the last six rows of the table. A comprehensive table of demographic data for the Study Area is provided in **Appendix E5**, Demographic Data to Support Analysis of Environmental Justice.

Compared to the statewide average, many of the communities in the South Section have high percentages of Hispanic or Latino individuals in the population. The largest racial group in many of these communities identify as 'some other race.' The San Xavier and Shuck Toak districts of the Tohono O'odham Nation both have communities containing high percentage of individuals that identify as American Indian or Alaskan Native. The San Xavier District also contains a relatively high concentration of individuals that identify as 'some other race.'

For minority individuals of Non-Hispanic or Latino races, there are high concentrations of Black and African Americans in Rillito, Eloy, and Coolidge City. The population in Eloy is diverse, with relatively high percentages of Black or African Americans and individuals that identify as 'some other race.' In nearby Casa Grande, there is a high percentage of minority individuals and Hispanic or Latinos in the population as well as pockets of other racial groups (Black or African American, American Indian or Alaska Native, some other race, and two or more races).

In the Central Section the minority population in Gila Bend includes a high percentage of Hispanic or Latino individuals as well as a pocket of American Indian or Alaskan Native, some other race, and two or more races. In the North Section the largest racial groups comprising the minority population in Buckeye are Black or African American, some other race, and two or more races.

3.5.3.3 Environmental Justice

Demographics showing concentrations of minority individuals within the Study Area are illustrated in **Figure 3.5-4** (Minority Populations – South Section)**, Figure 3.5-5** (Minority Populations – Central Section)**,** and **Figure 3.5-6** (Minority Populations – North Section). Concentrations of low-income individuals within the Study Area are illustrated in **Figure 3.5-7** (Low-Income Populations – South Section), **Figure 3.5-8** (Low-Income Populations – Central Section), and **Figure 3.5-9** (Low-Income Populations – North Section). The demographics illustrated in these figures can be compared to the county and statewide averages shown in **Table 3.5-4** (Race and Ethnicity in the Study Area, County and Statewide Averages). A comprehensive table of demographic data for the Study Area is provided in **Appendix E5**, Demographic Data to Support Analysis of Environmental Justice.

Much of the land within the Study Area is vacant or undeveloped. The US Census Bureau defined the geographic limits of the CDP's shown in **Figures 3.5-4** through **3.5-9** based upon concentrations of settled populations. The highest population densities in the Study Area occur within the CDPs, while the areas outside of the CDPs are more sparsely populated or vacant.

Table 3.5-4 Race and Ethnicity in the Study Area, County and Statewide Averages

Geography	Total Population	White, Non-Hispanic or Latino	Hispanic or Latino	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Two or More Races	Total Minority
Amado CDP	295	144	143	2	10	2	0	67	16	151
	100%	48.8%	48.5%	0.6%	3.4%	0.6%	0.0%	22.7%	5.4%	51.2%
Arivaca Junction CDP	1,090	326	737	1	24	0	1	238	41	764
	100%	29.9%	67.6%	0.1%	2.2%	0.0%	0.1%	21.8%	3.8%	70.1%
Arizona City CDP	10,475	6,016	3583	436	364	56	22	1,406	476	4,459
	100%	57.4%	34.2%	4.2%	3.5%	0.5%	0.2%	13.5%	4.6%	42.6%
Arlington CDP	194	125	58	1	3	0	0	47	9	69
	100%	64.4%	29.9%	0.5%	1.5%	0.0%	0.0%	24.2%	4.6%	35.6%
Avra Valley CDP	6,050	4,346	1,382	114	141	21	8	553	213	1,704
	100%	71.8%	22.8%	1.9%	2.3%	0.3%	0.2%	9.1%	3.5%	28.2%
Beyerville CDP	177	18	159	0	1	0	0	25	0	159
	100%	10.2%	89.9%	0.0%	0.6%	0.0%	0.0%	14.1%	0.0%	89.8%
Buckeye Town CDP	50,876	25,375	19489	3,618	909	913	100	9,794	2,118	25,501
	100	49.9%	38.3%	7.1%	1.8%	1.8%	0.2%	19.3%	4.2%	50.1%
Casa Grande CDP	48,571	24,226	18,932	2,245	2,232	875	87	7,953	2,492	24,345
	100%	49.9%	39.0%	4.6%	4.6%	1.8%	0.2%	16.3%	5.2%	50.1%
Casas Adobes CDP	66,795	47,575	13,956	1,406	637	2,155	78	3,713	2,363	19,220
	100%	71.2%	20.9%	2.1%	1.0%	3.2%	0.1%	5.5%	3.5%	28.8%
Catalina Foothills CDP	50,796	41,415	5,076	694	213	2,636	31	970	1,105	9,381
	100%	81.5%	10.0%	1.4%	0.4%	5.2%	0.1%	1.9%	2.2%	18.5%
Congress CDP	1,975	1,692	225	10	21	5	3	60	37	283
	100%	85.7%	11.4%	0.6%	1.1%	0.3%	0.2%	3.0%	1.9%	14.3%

Table 3.5-4 Race and Ethnicity in the Study Area, County and Statewide Averages (Continued)

Geography	Total Population	White, Non-Hispanic or Latino	Hispanic or Latino	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Two or More Races	Total Minority
Coolidge City CDP	11,825	5,153	4,962	928	670	115	13	2,095	586	6,672
	100%	43.6%	42.0%	7.8%	5.7%	1.0%	0.1%	17.7%	4.9%	56.4%
Drexel Heights CDP	27,749	6,271	19586	691	1,470	201	20	7,918	1,188	21,478
	100%	22.6%	70.6%	2.5%	5.3%	0.7%	0.0%	28.5%	4.3%	77.4%
Elephant Head CDP	612	421	163	0	10	9	0	40	15	191
	100%	68.8%	26.6%	0.0%	1.7%	1.5%	0.0%	6.5%	2.4%	31.2%
Eloy CDP	16,631	3,144	9648	1,685	571	755	958	5,302	504	13,487
	100%	18.9%	58.0%	10.1%	3.5%	4.5%	5.8%	31.9%	3.0%	81.1%
Flowing Wells CDP	16,419	9,564	5,953	287	335	200	17	2,219	607	6,855
	100%	58.2%	36.3%	1.8%	2.1%	1.3%	0.1%	13.5%	3.7%	41.8%
Gila Bend Town CDP	1,922	504	1257	32	121	11	0	605	75	1,418
	100%	26.2%	65.4%	1.7%	6.3%	0.6%	0.0%	31.5%	3.9%	73.8%
Goodyear City CDP	65,275	38,064	18,136	4,375	848	2,830	110	7,625	2,564	27,211
	100%	58.3%	27.8%	6.7%	1.3%	4.4%	0.1%	11.7%	4.0%	41.7%
Green Valley CDP	21,391	19,953	1,049	92	66	149	9	218	147	1,438
	100%	93.3%	4.9%	0.4%	0.3%	0.7%	0.0%	1.0%	0.7%	6.7%
Littletown CDP	873	220	607	15	26	11	0	225	37	653
	100%	25.2%	69.5%	1.7%	2.9%	1.3%	0.0%	25.8%	4.3%	74.8%
Marana Town CDP	34,961	24,050	7,730	874	433	1,322	47	2,338	1,293	10,911
	100%	68.8%	22.1%	2.5%	1.2%	3.8%	0.1%	6.7%	3.7%	31.2%
Morristown CDP	227	214	11	0	1	0	0	5	2	13
	100%	94.3%	4.8%	0.0%	0.4%	0.0%	0.0%	2.2%	0.8%	5.7%
Nelson CDP	259	178	70	4	4	3	0	35	1	81
	100%	68.7%	27.0%	1.5%	1.6%	1.2%	0.0%	13.5%	0.4%	31.3%

Table 3.5-4 Race and Ethnicity in the Study Area, County and Statewide Averages (Continued)

Geography	Total Population	White, Non-Hispanic or Latino	Hispanic or Latino	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Two or More Races	Total Minority
Nogales City CDP	20,837	803	19,793	75	140	126	4	5,060	499	20,034
	100%	3.9%	95.0%	0.3%	0.6%	0.6%	0.0%	24.2%	2.3%	96.1%
Oro Valley Town CDP	41,011	33,605	4,731	617	179	1,284	54	1,070	982	7,406
	100%	81.9%	11.5%	1.5%	0.4%	3.2%	0.1%	2.6%	2.4%	18.1%
Picacho CDP	471	159	294	6	12	0	0	139	33	312
	100%	33.8%	62.4%	1.2%	2.6%	0.0%	0.0%	29.5%	7.0%	66.2%
Picture Rocks CDP	9,563	7,580	1,558	72	138	44	8	472	288	1,983
	100%	79.3%	16.3%	0.7%	1.4%	0.5%	0.1%	4.9%	3.0%	20.7%
Red Rock CDP	2,169	1,437	603	42	35	22	1	186	126	732
	100%	66.3%	27.8%	1.9%	1.7%	1.0%	0.0%	8.6%	5.8%	33.7%
Rillito CDP	97	14	43	37	2	0	0	26	5	83
	100%	14.4%	44.3%	38%	2%	0%	0%	27%	5%	86%
Rio Rico CDP	18,962	2,578	16,179	75	121	94	10	4,846	344	16,384
	100%	13.6%	85.3%	0.4%	0.7%	0.5%	0.0%	25.5%	1.8%	86.4%
Sahuarita Town CDP	25,259	15,249	8,077	742	334	499	31	2,309	1,064	10,010
	100%	60.4%	32.0%	2.9%	1.3%	1.9%	0.1%	9.2%	4.2%	39.6%
South Tucson City CDP	5,652	578	4,435	171	605	44	6	2,043	224	5,074
	100%	10.2%	78.5%	3.0%	10.7%	0.8%	0.2%	36.1%	3.9%	89.8%
Stanfield CDP	740	151	489	26	64	12	0	352	24	589
	100%	20.4%	66.1%	3.5%	8.6%	1.7%	0.0%	47.6%	3.2%	79.6%
Summit CDP	5,372	898	4,313	32	98	24	1	1,593	174	4,474
	100%	16.7%	80.3%	0.6%	1.8%	0.4%	0.0%	29.6%	3.2%	83.3%
Surprise City CDP	117,517	83,677	21,724	6,018	801	3,020	233	8,212	4,486	33,840
	100%	71.2%	18.5%	5.1%	0.7%	2.6%	0.2%	7.0%	3.8%	28.8%

Table 3.5-4 Race and Ethnicity in the Study Area, County and Statewide Averages (Continued)

Geography	Total Population	White, Non-Hispanic or Latino	Hispanic or Latino	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Two or More Races	Total Minority
Three Points CDP	5,581	3,122	2,120	52	212	30	13	1,003	165	2,459
	100%	55.9%	38.0%	0.9%	3.8%	0.5%	0.2%	17.9%	3.0%	44.1%
Tohono O'odham Nation, Schuk Toak District (CT 9408)	4,462	40	227	3	4321	16	0	16	56	4422
	100%	0.9%	5.1%	0.1%	96.9%	0.3%	0.0%	0.4%	1.2%	99.10%
Tohono O'odham Nation, San Xavier District (CT 9409)	1,885	231	469	18	1184	6	3	374	30	1654
	100%	12.30%	24.9%	60.4%	62.8%	0.3%	1.1%	19.8%	1.6%	87.7%
Tonopah CDP	60	44	14	0	1	2	0	5	0	16
	100%	73.3%	23.3%	0.0%	1.7%	3.3%	0.0%	8.3%	0.0%	26.7%
Tubac CDP	1,191	922	246	5	7	7	0	77	13	269
	100%	77.4%	20.7%	0.4%	0.6%	0.6%	0.0%	6.5%	1.1%	22.6%
Tucson City CDP	520,116	245,323	216,308	26,000	14,154	14,920	1,147	79,239	22,007	274,793
	100%	47.2%	41.6%	5.0%	2.7%	2.8%	0.2%	15.3%	4.2%	52.8%
Tucson Estates CDP	12,192	7,643	3,948	193	250	130	14	1507	346	4549
	100%	62.7%	32.4%	1.6%	2.1%	1.1%	0.1%	12.4%	2.8%	37.3%
Tumacacori-Carmen	393	172	207	3	9	1	0	91	7	221
	100%	43.8%	52.7%	0.8%	2.3%	0.3%	0.0%	23.2%	1.8%	56.2%
Valencia West	9,355	2,527	6,089	305	389	146	20	2,453	371	6,828
	100%	27.0%	65.1%	3.2%	4.2%	1.6%	0.2%	26.2%	4.0%	73.0%

Table 3.5-4 Race and Ethnicity in the Study Area, County and Statewide Averages (Continued)

Geography	Total Population	White, Non-Hispanic or Latino	Hispanic or Latino	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian or Other Pacific Islander	Some Other Race	Two or More Races	Total Minority
Wickenburg	6,363	5,324	854	15	88	35	2	371	96	1,039
	100%	83.7%	13.4%	0%	1%	0.5%	0.0%	5.9%	1.5%	16.3%
Maricopa County	3,817,117	2,240,055	1,128,741	190,519	78,329	132,225	7,790	489,705	131,768	1,577,062
	100.0%	58.7%	29.6%	4.9%	2.1%	3.5%	0.2%	12.8%	3.5%	41.3%
Pima County	980,263	541,700	338802	34,674	32,605	25,731	1,624	120,639	36,239	438,563
	100%	55.3%	34.6%	3.6%	3.3%	2.6%	0.1%	12.3%	3.7%	44.7%
Pinal County	375,770	220,486	106,977	17,215	20,949	6,492	1,565	43,213	14,323	155,284
	100%	58.7%	28.5%	4.6%	5.5%	1.7%	0.4%	11.5%	3.8%	41.3%
Santa Cruz County	47,420	7,564	39273	179	328	255	15	10,855	953	39,856
	100%	16.0%	82.8%	0.4%	0.6%	0.5%	0.0%	22.9%	2.0%	84.0%
Yavapai County	211,033	172,968	28,728	1,267	3,549	1,785	213	10,346	5,358	38,065
	100%	82.0%	13.6%	0.6%	1.7%	0.8%	0.1%	4.9%	2.5%	18.0%
Arizona	6,392,017	3,695,647	1,895,149	259,008	296,529	176,695	12,648	761,716	218,300	2,696,370
	100%	57.8%	29.6%	4.0%	4.6%	2.8%	0.2%	11.9%	3.4%	42.2%

SOURCE: US Census Bureau 2010.

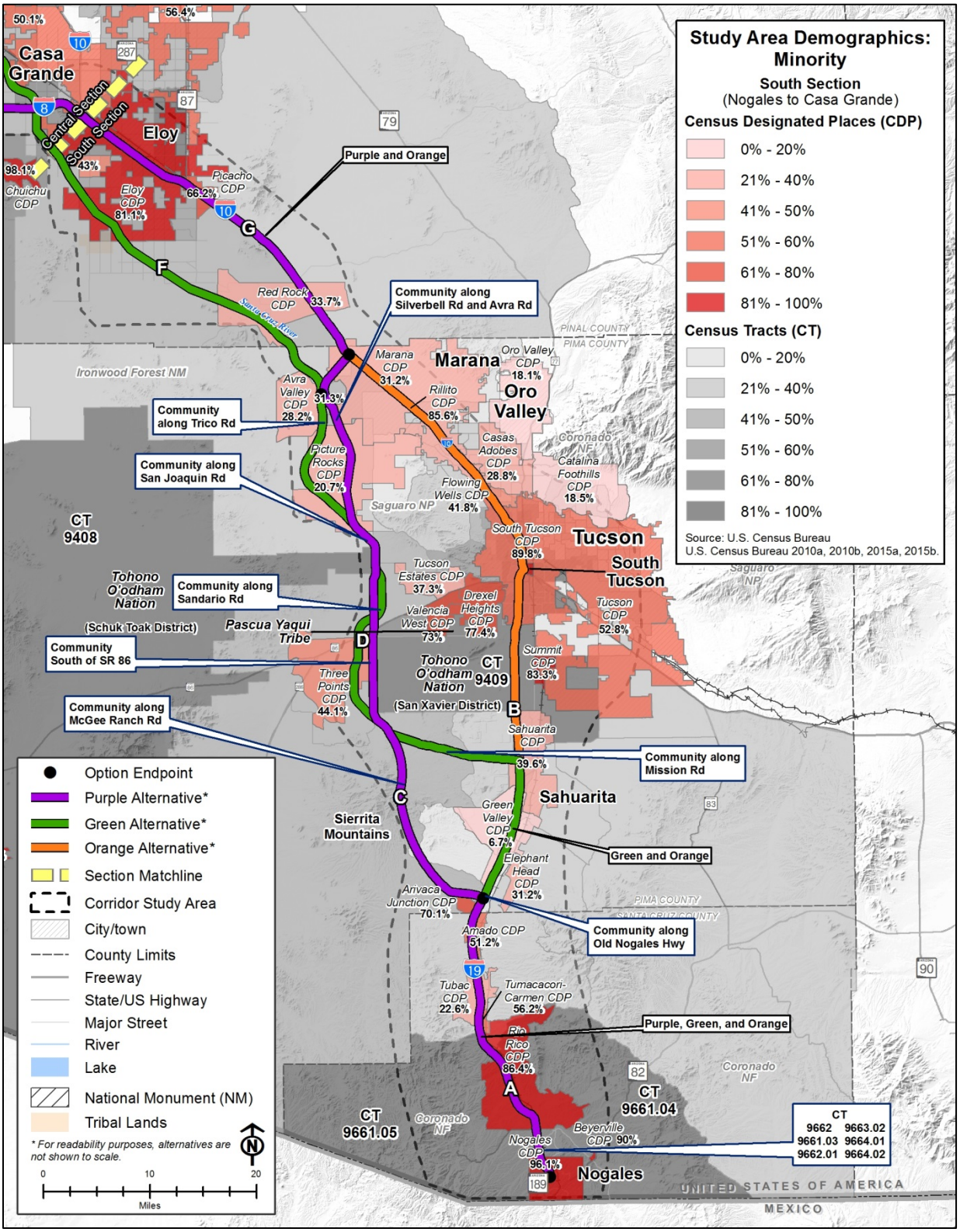


Figure 3.5-4 Minority Populations – South Section

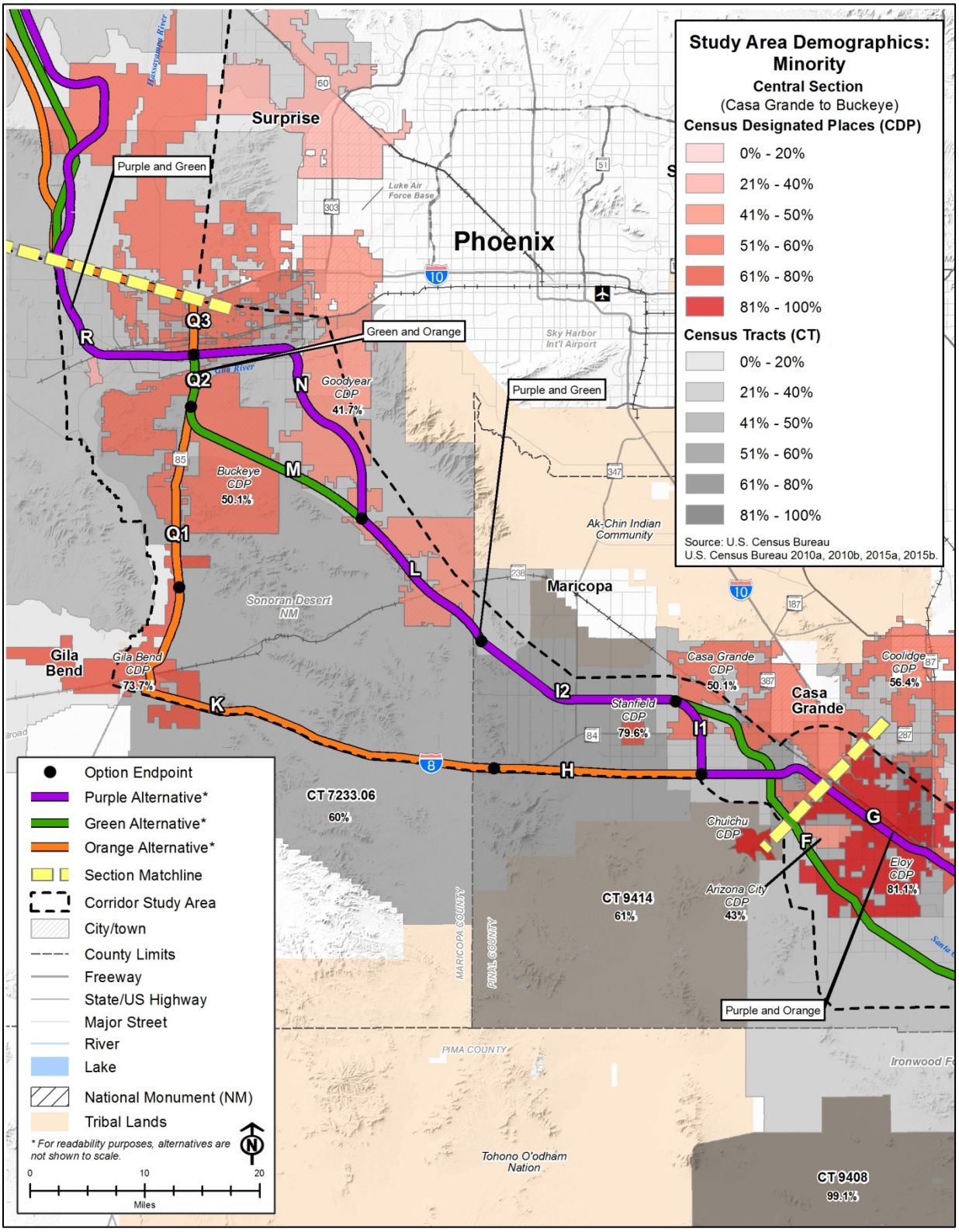


Figure 3.5-5 Minority Populations – Central Section

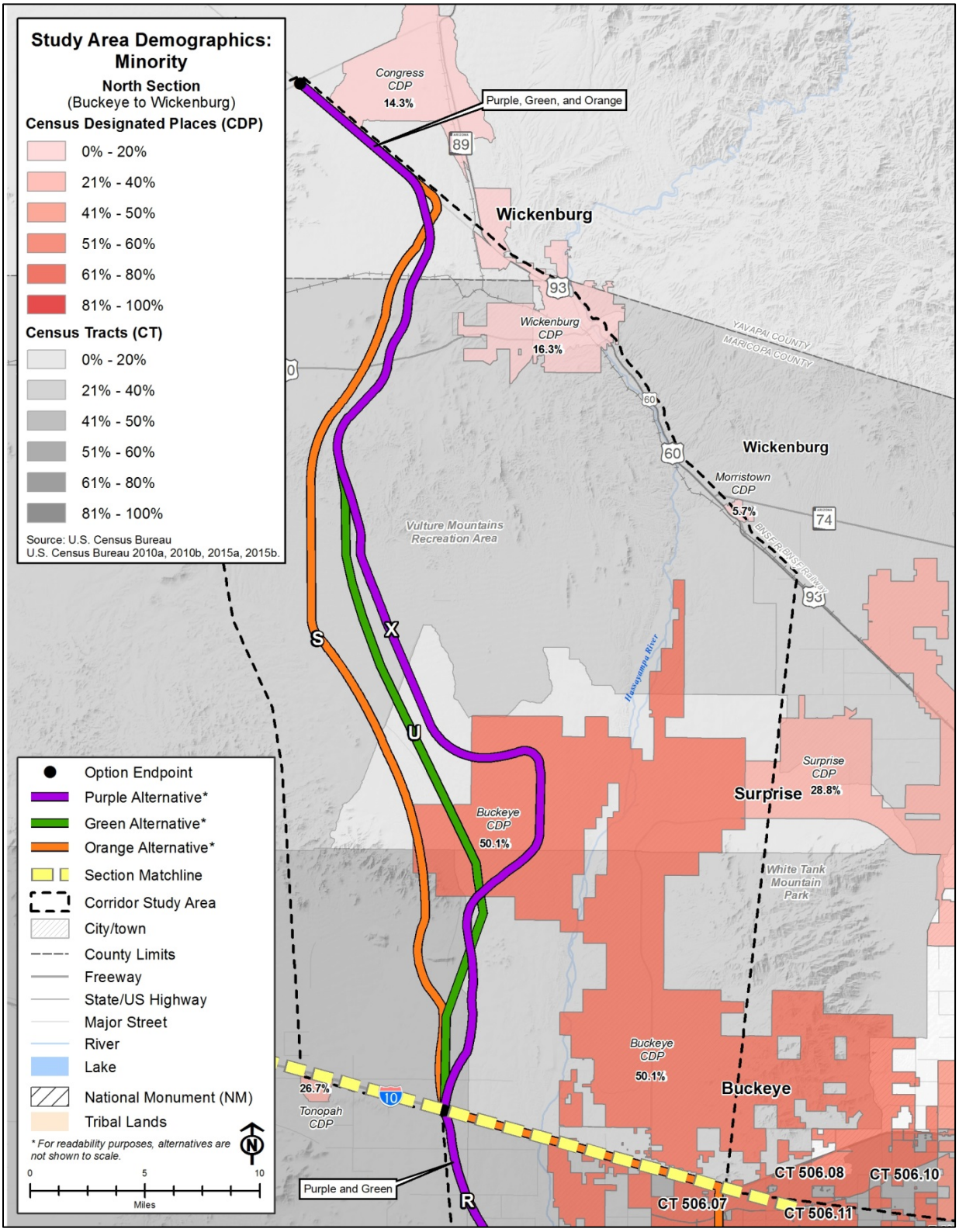


Figure 3.5-6 Minority Populations – North Section

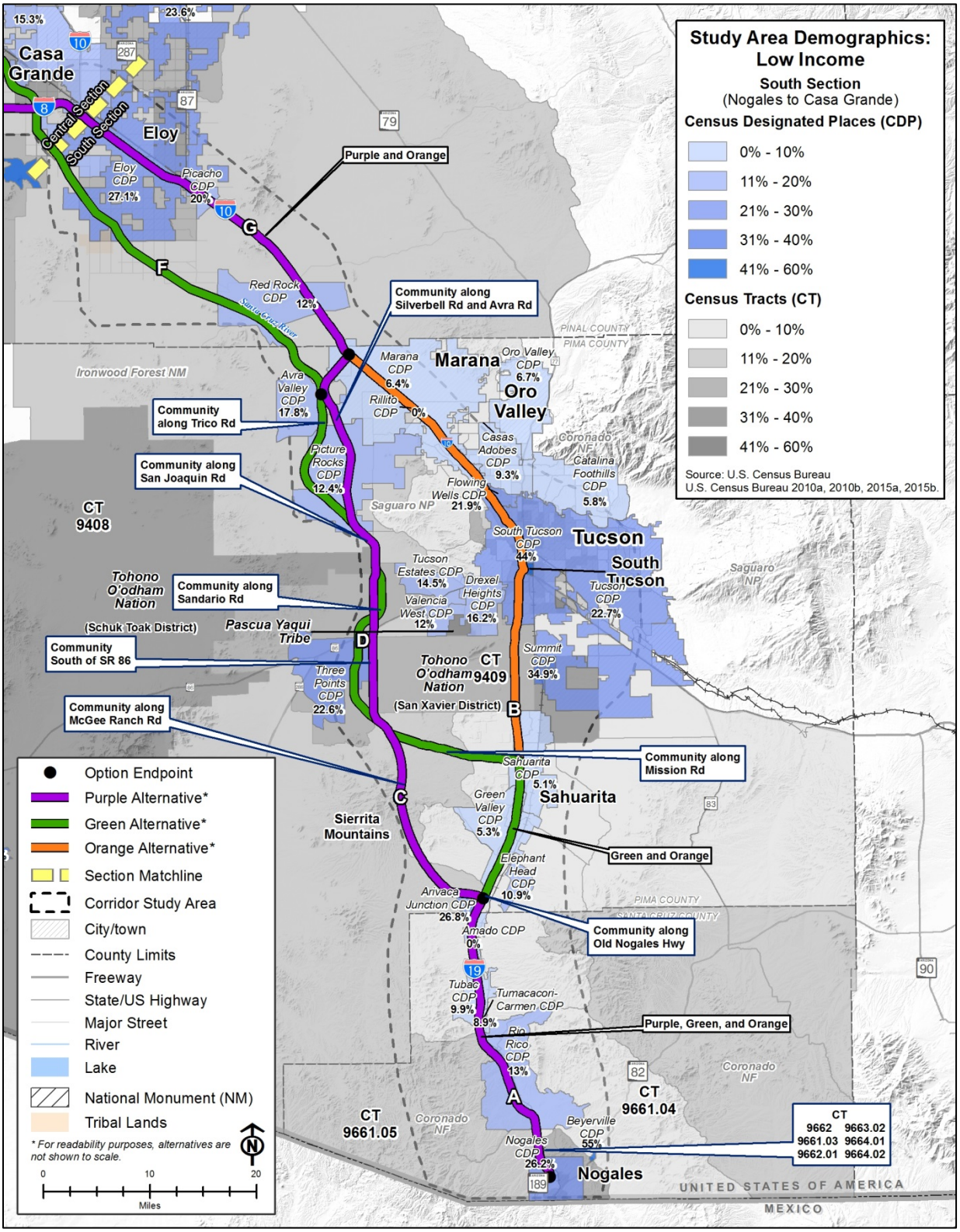


Figure 3.5-7 Low-Income Populations – South Section

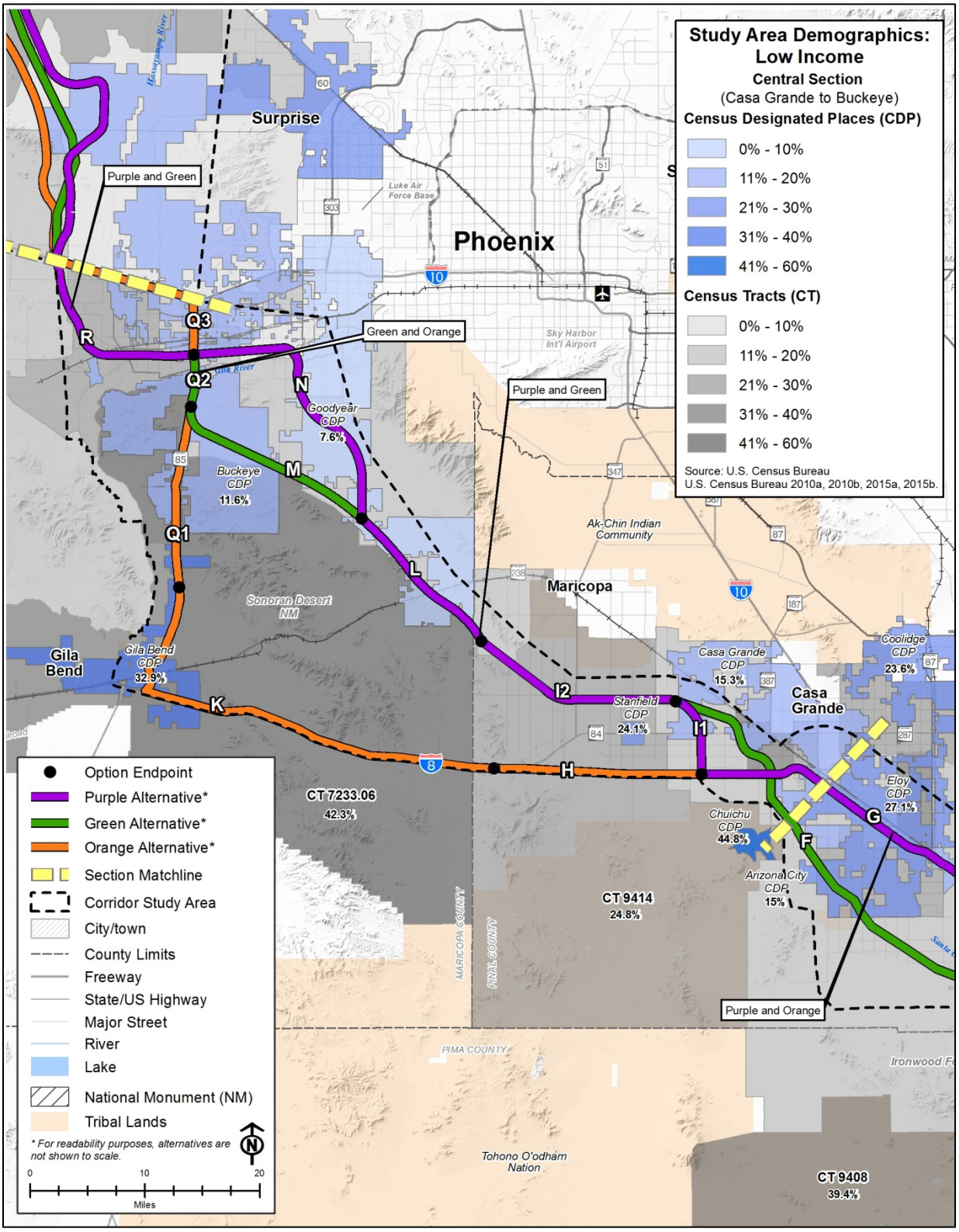


Figure 3.5-8 Low-Income Populations – Central Section

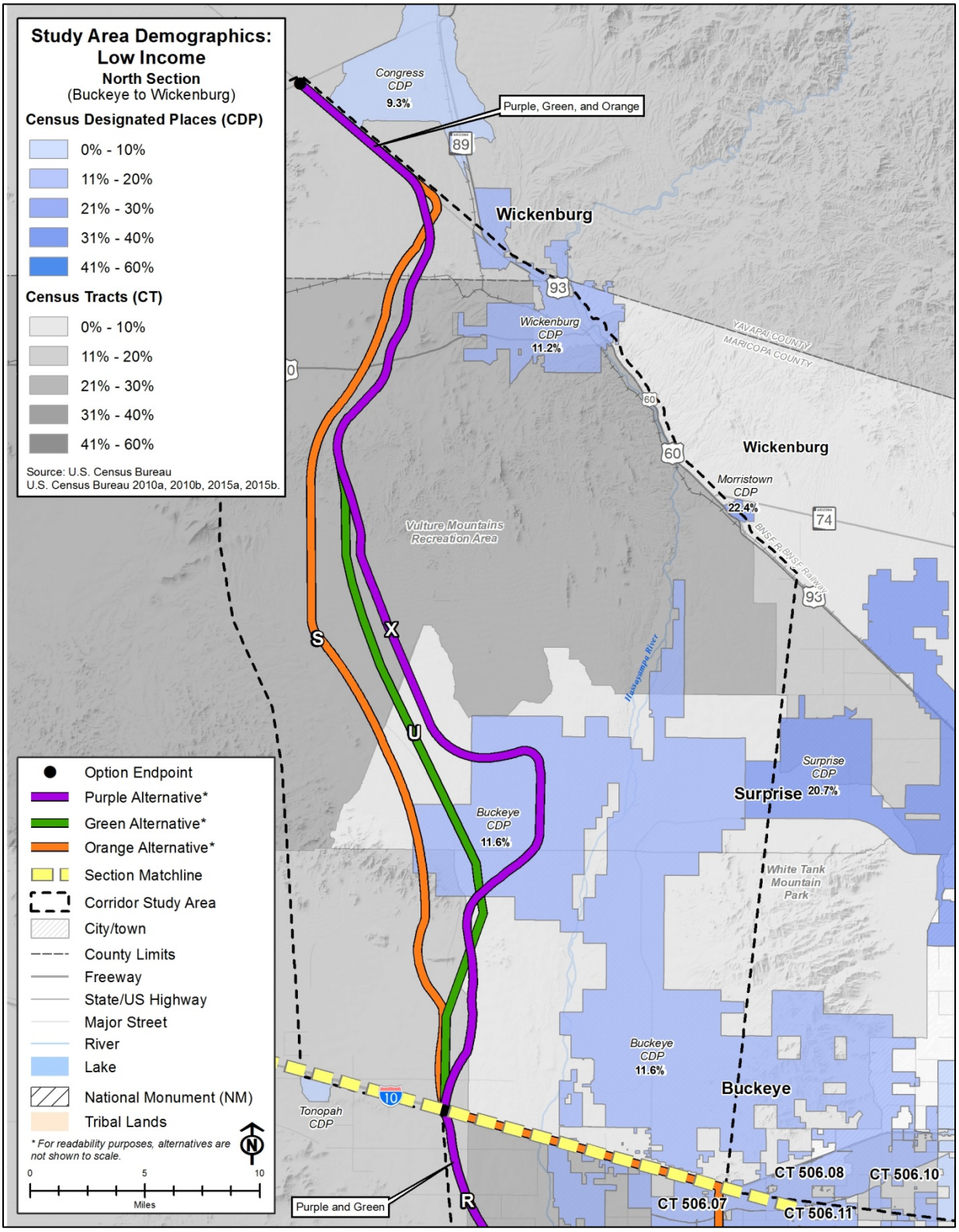


Figure 3.5-9 Low-Income Populations – North Section

There are high concentrations of minority and low-income individuals within the Nogales area, within and extending west from the Tucson area, near Eloy, and within the Tohono O'odham Nation. High percentages of minorities within the Nogales area CTs (9662, 9664.02, 9661.04, 9663.02, 9663.01, and 9661.05) can be seen. These CTs cover a large area and extend both east and west beyond the Study Area. The population in the area surrounding the intersection of SR 189 and I-19 in Nogales has a high concentration of both minority and low-income individuals.

Census data for the Tucson City CDP shows that a high percentage of minority individuals are present within Tucson and in the areas surrounding Option B. Further detail in the 100+ CTs in the Tucson area also demonstrate there are high concentrations of low-income individuals in the areas surrounding Option B, north of Tucson. Options F and G intersect the communities of Picacho and Eloy, both of which have a high percentage of minority and low-income individuals.

South and west of Tucson, there also are high percentages of minority and low-income individuals within Tribal lands in the South Section – Tohono O'odham Nation lands including both the Shuck Toak District and San Xavier District, and the Pascua Yaqui Tribe. The San Xavier District of the Tohono O'odham Nation is located along Options B, C, and D.

There are two large CTs within the Central Section which contain a high percentage of minority and/or low-income individuals – CT 7233.06 and 7233.05. These CTs cover a large geographic extent. Demographic data for the Gila Bend and Buckeye CDPs emphasize the presence of minority and low-income individuals concentrated in areas surrounding Options K, N, and Q. A third large CT containing high percentages of minority individuals is present along I-8, between Casa Grande and Gila Bend. There are five CDPs located within this CT but outside of the Study Area, including the Tribal communities of Ak-Chin Village, Kohatk, Tat Momoli, and Vaiva Vo. This, combined with the fact that much of the land use within the Project Area is either agricultural or undeveloped, indicates that much of the population within CT 9414 resides outside of the Project Area for the Build Corridor Alternatives. Demographic data for the CDPs outside of the Study Area was not collected.

The percentage of minority individuals in the Buckeye community population also is high relative to the surrounding Maricopa County. While CDP data shows high percentages of minority individuals in areas intersected by Options S, U, and X, these areas are generally undeveloped. In comparison, Options Q and N extend through the more populated areas of Buckeye.

Limited English Proficiency

Figures 3.5-10 (Limited English Proficiency Populations – South Section)**, 3.5-11** (Limited English Proficiency Populations – Central Section)**,** and **3.5-12** (Limited English Proficiency Populations – North Section) illustrate the percentage of the population within the Study Area that have LEP. Within the larger Study Area, of those that speak English 'less than very well', Spanish is the most commonly spoken language other than English. There is a Chinese language group (1,963 individuals) and a small pocket of Arabic-speaking individuals (989 individuals) in the Tucson City CDP.

The highest percentage of people that speak English 'less than very well' are within the South Section, within the CTs and CDPs surrounding the Nogales area and intersected by Option A.

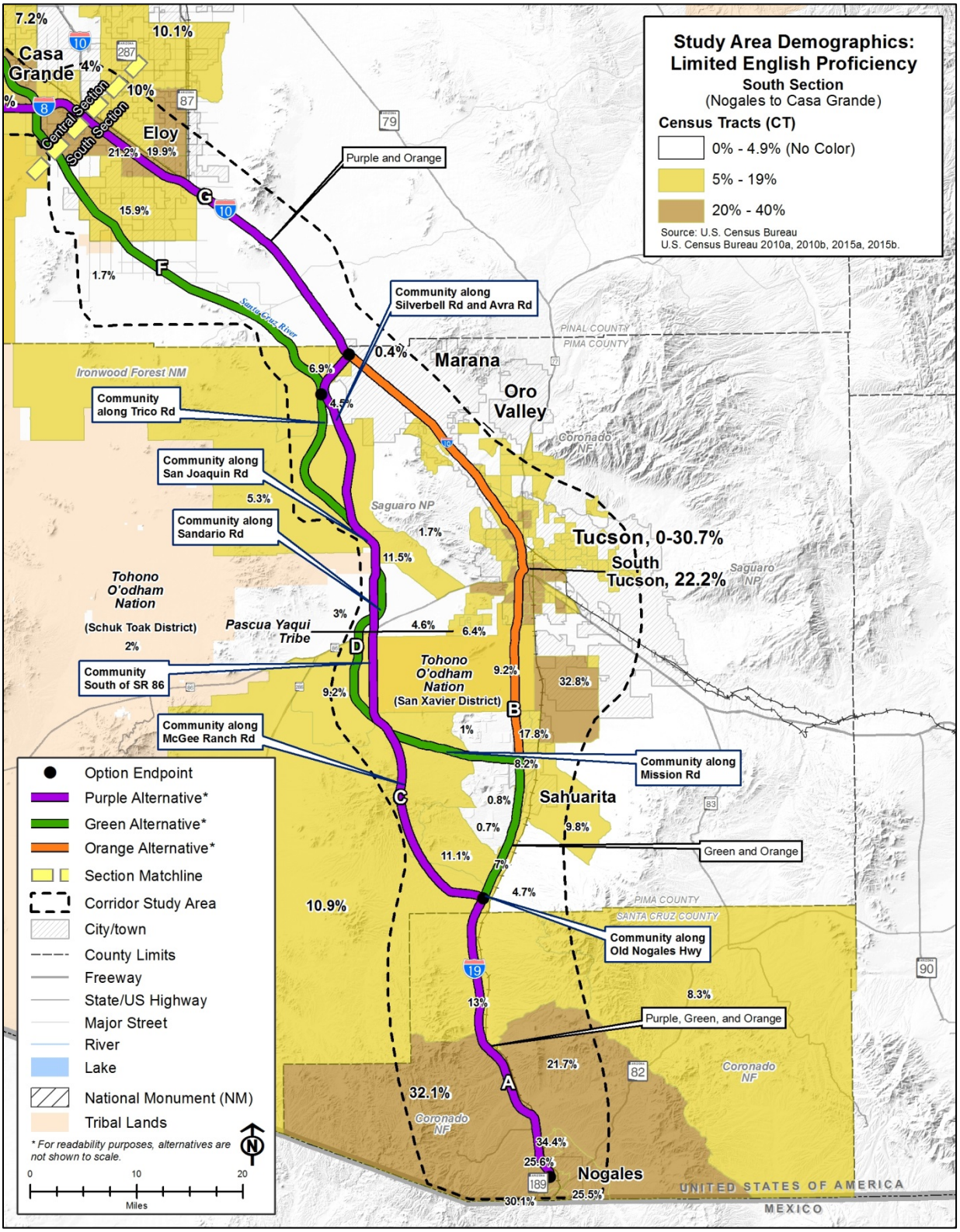


Figure 3.5-10 Limited English Proficiency Populations – South Section

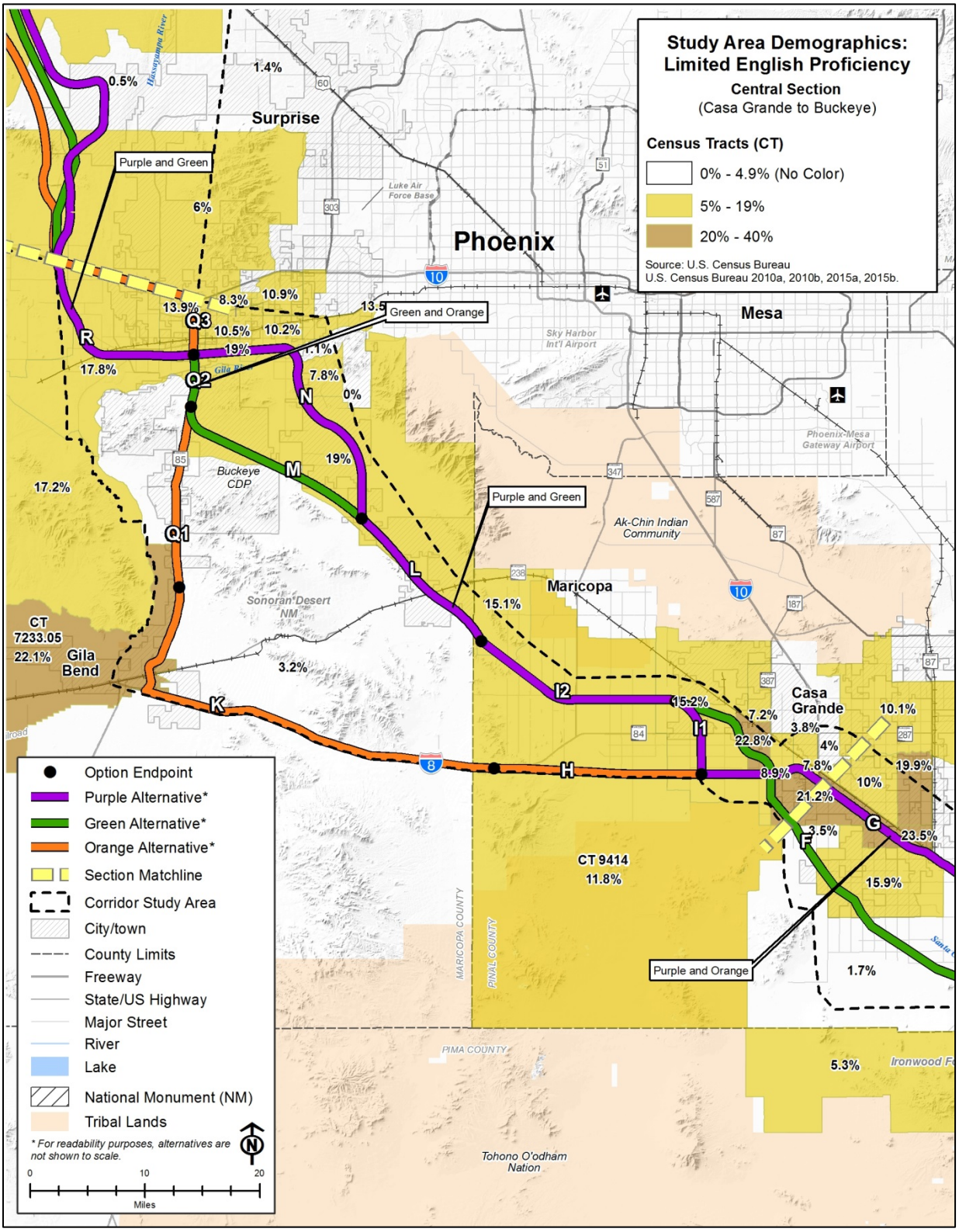


Figure 3.5-11 Limited English Proficiency Population – Central Section

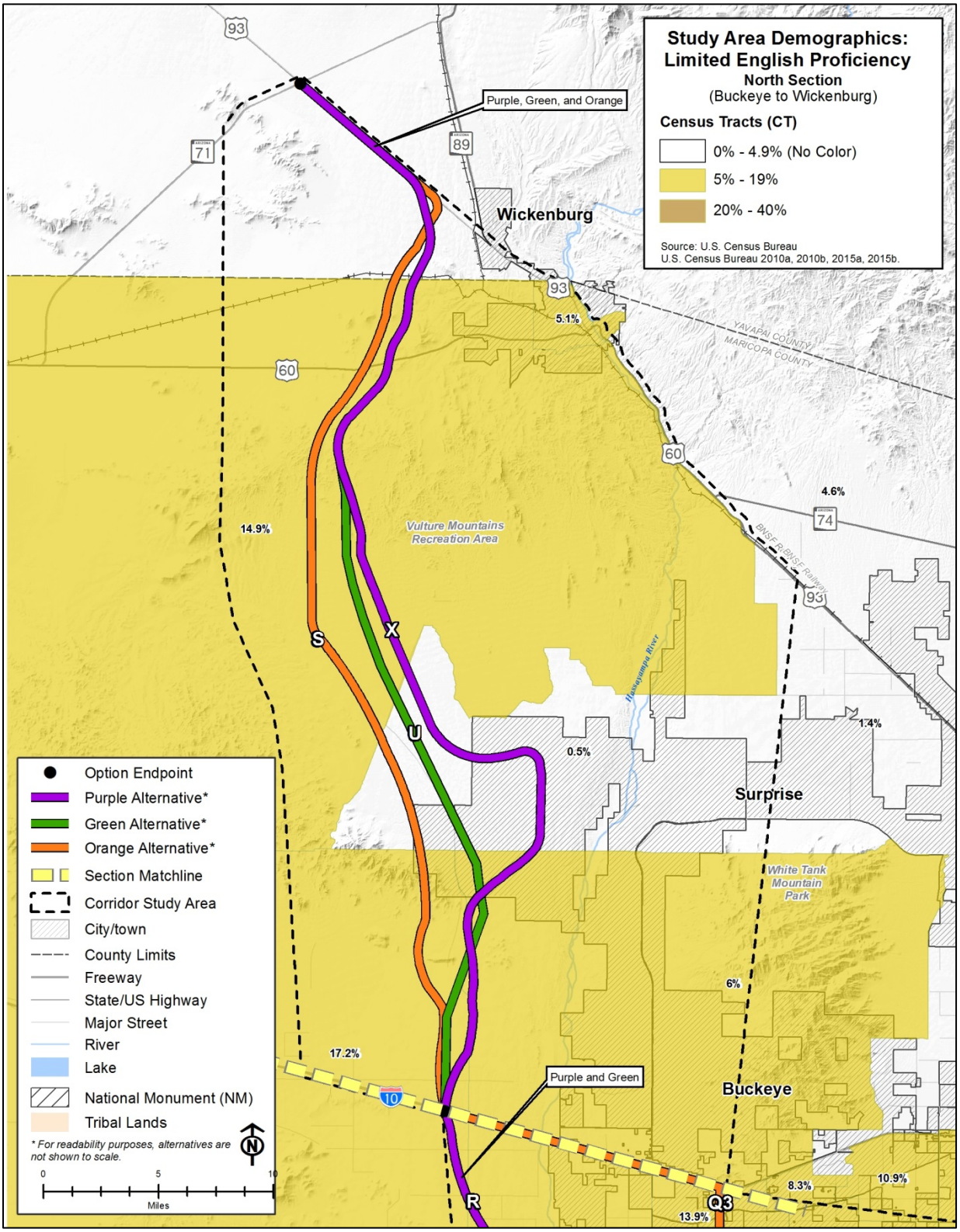


Figure 3.5-12 Limited English Proficiency Population – North Section

Throughout the CTs intersecting the Build Corridor Alternatives in the Central Section, the highest percentages of people that speak English 'less than very well' are located along Options F, G, K, and Q.

The percentage of the population that speak English 'less than very well' is lower within the CTs intersected by the Build Corridor Alternatives in the North Section.

Public Engagement during the Draft Tier 1 EIS Study

FHWA and ADOT worked to engage diverse populations in public participation efforts. A key focus of the public outreach and agency coordination is to facilitate an understanding with the public regarding the study process, key milestones, and decision points.

FHWA and ADOT conducted two rounds of public review at the major phases and key milestones of the planning process to elicit information, issues, and concerns from the public. The first round of public engagement, a 45-day scoping period, was conducted during May and June of 2016. The public was notified about the scoping process, public meeting locations, and schedule by way of newspaper advertisements, the I-11 website, e-mail blasts, social media, news releases, media interviews, and blog posts. Six public scoping meetings were held in the Study Area at Casa Grande, Buckeye, Nogales, Tucson, Marana, and Wickenburg. During these meetings, ADOT described the study objectives, as well as sought input on the I-11 Purpose and Need; potential alternatives to be studied; impacts to be evaluated; and evaluation methods to be used. A report was prepared documenting agency and public scoping and is attached in **Appendix G** (*Scoping Summary Report* dated January 2017). Additional information also is provided in **Chapter 5**.

A second round of public engagement was conducted during the alternatives analysis phase of the project and occurred between April and June 2017. During this outreach period, FHWA and ADOT conducted six public meetings, held throughout the Study Area, including Buckeye, Casa Grande, Marana, Nogales, Tucson, and Wickenburg. The public was notified about the outreach process, public meeting locations, and schedule by way of newspaper advertisements, the I-11 website, e-mail blasts, social media, news releases, and media interviews. Meeting attendees were encouraged to share verbal and written comments, as well as mark suggestions and concerns on maps of the Study Area, with the goal of reviewing and commenting on the proposed range of alternatives to be carried into the Tier 1 EIS for additional analysis. A report was prepared documenting this round of public and agency engagement and is attached in **Appendix G** (Agency and Public Information Meeting Summary Report dated November 2017). Additional information also is provided in **Chapter 5**.

A third round of public engagement will occur with issuance of this Draft Tier 1 EIS, and a public review period also will follow the issuance of the Final Tier 1 EIS document.

In addition to public engagement efforts, the project team has continuously accepted input from the public by mail, e-mail, and a bilingual telephone hotline. Contact information for these input channels was provided to attendees at the public meetings and also is available on the project website. Input gathered through these channels is distributed to the appropriate Project Team members for consideration upon receipt, regardless of whether the comment was received during one of the defined public comment periods.

Early in the study process, it was determined that the diverse population of the Study Area merited a communication strategy that addresses multicultural and bilingual issues and challenges. A review of US Census data for counties and local municipalities within the Study

Area identified groups that speak English "less than very well," which are defined as more than 1,000 people or five or more percent of the eligible protected population. The US Department of Justice "safe harbor" provisions are being used to ensure all groups that speak English "less than very well" are considered for language assistance services.

In order to appropriately provide reasonable accommodation to all persons within the communities involved and potentially impacted by the study, ADOT and FHWA developed a methodology for outreach to determine how to best reach out to minority and low-income populations, those with LEP, and other protected populations. This methodology included conducting interviews with federal, state, regional, county, and local agencies and stakeholders and asking specific questions about how to best communicate with the communities and protected populations within the Study Area. Previous experience with communities in the Study Area contributed to the overall approach.

After evaluating the Study Area's demographic data and implementing the methodology described above, ADOT and FHWA developed 11 techniques to reduce linguistic, cultural, institutional, geographic, and other barriers to meaningful participation.

- Translating all public involvement materials (included newspaper advertisements) into Spanish and other languages upon request;
- Providing Spanish interpretation at all public meetings and hearings, as well as other languages upon request;
- Adding "Google Translate" to the I-11 website, allowing translation of website text into approximately 100 languages, including Chinese and Vietnamese;
- Including Spanish language graphics for download on the study website, as well as other languages upon request;
- Establishing a bilingual I-11 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 4 adjacent and 22 statewide tribal governments;
- Using advertising and graphics to more effectively reach illiterate individuals;
- Holding public meetings in locations that are easily accessible and American with Disabilities Act compliant;
- Holding public hearings along transit lines for those who are transit dependent; and
- Providing reasonable accommodations such as for sign-language interpreters upon request.

Many of these techniques overlap with tools that also reach the public at large, with a goal of providing access so everyone can participate.

Throughout the scoping and outreach process, the Project Team received input from the 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 as an independent third party to facilitate a discussion in Pima County regarding the Draft Tier 1 EIS to allow the study partners the opportunity to better understand the values, interests, and characteristics most important to these community stakeholders. Two stakeholder groups participated in a series of

six stakeholder engagement meetings (three meetings per group) between March and April 2018 with the objective of facilitating discussions with the Pima County community to identify issues and concerns in order to inform the decision-making process. More detail regarding the meetings in Pima County facilitated by the US Institute for Environmental Conflict Resolution is contained in **Chapter 5** of this Draft Tier 1 EIS. No citizen planning or advisory bodies have been convened during the development of the Draft Tier 1 EIS.

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. More detail on tribal engagement is contained in **Chapter 5** of this Draft Tier 1 EIS.

Public outreach and engagement for the I-11 corridor would continue into the Tier 2 studies once a more specific alignment and facility footprint are determined.

3.5.4 Environmental Consequences

All three Build Corridor Alternatives are expected to have an impact on existing communities, community facilities, and communities which have a high concentration of minority and low-income individuals. The degree or severity of these impacts varies among the Build Corridor Alternatives and would be location-specific. For the purposes of determining the potential for disproportionate impacts in this planning-level study, this inventory identifies areas that are known to have a high percentage of low-income and minority individuals based upon readily available current US Census Bureau data. CDPs with minority and low-income populations approaching or exceeding approximately 10 percentage points higher than the surrounding county are called out as containing a high percentage of low-income and minority individuals for the purposes of this inventory. There may be smaller pockets of minority or low-income individuals and/or communities not apparent in the census data used for this analysis. Refer to Section 3.5.5 for a description of supplemental data gathering techniques recommended for future Tier 2 analyses.

Purple Alternative

As shown in **Table 3.5-5** (Inventory of Build Corridor Alternatives which Extend through Communities with High Concentrations of Minority and Low-Income Population), approximately 25 percent of the total area within the Purple Alternative passes through areas with high concentrations of low-income and minority individuals. Option A and Option I2 have the highest intersection with minority and low-income populations. Option A is co-located with I-19 through Santa Cruz County, and is included in all of the Build Corridor Alternatives under consideration in this Draft Tier 1 EIS. Option I2 extends through an unincorporated area west of Casa Grande. Option N of the Purple Alternative is a new facility extending through mixed agricultural/residential areas in the minority population within Buckeye, while Options M and Q2 extend through predominantly undeveloped areas.

The Purple Alternative has the potential to affect several communities that contain low-income and minority populations. In addition to determining whether there are disproportionately high and adverse effects during Tier 2 analyses, the following areas have the potential to need a greater public involvement and focus:

- Option A: Nogales, Rio Rico, Tumacacori-Carmen, Amado, Arivaca Junction
- Option C: Unincorporated communities along McGee Ranch Road, Three Points, North of SR 86 along Sandario Road, Picture Rocks area
- Option G: Eloy and Casa Grande
- Option I2: West of Casa Grande
- Option N and R: Buckeye

Table 3.5-5 Inventory of Build Corridor Alternatives which Extend through Communities with High Concentrations of Minority and Low-Income Populations

Option	Total Project Area Acres (1)	Project Area Acres through High Concentrations of Minority or Low-Income Individuals (1)	Percentage of Project Area Acres Through High Concentrations of Minority or Low-Income Individuals
Purple Alterative			
A	6,960	3,906	56%
C	14,145	140	1%
G	10,936	4,372	40%
I1	1,769	854	48%
I2	4,517	3,412	76%
L	3,648	386	11%
N	6,207	758	12%
R	4,236	327	8%
X	13,228	2,499	19%
Total (end-to-end)	**65,646**	**16,654**	**25%**
Green Alterative			
A	6,960	3,906	56%
D	12,281	0	0%
F	12,338	4,602	37%
I2	4,517	3,412	76%
L	3,648	386	11%
M	4,479	2,345	52%
Q2	1,101	688	62%
R	4,236	327	8%
U	12,071	1,008	8%
Total (end-to-end)	**61,631**	**16,674**	**27%**
Orange Alterative			
A	6,960	3,906	56%
B	14,194	3,347	24%
G	10,936	4,372	40%
H	4,384	4,112	94%
K	10,038	1,568	16%
Q1	3,860	1,864	48%
Q2	1,101	688	62%
Q3	4,198	1,798	43%
S	12,227	546	4%
Total (end-to-end)	**67,898**	**22,201**	**33%**

(1) Acreages provided represent area within the 2,000-foot wide Project Area; actual acreages within the ultimate footprint of I-11 would be much lower, based upon an approximately 400-foot wide cross section to be determined during Tier 2 analyses.

Source: US Census Bureau 2017, US Census Bureau 2015, US Census Bureau 2015a, US Census Bureau 2010.

Early in the planning process for the Tier 2 analysis, it is recommended that a public involvement plan be developed with the focus of ensuring full and fair participation by all affected communities and populations. Coordination with local stakeholders and community representatives may be needed to understand the needs and priorities of the communities which contain a high percentage of low-income and minority individuals, as well as determine the most effective means of engaging them in the outreach process.

Several of the communities listed above are small, unincorporated, rural communities in Pima County and are called out in **Figure 3.5-4** (Minority Populations – South Section) and **Figure 3.5-7** (Low-Income Populations – South Section). While census data does not show high percentages of low-income or minority individuals in this area, it is possible the large geography covered by the CT within which they are located masks the demographics of these communities. Supplemental data gathering techniques are recommended during Tier 2 analyses to better characterize the community profile in these locations and are discussed in more detail in Section 3.5.5 Tier 2 Analysis.

The Project Area for the Purple Alternative is not located on any Tribal communities. Option C is located between two discontinuous land holdings of the Tohono O'odham Nation – the San Xavier District and the Schuk Toak District.

Green Alternative

As summarized in **Table 3.5-6** (Summary of Potential Impacts and Beneficial Effects to Communities), the Green Alternative would cause impacts similar to those created by the Purple Alternative. Option D passes through areas with a high level of sensitivity based on agency, Tribal, and public input.

As shown in **Table 3.5-5** (Inventory of Build Corridor Alternatives which Extend through Communities with High Concentrations of Minority and Low-Income Populations), approximately 27 percent of the total area within the Green Alternative passes through known minority and low-income populations. Like the Purple Alternative, Option A and Option I2 intersect with communities known to include minority and low-income populations. The primary differentiation in impacts between the Purple Alternative and the Green Alternative is that Option F presents a new interstate facility that is not co-located with an existing highway through the minority population in Casa Grande.

Like the Purple Alternative, the Green Alternative also extends through a low-density, unincorporated residential community north of I-10 near Buckeye and the differences between Option X (Purple Alternative) and Option U (Green Alternative) are limited. The difference between the Project Areas of the Options S, U, and X is limited and have a similar potential to affect this community.

The Green Alternative is not located on any Tribal communities. Option D is located between two discontinuous land holdings of the Tohono O'odham Nation – the San Xavier District and the Schuk Toak District.

The Green Alternative has the potential to affect several communities that contain low-income and minority populations. In addition to determining whether there are disproportionately high and adverse effects during Tier 2 analyses, the following areas have the potential to need a greater involvement and focus:

- Option A: Nogales, Rio Rico, Tumacacori-Carmen, Amado, Arivaca Junction
- Options F and I1: Eloy and Casa Grande
- Option I2: West of Casa Grande
- Option R: Buckeye

Similar to the Purple Alternative, early in the planning process for the Tier 2 analysis, a public involvement plan should be developed with the focus of ensuring full and fair participation by all of the affected communities and populations.

Orange Alternative

The Orange Alternative follows more existing highway facilities than the Purple and Green Alternatives. Because there is a greater concentration of communities, community resources, and minority and low-income individuals following existing highway facilities, the Orange Alternative includes more communities with a high percentage of minority and low-income individuals in their populations than the Purple and Green Alternatives (see **Table 3.5-5** [Inventory of Build Corridor Alternatives which Extend through Communities with High Concentrations of Minority and Low-Income Populations]).

Option B is co-located with I-10 through downtown Tucson and extends through minority and low-income populations in the historic barrios and neighborhoods abutting the interstate. When I-10 was originally constructed in the 1960s, it introduced a barrier that divided many of the neighborhoods in downtown Tucson. Should Tier 2 evaluations determine property acquisitions are required, resulting residential displacement and/or relocations in combination with the expanded infrastructure could potentially affect the character of these low-income and minority populations and further reduce community cohesion. This is particularly true within the Yaqui communities in downtown Tucson and the historic neighborhoods of Barrio Anita, Barrio El Membrillo, and the El Paso & Southwestern Railroad Historic District, which has been determined eligible for listing in the National Register of Historic Places. (See Section 3.7, Archaeological, Historical, and Cultural Resources for more detail regarding potential impacts to the historic districts through downtown Tucson.) Because the residences and buildings are located very close to the existing interstate right-of-way (ROW) boundaries, there is a high potential for Option B to impact these communities, which have a high percentage of minority and low-income individuals and a unique character and community profile. During Tier 2 analyses, planning and design of the specific alignment and design elements of I-11 would explore opportunities to avoid and minimize impacts to these communities and further efforts would be needed during Tier 2 analyses to better understand the community, their needs, and how best to engage them in the transportation-planning process.

Option B along I-19 crosses the San Xavier District of the Tohono O'odham Nation. ADOT has a perpetual right-of-way easement from the Tohono O'odham Nation for approximately 8 miles of interstate highway in this area. Direct impacts to this area could be minimized by limiting the transportation improvements to the existing ADOT right-of-way in this area.

Like the Purple and Green Alternatives, the Orange Alterative also extends through a low-density, unincorporated residential community north of I-10 near Buckeye and the differences between Option X (Purple Alternative), Option U (Green Alternative) and Option S (Orange Alternative) are limited. The Purple and Green Alternatives have a similar potential to affect this community, but the Orange Alternative offers better avoidance opportunities to minimize potential impacts.

The Orange Alternative has the potential to affect several communities that contain a high percentage of low-income and minority individuals. In addition to determining whether there are disproportionately high and adverse effects during Tier 2 analyses, the following areas have the potential to need a greater involvement and focus:

- Option A: Nogales, Rio Rico, Tumacacori-Carmen, Amado, Arivaca Junction
- Options B: Tohono O'odham Nation, South Tucson, Tucson, Rillito
- Option G: Eloy and Casa Grande
- Option H: West of Casa Grande
- Option K: Gila Bend
- Options Q1, Q2, and Q3: Buckeye

Similar to the Purple and Green Alternatives, early in the planning process for the Tier 2 analysis, a public involvement plan should be developed with the focus of ensuring full and fair participation by all of the affected communities and populations.

No Build Alternative

Under the No Build Alternative, impacts to community facilities and communities with a high percentage of minority or low-income populations would include only those related to projects already planned and programmed. Improvement projects along SR 189 and I-10 in Nogales and Casa Grande, respectively, have the potential to affect both communities which a high percentage of minority individuals. Under the No Build Alternative, future projects would need to comply with EO 12989 and related statutes. Beneficial impacts of the Build Corridor Alternatives such as improved travel times, reduced congestion, economic development and improvements to regional mobility would not occur under the No Build Alternative.

Summary

ADOT and FHWA engaged all population segments to ensure access to the EIS study process. While the No Build Alternative would result in a few impacts, the benefits related to the need for greater connectivity and travel time reliability also would not be realized. The Build Corridor Alternatives would provide the following primary benefits:

- Improvement to connectivity and mobility, providing access to jobs, services, education, and entertainment.
- Result in travel time savings and improvements to travel time reliability.
- Offer the potential for economic opportunities through improved access and mobility.
- Improved safety when traveling on existing roads due to lower crash rates.
- Competitive advantages for existing and future businesses located in the Study Area due to the additional transportation capacity and accessibility.
- Improved regional air quality due to shifting traffic away from existing roadways and reducing congestion.

Potential impacts associated with the three Build Corridor Alternatives and the No Build Alternative are summarized in **Table 3.5-6** (Summary of Potential Impacts and Beneficial Effects to Communities) located at the end of this section. All three Build Corridor Alternatives are co-

located with I-19 along Option A, so they result in the same potential impacts on the communities of Nogales, Rio Rico, Tumacacori-Carmen, Amado, and Arivaca Junction (all of which contain a high percentage of minority and/or low-income individuals).

The Purple Alternative (Corridor Options I2, N, and R) has unavoidable impacts on the community west of Casa Grande and the community of Buckeye. The Green Alternative (Corridor Options F, I1, I2, and R) has the potential to adversely affect the communities of Eloy, Casa Grande, the unincorporated area west of Casa Grande, and Buckeye. The Orange Alternative (Corridor Options B and G) has the potential to adversely affect communities of South Tucson, Rillito, Eloy, and Casa Grande and impact Tribal land of the Tohono O'odham Nation.

Overall, the Purple Alternative presents the lowest overall potential to disproportionately and adversely affect minority and low-income populations. While all three Build Corridor Alternatives go through the community of Eloy, Option F in the Green Alternative represents a new facility through those communities.

3.5.5 Potential Mitigation Strategies

FHWA and ADOT identified communities with a high percentage of minority and low-income individuals along each of the Build Corridor Alternatives under consideration. Under all Build Corridor Alternatives, proactive efforts would need to continue to ensure meaningful opportunities for public participation by all affected communities, including minority and low-income populations. This is essential to address the requirements outlined in EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations* and FHWA regulations outlined in CFR Title 23, Part 450. These requirements are intended to ensure that a project does not cause a disproportionately high and adverse effect on minority and low-income populations, as well as other protected categories such as sex, age, and disability. Efforts to engage all populations throughout the Study Area that have been undertaken during the Tier 1 process are described in **Chapter 5**.

Further refinement of the Build Corridor Alternatives would be necessary in order to determine the full potential for impacts on low-income and minority populations. Impacts could be avoided or mitigated through the design of the specific alignment during the Tier 2 process by avoiding community features or resources; planning and locating new facilities outside of a selected Build Corridor Alternatives; building structures such as pedestrian overpasses to maintain existing neighborhood connections; or modifying existing facilities to maintain access and function. Actual mitigations would be identified and implemented as part of subsequent Tier 2 analysis.

If disproportionate adverse impacts to minority and low-income populations are found, collaboration to avoid and minimize the potential impacts would occur. If avoidance and minimization are not practicable or feasible, a mitigation strategy designed to satisfy the needs of the community would be needed. The anticipated impacts would determine which mitigation strategies, if any, are the most appropriate to implement in order to avoid disproportionate adverse effects on those populations.

3.5.6 Future Tier 2 Analysis

Future Tier 2 National Environmental Policy Act analysis would include identifying and quantifying impacts and mitigation measures. Characterization of the demographics for affected

communities would be conducted using the most recent census data and supplemental characterization techniques. Supplemental techniques could include, but are not limited to, reaching out to local planning staff and community leaders, examining residential property assessments/valuations, direct surveys of local residents, and outreach to local employment centers, schools, and social service programs. Using these techniques, a more complete profile of the affected communities should be developed. These efforts are particularly important in areas where the CTs cover large geographies, resulting in census data that potentially masks the demographics of smaller unincorporated rural communities. Some of these communities are called out in the maps of low-income and minority demographics in the South Section (**Figure 3.5-4** (Minority Populations – South Section) and **Figure 3.5-7** (Low-Income Populations – South Section)).

The Tier 2 analysis would be based on more specific corridor alignment information and design features, providing for a more precise evaluation of the impacts related to proposed displacements, relocations, changes to employment and businesses, community characteristics, and housing availability. Additional air quality, noise, and other applicable environmental studies also would be conducted in order to assess the impacts that these environmental concerns would have on human health. A full determination of these effects, both adverse and beneficial, to minority, low-income, and other protected populations would occur.

The Tier 2 Environmental Justice analysis would address the following items, as established by the *Federal Highway Administration Environmental Reference Guide* (FHWA 2012):

- Conduct major, proactive efforts to ensure meaningful opportunities for public participation, including activities to increase low-income and minority participation.
- Compare the project effects (including indirect and cumulative effects) on the minority and low-income populations with respect to those on the overall population. Fair distribution of the beneficial and adverse effects of the proposed action is the desired outcome.
- Determine if the adverse effects are predominantly borne by the minority and low-income populations or are appreciably more severe or greater in magnitude on these populations than the adverse effects suffered by the non-minority and non-low-income populations (i.e., disproportionately high and adverse effects).
- Determine if the project might prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.
- Determine whether there are practicable mitigation measures or alignment alternatives that would avoid or minimize the disproportionately high and adverse effect(s).
- Determine whether any of the affected communities include minorities, ethnic groups, senior populations, persons with disabilities, individuals with a Low-Income, or those who are LEP.

The Tier 2 analysis will involve further coordination with minority and low-income populations, including Tribal communities, and with agencies in order to determine the most effective means of minimizing and mitigating adverse impacts on these populations.

The Tier 2 analysis also will include a Public Involvement Plan consistent with ADOT's agency-wide Public Involvement Plan, which meets federal requirements for Title VI, Environmental Justice, and LEP in the transportation decision-making process. The Public Involvement Plan will continue efforts to remove barriers to participation in the public engagement and transportation decision-making process by addressing the unique needs of those affected by the project to include minorities, ethnic groups, and individuals with low incomes or who are LEP.

Table 3.5-6 Summary of Potential Impacts and Beneficial Effects to Communities

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Communities	No I-11 impacts identified. Existing conditions and baseline trends would continue. Potential for long-term socioeconomic change and impacts on communities due to growing populations and increasing traffic volumes.	Communities where Alternative follows an existing highway: • Marana • Red Rock • Picacho • Eloy • Casa Grande • Arivaca Junction Communities where Alternative would be a new corridor: • Goodyear • Buckeye • Arlington • Arivaca Junction	Communities where Alternative follows an existing highway: • Arivaca Junction • Buckeye Communities where Alternative does not follow an existing highway: • Sahuarita • Three Points • Picture Rocks • Avra Valley • Red Rock • Eloy • Casa Grande • Goodyear • Arlington • Buckeye	Communities where Alternative follows an existing highway: • Arivaca Junction • Green Valley • Sahuarita • Tucson • Flowing Wells • Casas Adobes • Rillito • Marana • Buckeye Communities where Alternative does not follow an existing highway: • Buckeye

Table 3.5-6 Summary of Potential Impacts and Beneficial Effects to Communities (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Communities with High Concentration of Minority and Low-Income Individuals *	Other projects within the Study Area would be subject to individual Environmental Justice evaluations.	Affected communities with a high percentage of minority and low-income individuals: • Arivaca Junction • Valencia West • Eloy • Casa Grande • Unincorporated area between Casa Grande and Gila Bend • Buckeye	Affected communities with a high percentage of minority and low-income individuals: • Arivaca Junction • Valencia West • Eloy • Casa Grande • Unincorporated area between Casa Grande and Gila Bend • Gila Bend • Buckeye	Affected communities with a high percentage of minority and low-income individuals: • Arivaca Junction • Tohono O'odham Nation, San Xavier District • Tucson • Rillito • Picacho • Eloy • Casa Grande • Unincorporated area between Casa Grande and Gila Bend • Gila Bend • Buckeye Highest proportion of Project Area extending through communities with minority and/or low-income populations (33%).
Tribal Communities (also contain high concentration of minority and/or low-income individuals*)	Through San Xavier District along existing I-10.	Closer to San Xavier District than Green, but not on tribal land. Close to Garcia Strip, but not on tribal land.	Similar to Purple Alternative.	Through San Xavier District along existing I-10.

Table 3.5-6 Summary of Potential Impacts and Beneficial Effects to Communities (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Potential Beneficial Effects	Existing conditions and baseline trends would continue.	Transportation benefits would affect communities throughout Study Area. Implementation of the Purple Alternative also would have a beneficial effect in terms of the region's economic conditions, leading to an increase in personal income and employment –which would benefit all communities.	Transportation benefits would affect communities throughout Study Area. Implementation of the Green Alternative also would have a beneficial effect in terms of the region's economic conditions on a similar scale to the Purple Alternative, leading to an increase in personal income and employment –which would benefit communities.	Transportation benefits would affect communities throughout Study Area. Benefits to the region's economic conditions.
Indirect Effects	Programmed transportation improvements plus projected population and employment growth could: • Decrease mobility and access to job opportunities and housing options due to increased travel times and congestion.	Land development induced by the project could increase or change the nature and location of residential, business, and other uses could: • 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.	Similar to the Purple Alternative; except: • The benefits and changes from improved mobility would be reduced in the South and Central Sections.

Table 3.5-6 Summary of Potential Impacts and Beneficial Effects to Communities (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Cumulative Effects	Past, present, and reasonably foreseeable projects could: • Increase displacements, increase noise levels, and impact air quality as part of the ongoing trend to develop land in the region.	Past, present, and reasonably foreseeable projects could: • Potentially have an incremental role improving access to housing and jobs for minority and Low-Income Environmental Justice 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.

* Based upon demographic data provided by the US Census Bureau. Detailed demographic tables can be found in **Table 3.5-4** (Race and Ethnicity in the Study Area, County and Statewide Averages) of this section and in **Appendix E5**.

This page intentionally left blank

3.6 Economic Impacts

A preliminary economic impact analysis was conducted to anticipate the response of the regional economy to changes in demand, income, and employment as a result of the No Build and Build Corridor Alternatives. The analysis included interviews with representatives of local jurisdictions to determine economic landscapes, economic development plans, and potential land use and community impacts. The interviews helped to inform a quantitative economic impact analysis that was conducted to examine changes in economic activity and the effects on the economy in the Interstate 11 (I-11) Corridor Study Area (Study Area) (see **Appendix E6**).

Potential changes in economic activity would be triggered by: (1) capital investment expenditures and (2) efficiencies gained from transportation improvements. The analysis of changes to the economy captured and combined the following three types of effects:

- **Direct effects:** Changes in economic activity as a direct consequence of the investment (e.g., transportation-related construction expenditures, savings in production costs due to transportation-related efficiencies, and additional residents or employment due to new development)
- **Indirect effects:** Changes in economic activity related to supplier spending
- **Induced effects:** Changes in economic activity related to employee spending (by employees of firms affected by the direct and indirect effects)

Note that the effects of additional residents or employment due to new development have not been included in the analysis. The indirect and induced effects are sometimes referred to as *multiplier effects,* since they can be formulated as a factor proportional to the direct effects. The direct effects can be multiplied by this factor to estimate total economic impacts. The sum of the direct, indirect, and induced effects represents the overall potential impact on the economy in the I-11 Corridor Study Area.

This section presents the regulatory setting and explains the methodology, data, and results from the interviews and economic analysis.

3.6.1 Regulatory Setting

Economic impact is not regulated by any state or local government. It merely measures the effect that an event, policy change, or development will have on the economy within a specified area by quantifying business revenue, wages, and jobs. However, development activity that generates the underlying economic impact is regulated by local plans and codes, including the general plans, zoning ordinances, and building codes of cities, towns, and counties along I-11. These regulatory documents dictate allowable land uses and provide standards for construction, which ultimately determine the potential economic impact that an activity will have on the local economy.

Within the Study Area, there are many county, municipal, and Tribal governments. Each has its own regulatory codes that affect economic development and land use goals that impact transportation infrastructure. Section 3.3, Land Use and Section 6(f), provides an overview of the jurisdictions' comprehensive/general plans.

3.6.2 Methodology

In-person interviews were conducted with economic development, planning, public works, and management representatives of local jurisdictions within the Study Area to understand the potential impact that the Build Corridor Alternatives would have on land use, community, and economic development. Input was solicited on a range of topics, including current economic drivers, industry targets, locations of existing and future employment centers, changes in land use or economic development resulting from I-11, and the potential support that new highway interchanges and other transportation improvements (e.g., accessibility) might provide to industrial, retail, or service businesses (see **Appendix E6**).

The economic impact analysis was conducted using Arizona Department of Transportation's (ADOT's) Regional Economic Models, Inc. (REMI) TranSight model (a commercial analysis tool licensed to ADOT for studies such as the I-11 Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation [EIS]). This is a widely applied economic impact analysis model used to evaluate the effects of transportation investments and policies at the regional level.[1] REMI TranSight is often described as a *hybrid analytical tool* because it combines several economic modeling approaches: input-output analysis, econometric analysis, new economic geography, and computable general equilibrium modeling. Unlike simpler input-output analysis tools, such as Impact Analysis for Planning and Regional Input-Output Modeling System, it is a dynamic forecasting model that accounts for changes in demographic and economic conditions (e.g., changes in prices and wages) over time. The model is structured around five major elements related specifically to conditions in the Study Area:

- Output and demand
- Labor and capital demand
- Population and labor supply
- Compensation, prices, and costs
- Market shares

Economic impacts within and between these elements are estimated using a series of equations that trace the dynamic interactions among businesses and consumers across sectors of Arizona's economy. Note that direct, indirect, and induced impacts are estimated in REMI. While the indirect impact refers to the change in economic activity resulting from purchases by suppliers to the directly impacted businesses (i.e., supply chain impact), the induced impact refers to the change in economic activity resulting from spending by employees of the directly and indirectly affected businesses (i.e., employee spending impact).

A principal indicator of the economic impact is the size of the economic multipliers (i.e., indirect and induced impacts combined). In theory, a larger multiplier will generate a larger response (i.e., total economic impact) to the initial change (i.e., direct effect). In reality, however, while indirect and induced impacts occur with the implementation of new/improved transportation infrastructure, the net impact on the total level of economic activity in an area may or may not be increased by the multiplier effects. That outcome depends on the composition of businesses, labor, and customers in the Study Area. Also, it depends on the extent to which additional workers and capital resources are available within the Study Area or attracted from elsewhere. In regions with limited economic activity, spending is likely to generate the occurrence of indirect effects outside the region, causing lower impacts within the Study Area. In contrast, higher

[1] A full description of the model is available on REMI's website at remi.com/products/trans-sight.

multipliers would be found in larger and more economically diverse regions, which enable and attract spending.[2]

The analysis was performed in relation to the overall Study Area and Corridor Options. Economic effects associated with business displacement and related economic effects will be addressed in Tier 2 analyses.

3.6.3 Affected Environment

3.6.3.1 Economic Landscape

Existing economic development plans for the international border and communities within the Study Area have various goals and initiatives that support job creation and embrace transportation infrastructure improvements by connecting people to employment hubs, economic activity centers, and tourist attractions. The ultimate outcome of these plans and infrastructure improvements is to help diversify and expand the economy by supporting existing businesses, recruiting new businesses, and implementing key industry clusters. The Arizona-Mexico Commission's *Arizona Border Communities Roadmap* (Arizona-Mexico Commission 2013) points to the need for infrastructure development, such as I-11, which would enhance Arizona's global competitiveness and connectivity.

According to the ADOT Arizona Statewide Travel Demand Model, leading economic sectors within the Study Area are agriculture, mining, and manufacturing, with projected growth in construction, health services, retail, and wholesale trade. As one of the most important industries driving the state's economy, tourism has an economic impact. Direct visitor statewide spending on lodging, food, retail, entertainment, recreation, and transportation in 2016 was $21.2 billion (Dean Runyan Associates 2017). Many tourist attractions can be found within the Study Area, including parks, recreational trails, and cultural destinations. Information on recreation can be found in Section 3.4 and parks can be found in **Chapter 4** (Preliminary Draft Section 4(f) Evaluation).

Additionally, wildlife recreation contributes to Arizona's economy. According to United States Fish and Wildlife Service (USFWS) data, Arizona residents and nonresidents spent $2.4 billion on wildlife recreation in 2011 (USFWS 2011). That total includes trip-related expenditures of $897 million and equipment expenditures of $1.1 billion. The remaining $326 million was spent on licenses, contributions, land ownership and leasing, and other items. In 2016, Arizona's Governor issued an Executive Order recognizing the importance of hunting, fishing, and other outdoor recreation to the state's economy (Arizona Game and Fish Department [AGFD] 2018).

Communities along the Build Corridor Alternatives receive hundreds of thousands of visitors each year, with the majority coming from out of state. For example, a recent National Park Service (NPS) study estimates that Saguaro National Park (SNP) contributed more than $88 million to the Tucson economy in 2017 (Thomas et al. 2018). The same study found that SNP visitors spent an estimated $60.7 million in local gateways and that 98.8 percent of that spending is from non-local visitors. Several spots along the I-11 Corridor, such as Santa Cruz

[2] Note that comparisons of multipliers by Study Area market size must be understood with information on the context because many different factors can lead to higher or lower values. For example, it is counter-intuitive but possible for multipliers in the same sectors to be smaller in a geographically larger Study Area. This outcome can occur, for example, if a number of related sectors are concentrated at a regional level (thus requiring fewer imports); the analysis would then reveal relatively high multipliers. But, then at a state level, for example, multipliers can be lower than in that smaller region if similar businesses that are located outside that smaller region draw primarily on labor, goods, or services from outside the state, which would lower the overall multiplier.

Flats and the Gila River, provide habitats that host unique species or wildlife populations and attract hunters and wildlife watchers from around the globe. While visitor spending contributes to the local economy, visitors also impact the performance of transportation facilities.

The following is a summary of each section as it relates to the economy:

- Santa Cruz and Pima counties; Nogales, Sahuarita, Tucson, and Marana municipalities; and the Pascua Yaqui and the Tohono O'Odham Nation Tribes are located in the South Section. The City of Tucson in Pima County has the most diverse economy within the South Section as well as the largest population and employment base. Nogales, which is situated on the United States (US)/Mexican border, is a major gateway into the US for produce, manufactured goods, and visitors using the Mariposa and DeConcini Land Ports of Entry.
- Pinal County is an emerging employment market in the Central Section that includes the cities of Casa Grande and Eloy as well as the Ak-Chin Indian Community, located adjacent to the City of Maricopa. The Gila River Indian Community is located farther east. Based on forecasts from the Arizona Statewide Travel Demand Model, employment growth in this area is projected to be higher than areas to the north and south through 2040, with manufacturing growth in the Central Section outpacing manufacturing growth in the other two sections.
- Maricopa County is located in the North Section. Although Maricopa County is home to the Phoenix Metropolitan Area, the portion that falls within the Study Area is the most sparsely populated and has the least employment. Affected communities within this section include Goodyear, central Buckeye, and Wickenburg. Current employment is concentrated in the service, health services, and leisure industries, with substantial growth projected within the construction sector. Employment growth within the area, which has several large master-planned communities on the horizon, is projected to be the second fastest within the Build Corridor Alternatives, based on forecasts from the Arizona Statewide Travel Demand Model.

3.6.3.2 Industry Targets and Economic Centers

Firms within certain industries, like aerospace and automotive, tend to cluster within a dense area. This clustering affords various advantages, such as access to a shared labor pool, proximity to key suppliers and customers, and transfer of knowledge and technology within industries. The Arizona Commerce Authority (2017) prepared a 5-year business plan for the state in which they strategically targeted six key industries to create high-wage jobs. These industries generate exports and have strong supply chains and multiplier effects that will drive economic development:

- Aerospace and defense;
- Bioscience and health care;
- Business and financial services;
- Film and digital media;
- Manufacturing; and
- Technology and innovation.

Detailed discussions of the current and/or growth targets of the above industries within each section of the Build Corridor Alternatives are presented below.

Industry targets for the South Section include aerospace, bioscience, manufacturing, mining, transportation and logistics, and tourism. Within the South Section, existing employment centers

are concentrated at the international border and along I-10 and I-19 near the Tucson International Airport. Large mining operations are located adjacent to I-19 near Sahuarita.

As noted in Section 3.3, this area contains about 14,500 acres of existing commercial, industrial, mixed use, and office land uses to accommodate business. There are plans for approximately 12,700 additional acres to accommodate future employment uses. Existing and planned economic centers within the South Section include:

- Mariposa International Commerce/Industry Park Area (Existing): Employment center, industrial parks, and distribution facilities near the Mariposa Land Port of Entry, which is the third largest border crossing by volume in the US.
- Sahuarita Farms (Planned): Approximately 7,000 acres of farmland. The farmland is approved for a new mixed-use, master-planned community with 19,055 dwelling units and 5 million square feet of commercial, office, hospitality, and employment space.
- Sonoran Corridor (Proposed): Auxiliary interstate freeway that would connect I-19 with I-10 south of Tucson. The freeway would loop around Tucson International Airport to the south and east.
- Port of Tucson (Existing): An intermodal freight facility fulfilling both domestic and international shipments along I-10 and the Union Pacific Railroad Sunset Limited mainline corridor east of Tucson.
- Tucson Aerospace Business Park (Planned): Located south of Tucson International Airport and the proposed Sonoran Corridor, this business park will provide key infrastructure improvements for existing businesses, but also will foster opportunities for new aviation and defense-related uses by creating a high-tech multimodal transportation corridor.
- Ryan Airfield (Existing): Located north of State Route (SR) 86 at the Valencia Road intersection, this airfield consists of 1,800 acres of commercial and industrial land.
- Marana Regional Airport (Existing): An activity center with opportunities to house manufacturing and distribution facilities is planned for this general aviation airport, which has a 6,900-foot runway.
- Pinal Airpark (Existing): This is a designated transportation and logistics activity center. Currently, the Western Army National Guard Aviation Training Site, parachute training and testing, and some aerospace companies have operations here. The long-term vision is that the Pinal Airpark could be used as a cargo airport.

The industry targets for the Central Section include aerospace, agriculture, education, manufacturing, transportation and logistics, and destination entertainment. Currently, employment is concentrated in Goodyear along Maricopa County 85/Bullard Corridor and in Casa Grande north and south of SR 287 and Jimmie Kerr Boulevard.

This area has about 2,400 acres of existing commercial, industrial, mixed-use, and office land uses, and there are plans for another approximately 11,400 acres. Existing and planned economic centers within the area include:

- Dreamport Village (Planned): This theme park with multiple resorts and aquatic and residential land uses consists of 1,500 acres located north and south of I-8 and west of I-10.
- Attesa (Planned): This is a motorsports raceway, research and development, and automotive facility on 2,500 acres south of I-8 between Montgomery and Bianca roads.

- Nikola Motor Company (Planned): The Nikola Motor Company will build a $1 billion hydrogen-electric semi-truck manufacturing operation in Coolidge, which will manufacture level-5 autonomous trucks (Khairalla 2018). The company, which plans to break ground on 500 acres in 2019, will have 1 million square feet of manufacturing space accommodating up to 2,000 employees at build-out.
- Union Pacific Railroad Red Rock Classification Yard (Planned): Union Pacific Railroad proposes to build this major railyard approximately 35 miles north of Tucson to serve its Sunset Limited mainline corridor. The railyard is intended to be one of the largest logistics centers in the western US.
- Phoenix Mart (Under Construction): This proposed global trade center in Casa Grande would be an international exposition center similar to the Merchandise Mart in Chicago, and it also would accommodate mixed-use development.
- Harrah's Ak Chin Casino and Resort (Existing): An entertainment center anchored with a casino and hotel, this development is located west of SR 347 and south of Farrell Road. Uses include gaming, dining, retail, a movie theater, and a bowling alley. The Southern Dunes Golf Club is located nearby.
- Estrella, formerly Estrella Mountain Ranch (Existing): This 20,000-acre master-planned community 17 miles west of downtown Phoenix, just south of I-10 and the Gila River is located along the proposed SR 303L extension. Estrella has 5,000 dwelling units and is currently approximately 10 percent built out. It will ultimately include three major mixed-use activity centers and more than 50,000 dwelling units.

Industry targets for the North Section include aviation and aerospace, advanced manufacturing, transportation and logistics, health services, and higher education. Much of the land in this area is currently vacant or low-density residential along the various Corridor Options (S, U, and X). There are no existing acres of industrial, commercial, mixed use, or office land uses. However, according to planning documents, approximately 5,100 acres of employment-generating land uses are proposed. Existing and planned economic centers within this area include:

- Buckeye Industrial Corridor (Existing): This corridor consists of more than 16 square miles of industrial and business park property that supports both domestic and international business.
- Belmont (Planned): This proposed 24,800-acre master-planned community would have approximately 72,800 dwelling units and 2,100 acres for commercial and employment use.
- Douglas Ranch (Planned): This proposed 33,800-acre master-planned community, which is approximately 14 miles north of I-10 in Buckeye, would have more than 104,000 dwelling units and 55 million square feet of business and commercial use proposed.
- Forepaugh Industrial Rail Park (Existing): This 76-acre industrial park in the Town of Wickenburg is planned for expansion to more than 700 acres, with rail and highway access for light and heavy industrial uses.

3.6.4 Environmental Consequences

The economic impact analysis considers two types of impacts:

- Short-term impacts resulting from construction-related expenditures, including right-of-way, during the I-11 development phase; and
- Long-term impacts resulting from production cost savings (from travel time savings and vehicle operating cost savings accruing to users of the roadway network), amenity benefits (from reduced emissions), and consumption reallocation (from reduced fuel expenditures) during the I-11 operational phase.

The economic impact analysis qualitatively considers the impact on outdoor and wildlife-related recreation and national parks, such as SNP. The Build Corridor Alternatives may have positive or negative effects on these resources. For example, the Build Corridor Alternatives may open access and make it easier for more people to visit the region and its parks. Alternatively, it could deter park visits and economic contributions from outdoor enthusiasts by reducing the rural character of the parks or diminishing the visitor experience of the parks.

As described earlier, ecotourism is an important part of the Arizona economy and the counties along I-11. For example, Southwick Associates estimates that watchable wildlife recreation contributed more than $1.0 billion to the economies of Maricopa, Pinal, and Pima counties in 2011 (Southwick Associates Inc. 2013). I-11 has the potential to provide better access and opportunities for appropriate gateway services, such as lodging, that enhance ecotourism. Carefully planned, I-11 can help further the growth of outdoor tourism as an anchor of the local economy.

The construction costs are based on current conceptual or planning level estimates. For the purpose of the economic impact analysis, construction is assumed to start in 2020 and end in 2024, and benefits are estimated over a 20-year period from 2025 to 2044. Separate tables for each time period show the short-term economic impacts of the construction expenditures (2020 to 2024) and the long-term economic impacts (2025 to 2044). The short-term impacts are temporary and reflect the size of the construction expenditures, while the long-term impacts capture changes to the transportation network. The overall analysis period was chosen to provide a common comparison across alternatives and avoid extending the economic impacts beyond a reasonable forecasting period.

Note that the sum of direct, indirect, and induced impacts (i.e., the total economic impact) is reported in the following sections.

3.6.4.1 No Build Alternative

Under the No Build Alternative, the I-11 facility would not be built. **Table 3.6-1** (No Build Economic Data by County, 2020 and 2044) provides a snapshot of the economy under the No Build Alternative, using baseline forecasts from REMI. Estimates of gross regional product (GRP), personal income, and employment in the start year (2020) and the end year (2044) of the analysis are provided for the five counties (Maricopa, Pima, Pinal, Santa Cruz, and Yavapai) included within the Study Area. Note that REMI defines employment as the number of full-time and part-time jobs.

Table 3.6-1 No Build Economic Data by County, 2020 and 2044

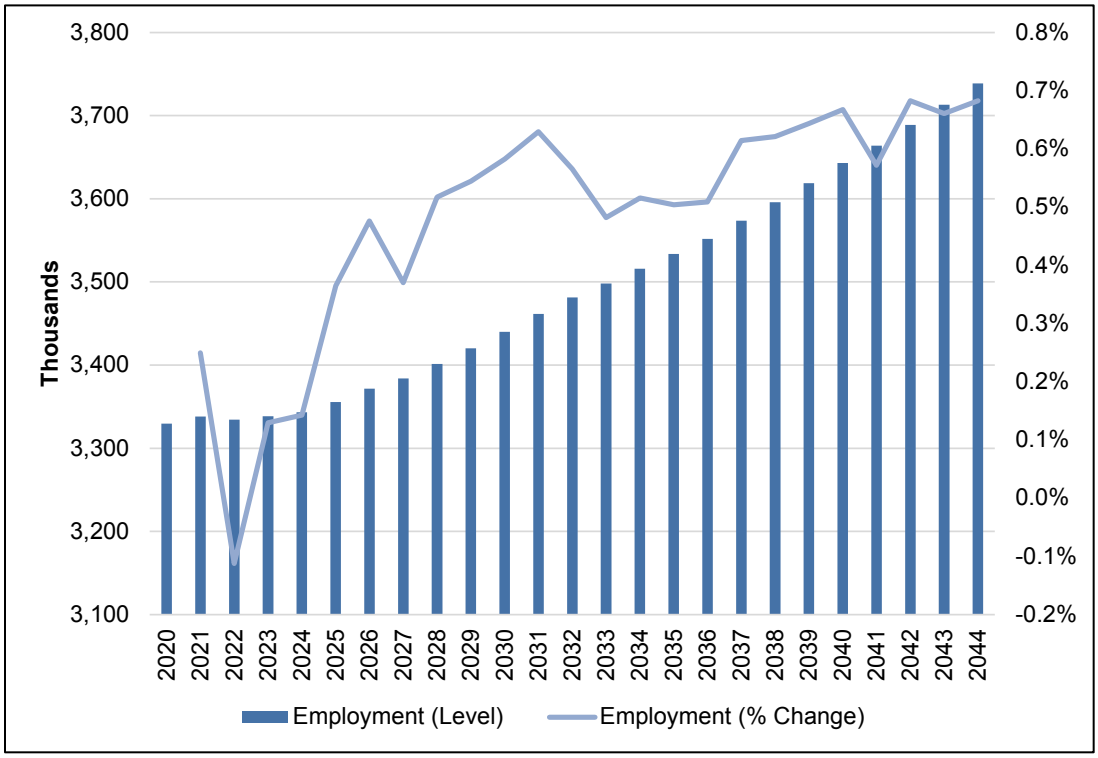
County	Year	GRP (Billions of 2016 Dollars)	Personal Income (Billions of 2016 Dollars)	Employment (Thousands of Jobs)
Yavapai	2020	$6.9	$8.9	100.2
	2044	$10.4	$13.6	105.5
	% Change	*51%*	*53%*	*5%*
Maricopa	2020	$251.6	$213.9	2,590.7
	2044	$419.9	$360.4	2,952.0
	% Change	*67%*	*69%*	*14%*
Pinal	2020	$7.2	$13.5	96.6
	2044	$11.6	$26.2	111.9
	% Change	*61%*	*94%*	*16%*
Pima	2020	$45.5	$44.4	520.9
	2044	$68.0	$67.7	547.4
	% Change	*50%*	*53%*	*5%*
Santa Cruz	2020	$1.7	$1.7	21.4
	2044	$2.6	$2.4	21.8
	% Change	*53%*	*41%*	*2%*

SOURCE: REMI 2017.

As shown in **Table 3.6-1** (No Build Economic Data by County, 2020 and 2044), Maricopa County is, and will remain, the largest economy in the Study Area. Its GRP is expected to increase by 67 percent, the most of any county, over the analysis period. As a result, Maricopa County's share of GRP for the Study Area will increase from 80 percent to 82 percent. Employment also is projected to grow to nearly 3 million.

Figure 3.6-1 (Baseline Employment in Study Area, 2020-2044) shows that total employment in the Study Area is expected to increase by 12 percent from 2020 to 2044 (or 0.48 percent per year on average). Overall, the Study Area's economy is expected to add more than 400,000 jobs.

The next sections show the economic impact of each of the three Build Corridor Alternatives. These impacts are shown as the net change from the No Build (or baseline) forecast.



SOURCE: REMI 2017

Figure 3.6-1 Baseline Employment in Study Area, 2020-2044

3.6.4.2 Purple Alternative

Of the three Build Corridor Alternatives, the Purple Alternative will generate the largest economic impacts. The $12.7 billion increase in GRP under the Purple Alternative is more than double the impact of the Orange Alternative, primarily due to initial construction costs, and this increase also is $1.0 billion more than the impact of the Green Alternative. Similarly, the Purple Alternative's impact on personal income ($11.1 billion) is expected to be more than twice the impact of the Orange Alternative and $1.1 billion greater than the impact under the Green Alternative. The employment impact in the Study Area is estimated at 138,200 job-years over the analysis period (2020-2044).

The Purple Alternative will positively impact the regional economy over the course of the analysis period (2020-2044). The economic impact will be the largest during the development phase (2020-2024). Construction expenditures during this phase will add $8.9 billion to GRP, $5.7 billion to personal income, and 106,400 job-years. **Table 3.6-2** (Net Economic Impact, 2020-2024 – Purple Alternative) summarizes the economic impacts of the Purple Alternative during the development phase.

Table 3.6-2 Net Economic Impact, 2020-2024 – Purple Alternative

Impact Metrics	Purple Alternative
GRP (Billions of 2016 Dollars)	$8.9
Personal Income (Billions of 2016 Dollars)	$5.7
Employment (Thousands of Job-Years)	106.4

NOTE: Estimates show the net difference between the Purple Alternative and the No Build Alternative. A job-year is simply defined as one (part- or full-time) job for 1 year.

Although some construction-related impacts will persist into later years, the economic impacts for the remainder of the analysis period, 2025-2044, will be attributed to transportation efficiencies. These impacts are expected to be smaller than those during the development phase. This is normally the case for highway projects of this magnitude. However, unlike construction-related impacts that are short-lived (temporary), impacts attributed to transportation efficiencies reoccur annually (permanent) and will continue to accrue beyond 2044, the end year of the analysis. The impact associated with transportation efficiencies under the Purple Alternative will result in the addition of $3.7 billion to GRP, $5.4 billion to personal income, and 31,800 job-years, as shown in **Table 3.6-3** (Net Economic Impact, 2025-2044 – Purple Alternative).

Table 3.6-3 Net Economic Impact, 2025-2044 – Purple Alternative

Impact Metrics	Purple Alternative
GRP (Billions of 2016 Dollars)	$3.7
Personal Income (Billions of 2016 Dollars)	$5.4
Employment (Thousands of Job-Years)	31.8

NOTE: Estimates show the net difference between the Purple Alternative and the No Build Alternative. A job-year is simply defined as one (part- or full-time) job for 1 year.

The GRP impact under the Purple Alternative will be larger during the first 5 years of the analysis period when construction occurs. After the construction period, the GRP impact will decrease to an average of $173 million per year from 2025 to 2044. **Figure 3.6-2** (Net GRP Impact, 2020-2044 [Billions of 2016 Dollars] – Purple Alternative) shows the annual change in GRP under the Purple Alternative.

Overall, the Purple Alternative is expected to generate more than 138,000 job-years from 2020 to 2044. The industries with the largest employment impact are expected to be construction; retail trade; food services and drinking places; and professional, scientific, and technical services (**Figure 3.6-3** [Employment Impact by Industry, 2020-2044 – Purple Alternative]). These four industries combined represent more than 60 percent of all jobs created in the Study Area during the analysis period. These results are consistent across all three Build Corridor Alternatives.

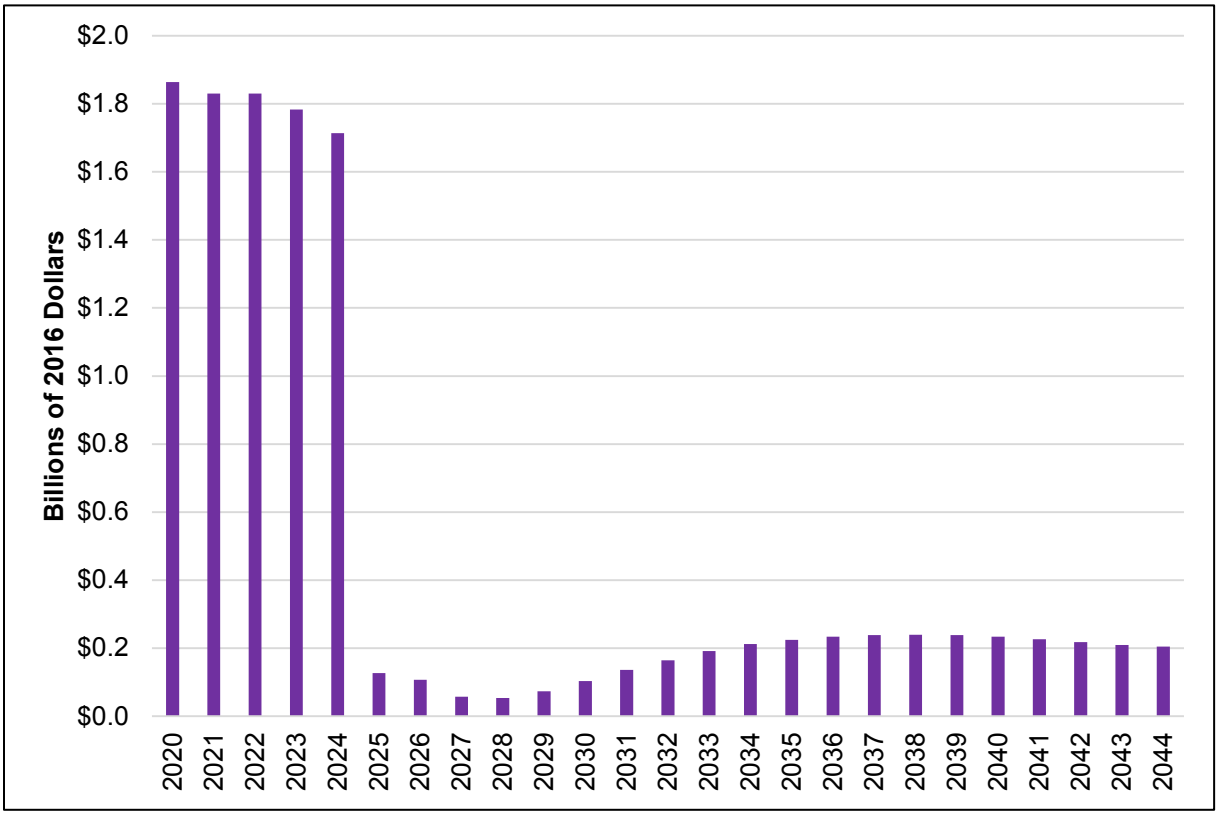


Figure 3.6-2 Net GRP Impact, 2020-2044 (Billions of 2016 Dollars) – Purple Alternative

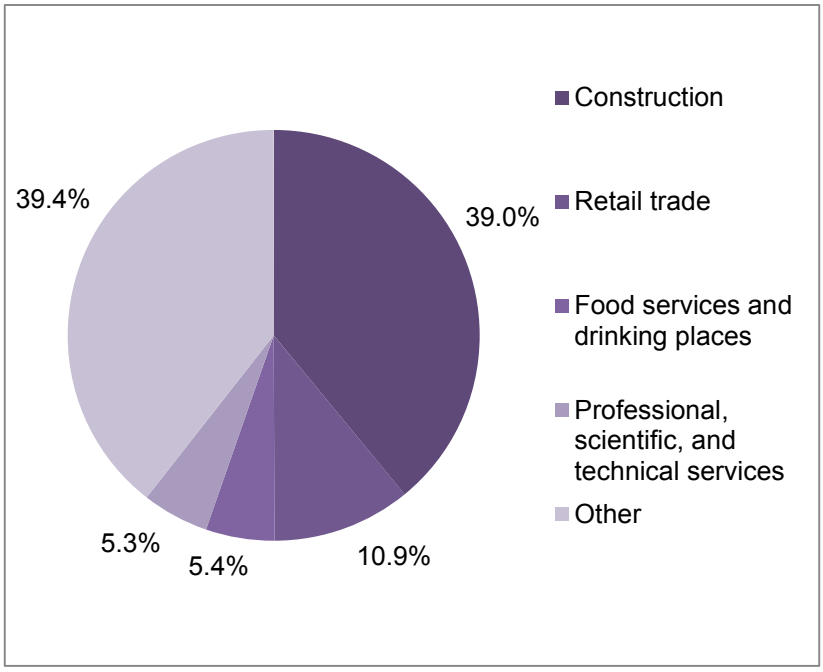


Figure 3.6-3 Employment Impact by Industry, 2020-2044 – Purple Alternative

The employment impact is summarized below by county:

- **Maricopa County**: Expected to have the largest increase in employment (105,000 job-years) compared with the other counties, representing approximately three-quarters of the total employment impact in the Study Area under the Purple Alternative.
- **Pima County**: Employment impact is estimated at 21,700 job-years from 2020 through 2044.
- **Pinal County**: Employment impact is estimated at 6,800 job-years from 2020 through 2044, representing approximately 5 percent of the total employment impact in the Study Area under the Purple Alternative.
- **Santa Cruz County**: Likely to have a small employment impact of 800 job-years from 2020 to 2044.
- **Yavapai County**: Employment impact is expected to result in 4,000 job-years added from 2020 to 2044.

3.6.4.3 Green Alternative

As is the case with the Purple Alternative, the economic impact due to construction expenditures will be larger than the economic impact due to transportation efficiencies. During the development phase, construction expenditures are expected to contribute a cumulative $8.7 billion to GRP or a cumulative $5.6 billion to personal income in the Study Area. In addition, the Green Alternative will generate more than 104,000 job-years (or nearly 21,000 jobs per year) during the development phase. **Table 3.6-4** (Net Economic Impact, 2020-2024 – Green Alternative) summarizes the economic impacts of the Green Alternative during the development phase.

Table 3.6-4 Net Economic Impact, 2020-2024 – Green Alternative

Impact Metrics	Green Alternative
GRP (Billions of 2016 Dollars)	$8.7
Personal Income (Billions of 2016 Dollars)	$5.6
Employment (Thousands of Job-Years)	104.5

NOTE: Estimates show the net difference between the Green Alternative and the No Build Alternative. A job-year is simply defined as one (part- or full-time) job for 1 year.

During the remainder of the analysis period (2025-2044), economic impacts due to transportation efficiencies are expected to be significantly smaller. Transportation efficiencies are expected to generate $2.9 billion in GRP or $4.4 billion in personal income through 2044. Note that the personal income impact is expected to be larger than the GRP impact because it accounts for the net decrease in consumer spending from fuel cost savings. The Green Alternative also is expected to generate nearly 26,000 job-years (or 5,000 jobs per year) during the operational phase. **Table 3.6-5** (Net Economic Impact, 2025-2044 – Green Alternative) summarizes the economic impacts of the Green Alternative during the operational phase.

Table 3.6-5 Net Economic Impact, 2025-2044 – Green Alternative

Impact Metrics	Green Alternative
GRP (Billions of 2016 Dollars)	$2.9
Personal Income (Billions of 2016 Dollars)	$4.4
Employment (Thousands of Job-Years)	25.9

NOTE: Estimates show the net difference between the Green Alternative and the No Build Alternative. A job-year is simply defined as one (part- or full-time) job for 1 year.

Overall, the Green Alternative is expected to contribute $11.7 billion to the GRP or $10.0 billion to personal income, and generate more than 130,000 job-years from 2020 to 2044. **Figure 3.6-4** (Net GRP Impact, 2020-2044 [Billions of 2016 Dollars] – Green Alternative) shows the change in GRP under the Green Alternative on an annual basis. As with the Purple Alternative, the economic impact due to construction during the first 5 years is expected to be larger than the economic impact due to transportation efficiencies. After the construction period, the GRP impact will decrease to $147 million annually from 2025 to 2044 under the Green Alternative.

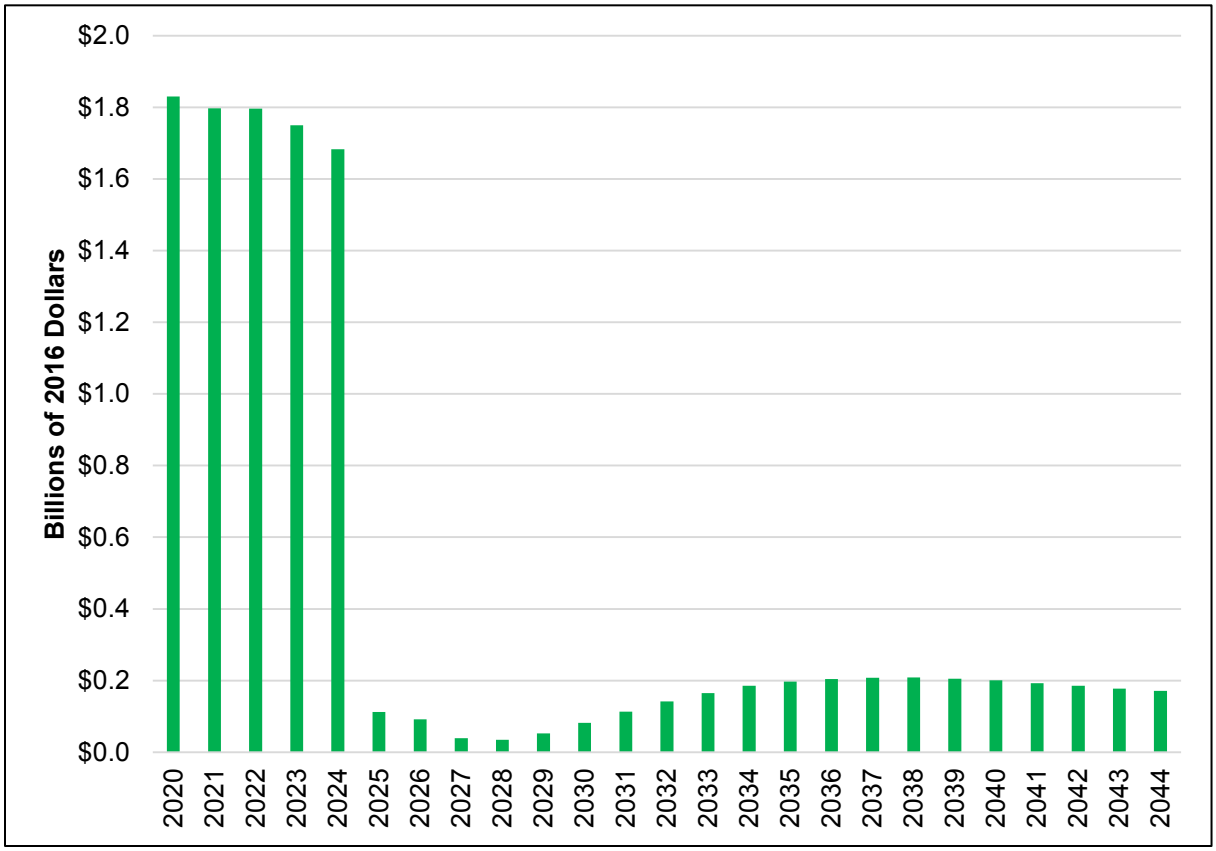


Figure 3.6-4 Net GRP Impact, 2020-2044 (Billions of 2016 Dollars) – Green Alternative

The industries with the largest employment impact are expected to be construction; retail trade; food services and drinking places; and professional, scientific, and technical services, as shown on **Figure 3.6-5** (Employment Impact by Industry, 2020-2044 – Green Alternative). These four industries combined represent more than 60 percent of all jobs created in the Study Area over the analysis period.

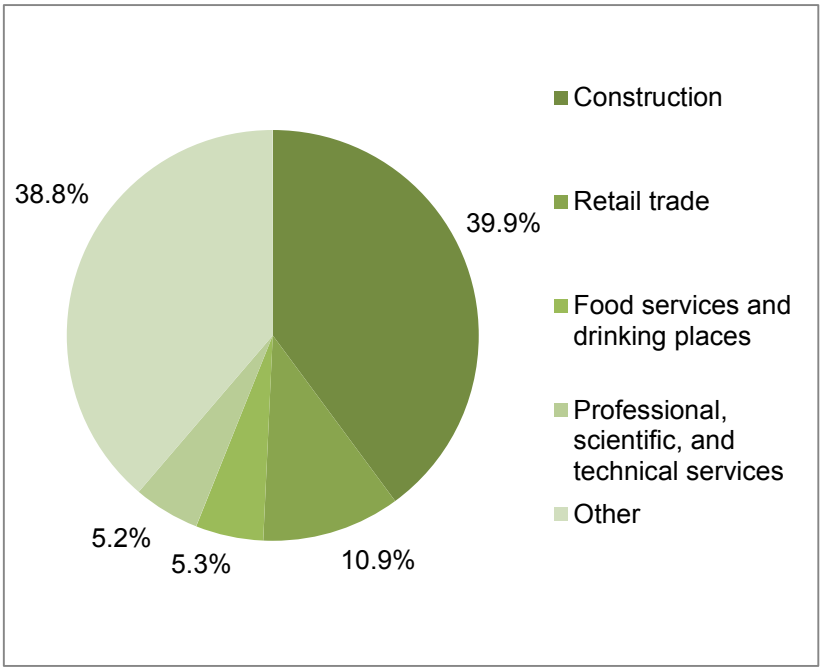


Figure 3.6-5 Employment Impact by Industry, 2020-2044 – Green Alternative

The employment impact under the Green Alternative is summarized below by county:

- **Maricopa County:** This county is expected to experience the vast majority of economic impacts. The cumulative employment impact over the analysis period (2020-2044) is estimated at 98.9 thousand job-years (or 76 percent of the total employment impact) under the Green Alternative.
- **Pima County:** This county will experience the second largest employment impact, with 20,700 job-years (or 16 percent of the total employment impact) from 2020 to 2044.
- **Pinal County:** The employment impact in this county is expected to be relatively smaller, with just 6,400 job-years generated over the analysis period. Pinal County is expected to be an emerging economy in the Study Area, one with strong employment growth opportunities.
- **Santa Cruz County:** This county, which is the smallest in Arizona, is expected to experience significantly smaller economic impacts, which are estimated at only 700 job-years from 2020 to 2044.
- **Yavapai County:** This county is expected to experience relatively smaller economic impacts and the cumulative employment impact is estimated at 3,700 job-years.

3.6.4.4 Orange Alternative

The Orange Alternative will result in the smallest economic impact of the three alternatives. It is expected to add $5.7 billion to GRP (about two-thirds of the dollar impact under the Green Alternative), $4.8 billion to personal income, and more than 62,000 job-years in the Study Area over the analysis period.

As with the Purple and Green Alternatives, the majority of the economic impact under the Orange Alternative is expected to be due to construction expenditures during the years 2020-2024. **Table 3.6-6** (Net Economic Impact, 2020-2024 – Orange Alternative), which summarizes the economic impact under the Orange Alternative, shows that the contributions to GRP and personal income are estimated at $3.9 billion and $2.5 billion, respectively. Construction expenditures also are expected to generate 46,800 job-years under the Orange Alternative.

Table 3.6-6 Net Economic Impact, 2020-2024 – Orange Alternative

Impact Metrics	Orange Alternative
GRP (Billions of 2016 Dollars)	$3.9
Personal Income (Billions of 2016 Dollars)	$2.5
Employment (Thousands of Job-Years)	46.8

NOTE: Estimates show the net difference between the Orange Alternative and the No Build Alternative. A job-year is simply defined as one (part- or full-time) job for 1 year.

The economic impact associated with transportation efficiencies in the remainder of the analysis period is much less for GRP and employment, but is comparable for personal income. It is expected that GRP will increase by $1.8 billion and employment by 15,400 job-years from 2025 through 2044. The impact to personal income is estimated at $2.3 billion, as shown in **Table 3.6-7** (Net Economic Impact, 2025-2044 – Orange Alternative).

Table 3.6-7 Net Economic Impact, 2025-2044 – Orange Alternative

Impact Metrics	Orange Alternative
GRP (Billions of 2016 Dollars)	$1.8
Personal income (Billions of 2016 Dollars)	$2.3
Employment (Thousands of Job-Years)	15.4

NOTE: Estimates show the net difference between the Orange Alternative and the No Build Alternative. A job-year is simply defined as one (part- or full-time) job for 1 year.

The GRP impact under the Orange Alternative will follow a trend that is similar to that of the Green Alternative. The impact is expected to be large during construction in the first 5 years, but is expected to decrease significantly to an annual economic impact of $84 million from 2025 to 2044. **Figure 3.6-6** (Net GRP Impact, 2020-2044 [Billions of 2016 Dollars] – Orange Alternative) shows the GRP impact under the Orange Alternative on an annual basis.

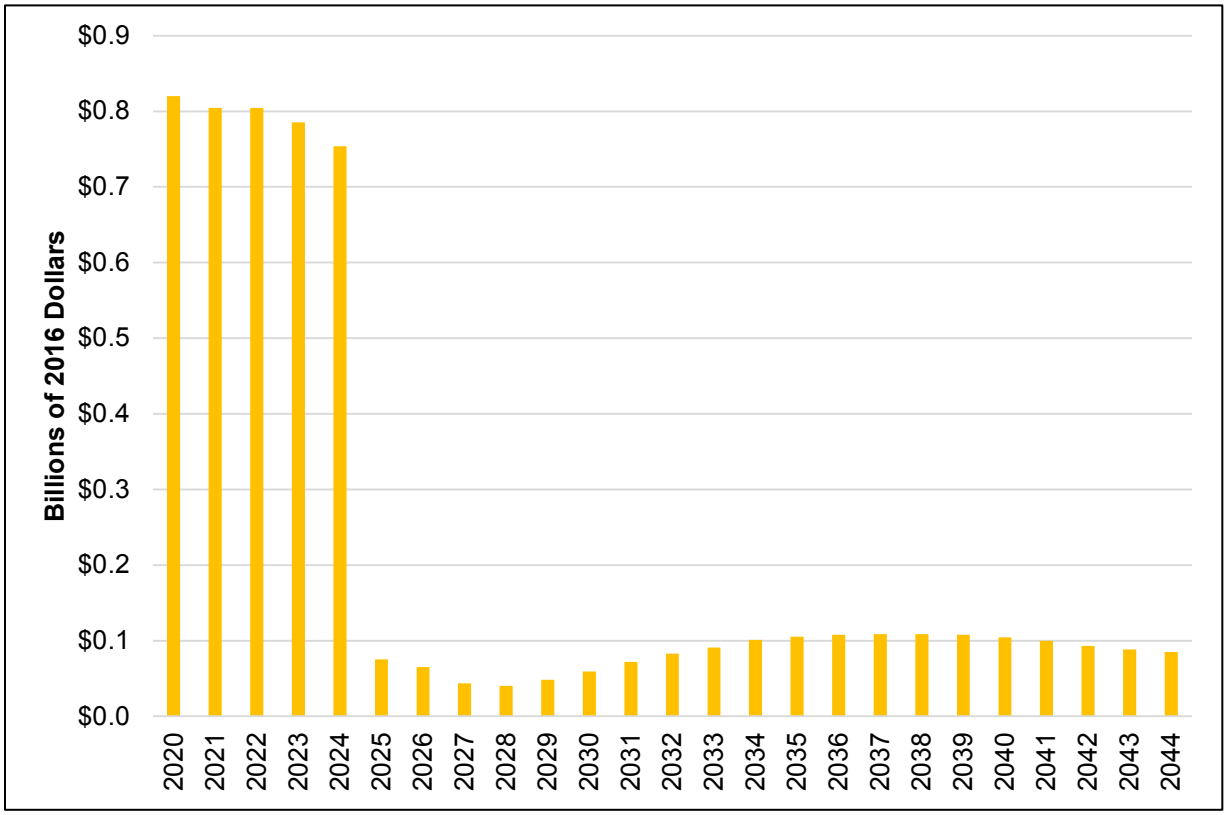


Figure 3.6-6 Net GRP Impact, 2020-2044 (Billions of 2016 Dollars) – Orange Alternative

Overall, the Orange Alternative is expected to generate more than 62,000 job-years from 2020 to 2044. Construction, retail trade, food services and drinking places, and professional, scientific, and technical services are expected to be the industries with the largest employment impact, as shown on **Figure 3.6-7** (Employment Impact by Industry, 2020-2044 – Orange Alternative). These four industries combined represent about 60 percent of all jobs created in the Study Area over the analysis period.

The employment impact under the Orange Alternative is summarized below by county:

- **Maricopa County:** As with the Green Alternative, Maricopa County is expected to experience the largest employment impact, with 47,300 job-years expected to be created over the analysis period. Maricopa County accounts for more than 75 percent of the total employment impact in the Study Area under the Orange Alternative.
- **Pima County:** The employment impact is estimated at 9,800 job-years over the period 2020-2044.
- **Pinal County:** Employment is expected to increase by 3,000 job-years as a result of construction expenditures and transportation efficiencies.
- **Santa Cruz County:** This county is expected to experience the smallest employment impact in the Study Area, with just 400 job-years created.
- **Yavapai County:** The cumulative employment impact is estimated at 1,800 job-years.

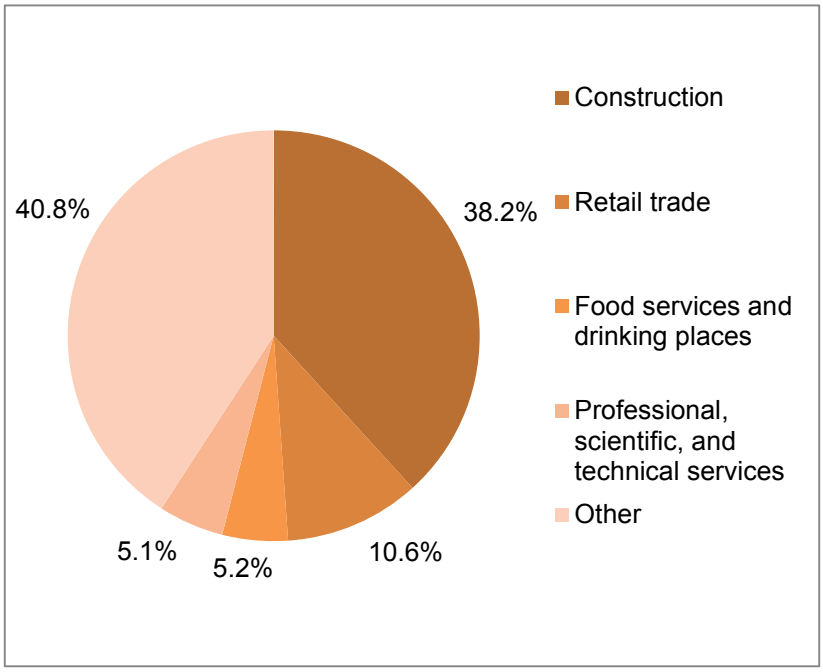


Figure 3.6-7 Employment Impact by Industry, 2020-2044 – Orange Alternative

3.6.4.5 Summary

Table 3.6-8 (Summary of Potential Impacts to Economic Indicators) summarizes the economic analysis results for the three Build Corridor Alternatives. The table shows the net change from the No Build Alternative (or baseline) for each alternative.

The Build Corridor Alternatives may have positive or negative effects on ecotourism. For example, the Build Corridor Alternatives may open access and facilitate more people visiting parks and other outdoor recreation destinations. Then again, the alternatives could deter park visits and economic contributions from outdoor enthusiasts by reducing the rural character of parks or diminishing the visitor experience. I-11 has the potential to provide better access and opportunities for appropriate gateway services, such as lodging, that enhance ecotourism. The Build Corridor Alternatives can help further the growth of outdoor tourism as an anchor of the local economy.

Table 3.6-8 Summary of Potential Impacts to Economic Indicators

	Corridor Alternatives			
	No Build*	Purple	Green	Orange
GRP ($ Billions)	N/A	$8.9	$8.7	$3.9
Personal Income ($ Billions)	N/A	$5.7	$5.6	$2.5
Employment (Thousands of Job-Years)	N/A	106.4	104.5	46.8
GRP ($ Billions)	N/A	$3.7	$2.9	$1.8
Personal Income ($ Billions)	N/A	$5.4	$4.4	$2.3
Employment (Thousands of Job-Years)	N/A	31.8	25.9	15.4
GRP($ Billions)	N/A	$12.7	$11.7	$5.7
Personal Income ($ Billions)	N/A	$11.1	$10.0	$4.8
Employment (Thousands of Job-Years)	N/A	138.2	130.4	62.3
Construction	N/A	39.0%	39.9%	38.2%
Retail Trade	N/A	10.9%	10.9%	10.6%
Food Services and Drinking Places	N/A	5.4%	5.3%	5.2%
Professional, Scientific, and Technical Services	N/A	5.3%	5.2%	5.1%
Yavapai County (Thousands of Job-Years)	N/A	4.0	3.7	1.8
Maricopa County (Thousands of Job-Years)	N/A	105.0	98.9	47.3
Pinal County (Thousands of Job-Years)	N/A	6.8	6.4	3.0
Pima County (Thousands of Job-Years)	N/A	21.7	20.7	9.8
Santa Cruz County (Thousands of Job-Years)	N/A	0.8	0.7	0.4

* The No Build is marked as N/A (not applicable) because the estimates show the estimated difference between the Build Corridor Alternatives and the No Build Alternative. The current economic growth trends would be expected to continue under the No Build Alternative.

Table 3.6-9 (Indirect and Cumulative Economic Effects) summarizes the indirect economic effects and cumulative economic effects for the No Build and the three Build Corridor Alternatives. Note that the economic effects are the same for the Purple, Green, and Orange Alternatives.

3.6.5 Potential Mitigation Strategies

I-11 is intended to mitigate transportation needs and issues while supporting improved regional mobility for people, goods, and homeland security. Economic development organizations and governmental agencies would be able to employ a variety of tactics to bolster economic development by leveraging I-11. These strategies could include:

- Revising county comprehensive and municipal general plans, zoning ordinances, and capital improvement programs to support the corridor;
- Reducing the risk of uncoordinated development and uncertainty by determining the location of the corridor;
- Adopting financing tools and strategies targeted to increase investment and job creation along the corridor;
- Implementing business attraction strategies and efforts to target desirable economic sector development along the corridor;
- Preparing for and funding infrastructure improvements to planned industrial and business parks along the corridor;
- Ensuring the presence of workforce housing by adopting plans and policies to preserve and increase affordable housing in the region;
- Adopting zoning strategies that support and encourage recreation compatibility and wildlife connectivity to support the mitigation in the Tier 1 Record of Decision; and
- Strategically locating traffic interchanges to provide good transportation access and sufficient distance from environmentally sensitive destinations.

3.6.6 Future Tier 2 Analysis

A future Tier 2 assessment would address the spacing and number of existing and future system interchanges along the transportation corridor. Use of an updated travel demand model delineating population and employment projections combined with an assessment of planned/entitled private developments would help determine the locations most suitable for ensuring transportation system safety and mobility. More detailed information on the alignment during the Tier 2 assessment would enable further analysis of impacts related to businesses, including loss of access. The Tier 2 EIS also can take advantage of the recently released Outdoor Recreation Satellite Accounts. These new satellite accounts developed by the Bureau of Economic Analysis would facilitate the translation of data gathered through tracker surveys into impacts on outdoor recreation and the overall regional economy. The surveys could collect information on visitor spending, on attractions that generate tourist visits, and on how the I-11 alternatives might affect tourists' decisions.

Table 3.6-9 Indirect and Cumulative Economic Effects

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Economic Effects				
Indirect Effects	Programmed transportation improvements plus projected population and employment growth could: • Result in high levels of congestion in the I-10 and I-19 corridors that would hinder business growth.	Land development induced by I-11 could: • 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 right-of-way. • Provide better access, resulting in greater use of parks and outdoor recreation areas as well as opportunities for appropriate gateway services to support ecotourism, such as lodging.	Similar to the Purple Alternative.	Similar to the Purple Alternative.

Table 3.6-9 Indirect and Cumulative Economic Effects (Continued)

Resource	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Economic Effects				
		• Diminish user experiences in parks and outdoor recreation areas by drawing additional visitors and reducing hunting, fishing, and bird-watching opportunities.		
Cumulative Effects	Past, present, and reasonably foreseeable projects could: • Lead to incremental economic losses and fewer economic opportunities due to increased levels of congestion.	Past, present, and reasonably foreseeable projects could: • Stimulate economic growth in Arizona by means of the economic multiplier (i.e., the increase in supplier spending and employee spending across all sectors of the economy).	Similar to the Purple Alternative.	Similar to the Purple Alternative.

This page intentionally left blank

3.7 Archaeological, Historical, Architectural, Cultural Resources

The resources addressed in this section are commonly referred to as cultural or heritage resources. The analysis considered three categories of cultural resources: (1) prehistoric and historic archaeological sites and historic structures, (2) historic districts and buildings, and (3) traditional cultural properties that can include a variety of resources and places significant to Tribes. The information presented in this section is more fully documented in Class I cultural resource overview reports prepared to support this Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS) (Mitchell et al. 2018; Ryden et al. 2018).

3.7.1 Regulatory Setting

Tier 1 cultural resource studies addressed the National Environmental Policy Act (NEPA) (42 United States Code [USC] §§ 4321-4370h) and initiated compliance with the National Historic Preservation Act (NHPA) (54 USC § 300101 et seq.). NEPA established a policy for the federal government to use practicable means to preserve important historic and cultural aspects of our national heritage. Pursuant to NEPA, federal agencies assess how their actions "may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places (NRHP) or may cause loss or destruction of significant scientific, cultural, or historical resources" (40 Code of Federal Regulations [CFR] § 1508.27[b][8]).

Pursuant to NHPA Section 106, federal agencies consider, in consultation with the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Offices (SHPO), Tribal Historic Preservation Offices, and other interested parties, the effects of agency undertakings on historic properties, and avoid, minimize, or mitigate any adverse effects. Historic properties are defined as prehistoric or historic districts, sites, buildings, structures, and objects listed in or eligible for listing in the NRHP. ACHP regulations that implement NHPA Section 106 (*Protection of Historic Properties,* 36 CFR § 800) define a process for federal agencies to consider how undertakings may affect historic properties. Federal Highway Administration (FHWA) and Arizona Department of Transportation (ADOT) pursued compliance with NHPA Section 106 concurrently with NEPA studies, as recommended by a Council on Environmental Quality and ACHP (2013) handbook.

To be eligible for the NRHP, properties must be 50 years old (unless they have special historic significance) and have national, state, or local significance in American history, architecture, archaeology, engineering, or culture (36 CFR § 60). Properties also must possess integrity of location, design, setting, materials, workmanship, feeling, and association to convey their historic values, and meet at least one of four criteria:

- Criterion A: are associated with events that have made a significant contribution to the broad patterns of our history; or
- Criterion B: are associated with the lives of significant persons in our past; or
- Criterion C: embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D: have yielded or may be likely to yield, information important in history or prehistory.

In accordance with the guidance of National Register Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties*, FHWA and ADOT consulted and continue to consult with Tribes to consider potential impacts on traditional cultural properties. Traditional cultural properties have associations with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. FHWA and ADOT Tribal consultations also are addressing policy established by the American Indian Religious Freedom Act of 1978 (42 USC § 1996) to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise their traditional religions, including but not limited to access to sites, use and possession of sacred objects, and freedom to worship through ceremonials and traditional rites.

The Tier 1 cultural resource studies support ADOT compliance with the State Historic Preservation Act of 1982 (Arizona Revised Statutes 41-861 through 41-864), which requires state agencies to consult SHPO about activities that could alter or demolish properties listed in or eligible for the Arizona Register of Historic Places. Because criteria for the Arizona Register of Historic Places and NRHP are identical, NHPA and State Historic Preservation Act requirements are addressed simultaneously.

The Arizona Antiquities Act (Arizona Revised Statutes 41-841 through 41-847) directs persons in charge of activities on lands owned or controlled by state agencies and institutions, counties, and municipal corporations to report the discovery of archaeological, historical, or paleontological sites or objects and human remains at least 50 years old, to the Arizona State Museum. Studies of such resources must be authorized by Arizona Antiquities Act permits issued by the Museum. ADOT will continue to address the Arizona Antiquities Act during planning of Tier 2 projects.

3.7.2 Methodology

Because the planning of Interstate 11 (I-11) is phased, FHWA and ADOT adopted a phased approach to inventory, evaluate, and assess effects of I-11 on cultural resources between Nogales and Wickenburg. Studies to support the Tier 1 level of conceptual planning involved FHWA and ADOT consultation with agencies, Tribes, and other interested parties, as well as collection and analysis of data compiled by prior archaeological and historical studies. Surveys to identify and inventory cultural resources, evaluate their NRHP eligibility, and assess and address effects will be undertaken during NEPA studies for individual Tier 2 projects.

3.7.2.1 Area of Potential Effects and Project Area

NHPA Section 106 regulations define the area of potential effects (APE) as the area where a federal undertaking could directly or indirectly alter the character or use of NRHP-listed or eligible properties. The APE is influenced by the scale and nature of an undertaking and may be different for different types of effects caused by an undertaking. The APE for direct impacts of highway projects may include the right-of-way (ROW) and temporary construction easements that could be disturbed by construction. Indirect effects are caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR § 1508.8). Delineating APEs for indirect effects of highway projects often involves consideration of visual changes, increased noise, and enhanced vehicular access that could increase inadvertent damage or vandalism. New highways also can induce development that could indirectly affect cultural resources beyond ROWs. See Section 3.2, Indirect and Cumulative Effects, for discussion of indirect effects of induced development and cumulative effects.

The three 2,000-foot-wide Build Corridor Alternatives were considered to be the I-11 Corridor Study Area (Study Area) and APE for the Tier 1 analysis that was conducted to provide a basis for generally characterizing and comparing potential direct and indirect impacts on cultural resources (see **Figures 2-8, 2-9**, and **2-10**). Conceptual engineering determined that the typical cross section for new highways that would be developed for I-11 would be approximately 400 feet wide, but specific footprints for new highways will not be identified until subsequent Tier 2 projects are planned and designed. A specific APE would be defined and a determination of effect would be made in conjunction with NEPA studies for each Tier 2 project.

3.7.2.2 Consultation

Pursuant to NHPA Section 106, federal agencies seek comments from Consulting Parties based on their special knowledge of, concern for, or mandated regulatory role relative to historic properties (36 CFR § 800). In addition to federal agencies with NHPA Section 106 responsibilities, the parties entitled to participate as Section 106 Consulting Parties include:

- ACHP
- SHPOs
- Federally recognized Tribes/Tribal Historic Preservation Officers
- Local governments
- Applicants for federal assistance, permits, licenses, and other approvals

Other individuals and organizations with a demonstrated interest in a project also may participate in the Section 106 process as Consulting Parties due to the nature of their legal or economic relationship to the undertaking or affected properties, or their concern with the undertaking's effects on historic properties. Their participation is subject to approval by FHWA, as the responsible federal agency.

On March 21, 2016, prior to issuing a Notice of Intent to prepare an EIS, FHWA and ADOT provided early notifications of I-11 to Tribes with reservations in the vicinity of the Corridor Options and offered to meet with them. Six early outreach meetings or telephone calls were held with five Tribes. On July 5, 2016, during scoping of the Draft Tier 1 EIS, FHWA initiated Section 106 consultations with the SHPO and invited agencies and Tribes to participate. Subsequently, FHWA identified other parties as having an interest in I-11 and invited them to participate in the consultations. FHWA invited 91 agencies, Tribes, and organizations to participate as Section 106 Consulting Parties (**Table 3.7-1**, Section 106 Consulting Parties).

Twelve parties declined the invitation to participate and per their request will not be included in future NHPA Section 106 consultations. Fifty-one parties accepted the invitation and were designated Consulting Parties. FHWA and ADOT will continue to consult the 28 parties that did not respond to the invitation unless they specifically indicate they do not want to participate. During preparation of the EIS, FHWA and ADOT consulted Tribes in a government-to-government framework and coordinated with other interested parties (see **Appendix E7**, Section 106 Consultation Summary and Draft Programmatic Agreement, for information about the consultations).

Table 3.7-1 Section 106 Consulting Parties

Agency	Response to Invitation
Federal Agencies	
ACHP	Asked to be invited after extent of impacts is more defined and development of a programmatic agreement is initiated.
Bureau of Indian Affairs, Western Region	Accepted
Bureau of Indian Affairs, San Carlos Irrigation Project	Accepted
Bureau of Land Management (BLM), State Office	Accepted
BLM, Hassayampa Field Office	Accepted
BLM, Lower Sonoran Field Office	Accepted
BLM, Tucson Field Office	Accepted
Bureau of Reclamation (Reclamation)	Accepted
Department of Homeland Security, Customs and Border Protection	Followed up on 10/14/16 (phone); No Response
Federal Aviation Administration (FAA), Regional Airports Division	Followed up on 10/25/16 (phone); No Response
Federal Railroad Administration (FRA)	Declined
National Park Service (NPS), Saguaro National Park (SNP)	Followed up on 10/25/16 (phone) and (email); No Response
US Air Force (USAF), Davis-Monthan Air Force Base	Followed up on 10/14/16 (phone) and 10/25/16 (email); No Response
USAF, Luke Air Force Base	Followed up on 10/14/16 and 10/25/16 (email); No Response
US Army Corps of Engineers (USACE)	Accepted
US Fish and Wildlife Service (USFWS)	Declined
US Forest Service (USFS), Coronado National Forest	Followed up on 10/11/16 (phone); No Response
Western Area Power Administration	Accepted
Federally Recognized Tribes	
Ak-Chin Indian Community	Accepted
Chemehuevi Indian Tribe	Accepted
Cocopah Indian Tribe	Declined
Colorado River Indian Tribes	Accepted
Fort McDowell Yavapai Nation	Followed up on 10/27/16 (email) and 11/22/16 (phone); No Response
Fort Mojave Indian Tribe	Accepted
Fort Yuma Quechan Tribe	Followed up on 10/27/16 (email) and 11/23/16 (phone); No Response
Gila River Indian Community	Accepted
Havasupai Tribe	Followed up on 10/27/16 (email) and 11/23/16 (phone and email); No Response
Hopi Tribe	Accepted
Hualapai Tribe	Accepted

Table 3.7-1 Section 106 Consulting Parties (Continued)

Agency	Response to Invitation
Kaibab Band of Paiute Indians	Declined
Moapa Band of Paiute Indians	Followed up on 10/27/16 (email) and 11/23/16 (phone); No Response
Navajo Nation	Declined
Pascua Yaqui Tribe	Followed up on 10/27/16 (email) and 11/23/16 (phone); No Response
Pueblo of Zuni	Accepted
Salt River Pima-Maricopa Indian Community	Accepted
San Carlos Apache Tribe	Declined
San Juan Southern Paiute Tribe	Followed up on 10/27/16 (email) and 11/23/16 (phone); No Response
Tohono O'odham Nation	Accepted
Tonto Apache Tribe	Followed up on 10/27/16 (email) and 11/23/16 (phone); No Response
White Mountain Apache Tribe	Declined
Yavapai-Apache Nation	Accepted
Yavapai-Prescott Indian Tribe	Accepted
State Agencies	
Arizona Air National Guard	Followed up on 10/14/16 (phone); No Response
Arizona Department of Corrections	Declined
Arizona Game and Fish Department (AGFD)	Accepted
Arizona State Land Department (ASLD)	Accepted
Arizona State Museum	Accepted
Arizona State Parks and Trails	Accepted
SHPO	Accepted
County Agencies	
Maricopa County Department of Transportation	Followed up on 11/14/16 (phone); No Response
Maricopa County Flood Control District	Followed up on 11/15/16 (phone); No Response
Pima County	Accepted
Pima County Flood Control District	Declined
Pinal County	Accepted
Pinal County Flood Control District	Accepted
Santa Cruz County	Accepted
Santa Cruz County Flood Control District	Followed up on 10/17/16 (phone) and (email); No Response
Yavapai County	Followed up on 11/21/16 (phone) and 11/22/16 (email); No Response
Yavapai County Flood Control District	Declined

Table 3.7-1 Section 106 Consulting Parties (Continued)

Agency	Response to Invitation
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	Returned consultation form; did not indicate if they wanted to be a consulting party.
City of Tucson	Accepted
Town of Gila Bend	Accepted
Town of Marana	Accepted
Town of Oro Valley	Declined
Town of Sahuarita	Accepted
Town of Wickenburg	Accepted
Other Organizations	
Archaeology Southwest	Accepted
Arizona Public Service	Followed up on 10/17/16 (phone); No Response
BNSF Railway	Followed up on 11/15/16 (phone); No Response
Buckeye Water Conservation and Drainage District	Followed up on 10/17/16 (phone); No Response
Central Arizona Irrigation and Drainage District	Accepted
Central Arizona Project (CAP)	Followed up on 10/17/16 (phone); No Response
Cortaro-Marana Irrigation District	Accepted
Green Reservoir Flood Control District	Accepted
Maricopa Flood Control District	No Response
Maricopa-Stanfield Irrigation and Drainage District	Accepted
Roosevelt Irrigation District	Accepted
Roosevelt Water Conservation District	Declined
Salt River Project	Followed up on 11/15/16 (phone); No Response
Silverbell Irrigation and Drainage District	Accepted
Trico Electric Cooperative	Accepted
Tucson Electric Power, a UNS Energy Corporation/	Accepted
Tucson Historic Preservation Foundation	No Response
Union Pacific Railroad	Followed up on 11/15/16 (phone); No Response

ACHP = Advisory Council on Historic Preservation, BLM = Bureau of Land Management, SHPO = State Historic Preservation Office, US = United States

Because the Tier 1 studies indicate I-11 has the potential to adversely affect historic properties, FHWA and ADOT are developing, in coordination with the Consulting Parties, a programmatic agreement (PA) and will execute the PA at the end of the Tier 1 EIS process. The PA will define procedures for inventory and evaluation of cultural resources, assessment of effects, and avoidance and minimization of impacts or mitigation of any unavoidable adverse effects (see **Appendix E7,** Section 106 Consultation Summary and Draft Programmatic Agreement). The PA procedures would be implemented in conjunction with NEPA studies conducted for each individual Tier 2 project.

3.7.2.3 Methods for Considering Archaeological Sites and Historic Structures

The Project Team used geographic information system (GIS) shapefiles to identify prior cultural resource studies and archaeological sites and historic structures recorded in the Build Corridor Alternatives. Review of the NRHP identified a few listed archaeological sites and historic structures but the AZSITE Cultural Resource Inventory was the primary source of information. AZSITE is a GIS database that includes records of the AZSITE Consortium members (Arizona State Museum, Arizona State University, Museum of Northern Arizona, and SHPO), and participating agencies such as the BLM. The Project Team also obtained information from the ADOT Historic Preservation Team Portal, a database that includes cultural resource information for ADOT ROWs, local public agency projects funded through ADOT, and materials sources. The Project Team contacted other agencies, particularly BLM Tucson, Lower Sonoran, and Hassayampa field offices, to acquire data not in the AZSITE database. Additional information provided by Archaeology Southwest, a non-profit organization that works to preserve archaeological resources, was considered as well.

The Project Team used the compiled information, other regional cultural resource studies, and hydrology, landform, and geological information to estimate the potential for unrecorded archaeological sites and historic structures in parts of the Build Corridor Alternatives that have not been surveyed for cultural resources. The information was used to estimate low, moderate, and high potential levels of impact on archaeological sites and historic structures.

3.7.2.4 Methods for Considering Historic Districts and Buildings

Because the inventory of historic built environment resources within the Study Area is less complete than the inventory of archaeological resources, the Tier 1 analysis focused on identification of unrecorded historic-period properties that might be eligible for the NRHP. The historic period was defined as pre-1971 because properties constructed in 1970 or before will meet the 50-year threshold for NRHP consideration when the Tier 1 EIS is completed. The Project Team used GIS shapefiles to identify NRHP-listed historic districts and buildings in the Build Corridor Alternatives. Because there are no databases, such as AZSITE, that document inventories and NRHP evaluations of historic built environment districts and buildings, the Project Team contacted SHPO to obtain information about surveys sponsored by SHPO or the four local governments certified by the SHPO (Certified Local Governments) that overlap the Study Area (Nogales, Pima County, Tucson, and Casa Grande). The City of Tucson Historic Preservation Office provided information from a GIS database of historic built environment resources in the part of Option B of the Orange Alternative within the Tucson city limits.

The Project Team used county assessor GIS files to identify parcels with buildings constructed before 1971 in the Build Corridor Alternatives. Based primarily on Google imagery, the Project Team preliminarily evaluated NRHP eligibility of unrecorded historic-period parcels by assessing historic integrity and architectural significance. The analysis focused on clusters of buildings

(potential districts), and preliminarily classified them as not NRHP eligible, possibly eligible, or likely eligible.

A historic-period district or individual building was classified as likely eligible when Google imagery indicated it had a significant architectural design or pattern of development that appeared to retain historic integrity. Properties classified as possibly eligible included some with potentially significant architectural characteristics and apparent historic integrity, but many were classified as possibly eligible simply because the Google imagery did not provide a clear view. Properties were classified as not eligible when Google imagery indicated they possessed no historic architectural significance or had lost the historic integrity needed to convey their significance. The preliminary evaluations were used to rate segments of the Build Corridor Alternatives as having low, moderate, or high levels of potential impact on historic districts and buildings.

3.7.2.5 Methods for Considering Traditional Cultural Properties

FHWA and ADOT conducted government-to-government consultations with 22 Tribes to solicit information and identify concerns about potential I-11 impacts on traditional cultural properties. Tribes often do not share information about traditional cultural properties with non-Tribal members, and provided limited information regarding their concerns. Tribes are opposed to disturbance of human burials and formal animal burials associated with some archaeological sites. The assessment of potential impacts considered the information the Tribes provided about the location of traditional cultural properties in relation to the Build Corridor Alternatives.

3.7.3 Affected Environment

3.7.3.1 Archaeological Sites and Historic Structures

Prior Cultural Resource Surveys and Recorded Archaeological Sites and Historic Structures

Prior cultural resource surveys covered 25 percent of the Green Alternative, 27 percent of the Purple Alternative, and 49 percent of the Orange Alternative. Those surveys recorded more than 200 archaeological sites and historic structures in the Purple and Green Alternatives, and more than 500 in the Orange (**Table 3.7-2**, Extent of Cultural Resource Survey and Recorded Archaeological Sites and Historic Structures). The average site density in surveyed areas of each Build Corridor Alternative is three to four archaeological sites and historic structures per corridor mile. Based on the average densities, it is estimated there could be approximately 800 to 1,000 archaeological sites and historic structures in each 2,000-foot-wide Build Corridor Alternative.

The highest density of recorded archaeological sites cluster in five areas in Options A, B, G, K, and Q1. The historic structures are densest in two areas in Options B, K, and Q1. Two areas of high archaeological site density are along the Purple Alternative, two are along the Green Alternative, and five, plus the two areas of high historic structure density, are along the Orange Alternative.

Table 3.7-2 Extent of Cultural Resource Survey and Recorded Archaeological Sites and Historic Structures [1]

Option	Length (miles)	Percent Previously Surveyed	Sites	Structures	Total	Average Density of Recorded Resources/Mile [2]	Estimated Total Resources [3]
A	28.7	39.9	66	5	71	6.2	178
C [4]	58.3 (59.5)	13.5 (9.6)	29 (26)	3 (3)	32 (29)	4.1 (5.1)	239 (243)
G	45.1	41.3	63	21	84	4.5	203
I1	7.3	46.0	2	5	7	2.1	15
I2	18.6	20.3	7	5	12	3.2	59
L	15.1	37.4	8	3	11	2.0	29
N	25.6	17.4	5	1	6	1.3	34
R	17.5	20.3	2	4	6	1.7	30
X	54.8	25.7	9	5	14	1.0	54
Totals	**271.0**	**26.9**	**191**	**52**	**243**	**3.3**	**841**
Totals [4]	**(272.2)**	**(26.0)**	**(188)**	**(52)**	**(240)**	**(3.4)**	**(845)**
A	28.7	39.9	66	5	71	6.2	178
D [4]	64.2 (65.0)	21.0 (19.1)	58 (55)	4 (4)	62 (59)	4.6 (4.5)	295 (293)
F	50.9	18.8	25	18	43	4.5	228
I2	18.6	20.3	7	5	12	3.2	59
L	15.1	37.4	8	3	11	2.0	29
M	18.5	15.7	3	1	4	1.4	25
Q2	4.5	97.6	7	3	10	2.3	10
R	17.5	20.3	2	4	6	1.7	30
U	49.8	23.6	7	5	12	1.0	51
Totals	**267.8**	**24.9**	**183**	**48**	**231**	**3.5**	**905**
Totals [4]	**(268.6**	**(24.4)**	**(180)**	**(48)**	**(228)**	**(3.5)**	**(903)**
A	28.7	39.9	66	5	71	6.2	178
B	58.6	64.7	196	23	219	5.8	338
G	45.1	41.3	63	21	84	4.5	203
H	18.1	37.4	11	1	12	1.8	32
K	41.5	52.0	44	4	48	2.2	92
Q1	15.9	89.8	33	2	35	2.4	39

Table 3.7-2 Extent of Cultural Resource Survey and Recorded Archaeological Sites and Historic Structures [1] (Continued)

Option	Length (miles)	Percent Previously Surveyed	Sites	Structures	Total	Average Density of Recorded Resources/Mile [2]	Estimated Total Resources [3]
Q2	4.5	97.6	7	3	10	2.3	10
Q3	17.3	66.5	19	7	26	2.3	39
S	50.5	22.5	13	5	18	1.6	80
Totals	**280.2**	**49.2**	**452**	**71**	**523**	**3.8**	**1,011**

(1) Includes all recorded sites and historic structures identified by the data collection regardless of NRHP eligibility (determined or recommended eligible, determined or recommended ineligible, and unevaluated). Because a few archaeological sites and historic structures are in more than one option they were counted more than once, which inflates the totals for the Build Corridor Alternatives by approximately 2 percent. The total number of archaeological sites and historic structures recorded along the Purple Alternative is 237. There are 226 along the Green Alternative and 513 along the Orange Alternative.

(2) Average number of recorded archaeological sites and historic structures per linear mile of 2,000-foot-wide corridor, based on results of areas previously surveyed for cultural resources within each option.

(3) Estimate is based on average densities of archaeological sites and historic structures recorded in areas of the option surveyed for cultural resources. The accuracy of the estimates hinges on how representative the sample of prior surveys are, which is unknown but the extent of prior survey suggests they should not be unduly biased.

(4) CAP Design Option data shown in parentheses.

SOURCE: Mitchell et al. 2018.

The types and percentages of archaeological sites recorded in each Build Corridor Alternative are generally similar. Approximately 61 percent of the sites along the Purple Alternative, 76 percent along the Green Alternative, and 57 percent along the Orange Alternative are prehistoric. Approximately 30 percent of the sites along the Purple Alternative, 12 percent along the Green Alternative, and 25 percent along the Orange Alternative are historic sites. Approximately 4 percent of the sites along the Purple Alternative, 8 percent along the Green Alternative, and 11 percent along the Orange Alternative have both prehistoric and historic components. The ages of 4 percent of the sites along the Purple Alternative, 5 percent along the Green Alternative, and 8 percent along the Orange Alternative are undetermined. Artifact scatters, with or without features, are the most common type of prehistoric site (89 percent along the Purple Alternative, 82 percent along the Green Alternative, and 77 percent along the Orange Alternative). Approximately 9 percent of the prehistoric sites along the Purple Alternative, 15 percent along the Green Alternative, and 12 percent along the Orange Alternative are classified as village or habitation sites. Other uncommon site types that make up 4 percent or less of the prehistoric site inventory along each alternative include those classified as rock features, trails, petroglyphs, rock shelters, and cleared areas.

Artifact scatters or trash dumps, with or without archaeological features, are the most common type of historic archaeological sites (45 percent along the Purple Alternative, 48 percent along the Green Alternative, and 40 percent along the Orange Alternative). Approximately 45 percent of the historic sites along the Purple Alternative, 29 percent along the Green Alternative, and 38 percent along the Orange Alternative are classified as homesteads, habitations, or structures (which are mostly foundations of demolished buildings). Other site types make up 10 percent or less of the historic archaeological site inventory along each alternative and are classified as ranching, military, agricultural, mining, water control, city block, trail, and rock features.

Roads are the most common type of historic structures (63 percent along the Purple Alternative, 73 percent along the Green Alternative, and 52 percent along the Orange Alternative). The next

most frequent types of historic structures are railroads (13 percent along the Purple Alternative, 9 percent along the Green Alternative, and 17 percent along the Orange Alternative) and irrigation canals (10 percent along the Purple Alternative, 9 percent along the Green Alternative, and 17 percent along the Orange Alternative). Less common types include utilities and cemeteries.

Potential for Archaeological Sites and Historic Structures in Unsurveyed Areas

To address the largest gaps in the coverage of prior cultural resource surveys, the Project Team assessed the potential for unrecorded prehistoric and historic archaeological sites in parts of the Build Corridor Alternatives that have not been surveyed for cultural resources. The assessment focused on areas with less than 30 percent survey coverage because they represent the largest data gaps and encompass areas deemed most likely to have high densities of unrecorded sites. The assessment considered the results of nearby prior surveys, indications of land use on historic maps and aerial photos, and GIS-mapped environmental factors that influenced prehistoric and historic settlement and land use, including hydrology, landforms, and surface geology. The analysis identified six areas as having high potential for unrecorded archaeological sites and historic structures, including 33 miles of unsurveyed areas of the Purple Alternative, 38 miles of the Green Alternative, and only 2 miles of the Orange Alternative.

NRHP-Listed Archaeological Districts and Sites

Only three NRHP-listed archaeological properties overlap edges of the Build Corridor Alternatives (Valencia Site in the Orange Alternative, Los Robles District in the Green Alternative, and Picacho Pass Skirmish Site–Overland Mail Co. Stage Station at Picacho Pass in the Purple and Orange Alternatives). Three other listed archaeological districts are nearby (Gunsight Mountain near the Purple and Green Alternatives, Tumamoc Hill near the Orange Alternative, and McClelland Wash near Purple and Orange Alternatives).

NRHP-Eligible Historic Structures

Twelve historic structures in the Build Corridor Alternatives are not listed in the NRHP but have been determined to be eligible under Criteria A, B, or C, in addition to or in lieu of their potential to yield important information (Criterion D), indicating they may warrant preservation in place (**Table 3.7-3**, Historic Structures Eligible for the NRHP under Criteria A, B, or C). Nine are along the Purple Alternative, eight are along the Green Alternative, and 13 are along the Orange Alternative.

NRHP Eligibility of Other Archaeological Sites and Historic Structures

The AZSITE database has information about NRHP eligibility determinations or recommendations for 61 to 74 percent of the archaeological sites and historic structures recorded in the Build Corridor Alternatives (**Table 3.7-4**, NRHP Eligibility of Archaeological Sites and Historic Structures). Approximately 60 to 70 percent of the evaluated properties were determined or recommended eligible. Tier 2 studies will need to determine NRHP eligibility, but the prior surveys suggest no more than approximately three-fourths of all archaeological sites and historic structures that could be affected are likely to be NRHP eligible.

Table 3.7-3 Historic Structures Eligible for the NRHP under Criteria A, B, or C

Option	Historic Structure	Criteria	Option Description
A	Otero Cemetery	A, B	Co-located with I-19
A	New Mexico & Arizona Railroad: Nogales Branch	C (1)	
G	Arizona Southern Railroad	A, D	Co-located with I-10
G	SPRR	A	
G	Casa Grande Canal	A	
L	SPRR	A	New corridor
L	Butterfield Overland Mail Stage Route	A	
R	Buckeye Canal	A	New corridor
R	SPRR: Phoenix Mainline	A	
A	Otero Cemetery	A, B	Co-located with I-19
A	New Mexico & Arizona Railroad: Nogales Branch	C (1)	
F	Arizona Southern Railroad	A, D	New corridor
F	Casa Grande Canal	A	
L	SPRR	A	New corridor
L	Butterfield Overland Mail Stage Route	A	
R	Buckeye Canal	A	New corridor
R	SPRR: Phoenix Mainline	A	
A	Otero Cemetery	A, B	Co-located with I-19
A	New Mexico & Arizona Railroad: Nogales Branch	C (1)	
B	Augustin del Tucson Mission site (also Clearwater archaeological site)	A, D	Co-located with I-10
B	Cortaro Farms Canal	A	
B, G	SPRR	A	Co-located with I-10
G	Arizona Southern Railroad	A, D	Co-located with I-10
G	Casa Grande Canal	A	
K	SPRR	A	Co-located with I-8 and SR 85, except for realigned junction of those highways
K	Butterfield Overland Mail Stage Route	A	
K	Gila Bend Canal	A	
Q3	Buckeye Canal	A	Co-located with SR 85 and I-10
Q3	SPRR: Phoenix Mainline	A	
Q3	Roosevelt Canal	A	

(1) Likely eligible under Criterion A as well.
I-19 = Interstate 19, I-10 = Interstate 10, I-8 = Interstate 8, SPRR = Southern Pacific Railroad, SR = State Route
SOURCE: Mitchell et al. 2018.

Table 3.7-4 NRHP Eligibility of Archaeological Sites and Historic Structures

NRHP Eligibility of Recorded Sites and Historic Structures	Purple Alternative	Green Alternative	Orange Alternative
Eligible under Criterion D	56	64	187
Eligible under Criteria A, B, and/or C and/or in lieu of D	12	12	22
Eligible, no criterion listed	20	18	48
Total Eligible [1]	**88**	**94**	**257**
Not Eligible [2]	64	43	125
Total Evaluated	**152**	**137**	**382**
Percent Evaluated as Eligible	**58%**	**69%**	**67%**
Not Evaluated [3]	85	89	131
Total	**237**	**226**	**513**
Percent Evaluated	**64%**	**61%**	**74%**

(1) Includes resources that have been determined to be NRHP eligible or recommended eligible.
(2) Includes resources that have been determined to not be NRHP eligible or recommended not eligible.
(3) Excludes two historic natural gas pipelines that are not subject to Section 106 review pursuant to an ACHP exemption issued in accordance with 36 CFR 800.14(c) and effective as of April 5, 2002.
SOURCE: Mitchell et al. 2018.

All archaeological sites determined to be NRHP eligible were evaluated as eligible under Criterion D for their potential to yield information, except for three that also were determined to be eligible under Criterion A and/or C and might warrant preservation in place. Two of those exceptions are sites with prehistoric trails and the other has a prehistoric canal that was refurbished and reused during the historic period.

3.7.3.2 Historic Districts and Buildings

Most properties listed in the NRHP in the Study Area are historic districts and buildings. Unlike archaeological sites, most are listed for historic values other than their potential to yield important information.

NRHP-Listed and Previously Determined Eligible Properties

Almost 200 NRHP-listed historic districts and buildings were identified in the large Study Area of the prior Alternatives Selection Report analysis. All but 10 listed historic districts and buildings and one previously determined eligible historic district were avoided by the three 2,000-foot-wide Build Corridor Alternatives assessed by this Draft Tier 1 EIS. One listed property is in all three Build Corridor Alternatives, another is in the Green and Orange Alternatives, and the other eight listed properties and the one previously determined eligible property are in the Orange Alternative (**Table 3.7-5**, NRHP-listed and Determined Eligible Historic Districts and Buildings).

Table 3.7-5 NRHP-listed and Determined Eligible Historic Districts and Buildings [(1)]

Option	NRHP-Listed or Eligible Property	Option Description
A	Tumacácori National Monument and Museum	Co-located with I-19.
A	Tumacácori National Monument and Museum	Co-located with I-19.
D	Canoa Ranch Rural Historic District	Partly co-located with I-19 but mostly new corridor.
A	Tumacácori National Monument and Museum	Co-located with I-19.
B	Canoa Ranch Rural Historic District	Co-located with I-19 and I-10.
B	El Paso & Southwestern Railroad District	
B	Barrio El Hoyo Historic District	
B	Barrio El Membrillo Historic District	
B	El Presidio Historic District	
B	Manning, Levi H. House (in El Presidio District)	
B	Barrio Anita Historic District	
B	Menlo Park Historic District	
B	Ronstadt-Sims Warehouse (non-contiguous contributor to John Spring Neighborhood District)	
B	US Department of Agriculture Plant Materials Center	

(1) All properties are listed in the NRHP except for the El Paso & Southwestern Railroad District, which has been determined to be eligible and a nomination is pending.

1-19 = Interstate 19, I-10 = Interstate 10

SOURCE: Ryden et al. 2018.

Preliminary NRHP Evaluation of Unrecorded Historic-Period Properties

The study identified 2,670 unrecorded historic-period (pre-1971) parcels in the 2,000-foot-wide Build Corridor Alternatives, with more than 87 percent (2,328) in the 59-mile-long Option B of the Orange Alternative that is co-located with I-19 and I-10 in the Tucson area. Because of the large number of historic-period parcels in Option B, only the parcels adjacent to the existing I-10 and I-19 ROWs were preliminarily assessed. (The assessed adjacent parcels covered the area where conceptual engineering indicated additional ROW might be needed between the I-19/I-10 interchange and the I-10/Prince Road interchange under some design scenarios that would be further evaluated for Tier 2 projects.)

Most parcels were evaluated in clusters as potential historic districts. In total, 16 potential districts and 274 individual historic-period buildings were preliminarily evaluated. Thirteen percent of the evaluated properties (4 potential districts and 34 individual properties) were preliminarily evaluated as likely eligible, 23 percent (2 districts and 63 individual properties) as possibly eligible and 64 percent (10 potential districts and 177 individual properties) as not

eligible. The analysis identified 16 to 21 likely eligible and 33 possibly eligible properties along each of the Build Corridor Alternatives (**Table 3.7-6**, Preliminary NRHP Eligibility Evaluations of Unrecorded Historic-Period Properties).

Table 3.7-6 Preliminary NRHP Eligibility Evaluations of Unrecorded Historic-Period Properties

Option	Districts			Individual Properties			Option Description
	Likely Eligible	Possibly Eligible	Not Eligible	Likely Eligible	Possibly Eligible	Not Eligible	
A	1	1	0	9	14	20	Co-located with I-19
C	0	0	0	2	2 (1)	6 (2)	New corridor
G	0	0	0	3	2	32	Co-located with I-10
I1	0	0	0	3	0	1	New corridor
I2	0	0	0	1	2	3	New corridor
L	0	0	0	0	0	2	New corridor
N	0	1	0	1	5	21	New corridor
R	0	0	0	2	4	10	New corridor
X	0	0	0	0	4	2	New corridor
Totals	1	2	0	21	33	97	
A	1	1	0	9	14	20	Co-located with I-19
D	3	1	1	4	11 (3)	15 (2)	Part co-located with I-19 but mostly new corridor
F	0	0	0	0	2	5	New corridor
I2	0	0	0	1	2	3	New corridor
L	0	0	0	0	0	2	New corridor
M	0	0	0	0	0	0	New corridor
Q2	0	0	0	0	0	2	Co-located with SR 85
R	0	0	0	2	4	10	New corridor
U	0	0	0	0	0	0	New corridor
Totals	4	2	1	16	33	57	
A	1	1	0	9	14	20	Co-located with I-19
B	0	0	8	6 (4)	6	54	Co-located with I-10
G	0	0	0	3	2	32	Co-located with I-10
H	0	0	0	2	1	3	Co-located with I-8
K	0	0	0	0	2	3	Co-located with I-8 and SR 85, except for realigned junction of those highways

Table 3.7-6 Preliminary NRHP Eligibility Evaluations of Unrecorded Historic-Period Properties (Continued)

Option	Districts			Individual Properties			Option Description
	Likely Eligible	Possibly Eligible	Not Eligible	Likely Eligible	Possibly Eligible	Not Eligible	
Q1	0	0	0	0	3	1	Co-located with SR 85
Q2	0	0	0	0	0	2	Co-located with SR 85
Q3	0	0	0	0	5	1	Co-located with SR 85 and I-10
S	0	0	0	0	0	0	New corridor
Totals	1	1	8	20	33	116	

(1) Two additional possibly eligible properties if the CAP Design Option is used.
(2) Five additional not eligible properties if the CAP Design Option is used.
(3) One additional possibly eligible property if the CAP Design Option is used.
(4) Two separate but related parcels are considered part of one historic-period property.
CAP = Central Arizona Project, I-8 = Interstate 8, I-10 = Interstate 10, I-19 = Interstate 19, SR = State Route
SOURCE: Ryden et al. 2018.

3.7.3.3 Traditional Cultural Properties

FHWA and ADOT corresponded and met with Tribal representatives to discuss cultural resources throughout the Draft Tier 1 EIS process (see **Appendix E7**, Section 106 Consultation Summary and Draft Programmatic Agreement). Tribes identified five traditional cultural properties (**Table 3.7-7**, Traditional Cultural Properties). Tribes also oppose disturbance of human burials and formal animal burials.

Table 3.7-7 Traditional Cultural Properties

Option	Location	Option Description
C	Site associated with a traditional Tribal story (1)	New corridor
I2	Archaeological site (2)	New corridor
D	Site associated with a traditional Tribal story (1)	Part co-located with I-19 but mostly new corridor
F	San Lucy Farms (3)	New corridor
I2	Archaeological site (2)	New corridor
B	Area of high archaeological site density	Co-located with I-19
Q1	A petroglyph site, AZ T:14:115 (ASM) (4)	Co-located with SR 85

(1) Site reported to be in the vicinity of Options C and D but exact location not determined.
(2) Site reported to be in the vicinity of Option I2 but exact location not determined.
(3) The tribal farm is west of Option F. At its closest, the Option F corridor is approximately 900 feet east of the farmland.
(4) This site was avoided during construction of prior improvements of SR 85 and FHWA and ADOT have made a commitment to avoid the site during construction of any future improvements.
I-19 = Interstate 19, SR = State Route
SOURCE: FHWA and ADOT consultations 2016-2018.

3.7.4 Environmental Consequences

Because the Tier 1 stage of planning is conceptual, FHWA and ADOT will apply the criteria of effect, pursuant to NHPA Section 106, in phases as each Tier 2 project is planned. The more general Tier 1 characterization of potential levels of impact presented in the following sections are not intended to equate with a Section 106 determination of effect. Areas rated as having potential moderate or even low levels of impact could still result in a Section 106 finding of an adverse effect.

The Tier 1 assessment considered data compiled about the types and numbers of cultural resources in the 2,000-foot-wide Build Corridor Alternatives and the extent of construction disturbance in narrower ROW footprints where new lanes would be built for each Build Corridor Alternative to develop I-11, as identified by the Tier 1 conceptual engineering (**Appendix E1,** Conceptual Drawings). Conceptual engineering concluded the existing highways for co-located Options A (I-19), G (I-10), H (I-8), most of K (I-8 and SR 85), Q1 (SR 85), and Q2 (SR 85) are likely to have capacity to meet I-11 needs throughout the planning and implementation horizon (2040). Because no new lanes are likely to be needed along those options the assessment concluded cultural resources along those options were unlikely to be affected. The assessment of impacts also considered the restricted extent of potential impacts along co-located Options B (I-19 and I-10), part of Option D (I-19), and Option Q3 (SR 85 and I-10), where the Tier 1 conceptual engineering concluded additional lanes would probably be needed for I-11 but construction impacts were likely to be confined to the existing ROWs, with one possible exception. The exception is along approximately 6 miles of Option B between the I-19/I-10 interchange and the I-10/Prince Road interchange where four to six additional lanes and additional ROW up to approximately 120 feet wide might be required under some scenarios that would be further evaluated during Tier 2.

The assessment did not address the north ends of Options S, U, and X that are co-located with US Highway 93 (US 93), which was previously designated as the I-11 corridor north of Wickenburg. Any future upgrades of US 93 for I-11 would be assessed if and when they are proposed.

3.7.4.1 Archaeological Sites and Historic Structures

The assessment of potential levels of impacts of construction activities on archaeological sites and historic structures considered: (1) the compiled information about the types and densities of recorded sites and structures in each Build Corridor Alternative (which reflects potential mitigation efforts that might be required), (2) the evaluation of the potential for unrecorded archaeological sites and historic structures in unsurveyed areas, and (3) the potential extent of ground disturbance as indicated by the Tier 1 conceptual engineering. The following factors were used to characterize the levels of potential impact.

Potential High Impact

Potential levels of impact were rated high for the parts of Options with:

- recorded prehistoric village or habitation sites and multicomponent sites with prehistoric village or habitation components (as identified in the source data); and
- recorded archaeological sites and historic structures determined or recommended eligible for the NRHP under Criteria A, B, or C, in addition to or in lieu of Criterion D (information potential), indicating they could warrant efforts for preservation in place.

Potential Moderate Impact

Potential levels of impact were rated moderate for the parts of Options with:

- recorded archaeological sites or historic structures determined to be NRHP eligible or recommended eligible for their potential to yield important information (Criterion D);
- recorded archaeological sites or historic structures unevaluated for NRHP eligibility; and
- areas not previously surveyed for cultural resources but assessed as having high potential for unrecorded archaeological sites or historic structures.

Potential Low Impact

Potential levels of impact were rated low for the parts of Options with:

- no recorded archaeological sites or historic structures that have been determined to be eligible or recommended eligible for the NRHP or are unevaluated; and
- areas not surveyed for cultural resources but assessed as having moderate or low potential for unrecorded archaeological sites or historic structures.

Unlikely Impact

Ratings of unlikely impact were assigned to Options where:

- Tier 1 conceptual engineering indicated existing capacity of co-located highways would probably be adequate for I-11 and new lanes were unlikely to be needed during the planning and implementation horizon (2040) (Options A, G, H, most of K, Q1, and Q2).

The assessment of new corridors considered information compiled and analyzed for the full 2,000-foot-wide options, and within 400 feet of co-located Options B, part of Option D, and Option Q3 where conceptual engineering indicated new travel lanes would be needed but could probably be added in existing ROWs, except for 6 miles of Option B where new ROW might be required.

Assessed Potential Levels of Impact

Application of the methodology to rate potential levels of high, moderate, low, and probably no impacts along each of the Build Corridor Alternatives indicated that 25 miles of the Orange Alternative are assessed as having potential levels of high impact compared to 8 miles along the Green Alternative and 4 miles along the Purple Alternative. Potential levels of impact are rated as moderate along 55 miles of the Green Alternative, 48 along the Purple Alternative, and 20 along the Orange Alternative (**Table 3.7-8**, Potential for Impacts on Archaeological Sites and Historic Structures along the Build Corridor Alternatives).

Table 3.7-8 Potential for Impacts on Archaeological Sites and Historic Structures along the Build Corridor Alternatives

Option	Potential Levels of Impact				Total	Potential Major Impacts
	High	Moderate	Low	Unlikely	Miles	
A	0	0	0	28.7	28.7	
C [1]	1.2 (0.9)	25.2 (22.1)	31.9 (36.3)	0 (0)	58.3 (59.3)	2 prehistoric village sites, Cortaro Farms canal [2]
G	0	0	0	45.1	45.1	
I1	0	0.2	7.1	0	7.3	
I2	0	7.0	11.6	0	18.6	
L	0.8	0.6	13.7	0	15.1	Butterfield Overland Stage Route, SPRR [2]
N	0	6.9	18.7	0	25.6	
R	1.4	6.5	9.6	0	17.5	Buckeye Canal, SPRR: Phoenix Main Line [2]
X	0.7	2.0	46.0	6.1	54.8	2 homestead sites [2]
Totals [1]	4.1 (3.8)	48.4 (45.3)	138.6 (143.0)	79.9 (79.9)	271.0 (272.0)	
A	0	0	0	28.7	28.7	
D [1]	0.8 (0.5)	17.3 (14,5)	32.5 (36,2)	13.6 (13.6)	64.2 (64.8)	2 prehistoric habitation site
F	4.7	21.1	25.1	0	50.9	4 prehistoric habitation sites, Casa Grande Canal, abandoned Arizona Southern Railroad [2]
I2	0	7.0	11.6	0	18.6	
L	0.8	0.6	13.7	0	15.1	Butterfield Overland Stage Route, SPRR [2]
M	0	0.2	18.3	0	18.5	
Q2	0	0	0	4.5	4.5	
R	1.4	6.5	9.6	0	17.5	Buckeye Canal, SPRR: Phoenix Main Line [2]
U	0	2.6	41.1	6.1	49.8	
Totals [1]	7.7 (7.4)	55.3 (52.5)	151.9 (155.6)	52.9 (52.9)	267.8 (268.4)	
A	0	0	0	28.7	28.7	
B	21.8	12.8	10.4	13.6	58.6	16 prehistoric habitation sites [3], 1 homestead site, Cortaro Farms Canal [2]
G	0	0	0	45.1	45.1	
H	0	0	0	18.1	18.1	
K	1.9	1.2	0.5	37.8	41.4	Butterfield Overland Stage Route, SPRR, might cross Gila Bend Canal [2]

Table 3.7-8 Potential for Impacts on Archaeological Sites and Historic Structures along the Build Corridor Alternatives (Continued)

Option	Potential Levels of Impact				Total Miles	Potential Major Impacts
	High	Moderate	Low	Unlikely		
Q1	0	0	0	15,9	15.9	
Q2	0	0	0	4.5	4.5	
Q3	0.9	1.9	14.5	0	17.3	SPRR: Phoenix Main Line, Buckeye Canal, Roosevelt Canal (2)
S	0	3.9	38.9	7.7	50.5	
Totals	24.6	19.8	64.3	171.5	280.2	
B		2.7	3.5	0	8.0	3 prehistoric habitation sites

(1) CAP Design Option data are shown in parentheses.

(2) The linear historic structures may not be major conflicts because their historic integrity varies greatly along their lengths. If Tier 2 studies determine an I-11 crossing would affect significant historic characteristics, they often can be bridged to avoid an adverse effect. Similarly, Tier 2 studies would need to determine if the archaeological sites of historic homesteads actually warrant preservation in place or if they are important primarily for their potential to yield important information.

(3) Archaeological excavations were conducted at many of these sites to mitigate impacts of prior improvements of I-10. Tier 2 studies would need to determine whether they would warrant additional data recovery investigations if they were affected.

CAP = Central Arizona Project, SPRR = Southern Pacific Railroad

SOURCE: Mitchell et al. 2018.

A second step of the assessment considered the typical cross-sections developed by the Tier 1 conceptual engineering. For Corridor Options co-located with an existing transportation facility, the cross sections included capacity improvements on the existing facilities as needed to meet an acceptable level of service. Potential ROW footprints for the assumed cross sections were used to estimate the number of NRHP-eligible archaeological sites and structures that might be affected by the Build Corridor Alternatives. The estimate for the Purple Alternative was based on the estimated total of approximately 450 archaeological sites and historic structures in 192 miles of the 2,000-foot-wide Corridor Options where new lanes would likely be built (see **Table 3.7-2**). Because Tier 1 conceptual engineering indicated the I-11 ROW would be approximately 400 feet wide, which is 20 percent of the width of the 2,000-foot-wide Corridor Options, it was assumed that approximately 20 percent of those 450 archaeological sites and historic structures (approximately 90) could be subject to impacts and the other 80 percent would not be directly disturbed or destroyed by construction of new lanes. Prior evaluations indicate about 75 percent of those 90 archaeological sites and structures (approximately 70) are likely to be NRHP eligible (see **Table 3.7-3**).

Using that logic, it was estimated that approximately 100 NRHP-eligible archaeological sites and historic structures could be affected by the Green Alternative, where 216 new lane miles would be constructed. Approximately 60 eligible archaeological sites and historic structures could be affected along the 109 miles of new lanes for the Orange Alternative (**Table 3.7-9,** Estimates of Potentially Affected NRHP-Eligible Archaeological Sites and Historic Structures). These estimates are based on analysis of the results of prior cultural resource surveys that covered parts of the Build Corridor Alternatives, but they must be considered to be only general approximations because the documentation of the prior surveys is sometimes inaccurate or ambiguous and the surveys might not be an unbiased sample of the archaeological sites and historic structures in each Build Corridor Alternative. The numerical estimates might not be

particularly precise because they are based on assumptions subject to unknown margins of error but they should provide a valid basis for a relative comparison of the Build Corridor Alternatives.

Table 3.7-9 Estimates of Potentially Affected NRHP-Eligible Archaeological Sites and Historic Structures (1)

Estimated Parameters	Purple Alternative	Green Alternative	Orange Alternative
Number of sites and structures in total width and length of 2,000-foot-wide corridor (2)			
South Section	620	700	720
Central Section	170	150	210
North Section	50	50	80
Total (rounded)	840	900	1,010
Miles where new lanes would be built			
South Section	59	103	45
Central Section	84	69	21
North Section	49	44	43
Total	192	216	109
Density of sites and structures per linear mile in options where new lanes would be built (2)			
South Section	4.1	4.5	5.8
Central Section	2.0	2.1	3.2
North Section	0.9	0.9	1.7
Total	2.3	3.0	3.7
Number of sites and structures in options where new lanes would be built (2)			
South Section	240	460	260
Central Section	170	150	70
North Section	40	40	70
Total (rounded)	450	650	400
Number of sites and structures within a 400-foot ROW (20 % of total corridor estimate)			
South Section	48	94	52
Central Section	34	28	14
North Section	8	8	14
Total (rounded)	90	130	80
Number of NRHP eligible and potentially affected sites and structures (75% of inventory) (3)			
South Section	36	71	39
Central Section	26	21	11
North Section	6	6	11
Total (rounded)	70	100	60

(1) These estimates must be considered to be only general approximations (see the text for a discussion of the methods on which they are based).

(2) The data are extracted from **Table 3.7-2**, Extent of Cultural Resource Survey and Recorded Archaeological Sites and Historic Structures using values for CAP Design Options for Options C and D, which completely avoid a prehistoric habitation site that could be disturbed along its edge by the original alignment along Sandario Road.

(3) Some of these sites and structures could be avoided by specific ROW alignments delineated during Tier 2 analysis.

SOURCE: Mitchell et al. 2018.

The estimates of archaeological and historical sites that might be subject to construction impacts are likely to be high because (1) FHWA and ADOT would work to locate the ROW within a selected 2,000-foot-wide Build Corridor Alternative to avoid or minimize disturbance of NRHP-eligible archaeological sites and historic structures whenever feasible and (2) not all sites and structures within a selected 400-foot ROW would necessarily be disturbed by construction of new lanes. The estimate for the Orange Alternative is especially likely to be high because more than half of the miles of new lanes would be along co-located highways and many of the archaeological sites and historic structures in those areas are likely to have been disturbed or destroyed by the original highway construction and any prior improvements of those highways. However, new lanes along co-located highways would inherently have little flexibility for avoiding any archaeological sites and historic structures that are adjacent to the existing lanes.

The situation is particularly uncertain along Option B of the Orange Alternative where densities of archaeological sites are higher and more sites are complex habitation sites than anywhere else along the three Build Corridor Alternatives. Many of the archaeological sites along Option B are deeply buried in the alluvium of the Santa Cruz River floodplain and there are no clues of their locations on the ground surface. Many deeply buried sites were only discovered due to prior construction projects along I-10, and archaeological excavations were conducted at many of those sites to recover and preserve information and artifacts to mitigate the impacts of the prior I-10 construction projects. Tier 2 studies would need to determine whether or not parts of those sites remain intact and would be adversely affected by construction of additional lanes for I-11. It also would need to be determined whether any of the sites along the 6 miles of Option B through downtown Tucson extend into new ROW areas or if additional archaeological sites are present in the new ROW and would warrant additional data recovery investigations. Although the number of sites along the Orange Alternative may be relatively fewer than along the Purple and Green Alternatives, they are likely to be more complex and could require relatively greater mitigation efforts.

The assessment indicated construction of new lanes in Options not co-located with existing highways would intersect previously recorded historic linear structures (irrigation canals, railroads, roads) including five along the Purple Alternative and six along each of the Green and Orange Alternatives. Those structures have been evaluated as NRHP eligible under criteria indicating they warrant preservation in place, but their historic integrity varies greatly along their lengths. Tier 2 NEPA studies would determine if significant segments of the linear structures would be adversely affected by development of I-11. If warranted, historic linear structures can often be bridged to avoid an adverse effect.

The No Build Alternative would avoid most impacts on archaeological sites and historic structures in the Build Corridor Alternatives, but not all because four improvement projects along parts of I-10 co-located with Options B, G, and Q3 are programmed for funding and would be constructed even if FHWA and ADOT decide not to pursue development of I-11. Twelve archaeological sites and three historic structures have been recorded at those project locations in Options B and G. Determinations of the effects of all those projects have not yet been made but potential levels of impact were rated high for 2 miles along Option B where at least three prehistoric habitation archaeological sites might be affected. If I-11 is not pursued, it is likely that other projects not yet programmed for funding would be developed in the future and affect additional archaeological sites and historic structures elsewhere in the I-11 Options.

3.7.4.2 Historic Districts and Buildings

The assessment of the potential level of impact on historic districts and buildings considered (1) NRHP-listed and previously determined eligible properties, (2) unrecorded historic-period properties preliminarily evaluated as likely eligible for the NRHP or possibly eligible, and (3) the potential extent of ground disturbance as indicated by the Tier 1 conceptual engineering. The evaluation of the unrecorded historic-period properties is preliminary, and will need to be augmented by detailed evaluations and potential inventory of additional properties that meet the NRHP 50-year age threshold during the planning and implementation horizon (2040) as each Tier 2 project is designed. The following factors were used to characterize the potential levels of impact.

High Impact

Potential levels of impact were rated high for the parts of Options with:

- NRHP-listed or determined eligible properties that could be altered in new ROW; and
- properties preliminarily evaluated as likely eligible or possibly eligible for the NRHP and unavoidable by a 400-foot-wide footprint in a 2,000-foot-wide Build Corridor Alternative where new lanes would be constructed in a new ROW.

Moderate Impact

Potential levels of impact were rated moderate for the parts of Options with:

- properties preliminarily evaluated as likely eligible or possibly NRHP eligible and unavoidable by a 400-foot-wide footprint in a 2,000-foot-wide Build Corridor Alternative where new lanes would be constructed in a new ROW but have sufficient open space that they might be crossed without adversely affecting their character-defining buildings or features (such as a large property with a cluster of historic farm buildings and open fields).

Low Impact

Potential levels of impact were rated low for the parts of Options with:

- Properties preliminarily evaluated as likely eligible or possibly eligible for listing in the NRHP but of a size that they could be avoided by a 400-foot-wide footprint.

Impact Unlikely

Ratings of unlikely impact were assigned to Options where:

- There are no properties listed in the NRHP, determined eligible for the NRHP, or unrecorded historic-period properties preliminarily evaluated as likely eligible or possibly eligible for the NRHP;
- Conceptual engineering indicated new lanes would be required but probably could be built in an existing ROW (part of Option D, Option B [except for approximately 6 miles between the I-19/I-10 interchange and I-10/Prince Road interchange where new ROW might be required], and Option Q3); or
- Tier 1 conceptual engineering indicated existing capacity of co-located highways would probably be adequate for I-11 and new lanes were unlikely to be needed during the planning and implementation horizon (2040) (Options A, G, H, most of K, Q1, and Q2).

Potential Levels of Impact

Two of the 10 NRHP-listed properties in the 2,000-foot-wide Build Corridor Alternatives are unlikely to be affected because they are outside the existing ROWs of co-located options that Tier 1 conceptual engineering indicated are unlikely to require new ROW for development of I-11 during the planning and implementation horizon (2040). One of those properties (Tumacácori National Monument) is in Option A, which is co-located with I-19 where conceptual engineering indicated no new travel lanes are likely to be needed during the planning and implementation horizon. Option A is part of all three Build Corridor Alternatives. One property (Canoa Ranch Historic District) is along Option B of the Orange Alternative and the overlapping part of Option D of the Green Alternative, where conceptual engineering also indicated the co-located I-19 is unlikely to need additional lanes during the planning and implementation horizon.

The other eight NRHP-listed properties and one previously determined eligible historic district are located along Option B of the Orange Alternative between the I-19/I-10 interchange and the I-10/Prince Road interchange where four to six additional travel lanes are likely to be needed for I-11. Tier 1 conceptual engineering concluded that under some design scenarios (which would be evaluated during planning of Tier 2 projects) as much as approximately 120 feet of additional ROW might be needed along this segment of I-10. Five of the NRHP-listed properties are far enough from I-10 that they would not be directly affected by the potential ROW expansion (Barrio El Hoyo, Barrio El Presidio, and Menlo Park Historic Districts; Ronstadt-Sims Warehouse; and the US Department of Agriculture Plant Materials Center).

The potential ROW expansion could extend into the NRHP-listed Levi H. Manning House, the Barrio Anita and Barrio El Membrillo Historic Districts, and the previously determined NRHP-eligible El Paso & Southwestern Railroad District that is pending nomination to the NRHP. That level of potential impact is rated high (**Table 3.7-10**, Potential Levels of Impacts on Historic Districts and Buildings). Any ROW expansion east of I-10 would take part of a parking lot associated with the Levi H. Manning House but the house is unlikely to be directly affected. The Barrio Anita Historic District NRHP nomination identified 66 buildings and Oury Park (now David G. Herrera and Ramon Quiroz Park) as contributing properties. ROW expansion would require land from the west edge of Oury Park where ball fields and soccer fields are located, and could require land from four parcels with contributing residences along the west side of Contzen Avenue but not all of those houses might be directly affected. The small Barrio El Membrillo Historic District may only have approximately 10 surviving contributing residences and if all the potential ROW expansion had to be added to the east side of I-10, four of those residences would need to be demolished and street access to the rest of the residences might be lost, making occupation of the District no longer viable. The expanded ROW also could result in at least partial demolition of the historic roundhouse that is a contributing property to the El Paso & Southwestern Railroad Historic District (now adaptively reused by a commercial business) and also require acquisition of edges of the vacant abandoned railroad corridor (which is the spine of the district) in as many as three other locations.

Table 3.7-10 Potential Levels of Impacts on Historic Districts and Buildings

Listed/Eligible Properties		Preliminarily Evaluated Unrecorded Historic-Period Properties									
		Likely Eligible				Possibly Eligible					
High Impact	Unlikely Impact	High Impact	Moderate Impact	Low Impact	Unlikely Impact	High Impact	Moderate Impact	Low Impact	Unlikely Impact	Not Eligible	Totals
0	1	0	2 in Options C and N	7	13	1 in Option C	0	17	17	97	155
0	1		2 in Options C and N	7	13	1 in Option C	1 in Option C	18	17	103	163
0	2	0	0	3	17	0	3 in Option D	14	18	58	115
0	2	0	0	3	17	0	3 in Option D	15	18	64	121
4 in Option B	7	1 in Option B	0	0	20	4 in Option B	0	2	28	125	190

The options where potential high and moderate levels of impact could occur are indicated.
SOURCE: Ryden et al. 2018.

Analysis also indicated the potential widened ROW for Option B of the Orange Alternative could have a high level of impact on one unrecorded historic-period property preliminarily evaluated as likely eligible for listing in the NRHP (University of Arizona West Campus Agricultural Center). The widened ROW might require demolition of some structures at the eastern edge of that property. The widened ROW also could have a high impact on four unrecorded historic-period properties preliminarily evaluated as possibly NRHP eligible, including three residences and a hotel. The expanded ROW could result in demolition of the three residences. No buildings at the hotel would likely need to be demolished but one might be left immediately adjacent to the edge of the expanded ROW. The Orange Alternative also was assessed as having potential low impacts on two unrecorded historic-period properties preliminarily evaluated as possibly eligible, and probably no impacts on 20 properties evaluated as likely eligible and 28 as possibly eligible. Tier 2 NEPA studies would need to make a detailed assessment of impacts on those properties that might result from the various scenarios considered for Option B.

The assessment indicated the Purple Alternative could have potential high impacts on one property preliminarily evaluated as possibly eligible for the NRHP and moderate impacts on two preliminarily evaluated as likely eligible. Those impacts are in Options C and N. The Purple Alternative also was assessed as having potentially low impacts on seven unrecorded historic-period properties preliminarily evaluated as likely NRHP eligible and 17 preliminarily evaluated as possibly eligible. The Purple Alternative with the CAP Design Option was rated as having a potential moderate level of impact on one additional unrecorded historic-period property and low level of impact on one additional property preliminarily evaluated as possibly NRHP eligible. The

Purple Alternative was rated as unlikely to have impacts on 13 unrecorded historic-period properties preliminarily evaluated as likely NRHP eligible and 17 as possibly eligible.

Analysis indicated the Green Alternative, with or without the CAP Design Option, would have no high levels of impact on unrecorded historic-period properties preliminarily evaluated as likely eligible or possibly eligible for the NRHP. The assessment concluded the Green Alternative could have potential moderate impacts on three properties in Option D that were preliminarily evaluated as possibly NRHP eligible, and potential low impacts on 3 unrecorded historic-period properties preliminarily evaluated as likely NRHP eligible and 14 as possibly eligible. The Green Alternative with the CAP Design Option could have a low level of impact on one additional unrecorded historic-period property preliminarily evaluated as possibly NRHP eligible. The Green Alternative was rated as unlikely to have impacts on 17 unrecorded historic-period properties preliminarily evaluated as likely NRHP eligible and 18 as possibly eligible.

3.7.4.3 Traditional Cultural Properties

Options C and I2 of the Purple Alternative and Options D and I2 of the Green Alternative could affect the same two traditional cultural properties (a site associated with a traditional Tribal story and an archaeological site), but that is uncertain because Tribes have not shared specific information about the locations of those properties in relation to the Build Corridor Alternatives. Also, Option F of the Green Alternative is near another traditional cultural property (San Lucy Farms), but at its closest the 2,000-foot-wide corridor is approximately 900 feet from the tribal farmland and the Green Alternative is not expected to impact San Lucy Farms. Two other traditional cultural properties were identified along the Orange Alternative. One is an area of high archaeological site density along the part of Option B co-located with I-19. Conceptual engineering indicated that no new ROW is likely to be required along I-19 during the planning and implementation horizon but construction of additional lanes within the existing ROW could disturb parts of any archaeological sites that might remain intact within the existing ROW. The other traditional cultural property along the Orange Alternative is a petroglyph site within Option Q1, which is co-located with SR 85. The petroglyph site was avoided by prior improvements of SR 85 and FHWA and ADOT have made a commitment that any future improvements would be designed to avoid the site. The FHWA and ADOT are continuing to consult and work with Tribes to avoid adverse impacts on traditional cultural properties and would continue to do so during the NEPA studies for each Tier 2 project in accordance with the Section 106 PA developed for I-11 (see **Appendix E7**, Section 106 Consultation Summary and Draft Programmatic Agreement).

3.7.5 Summary

Table 3.7-11 (Summary of Potential Impacts on Cultural Resources) located at the end of this section, summarizes potential impacts on cultural resources. **Figure 3.7-1** (Potential Levels of Impacts on Archaeological Sites and Historic Structures) is a map highlighting levels of potential impact on archaeological sites and historic structures. **Figure 3.7-2** (Potential Levels of Impacts on Historic Districts and Buildings) is a map highlighting levels of potential impact on historic districts and buildings.

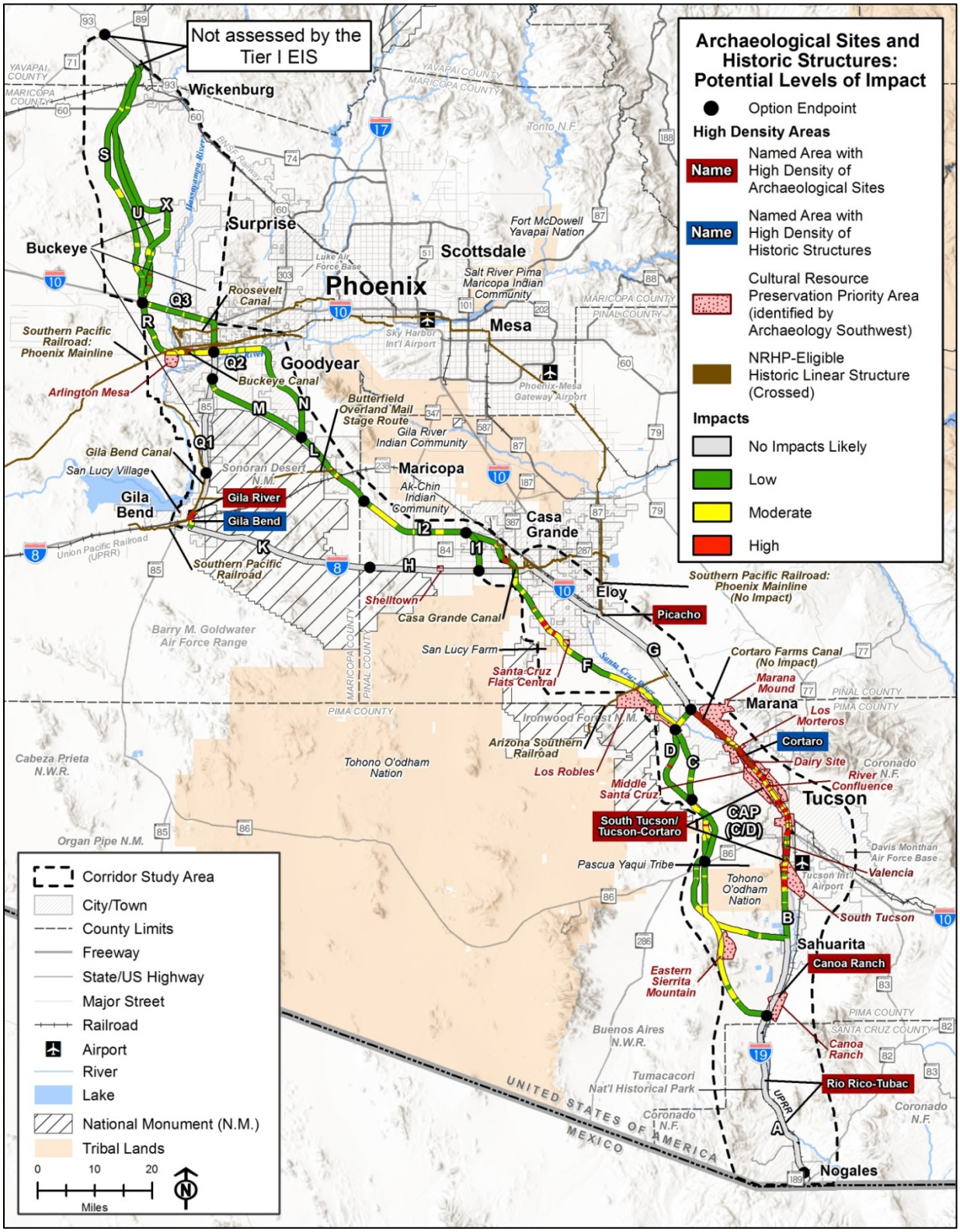


Figure 3.7-1 Potential Levels of Impacts on Archaeological Sites and Historic Structures

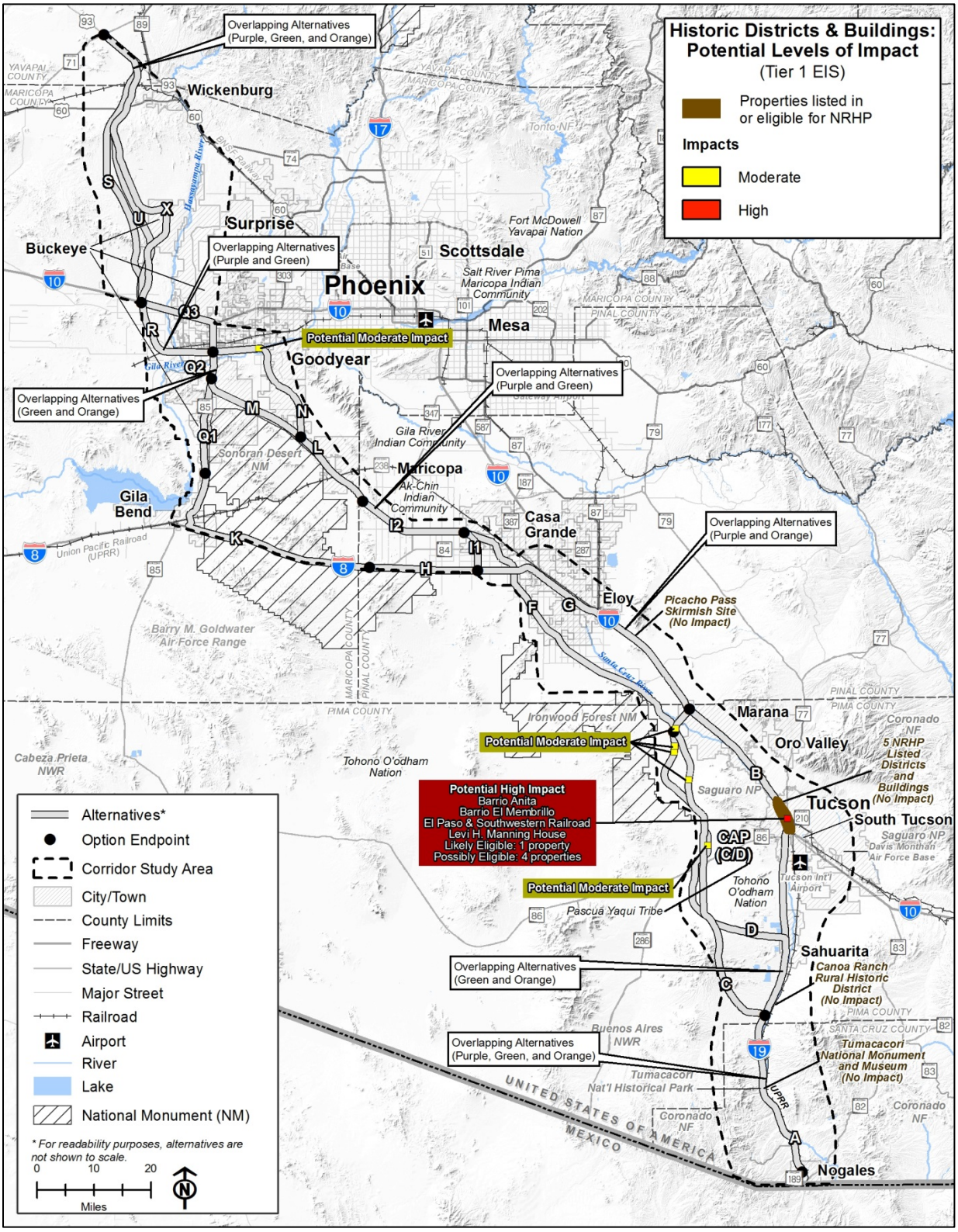


Figure 3.7-2 Potential Levels of Impacts on Historic Districts and Buildings

The inventory of cultural resources for each Build Corridor Alternative is incomplete. Cultural resource surveys would be conducted to complete the inventory during the NEPA study for each Tier 2 project in accordance with procedures defined by the I-11 PA (see **Appendix E7**, Section 106 Consultation Summary and Draft Programmatic Agreement). The Tier 1 analysis of available inventory data concluded that each Build Corridor Alternative could adversely affect recorded archaeological sites, historic structures, historic districts and buildings, and traditional cultural properties that (1) are listed in the NRHP, (2) have been determined eligible for the NRHP, (3) were recommended eligible for the NRHP, or (4) remain unevaluated and might be eligible for the NRHP.

Potential levels of impact on archaeological sites and historic structures were rated as high along 4 miles of the Purple Alternative, 8 miles of the Green Alternative, and 25 miles of the Orange Alternative. Potential levels of impact on archaeological sites and historic structures were rated as moderate along 48 miles of the Purple Alternative, 55 miles of the Green Alternative, and 20 miles of the Orange Alternative.

The many miles of potential high levels of impact along the Orange Alternative are primarily in Option B in the Tucson area where archaeological sites are densely concentrated along the Santa Cruz River. The Orange Alternative is estimated to have the potential to affect approximately 60 archaeological sites and historic structures that could be eligible for the NRHP. About two-thirds of those archaeological sites are along Option B and excavations were conducted at many of those sites within the I-19 and I-10 ROWs to recover artifacts and information to mitigate impacts of prior highway improvements. Tier 2 studies would need to determine if improvements for I-11 in Option B would warrant additional data recovery studies. If any of those sites do warrant more archaeological excavation, it could be a complex effort because many are habitation sites deeply buried in the alluvium of the Santa Cruz River floodplain. The Purple Alternative is estimated to have the potential to affect approximately 70 archaeological sites and historic structures that could be eligible for the NRHP, compared to approximately 100 for the Green Alternative. Construction of new lanes for all Build Corridor Alternatives would intersect five or six recorded historic linear historic structures but if necessary, bridging could probably avoid any adverse effects.

The Orange Alternative is likely to affect more historic districts and buildings than the Purple Alternative, which is likely to affect more than the Green Alternative. The potential need for additional ROW for the Orange Alternative along approximately 6 miles of I-10 in Tucson could result in adverse impacts on two NRHP-listed districts (Barrio Anita and Barrio El Membrillo) and one NRHP-eligible district (El Paso & Southwestern Railroad). If additional ROW is needed, the Orange Alternative also could result in high impacts on five unrecorded historic-period properties preliminarily evaluated as likely or possibly eligible for the NRHP.

The Purple and Green Alternatives would not affect any properties listed in or determined eligible for the NRHP. The assessment indicated the Purple Alternative could affect one unrecorded historic-period property preliminarily evaluated as possibly eligible, and if the property was determined eligible, the level of impact could be high because it is so large it probably could not be avoided within the 2,000-foot-wide corridor. The assessment rated the Green Alternative as having no potential for a high level of impact on any historic-period properties preliminarily evaluated as likely or possibly eligible for the NRHP.

The Orange Alternative has potential to affect one traditional cultural property that the consulted Tribes identified. The Purple and Green Alternatives each could affect two identified traditional

cultural properties although that is uncertain because the Tribes have not shared specific information about the location of those properties in relation to the Build Corridor Alternatives.

3.7.6 Potential Mitigation Strategies

In conjunction with Tier 2 NEPA studies, FHWA and ADOT would coordinate with the Section 106 Consulting Parties in accordance with the I-11 PA to develop and implement measures to minimize or mitigate any unavoidable adverse effects of Tier 2 projects.

3.7.7 Future Tier 2 Environmental Reviews

In conjunction with NEPA environmental reviews of Tier 2 projects, FHWA and ADOT would arrange for cultural resource surveys as needed to complete the inventory of cultural resources within the APE delineated for each Tier 2 project and assess potential effects. The FHWA and ADOT would work with the Consulting Parties to avoid or minimize adverse impacts, or mitigate unavoidable adverse effects in accordance with procedures stipulated by the I-11 PA (see **Appendix E7**, Section 106 Consultation Summary and Draft Programmatic Agreement).

Table 3.7-11 Summary of Potential Impacts on Cultural Resources

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Archaeological Sites and Historic Structures	2 miles of potential high impacts that may have been disturbed during previous I-10 construction. No I-11 impacts identified. Other projects in the Study Area will be subject to their own evaluation.	4 miles of potential high impacts and 48 miles of moderate impacts. Prior cultural resource surveys covered 27 percent of the 2,000-foot-wide corridor and found 243 archaeological sites and historic structures. Estimate approximately 70 NRHP-eligible archaeological sites and historic structures could be in ROW where new lanes would be built; some may be avoided by ROW adjustments and not all resources in ROW would necessarily be disturbed. Five recorded NRHP-eligible historic linear structures (canals, railroads, and roads) could be affected but such structures could be bridged if necessary to avoid adverse effects.	8 miles of potential high impacts and 55 miles of moderate impacts. Prior cultural resource surveys covered 25 percent of the 2,000-foot-wide corridor and found 231 archaeological sites and historic structures. Estimate approximately 100 NRHP-eligible archaeological sites and historic structures could be in ROW where new lanes would be built; some may be avoided by ROW adjustments and not all resources in ROW would necessarily be disturbed. Six recorded NRHP-eligible historic linear structures (canals, railroads, and roads) could be affected but such structures could be bridged if necessary to avoid adverse effects.	25 miles of potential high impacts and 20 miles of moderate impacts. Prior cultural resource surveys covered 49 percent of the 2,000-foot-wide corridor and found 523 archaeological sites and historic structures. Estimate approximately 60 NRHP-eligible archaeological sites and historic structures could be in ROW where new lanes would be built; some may be avoided by ROW adjustments and not all resources in ROW would necessarily be disturbed. Approximately two-thirds of the potentially affected sites are along I-10 in the Tucson area, which is the most dense and most complex concentration of sites in the Build Corridor Alternatives. Many of those sites were identified and previously studied in conjunction with prior improvements of I-10. Six recorded NRHP-eligible historic linear structures (canals and railroads) could be affected but such structures could be bridged if necessary to avoid adverse effects.

Table 3.7-11 Summary of Potential Impacts on Cultural Resources (Continued)

Historic Districts and Buildings	No resources identified. Other projects in the Study Area will be subject to their own evaluation.	Potential high impacts on one historic-period property preliminarily evaluated as likely or possibly NRHP eligible, moderate impacts on two (and one additional for the CAP Design Option), and low impacts on 24 (and one additional for the CAP Design Option).	Potential moderate impacts on three historic-period properties preliminarily evaluated as possibly NRHP eligible and low impacts on 17 (and one additional for the CAP Design Option).	Potential high impacts on two NRHP-listed districts, one NRHP-listed house, one NRHP determined eligible district, and five unrecorded historic-period properties preliminarily evaluated as likely or possibly NRHP eligible, and low impacts on two others.
Traditional Cultural Properties	No resources identified. Other projects in the Study Area will be subject to their own evaluation.	Tribes identified two places in or near the 2,000-foot-wide corridors of Options C and I2 as having traditional cultural importance (same places as the Green Alternative).	Tribes identified two places in or near the 2,000-foot-wide corridors of Options D and I2 as having traditional cultural importance (same places the Purple Alternative).	Tribes identified two places in the 2,000-foot wide corridors of Options B and Q1 as having traditional cultural importance, but one was avoided by prior highway improvements and FHWA and ADOT are committed to avoiding it with any future improvements.

Table 3.7-11 Summary of Potential Impacts on Cultural Resources (Continued)

Indirect Effects	Programmed transportation improvements plus projected population and employment growth could: • Increase pressure for potential land use conversion with an associated loss of cultural resources. • Confine the extent of potential indirect effects to a much smaller area than for Build Corridor Alternatives. • Generally avoid potential adverse effects if the project is subject to regulatory review.	Land development induced by the project could: • Increase loss of cultural resources due to land use conversions. • Increase access to previously remote cultural resources and lead to inadvertent damage and vandalism. • Result in potential indirect effects rated moderate because of the extent of co-located Corridor Options (122 miles). • Generally avoid potential adverse effects if the project is subject to regulatory review.	Similar to the Purple Alternative, except: • Greater potential for indirect effects because of shorter length of co-located Corridor Options (90 miles).	Similar to the Purple Alternative, except: • Longer length of co-located Corridor Options (263 miles) may reduce or slow induced growth in new areas. • Longer length of co-located Corridor Options is likely to reduce overall extent of indirect effects, but those effects could be severe 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 3.7-11 Summary of Potential Impacts on Cultural Resources (Continued)

Cumulative Effects	Past, present, and reasonably foreseeable projects could: • Have and will continue to affect cultural resources. • Have minor incremental effects.	Past, present, and reasonably foreseeable projects could: • 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.	Similar to Purple Alternative except: • Potential incremental effects on archaeological sites are expected to be greater because more archaeological sites are likely to be affected.	Similar to Purple Alternative except: • Potential incremental effects on historic districts and buildings are expected to be greater if new ROW is needed for Option B near historic Tucson neighborhoods.

CAP = Central Arizona Project, 1-10 = Interstate 10, NRHP = National Register of Historic Places, ROW = right-of-way.

3.8 Noise

This section describes potential traffic noise impacts that could result from implementing the Build Corridor Alternatives. This section provides a summary of the noise evaluation, with additional details included in the Draft Noise Report, which can be found in **Appendix E8**.

Noise is generally defined as unwanted or undesirable sound. Some of the most pervasive sources of noise in the environment can come from transportation systems. Noise levels decrease by about 3 to 4.5 decibels for each doubling of the distance from the source roadway. Noise barriers along a highway are most effective for homes within about 300 feet of the highway. Beyond that, noise barriers are less effective, but the natural decrease in noise with distance usually reduces noise levels to acceptable levels. To provide some context for the transportation noise levels provided in this chapter, noise levels associated with various types of sound sources are summarized in **Figure 3.8-1** (Common Outdoor and Indoor Noise Levels).

Ground vibration, which can be a concern associated with the rail corridors, was not evaluated as part of this Tier 1 analysis. There are no federal requirements directed specifically to highway traffic induced vibration. All studies that highway agencies have completed to assess the impact of operational traffic-induced vibrations showed that both measured and predicted vibration levels are less than any known criteria for structural damage to buildings. In fact, normal living activities (e.g., closing doors, walking across floors, operating appliances) within a building have been shown to create greater levels of vibration than highway traffic. Vibration concerns are addressed on a case-by-case basis as deemed appropriate in the noise analysis or in a stand-alone vibration analysis report.

3.8.1 Regulatory Setting

The Federal Noise Control Act of 1972 (Public Law 92-574) requires that all federal agencies administer their programs in a manner that promotes an environment free from noises that could jeopardize public health or welfare. Federal Highway Administration (FHWA) assesses noise impacts in accordance with 23 Code of Federal Regulations 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. The noise evaluation conducted for the Interstate 11 (I-11) Corridor is consistent with FHWA guidelines for assessing highway traffic noise (FHWA 2011) and the most current version of Arizona Department of Transportation (ADOT 2017) *Noise Abatement Requirements* (NAR), May 2017.

The 1964 Wilderness Act (Public Law 88-577) requires that natural sound and the visitor's ability to experience it is a defined component of wilderness character. There are wilderness areas in the Saguaro National Park (SNP) – West (near Options C, D, and Central Arizona Project [CAP] canal).

3.8.2 Methodology

The Analysis Area for the noise evaluation consisted of the 2,000-foot-wide Project Area and the immediately adjacent area extending a maximum of 1,000 feet away from the boundary of the Project Area. The procedure used to evaluate noise impacts included the following steps:

1. Identify noise-sensitive land uses within the Analysis Area. Noise-sensitive land uses are those which fall under Noise Abatement Criteria Land Use Categories A, B, C, and E in **Table 3.8.1** (Noise Abatement Criteria).

2. Establish existing noise levels by utilizing noise measurements conducted for previous noise studies throughout the I-11 Corridor dating between 2004 and 2015. New measurements also were conducted in 2018 in some areas for which previous data was unavailable or outdated. Previous noise measurements conducted within the past five years are still considered valid for the purposes of this analysis. New measurements were taken in areas where new roadways are proposed as well as noise-sensitive areas along existing roadways that were not represented in the previously-collected data. Measurements were conducted in accordance with the standards and guidelines established by FHWA (FHWA 1996).

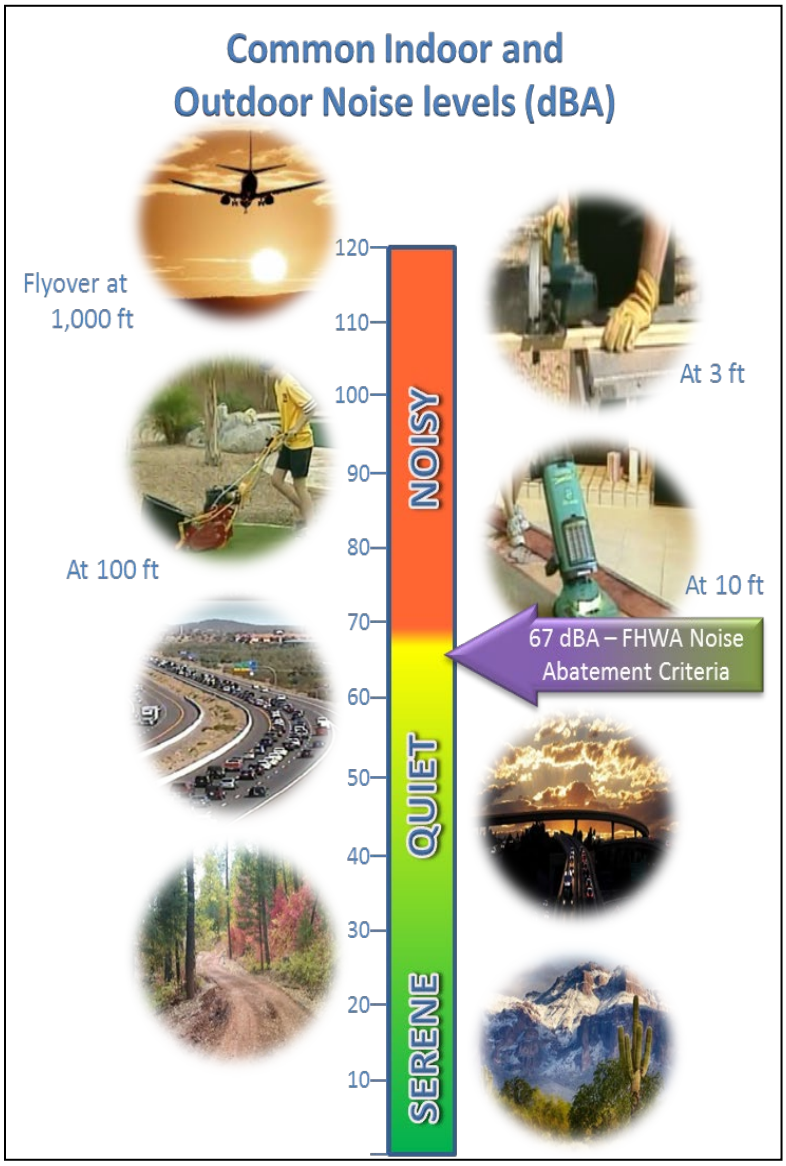


Figure 3.8-1 Common Outdoor and Indoor Noise Levels

3. Predict future (2040) noise levels using FHWA's Traffic Noise Model (TNM), Version 2.5. To do this, the analysis methodology employed two approaches. The first more detailed approach placed receivers at noise-sensitive land uses within the Analysis Area and predicted future traffic noise levels at the receiver locations for each of the Build Corridor Alternatives. Because specific roadway alignments are needed to build the TNM model predicting future noise levels, the modeling evaluation for Options not co-located with an existing highway used the typical cross sections (described in **Chapter 2**) placed at in the center of the 2,000-foot-wide corridor. Because this analysis is intended to be a screening level approach, a simplified model assuming flat earth with no terrain input was used. For analysis of the Options co-located with existing facilities, TNM models developed for the previous noise studies were used in combination with the assumed capacity improvements (described in **Chapter 2**). The results of this detailed modeling are described in the attached **Appendix E8,** Draft Noise Report.

   The second more generalized approach using TNM 2.5 focused on predicting noise levels at set distances from the edge of the right-of-way (ROW). The set distances consisted of 50, 100, 250, 500, and 1,000 feet. This approach utilized the same traffic volumes and typical section assumptions as the more detailed analysis. The intent of modeling noise levels at set distances was to provide representative noise levels that could be used to determine noise levels at any sensitive land uses that fall within those distances. Modeling of the No Build Alternative consisted of future traffic volumes moving at or five miles above the posted speed limit, which represents free flow traffic conditions. This represents worst-case scenario noise predictions, as congestion also would increase.

4. Determine areas where potential traffic noise impacts at noise-sensitive receivers are expected to occur by comparing predicted noise levels in 2040 with the appropriate noise abatement criteria (NAC), as shown in **Table 3.8.1**.

5. Describe where potential noise impacts could occur during construction of the Build Corridor Alternatives.

6. Discuss noise mitigation strategies for those areas where noise impacts could potentially occur.

7. Determine the zoning classification of vacant and undeveloped lands within the analysis area to be made available to local planning agencies for their use in land-use planning. This detailed inventory of vacant/undeveloped parcels and their zoning is available in the attached **Appendix E8,** Draft Noise Report.

This evaluation represents a planning-level assessment based on generalized assumptions regarding facility design (i.e., typical cross sections rather than specific roadway geometry) and traffic information and other related assumptions available at the time of the analysis (December 2017). For example, the TNM 2.5 model runs for the Corridor Options that do not follow existing roadways were based upon typical cross sections(available in **Appendix E1**) rather than specific roadway geometry (which is standard procedure in a project-level traffic noise evaluation and would be conducted during Tier 2 analysis). In the areas where a new road would be constructed, a centerline was created in the middle of the 2,000-foot-wide corridor I-11 Corridor Study Area (Study Area). Details associated with Corridor Option co-location and related construction footprint implications were deferred to the refined analyses anticipated during the Tier 2 process. As the project proceeds and an alignment is identified during the Tier 2 studies, additional noise analyses, including alternative noise sources such as nearby railroads and airports, also would be required. The results of this analysis and the mitigation

considerations described should not be considered final; they will be verified and refined as the design progresses.

3.8.2.1 Noise Abatement Criteria

NAC are used to define the noise levels that are considered an impact for each land use activity category. If future noise levels approach or exceed the NAC, they are considered noise impacts under ADOT's NAR. 'Approach' is defined as noise levels within 1 decibel of the NAC. In addition, a 15-decibel on the A-weighted scale (dBA) increase over existing noise levels is considered a substantial increase in noise and would constitute an impact.

Table 3.8-1 Noise Abatement Criteria

Activity Category[1]	dBA Leq(h)[2],[3]	Common Indoor Noise Levels
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Residential.
C	67 (exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, churches, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, churches, public meeting rooms, public or nonprofit institutional structures, radio structures, recording studios, schools, and television studios.
E	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in categories A–D or F.
F	—	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	—	Undeveloped lands that are not permitted.

(1) Activity Categories B, C, and E include undeveloped lands permitted for each activity category.
(2) The 1-hour equivalent loudness in dBA, which is the logarithmic average of noise over a 1-hour period.
(3) The $L_{eq}(h)$ activity criteria values are for impact determination only, and are not design standards for noise abatement measures.

dBA = A-weighted decibels.

SOURCES: FHWA 2011; 23 Code of Federal Regulations 772.

3.8.3 Affected Environment

Noise sensitive land uses within the South Section (between Nogales and Casa Grande) include residential, places of worship, schools, hotels, and parks/trails. Land uses in the Central

and North Sections primarily consist of scattered residences, agricultural land, industrial, and undeveloped areas.

3.8.3.1 Existing Noise Environment

Measurements characterizing the existing noise environment were obtained from previous noise studies within the project corridor as well as new noise measurements conducted for the I-11; all noise measurements were conducted between August 2013 and August 2018 and are shown in **Table 3.8-2** (Ambient Noise Monitoring Data).

Table 3.8-2 Ambient Noise Monitoring Data

Noise Monitoring Site # [1]	Previous Project or New Measurement	Date	Noise Level (dBA) [2]	GPS Coordinates	Location Description
Mon 1	SR 189, International Border to Grand Ave[3]	March 2016	53	31°22'3.51"N 110°56'43.84"W	Nogales High School near baseball field
Mon 2	New Measurement conducted for Draft I-11 Tier 1 EIS [4]	February 2018	59	31°23'3.42"N 110°57'16.95"W	Near 2873 N Bitache Dr, Nogales, 85621
Mon 3			64	31°30'5.65"N 111° 0'41.49"W	East of 422 Gamino Agosto, Rio Rico, 85648
Mon 4			51	31°36'9.22"N 111° 2'59.46"W	Corner Post Way & Lombard Way, Tubac, 85646
Mon 5			55	31°48'44.87"N 111° 0'28.70"W	Behind 3994 S Via de Cristal, Green Valley, 85614
Mon 6	I-19 Noise Complaint Green Valley[5]	July 2015	64	31°53'18.89"N 110°59'17.43"W	1222 N La Canoa, Green Valley- near Duval Mine Road
Mon 7	New Measurement conducted for I-11 Draft Tier 1 EIS [4]	February 2018	63	31°57'45.01"N 110°59'21.54"W	Near 1130 W Vuelta Portillo Mesteno (Rancho Resort Community), Sahuarita, 85629
Mon 8			73	32° 8'35.38"N 110°59'9.80"W	966 W Mossman St, Tucson, 85706
Mon 9	Ajo Way (SR 86) Traffic Interchange (TI) [6]	April 2014	70	32°10'1.91"N 110°59'5.45"W	Alley adjacent to residence at 4658 S 19th Ave
Mon 10			61	32°10'9.67"N 110°59'3.61"W	Near driveway to residence at 4525 S 19th Ave
Mon 11	Ajo Way (SR 86) TI	April 2014	71	32°10'13.12"N 110°59'6.15"W	On west side of privacy wall of residence at 942 W Macarthur St
Mon 12	Ajo Way (SR 86) TI	April 2014	68	32°10'14.98"N 110°59'11.22"W	Near driveway to residence at 1013 W Michigan St
Mon 13			67	32°10'27.73"N 110°59'12.18"W	Near driveway to residence at 1020 W District St
Mon 14			70	32°10'27.63"N 110°59'5.69"W	On west side of privacy fence of residence 926 W District St
Mon 15			60	32°10'30.46"N 110°59'3.78"W	Site in La Mar Park

Table 3.8-2 Ambient Noise Monitoring Data (Continued)

Noise Monitoring Site # [1]	Previous Project or New Measurement	Date	Noise Level (dBA) [2]	GPS Coordinates	Location Description
Mon 16			64	32°10'35.25"N 110°59'12.52"W	Near driveway to residence at 1016 W Ebner Pl
Mon 17			58	32°10'37.26"N 110°59'0.99"W	West corner at property 851 W Ajo Way
Mon 18			63	32°10'38.03"N 110°59'16.50"W	Near driveway to residence at 3808 S Lamar Ave
Mon 19			52	32°11'24.19"N 110°59'3.01"W	In Paseo De Las Iglesias east of Cottonwood Ln
Mon 20	New Measurement conducted for I-11 Draft Tier 1 EIS [4]	February 2018	60	32°12'28.98"N 110°58'37.14"W	Corner of S Osborn Ave & W 21st St, near 599 W 21st St, Tucson, 85701
Mon 21			59	32°14'34.84"N 110°59'7.84"W	1679 N Halron Ct, Tucson, 85705
Mon 22	I-10 Ruthrauf TI [7]	December 2017	65	32°17'43.63"N 111° 1'44.88"W	4842 N Shannon Road
Mon 23			65	32°17'49.20"N 111° 1'50.13"W	4945 N Shannon Road
Mon 24			64	32°17'54.93"N 111° 1'54.49"W	5001 N Shannon Road
Mon 25			60	32°18'2.42"N 111° 2'1.00"W	Near 3051 Jade Place
Mon 26	I-10 Corridor Study, Tangerine Rd to Ina Rd [8]	August 2013	67	32°20'43.58"N 111° 4'12.77"W	4902 West Massingale, Marana
Mon 27			60	32°21'22.81"N 111° 4'59.61"W	8221 N Cerius St, Marana
Mon 28			68	32°21'45.07"N 111° 5'18.48"W	Cortaro Ranch, undeveloped lot
Mon 29			63	32°21'58.84"N 111° 5'39.11"W	8815 Joplin Lane
Mon 30			57	32°22'1.80"N 111° 5'58.04"W	Marana Golf Continental Ranch
Mon 31			64	32°24'30.35"N 111° 8'25.02"W	111000 N Casa Grande Highway, Marana
Mon 32			72	32°24'59.76"N 111° 9'14.18"W	8800 N Frontage, Rillito
Mon 33			64	32°25'22.00"N 111° 9'32.10"W	A-Bar-A Recreational Vehicle Park
Mon 34	New Measurement conducted for I-11 Draft Tier 1 EIS [4]	February 2018	39	32°18'42.17"N 111°15'19.57"W	SNP-Near 12900 Sweetwater Dr, Tucson, 85743
			40	32°18'42.17"N 111°15'19.57"W	SNP-Near 13500 W Mustang Rd, Tucson, 85743

Table 3.8-2 Ambient Noise Monitoring Data (Continued)

Noise Monitoring Site # [1]	Previous Project or New Measurement	Date	Noise Level (dBA) [2]	GPS Coordinates	Location Description
Mon 35a	New Measurement conducted for I-11 Draft Tier 1 EIS [4]	August 2018	43	32°15'46.21"N 111°14'7.26"W	SNP – near 12690 W Fort Lowell Rd, Tucson 85743
Mon 35b			46	32°15'13.38"N 111°13'0.36"W	SNP – NE corner of W Mile Wie Rd & N Sandario Rd at Campsite
Mon 35c	SNP, Discovery Trail[9]	2016	39	32°15'37.30"N 111°12'36.90"W	SNP – Discovery Trail
Mon 36	Picacho_2017_Draft Noise Report[10]	April 2017	56	32°43'5.81"N 111°29'51.91"W	Picacho School Playground
Mon 37	New Measurement conducted for I-11 Draft Tier 1 EIS [4]	February 2018	68	32°46'59.23"N 111°37'39.32"W	3400 N Outer Dr, Eloy, AZ 85131
Mon 38			48	32°51'0.22"N 111°51'35.23"W	South of SKP Co-OP Retreat Mobile Home Park -SE corner W Selma Hwy & S Montgomery Rd, Casa Grande, 85193
Mon 39			60	32°50'1.30"N 112° 7'53.19"W	Within Saguaro-One Recreational Vehicle Park-52725 West of I-8 Frontage Rd, Maricopa, 85139
Mon 40			48	32°57'24.39"N 112° 7'48.49"W	NE Corner of W Teel Road and N Johnson Road, Maricopa, 85139
Mon 41			55	32°56'34.61"N 112°41'16.50"W	South end of the Mobile home park near S Butterfield Tr & S Main St, Gila Bend, 85337
Mon 42			49	33°20'39.17"N 112°28'8.60"W	19478 W Corto Lane, Buckeye, 85326
Mon 43			52	33°21'18.28"N 112°39'12.80"W	27935 W Hazen Rd, Buckeye, 85326
Mon 44			41	33°29'21.23"N 112°49'45.70"W	36032 W Weldon Ave, Tonopah, 85354
Mon 45			50	34° 2'35.76"N 112°50'28.12"W	22275 W El Grande Trl, Wickenburg, 85390

(1) Monitoring site numbers correspond to labels in the figures attached in **Appendix E8**.
(2) Equivalent sound level.
(3) ADOT 2016.
(4) New measurements were conducted by the I-11 Tier 1 EIS study team between February and August 2018. Full details of these measurements are provided in **Appendix E8**.
(5) ADOT 2015.
(6) ADOT 2014.
(7) ADOT 2017.
(8) ADOT 2013.
(9) Job 2016.
(10) ADOT 2017.

dBA = A-weighted decibels, EIS = Environmental Impact Statement, I-10 = Interstate 10, I-19 = Interstate 19, SNP = Saguaro National Park, SR = State Route, TI = Traffic Interchange.

Noise measurement data obtained from previous noise studies dating from 2013 to 2018 range 39 dBA to 73 dBA. Measured noise levels ranged from 39 dBA (near SNP) to 72 dBA (near I-19 in South Tucson). In general, measured noise levels were consistent with the prevailing land uses, with higher noise levels in the more urban areas and lower noise levels in rural areas.

Local airports also are a contributing factor to the existing noise environment. Disturbance from aircraft noise can be greater in areas with low background noise than in urban areas. There are several airports within the Study Area, including Buckeye Municipal Airport, Marana Regional Airport, Palm Valley Tucson Airport, Pinal Airpark, and the Tucson International Airport. Further discussion and graphical representation of nearby airports and Study Area noise monitors can be found in **Appendix E8**.

In consideration of noise effects on the SNP, the frequencies, magnitudes, and durations of acceptable levels of unnatural sound may vary throughout a park, and are generally greater in developed areas, which are adjacent to the observed corridors. Natural sounds may form a valued part of the visitor experience. Conversely, the sounds of motor vehicle traffic, an electric generator, or construction equipment can greatly diminish the solemnity of a visit to a national memorial, the effectiveness of a park interpretive program, or the ability of a visitor to hear a bird singing its territorial song. Additionally, culturally appropriate sounds are important elements of the national park experience in many parks, and soundscape resources and values of the parks are fundamental components of the purposes and values for which the parks were established. It is essential to minimize all noise that through frequency, magnitude, or duration affects the natural soundscape or other park resources or values, or that exceeds levels that have been identified as being acceptable to or appropriate at the sites, including the course of construction activities. More detailed noise analyses of the SNP will be completed in future Tier 2 environmental reviews.

3.8.4 Environmental Consequences

3.8.4.1 Build Corridor Alternatives

The goal of the traffic noise analysis was to determine the total number of receptors where future noise levels would be expected to approach or exceed the applicable NAC, potentially warranting consideration of noise-abatement measures during Tier 2 National Environmental Policy Act evaluations. The noise modeling evaluation focused on noise-sensitive land uses or active, permitted residential developments within 1000’ of the ROW. TNM 2.5 loses prediction accuracy as the receiver is located farther away from the noise source. The results of this detailed noise analysis are contained in the Draft Noise Report in **Appendix E8**, which includes a detailed table and corresponding map of all receiver locations where noise impacts may potentially occur. The results of the more generalized noise analysis, conducted at set distances meant to be representative, are summarized below.

Constructing roads causes a substantial amount of temporary noise. Noise during construction could be a nuisance to nearby residents and businesses. All three Build Alternatives would generate similar types of noise that would occur sporadically in different locations throughout the construction period. For all projects, ADOT will consider the effects of noise from project construction activities and will determine any additional measures that are needed in the plans or specifications to minimize or eliminate adverse impacts from construction noise.

As a general matter, new highway alignments constructed in otherwise quiet noise environments, such as those in the undeveloped areas of the corridor, will often result in a

substantial noise increase at nearby residences (that is, 15 dBA or greater increases over existing noise levels). Under such circumstances and depending on the number of residences affected, detailed consideration of noise barriers during Tier 2 analyses would be warranted.

Noise modeling results for the Build Alternatives are described in **Table 3.8-3** (Summary of Predicted 2040 Traffic Noise Levels). Future traffic noise impacts are predicted at a majority of the modeled noise receiver locations within the Analysis Area as described in more detail in **Appendix E8**. Under the Purple Alternative, noise impacts would generally occur within 100 feet of the ROW, but potential impacts would occur out to 250 feet along Option G. Under the Green Alternative, noise impacts are predicted to occur at most locations within 100 feet of the ROW. Under the Purple and Green Alternatives, noise levels 1,000 feet away from I-11 are predicted in the range of 40 to 50 dBA, which would not exceed the FHWA NAC for any land use categories. Traffic volumes are directly related to modeled noise level predictions; higher traffic volumes result in higher noise levels.

Noise impacts for the Orange Alternative are likely to occur at noise sensitive land uses within 250 feet of the edge of the ROW. Potential impacts would occur out to 500 feet along some of the Options co-located with existing facilities (Option B).

Similar to the Purple and Green Alternatives, most noise-sensitive land uses within the Analysis Area are expected to experience potential noise impacts. Noise abatement would need to be evaluated at a number of locations under all three Build Corridor Alternatives. Due to the density of the noise-sensitive land uses along the Orange Alternative, this Alternative has the highest number of locations where noise abatement would potentially be warranted, subject to further study in Tier 2 analyses. All three alternatives may have similar numbers of modeled noise sensitive receiver locations; however, the Orange Alternative would most likely have more receptors (the number of dwelling units represented by a receiver location) compared to the receivers in the Green and Purple Alternatives. While the other Build Corridor Alternatives would likely see similar numbers of impacted receivers and warrant mitigation in some of those locations, the development along the Orange Alternative close to the co-located facility is much more dense in comparison to the more rural areas surrounding the Purple Alternative and Green Alternative. Noise abatement measures can include noise walls, reduced speeds, and truck traffic restrictions.

In addition to the screening evaluation which modeled noise levels at set distances described above, noise levels also were predicted at several parks and recreation areas. **Table 3.8-4** (Summary of Predicted 2040 Traffic Noise Levels at Major Parks and Recreation Areas) presents the distance to the point along the park/recreation area boundary closest to the Option cited as well as the predicted noise level at that boundary location. These noise levels are provided for planning purposes only; because the receiver point was placed at the closest point along the park boundary, the noise levels represent a worst-case scenario for noise levels at the location within the park where highway noise levels would be loudest. In addition, the approach to this screening level analysis consisted of a simplified noise model assuming flat earth, with no elevation or terrain input. During the Tier 2 analysis, a project-level noise impact evaluation will identify exterior areas of frequent human use, such as a picnic area or visitors center, and require development of more detailed noise models with terrain and elevation inputs.

Table 3.8-3 Summary of Predicted 2040 Traffic Noise Levels

Option	Distance From Edge Of Right-of-Way				
	50'	100'	250'	500'	1000'
Purple Alternative					
A	70	68	63	58	52
C[(1)]	67	65	61	57	51
G	74	72	67	62	56
I1	70	69	65	60	54
I2	70	68	64	60	54
L	67	65	62	57	51
N	71	69	65	61	55
R	70	69	65	60	54
X	61	59	55	50	44
Green Alternative					
A	70	68	63	58	52
D[(2)]	55	53	49	44	38
F	69	67	63	58	52
I2	70	68	64	60	54
L	67	65	62	57	51
M	65	64	60	55	49
Q2	70	69	65	60	54
R	58	56	52	48	43
U	70	68	63	58	52
Orange Alternative					
A	70	68	63	58	52
B (portion along I-19)	79	76	71	66	60
B (portion along I-10)	78	77	72	66	60
G	74	72	67	62	56
H	67	65	61	56	49
K	67	65	61	56	49
Q1	64	62	58	53	47
Q2	65	64	60	55	49
Q3	78	75	70	65	59
S	62	61	57	52	46

(1) Noise levels predicted for Option C are representative of noise levels for both Option C along Sandario Road and Option C with the CAP Design Option.

(2) Noise levels predicted for Option D are representative of noise levels for both Option D along Sandario Road and Option D with the CAP Design Option.

1-10 = Interstate 10, I-19 = Interstate 19.

The noise modeling evaluation focused on areas of active, permitted residential development. Under ADOT NAR, permitted developments are those locations where a commitment to develop land was issued in the form of a site development plan and the issuance of building permits.

Table 3.8-4 Summary of Predicted 2040 Traffic Noise Levels at Major Parks and Recreation Areas

Alternative/ Option	Description	Approximate Distance From Edge Of Corridor (Feet)	dBA
Orange/B	SNP	7,884	45
	Tucson Mountain Park	8,890	42
Purple/C	SNP	1,600	46
	Tucson Mountain Park	5,970	40
	Ironwood Forest National Monument (NM)	5,965	40
Green/D	Ironwood Forest NM	5,965	37
Central Arizona Project (CAP) Design Option	SNP	1,600	
	Tucson Mountain Park	400	
Green/F	Ironwood Forest NM	574	43
Orange/H	Sonoran Desert National Monument (SDNM)	50	78
Purple and Green/I2	SDNM	14,078	39
Orange/K	SDNM	50	78
Purple/L	SDNM	500	61
Green/M	SDNM	2,820	44
Purple/N	SDNM	3,921	46
Orange/Q1	SDNM	2,310	42
Orange/S	Proposed Vulture Mountains Recreation Area (VMRA)	50	74
Green/U	Proposed VMRA	50	71
Purple/X	Proposed VMRA	50	71

CAP = Central Arizona Project, dBA = A-weighted decibels, NM = National Monument, SDNM – Sonoran Desert National Monument, SNP – Saguaro National Park, VMRA = Vulture Mountains Recreation Area.

Option A, Option B, and Option G are co-located with existing facilities which have a parallel railroad. Options L, R, S, U, and X cross railroad corridors. Railroad corridors may be considered as an alternative noise source and would need to be considered in the Tier 2 noise analyses.

The CAP Design Option comes slightly closer to the boundary than the Sandario Road Alignment with negligible difference in noise levels and impacts. Option C comes closer to the boundary of the SNP in its northern extents, but the distances are approximately 3,770 feet and meaningful effects at those distances to the park are highly unlikely.

In all Build Corridor Alternatives under consideration, noise levels 1,600 feet from the highway are not likely to exceed 60 dBA at any location in the SNP; however, there may be potential impacts due to a substantial increase in noise levels (15 dBA or more). Noise measurements were taken at two residential areas near the park in February 2018; the noise levels ranged from 39 to 40 dBA. Two additional measurements were taken within the SNP boundary in August 2018; the noise levels ranged from 43 to 46 dBA. Option B (Orange Alternative) follows the existing alignment of I-10 and would not result in any meaningful changes to the park that would require additional analysis.

3.8.4.2 No Build Alternative

Under the No Build Alternative, I-11 would not be constructed. Land uses would remain undeveloped or agricultural until development occurs as planned by local jurisdictions. There would be no changes in future traffic noise associated with I-11 although noise levels along existing transportation facilities throughout the Study Area would likely increase due to the projected population growth and the accompanying increased future traffic volumes. As shown in **Table 3.8-5** (Summary of Predicted 2040 Traffic Noise Levels – No Build Alternative), noise levels exceeding the NAC would potentially occur at most noise-sensitive land uses within 500 feet.

Table 3.8-5 Summary of Predicted 2040 Traffic Noise Levels – No Build Alternative

Option	Distance From Edge Of Right of Way				
	50'	100'	250'	500'	1000'
I-19 (Nogales to Sahuarita)	85	82	73	66	58
I-19 (Sahuarita to I-10)	88	84	77	69	62
I-10 (I-19 to Marana)	92	89	82	74	66
I-10 (Marana to I-10)	88	84	76	69	61
I-8 (I-10 to Gila Bend)	82	78	69	62	55
SR 85 (Q1, Gila Bend to Buckeye Hills)	79	75	66	60	53
SR 85 (Q2, near Buckeye Hills)	84	81	72	65	58
SR 85 and I-10 (coincident with Option Q3)	88	84	75	68	60

I-8 = Interstate 8, I-10 = Interstate 10, I-19 = Interstate 19, SR = State Route.

Summary of the Potential Impacts of the Build Corridor Alternatives

Predicted 2040 traffic noise levels at most of the noise-sensitive land uses within the Analysis Area would experience potential noise impacts under all of the Build Corridor Alternatives (**Table 3.8-6** [Summary of the Potential Noise Impacts of the Build Corridor Alternatives] located at the end of this section). The potentially impacted receivers are shown in **Appendix E8**. Generally, noise impacts could be expected to occur at noise-sensitive land uses within 100 feet of the edge of the ROW. For all of the alternatives, noise impacts could extend up to 500 feet. Under the Green and Purple alternatives, noise impacts could extend out to a greater distance into National Park, NM, and designated wilderness areas due to the relatively low existing noise levels. As a general principle, new highway alignment constructed in a quiet or undeveloped area (e.g., Option C, Option D, and Option F) will typically result in a substantial increase of 15 dBA or

greater which would warrant the consideration of noise mitigation. Project-level analysis identifying noise impact locations would occur during Tier 2 analysis, which would include a full evaluation of noise mitigation.

3.8.5 Potential Mitigation Strategies

Traffic noise levels can be mitigated by a variety of abatement measures, such noise barriers, earthen berms, refinement of horizontal and vertical alignments, reduced speeds, and truck traffic restrictions. ADOT NAR has specific requirements for analyzing the feasibility, reasonableness, and cost-effectiveness of noise-abatement measures. The abatement evaluation requires specific design details that are not yet available for I-11. As a result, a detailed barrier evaluation is not possible at this preliminary stage of the project.

As described in Section 3.8.4.2, Residential Developments (Activity Category B Modeling), expected noise impacts were identified at most of the noise-sensitive land uses. Noise barriers would likely be warranted for the Build Corridor Alternatives as follows:

Purple Alternative: Options A and B

Green Alternative: Options A and B

Orange Alternative: Options A, B, and G

FHWA and ADOT will identify specific mitigation measures during the Tier 2 processes.

A goal of this noise study is to identify areas that may be impacted by traffic noise. Using traffic projections, noise levels were predicted at specific distances to provide the best estimation of future noise levels in the vicinity of the Build Corridor Alternatives. 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 would be available to local and regional jurisdictions for their use in planning noise-compatible land uses in the vicinity of I-11 in the future.

3.8.6 Future Tier 2 National Environmental Policy Act Noise Analysis

This evaluation is based on limited design and traffic information and presents preliminary model results. Certain assumptions were made to complete the noise analysis. In areas where a new road would be constructed, a centerline was created at the existing grade in the middle of the 2,000-foot-wide corridor Project Area. As the design for the project is developed further and alignments are refined or eliminated, additional noise analyses will be required.

For the Tier 2 Analysis, updated noise measurements will need to be conducted throughout the entire corridor, especially in rural areas where a substantial noise increase (a 15-dBA increase over existing noise levels) would be likely. Detailed noise modeling will be conducted in accordance with the standards, procedures, and guidelines in place when the Tier 2 studies commence.

Options B and G are co-located with existing I-19 and I-10 and also have a railroad parallel to the existing highway; those may be considered as an alternative noise source and need to be included in Tier 2 noise analyses.

Table 3.8-6 Summary of the Potential Noise Impacts of the Build Corridor Alternatives

Topics	Alternatives			
	No Build	Purple	Green	Orange
Potential Noise Impacts	No changes in future traffic noise associated with I-11; noise impacts predicted to occur in areas up to 500 feet from existing ROW due to projected population growth and the accompanying increased future traffic volumes.	Noise impacts predicted to occur in areas up to 250 feet from ROW, some impacts up to 500 feet.	Noise impacts predicted to occur in areas up to 250 feet from ROW.	Noise impacts predicted to occur in areas up to 250 feet of ROW, some impacts up to 500 feet. More locations potentially warranting noise mitigation due to density of surrounding development.
Indirect Effects	Programmed transportation improvements plus projected population and employment growth could: • Continue to follow the trend in increasing noise levels, which are already exceeding FHWA Noise Abatement Criteria (NAC) in certain locations.	Land development and the affiliated increase in traffic induced by the project could: • 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.	Similar to the Purple Alternative.	Similar to the Purple Alternative, except: • Noise levels potentially increase in areas where there is an existing transportation use in the South and Central Sections.

Table 3.8-6 Summary of the Potential Noise Impacts of the Build Corridor Alternatives (Continued)

Topics	Alternatives			
	No Build	Purple	Green	Orange
Indirect Effects (Con't)	• Increase the noise levels affecting biologic resources in areas that are currently not developed			
Cumulative Effects	Past, present, and reasonably foreseeable projects could: • Potential incremental increases in noise levels in communities as population growth occurs.	Past, present, and reasonably foreseeable projects could: • Increase noise levels and the associated effects in communities surrounding the corridor.	Similar to the Purple Alternative.	Similar to the Purple Alternative.

FHWA = Federal Highway Administration, NAC = Noise Abatement Criteria,=, ROW = right-of-way.

This page intentionally left blank

3.9 Visual and Aesthetics

This section describes the regulatory setting, methodology, and affected environment applicable to visual and aesthetic resources in the vicinity 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 aesthetic resources and identifies mitigation measures to avoid or minimize these impacts.

3.9.1 Regulatory Setting

The National Environmental Policy Act of 1969 (NEPA) and Council on Environmental Quality regulations to implement NEPA discuss visual impacts under the heading of aesthetics. These regulations identify aesthetics as one of the elements or factors in the human environment that must be considered to determine the effects of a project.

NEPA requires the federal government to do the following:

> "…use all practicable means... [to]…assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings [and to] … preserve important historic, cultural and natural aspects of our national heritage, and maintain whenever possible, an environment that supports diversity and variety of individual choice." [42 United States Code [USC] § 4331 [NEPA § 101 (b)(2)]]
>
> To this end, federal agencies are directed to:
>
> "…utilize a systematic, interdisciplinary approach that will insure that integrated use of the natural and social sciences and the environmental design arts in planning and decision making that may have an impact on man's environment." [42 USC § 4332 [NEPA § 102 (2)(A)]]"

Technical Advisory T6640.8A identifies visual resources as an item to be included in environmental and Section 4(f) documents (Federal Highway Administration [FHWA] 1987). When Bureau of Land Management (BLM) lands are present and may be impacted by a project, NEPA and the Federal Land Policy and Management Act are the primary laws that are applicable. These rules and regulations require BLM to address potential effects on visual resources. Visual resources on BLM-administered lands are managed within the context of the Visual Resource Management (VRM) system, as described in BLM Manual 8400 – Visual Resource Management (BLM 1986). Various other federal laws and programs also are considered to protect the scenic values of visual resources. For example, National Park Service (NPS) resource management objectives were considered in the assessment of visual impacts to the scenic quality of the trails and other important recreational locations within NPS lands.

Similarly, state and local governments engage in efforts for VRM, usually through establishing specific goals and objectives regarding visual resources in city or county General Plans and Comprehensive Plans. These state and local level plans and policies for VRM will be referred to in detail for individual I-11 projects as part of the Tier 2 NEPA analysis.

3.9.2 Methodology

FHWA published the *Guidelines for the Visual Impact Assessment of Highway Projects* (FHWA 2015) in January 2015 as an update to the original 1980s Visual Impact Assessment (VIA) document. The guidelines require that each project subject to NEPA determine the level of documentation needed for the visual impact assessment (VIA). There are four different levels of VIA documentation, which are based on the scope, complexity, and controversy associated with a project.

The level of VIA prepared for I-11 was based on the nature and limitations of the Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS) rather than direct use of the VIA Scoping Questionnaire. An "Abbreviated VIA" was determined to be the appropriate level of documentation.

The visual effects analysis of the Build Corridor Alternatives considered impacts within the 2,000-foot-wide I-11 Corridor for Options co-located within existing facilities and new construction.

3.9.2.1 Area of Visual Effect

The Area of Visual Effect (AVE), or Analysis Area, is the area in which the project could potentially be visible, given the presence or absence of intervening topography, vegetation, and structures. Project features in the foreground and middleground often obscure background views. Where background views are available, the visibility of project elements would be substantially reduced or indistinguishable. FHWA guidelines define background views as those beyond 3 to 5 miles from the viewer. For the purposes of this analysis, a more conservative approach was used, and the AVE was defined as 5 miles from the edge of any Build Corridor Alternative because anything outside these limits would be in the background (see **Figure 3.9-1** [Area of Visual Effect]).

3.9.2.2 Inventory

The visual resources inventory and the assessment of potential impacts include the evaluation of visual character, visual quality, viewer sensitivity, and visual contrast levels of the proposed project. BLM VRM classifications and NPS resource management objectives also were included in the inventory to assess conformance.

The inventory and assessment methods are based on FHWA's Guidelines for the VIA of Highway Projects (FHWA 2015) and are consistent with and adhere to the BLM VRM Manual (VRM 8400 Series 1984). As part of the inventory methods, existing geographic conditions were characterized to identify the limits of individual Landscape Units (LUs). A LU can be visualized as an outdoor room that exhibits a distinct visual character, and the LU will often correspond to a place or district that is commonly known among local viewers. LUs were identified based on land use (cultural environment) and landscape character (natural environment) considerations. Representative viewpoints within each LU were selected for detailed analysis to further characterize the existing conditions and potential impacts to each LU. **Appendix E9** contains detailed description of the LUs identified along the I-11 Corridor and the associated representative viewpoints.

Data collected within the AVE were based on reviews of aerial photographs, topographic maps, planning documents, and field investigations.

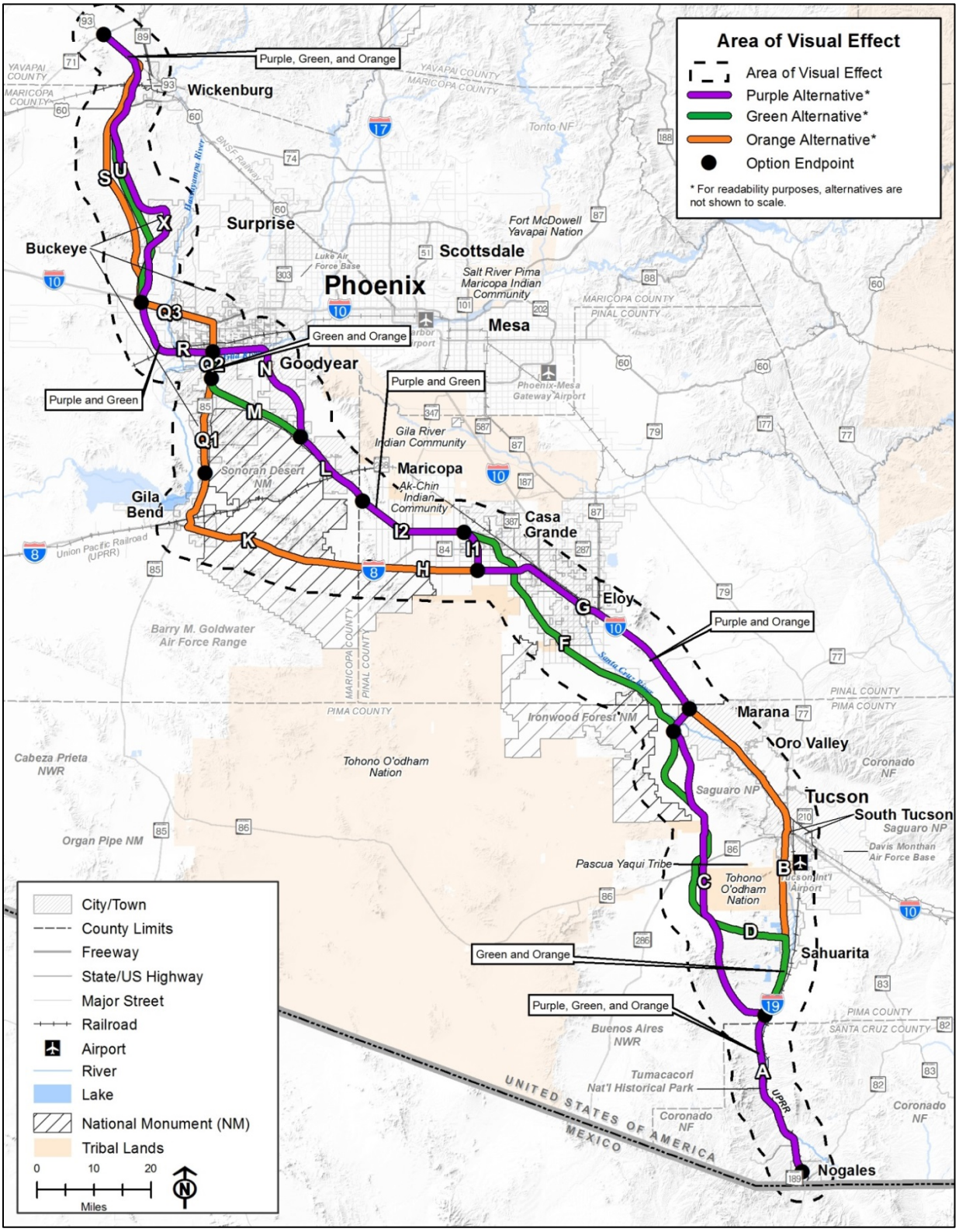


Figure 3.9-1 Area of Visual Effect

Visual Character

Visual character is the physical appearance of the landscape, including natural (vegetation and water features), physical (landform), and cultural features (human modifications, such as buildings and infrastructure) that give landscape a unique identity. The assessment of landscape character does not place value on the characterization (i.e., as positive or negative). Developed areas, including residences and other land uses such as agriculture or industrial facilities, have landscape character, although developed areas have modified the natural landscape. These cultural (i.e., man-made) modifications within the Build Corridor Alternatives range from not modified (natural) to completely modified based on occurrences of urban and rural development; infrastructure (e.g., roads, railroads, and transmission lines); mines; and other structural features.

Existing landscape character was evaluated by means of aerial photography and field reconnaissance.

Visual Quality

Visual quality is a result of the interactive experience between viewers and their environment. This relates directly to the intrinsic qualities of a landscape, or the elements and characteristics of a place that makes it distinct and memorable. Overall visual quality of the landscape is determined by evaluating the landform, vegetation, water, color, and cultural features. Typically, more complex or distinct landscapes have a higher visual quality rating or value.

The evaluation of visual quality for I-11 employs an approach that is consistent with both FHWA and BLM visual inventory guidelines. FHWA approach to assessing visual quality has been used for both natural and developed settings by looking at the relationships of key visual quality indicators. The BLM VRM system evaluates the visual quality of natural landscape. BLM's scenic quality criteria are a measure of aesthetic value of a specific area of land defined by characteristics that include landform, vegetation, water, scarcity, color, adjacent scenery, and cultural modifications.

The LUs in the AVE were assigned a range of high to low ratings based on a combination of the following key indicators of visual quality:

- **Vividness:** The memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern. Memorable, striking (high), above average (moderate), and plain or common (low).
- **Intactness:** The integrity of visual order in the natural and built landscape, and the extent to which the landscape is free from visual encroachment. Free of encroaching elements (high), developed elements retain integrity (moderate), and cluttered or lacking integrity (low).
- **Unity:** The visual coherence and harmony of a landscape when considered as a whole. Coherent/harmonious (high), partially contiguous (moderate), and disjointed/jarring (low).

The visual quality scores reflect an overall assessment of each LU. For the discussion of visual quality associated with each LU described in the VIA, it is important to note that these are general evaluations for the unit as a whole. Specific locations within the unit may have higher or lower visual quality than the average. For purposes of this Draft Tier 1 EIS, a total of 15 LU types distributed throughout the AVE were defined. These LUs will be refined and examined in more detail as part of the Tier 2 NEPA analysis.

Anticipated Viewer Response

The impact assessment attempts to predict viewer response to landscape changes by evaluating viewer awareness, exposure to the project, and visual contrast levels anticipated as a result of the project.

Viewer Sensitivity

Viewer Awareness

Viewer awareness is a measure of public concern for change to the characteristic landscape. Viewer awareness is determined by evaluating "use" of the resource by viewers (type of use, user attitude and expectations, quantity of use, and use duration).

Viewer Exposure

Viewer exposure reflects how the project would be seen and at what distance. It is typically assessed by measuring the number of viewers exposed to the project, type of viewer activity, duration of the viewer's view, the speed at which the viewer moves, and viewer position.

Factors that may limit views include viewer orientation and distance from the project and the physical elements of topography and vegetation that may screen project elements. In general, the closer a resource is to the viewer, the more dominant it is and the greater its importance to the viewer.

FHWA guidelines define three distance zones (FHWA 2015):

- Foreground views: 0.25 to 0.5 mile from the viewer
- Middleground views: from foreground zone to 3 to 5 miles from the viewer
- Background views: beyond the middleground zone

Features within the foreground and middleground often obscure background views. Where background views are available, the perceived mass and visibility of project elements are reduced and become a less substantial portion of the total landscape because detail is lost. Elements of the project begin to blend in scale and color with existing landscape elements of the background, so that only broad forms, large-scale patterns, and muted colors associated with both the existing landscape and the project would dominate the visual landscape (FHWA 2015). Therefore, the AVE was defined as 5 miles from the edge of any Build Corridor Alternative, as anything outside these limits would be in the background.

Visual Contrast Level

The magnitude of visual change is determined by assessing the compatibility of the project features with the existing visual quality of the LU and the viewer exposure. The visual character elements of scale, diversity, continuity, and dominance are assessed to determine compatibility of the impact. Four visual contrast levels for the I-11 analysis were established:

- **Not Noticeable**: Changes in the landscape scenery or views that would not be evident unless pointed out due to such factors as previous disturbance, viewshed limiting factors (e.g., distance, viewer orientation, and terrain), dominance of adjacent landscape features, and background terrain. Changes are typically viewed in the background and are

unobstructed. This level may include middleground views that are partially screened or foreground views that are completely screened.

- **Noticeable**: Changes in the landscape scenery or views that would be evident but visually subordinate to the setting due to the factors described above. These changes may attract slight attention but do not compete with adjacent landscape scenery or views. Changes are typically viewed in the middleground or background or are unobstructed. However, this level may include foreground views that are partially screened.
- **Co-Dominant**: Changes in the landscape scenery or views that attract attention and begin to compete with adjacent landscape scenery or views. Changes are typically viewed in the middleground and are unobstructed or partially screened in the foreground.
- **Dominant**: Changes in the landscape scenery or views that become the focal point or most dominant feature in the setting. Changes are typically viewed in the foreground and are unobstructed. In extreme cases, they may be partially screened. Such changes often cause a lasting impression when viewed from the landscape.

BLM VRM System

To address portions of the Build Corridor Alternatives that cross BLM-administered lands, the VIA evaluates the compatibility of I-11 to applicable BLM VRM classifications to determine conformance with adopted policies. BLM VRM classifications, ranging from Class I to Class IV, and their associated objectives define the levels of acceptable visual change (contrast) allowed on BLM-administered land. BLM designates these classifications based in part on the inventoried scenic values (visual resource inventory [VRI]) and other land use allocations during the resource management planning process.

Table 3.9-1 (BLM VRM Objectives) describes the management objectives associated with each BLM VRM Class designation, per BLM Manual H-8410-1 (BLM 1986).

National Park Service Resource Management Objectives

The NPS resource management objectives were considered in the assessment of visual impacts to the scenic quality of the trails and other important recreational locations in Saguaro National Park (SNP) (West). The park lies within the AVE, and the Build Corridor Alternatives could potentially be visible from the area. For this purpose, Key Observation Points (KOPs) were identified based on issues and concerns raised by NPS and FHWA staff and based on the experience of users on viewing platforms where recreational visitors would be visually sensitive. The assessment will analyze the magnitude of change to the visual character and visual quality, and also will analyze the effects on park users from the sensitive viewing platforms. To analyze these effects and identify the differences between the Build Corridor Alternatives, the basic design elements of form, line, color, and texture will be used to describe the visual quality and rate the degree of visual contrast.

Table 3.9-1 BLM VRM Objectives

Class	Description
Class I Objective	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be very low. Management activities may be seen, but should not attract attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective	The objective of this class is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and may be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of the basic elements.

SOURCE: BLM 1986.

3.9.3 Affected Environment

The following sections describe the inventoried visual resources within the AVE, including the regional visual character, visual quality, sensitive viewers, and VRM classifications.

3.9.3.1 Visual Character

The overall visual character of the Analysis Area is associated with its location within the Basin and Range Province (Fenneman 1931), which is distinguished by isolated, roughly parallel mountain ranges separated by closed desert basins. In general, the mountain ranges in the Analysis Area trend north-south and have distinctive alluvial areas at their bases, known locally as bajadas. A subdivision of the Basin and Range Province, the Sonoran Desert, comprises the entire Analysis Area. The Sonoran Desert is characterized by desert mountains with intervening desert plains. The Sonoran Desert subdivision typically has smaller mountain ranges, and rock pediments are much more prevalent.

Southern Arizona mountain ranges are characterized by the “Sky Islands” physiography, which is related to basin and range faulting and provides dominant visual elements in the overall landscape. These ranges are significantly higher in elevation and contain more diverse vegetation communities. Mountain ranges in the southern section include the Tumacacori, San Cayetano, Patagonia, Santa Rita, Sierrita, Santa Catalina, Roskruge, and Picacho Mountains. Mountain ranges in the Central Section and North Section include the Table Top, Maricopa, Gila Bend, Belmont, White Tank, and Vulture Mountains. Notable long desert valleys include Avra Valley, Santa Cruz Flats, Little Rainbow Valley, Buckeye Valley, and the Hassayampa Plain.

Major bodies of water in the southwest are limited to larger river systems such as the Santa Cruz, Gila, and Hassayampa Rivers. Portions of these rivers are ephemeral and others flow year-round. Rivers are a key visual resource within the Study Area. The Santa Cruz River Valley bisects the bajada landscape between the Tumacacori and Santa Rita mountain ranges. The river floodplain is constrained between these alluvial bases, and there are several canyons along the Santa Cruz River between Nogales and Tubac. In Tucson, the Santa Cruz River is highly channelized and surrounded by urban development. In the Central Section, the Gila River flows through Buckeye towards Gila Bend and is surrounded primarily by agricultural land uses and undeveloped areas. The Hassayampa River has a substantial floodplain that traverses Hassayampa Plain on undeveloped land between I-10 and Wickenburg.

Vegetation communities that occur in the Analysis Area include two subdivisions of the Sonoran Desert (Brown 1994), the Arizona upland and lower Colorado River Valley. Natural areas outside of developed landscape areas and the vegetation associated with these areas are primary visual resources. These vegetation communities are typically either arid or naturally appearing grazing land of creosote, tarbush, and other desert scrub. Mixed desert cacti landscapes, which typically include yucca, barrel cactus, prickly-pear, and ocotillo, occur along bajadas within the Santa Cruz Valley and lower slopes of the Tumacacori, San Cayetano, Santa Rita, and Santa Catalina Mountains. Open stands of saguaro, cholla, ocotillo, and paloverde become more prevalent in the upper foothills of the Santa Catalina Mountains. Valley plain areas are typically dominated by creosote, mixed cacti, and desert grasses.

Dense riparian areas are found concentrated along non-channelized portions of the Santa Cruz River, the Gila River, and the Hassayampa River. Riparian areas also are found along drainage ways and canyons that cut across bajadas and into the surrounding valley landscapes. There tends to be less variety and density of riparian vegetation along these smaller drainage ways, although they are noticeably distinct when they bisect lower-lying valleys dominated by creosote.

Regionally, the Analysis Area has a range of developed and natural landscapes, from highly urbanized areas in the Tucson metropolitan area to the relatively intact wilderness of the Santa Rita and Maricopa Mountains.

In the South Section, urban development is dominant, particularly around the Tucson metropolitan area. Other smaller urban and suburban development concentrations occur in and near Nogales, Tumacacori, Tubac, Amado, Green Valley, Sahuarita, Casa Grande, Gila Bend, Buckeye, and Wickenburg. Large-scale industrial land uses typically occur near larger urban areas and are most heavily concentrated along the I-10 corridor in Tucson. Near Green Valley, mining operations are concentrated along the west side of I-19, south of the San Xavier Indian Reservation.

The Central Section and North Section have a few industrial facilities, including the Gila River Power Station, a landfill, and the Toyota Proving Grounds. Between Nogales and Sahuarita, agricultural land uses are common along the Santa Cruz River, and are generally within or adjacent to the floodplain. Agricultural activities such as dryland and irrigated agriculture dominate the valley landscapes near Avra Valley, Marana, Casa Grande, and Buckeye. Agricultural land uses and undeveloped areas primarily dominate the Central Section. The North Section is one of the least-developed areas within the I-11 Corridor, although there are some rural and suburban residences near I-10 and Sun Valley Parkway.

3.9.3.2 Visual Quality

Fifteen distinct LU types were defined within the AVE (see **Figure 3.9-2** [Landscape Units and Viewpoints within the AVE {Purple Alternative}]**, Figure 3.9-3** [Landscape Units and Viewpoints within the AVE {Green Alternative}]**,** and **Figure 3.9-4** [Landscape Units and Viewpoints within the AVE {Orange Alternative}]). The LU determination was based in part on landform, existing land uses, visual character, and presence of special features. The relative distinctness, intactness, and unity of the landscape also were evaluated. The existing visual quality of the AVE is generally in the moderate to low range for most LUs. Two LU types, one in the South Section and the other in the North Section, are relatively undisturbed or have lower levels of disturbance over a larger area. The most common LU type is associated with rural residential development in varied landscape settings. For detailed information for LUs, including viewpoint photos, see **Appendix E9**.

3.9.3.3 Affected Viewers

A viewer observing an existing scene has a range of available responses that are inherent to all human beings. The FHWA VIA guidelines recognize three types of visual perception, and these correspond to each of the three types of visual resources:

- When viewing the components of a scene's natural environment, viewers inherently evaluate the natural harmony of the existing scene, determining if the composition is harmonious or inharmonious.
- When viewing the components of the cultural environment, viewers evaluate the scene's cultural order, determining if the composition is orderly or disorderly.
- When viewing the project environment, viewers evaluate the coherence of the project components, determining if the project's composition is coherent or incoherent.

There are two distinct groups of viewers within the AVE: neighbors and travelers. Neighbors are those people who are adjacent to the highway and have “views of the road.” Travelers are those people who are using the highway and have “views from the road.” Neighbors and travelers are further subdivided into the following categories that help establish viewer preferences and their awareness to changes in visual resources (for details about viewer types and their awareness, see **Appendix E9**):

- **Neighbors - Residential:** Those who live within viewing distance of the I-11 Corridor.
- **Neighbors - Recreational:** Those who supply a recreational service for others to consume and enjoy, are sometimes permanent; visitors are consumers of the recreational service and are more transitory.
- **Neighbors - Commercial:** Those who occupy or use office buildings, warehouses, and other commercial structures.
- **Neighbors - Industrial:** Those who mine or harvest raw materials, manufacture goods and services, or transport goods, services, and people.
- **Neighbors - Agricultural:** Those who often work in fields and pastures.

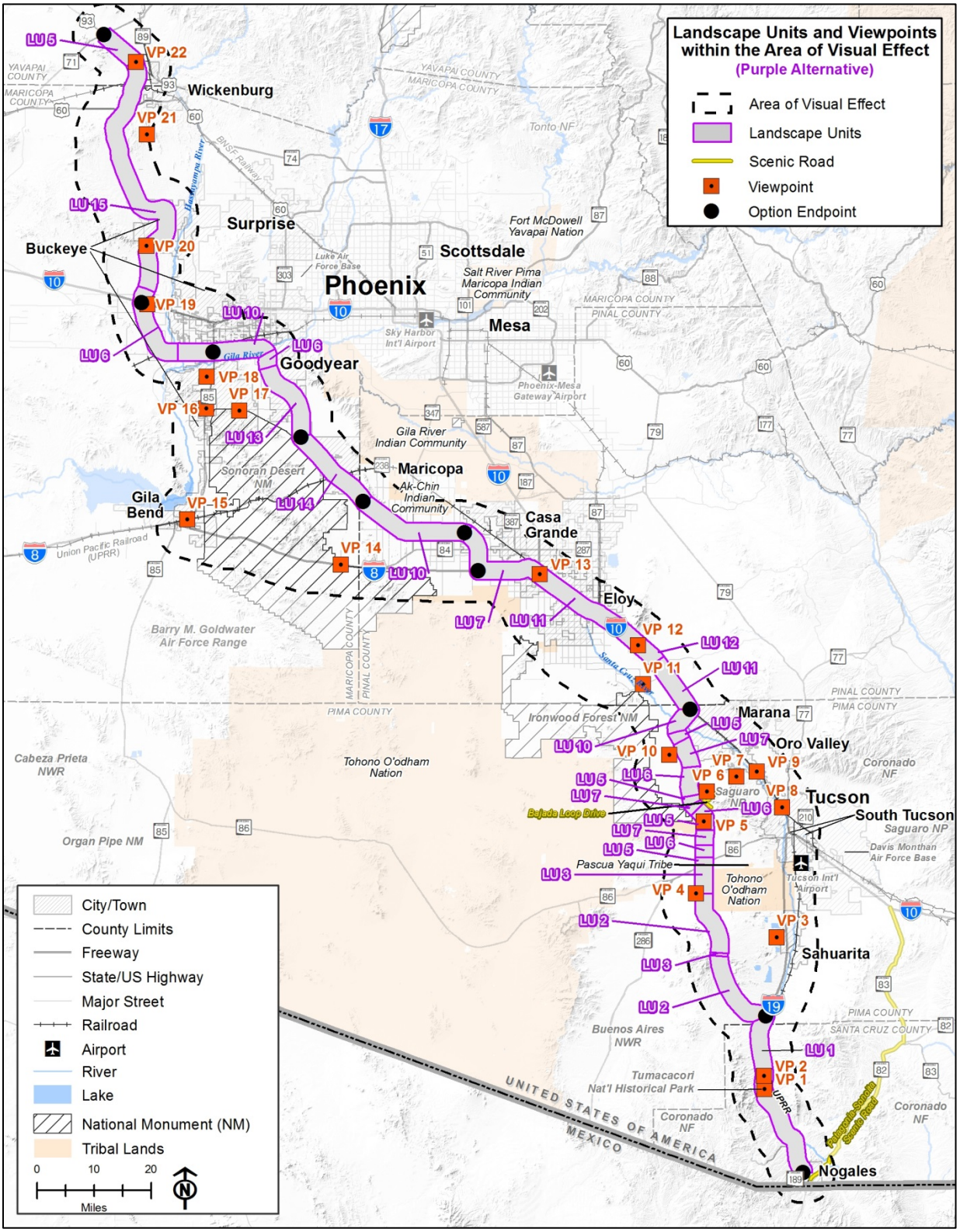


Figure 3.9-2 Landscape Units and Viewpoints within the AVE (Purple Alternative)

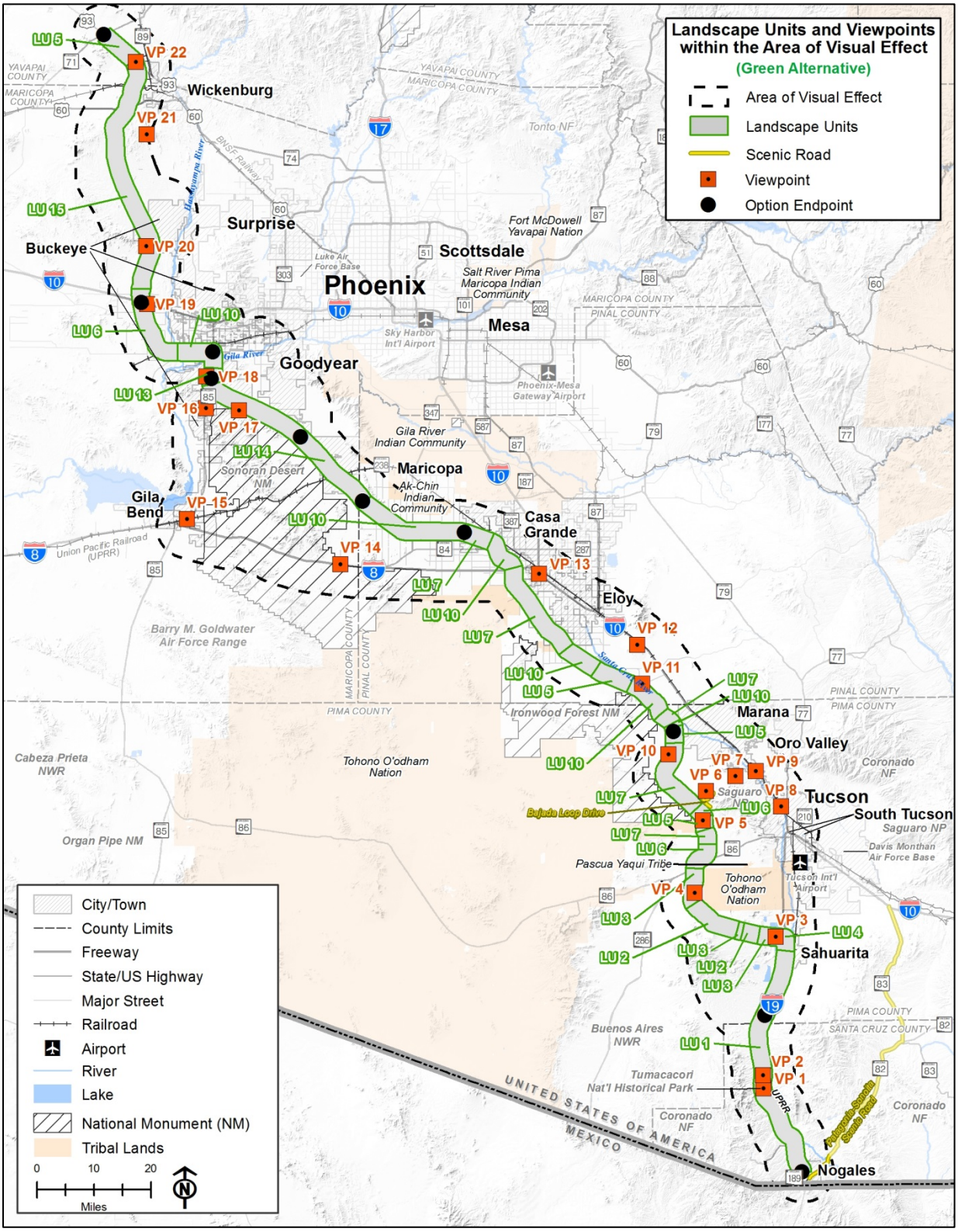


Figure 3.9-3 Landscape Units and Viewpoints within the AVE (Green Alternative)

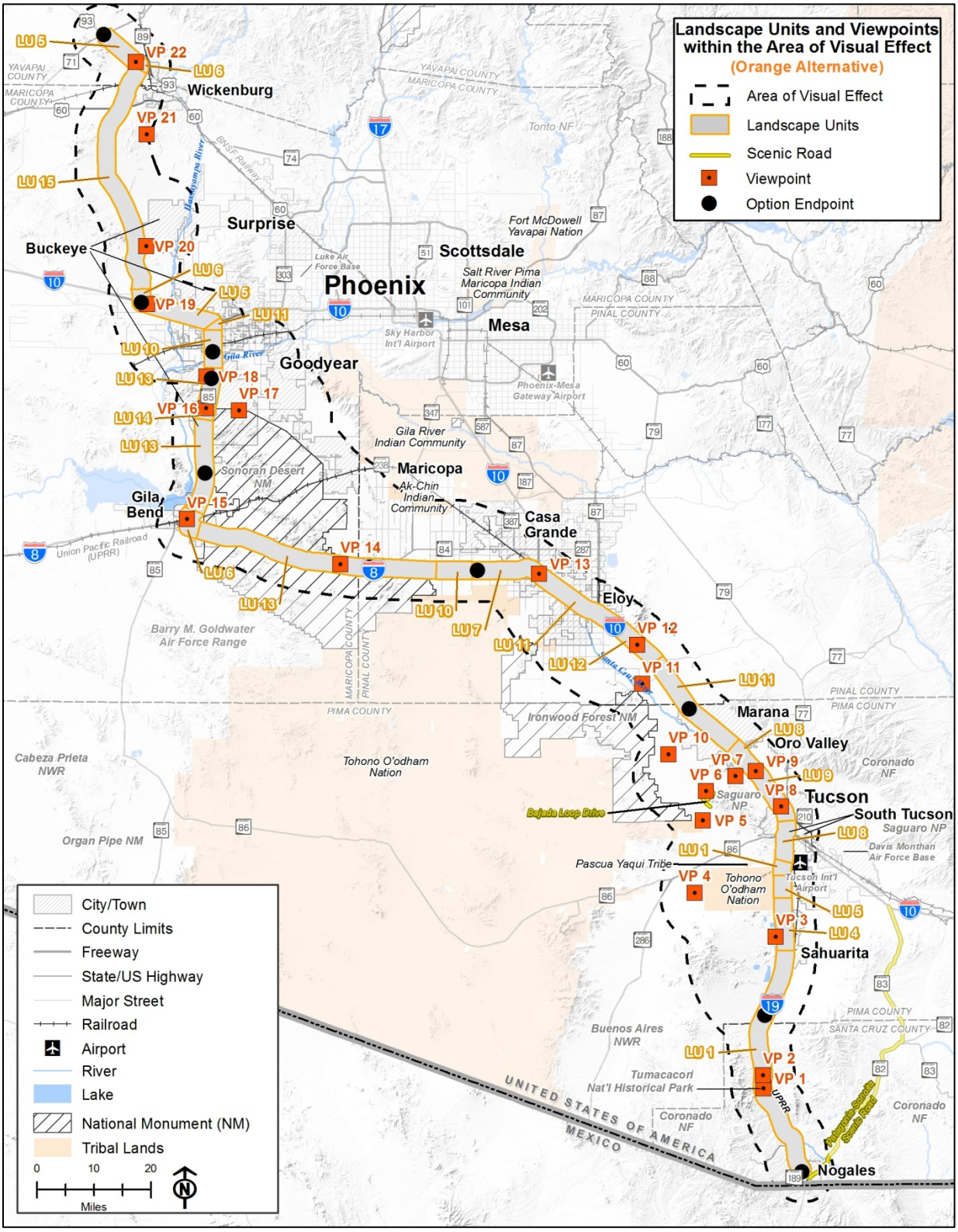


Figure 3.9-4 Landscape Units and Viewpoints within the AVE (Orange Alternative)

- **Travelers - Recreational/Touring:** Those who are traveling on a highway, primarily for enjoyment, usually to a pre-determined destination.
- **Travelers - Commuting:** Those who are regular travelers of the same route.
- **Travelers - Shipping:** Those who make a living using a highway primarily to move goods.

3.9.3.4 BLM VRM Designations

The portions of the Build Corridor Alternatives that fall within BLM lands would be subject to compliance with VRM designations. BLM Class I lands are limited to wildernesses, none of which falls within a Build Corridor Alternative (see **Figure 3.9-5** [BLM Visual Resource Management System, South Section]**, Figure 3.9-6** [BLM Visual Resource Management System, Central Section]**,** and **Figure 3.9-7** [BLM Visual Resource Management System, North Section]). Outside of wilderness, most of the Sonoran Desert National Monument is designated as VRM Class II. In the North Section, the BLM-designated multi-use corridor is managed as VRM Class III within the Vulture Mountains Recreation Area (VMRA), and as Class IV outside of the VMRA. The majority of these BLM-administered lands within the Build Corridor Alternatives are allocated to VRM Class III. These include BLM lands that encompass the existing I-8 and State Route (SR) 85. VRM Class III areas are compatible with the BLM VRM objective. Hence, BLM would not need an amendment to their Resource Management Plan in Class III areas.

3.9.3.5 SNP (West) and Tucson Mountain Park

SNP (West) and Tucson Mountain Park lie in the south section of the AVE, with the Orange Alternative on the east side and the Purple and Green Alternatives on the west side. Visibility modeling was conducted to reveal the visually exposed areas within the landscape for each Build Corridor Alternative. The visibility analysis uses the National Elevation Dataset from the United States (US) Geological Survey for topological information. These data do not account for structures or vegetation that may be present. The analysis also assumes a viewing height of 5.5 feet from the ground. The areas exposed to views of the Build Corridor Alternatives are listed in **Table 3.9-2** (Visibility of Build Corridor Alternatives from SNP (West) and Tucson Mountain Park).

Table 3.9-2 Visibility of Build Corridor Alternatives from SNP (West) and Tucson Mountain Park

Build Corridor Alternative	Saguaro Wilderness Area in Viewshed	SNP (West) Area in Viewshed	Tucson Mountain Park Area in Viewshed
Purple Alternative (Option C)	6021.8 acres	9984.8 acres	5863.4 acres
Green Alternative (Option D)	5249.1 acres	8289.1 acres	6250.1 acres
Orange Alternative (Option B)	278.1 acres	4257.9 acres	0 acres

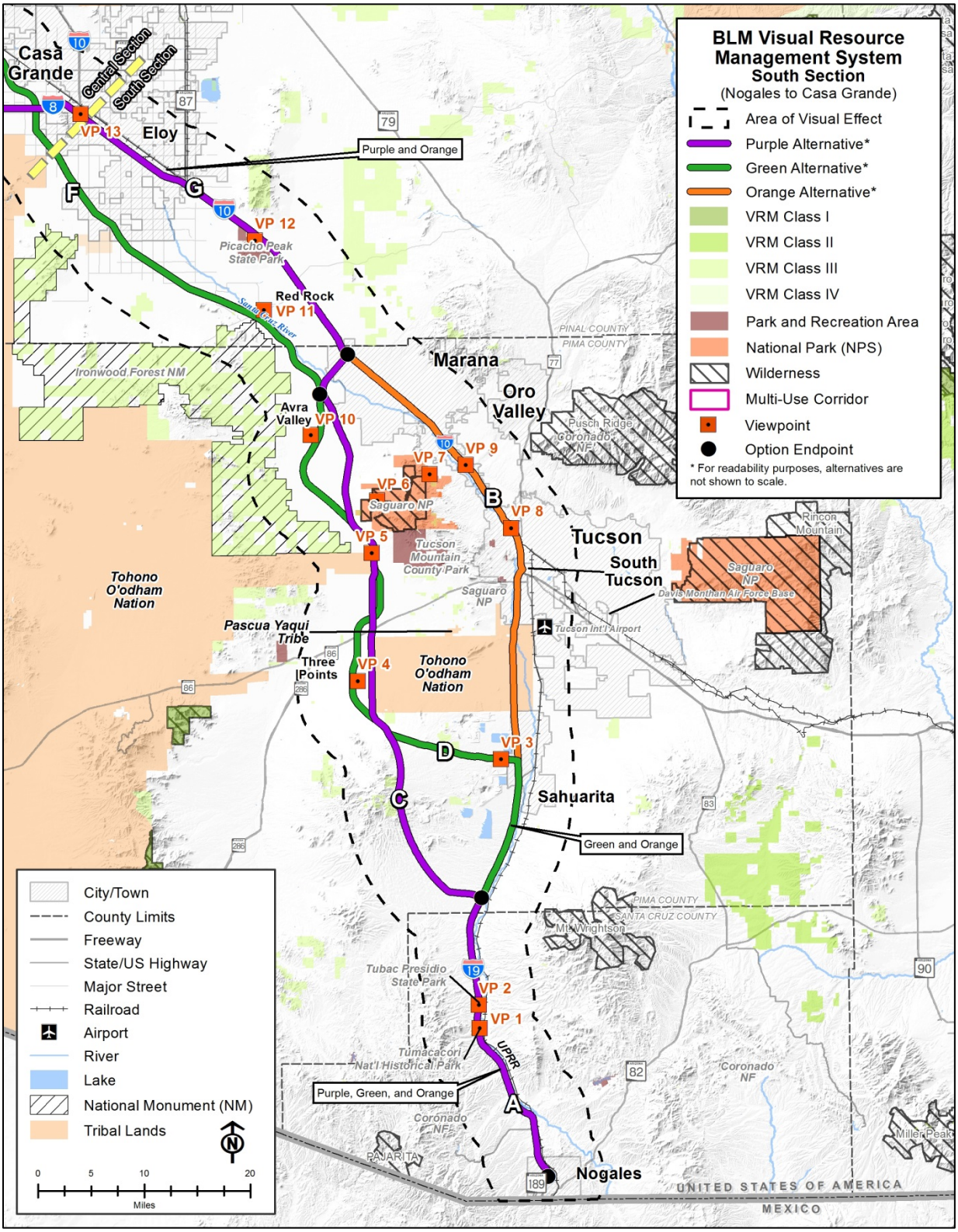


Figure 3.9-5 BLM Visual Resource Management System, South Section

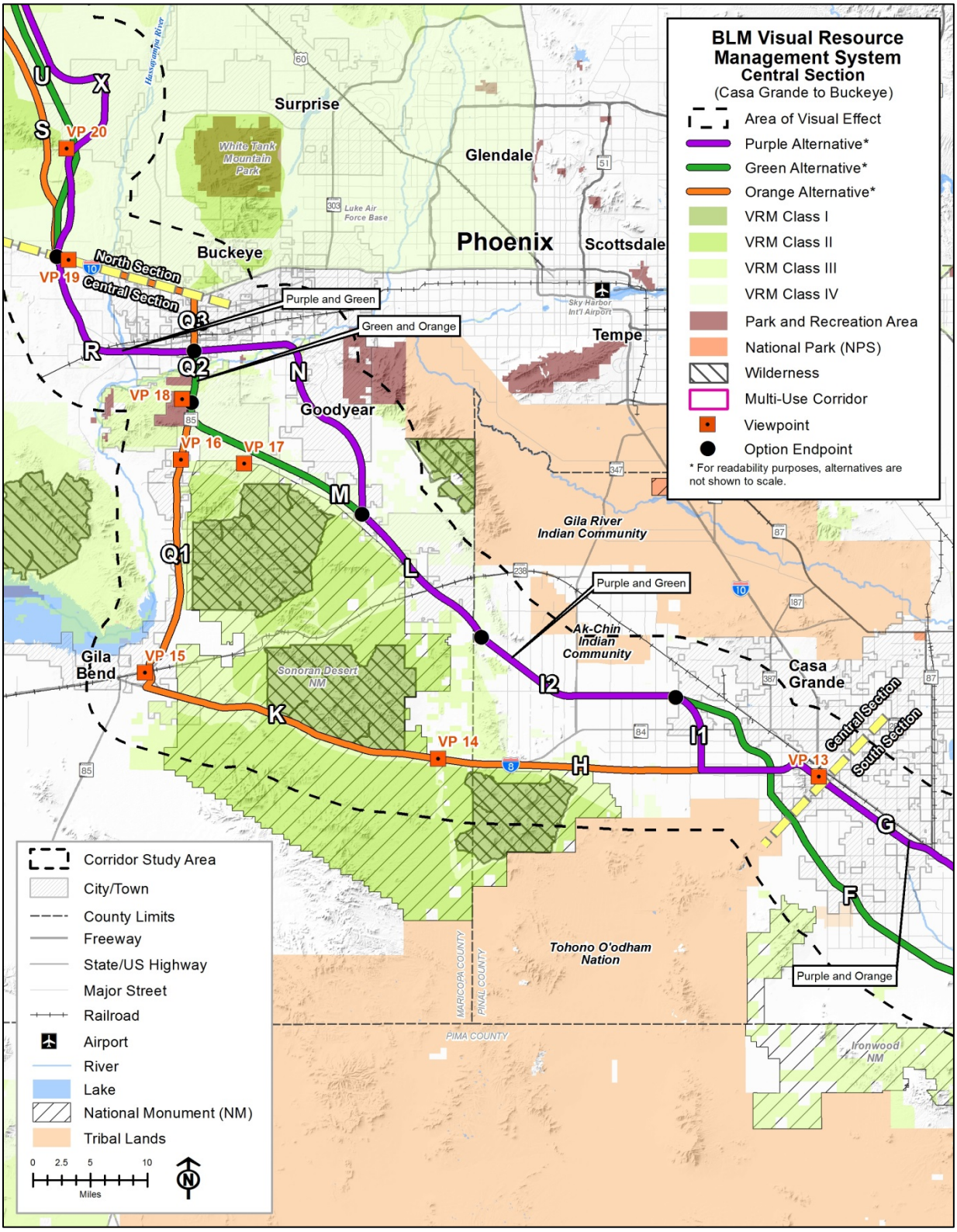


Figure 3.9-6 BLM Visual Resource Management System, Central Section

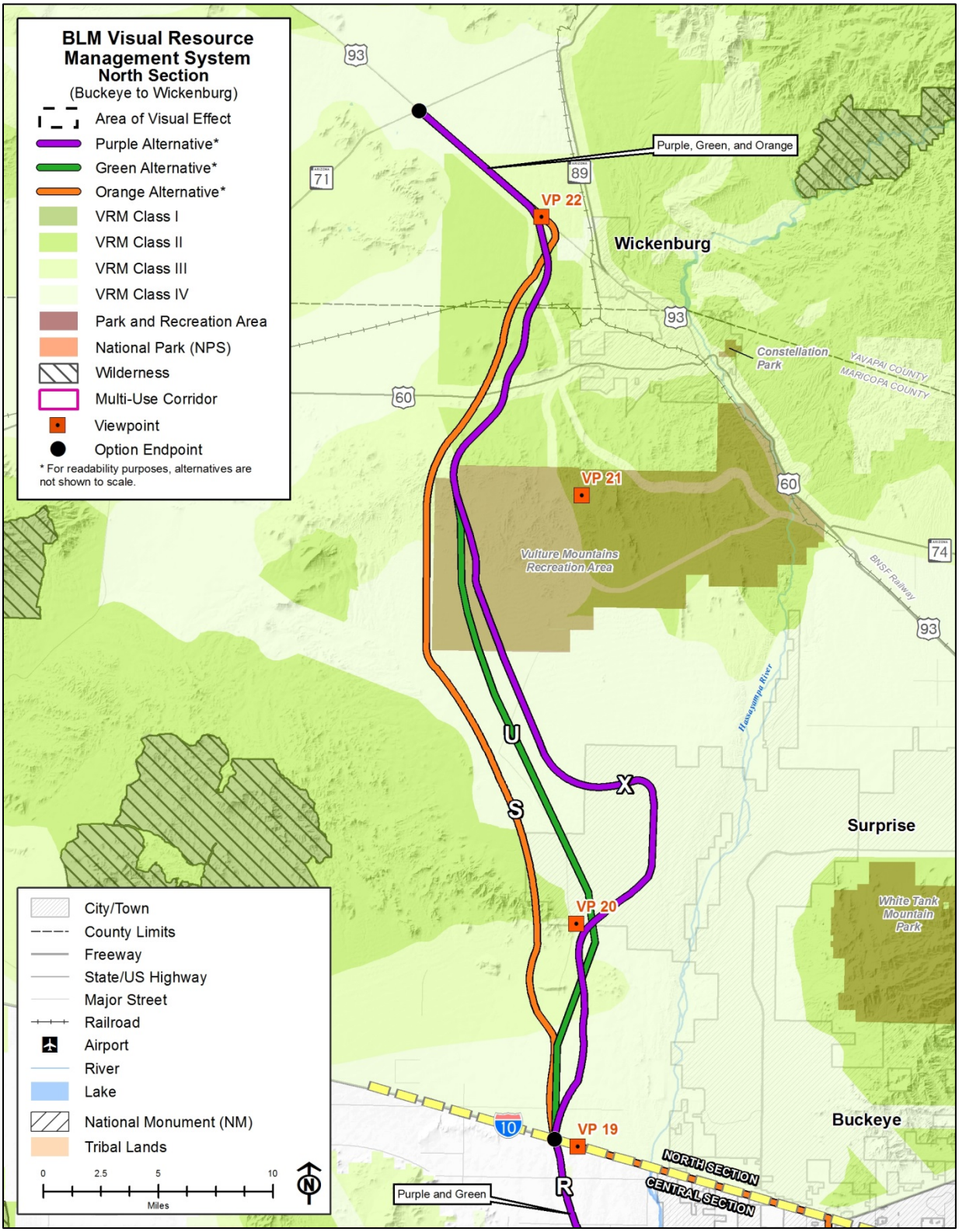


Figure 3.9-7 BLM Visual Resource Management System, North Section

NPS and FHWA identified six KOPs within the two parks for potential VIA (see **Figure 3.9-8** [KOPs within SNP (West) and Tucson Mountain Park]). These KOPs are the viewing platforms most frequently visited by park users, and they will have higher viewer sensitivity compared to other locations in the park. Also, KOPs located at a higher elevation, such as Wasson Peak, Hugh Norris Trail, and Sus Hill, will provide a wider horizontal field of view to hikers, and therefore will have a greater visual impact. For detailed information about the KOPs, see **Appendix E9**.

Similar visibility modeling was conducted to reveal the visually exposed areas in the landscape for the Central Arizona Project (CAP) Design Option, as shown in **Table 3.9-3** (Visibility of CAP Design Option from SNP [West] and Tucson Mountain Park) (see **Appendix E9** for details).

Table 3.9-3 Visibility of CAP Design Option from SNP (West) and Tucson Mountain Park

Build Corridor Alternative	Saguaro Wilderness Area in Viewshed	SNP (West) Area in Viewshed	Tucson Mountain Park Area in Viewshed
Purple Alternative (Option C) CAP Design Option	4766.1 acres	7461.0 acres	7752.3 acres
Green Alternative (Option D) CAP Design Option	5120.5 acres	8072.6 acres	7704.9 acres

3.9.3.6 Light Pollution

Light pollution is excessive and/or misdirected artificial light with the potential to adversely impact visual conditions at night. The four common components of light pollution include:

1. **Glare** – excessive brightness that causes visual discomfort and/or safety issues
2. **Skyglow** – brightening of the night sky over inhabited areas, reducing visibility of stars, celestial objects, and other aspects of the night sky
3. **Light trespass** – light falling where it is not intended or needed
4. **Clutter** – bright, confusing, and excessive groupings of light sources

Light pollution exists in Arizona and within the AVE. Existing light pollution impacts motorists in terms of glare and clutter, and residents, tourists and scientists in terms of skyglow. Light trespass may occur along Arizona Department of Transportation (ADOT) roads from construction lighting and roadway lighting. Glare, light trespass and clutter can occur as a direct impact from a roadway project. Skyglow is a cumulative effect and impacts urbanized areas.

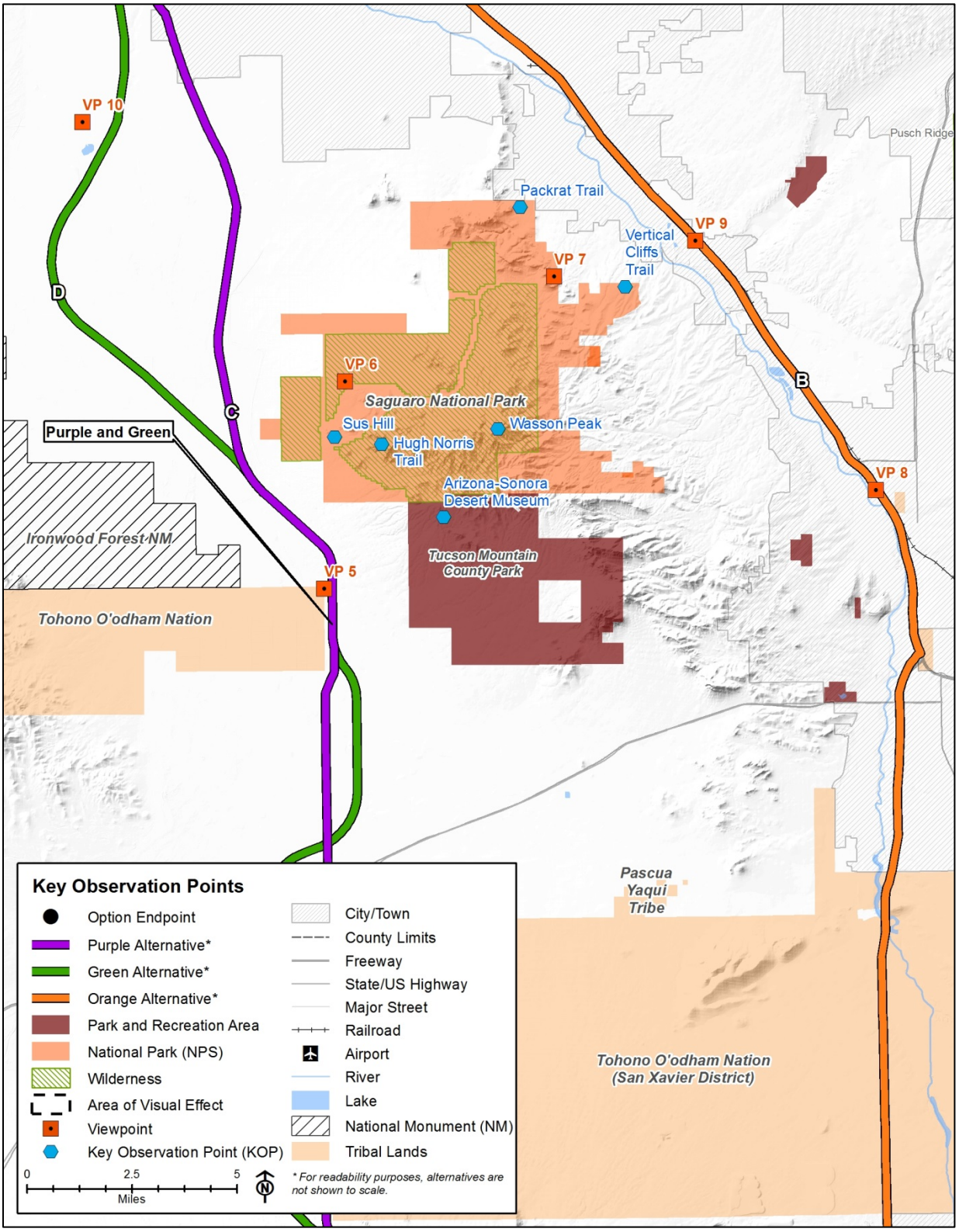


Figure 3.9-8 KOPs within SNP (West) and Tucson Mountain Park

Skyglow is an impact that is increasing, and efforts to protect dark skies have been initiated. These efforts focus on lighting design and fixtures that reduce glare, skyglow, and light trespass and clutter. An example of a broad effort focused on reducing light pollution is the program implemented by the International Dark-Sky Association (2017). The association uses different designations for dark sky places, and follows a rigorous application process. The process requires applicants to demonstrate robust community support for dark-sky protection and to document how a proposed site achieves designation-specific program requirements.

Figure 3.9-9 (Dark Sky Locations, Scientific Observatories, and Recreational Star-gazing Location within 50 Miles of the AVE) shows the International Dark-Sky Association's "dark sky places" near the I-11 Corridor. Within southern Arizona, two places are designated by International Dark-Sky Association: Oracle State Park and Kartchner Caverns State Park.

Skyglow impacts astronomical observatories and scientists seeking dark skies for research observations. A major city's glow is a serious problem anywhere within 50 miles of the city center, and it is visible for at least 150 miles. Numerous scientific observatories and telescopes exist in the vicinity of the Study Area. Six major observatories are located within 50 miles of the AVE:

1. Kitt Peak National Observatory is approximately 40 miles southwest of Tucson and 15 miles from the AVE.
2. Fred Lawrence Whipple Observatories is located at the top of Mount Hopkins, approximately 10 miles East of Amado and 1 mile from the AVE
3. The Sabino and Grasslands Canyon Observatory are located northeast of Tucson, approximately 6 miles from the AVE.
4. Winer Observatory is in Sonoita, approximately 40 miles south of Tucson, 15 miles east of I-19, and 21 miles from the AVE.
5. Patterson Observatory is in Sierra Vista, approximately 40 miles Northeast of Nogales and 38 miles from the AVE.
6. San Pedro Valley Observatory is in Benson, approximately 40 miles southeast of Tucson and 37 miles from the AVE.

In addition to the astronomical observatories, SNP in partnership with the Kitt Peak National Observatory hosts star parties at the Red Hills Visitor Center. At these star parties, which are part of an educational program, park visitors learn about the night sky. The park is an important night sky resource and offers recreational stargazing, and guided night hikes to explore and experience the Sonoran Desert.

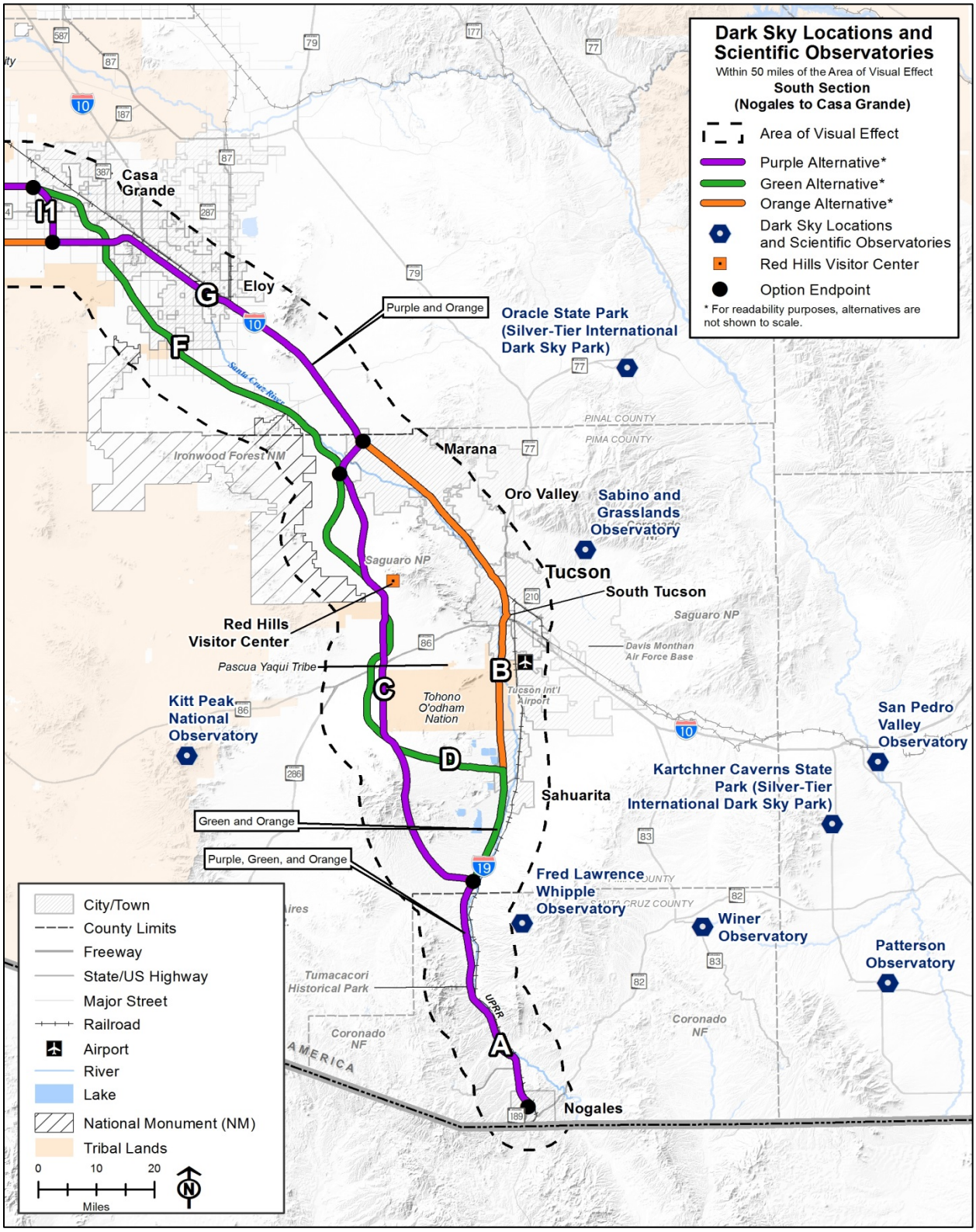


Figure 3.9-9 Dark Sky Locations, Scientific Observatories, and Recreational Star-gazing Location within 50 Miles of the AVE

3.9.4 Environmental Consequences

This section provides a summary of potential effects on visual resources associated with each Build Corridor Alternative and the No Build Alternative. For each Build Corridor Alternative, a table summarizes the potential types of impacts throughout the Analysis Area for different types of viewers. Most representative locations are accompanied by a specific viewpoint that was analyzed. **Appendix E9** provides more information on the representative viewpoints noted in the table as well as other viewpoints throughout the Study Area. The potential for impacts is based on whether an area of higher visual quality would be affected and how sensitive the viewers are to change. Other key elements with respect to the potential for impacts include the visibility of a future project and the nature of the change in terms of contrast level. **Appendix E9** provides additional information on this analysis.

The potential visual resource impacts due to the CAP Design Option would be similar to the impacts of Option C and Option D (Sandario Road Portion). The representative locations Sandario Road (Viewpoint 5) and SNP (West) (Viewpoint 6) in **Table 3.9 4** (Visual Resource Impact Summary for the Purple Alternative) and **Table 3.9 5** (Visual Resource Impact Summary for the Green Alternative) show the potential visual resource impacts for the CAP Design Option.

3.9.4.1 Purple Alternative

Table 3.9-4 (Visual Resource Impact Summary for the Purple Alternative) summarizes the types of potential impacts for each viewer type throughout the Purple Alternative.

3.9.4.2 Green Alternative

Table 3.9-5 (Visual Resource Impact Summary for the Green Alternative) summarizes the types of potential impacts for each viewer type throughout the Green Alternative.

3.9.4.3 Orange Alternative

Table 3.9-6 (Visual Resource Impact Summary for the Orange Alternative) summarizes the types of potential impacts for each viewer type throughout the Orange Alternative.

Table 3.9-4 Visual Resource Impact Summary for the Purple Alternative

Representative Location	Typical Viewer Type	Representative VP# [1]	LU [2]	LU Visual Quality Rating (Existing)	Anticipated Viewer Response		
					Viewer Sensitivity		Visual Contrast Level
					Viewer Awareness	Viewer Exposure	
I-19 Corridor (no viewpoint)	Travelers (commuting, shipping)	N/A	1	Moderate	Moderate	Limited to foreground views	Not Noticeable
I-19 Tumacacori National Historical Park	Neighbors (recreational)	1	1	Moderate	High	Partially obstructed foreground views	Not Noticeable
I-19 Rural residential areas along I-19 corridor including Nogales, Rio Rico, Tumacacori, Tubac, Agua Linda, Amado, and Arivaca Junction	Neighbors (residential)	2	1	Moderate	High	Partially obstructed foreground views	Not Noticeable
Rural communities in Pima County such as Three Points and Avra Valley	Neighbors (residential)	4, 10	3, 7	Moderate	High	Partially obstructed foreground and middleground views	Co-Dominant
Sandario Road	Travelers (commuting)	5	5	Moderate	Moderate	Foreground views	Co-Dominant
SNP (West)	Neighbors (recreational)	6	6	Moderate	High	Superior, unobstructed views of the existing Avra Valley landscape in the middleground.	Co-Dominant (daytime) to Dominant (nighttime)

Table 3.9-4 Visual Resource Impact Summary for the Purple Alternative (Continued)

Representative Location	Typical Viewer Type	Representative VP# (1)	LU (2)	LU Visual Quality Rating (Existing)	Anticipated Viewer Response		
					Viewer Sensitivity		Visual Contrast Level
					Viewer Awareness	Viewer Exposure	
I-10 Picacho Peak State Park	Neighbors (recreational)	12	12	Moderate	High	Foreground views from higher elevations within the park.	Not Noticeable
I-10 Transitional Development	Neighbors (residential)	13	11	Moderate to Low	High	Views would be limited to the foreground. I-11 would not likely be visible in the middleground due to partial to complete vegetation screening.	Not Noticeable
I-10 at 355th Avenue	Travelers (commuting shipping)	19	6	Moderate to Low	Low	Limited to foreground views	Not Noticeable
Aguila Road	Travelers (recreational)	20	15	High	Moderate to High	Foreground views	Dominant
Rural residents in Wintersburg and Wickenburg	Neighbors (residential)	N/A	10, 15	Moderate to Low	High	Foreground and middleground views	Co-Dominant
Vulture Mine Road	Travelers (recreational) Neighbors (recreational)	21	15	High	High to Moderate	Corridor views would be obstructed due to distance, intervening terrain, and vegetation screening.	Not Noticeable
US 93	Travelers (commuting, shipping, recreational)	22	5	Moderate	High to Low	Foreground views	Not Noticeable

(1) For more information on viewpoints, see **Appendix E9**.
(2) LUs are mapped in **Figure 3.9-2** (Landscape Units and Viewpoints within the AVE [Purple Alternative]).
NOTE: VP = Viewpoint.

Table 3.9-5 Visual Resource Impact Summary for the Green Alternative

Representative Location	Typical Viewer Type	Representative VP# [1]	LU [2]	LU Visual Quality Rating (Existing)	Anticipated Viewer Response		
					Viewer Sensitivity		Visual Contrast Level
					Viewer Awareness	Viewer Exposure	
Interstate 19 (I-19) Corridor (no viewpoint)	Travelers (commuting, shipping)	N/A	1	Moderate	Moderate	Limited to foreground views.	Not Noticeable
I-19 Tumacacori National Historical Park	Neighbors (recreational)	1	1	Moderate	High	Partially obstructed foreground views	Not Noticeable
I-19 Rural residential areas along I-19 corridor including Nogales, Rio Rico, Tumacacori, Tubac, Agua Linda, Amado, and Arivaca Junction	Neighbors (residential)	2	1	Moderate	High	Partially obstructed foreground views.	Not Noticeable
Twin Buttes Road	Travelers and Neighbors (recreational)	3	4	Moderate to Low	Moderate	Foreground views.	Noticeable
Rural communities in Pima County such as Three Points and Avra Valley	Neighbors (residential)	4, 10	3, 7	Moderate	High	Partially obstructed foreground and middleground views.	Co-Dominant
Sandario Road	Travelers (commuting)	5	5	Moderate	Moderate	Foreground views.	Co-Dominant

Table 3.9-5 Visual Resource Impact Summary for the Green Alternative (Continued)

Representative Location	Typical Viewer Type	Represen-tative VP# [1]	LU [2]	LU Visual Quality Rating (Existing)	Anticipated Viewer Response		
					Viewer Sensitivity		Visual Contrast Level
					Viewer Awareness	Viewer Exposure	
SNP (West)	Neighbors (recreational)	6	6	Moderate	High	Superior, unobstructed views of the existing Avra Valley landscape in the middleground.	Co-Dominant (daytime) to Dominant (nighttime)
Red Rock Agricultural Area and Rural Residences	Neighbors (residential)	11	11	Moderate	High	Partially obstructed middleground views.	Co-Dominant
Sonoran Desert National Monument	Neighbors (recreational)	17	14	Moderate	High	Foreground views.	Co-Dominant
Buckeye Hills Regional Park	Neighbors (recreational) Travelers (commuting, shipping)	18	13	Moderate	High to Low	Travelers would have unobstructed foreground views; recreational viewers would have unobstructed to partially obstructed foreground and middleground views at higher elevations.	Not Noticeable
I-10 at 355th Avenue	Travelers (commuting shipping)	19	6	Moderate to Low	Low	Limited to foreground views.	Not Noticeable
Aguila Road	Travelers (recreational)	20	15	High	High to Moderate	Foreground views.	Dominant
Vulture Mine Road	Travelers (recreational) Neighbors (recreational)	21	15	High	High to Moderate	Corridor views would be obstructed due to distance, intervening terrain, and vegetation screening.	Not Noticeable

Table 3.9-5 Visual Resource Impact Summary for the Green Alternative (Continued)

Representative Location	Typical Viewer Type	Represen-tative VP# (1)	LU (2)	LU Visual Quality Rating (Existing)	Anticipated Viewer Response		
					Viewer Sensitivity		Visual Contrast Level
					Viewer Awareness	Viewer Exposure	
Rural residents in Wintersburg and Wickenburg	Neighbors (residential)	N/A	10, 15	Moderate to Low	High	Foreground and middleground views.	Co-Dominant
US 93	Travelers (commuting, shipping, recreational)	22	5	Moderate	High to Low	Foreground views.	Not Noticeable

(1) For more information on viewpoints, see **Appendix E9**.

(2) LUs are mapped in **Figure 3.9-**3 (Landscape Units and Viewpoints within the AVE [Green Alternative])

NOTE: VP = Viewpoint.

Table 3.9-6 Visual Resource Impact Summary for the Orange Alternative

Representative Location	Typical Viewer Type	Represen-tative VP# [1]	LU [2]	LU Visual Quality Rating (Existing)	Anticipated Viewer Response		
					Viewer Sensitivity		Visual Contrast Level
					Viewer Awareness	Viewer Exposure	
Interstate 19 (I-19) Corridor (no viewpoint)	Travelers (commuting, shipping)	N/A	1	Moderate	Low	Limited to foreground views.	Not Noticeable
I-19 Tumacacori National Historic Park	Neighbors (recreational)	1	1	Moderate	High	Partially obstructed foreground views.	Not Noticeable
I-19 Rural residential areas along I-19 corridor including Nogales, Rio Rico, Tumacacori, Tubac, Agua Linda, Amado, and Arivaca Junction	Neighbors (residential)	2	1	Moderate	High	Partially obstructed foreground views.	Not Noticeable
Picture Rocks Road	Travelers (recreational, commuting)	7	8	Moderate	Moderate	Partially obstructed middleground to background views.	Not Noticeable
Suburban/urban residents along I-19 and I-10 corridor from Green Valley through Tucson	Neighbors (residential)	N/A	1, 4, 8	Moderate to Low	High	Partially obscured views limited to foreground and middleground.	Not Noticeable
Commercial and industrial areas along I-19 and I-10	Neighbors (commercial, industrial)	N/A	1,8,9	Moderate to Low	Low	Foreground and middleground views.	Not Noticeable

Table 3.9-6 Visual Resource Impact Summary for the Orange Alternative (Continued)

Representative Location	Typical Viewer Type	Represen-tative VP# [1]	LU [2]	LU Visual Quality Rating (Existing)	Anticipated Viewer Response		
					Viewer Sensitivity		Visual Contrast Level
					Viewer Awareness	Viewer Exposure	
I-10 Downtown Tucson Historic Districts Barrios Anita, Barrio El Membrillio, El Paso, and Southwestern Railroad	Neighbors (residential, commercial)	N/A	8, 9	Moderate to Low	High	Foreground views. The range of solutions for capacity improvements includes potential right-of-way expansion or elevated facility along I-10. Either option, or a combination thereof, would expose the historic districts to impacted foreground views.	Co-Dominant to Dominant
I-10 Downtown Tucson	Travelers (commuting, shipping)	8,9	9	Low	Low	Limited to foreground views.	Not Noticeable to Noticeable, depending on configuration of additional lanes
I-10 Picacho Peak State Park	Neighbors (recreational)	12	12	Moderate	High	Foreground views from higher elevations within the park.	Not Noticeable
I-10 Transitional Development	Neighbors (residential)	13	12	Moderate to Low	High	Views would be limited to the foreground. The I-11 Corridor would not likely be visible in the middleground due to partial to complete vegetation screening.	Not Noticeable

Table 3.9-6 Visual Resource Impact Summary for the Orange Alternative (Continued)

Representative Location	Typical Viewer Type	Represen-tative VP# [1]	LU [2]	LU Visual Quality Rating (Existing)	Anticipated Viewer Response		
					Viewer Sensitivity		Visual Contrast Level
					Viewer Awareness	Viewer Exposure	
I-8	Travelers (shipping, recreational)	14	13	Moderate	High to Low	Limited to foreground views.	Not Noticeable
I-8 Gila Bend	Neighbors (residential commercial) Travelers (commuting, shipping)	15	6	Moderate	High to Low	The flat terrain and vegetation cover would limit views to the foreground, on or adjacent to the corridor.	Noticeable
State Route 85	Travelers (commuting, shipping, recreational)	16	14	Moderate to Low	High to Low	Limited to foreground views.	Not Noticeable
Buckeye Hills Regional Park	Neighbors (recreational) Travelers (commuting, shipping)	18	13	Moderate	High to Low	Travelers would have unobstructed foreground views; recreational viewers would have unobstructed to partially obstructed foreground and middleground views at higher elevations within the park.	Not Noticeable
I-10 at 355th Avenue	Travelers (commuting shipping)	19	5	Moderate to Low	Low	Limited to foreground views.	Not Noticeable

Table 3.9-6 Visual Resource Impact Summary for the Orange Alternative (Continued)

Representative Location	Typical Viewer Type	Represen-tative VP# (1)	LU (2)	LU Visual Quality Rating (Existing)	Anticipated Viewer Response		
					Viewer Sensitivity		Visual Contrast Level
					Viewer Awareness	Viewer Exposure	
Vulture Mine Road	Travelers (recreational) Neighbors (recreational)	21	15	High	High to Moderate	Corridor views would be obstructed due to distance, intervening terrain, and vegetation screening.	Not Noticeable
Rural residents in Wickenburg	Neighbors (residential)	N/A	10, 15	Moderate to Low	High	Foreground and middleground views.	Co-Dominant
US 93	Travelers (recreational, commuting, shipping)	22	5	Moderate	High to Low	Limited to foreground views.	Not Noticeable

(1) For more information on viewpoints, see **Appendix E9**.
(2) LUs are mapped in **Figure 3.9-4** (Landscape Units and Viewpoints within the AVE [Orange Alternative]).
NOTE: VP = Viewpoint.

3.9.4.4 Effects on BLM Visual Resource Management

Table 3.9-7 (Potential Impacts on BLM VRM Class I and II Designations) summarizes the effects of the Build Corridor Alternatives on BLM VRM Class I and II lands by section and Corridor Option.

Table 3.9-7 Potential Impacts on BLM VRM Class I and II Designations

Sections, Build Corridor Alternatives, and Corridor Options	Potential Impact on BLM VRM Class I	Potential Impact on BLM VRM Class II
Purple Alternative		
A+C+G	Not present	Not present
I[1,2]+L+N+R	Not present	Not present
X	Not present	Not present
Green Alternative		
A+D+F	Not present	Not present
I2+L+M+Q2+R	Not present	Not present
U	Not present	Not present
Orange Alternative		
A+B+G	Not present	Not present
H+K+Q[1,2,3]	Option H – Co-located with I-8; improvements within current ADOT right-of-way (ROW), and no additional lanes are proposed. Option K – Co-located with I-8; improvements within current ADOT ROW. Option Q1 – Co-located with SR 85; improvements within current ADOT ROW. Option Q2 – Co-located with SR 85; improvements within current ADOT ROW. Option Q3 – Co-located with SR 85 and I-10; improvement within current ADOT ROW.	Option H – Co-located with I-8; improvements within current ADOT ROW. Option K – Co-located with I-8; improvements within current ADOT ROW. Option Q1 – Co-located with SR 85; improvements within current ADOT ROW. Option Q2 – Co-located with SR 85; improvements within current ADOT ROW. Option Q3 – Co-located with SR 85 and I-10; improvement within current ADOT ROW.
S	Not present	Encroaches on Class II VRM lands in two locations. Southernmost location spans the width of Option S for approximately 1 mile; northernmost location extends approximately 1,750 feet into the corridor at the widest point. Potential conflicts exist for approximately 1,500 feet (see **Figure 3.9-10** [Compatibility with BLM Visual Resource Management System, North Section]).

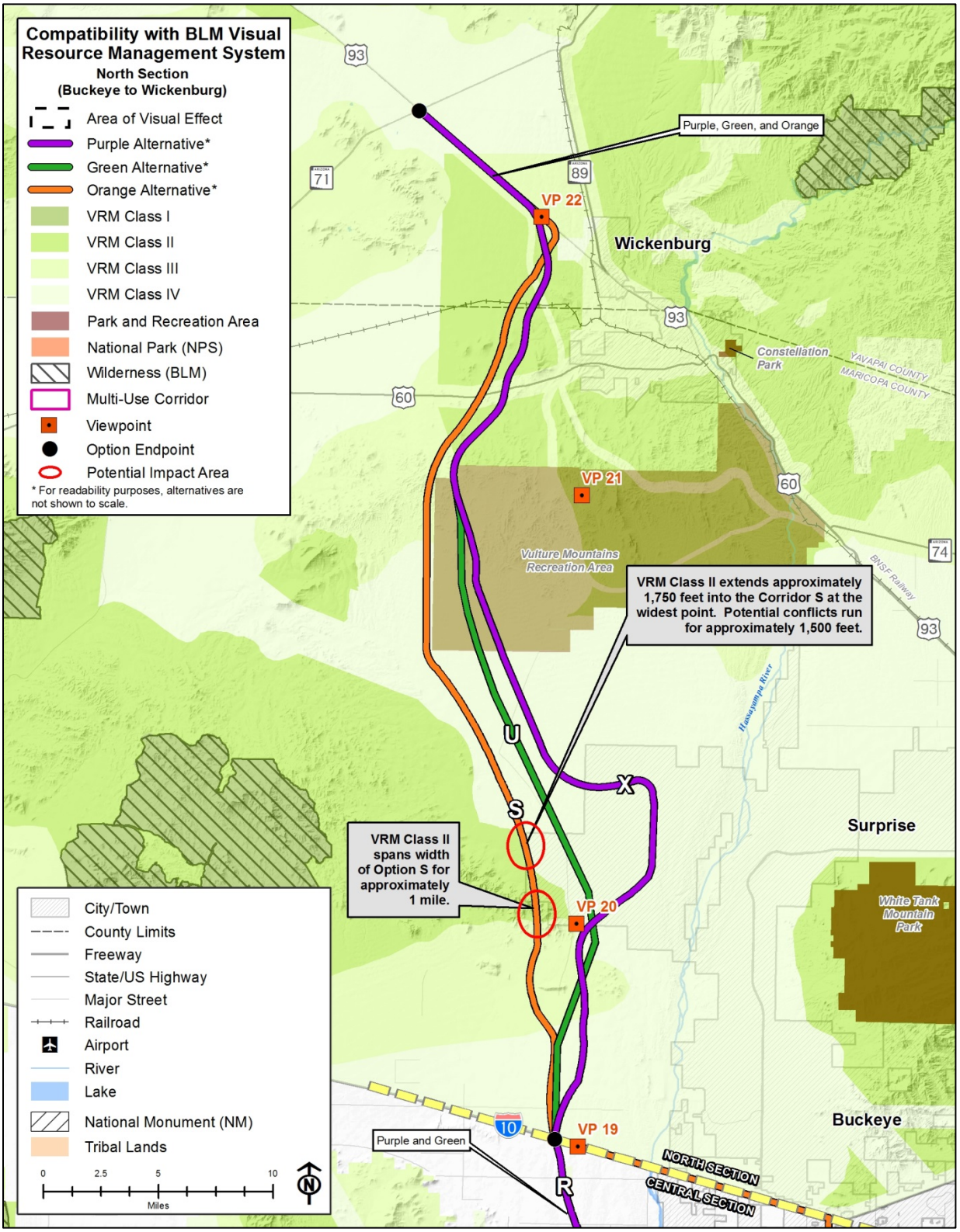


Figure 3.9-10 Compatibility with BLM Visual Resource Management System, North Section

3.9.4.5 Effects on SNP (West) and Tucson Mountain Park Visual Resources

The recreational destinations used by locals and visitors year-round were the KOPs assessed to understand the impacts on SNP's visual resources. All these KOPs are sensitive viewing platforms, and the magnitude of visual impact varies depending on the location of each within the park and the time of the visit (daytime or nighttime); that said, recreational viewers are usually associated with high visual sensitivity.

The Sus Hill, Hugh Norris Trail, and Arizona-Sonoran Desert Museum KOPs on the west side of the park are located along the Green Alternative (Option D) and the Purple Alternative (Option C), where improvements would be incongruous in the overall setting and would create Co-Dominant (daytime) or Dominant (nighttime) visual contrast due to scale. Recreational viewers will have middleground views of the Green and Purple Alternatives, and the overall visual impact is likely to be high because of high viewer sensitivity and superior, unobstructed views. The CAP Design Option will have slightly higher visual impacts, as it is aligned closer to both the park areas compared to Option C and Option D (Sandario Road Portion).

The Vertical Cliffs Trail and Packrat Trail KOPs on the east side of the park are located along the I-10 corridor and Orange Alternative (Option B). The Tucson Metropolitan Area in the middleground dominates the landscape and provides a high level of visual absorption. The change to the visual quality rating would be low because the Orange Alternative would be co-located with the existing I-10.

The Wasson Peak KOP, which is the highest viewing platform in the park, provides superior panoramic views of the existing landscape on the west and east side of SNP (West) in the background. Overall, the visual impact due to the Build Corridor Alternatives and the CAP Design Option is anticipated to be moderate to neutral due to viewing distance, dominance of the developed area in the middleground, and screening by vegetation and topography in the foreground.

Visitors to SNP (West) and Tucson Mountain Park expect high-quality experiences related to solitude, natural quiet, and landscape views. The visual intrusions related to the Build Corridor Alternatives could impact the visual resources and result in unsatisfactory visitor experiences.

3.9.4.6 Light Pollution Effects

The following discussion summarizes the potential light pollution effects that are applicable to all of the Build Corridor Alternatives.

All Build Corridor Alternatives would include lighting that meets ADOT standards. These standards reflect appropriate safety requirements for construction activities and operation of Interstate roadway facilities. These standards also reflect ADOT's approach to minimizing glare, skyglow, light trespass and clutter. No site-specific roadway or lighting designs are available at the Tier 1 stage. Analyses of potential effects of roadway lighting designs are anticipated in the Tier 2 analysis.

In general, the Build Corridor Alternatives would incrementally increase skyglow, but would not be expected to substantially increase glare, light trespass, or clutter. Build Corridor Alternatives on new alignments where no road currently exists would increase sky glow the most because they would:

- Introduce new sources of light.
- Provide transportation corridor access to the adjacent areas, which could encourage adjacent development based on local zoning.

Vehicle lights would be one of the new sources of light along the I-11 Corridor; however, the light would be limited to viewers within or immediately adjacent to the corridor. Also, unobstructed nighttime views of I-11 would be more apparent due to vehicle lights. The additional new sources of light have the potential to impact night sky viewing in nearby SNP (West), which is an important night sky resource for recreational stargazing.

Table 3.9-8 (Potential Effects on Light Pollution: Contribution to Skyglow) summarizes the potential contribution to skyglow due to the different alternatives.

Table 3.9-8 Potential Effects on Light Pollution: Contribution to Skyglow

Build Corridor Alternatives and Options	Potential for Light Pollution (Skyglow)
Purple Alternative	
A+C+G	Low+High+Moderate
I[1,2]+L+N+R	High+High+High+High
X	High
Green Alternative	
A+D+F	Low+High+High
I2+L+M+Q2+R	High+High+High+Moderate+High
U	High
Orange Alternative	
A+B+G	Low+Low+Moderate
H+K+Q[1,2,3]	Moderate+Moderate+Moderate+Moderate+Moderate
S	High

NOTES:

High: Areas where the Corridor Options follow new alignments in undeveloped areas.

Moderate: Areas where the Corridor Options follow new alignments in partially developed areas or existing alignments in undeveloped areas.

Low: Areas where the Corridor Options follow existing major road in developed areas.

3.9.4.7 No Build Alternative

The No Build Alternative would not substantially change the visual character or quality in the Study Area because it would not involve construction or modification to accommodate additional infrastructure (e.g., additional lanes, overpasses, median modifications) associated with I-11. This Draft Tier 1 EIS does not assess the specific environmental impacts associated with planned and committed projects, but these impacts would be considered as part of the environmental review process for individual projects. Most committed projects involve widening and improvements that would affect existing transportation facilities rather than introduce new features into the landscape.

Over time, the visual character and quality in the AVE would change with or without I-11 because of the continued urbanization of the corridor, especially in Tucson, Casa Grande, and Phoenix. Urban expansion could encroach on portions of the AVE that are currently rural or undeveloped, leading to a more urbanized character for the AVE. Anticipated changes would have beneficial and adverse impacts on visual quality. The visual character and quality of new development would depend on what is constructed. Future development may or may not be harmonious with the existing visual elements and patterns, and community members may or may not object to the changes.

3.9.4.8 Summary

The Build Corridor Alternatives would create a range of potential effects on viewsheds. These effects represent trade-offs rather than a definitive choice for which alternative (the Purple, Green, or Orange Alternative) would produce the lowest overall potential for visual impacts. **Table 3.9-9** (Summary of Potential Impacts on Visual and Aesthetics) located at the end of this section, summarizes the key impact topics.

3.9.5 Potential Mitigation Strategies

An Abbreviated VIA was conducted for the Draft Tier 1 EIS and this VIA describes how mitigation strategies avoid, minimize, or compensate for adverse visual impacts and how beneficial visual impacts will be incorporated in the project. However, it is recognized that it may not be possible to mitigate all visual impacts on SNP's designated wilderness area and other natural areas.

Mitigation measures to address the visual impacts caused by the Tier 1 Build Corridor Alternatives are general rather than specific because the level of engineering design and corresponding visual effects analysis are general and comparative rather than site-specific. The Tier 2 VIA will provide project-specific mitigation measures for the individual projects and components of the recommended alternative. The following general mitigation strategies are recommended for I-11 that will help avoid, minimize, or compensate for adverse visual impacts:

- Prepare landscape design plans for visually sensitive areas. These plans should:
  - Protect existing vegetation and add new vegetation to minimize the visual effects of I-11 features and to retain and enhance the areas' natural features.
  - Minimize the spatial limits of earthwork and grading where possible. Site restoration plans should be implemented as soon as possible.
  - Protect and enhance existing rock outcrops.
  - Include and treat newly exposed rock outcrops by considering scale, shape, slope, and fracturing and by using rock stain where desert rock varnish has been disturbed to reduce the color contrast with adjacent rocks.
  - Salvage protected native plants to the extent possible.
  - Protect existing views and do not block those views with new vegetation or other I-11 features such as signs.
- Include grading designs that create natural-looking slopes, surfaces, and transitions.
- Include landscape treatments in stormwater channels and basins to help blend them into their surroundings and create new visual resources in the landscape.

- Enhance sound walls, retaining walls, headwalls, concrete barriers, riprap, and similar I-11 features that are highly visible by selecting colors that complement their surroundings and/or by using artistic surface treatments, including textures and patterns that support an overall design theme compatible with their setting.
- Select lighting standards, guardrails, and other supporting features that minimize visual impacts. Use natural-tone metals with non-contrasting, non-glare finishes and color choices that match their settings.
- Select roadway lighting that is compatible with dark skies objectives and policies, or do not use roadway lighting at all in the vicinity of the Tucson Mitigation Corridor and SNP.
- Minimize fugitive light from portable light sources used during construction near sensitive receptors to the maximum extent feasible, given safety considerations. All lights should be screened and directed downward toward work activities, and should be screened and directed away from the night sky and nearby residents to the maximum extent possible.
- Make sure that bridge designs and designs for other vertical I-11 components conform to the design standards applicable to the entire corridor or to the special design standards in key locations where these features can become visual resources.
- Define the storage sites for equipment, materials and stockpiles, and borrow sites in the Tier 2 project plans. Site selection should consider and minimize visual impacts, and should include screening to minimize visual impacts, where appropriate. To minimize the impact of staging areas on visual quality and character, return these areas to preconstruction conditions once the staging facilities are decommissioned and removed. Restore all disturbed terrain, and install replacement plantings in areas where vegetation was removed. All replacement plantings should be native and indigenous to the area. Staging areas would be restored through the implementation of these measures.

3.9.6 Future Tier 2 Analysis

After completion of the Tier 1 EIS, further VIAs are anticipated as part of the Tier 2 NEPA analyses. Individual Tier 2 projects would be assessed using the VIA Scoping Questionnaire. Depending on the findings of the questionnaire, an Abbreviated VIA may be needed or a more involved Standard VIA or Expanded VIA may be required.

Table 3.9-9 Summary of Potential Impacts on Visual and Aesthetics

<table>
<tr><th>Topics</th><th>No Build Alternative</th><th>Purple Alternative</th><th>Green Alternative</th><th>Orange Alternative</th></tr>
<tr><td rowspan="3">Overall Visual Effects</td><td rowspan="3">No Interstate 11 (I-11) impacts were identified.

Existing conditions and baseline trends would continue.

The other projects in the I-11 Corridor Study Area (Study Area) are subject to their own evaluation.</td><td colspan="3">Option A is shared by all Build Corridor Alternatives, creating the same visual effects. Since all the Build Corridor Alternatives would be co-located with I-19, it is anticipated that any visual changes to the landscape as a result of I-11 would not be noticeable.</td></tr>
<tr><td colspan="2">The Purple and Green Build Corridor Alternatives in the vicinity of the Tucson Mitigation Corridor (Option C/D) would build new corridor facilities and change the character of the existing landscape. I-11 would be visible from Sandario Road, the Tohono O'odham Nation (Garcia Strip), and rural residences such as those in the Three Points neighborhood. North of the Tucson Mitigation Corridor, the Green Alternative (Option D) would have similar visual effects as the Purple Alternative (Option C), but the Green Alternative is closer to low-density residential development in Avra Valley.

The Purple Alternative (Option C) and the Green Alternative (Option D) also would affect the views from SNP-West, Tucson Mountain Park (trails), and Ironwood Forest National Monument.

Visitors to SNP-West and Tucson Mountain Park would see the Purple Alternative in the middleground and background (depending on location). I-11 would be more apparent at night where vehicle and street lights are visible.</td><td>The Orange Alternative (Option B) would have the least visual effect on motorists and the majority of the neighbors because the character of the landscape would remain the same.

The primary exception to this is in downtown Tucson, where the range of future cross sections necessary to provide capacity improvements along I-10 could include right-of-way expansion or an elevated facility. Either option, or a combination thereof, would expose the adjacent historic districts to impacted foreground views.</td></tr>
<tr><td>The Purple Alternative where it is co-located with I-10 and a short portion of I-8 in Pinal County would not change the character of the landscape. Thus, it does not affect adjacent land uses, including the visitor views of Picacho Peak State Park.</td><td>The Green Alternative (Option F) would affect the character of the landscape, as I-11 would be a new facility. Residential viewers of the rural neighborhoods in Red Rock would have partially obstructed middleground views.</td><td>The Orange Alternative (Option G) would be co-located with I-10 and a short portion of I-8 in Pinal County, and hence would not affect the character of the landscape. Thus, it would not affect the visitor views of Picacho Peak State Park.</td></tr>
</table>

Table 3.9-9 Summary of Potential Impacts on Visual and Aesthetics (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Overall Visual Effects (Con't)		New roadway facilities along Option N and Option R would introduce changes to the landscape character in the surrounding agricultural areas and limited residential development of Goodyear and Buckeye. These changes to the landscape character would only be visible in foreground views.	Option M would cause changes to the landscape character due to the introduction of new dominant features, and it would affect the views of visitors within the Sonoran Desert National Monument and North Maricopa Mountains Wilderness.	The Orange Alternative would have the least changes to the landscape character in the Central Section, as it requires the least amount of new roadway and related facilities due to co-located facilities.
		The Purple Alternative (Option X), Green Alternative (Option U), and Orange Alternative (Option S) in the North Section would change the character of the landscape. These alternatives would affect the views of the travelers along Aguila Road and Vulture Mine Road, of the residential viewers of Wintersburg and Wickenburg, and of the recreational visitors to the Vulture Mountains Recreation Area.		
Class II Visual Resource Management (VRM) Lands	No I-11 impacts were identified. Existing conditions and baseline trends would continue. The other projects in the Study Area are subject to their own evaluation.	The Purple Alternative does not encroach on Class I and II VRM Lands.	The Green Alternative does not encroach on Class I and II VRM Lands.	The Orange Alternative (Option S) encroaches on Class II VRM lands in two locations, for a total of approximately 1.25 miles.
SNP (West) and Tucson Mountain Park		The Purple Alternative (Option C) and the Green Alternative (Option D) would cause the most changes to the landscape character on the west side of the park.		The Orange Alternative (Option B) would cause the least changes to the landscape character on the east side of the park as it would be co-located with the existing I-10 corridor.

Table 3.9-9 Summary of Potential Impacts on Visual and Aesthetics (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Light Pollution (Skyglow)	No I-11 impacts were identified. Existing conditions and baseline trends would continue. The other projects in the Study Area are subject to their own evaluation.	The Purple and Green Alternatives would both, in equal measure, have the most potential for generating light pollution in the Central and North Section.	The Green Alternative would introduce the most new roadway and related facilities in the South Section, which implies that it would generate the most new light and therefore have a corresponding potential for light pollution.	The Orange Alternative would have the least potential to increase skyglow due to its lower overall level of new roadway and related facilities.
Indirect Effects	Programmed transportation improvements plus projected population and employment growth could: • Generally continue current growth and development, with associated visual effects, along existing transportation corridors.	Land development induced by I-11 could: • Change the landscape character, particularly in rural areas or near recreation areas where development is currently limited. • Create potential for changes in landscape character near new interchanges as agricultural land or open space is developed.	The Green Alternative would be similar to the Purple Alternative, except: • Potential effects may have increased intensity due to more Corridor Options requiring new facility development.	• Overall potential indirect changes to the landscape character would be lower than with the Purple and Green Alternatives in the South and Central Sections due to the Orange Alternative's co-location with existing transportation facilities. • In 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.

Table 3.9-9 Summary of Potential Impacts on Visual and Aesthetics (Continued)

Topics	No Build Alternative	Purple Alternative	Green Alternative	Orange Alternative
Indirect Effects (Con't)				• In Tucson, the Rio Nuevo and Downtown Zone requires that exterior alterations to National Register of Historic Places listed or eligible buildings follow national standards for the rehabilitation of historic buildings. • Indirect effects would be similar to the Purple and Green Alternatives in the North Section.