Pecos Industrial Rail Access and Train Extension (PIRATE) Project

Final Environmental Assessment

Docket No. FD 36501 - Union Pacific Railroad Company
Construction and Operation Exemption - In Maricopa County, Ariz.

Lead Agency
Surface Transportation Board
Office of Environmental Analysis

Decision ID No. 52931

Service Date: February 27, 2026

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~~DRAFT~~FINAL ENVIRONMENTAL ASSESSMENT

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February 2026~~May 2023~~

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Summary

Introduction

This summary addresses the key elements of the development of this ~~Draft~~ Environmental Assessment (~~Draft~~ EA), the alternatives screening process, the proposed action and the no-action alternative, and major conclusions regarding potential environmental impacts.

Purpose and Need and Proposed Action

The proposed federal action is the Surface Transportation Board's (Board's) decision to approve with appropriate conditions, or deny, Union Pacific Railroad Company's (UP's) request for authority to construct and operate the proposed Pecos Industrial Rail Access and Train Extension (PIRATE) rail line. The proposed rail line is not being proposed or sponsored by the federal government. Therefore, the purpose of and need for the proposed rail line is informed by the goals of UP as the project applicant in conjunction with the Board's enabling statutes.

According to UP, the purpose of the proposed rail line is to meet the transportation and logistics needs of existing and future manufacturing businesses within the city of Mesa's Pecos Advanced Manufacturing Zone (PAMZ) and adjacent areas. Currently, large industrial companies in the PAMZ rely solely on trucking for transporting manufacturing materials and shipping finished products, as the nearest rail transload facility is UP's Loup Logistics facility, west of downtown Phoenix, approximately 40 miles away. UP intends to provide Commercial Metals Company (CMC)~~, Fujifilm,~~[1] and other current and future industrial operations in the PAMZ with rail service and a connection to UP's Phoenix Subdivision main line (Phoenix Subdivision), thus reducing the need to truck cargo.

Draft EA and Final EA Process

The Board is the lead agency for this environmental review. The Board's Office of Environmental Analysis (OEA) is responsible for conducting the environmental review process, independently analyzing environmental data, and making environmental recommendations to the Board. ~~OEA is issuing this Draft EA for public review and comment for 30 days. Comments are due by June 30, 2023. OEA will consider all comments received on this Draft EA and will respond to substantive comments in the Final EA, which will include OEA's final recommended environmental mitigation.~~

OEA issued a Draft Environmental Assessment (Draft EA) on May 31, 2023, for public review and comment and provided a 30-day comment period, which ended on June 30, 2023. OEA received 10 comments from agencies and individuals on the Draft EA. In July 2023, following the closure of the public comment period on the Draft EA, OEA learned that there had been significant ground disturbance and damage to archaeological resources in the area of the proposed right-of-way. In August 2023, at the request of Native American Tribes, OEA delayed

[1] In October 2025, UP indicated that it no longer plans to grade for a future connection to Fujifilm (UP 2025a). Therefore, references to grading for a future connection to Fujifilm have been removed from this Final Environmental Assessment (Final EA).

issuance of the Final EA to assess the damage to archaeological sites and resolve related legal issues, as described in Section 5.1.4. OEA is now issuing this Final EA and has considered and responded to the substantive comments received on the Draft EA in Appendix M, *Draft EA Comments and Responses*. Based on the analysis in the Draft EA and Final EA, OEA has determined that the conclusions in the Draft EA remain valid. While OEA has not changed its conclusions from the Draft EA, OEA has included additional information in this Final EA in response to comments and to update existing conditions in the project vicinity.

Any changes made to the text of the Draft EA appear in red and blue in Final EA (track changes indicate the language deleted in red, strikethrough text and new language in blue, underlined text). Additionally, any graphics that have been revised since the Draft EA will contain a note indicating that the graphic has been replaced with a new version.

The Board will now consider the entire record, including the Draft EA and Final EA, all comments received, OEA's final recommendations, and the transportation merits in making its final decision on UP's petition to construct and operate the proposed rail line.

Alternatives

National Environmental Policy Act (NEPA) implementing regulations require that federal agencies consider reasonable alternatives to the proposed action, including a No-Action Alternative.[2] A reasonable alternative must meet the project's purpose and need and must be logistically feasible and practical to implement. OEA used a three-part screening process to evaluate and identify a range of reasonable alternatives.

- The first screening level considered whether the alignment met the project's purpose and need. Based on the results of the Level 1 screening, OEA determined that potential alternatives would need to access the PAMZ from the west because the terrain, land use, zoning, and infrastructure render approaches from the other directions infeasible. OEA determined that starting the PIRATE alignment at the Phoenix Subdivision would allow UP to use the closest existing rail infrastructure to best meet the project's purpose and need.
- In the Level 2 screening, OEA evaluated potential west-to-east alignments across the PAMZ to reach CMC. Land ownership and existing land use within and adjacent to the PAMZ were the primary considerations in identifying feasible alignments. OEA considered three potential alignments in its Level 2 screening that were developed based upon alignments in UP's initial design plans. Based on the results of the Level 2 screening, OEA selected two alignments to carry forward for Level 3 screening.

[2] Consistent with Executive Order (EO) 14154, "Unleashing American Energy," 90 Fed. Reg. 8353 (Jan. 20, 2025), the Council on Environmental Quality (CEQ) rescinded its NEPA implementing regulations effective April 11, 2025. *See* "Interim Final Rule, Removal of NEPA Implementing Regulations," 90 Fed. Reg. 10610 (Feb. 25, 2025). *See also* 91 Fed. Reg. 618 (Jan. 8, 2026) (Final Rule). Regarding NEPA documents in progress during this transitionary period, CEQ has stated that "agencies should continue to follow their existing practices and procedures for implementing NEPA to the extent consistent with the text of NEPA, EO 14154, case law, and [CEQ] guidance." CEQ has also stressed that agencies "should not delay pending or ongoing NEPA analyses" *Id*. To that end, OEA has retained references to the CEQ regulations throughout this Final EA.

- Level 3 screening focused on the process for refining the alignments for Alternatives 1 and 2 based upon UP's previous designs, avoidance and design criteria, and landowner concerns. OEA identified a common alignment for both alternatives west of Ellsworth Road with the alignments diverging east of Ellsworth Road, resulting in a northern alignment (Alternative 1) and a southern alignment (Alternative 2). OEA determined that these two alignments were responsive to known landowner concerns, avoided conflicts with existing or known future planned development, and avoided private land that is not available for acquisition.

Accordingly, OEA identified two Action Alternatives for PIRATE: Alternative 1 and Alternative 2 (Figure 2-1, *PIRATE and the Phoenix Subdivision*). Both Alternative 1 and Alternative 2 include construction of a new wye (Y-like rail connection) at the Phoenix Subdivision and approximately 6.0 miles of rail line extending from the Phoenix Subdivision to industrial companies at the eastern end of the PAMZ.

In addition, OEA evaluated the No-Action Alternative. Under the No-Action Alternative, the Board would deny UP's request for authority to construct and operate PIRATE to serve the PAMZ and UP would not construct and operate the rail line as proposed.

Planned Phoenix Subdivision Support Tracks

In addition to PIRATE, UP would also construct and operate additional features along the Phoenix Subdivision, including two new planned support tracks (siding and working track) between Power Road and Ellsworth Road, totaling about 2.5 miles long, and associated drainage ditches. Though these additional features do not require Board approval, OEA evaluated their potential impacts in this ~~Draft~~ EA because UP stated that these planned support tracks would be necessary to accommodate increased rail traffic associated with the construction of PIRATE and UP sufficiently developed the engineering and design of the planned support tracks and drainage ditches to support an environmental review.

Summary of Impacts

No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks; rail service would not be available in the PAMZ and existing and future businesses would continue to rely solely on trucking.

Action Alternatives

OEA concluded that the potential environmental and historic impacts of the proposed rail line would be negligible, minor, and/or temporary. Table S-1 summarizes the potential impacts of the Action Alternatives and the planned Phoenix Subdivision support tracks. This~~e~~ ~~Draft~~Final EA recommends mitigation to minimize the potential environmental and historic impacts of PIRATE. ~~The~~OEA's final recommended mitigation is set forth in Chapter 4 of this~~e~~ ~~Draft~~Final EA. This mitigation includes UP's voluntary mitigation (VM) and OEA's recommended mitigation measures (MMs). With this mitigation, no significant impacts would occur.

Table S-1. Summary of direct and indirect project impacts

Resource Area	Alternative 1 and the Planned Phoenix Subdivision Support Tracks	Alternative 2 and the Planned Phoenix Subdivision Support Tracks	Mitigation
Transportation and Safety			
Traffic during construction	Temporary road closures and detours needed to construct or modify at-grade crossings	Same as Alternative 1	VMs and MM require temporary traffic controls, coordination with adjacent municipalities and Mesa Gateway Airport regarding intersection and roadway closures, and coordination with emergency service providers. (Refer to Section 4.5.1, *Transportation and Safety.*)
2050 Build intersection LOS	All intersections would operate at an acceptable LOS D or better~~, except Sossaman Road and Germann Road, which would operate at LOS E~~	Same as Alternative 1	N/A
2050 Build delays and vehicle queues	Minor adverse impact from longer delays Minor adverse impact from longer queues that would dissipate within the first few cycles of the traffic signal operations	Same as Alternative 1	~~N/A~~MM restricts trains from blocking at-grade crossings during peak traffic periods or for more than 10 minutes at a time.[3] MM requires UP to fulfill all commitments imposed during the Arizona Corporation Commission railroad crossing review process. (Refer to Section 4.5.1, *Transportation and Safety.*)
Transportation safety and access management during operation	Trains may block at-grade crossings and public roads, which could cause minor adverse impacts from traffic and emergency response delays	Trains may block at-grade crossings and public roads, which could cause minor adverse impacts from traffic and emergency response delays Minor adverse impacts from proximity of the future Crismon Road and Willis Road intersection to the Crismon Road at-grade crossing	VMs require continued coordination with emergency service providers, and state and local agency approval of at-grade crossing warning devices and other warning and safety devices. MMs restrict trains from blocking at-grade crossing during peak traffic periods or for more than 10 minutes at a time, and require Arizona Corporation Commission review of increased train frequency. MM also requires coordination regarding the future segments of Willis Road ~~project~~ (Alternative 2 only). (Refer to Section 4.5.1, *Transportation and Safety.*)
Air Quality and Climate Change			
Short-term construction emissions of criteria pollutants	Temporary, minor impacts No National Ambient Air Quality Standards violations Meets general conformity requirements	Same as Alternative 1	VMs control dust and air pollutant emissions during construction. (Refer to Section 4.5.2, *Air Quality and Climate Change.*)
Long-term operation emissions of criteria pollutants	Beneficial impacts from reduced emissions because of fewer diesel truck trips No National Ambient Air Quality Standards violations	Same as Alternative 1	N/A
Greenhouse gas emissions	Beneficial impacts from reduced emissions because of fewer diesel truck trips	Same as Alternative 1	N/A

[3] This MM is not new, but has been added here to show mitigation is recommended to minimize the minor adverse impacts from longer delays and queues.

Table S-1. Summary of direct and indirect project impacts

Resource Area	Alternative 1 and the Planned Phoenix Subdivision Support Tracks	Alternative 2 and the Planned Phoenix Subdivision Support Tracks	Mitigation
Noise and Vibration			
Construction noise and vibration	Temporary adverse noise impact	Same as Alternative 1	VM and MMs control noise from construction equipment, restrict construction to daytime unless specifically permitted for nighttime work, and require best management practices to reduce construction noise. (Refer to Section 4.5.3, *Noise and Vibration.*)
Operational noise and vibration	No impact	No impact	VM requires trains to meet Federal Railroad Administration noise limits. (Refer to Section 4.5.3, *Noise and Vibration.*)
Hazardous Materials and Waste Sites			
Hazardous waste sites	No impact to known hazardous sites, including ongoing remediation efforts associated with the former Williams Air Force Base Superfund site	Same as Alternative 1	MM requires an ASTM International E1527-21 Phase I Environmental Site Assessment for any commercial real estate to be acquired. (Refer to Section 4.5.4, *Hazardous Materials and Waste Sites.*)
Hazardous materials management	Minor impacts during construction from use of materials such as gasoline, diesel, and oil in heavy construction equipment and storage onsite Beneficial impact from shifting transport of hazardous materials away from public roadways onto rail	Same as Alternative 1	VMs to prepare a hazardous waste management plan and notify appropriate agencies according to applicable regulations in the event of a spill during construction. VMs to prepare a hazardous materials emergency response plan to address potential derailments or spills and comply with applicable Federal Railroad Administration safety regulations. (Refer to Section 4.5.4, *Hazardous Materials and Waste Sites.*)
Wells and pipelines	Minor impacts due to presence of ~~13~~seven wells and one active natural gas pipeline within project footprint	Same as Alternative 1	MMs require coordination with Kinder Morgan to protect closed and active pipelines, and coordination with the owner/operator of any active wells. (Refer to Section 4.5.4, *Hazardous Materials and Waste Sites.*)
Biological Resources			
Federally listed species or suitable habitat	No impact	No impact	N/A
Native vegetation providing habitat for migratory birds	~~172~~173 acres (minor impact)	174 acres (minor impact)	N/A

Table S-1. Summary of direct and indirect project impacts

Resource Area	Alternative 1 and the Planned Phoenix Subdivision Support Tracks	Alternative 2 and the Planned Phoenix Subdivision Support Tracks	Mitigation
Burrowing owl habitat	~~115~~114 acres (minor impact)	~~122~~114 acres (minor impact)	VMs and MM to conduct pre-construction surveys for burrowing owls, provide results of the pre-construction survey to Arizona Game and Fish Department, implement a construction buffer around any observed burrows, and remove burrowing owls that cannot by avoided during construction. (Refer to Section 4.5.5, *Biological Resources.*)
Suitable habitat for eagles	No impact	No impact	N/A
Protected native plants	Portions of ~~172~~173 acres (minor impact)	Portions of 174 acres (minor impact)	MM to conduct a native plant inventory and comply with Arizona Department of Agriculture native plant permit requirements. (Refer to Section 4.5.5, *Biological Resources.*)
Area of disturbance creating potential to spread invasive species	~~254~~256 acres (minor impact)	~~260~~262 acres (minor impact)	MMs to seed disturbed soils with native plants or permanently stabilize soils, as well as implement a non-native invasive plants mitigation plan during construction. (Refer to Section 4.5.5, *Biological Resources.*)
Water Resources			
Surface waters	~~0.52~~0.53 acre	Same as Alternative 1	VMs and MM to obtain a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers prior to construction, prepare a mitigation plan for stream impacts in consultation with the U.S. Army Corps of Engineers (if applicable), and mark the construction limits authorized in the Section 404 permit. (Refer to Section 4.5.6, *Water Resources.*)
Wetlands	No impact	No impact	VM and MM to prepare a mitigation plan for any wetland impacts in consultation with the U.S. Army Corps of Engineers (if applicable) and mark the boundaries of wetlands to avoid during construction. (Refer to Section 4.5.6, *Water Resources.*)
Floodplains	0.19-foot increase in 100-year flood water surface elevation 0.45 acres of permanent impacts	Same as Alternative 1	VM~~s~~ to coordinate with floodplain managers if the 100-year water surface elevation would increase more than 1 foot and MM to ~~obtain a permit from~~ comply with all the conditions in the August 2025 permit from the Flood Control District of Maricopa County ~~prior to construction within a floodplain~~. (Refer to Section 4.5.6, *Water Resources.*)
Groundwater	Temporary, minor impacts during construction No impact during operations	Same as Alternative 1	N/A

Table S-1. Summary of direct and indirect project impacts

Resource Area	Alternative 1 and the Planned Phoenix Subdivision Support Tracks	Alternative 2 and the Planned Phoenix Subdivision Support Tracks	Mitigation
Geology and Soils			
Topography	Excavation and fill would slightly change local topography	Same as Alternative 1	N/A
Geologic landforms	No impact	No impact	N/A
Soil	Excess of ~~280,000~~181,000 cubic yards of excavated material Minor impacts to soil quality from excavating and stockpiling soil ~~23.5~~14.7 acres contain soil that is highly corrosive to concrete or steel	Similar amounts of cut and fill as Alternative 1 Minor impacts to soil quality from excavating and stockpiling soil ~~24.1~~17.1 acres contain soil that is highly corrosive to concrete and steel	VMs and MM to limit ground disturbance, remove excess material to a permissible offsite location, implement erosion control measures, and comply with Federal Railroad Administration inspection and maintenance requirements related to corrosive soil. (Refer to Section 4.5.7, *Geology and Soils.*)
Land Use and Farmland			
Right-of-way acquisition	~~142~~144 acres of right-of-way 29 acres of temporary construction easements	~~151~~152 acres of right-of-way ~~25~~28 acres of temporary construction easements	N/A
Land use and zoning	Proposed use is consistent with planned industrial land uses and current zoning classifications Minor impact from 1 planned land use conflict (preliminary road alignment for SkyBridge development)	Proposed use is consistent with planned industrial land uses and current zoning classifications ~~Minor i~~Impact from one existing land use conflict (The Cubes at Mesa Gateway) ~~development would have to revise its design and possibly reconstruct portions of the site [depending on construction progress])~~ Minor impact from ~~1~~two planned land use conflicts (preliminary road alignment for SkyBridge development and realignment of Willis Road)	MMs require coordination to resolve land use conflicts with ~~Phoenix~~ Mesa Gateway Airport (both alternatives) and The Cubes at Mesa Gateway (Alternative 2 only). (Refer to Section 4.5.8, *Land Use and Farmland.*)
Business or residential displacements	None	None	N/A
Farmland	~~50~~145 acres of land based on farmland soil characteristics[4]	~~53~~152 acres of land based on farmland soil characteristics	N/A

[4] Per OEA's 2025 and 2026 coordination with the Natural Resources Conservation Service, the new acreages include all land with soils that qualify as prime or unique farmlands, regardless of the current land use except for land that would be used only for temporary construction easements and the existing Phoenix Subdivision right-of-way, which are exempt from the Farmland Protection Policy Act.

Table S-1. Summary of direct and indirect project impacts

Resource Area	Alternative 1 and the Planned Phoenix Subdivision Support Tracks	Alternative 2 and the Planned Phoenix Subdivision Support Tracks	Mitigation
Property access	Minor impacts from creating a barrier to access bisected agricultural fields	Same as Alternative 1	N/A
Recreation	No impact	No impact	N/A
Utilities	Minor impacts from utility conflicts	Same as Alternative 1	VM and MMs to coordinate with utility owners to protect or relocate utilities affected by construction~~, including avoidance of the Salt River Project's Southeast Power Link project~~. MM to coordinate with utility providers to verify adequacy of existing utility infrastructure. (Refer to Section 4.5.8, *Land Use and Farmland.*)
Socioeconomics			
Construction	Access to local streets and businesses would be maintained Temporary impact to businesses and commuters from detours and traffic delays	Same as Alternative 1	VM to appoint community liaison to provide project and construction progress information to communities, businesses, agencies, Native American Tribes, educational institutions, and nonprofit organizations. VM to consult with adjacent landowners regarding construction schedules and temporary construction access. MM to alert schools, emergency service providers, and adjacent landowners prior to temporary road closures. (Refer to Section 4.5.9, *Socioeconomics.*)
Local economy	Beneficial impact from more than doubling jobs, wages, economic output, and tax revenues within the PAMZ	Same as Alternative 1	N/A
Businesses	Minor impact from cutting off northern access to TRW Vehicle Safety Systems	Same as Alternative 1	N/A
Community cohesion	No impact	No impact	N/A
Environmental Justice[5]			
Environmental justice	No impact	No impact	N/A

[5] Environmental justice analyses are no longer required in NEPA documents. *See* EO 14148, "Initial Rescissions of Harmful Executive Orders and Actions"; EO 14173, "Ending Illegal Discrimination and Restoring Merit-Based Opportunity"; and EO 14154, "Unleashing American Energy." Nevertheless, to avoid delay in the NEPA process and to ensure that the information contained in this Final EA is accurate, OEA has retained and updated this analysis in this Final EA.

Table S-1. Summary of direct and indirect project impacts

Resource Area	Alternative 1 and the Planned Phoenix Subdivision Support Tracks	Alternative 2 and the Planned Phoenix Subdivision Support Tracks	Mitigation
Visual Quality			
Views	Intermittent, recurring temporary impact from rail cars blocking farther views as they move through the area	Same as Alternative 1	MMs for lighting during construction and operation to comply with applicable regulations to preserve visibility around airports and the zoning provisions of Mesa's Airfield Overlay District. (Refer to Section 4.5.10, *Visual Quality*.)
Visual character	No impact~~Minor impact from parked trains visible north of the Germann Road and Merrill Road intersection~~	No impact~~Same as Alternative 1, except slightly more prominent where rail line would be 0.25 mile closer to Germann Road~~	N/A
Visual quality	No impact	No impact	N/A
Archaeological and Historic Resources			
Archaeological sites	Physical impacts resulting in an adverse effect to 4 sites	Physical impacts resulting in an adverse effect to 3 sites	VM requires a cultural resources Memorandum of Agreement and historic properties treatment plan to govern the identification and handling of cultural resources prior to and during construction. (Refer to Section 4.5.11, *Archaeological and Historic Resources*.)
Historic resources	Physical impacts to 1 historic structure, but no adverse effect	Same as Alternative 1	N/A

MM = mitigation measure; N/A = not applicable; VM = voluntary mitigation

Cultural Resources

OEA also evaluated the potential historic impacts of PIRATE under Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. § 306108). OEA initiated the Section 106 process for the project in April 2022, conducted cultural resources surveys, from May through September 2022, assessed project effects in October and November 2022, and started the resolution of adverse effects process in December 2022~~2023~~. The Section 106 process is being undertaken in consultation with 15 agencies and 10 federally recognized Native American Tribes (Section 106 consulting parties), 4 of which have requested government-to-government consultation.

OEA determined that Alternative 1 and the planned Phoenix Subdivision support tracks would adversely affect four National Register of Historic Places-eligible and/or listed archaeological sites, while Alternative 2 would affect three of those sites. OEA, in consultation with the Section 106 consulting parties, ~~is~~ developed~~ing~~ a Memorandum of Agreement (MOA) and will develop an associated historic properties treatment plan (HPTP) that identify treatment measures that would be implemented to mitigate adverse effects. Refer to Section 3.12, *Archaeological and Historic Resources,* and Section 5.1.2, *NHPA Section 106 Consultation.*

The MOA was fully executed on February 23, 2026, and is included in this Final EA as Appendix K1, *Section 106 Memorandum of Agreement*. Execution of the MOA and the formal filing with the Advisory Council on Historic Preservation~~will~~ completed the Board's Section 106 review process. The Board and signatories to the MOA ~~would then be~~ are legally obligated to meet their responsibilities as defined in the MOA and the HPTP. UP submitted VM agreeing to comply with the requirements of the MOA and HPTP (VM-AHR-1), and OEA is recommending that the Board impose this condition in any decision authorizing construction and operation of PIRATE.

Cumulative Impacts[6]

OEA reviewed all resources evaluated in the~~is Draft~~ EA to identify those that would experience direct or indirect impacts under the Action Alternatives and the planned Phoenix Subdivision support tracks and that are likely to experience the effects of other past, present, and reasonably foreseeable future actions. OEA identified transportation, burrowing owls, farmland, visual quality, and cultural resources for inclusion in the~~is~~ cumulative impact analysis.

[6] As noted above, CEQ rescinded its NEPA implementing regulations effective April 11, 2025. Accordingly, cumulative impacts analyses are no longer required in NEPA documents. Nevertheless, to avoid delay in the NEPA process and to ensure that the information contained in this Final EA is accurate, OEA has retained and updated this analysis in this Final EA.

Mitigation

UP provided 42 VM measures addressing a broad range of environmental issues and OEA is recommending ~~32~~36 additional MMs to further minimize project-related impacts. After considering all public comments on the Draft EA, OEA:

- Added 4 new MMs in response to comments on the Draft EA and updated project information received from UP (UP 2025a);
- Modified 12 previous MMs to update existing conditions and to respond to comments on the Draft EA;
- Removed 1 MM because it is no longer applicable; and
- Deleted 1 VM and replaced it with one of the new MMs.

OEA is recommending that the Board impose all of the mitigation in this Final EA on any decision authorizing the proposed rail line. Refer to Chapter 4, *Recommended Mitigation*.~~OEA will make its final recommendations on mitigation to the Board in the Final EA after considering all public comments on this Draft EA.~~

Environmentally Preferred Alternative

Based on OEA's analysis and consultation with appropriate agencies, Native American Tribes, and other stakeholders, OEA ~~preliminarily~~ concludes that among the two Action Alternatives, Alternative 1 would result in the fewest impacts on the environment. Alternative 2 would result in slightly greater impacts to native vegetation, burrowing owl habitat, and farmland. In addition, Alternative 2 would result in adverse impacts to The Cubes at Mesa Gateway, as well as minor adverse impacts to Willis Road and the future intersection of Willis and Crismon Roads. ~~Therefore~~For these reasons, ~~if~~should the Board decide to authorize~~s~~ construction and operation of the proposed rail line, OEA ~~preliminarily~~ recommends that the Board authorize Alternative 1 to minimize the impacts from construction and operation of PIRATE on the environment.~~ OEA invites agency and public comment on this preliminary recommendation and will make its final recommendations to the Board in the Final EA after considering all comments received during the public comment period.~~

Conclusion

Based on the information provided from all sources to date and the analysis presented in this ~~Draft~~ EA, OEA ~~preliminarily~~ concludes that construction and operation of PIRATE, if all of OEA's final recommended mitigation is imposed and implemented, would have no significant environmental impacts. Therefore, preparation of an EA is appropriate and an Environmental Impact Statement is not required.

This Final EA is available for viewing and downloading on the Board's website (www.stb.gov) by clicking "Search STB Records" near the top of the home page and then searching for "Decisions" using Docket Number "FD 36501." In addition, a hard copy of this Final EA is available at the local libraries and municipal offices identified in Table 1-1 of this Final EA, which includes the address, telephone, website, and operating hours for each location. If you require an accommodation under the Americans with Disabilities Act, please call (202) 245-0245.

~~Request for Comments~~

~~This Draft EA is available for viewing and downloading on the Board's website (www.stb.gov) by clicking "Search STB Records" near the top of the home page and then searching for "Decisions" using Docket Number "FD 36501." An interactive StoryMap of the environmental review is also available at the Board's Railroad Map Depot at (https://storymaps.arcgis.com/stories/f03ead62167b4a99b266d3f9b4fd1010). In addition, a hard copy of the Draft EA is available at the local government offices and libraries identified in Table 1-1 of the Draft EA, which includes the address, telephone, website, and operating hours for each location.~~

~~OEA invites comments on all aspects of this Draft EA and will consider all timely comments received. All comments on this Draft EA must be submitted by the comment due date, within the published comment period, which will close in 30 days on **June 30, 2023**. When submitting comments on this Draft EA, OEA encourages commenters to be as specific as possible and to substantiate concerns and recommendations.~~

~~Comments on this Draft EA may be submitted electronically through the Board's website at www.stb.gov by clicking on the "E-Filing" link on the left side of the home page and then selecting "Environmental Comments." Brief comments may be typed within the comment field provided or longer comments may be attached as a separate file. Alternatively, comments on this Draft EA can be mailed to:~~

~~Adam Assenza~~
~~Surface Transportation Board~~
~~Environmental Filing, Docket No. FD 36501~~
~~c/o Sabra McNeish, Jacobs Engineering Group Inc.~~
~~1501 West Fountainhead Parkway, Suite 401~~
~~Tempe, AZ 85282~~

~~It is not necessary to mail written comments that have been filed electronically. Please refer to Docket No. FD 36501 in all correspondence addressed to the Board, including all comments submitted on the Draft EA.~~

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Appendix K1. Section 106 Memorandum of Agreement

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Appendix L. List of Preparers

Appendix M. Draft EA Comments and Responses

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Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ACC	Arizona Corporation Commission
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
AMA	Active Management Area
AOA	airport overflight area
APE	area of potential effects
ASLD	Arizona State Land Department
ASM	Arizona State Museum
AST	aboveground storage tank
AVE	area of visual effect
AZDA	Arizona Department of Agriculture
AZPDES	Arizona Pollutant Discharge Elimination System
BFHS	Benjamin Franklin High School
BMP	best management practice
Board	Surface Transportation Board
CBC	concrete box culvert
CDC	Centers for Disease Control and Prevention
CE	Common Era
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
C.F.R.	Code of Federal Regulations
CGP	Construction General Permit
CMC	Commercial Metals Company
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Corps	U.S. Army Corps of Engineers
CORRACTS	corrective action report
CUSD	Chandler Unified School District

CWA	Clean Water Act
dBA	A-weighted decibel
DEUR	Declaration of Environmental Use Restriction
Draft EA	Draft Environmental Assessment
EA	Environmental Assessment
ECHO	enforcement and compliance history information
EDR	Environmental Data Resources
EIS	Environmental Impact Statement
EO	executive order
EMAP	Environmental Monitoring and Assessment Program
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FCDMC	Flood Control District of Maricopa County
Fed. Reg.	Federal Register
FEMA	Federal Emergency Management Agency
FIFRA	Federal Insecticide, Fungicide, & Rodenticide Act
Final EA	Final Environmental Assessment
FINDS	Facility Index System/Facility Registry System
FPPA	Farmland Protection Policy Act
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FUDS	formerly used defense sites
GBN	ground-borne noise
GBV	ground-borne vibration
GHG	greenhouse gas
Gilbert	Town of Gilbert
HAZNET	facility and manifest data
HIST FTTS	FIFRA/TSCA Tracking System
HPTP	historic properties treatment plan
HUD	U.S. Department of Housing and Urban Development
HUSD	Higley Unified School District
~~IC~~	~~institutional control~~
ICIS	Integrated Compliance Information System
Jacobs	Jacobs Engineering Group Inc.
KOP	key observation point
kV	kilovolt

Ldn	day-night average noise level
Lmax	maximum noise level
LOS	level of service
MCAQD	Maricopa County Air Quality Department
Mesa	City of Mesa
MGA	Mesa Gateway Airport
MM	mitigation measure
MOA	Memorandum of Agreement
MOVES3	Motor Vehicle Emission Simulator Version 3
MOVES5	Motor Vehicle Emission Simulator Version 5
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
~~NGS~~	~~U.S. National Geodetic Survey~~
NHPA	National Historic Preservation Act
NLR	no longer regulated
NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OEA	Office of Environmental Analysis
PAMZ	Pecos Advanced Manufacturing Zone
PEDP	Public Environmental Data Partners
PFAS	perfluoroalkyl substances
PHMSA	Pipeline and Hazardous Material Safety Administration
Phoenix Subdivision	Phoenix Subdivision main line
PIRATE	Pecos Industrial Rail Access and Train Extension
PM_{10}	particulate matter less than 10 micrometers in aerodynamic diameter
$PM_{2.5}$	particulate matter less than 2.5 micrometers in aerodynamic diameter
PMGA	Phoenix-Mesa Gateway Airport
ppm	parts per million
PPV	peak particle velocity
QCUSD	Queen Creek Unified School District
Queen Creek	Town of Queen Creek
RCRA	Resource Conservation and Recovery Act

SEMS	Superfund Enterprise Management System
SHPO	State Historic Preservation Office
SOx	sulfur oxide
SPL	Superfund Program list
SQG	small quantity generator
SR	State Route
SRP	Salt River Project
SVE	soil vapor extraction
SVI	Social Vulnerability Index
SPDES	State Pollutant Discharge Elimination System
SWF/LF	solid waste facility/landfill
SWPPP	stormwater pollution prevention plan
TCE	temporary construction easement
TCP	Traditional Cultural Place
The Cubes	The Cubes at Mesa Gateway
THPO	Tribal Historic Preservation Officer
TRIS	Toxic Release Inventory System
TRW	TRW Vehicle Safety Systems
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
UP	Union Pacific Railroad Company
USAF	U.S. Air Force
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VdB	vibration decibel
VIA	visual impact assessment
VM	voluntary mitigation
VOC	volatile organic compound
vpd	vehicles per day
VSQG	very small quantity generator
WAFB	Williams Air Force Base

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Chapter 1
Purpose and Need

1.1 Introduction

On June 30, 2022, the Union Pacific Railroad Company (UP) filed a petition with the Surface Transportation Board (Board) in Docket No. FD 36501 pursuant to §10502 of Title 49 of the United States Code (49 U.S.C. § 10502) seeking exemption from the requirements of 49 U.S.C. § 10901 to construct and operate approximately 6.0 miles of new rail line in Maricopa County, Arizona (Figure 1-1). The proposed rail line would connect UP's Phoenix Subdivision main line (Phoenix Subdivision) to industrial properties southeast of the ~~Phoenix-~~Mesa Gateway Airport (MGA) (formerly Phoenix-Mesa Gateway Airport [PMGA]) (Figure 1-2). This project is referred to as the Pecos Industrial Rail Access and Train Extension (PIRATE).

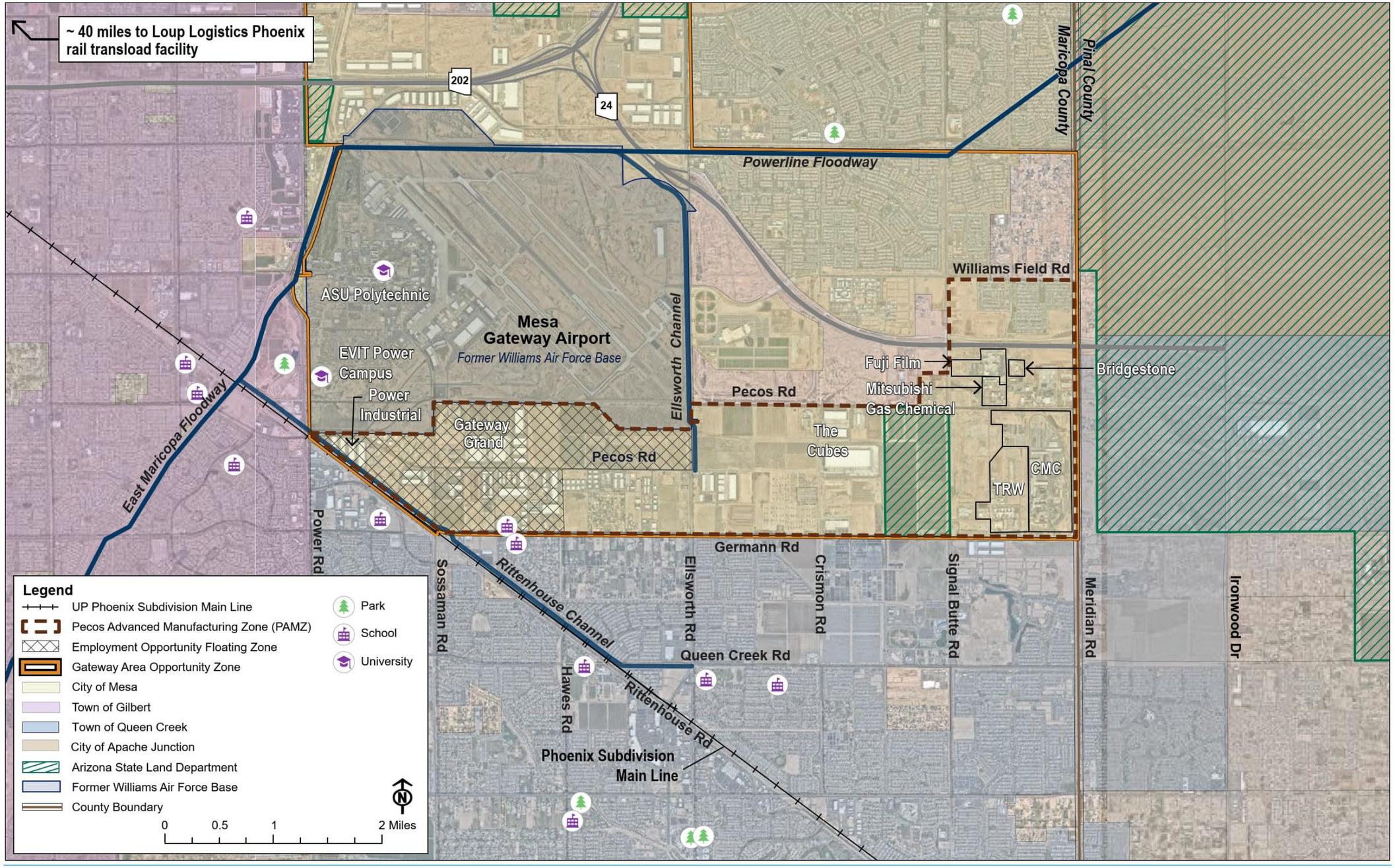
UP characterizes PIRATE as a "public/private initiative to fund, engineer, design, and construct" the proposed rail line and has collaborated with the City of Mesa, Arizona (Mesa) since 2016 (Mesa 2021c~~a~~; UP 2022d). However, PIRATE would be funded solely by UP. No local, state, or federal money would be used to construct or operate the proposed rail line.

Before deciding whether to authorize the construction and operation of the proposed rail line, the Board must consider the potential impacts of that decision on the environment pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321–4370m-11, and related environmental laws, including Section 106 of the National Historic Preservation Act (NHPA), 54 U.S.C. § 306108~~,~~. The Board's Office of Environmental Analysis (OEA) is responsible for fulfilling the agency's responsibilities under NEPA and related environmental laws. OEA conducted this environmental analysis consistent with ~~as well as~~ the Council on Environmental Quality (CEQ) regulations in effect at the time that the Draft Environmental Assessment (Draft EA) was issued (Parts 1500–1508 of Title 40 of the *Code of Federal Regulations* [40 C.F.R. Parts 1500–1508]), the Board's environmental rules (49 C.F.R. Part 1105), and the Section 106 regulations at 36 C.F.R. Part 800. The Board issued a Draft EA on May 31, 2023, and held a public comment period from May 31 through June 30, 2023.

Consistent with Executive Order (EO) 14154, "Unleashing American Energy," 90 Fed. Reg. 8353 (Jan. 29, 2025), CEQ rescinded its NEPA implementing regulations effective April 11, 2025. *See* "Interim Final Rule, Removal of NEPA Implementing Regulations," 90 Fed. Reg. 10610 (Feb. 25, 2025). *See also* 91 Fed. Reg. 618 (Jan. 8, 2026) (Final Rule). The Board intends to revise its environmental rules to reflect the rescission of the CEQ regulations, statutory revisions to NEPA enacted in 2023 and 2025, and case law. *See* Memorandum for Heads of Federal Departments and Agencies: Implementation of the National Environmental Policy Act, Sept. 29, 2025 (available at nepa.gov).

Figure 1-1. State location

Figure 1-2. Project vicinity



Note: This graphic was revised in the Final EA.

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Regarding NEPA documents in progress during this transitionary period, CEQ has stated that "agencies should continue to follow their existing practices and procedures for implementing NEPA to the extent consistent with the text of NEPA, EO 14154, case law, and [CEQ] guidance." CEQ has also stressed that agencies "should not delay pending or ongoing NEPA analyses" *Id*. To that end, OEA has retained references to the CEQ regulations throughout this Final Environmental Assessment (Final EA). OEA has confirmed that the rescission of the CEQ regulations and other changes to the NEPA process do not call into question the substantive analysis contained in the Draft EA and that this Final EA is consistent with current authorities as reflected in the EO, CEQ guidance, and case law (while it does provide more analysis than those authorities require, as noted in Chapter 3, *Affected Environmental and Environmental Effects,* below).

~~The Board's Office of Environmental Analysis (OEA) is responsible for fulfilling the agency's responsibilities under NEPA and related environmental laws and~~OEA has prepared this ~~Draft~~Final EA to examine the potential environmental and historic impacts of UP's proposal. OEA identified two reasonable alternatives for consideration in this ~~Draft~~Final EA, one of which is UP's preferred alternative. Alternative 1, UP's preferred alternative, and Alternative 2 are discussed in detail in Chapter 2, *Proposed Action and Alternatives*. This ~~Draft~~Final EA also considers a No-Action Alternative, which would occur if the Board were to deny UP's request for construction and operation authority. Based on the information presented in this ~~Draft~~Final EA, OEA has identified Alternative 1 as OEA's environmentally preferred alternative for construction and operation of PIRATE because Alternative 1 would minimize the impacts of construction and operation on the environment.

Although the Board normally requires an Environmental Impact Statement (EIS) for rail line construction projects, 49 C.F.R. § 1105.6(a), OEA can reclassify a proposal and prepare an Environmental Assessment (EA) if the proposal is not likely to have a significant impact on the environment, 49 C.F.R. § 1105.6(d). As discussed in Section 1.3.3, *Determination to Prepare an Environmental Assessment*, OEA determined that construction and operation of UP's proposed rail line would be unlikely to result in significant environmental impacts based on design and operational information provided by UP, on feedback obtained during initial agency consultation and meetings, and on a site visit of the study area. Therefore, OEA concluded that an EA is the appropriate level of environmental documentation for the NEPA process (Appendix A, *OEA, Applicant, and Agency Correspondence*).

In July 2023, following the closure of the public comment period on the Draft EA, OEA learned that there had been significant ground disturbance and damage to archaeological resources in the area of the proposed right-of-way. In August 2023, at the request of Native American Tribes, OEA delayed issuance of the Final EA to assess the damage to archaeological sites and resolve related legal issues, as described in Section 5.1.4. Refer to Section 3.12, *Archaeological and Historic Resources*, and Section 5.1.4, *NHPA Section 110(k) Consultation*.

This chapter describes the purpose ~~of~~ and need for PIRATE and~~,~~ provides more information on the NEPA process~~., and explains how to comment on this Draft EA.~~ This Final EA incorporates changes to the analysis and information included in the Draft EA that resulted from public comments, the passage of time, and changes to the existing conditions since the Draft EA was issued. This Final EA also includes OEA's final recommended mitigation measures (MMs) for the Board to consider imposing should the Board authorize construction and operation of PIRATE.

1.2 Purpose and Need

The proposed federal action is the Board's decision to approve with appropriate conditions, or deny, UP's request for authority to construct and operate the proposed rail line. If the Board grants UP's petition, UP would be able to operate the proposed rail line as a common carrier rail line. As a common carrier, UP would be required to provide rail service to any shipper upon reasonable request. The proposed rail line is not being proposed or sponsored by the federal government. Therefore, the purpose of and need for the proposed rail line is informed by the goals of UP as the project applicant in conjunction with the Board's enabling statutes.[7]

Construction and operation of new rail lines require prior authorization by the Board, either through an application under 49 U.S.C. § 10901 or an exemption from the formal application requirements of § 10901 under § 10502. Section 10901(c) directs the Board to grant proposals to construct and operate new rail lines "unless" the Board finds the proposal "inconsistent with the public convenience and necessity." This is a permissive licensing standard that presumes rail construction projects are in the public interest unless shown otherwise.

According to UP, the purpose of the proposed rail line is to meet the transportation and logistics needs of existing and future manufacturing businesses within Mesa's Pecos Advanced Manufacturing Zone (PAMZ) and adjacent areas. Eliminating the need to truck cargo to Loup Logistics' Phoenix, Arizona, transload facility would allow and encourage businesses within the area to increase their current operations because of reduced shipping costs and potential increased shipping capacity.[8] UP states that providing direct rail access within this area would remove approximately 30,000 truck trips off public roadways in its first year of operation (Mesa 2021d~~b~~).

Over the last 30 years, MGA has redeveloped the former Williams Air Force Base (WAFB) in order to use the base's existing flight infrastructure for commercial flights for passengers and freight. With an increase in flights arriving and departing MGA, Mesa has encouraged the development of a variety of industrial and commercial uses in and adjacent to the designated flight path south of the airport. Mesa's 4,000-acre PAMZ incentivizes industrial development and manufacturing operations by streamlining approvals and permits and by providing tax benefits (Mesa 2021d~~b~~). Currently, large industrial companies in the PAMZ—such as Mitsubishi Gas Chemical, Bridgestone, Commercial Metals Company (CMC), and Fujifilm—manufacture chemicals, metals, plastics, rubber, and electrical equipment.

The Phoenix Subdivision borders the western edge of the PAMZ, but rail service currently is not available inside the zone. CMC in particular plans to expand its current industrial operation and has stated that it would benefit from common carrier rail service (UP 2022d). According to UP, the Loup Logistics rail transload facility, approximately 40 miles away to the west of downtown Phoenix, is currently the closest such facility. Therefore, the manufacturing companies in the PAMZ now must rely solely on trucking for transporting manufacturing materials and shipping

[7] The Board's enabling statutes include 49 U.S.C. § 10101, the Rail Transportation Policy provision; 49 U.S.C. § 10502, the Board's exemption provision; and 49 U.S.C. § 10901, the Board's rail construction licensing provision. Also, see *Alaska Survival v. STB*, 705 F.3d 1073, 1084-85 (9th Cir. 2013), and *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 199 (D.C. Cir. 1991).

[8] Loup Logistics is a wholly owned subsidiary of UP (PR Newswire 2022).

final products. UP states that over 6,100 trucks travel to and from the PAMZ monthly, carrying materials such as heavy recycled steel, recycled rubber, and hazardous chemicals. This includes over 400 trucks per month that travel over 80 miles round trip to and from Loup Logistics' Phoenix transload facility (Mesa 2021d~~b~~). In addition, UP indicates that many of the trucks carry hazardous materials and must travel on local streets before reaching a highway and heading toward their destinations.

Even without direct rail access, UP states that substantial investment in heavy industry has occurred and continues to occur near the project vicinity. Mesa anticipates future industrial and manufacturing growth in the PAMZ and adjacent areas due to the existing heavy industrial land uses and supporting infrastructure, current zoning designations, and the presence of adjacent undeveloped land. In addition to current heavy industrial and manufacturing uses, the PAMZ and adjacent areas have approximately ~~3,000~~1,000 acres of vacant land available for future development (Mesa 2021b~~d~~).

1.3 NEPA Process

In conducting its environmental analysis, OEA reviewed UP's petition for exemption, correspondence, and responses to OEA's information requests to identify potential environmental impacts from the construction and operation of PIRATE. OEA considered applicable federal statutes, regulations, and EOs and consulted with appropriate federal, state, and local agencies, as well as Native American Tribes, to inform them of the proposed project and to solicit comments that would aid OEA in its preparation of this ~~Draft~~Final EA. Chapter 5, *Consultation and Coordination,* provides additional details regarding OEA's agency and tribal consultation and public involvement efforts.

OEA has engaged an independent third-party contractor (Jacobs Engineering Group Inc. [Jacobs]) to assist with the environmental analysis and help with the preparation of the EA for PIRATE. The Board's, and CEQ's pre-recission, environmental rules permit the use of agency-approved, independent third-party contractors (49 C.F.R. § 1105.10[d] and 40 C.F.R. § 1506.5, respectively). The independent third-party contractor works under OEA's sole supervision, direction, and control to assist OEA in conducting independent environmental analysis; developing appropriate environmental approaches, documentation, and mitigation options; and verifying the environmental information provided by the railroad seeking authority, consulting agencies, and all other interested parties and members of the general public.

~~OEA is issuing this Draft EA for public review and comment. After a 30-day public comment period,~~ In preparing this Final EA, OEA ~~will~~ considered all public and agency comments received on the~~is~~ Draft EA; consulted further with appropriate agencies, Native American Tribes, concerned parties, and communities; and conducted additional environmental analysis as necessary.

~~OEA will then prepare a~~ This Final EA ~~that~~ includes responses~~ds~~ to all comments received~~,~~ and provides OEA's final environmental analysis and final recommended environmental mitigation, including both UP's voluntary mitigation (VM) and recommended MMs developed by OEA. The Board will consider the entire environmental record, including the Draft EA, this Final EA, all public and agency comments, and OEA's final environmental recommendations, when it makes its final decision on whether to authorize the construction and operation of PIRATE.

1.3.1 Lead Agency

The Board, through OEA, is the lead agency responsible for preparing this ~~Draft~~Final EA to identify and evaluate the potential environmental and historic impacts associated with the proposed rail line and reasonable and feasible alternatives. OEA is the office within the Board responsible for carrying out the Board's responsibilities under NEPA, Section 106 of the NHPA, and related environmental laws.

1.3.2 Other Consultation

In preparing the~~is Draft~~ EA, OEA consulted with the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (Corps), Advisory Council on Historic Preservation (ACHP), the Natural Resources Conservation Service (NRCS), U.S. Air Force (USAF), Arizona State Land Department (ASLD), Flood Control District of Maricopa County (FCDMC), MGA, Federal Aviation Administration (FAA), Arizona State Historic Preservation Office (SHPO), and other appropriate federal, state, and local agencies, as well as Native American Tribes, regarding the proposed rail line.

During ~~Draft~~ EA preparation, OEA consulted with the 11 federally recognized Native American Tribes that may have current or historical interest in the area of potential effects (APE). OEA formally invited those Native American Tribes to participate in the consultation process under Section 106 of the NHPA, government-to-government consultation, or both. The Gila River Indian Community, Hopi Tribe, and Pascua Yaqui Tribe requested government-to-government consultation with OEA. Pascua Yaqui deferred government-to-government consultation to the Gila River Indian Community. OEA met with the Salt River Pima-Maricopa Indian Community in January 2023 and with the Gila River Indian Community in April 2023.

OEA continued its Section 106 consultation process and ongoing tribal consultation after publication of the Draft EA. After May 2023, OEA continued Section 106 consultation by distributing an addendum to the Class III survey report for unsurveyed areas and a revised draft Memorandum of Agreement (MOA) to consulting parties. OEA also initiated additional outreach to Native American Tribes, including letters in June 2023 requesting government-to-government meetings regarding Traditional Cultural Places (TCPs) within the APE. The Section 106 consulting parties were involved throughout the Section 106 process, which ended with the execution of the MOA on February 23, 2026.

~~OEA will continue to consult with agencies and Native American Tribes to discuss issues or concerns they may have regarding the project and address substantive responses to the Draft EA.~~ Refer to Chapter 5, *Consultation and Coordination*, for more detailed information on OEA's agency outreach.

1.3.3 Determination to Prepare an Environmental Assessment

Under 49 C.F.R. § 1105.6(a), an EIS is normally required for rail construction proposals. However, 49 C.F.R. § 1105.6(d) states than an applicant can request that the Board reclassify a rail construction project to prepare an EA instead of an EIS if the proposal is not likely to result in significant environmental impacts. On March 24, 2022, UP requested that the Board waive the EIS requirement of 49 C.F.R. § 1105.6(a) and prepare an EA because construction and operation of PIRATE would be unlikely to result in significant environmental impacts. After conducting a site visit; consulting with federal, state, and local agencies; and reviewing UP's

request for a waiver of 49 C.F.R. § 1105.6(a), OEA agreed that preparation of an EA ~~is~~ was the appropriate level of NEPA documentation for this proposal by letter dated April 21, 2022.

Appendix A, *OEA, Applicant, and Agency Correspondence*, includes UP's request for reclassification and OEA's grant of UP's EIS waiver request.

1.3.4 Draft Environmental Assessment

As noted above, OEA issued the Draft EA on May 31, 2023, and held a 30-day comment period. The Draft EA analyzed the potential environmental and historic impacts that could result from construction and operation of the proposed rail line and included OEA's preliminary recommendations for environmental mitigation, including UP's proposed VMs. OEA received comments from 10 individual commenters, including individuals, local agencies, state agencies, and businesses. OEA responded to the substantive comments received in Appendix M, *Draft EA Comments and Responses*, and made corresponding changes to the Draft EA in this Final EA where appropriate. When a comment resulted in a substantive revision to the Draft EA text (an addition, deletion, correction, etc.), the change in this Final EA is indicated in blue, underlined text for new language added and red, strikethrough text for deleted language. Minor revisions and corrections, such as those to correct misspellings, punctuation, or acronym use, are not shown as new or deleted text.

1.3.5 Final Environmental Assessment

After issuance of the Draft EA, OEA then prepared this Final EA, which includes updates to the analysis, responds to comments on the Draft EA, and sets forth OEA's final recommended MMs. Issuance of the Final EA completes the environmental review in this proceeding. The Board will now consider the entire environmental record, including the Draft EA, the Final EA, all comments received, and OEA's final recommended mitigation in making its final decision on whether to authorize PIRATE.

~~1.4 Request for Comments~~

This ~~Draft~~Final EA is available for viewing and downloading on the Board's website (www.stb.gov) by clicking "Search STB Records" near the top of the home page and then searching for "Decisions" using Docket Number "FD 36501." If you require an accommodation under the Americans with Disabilities Act, please call (202) 245-0245.~~An interactive StoryMap of the environmental review is also available at the Board's Railroad Map Depot at (Bit.ly/3pNXz9s).~~ In addition, a physical copy of the ~~Draft~~Final EA is available at the local government offices and libraries identified in Table 1-1, which includes address, telephone number, website, and operating hours for each location.

Table 1-1. ~~Draft EA~~Final EA hard copy locations

City of Mesa
City of Mesa Planning Division 55 North Center Street, Mesa, AZ 85201 (480) 644-2385 https://www.mesaaz.gov/business/development-services/planning Monday through Thursday: 7:00 a.m. to 6:00 p.m.
Mesa Public Library - Main Library 64 East 1st Street, Mesa, AZ 85201 (480) 644-3100 https://www.mesalibrary.org/ Monday through Thursday: 10:00 a.m. to 8:00 p.m.; Friday and Saturday: 10:00 a.m. to 5:00 p.m.
Mesa Public Library - Red Mountain Branch 635 North Power Road, Mesa, AZ 85205 (480) 644-3100 https://www.mesalibrary.org/about/hours-and-locations/red-mountain-library Monday through Thursday: 10:00 a.m. to 8:00 p.m.; Friday and Saturday: 10:00 a.m. to 5:00 p.m.
Town of Gilbert
Town of Gilbert Planning Division 90 East Civic Center Drive, Gilbert, AZ 85296 (480) 503-6700 https://www.gilbertaz.gov/departments/development-services/planning Monday through Thursday: 7:00 a.m. to 6:00 p.m. A copy of the Draft EA for review can be requested at the Planning Division front desk.
Perry Library 1965 East Queen Creek Road, Gilbert, AZ 85297 (602) 652-3000 https://mcldaz.org/locations/perry/ Monday through Thursday: 10:00 a.m. to 7:00 p.m.; Friday and Saturday: 10:00 a.m. to 4:00 p.m.
Southeast Regional Library 775 North Greenfield Road, Gilbert, AZ 85234 (602) 652-3000 https://mcldaz.org/locations/southeast/ Monday through Thursday: 10:00 a.m. to 9:00 p.m.; Friday and Saturday: 10:00 a.m. to 5:00 p.m.; Sunday: 1:00 to 5:00 p.m.
Town of Queen Creek
Town of Queen Creek Planning Division 22358 South Ellsworth Road, Queen Creek, AZ 85142 (480) 358-3000 https://www.queencreekaz.gov/government/development-services/planning-and-zoning Monday through Thursday: 7:00 a.m. to 6:00 p.m.

Queen Creek Library 21802 South Ellsworth Road, Queen Creek, AZ 85142 (602) 652-3000 https://mcldaz.org/locations/queencreek/ Monday through Thursday: 9:00 a.m. to 8:00 p.m.; Friday and Saturday: 9:00 a.m. to 5:00 p.m.

~~OEA requests and encourages the public and all interested parties to submit environmental comments on all aspects of this Draft EA. OEA encourages commenters to be as specific as possible and substantiate concerns and recommendations when submitting comments.~~

~~Comments on this Draft EA may be submitted electronically through the Board's website at www.stb.gov by clicking on the "E-Filing" link on the left side of the home page and then selecting "Environmental Comments." Brief comments may be typed within the comment field provided or you may attach longer comments as a separate file. Alternatively, comments on this Draft EA may be mailed to:~~

~~Adam Assenza~~
~~Surface Transportation Board~~
~~Environmental Filing, Docket No. FD 36501~~
~~c/o Sabra McNeish, Jacobs Engineering Group Inc.~~
~~1501 West Fountainhead Parkway, Suite 401~~
~~Tempe, AZ 85282~~

~~It is not necessary to mail written comments that have been filed electronically. Please refer to Docket No. FD 36501 in all correspondence addressed to the Board, including all comments submitted on the Draft EA.~~

~~All comments on the Draft EA must be submitted within the 30-day comment period, which will close on **June 30, 2023**. Written comments on this Draft EA must be postmarked by **June 30, 2023**. Electronically filed comments must be received by **June 30, 2023**. For additional information about this project, please contact Adam Assenza of OEA at (202) 245-0301 or adam.assenza@stb.gov. If you require an accommodation under the Americans with Disabilities Act, please call (202) 245-0245.~~

~~Following the close of the comment period on the Draft EA on **June 30, 2023**, OEA will issue a Final EA that will consider and respond to all substantive comments received on the Draft EA and will set forth OEA's final recommendations on alternatives and environmental mitigation. The Board will then issue a decision based on the entire record, including the Draft and Final EAs, the information presented to the Board on the transportation merits, and all public and agency filings and comments in the public record for this proceeding. If the Board decides to authorize PIRATE, the Board will impose appropriate conditions, including environmental conditions, upon UP as part of that decision.~~

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Chapter 2
Proposed Action and Alternatives

This chapter describes UP's proposed action, the process for developing alternatives, and the final range of reasonable alternatives that OEA carried forward for evaluation in this ~~Draft~~ EA. As discussed in the following sections, this ~~Draft~~ EA evaluates Alternative 1 (UP's preferred alignment) and Alternative 2 (collectively, the Action Alternatives). OEA also evaluates the No-Action Alternative, which would occur if the Board were to deny UP's request for Board authority to construct and operate PIRATE.

2.1 Proposed Action

As noted in Section 1.2, *Purpose and Need*, the proposed action before the Board is the petition for authority to construct and operate PIRATE. According to UP, the purpose of PIRATE is to transport raw materials and commercial freight. The proposed action includes construction and operation of approximately 6.0 miles of new single-track rail line from the Phoenix Subdivision to industrial companies at the eastern end of the PAMZ. The proposed rail line also includes a new wye to connect PIRATE to the existing Phoenix Subdivision.[9]

Along the existing Phoenix Subdivision, two new "support tracks" (siding and working track) are planned between Power Road and Ellsworth Road.[10] The existing Germann Siding, which parallels the main line track to the southwest for 1.6 miles north of Ellsworth Road, would be extended about 1.4 miles northwest toward the new wye.[11] Southeast of Sossaman Road, a new 1.1-mile-long working track would be constructed paralleling the existing Phoenix Subdivision to the northeast. Figure 2-1 shows the relative locations of the proposed rail line and the planned Phoenix Subdivision support tracks. Finally, UP would build and operate a 3,500-foot-long PIRATE yard with 2 to 5 yard tracks.

Under 49 U.S.C. § 10906, Board authorization is not required for construction, acquisition, operation, abandonment, or discontinuance of ancillary industrial switching, yard, or sidetrack. Railroads also have the right to increase efficiency by improving their rail lines and rerouting their traffic without seeking authority from the Board. Therefore, railroad capital improvements that are designed to improve operational efficiency (such as adding support tracks, including sidings, double-track, working track, and industry track) typically do not require Board authorization or environmental review by OEA. However, where, as here, planned support track additions and modifications are an integral part of the project and OEA has the information needed to include the planned improvements in its environmental review, OEA considers, as appropriate, the potential environmental impacts from such planned capital improvements on a case-by-case basis.

[9] "Wye" refers to the Y-like formation created where two sets of tracks branch off of one line to connect to another line in different directions. The wye creates a triangle that can be used for turning locomotives or trains.

[10] "Working track" refers to a section of track, separate from the main line track, where cars can be "set out" by one train and "picked up" by another train.

[11] "Siding" refers to a low-speed section of track, separate from the main line track, that is used to store railway vehicles or to allow trains to pass on the same line.

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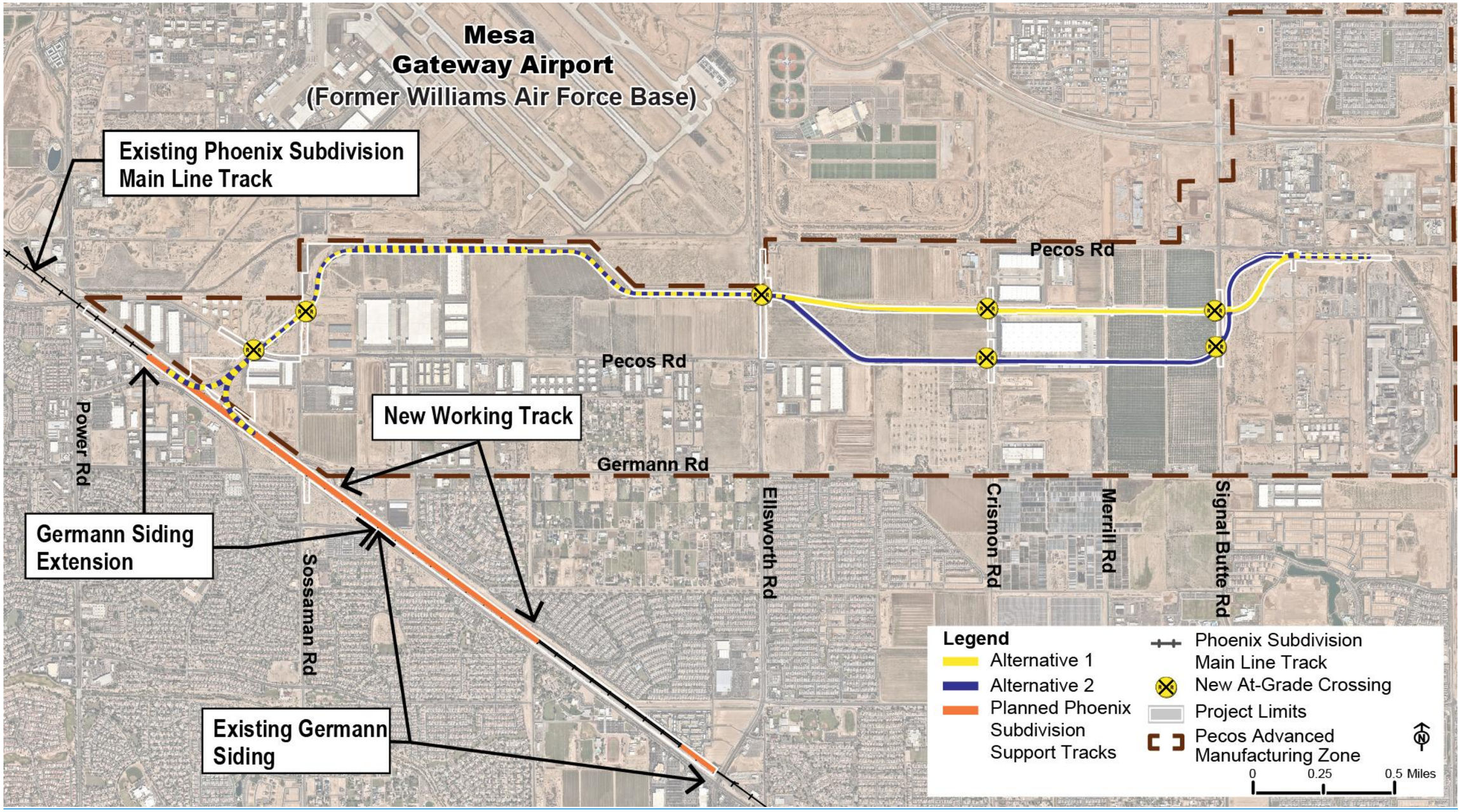
Figure 2-1. PIRATE and the Phoenix Subdivision



Note: This graphic was revised in the Final EA.

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In this case, UP has stated that the planned PIRATE yard tracks and Phoenix Subdivision support tracks are necessary to accommodate the projected rail traffic on the proposed line, and UP has sufficiently developed the location, general layout, and engineering and design to support an environmental review. Moreover, the environmental impacts of the planned support tracks are largely similar to the impacts of the proposed rail line. Therefore, OEA has assessed the potential impacts of the planned support tracks as part of this ~~Draft~~ EA.

In this ~~Draft~~ EA, the terms "PIRATE" and "proposed rail line" are used interchangeably to refer to the approximately 6.0 miles of new rail line, including the wye, between the Phoenix Subdivision and the eastern end of the PAMZ. Alternatives 1 and 2 are the two potential PIRATE routes that require Board approval. The term "project" refers to both the proposed rail line and the planned Phoenix Subdivision support tracks.

2.2 Alternatives

This section discusses OEA's alternatives development process including routes that were considered but not carried forward for detailed analysis, and the final set of reasonable alternatives that OEA carried forward for detailed review. While developing the range of reasonable alternatives, OEA considered UP's project plans at various stages of design: early conceptual drawings and plans from the 10 percent, 25 percent, 30 percent, and 60 percent stages of design. OEA also considered additional design information provided by UP in response to OEA's information requests.

2.2.1 Alternatives Development

NEPA implementing regulations (40 C.F.R. Parts 1500–1508) required that federal agencies consider reasonable alternatives to the proposed action, including a No-Action Alternative. A reasonable alternative must meet the project's purpose and need and must be logistically feasible and practical to implement. In railroad construction projects, OEA typically determines the range of reasonable alternatives by first developing a list of conceptual routes. OEA then considers those potential alternatives in consultation with appropriate agencies, other stakeholders, and the public. In determining whether an alternative is reasonable, OEA considers the totality of circumstances for each potential alternative, including the following:

- **Logistical constraints**. Some potential alternatives may not be logistically feasible because of topography, existing land uses, or design features that would be impossible or impractical to construct or operate safely.
- **Length of the rail line**. Longer rail lines are more expensive to construct and operate and are likely to result in more environmental impacts than shorter rail lines. A conceptual route that is substantially longer than other potential alternatives may not be reasonable under NEPA if it does not offer potential benefits, such as less environmental impacts, improved operational safety, or increased economic efficiency compared to other potential alternatives.
- **Construction and operation costs**. Some potential alternatives would be prohibitively expensive to construct or operate and as a result may not be reasonable or feasible enough to warrant further analysis.

OEA considered the totality of these circumstances, including agency comments received during initial consultation, for each potential alternative. In addition, OEA considered information

provided by UP regarding design criteria and potential alignment constraints to develop a reasonable range of alternatives. For example, UP explained that any proposed route must meet UP design standards and cross public roads at a 90-degree angle, or as close to a 90-degree angle as possible (UP 2022a).

UP provided OEA with three potential alignments in its design plans, all of which ran west-east through the northern half of the PAMZ between the existing Phoenix Subdivision and CMC. UP developed these alignments primarily based on real estate availability and, as discussed in the next section, the information UP provided was integrated into OEA's Level 2 screening summary. OEA then conducted an independent review of the information UP provided to develop potential alternatives for evaluation in this ~~Draft~~ EA. The following sections summarize OEA's screening methodology for determining a range of reasonable alternatives.

2.2.1.1 Level 1 Screening

OEA based the first alternatives screening on alternatives that would meet UP's purpose and need which, according to UP, is to meet the transportation and logistics needs of existing and future manufacturing businesses within the PAMZ and adjacent areas. In particular, the proposed rail line must serve the needs of CMC's planned expansion and desire for rail service at the eastern end of the PAMZ. Therefore, any potential alternative alignment must terminate in the PAMZ and serve CMC to meet the project's purpose and need.

OEA considered conceptual alignments that would connect to the industrial area within the PAMZ from each direction and ultimately determined that alignments from the east, north, or south are logistically infeasible or unreasonable to construct or operate. Lands to the ~~east,~~ north~~,~~ and south of the PAMZ are not zoned for industrial purposes, and an alignment from the north or south would be infeasible because of land use constraints from existing residential development. Furthermore, the Superstition Mountains and the Central Arizona Project canal present terrain challenges and physical obstacles that would prevent feasible or cost-effective construction of an alignment to the PAMZ from the east. MGA and associated runway protection zones present similar constraints to the north of the PAMZ (refer to Figure 2-2).

After OEA issued the Draft EA in May 2023, the Town of Queen Creek (Queen Creek) began construction on an LG Energy Solutions battery plant on Ironwood Drive east of the PAMZ. This new development, which extends over 1 mile along Ironwood Drive, would further limit the feasibility of an alignment to the PAMZ from the east because an eastern alignment would either be physically constrained by the new buildings and appurtenances or would displace a business and newly built infrastructure.

Two of UP's earliest concepts and its 10 percent design showed the proposed rail line extending east past the PAMZ to Ironwood Road (March 2020 concept) and to Meridian Road at the eastern edge of the PAMZ (July 2020 concept and the August 2020, 10 percent plans). UP indicated that with this design, PIRATE could potentially serve additional customers east of CMC and outside of the PAMZ. UP subsequently shifted the proposed eastern terminus of the proposed rail line about 1,800 feet west to CMC because it determined that industrial development was not likely east of the PAMZ (UP 2022b).

In addition, areas east of the PAMZ do not have any existing rail infrastructure to accommodate an efficient or cost-effective connection to the Phoenix Subdivision or any other main line. A primary purpose of the proposed rail line is to eliminate the need to truck cargo to Loup

Logistics' Phoenix transload facility. A route that would access the eastern end of the PAMZ from the east, north, or south would not address this need because it would not connect to a main line that reaches Phoenix. Were a route to access the PAMZ from the east, north, or south, the route would still need to continue west to connect to the Phoenix Subdivision, requiring substantially more track than starting the proposed rail line at the Phoenix Subdivision and resulting in a circuitous route. Because such alignments do not meet the project's purpose and need and, given their drawbacks, would be unreasonable to construct or operate, OEA did not analyze them in detail in this ~~Draft~~ EA.

Based on the Level 1 screening, OEA determined that potential alternatives would need to access the PAMZ from the west because the terrain, land use, zoning, and infrastructure render approaches from the other directions infeasible. Starting the PIRATE alignment at the Phoenix Subdivision would allow UP to use the closest existing rail infrastructure to best meet the project's purpose and need. Accordingly, as explained in the next section, OEA's Level 2 screening evaluated potential alignments into the PAMZ from the west.

2.2.1.2 Level 2 Screening

As part of the Level 2 screening, OEA evaluated potential west-to-east alignments across the PAMZ to reach CMC. This screening was informed by UP's conceptual drawings, design plans, and supplemental information and by OEA's independent evaluation of UP's materials. Figure 2-3 shows the various constraints OEA considered.

OEA considered land ownership and existing land use within and adjacent to the PAMZ in identifying reasonable and feasible alignments. In particular, based upon input provided by EPA in January 2022, OEA determined that the wye and western segment of the alignment could not cross the boundaries of the former WAFB, a National Priorities List (NPL) (Superfund) site subject to ongoing remediation by USAF, EPA, and the Arizona Department of Environmental Quality (ADEQ). In addition, the alignment could not cross two sites in the southwestern portion of the former WAFB adjacent to the PAMZ: (1) a former solid waste landfill and (2) the Parcel N Debris Area, a site where several small disposal pits of munitions debris, explosives, and small amounts of chemical warfare materials were discovered during remediation activities. As part of the planned redevelopment efforts in this portion of the former WAFB, these two sites will be transferred after remediation is complete to the Bureau of Indian Affairs to hold in trust for the Gila River Indian Community.

Most of the southern half of the PAMZ (between the southern Pecos Road alignment and Germann Road) involves agriculture, commercial, or industrial uses and is rapidly developing with light industrial and warehouse parcels (refer to Figure 2-3). However, an existing large-lot residential area (Queens Park neighborhood) is located in between 85th Place and 88th Street, north of Germann Road, with commercial and institutional properties filling the space between Woodland Avenue and Pecos Road. Therefore, any alignment across the southern half of the PAMZ would result in either residential or business and institutional displacements.

OEA's analysis showed that avoiding this neighborhood by placing an alignment between Woodland Avenue and Pecos Road would still result in noise and socioeconomic impacts to the neighborhood along with business and institutional displacements. However, keeping the alignment north of Pecos Road would avoid these impacts and reduce the length of the proposed rail line.

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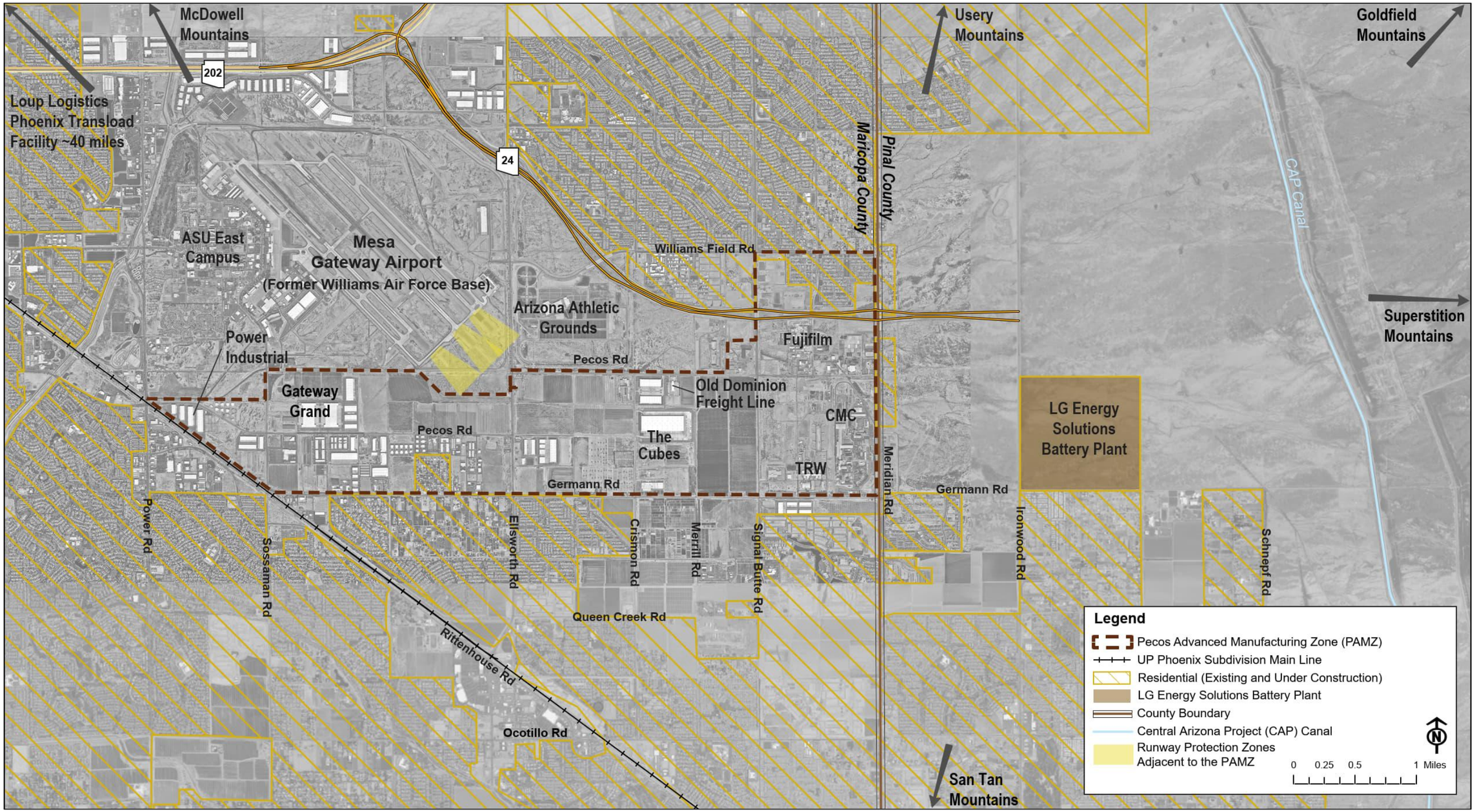
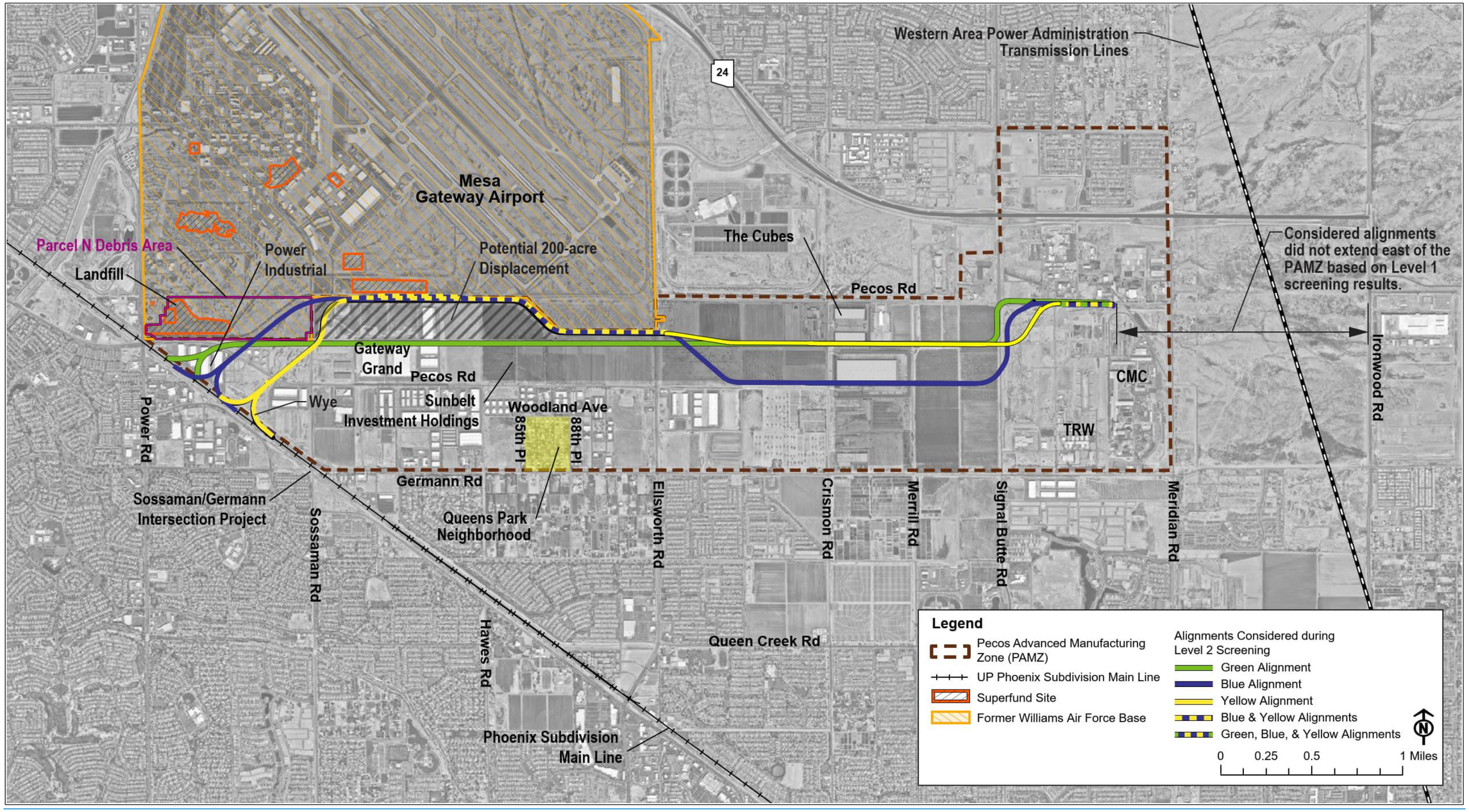
Figure 2-2. Level 1 screening constraints



Note: This graphic was revised in the Final EA.

Figure 2-3. Level 2 screening constraints and alignments considered



Note: This graphic was revised in the Final EA.

Also, OEA determined that the wye could not be located adjacent to the southern edge of the PAMZ because Queen Creek requested that the project not conflict with its future plans to connect Germann Road east and west of Sossaman Road and its 2025 reconfiguration~~e~~ of the existing intersection of Germann and Sossaman Roads. Based on existing land use constraints north of the PAMZ and in the southern half of the PAMZ, OEA determined that feasible and reasonable alternatives must traverse the northern half of the PAMZ. Therefore, OEA considered the three possible alignments in the northern half of the PAMZ shown on Figure 2-3:

1. Green Alignment, an alignment generally equidistant between the two Pecos Roads.
2. Blue Alignment, bordering MGA west of Ellsworth Road and overlapping Willis Road east of Ellsworth Road before continuing generally equidistant between Pecos and Germann Roads ~~east of Ellsworth Road~~.
3. Yellow Alignment, also bordering MGA west of Ellsworth Road and equidistant between the two Pecos Roads east of Ellsworth Road.

Since OEA issued the Draft EA in May 2023, Mesa paved a segment of Willis Road east of Ellsworth Road and now the Blue Alignment overlaps about 380 feet of the paved segment. ~~None of these possible alignments~~Neither the Green Alignment nor Yellow Alignment run alongside existing roads (until after the easternmost public road crossing at Signal Butte Road) because the required railroad crossings would interfere with the safety, operations, and performance of existing intersections. For example, none of the alignments abut Pecos Road west of Ellsworth Road because the railroad crossing of Ellsworth Road would adversely affect the Pecos Road (south) and Ellsworth Road intersection.

The first alignment OEA considered in its Level 2 screening, shown as the Green Alignment on Figure 2-3, is based on an early UP conceptual drawing from December 2018. OEA found this alignment to be infeasible and unreasonable because access to the privately owned land between the USAF and MGA parcels would be cut off by PIRATE. Eliminating access would render that land unusable by the owners and would be considered a displacement of over 200 acres (refer to Figure 2-3). Since OEA issued the Draft EA in May 2023, multiple commercial buildings and warehouses have been constructed within the Green Alignment west and east of Sossaman Road, which further limits the feasibility of this alignment. The Green Alignment would conflict with these new developments because it would either be physically constrained by the new buildings and appurtenances or would displace multiple businesses and newly built infrastructure. The second and third alignments OEA considered border MGA west of Ellsworth Road to avoid these land use and ownership impacts.

Specifically, the second alignment OEA considered in its Level 2 screening, shown as the Blue Alignment on Figure 2-3, is based on UP's 10 percent design that would route the proposed rail line through the center of the PAMZ from Ellsworth Road to Signal Butte Road. According to UP, landowners of parcels that border Pecos Road east of Ellsworth Road requested that UP run the alignment along the southern edge of their properties to avoid bisecting their parcels.

Since OEA issued the Draft EA in May 2023, about 0.5 mile of Willis Road has been constructed and paved east of Ellsworth Road, and The Cubes at Mesa Gateway (The Cubes), a large warehouse development, has been constructed east of Crismon Road. Portions of both of these developments are within the Blue Alignment and, therefore, further limit the feasibility of this alignment. The Blue Alignment would conflict with these new developments because it

would either be physically constrained by the new roadway, buildings, and appurtenances, or would displace part of Mesa's roadway, multiple businesses, and newly built infrastructure.

The third potential alignment OEA considered, shown as the Yellow Alignment on Figure 2-3, reflects subsequent landowner requests that UP incorporated into the 25 percent design and retained in its 30 and 60 percent designs. Specifically, Sunbelt Investment Holdings, which owns about ~~240~~205 acres west of Ellsworth Road and about ~~310~~265 acres between Ellsworth and Crismon Roads, requested that UP shift the alignment 0.25 mile north to bisect its acreage and allow for more potential rail users in the future. UP also previously consulted with TRW Vehicle Safety Systems (TRW), a manufacturer within the industrial area, to develop an alignment east of Signal Butte Road that would be compatible with TRW's ~~proposed~~planned land development and with the proposed connection to CMC. UP also coordinated with The Cubes, which is developing about ~~260~~270 acres between Crismon and Merrill Roads for industrial and commercial use, to get feedback from The Cubes on the 0.25-mile shift.

Based on the existing conditions in 2022 when OEA conducted the Level 2 screening, OEA selected the Blue and Yellow Alignments to carry forward for Level 3 screening.

2.2.1.3 Level 3 Screening

The Level 3 screening focused on refining the Blue and Yellow Alignments from the Level 2 screening to identify alternatives to carry forward for detailed environmental review in the ~~Draft~~ EA. To do so, OEA conducted an independent review of additional alignment information provided by UP between August 2021 and February 2022.

West of Ellsworth Road, the Blue Alignment crosses MGA and future Gila River Indian Community land while the Yellow Alignment shifts the wye to the south to avoid these impacts. Therefore, OEA determined that the reasonable alternatives carried forward should share a common route alignment west of Ellsworth Road, as would be the case under the Yellow Alignment. East of Ellsworth Road, both alignments met OEA's avoidance and design criteria and addressed landowner concerns in 2022. Therefore, OEA determined that both the Yellow and Blue Alignments east of Ellsworth Road should be carried forward as reasonable alternatives. OEA determined that, in 2022, these two alignments were~~are~~ responsive to known landowner concerns, avoided conflicts with existing or known future planned development, and avoided private land that is not available for acquisition. Sharing a common alignment west of Ellsworth Road, Alternative 1 follows a northern alignment east of Ellsworth Road, like the Yellow Alignment on Figure 2-3, while Alternative 2 follows a southern alignment east of Ellsworth Road, like the Blue Alignment on Figure 2-3. Thus, these two alignments are the basis for Alternatives 1 and 2, as evaluated in this ~~Draft~~ EA.

Alternatives 1 and 2 were presented at the agency coordination meetings in March 2022 and in subsequent meetings. During that coordination, OEA consulted with 27 agencies and none of the agencies suggested any new alternatives or modifications to Alternative 1 and Alternative 2. However, the feedback and information OEA received from agencies was used to evaluate the potential impacts of Alternative 1 and Alternative 2 and to identify recommended environmental MMs for this ~~Draft~~ EA. Refer to Chapter 5, *Consultation and Coordination*, for a summary of the agency outreach OEA has conducted to date.

2.2.1.4 Alternatives Analyzed in the ~~Draft~~ EA

The next sections describe the two Action Alternatives (Alternative 1 and Alternative 2), the No-Action Alternative, and the planned Phoenix Subdivision support tracks. Sections 2.2.3, 2.2.4, and 2.3 include additional details concerning project features and overview maps showing those features.

2.2.2 No-Action Alternative

If the Board denies UP's request for authority to construct and operate PIRATE, then UP would not construct and operate the proposed rail line or construct the planned Phoenix Subdivision support tracks. Instead, current and future businesses in the PAMZ would continue to receive raw materials and ship finished products by truck.

2.2.3 Alternative 1

As shown on Figures 2-4 and 2-5, Alternative 1 would extend the proposed rail line approximately 5.7 miles east from a new wye at the Phoenix Subdivision. The proposed rail line would initially proceed northeast toward the boundary between the PAMZ and MGA, where UP would operate the 3,500-foot-long PIRATE yard with 2 to 5 yard tracks in addition to the proposed rail line. The PIRATE yard would house rail cars, locomotives, and/or trains waiting to move back on the proposed rail line or on the Phoenix Subdivision.

East of the Ellsworth Road crossing, Alternative 1 would depart from the northern PAMZ boundary and continue due east toward the existing industrial development in the PAMZ. Between Crismon Road and Signal Butte Road, UP would construct a 5,100-foot-long run-around track south of the proposed rail line. The run-around track would allow UP to change directions by shifting a train off the proposed rail line and moving the locomotive from one end of the train to the other.

East of the Signal Butte Road crossing, the alignment would turn northeast toward Fujifilm and Pecos Road and then continue east until its terminus near CMC. UP would also grade within the PIRATE right-of-way to prepare for ~~two~~a segment~~s~~ of connecting track to be laid in the future to connect ~~Fujifilm and~~ CMC to the proposed rail line.[12] UP would only grade within the PIRATE right-of-way where ~~the~~a future turnout and 300-foot-long segment~~s~~ of connecting track to CMC would begin to depart from the proposed rail line (UP 2025a). ~~: about 650 feet of the track connecting to Fujifilm and about 300 feet of the track connecting to CMC.~~ Future construction and operation by ~~Fujifilm or~~ CMC of ~~these~~this segment~~s~~ of connecting track would be outside of the PIRATE right-of-way. Therefore, ~~these~~this segment~~s~~ of connecting track outside of the PIRATE right-of-way ~~are~~is not part of the action proposed by UP or evaluated as part of PIRATE. As noted, OEA is including ~~these~~this future action~~s~~ as part of the cumulative impacts analysis in this ~~Draft~~ EA. Refer to Section 3.13, *Cumulative Impacts*.

[12] In October 2025, UP indicated that it no longer plans to grade for a future connection to Fujifilm (UP 2025a). Therefore, references to grading for a future connection to Fujifilm have been removed from this Final EA.

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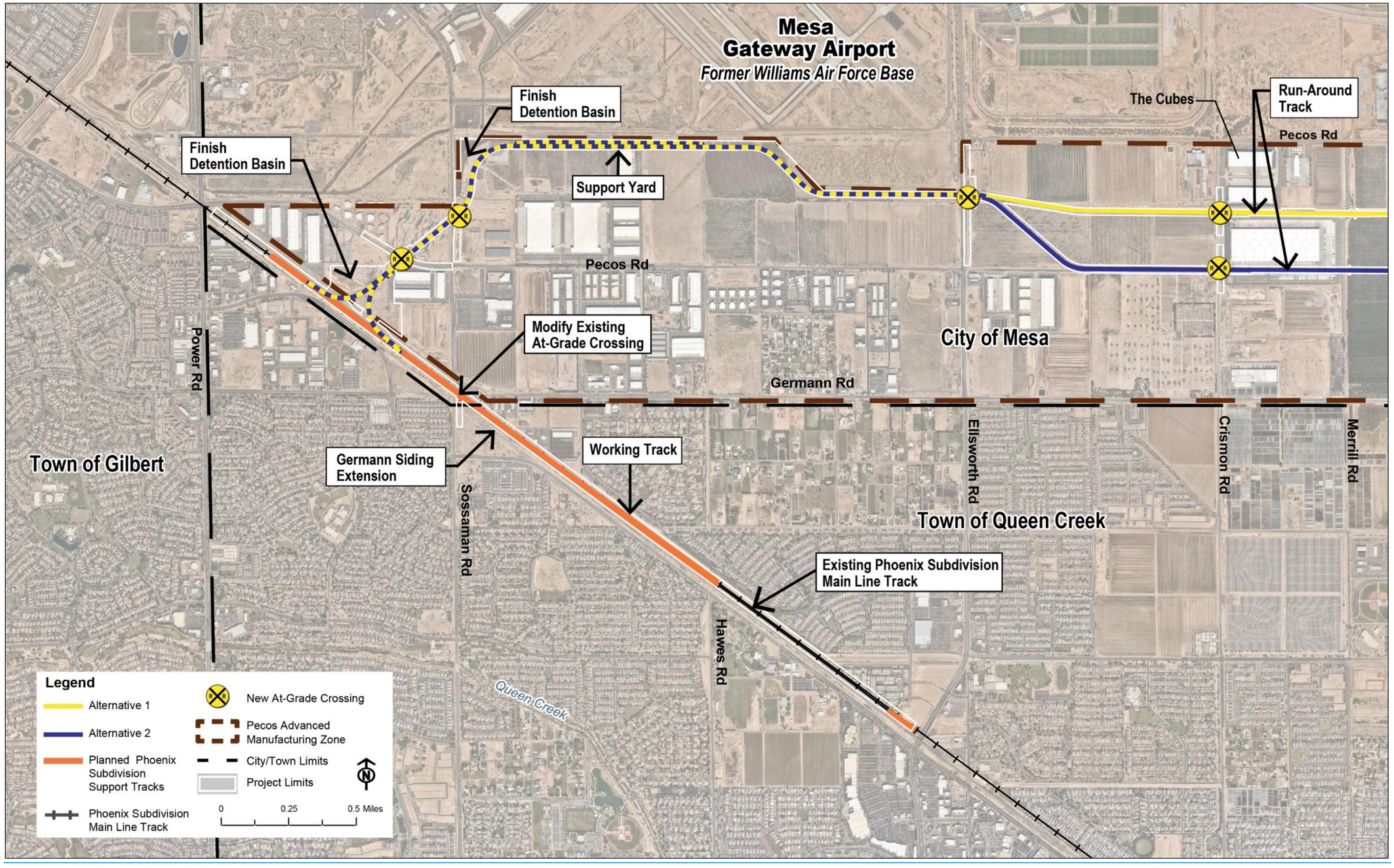
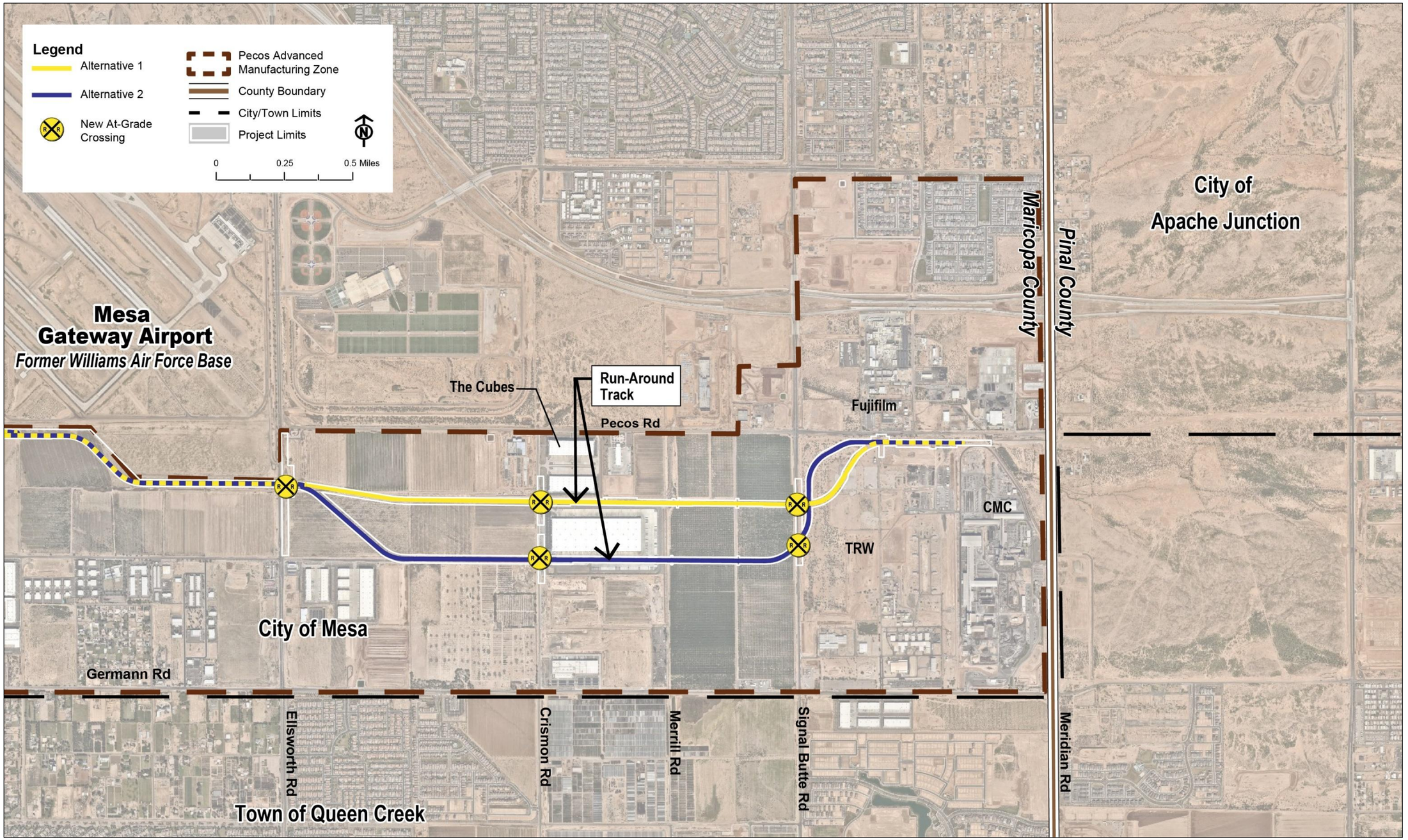
Figure 2-4. Alternatives 1 and 2 (west)



Note: This graphic was revised in the Final EA.

Figure 2-5. Alternatives 1 and 2 (east)



Note: This graphic was revised in the Final EA.

2.2.4 Alternative 2

Alternative 2, with a length of approximately 6.0 miles, would be identical to Alternative 1 between the wye and Ellsworth Road, including the PIRATE yard and 2 to 5 yard tracks. Between Ellsworth Road and Signal Butte Road, Alternative 2 would follow an east-west alignment about 0.25 mile south of Alternative 1 and would also include a run-around track west of Signal Butte Road. Alternative 2 would turn northeast near Signal Butte Road to head toward Fujifilm and Pecos Road and then continue east until its terminus near CMC (refer to Figures 2-4 and 2-5).

As in Alternative 1, UP would also grade within the PIRATE right-of-way to prepare for ~~two~~a segment~~s~~ of connecting track to be laid in the future to connect ~~Fujifilm and~~ CMC to the proposed rail line. UP would only grade within the PIRATE right-of-way where ~~the~~a future turnout and 300-foot-long segment~~s~~ of connecting track to CMC would begin to depart from the proposed rail line (UP 2025a)~~: about 400 feet of the track connecting to Fujifilm and about 300 feet of the track connecting to CMC.~~ Future construction and operation by ~~Fujifilm or~~ CMC of ~~these~~this segment~~s~~ of connecting track would be outside of the PIRATE right-of-way. Therefore, ~~these~~this segment~~s~~ of connecting track outside of the PIRATE right-of-way ~~are~~is not part of the action proposed by UP or evaluated as part of PIRATE. As noted, OEA is including ~~these~~this future action~~s~~ as part of the cumulative impacts analysis in this ~~Draft~~ EA. Refer to Section 3.13, *Cumulative Impacts*.

2.3 Phoenix Subdivision Support Tracks

In addition to PIRATE, UP would also construct and operate additional features along the Phoenix Subdivision, including two planned support tracks (siding and working track) totaling about 2.5 miles long and associated drainage ditches. As stated previously, track upgrades and additions such as these do not require a railroad to seek Board approval and do not trigger the need for an environmental review. However, because UP stated that these planned support tracks would be necessary to accommodate increased rail traffic associated with the construction of PIRATE, and because UP has sufficiently developed the engineering and design of the planned support tracks and drainage ditches to support an environmental review, OEA has evaluated their potential impacts in this document.

2.4 Construction and Design Features

This section describes UP's plans for constructing PIRATE and the planned Phoenix Subdivision support tracks, including information pertaining to temporary and permanent project footprints, railbed and track construction, materials for rail line construction, construction staging areas, rail crossings of roads and other infrastructure, and related UP actions. This section also summarizes UP's anticipated construction schedule if the Board authorizes the proposed rail line. Figures 2-4 and 2-5 include construction and design features for Alternatives 1 and 2 and for the planned

Phoenix Subdivision support tracks. These figures also show the project limits, which refers to UP's existing and proposed right-of-way and temporary construction easements (TCEs).[13]

Alternatives 1 and 2 generally are similar. The two alternatives are presented in Table 2-1 and discussed along with the planned Phoenix Subdivision support tracks in Sections 2.4.1 through 2.4.7.

2.4.1 Right-of-Way

Under either Alternative 1 or Alternative 2, all work would occur within the right-of-way and permanent easements that UP proposes to acquire for construction and operation of PIRATE and within the TCEs shown on Figures 2-4 and 2-5 (UP 2025c). Refer to Table 2-1 for acreages. All Phoenix Subdivision work would remain within UP's existing 200-foot-wide right-of-way and a ~~1.5~~1.6-acre TCE at the existing at-grade crossing of Sossaman Road.

The proposed new right-of-way generally ranges from about 110 to 150 feet wide but expands in several areas depending on the project elements, construction footprint, and construction activities (for example, the wye, staging, drainage, additional yard tracks, and road crossings).

TCEs would be necessary for construction of the following:

- Six at-grade road crossings;
- ~~Detention basin east of Signal Butte Road (Alternative 1 only); and~~
- Drainage in the orchard east of Signal Butte Road; and
- ~~Short segment (about 100 feet) of a drainage channel~~Drainage south of the track near the eastern terminus.

The TCEs would be generally 130 feet wide for the at-grade road crossings, and the length would vary depending on the amount of construction required along each road. The TCEs in the orchard would be about 40 feet by 40 feet, and the TCE near the eastern terminus would be about 1,000 feet long by 25 to 50 feet wide (UP 2025c).~~The TCE for the detention basin would expand to about 370 feet wide, and the TCE for the drainage channel would be about 25 feet by 125 feet.~~[14]

UP would acquire most of the new right-of-way from private landowners, with a small portion of new right-of-way or permanent easement acquired from state and local agencies. Most of the TCEs would be used along Mesa's public roads or on privately owned land. Because the areas to be graded cover most of the proposed right-of-way, OEA assumes that the entire right-of-way would be permanently cleared of vegetation for construction and then operation of the proposed rail line. However, if UP does not require full right-of-way use, UP might restore those areas or leave them undisturbed.

[13] A TCE encompasses an area outside of UP's proposed right-of-way that allows UP to use property belonging to another landowner for a limited period of time in order to construct the project.

~~[14] A detention basin temporarily stores stormwater runoff and gradually releases the runoff until completely drained.~~

Table 2-1. Comparison of Alternatives 1 and 2 construction and design features

Project Element (Report Section)	Alternative 1	Alternative 2
Proposed rail line length (Section 2.2)	5.7 miles	6.0 miles
PIRATE yard (Section 2.2)	3,500 feet long; 2 yard tracks in addition to the proposed rail line	Same as Alternative 1
Future yard tracks (Section 2.2)	3 planned additional yard tracks at the PIRATE yard up to 2,500 feet long (for a total of 5)	Same as Alternative 1
Run-around track (Section 2.2)	5,100-foot-long run-around track west of Signal Butte Road	Same as Alternative 1
Grading for segments of connecting track located within PIRATE right-of-way (Section 2.2)	~~650 feet of the segment of track connecting to Fujifilm;~~ Turnout and 300 feet of the segment of track connecting to CMC	Same as Alternative 1 ~~400 feet of the segment of track connecting to Fujifilm; 300 feet of the segment of track connecting to CMC~~
Total new right-of-way (Section 2.4.1)	~~141.7~~144.4 acres	~~151.2~~151.7 acres
New right-of-way from private owners (Section 2.4.1)	~~126.0~~127.0 acres	~~134.4~~133.0 acres
New right-of-way or permanent easements from public agencies:[1] ASLD, FCDMC, and Mesa (Section 2.4.1)	7.3 acres (ASLD), ~~3.5~~3.3 acres (FCDMC), and ~~4.9~~6.9 acres (Mesa)	8.4 acres (ASLD), ~~3.5~~3.3 acres (FCDMC), and ~~4.9~~7.0 acres (Mesa)
Total TCEs	28.7 acres	~~24.9~~28.0 acres ~~(Alternative 2 does not require a detention basin TCE east of Signal Butte Road)~~
TCEs from private owners (Section 2.4.1)	~~9.0~~6.1 acres	~~5.4~~6.1 -acres
TCEs from public agencies: ASLD, Mesa, and Queen Creek (Section 2.4.1)	~~1.5~~1.9 acres (ASLD), ~~16.9~~19.4 acres (Mesa), and 1.3 acres (Queen Creek)	1.4 acres (ASLD), ~~16.8~~19.2 acres (Mesa), and 1.3 acres (Queen Creek)
Rail line access (Section 2.4.2)	New, unpaved access roads within UP's right-of-way~~parallel to rail alignment west of Ellsworth Road~~; existing paved public roads; existing unpaved private roads	Same as Alternative 1
Railbed and track construction (Section 2.4.3)	Railbed and track construction as shown on Figures 2-4 and 2-5; total fill: approximately ~~100,000~~150,000 cubic yards; total excavation: approximately ~~320,000~~331,000 cubic yards	Similar to Alternative 1 due to similar track length and acreage of new right-of-way (~~<7%~~about 5% difference) and homogeneous topography [2]
At-grade crossings (Section 2.4.4)	Pecos, Sossaman (two locations), Ellsworth, Crismon, and Signal Butte Roads	Same as Alternative 1
Drainage (Section 2.4.4)	Culverts to convey existing channels and washes beneath railbed; drainage ditches adjacent to the railbed; detention basins to manage stormwater runoff	Same as Alternative 1 ~~but does not require a detention basin east of Signal Butte Road~~
Utilities (Section 2.4.4)	Utility crossings and conflict resolution	Same as Alternative 1
Acquisition of materials for rail line construction (Section 2.4.5)	No new materials sources or borrow areas; construction materials delivered via truck and rail	Same as Alternative 1
Construction staging areas (Section 2.4.6)	Staging, stockpiling, and laydown areas within proposed right-of-way and TCEs	Same as Alternative 1
Construction schedule (Section 2.4.7)	9-month time frame; weekday and daylight work only	Same as Alternative 1

[1] Across ASLD and FCDMC land, UP would acquire permanent easements that would grant UP the right to use the property for a specific purpose. However, ASLD and FCDMC would continue to own the land beneath the proposed rail line. Across Mesa's property, UP would purchase right-of-way from Mesa and would own the land beneath the proposed rail line.
[2] UP's design plans for Alternative 2 were at the 10 percent design stage and did not include estimated cut and fill quantities.

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2.4.2 Rail Line Access

For rail line construction and post-construction operations under either Alternative 1 or Alternative 2, UP would construct an unpaved access road parallel and adjacent to the proposed rail line from the Phoenix Subdivision to Pecos Road, ~~and~~ from Sossaman Road to Ellsworth Road, and from Crismon Road to Signal Butte Road. UP would also construct short (between 50- and 100-foot long) unpaved access roads from UP's right-of-way boundary to the signal equipment at each of the six at-grade crossings (UP 2025a). During construction, UP would also use existing paved, public roads and existing unpaved, private roads that either cross or are adjacent to PIRATE. UP would not maintain the private access roads as public roads.

2.4.3 Railbed and Track Construction

UP would construct a suitable railbed prior to track construction under either Alternative 1 or Alternative 2. UP would also construct suitable railbeds for the planned Phoenix Subdivision support tracks. The railbeds would form the base upon which UP would lay the ballast, rail ties, and rail. Railbed construction would require clearing, excavating earth and rock on previously undisturbed land, and removing and stockpiling topsoil, where needed. Construction would require UP to excavate and place new railbed material on the existing ground surface to achieve the desired track grade, which would increase from 1,346 feet above mean sea level at the Phoenix Subdivision to 1,442 feet at the eastern terminus. UP would also grade within PIRATE's proposed right-of-way near the eastern terminus to accommodate future construction of ~~two~~a segment~~s~~ of connecting track to connect ~~Fujifilm and~~ CMC to PIRATE (UP 2025a).

The railbed width and height would vary depending on the existing terrain or presence of a new access road or additional tracks. UP would cover the top of the railbed with an ~~12~~8-inch-deep layer of subballast, followed by a 12-inch-deep layer of ballast, railroad ties, and steel rails. A typical single-track section would be 30 feet wide, with 15 feet to the edge of the subballast on either side of the rail centerline (Figures 2-6 and 2-7). The maximum height of the railbed, ballast, and track would be about 15 feet above the existing ground surface. UP would install wayside signs as needed along the new track and these signs would not exceed 32 feet tall.

Construction of either Alternative 1 or Alternative 2, plus the planned Phoenix Subdivision support tracks, would require approximately ~~110,000~~150,000 cubic yards of fill and ~~340,000~~331,000 cubic yards of excavation, resulting in a net of ~~280,000~~181,000 cubic yards of excavated material. UP would remove excess fill material created during railbed construction and would transport and deposit it in an appropriate location. UP would store unsuitable railbed material onsite to apply to finished slopes and to facilitate revegetation and provide erosion control, or UP would remove unsuitable material from the area and dispose of it in accordance with applicable laws.

Construction of the proposed rail line and planned Phoenix Subdivision support tracks would involve a variety of construction methods and equipment. In-place track construction would consist of placing subballast, ballast, ties, and rail on top of the railbed in the following order:

1. Place ties on the ballast.
2. Lay and weld the rail to create a "skeleton track" with track welding machines or crews where necessary.

3. Use special equipment to unload and secure the rail onto the ties, unload ballast from rail ballast cars and trucks, and dump ballast evenly along the skeleton track.
4. Use equipment to raise the rail line to achieve the proper ballast depth.
5. Use bulldozers, front-end loaders, and dump trucks to create the appropriate corridor and grade.

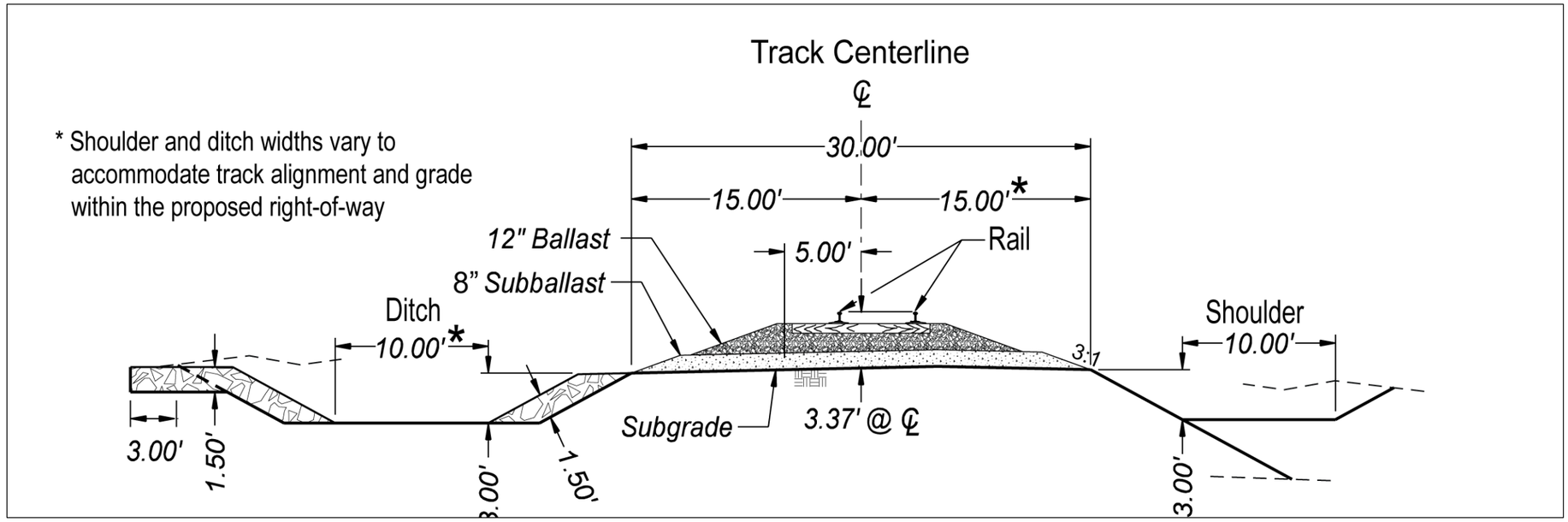
2.4.4 Roads and Infrastructure

2.4.4.1 At-grade Crossings

To maintain access to existing public and private roads, UP would construct at-grade crossings where either Alternative 1 or Alternative 2 would cross roadways. Either alternative would include five new at-grade road crossings at Pecos Road, Sossaman Road, Ellsworth Road, Crismon Road, and Signal Butte Road. UP's planned work along the Phoenix Subdivision would also include modifications to the existing at-grade Sossaman Road crossing. UP would install crossing gates, lights, and signal electronics at each of the at-grade road crossings for safety. The crossing gates and lights would not exceed 32 feet tall.

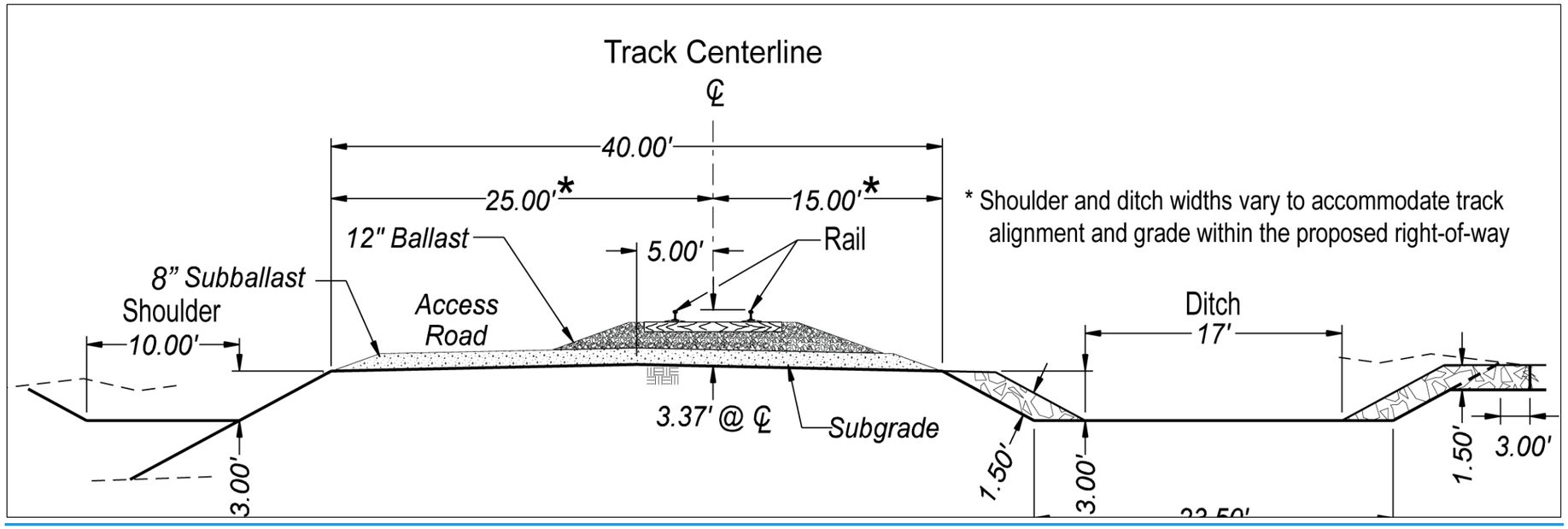
Construction activity at the six at-grade crossings with public roads would require temporary road closures and traffic detours, as shown on Figure 2-8. UP would determine the duration of such closures at a later design stage. UP has already begun consulting with Mesa, Queen Creek, and the Town of Gilbert (Gilbert) on likely traffic detour routes, including associated reviews and approvals.

Figure 2-6. Representative section of a single-track segment paralleled by a drainage ditch



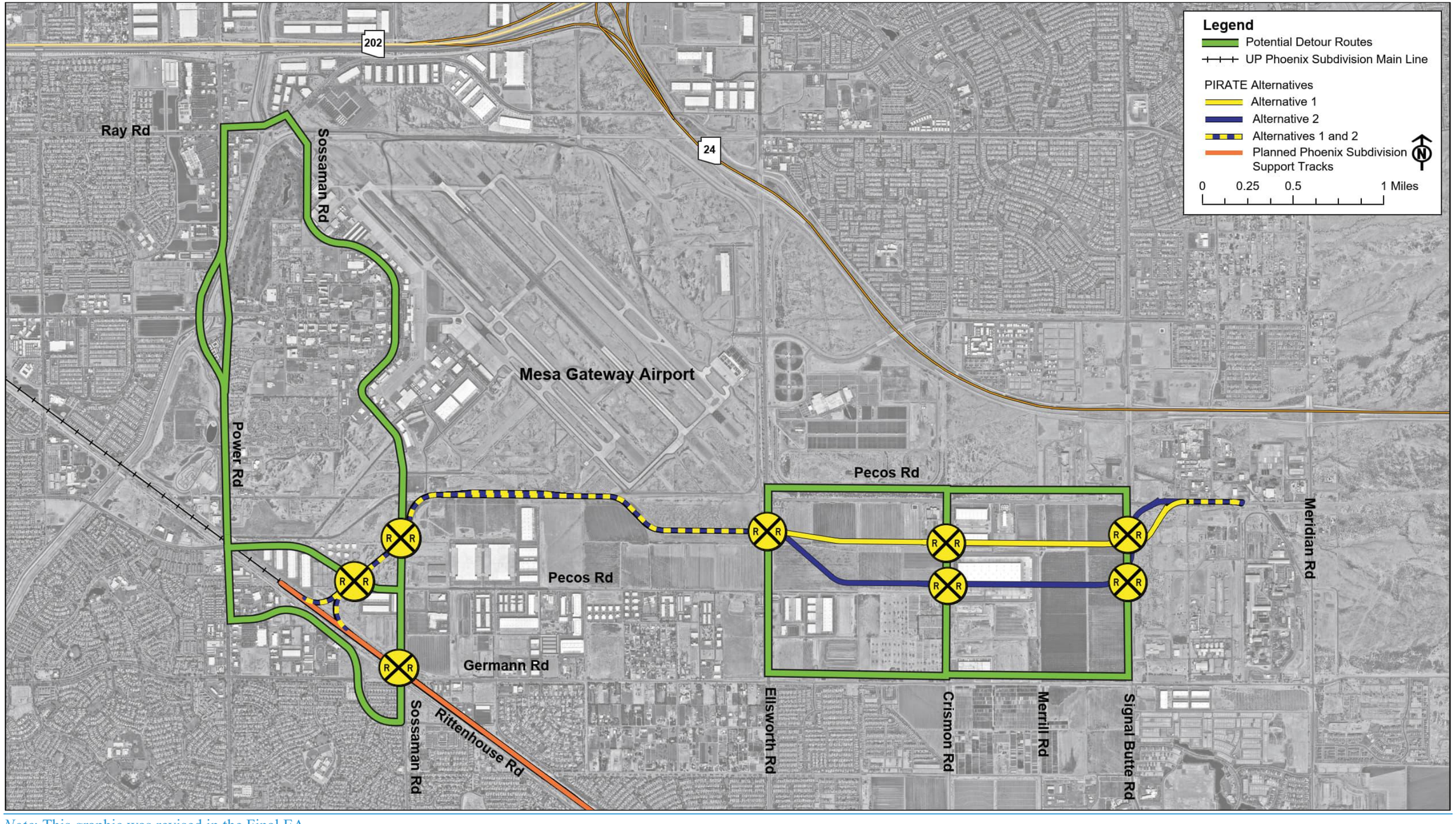
Note: This graphic was revised in the Final EA.

Figure 2-7. Representative section of a single-track segment paralleled by an access road and drainage ditch



Note: This graphic was revised in the Final EA.

Figure 2-8. Temporary road closures and traffic detours



Note: This graphic was revised in the Final EA.

2.4.4.2 Drainage

Alternative 1, Alternative 2, and the planned Phoenix Subdivision support tracks would also include drainage and stormwater management. Two concrete box culverts (CBCs) would be constructed beneath the wye to convey ephemeral flows in FCDMC's Rittenhouse Channel, and another CBC would be installed east of Ellsworth Road to convey ephemeral flows in the Ellsworth Channel. Refer to Figure 2-9 for an example of a CBC.

Figure 2-9. Examples of a concrete box culvert and a corrugated metal pipe.

Drainage ditches lined with riprap (loose stone) about 10 to 20 feet wide and 2 to 5 feet deep would be constructed adjacent to the railbed along the length of the proposed rail line and adjacent to planned support tracks along the Phoenix Subdivision, with several CBCs and corrugated metal pipes installed to convey drainage in the ditches beneath roads and the railbed.[15] In some locations, existing drainage channels and culverts would be removed and replaced with the riprap-lined channels or with new culverts to convey existing washes beneath the railbed.

In addition, UP's design included excavation and grading of ~~would excavate and grade three (Alternative 1) or two (Alternative 2)~~ two detention basins up to 10 feet deep.[16] These basins, at the wye~~,~~ and the PIRATE yard~~, and TRW,~~ would temporarily hold stormwater and slowly convey runoff via culverts to the Rittenhouse Channel and/or the railbed-adjacent drainage ditches.

The wye and yard basins have already been partially constructed. Clayco excavated approximately 25,000 cubic yards of the wye basin as part of the Power Industrial project and Derek Builders excavated approximately 16,000 cubic yards of the yard basin as part of the Gateway Grand project (Figure 2-2). In total, 41,000 cubic yards of native materials were excavated and removed to create both basins and one of the culverts was installed at the PIRATE yard basin. However, neither basin was excavated to the depth specified in UP's design and the wye basin is not the same shape or size. Therefore, UP would still need to finish constructing the basins in accordance with the design and install the other culverts that would allow the basins to drain.

[15] Riprap is rock, stone, or other material used to protect structures against erosion.

[16] A detention basin temporarily stores stormwater runoff and gradually releases the runoff until completely drained.

2.4.4.3 Utilities

Alternative 1, Alternative 2, and the planned Phoenix Subdivision support tracks would cross over or beneath other existing utilities infrastructure, such as water mains, sewer lines, fiber-optic lines, gas pipelines, and electrical transmission lines. Utility conflicts and relocations would be coordinated with the utility providers as UP finalizes the project's design.

2.4.5 Acquisition of Materials for Rail Line Construction

No new material sources would be required to construct this project, and construction would not require borrow areas. All construction materials would be delivered to the work areas via truck and rail on existing roadway and railroad infrastructure. UP would establish local haul roads in the project vicinity as needed. Any water necessary for construction would be sourced from an offsite location or from municipal hydrants with Mesa and Queen Creek concurrence.

2.4.6 Construction Staging Areas

Alternative 1, Alternative 2, and the planned Phoenix Subdivision support tracks would require construction staging areas to store equipment and materials and to support construction activities. UP would locate all temporary staging areas within the existing and proposed rights-of-way and TCEs. The project would use all stockpiled materials or UP would remove them from staging areas following construction.

2.4.7 Construction Schedule

The project construction schedule likely would occur over 9 months during daylight hours (10-hour workdays from 7:00 a.m. to 6:00 p.m.) on weekdays. UP anticipates construction sequencing to begin with the proposed rail line, starting in areas outside of archaeological sites where no cultural resources were identified~~at the wye and continuing east~~, followed by construction of the planned Phoenix Subdivision support tracks. Construction within archaeological sites must proceed in accordance with the requirements of the MOA and historic properties treatment plan (HPTP). Construction of the future yard tracks is not scheduled and is dependent on additional customers requesting rail service in the PAMZ and the capacity needed to service those customers.

2.5 Operations

As discussed in Sections 2.5.1 and 2.5.2, rail operations and maintenance would be the same for Alternatives 1 and 2.

2.5.1 Rail Traffic

Existing rail traffic on the Phoenix Subdivision consists of four trains per day: two trains traveling southeast and two trains traveling northwest. UP estimates that the existing rail traffic would increase by ~~one~~two trains per day, one in each direction, to a total of six~~five~~ by 2027 (UP 2025b). This increase on the Phoenix Subdivision represents organic growth independent of the proposed rail line. UP does not anticipate that PIRATE would change the frequency of trains on the Phoenix Subdivision.

If the Board authorizes construction and operation of the proposed rail line, UP estimates up to two trains per day (one in each direction) would travel on PIRATE. The trains would bring raw materials to manufacturers within the PAMZ, as well as carry materials such as chemicals, metals, plastics, and rubber from manufacturers within the PAMZ. All trains operating on the proposed rail line would be single-stack trains (UP 2025d). Customer demand would determine train length, and UP would increase train length (that is, add more cars to the two scheduled trains) before increasing train frequency. UP anticipates trains would operate during daylight hours on weekdays, unless customers require specific service windows.

UP estimates 30 to 35 cars per train during initial service and 70 cars per train at full occupation of the PAMZ , with an approximate maximum train length of 4,500 feet. Trains would travel ~~at 20~~between 5 and 30 miles per hour on the proposed rail line. The yard tracks at the PIRATE yard would be used to sort and store empty and loaded rail cars heading to and from manufacturers in the PAMZ. Trains leaving the PAMZ that need to be assembled before heading to the Phoenix Subdivision would also use the yard tracks.

Air horns would be used when trains cross at-grade crossings. When trains are required to push rail cars from the rear, train crews would manually protect/flag at-grade crossings.

2.5.2 Maintenance

OEA expects that UP would construct the proposed rail line and the planned Phoenix Subdivision support tracks using new materials, which would initially require a minimal amount of maintenance. UP would regularly inspect and maintain the proposed rail line to ensure safe and reliable operations, as required by Federal Railroad Administration (FRA) track standards. Maintenance activities on the proposed rail line and planned Phoenix Subdivision support tracks would include preventive and corrective activities, such as rail surfacing, ballast cleaning and tamping, and rail grinding. Other maintenance activities would include signal testing and inspection; maintaining signal track circuits; lubricating rails; replacing rail, ties, and ballast; and inspecting track.

Additional inspections would be carried out when warranted by weather or other operating conditions. Inspections would focus on the condition of runoff drainage, vegetation growth, rail line alignment, rail line surface, track gage, rail and turnouts, cross ties, drainage ditches and basins, and culverts.

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Chapter 3
Affected Environment and Environmental Effects

This chapter describes the affected environment and analyzes the potential impacts from the No-Action Alternative, Alternative 1, Alternative 2, and the planned Phoenix Subdivision support tracks for each resource. OEA analyzed the environmental resource areas set forth in the Board's environmental regulations at 49 C.F.R. § 1105.7(e).

OEA took the following steps to analyze each resource area:[17]

- Reviewed relevant regulations and guidance, as described in each resource's respective section and/or appendix.
- Defined a study area or study areas to be analyzed.
- Determined appropriate analytical methodology.
- Reviewed the current conditions of the resource in the relevant study areas(s).
- Determined the nature and severity of potential impacts that construction and operation of PIRATE would or could have on the resource.
- Identified mitigation, including both the VM submitted by UP and additional mitigation developed by OEA, that would minimize or compensate for potential environmental impacts, if implemented.[18]
- For cumulative impacts, analyzed the effects of PIRATE when combined with impacts of other past, present, and reasonably foreseeably future projects and actions.

Since OEA issued the Draft EA in May 2023, there have been some changes to the existing conditions in the project vicinity. First, the ground disturbance that OEA discovered in July 2023 permanently changed approximately 24 acres within the project limits from native desertscrub habitat or agricultural land to partially constructed detention basins surrounded by disturbed areas. Second, rapid development and land use changes occurred throughout the project vicinity. As a result, OEA updated the analysis to ensure that the Final EA reflects current conditions in the project vicinity. The updates in this Final EA do not result in any new significant impacts, and the conclusions in the Draft EA remain the same.

In addition, as explained in Chapter 1 above, CEQ has rescinded its NEPA regulations, which were cited throughout the Draft EA. Moreover, environmental justice and cumulative impacts analyses are no longer required in NEPA documents. *See* EO 14148, "Initial Rescissions of Harmful Executive Orders and Actions;" EO 14173, "Ending Illegal Discrimination and

[17] To date, OEA has used the best available data to inform its analyses. These data may not reflect all recent changes in conditions that have taken place due to continuing rapid development in the project vicinity.

[18] OEA's ~~has made preliminary~~final recommendations for mitigation are set forth in Chapter 4 of this ~~Draft~~Final EA, including UP's VM and mitigation developed by OEA. ~~After OEA has considered comments received on the Draft EA, OEA will present its final mitigation recommendations to the Board in the Final EA.~~

Restoring Merit-Based Opportunity," EO 14154, "Unleashing American Energy." *See also Seven Cnty. Infrastructure Coal. v. Eagle Cnty.* 605 U.S. 168, 182 (2025) (limiting the scope of review required under NEPA to the "project at hand"). Nevertheless, to avoid delay in the NEPA process and to ensure that the information contained in this Final EA is accurate, OEA has retained and updated these analyses below.

As defined in Chapter 2, the terms "PIRATE" and "proposed rail line" are used interchangeably in this ~~Draft~~Final EA to refer to the approximately 6.0 miles of single-track rail line, including the wye, proposed between the Phoenix Subdivision and the eastern end of the PAMZ. Alternatives 1 and 2 are the two potential PIRATE routes that require Board approval. The term "project" refers to both the proposed rail line and the planned Phoenix Subdivision support tracks, and "project limits" refers to UP's existing and proposed right-of-way and TCEs. In Chapter 3, OEA also uses the term "study area," which may vary from resource to resource and is defined in each resource section. Finally, the term "rail construction" includes all of the elements required to construct both PIRATE and the planned Phoenix Subdivision support tracks, including, but not limited to, grading and excavation, grubbing, railbed preparation, ballast, tracks, at-grade crossings, access roads, drainage ditches, and detention basins.

3.1 Transportation and Safety

This section addresses the existing conditions and impacts related to transportation and safety and is based on the updated traffic analysis found in Appendix B, *Traffic Report*. The *Traffic Report* is an update to the previous report included in the Draft EA. The previous analysis used traffic data and assumptions from 2022. The population growth and development expansion in this region has increased since OEA issued the Draft EA in May 2023. The *Traffic Report* serves as the updated version of the traffic operational analysis for the current and future conditions and includes a grade separation analysis for the railroad crossings of roads within the study area.

The traffic analysis study area is bounded by Power and Rittenhouse Roads to the west, Meridian Road to the east, Pecos Road (north) to the north, and Germann Road to the south.

The operational traffic analysis evaluated major intersections in the study area for three scenarios in the a.m. and p.m. peak periods (~~7~~6:00 to 9:00 a.m. and 3:00 to ~~6~~7:00 p.m.): Existing (2025~~2022~~), No Build (2050), and Build (2050). These scenarios are used exclusively to refer to existing and future conditions in the traffic analysis. The Existing scenario represents traffic conditions that existed in the year 2025~~2022~~. The No Build scenario includes planned and funded roadway projects in the study area anticipated to be completed by the year 2050 and was used to evaluate the traffic impacts at that point if the proposed line is not authorized and constructed.

In addition to the projects included in the No Build scenario, the Build scenario assumes construction and operation of PIRATE and the planned Phoenix Subdivision support tracks and assesses impacts related to transportation and safety in 2050. The Build scenario was used to evaluate the traffic impacts of both Alternatives 1 and 2 and the planned Phoenix Subdivision support tracks, since the alignments are within 0.25 mile of one another and, from a traffic operations standpoint, would have similar effects on adjacent roadways and intersections. The analysis of Alternatives 1 and 2 and the planned Phoenix Subdivision support tracks assumed

that a train on PIRATE would interrupt vehicular traffic for ~~10~~ 4 minutes during the peak period~~hours~~ of ~~7~~6:00 to 9:00 a.m. and 3:00 to ~~6~~7:00 p.m.

Intersection delays and queue lengths were used as measures of effectiveness to compare operations between the Build and No Build scenarios. The study area intersections include the following:

- Power Road and Pecos Road (south)
- Sossaman Road and Pecos Road (south)
- Sossaman Road and Germann Road
- Ellsworth Road and Pecos Road (north)
- Ellsworth Road and Pecos Road (south)
- Ellsworth Road and Germann Road
- Crismon Road and Pecos Road (north)
- Crismon Road and Germann Road
- Signal Butte Road and Pecos Road (north)
- Signal Butte Road and Germann Road

The intersection of Power Road and Pecos Road (south) is in the study area but was not included in the operational analysis in the Draft EA.~~because the project limits do not extend past this intersection and construction activities, temporary staging, and rail operations would not alter the existing intersection configuration (Figure 2-4).~~ The Phoenix Subdivision currently crosses this intersection diagonally.

Chapter 4 of the *Traffic Report* also includes a grade separation analysis conducted in response to comments on the Draft EA at the six proposed at-grade crossings. Refer to Appendix B and Section 3.1.3.5 below.

3.1.1 Affected Environment

3.1.1.1 Existing Transportation Network[19]

In the study area, the existing roadway network is comprised of regional and local routes and the ~~seven~~eight major corridors listed in Table 3-1. OEA also factored Mesa's ~~future~~ Willis Road project into the network. The ~~five~~two-lane Willis Road ~~would~~ continues along the same alignment as Pecos Road (south) between Ellsworth and Crismon Roads and will~~ould~~ end at one of The Cubes' western entrances on Crismon Road. Mesa has already constructed a ~~450-foot-long~~0.5-mile-long segment of Willis Road and installed Willis Road street signs east of Ellsworth Road. However, it is unknown when the remainder of Willis Road will be built and open to traffic.

The Phoenix Subdivision travels parallel to Rittenhouse Road and includes three existing at-grade railroad crossings at the intersection of Power Road and Pecos Road (south), at Sossaman Road near Germann Road, and at Ellsworth Road near Rittenhouse Road.

[19] MGA is discussed in Section 3.8, *Land Use and Farmland*, in the context of the airport's land use compatibility and master plans (Ricondo & Associates 2017; PMGA ~~2017,~~ 2020).

Table 3-1. Major roadway corridors in the study area

Road Name	Road Size/Type	Road Access/ Connections	Existing Volumes (vpd)	Year 2050 Forecasted Volumes (vpd)
Power Road	Six-lane, north-south arterial	Access to State Route (SR) 202 north of the study area	37,400 ~~29,100~~	43,000 to 54,000 (near Pecos Road [south])
Sossaman Road	Two-lane, north-south arterial	Access from MGA to Germann and Rittenhouse Roads	8,000 ~~6,000~~	20,000 to 32,000 ~~18,000 to 27,000~~
Ellsworth Road	Four- to six-lane, north-south arterial	Access to SR 24, north of the study area	47,000 ~~49,100~~	~~45,000~~ 46,000 to 52,000
Pecos Road (north)	Two-lane, east-west arterial	Access from Ellsworth Road to Meridian Road	3,500 ~~4,900~~	25,000 ~~20,000~~
Pecos Road (south)	Two-lane, east-west arterial	Access from Ellsworth Road to Power Road	23,800 ~~13,400~~	25,000 to 32,000 ~~30,000~~
Germann Road	Two-lane, east-west arterial	Access from Power Road to Ironwood Road	10,000 ~~5,500 to 7,500~~	~~16,500~~ 20,000 to 30,000
Rittenhouse Road	Four- to six-lane, northwest-southeast diagonal arterial	Between Power Road and Ellsworth Road	28,000 ~~21,000~~	30,000 ~~28,000~~
Crimson Road	Two-lane, north-south arterial	Germann Road to Pecos Road (north)	3,800	No data
Signal Butte Road ~~(complete in 2023)~~	Two-lane, north-south arterial	Access to SR 202, north of the study area	16,800 ~~No data~~	42,000 ~~45,000~~ (near SR 24)

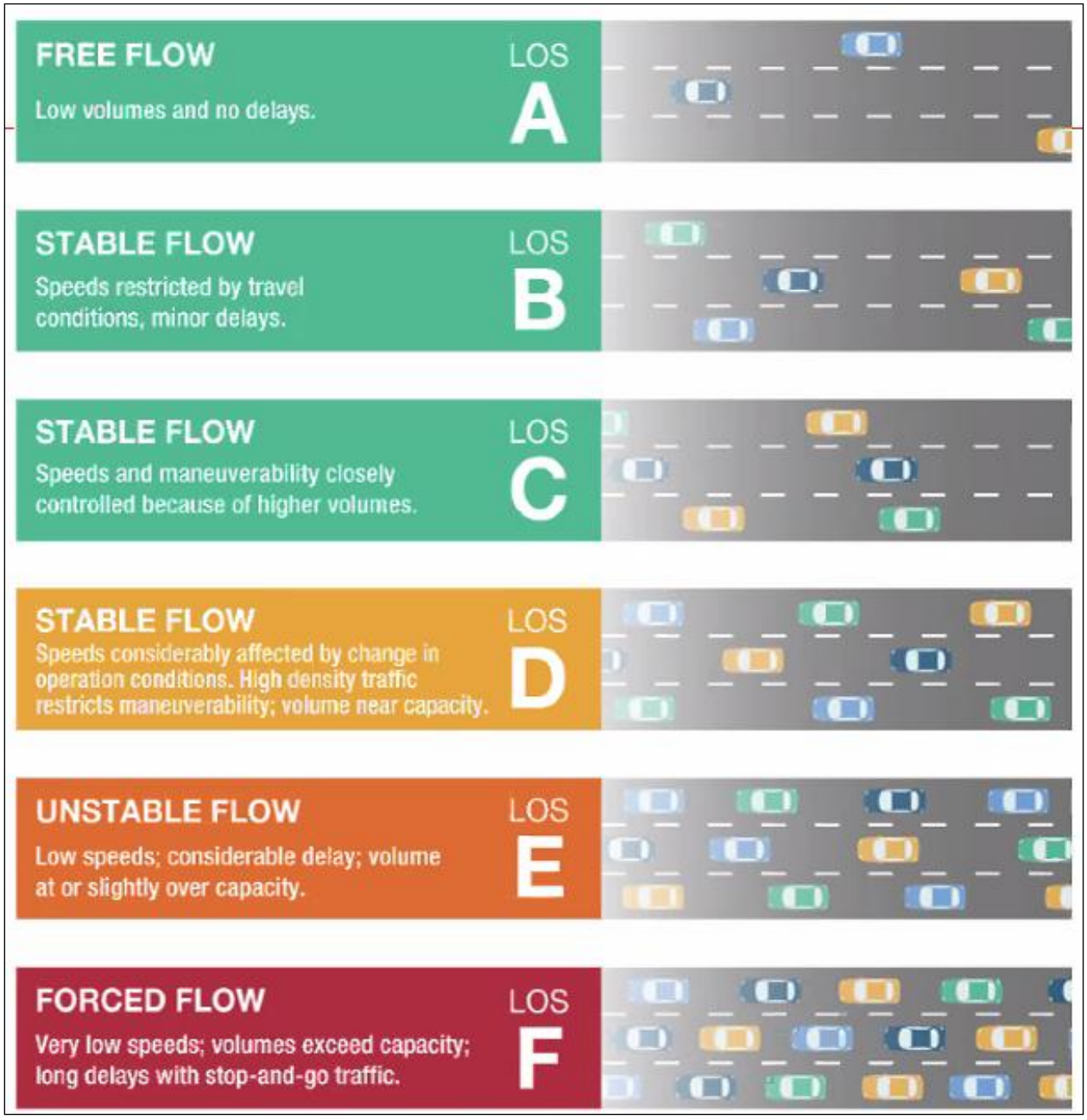
vpd = vehicles per day

3.1.1.2 Existing Level of Service

Level of service (LOS) is a measure used to describe traffic conditions based on speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. Six levels of service are used to define operating conditions, designated by letters A through F, as illustrated on Figure 3-1. Mesa has a goal of maintaining traffic operations at LOS D or better (Mesa 2025a~~2021a~~, Section 204.4.21) for urban intersections. Queen Creek also has a goal of maintaining traffic operations at LOS D or better for urban intersections (Queen Creek 2020).

Existing LOS at key intersections for the a.m. and p.m. peak hours are presented in Table 3-2. Traffic in the study area generally travels northwest in the a.m. peak period and southeast in the p.m. peak period.

Figure 3-1. Levels of service



Source: Kuntzman 2020.

Table 3-2. Intersection level of service for Existing and 2050 No Build scenarios

Intersection	Existing Average Level of Service		2050 No Build Average Level of Service	
Peak Hour	**a.m.**	**p.m.**	**a.m.**	**p.m.**
Power Road and Pecos Road (south)	D	D	D[1]	C[1]
Sossaman Road and Pecos Road (south)	D	D	C	C[2]
Sossaman Road and Germann Road	**F** ~~C~~	B ~~E~~	B ~~E~~	B ~~E~~
Ellsworth Road and Pecos Road (north)	A ~~C~~	A ~~B~~	B[3] ~~A~~ [1]	B ~~A~~ [1]
Ellsworth Road and Pecos Road (south)	C ~~D~~	C ~~F~~	C[4] ~~B~~ [2]	C ~~B~~ [2]
Ellsworth Road and Germann Road	C ~~D~~	C ~~D~~	C[5] ~~C~~	C[5] ~~C~~
Crismon Road and Pecos Road (north)	B ~~Not yet built~~	C ~~Not yet built~~	B	B
Crismon Road and Germann Road	B ~~Not yet built~~	B ~~Not yet built~~	B	B
Signal Butte Road and Pecos Road (north)	C ~~Not yet built~~	C ~~Not yet built~~	C[3]	C ~~B~~
Signal Butte and Germann Road	C ~~Not yet built~~	B ~~Not yet built~~	B ~~C~~	B ~~C~~

Note: **bolded** values indicate project locations with adverse delays.

[1] The 2050 No Build southbound and westbound approach at the Power Road and Pecos Road (south) intersection would operate at an LOS D during the a.m. peak hour and the westbound approach would operate at an LOS D during the p.m. peak hour.

[2] The 2050 No Build eastbound approach at the Sossaman Road and Pecos Road (south) intersection would operate at an LOS D during the p.m. peak hour.

[3] The 2050 No Build westbound approach at the Ellsworth Road and Pecos Road (north) intersection would operate at an LOS D during the a.m. ~~and p.m.~~ peak hour~~s~~.

[~~4~~2] The 2050 No Build eastbound approach at the Ellsworth Road and Pecos Road (south) intersection would operate at an LOS D during the a.m. ~~and p.m.~~ peak hour~~s~~.

[5] The 2050 No Build westbound and eastbound approaches at the Ellsworth Road and Germann Road intersection would operate at an LOS D during the a.m. and p.m. peak hours.

~~[3] The 2050 No Build eastbound approach at the Signal Butte Road and Pecos Road intersection would operate at an LOS E during the a.m. peak hour.~~

~~Two~~One intersection~~s~~ operates at a failing LOS in the Existing scenario: the intersection of Sossaman Road and Germann Road~~,~~ is at LOS F~~E~~ in the ~~p.m.~~a.m. peak hour~~, and the intersection of Ellsworth Road and Pecos Road (south), at LOS F in the p.m. peak hour~~. Currently, the existing roadways (such as Sossaman Road, Ellsworth Road, and Pecos Road) and the signalized intersections along these roadways are unable to serve increasing traffic volumes due to tremendous growth occurring in the area. Mesa is currently widening Ellsworth Road from two lanes in each direction to three lanes in each direction, with increased capacity at the signalized intersections. Mesa anticipates completion of the widening project by 2027~~2023~~, which should provide adequate capacity at all the study intersections.

3.1.1.3 Emergency Services

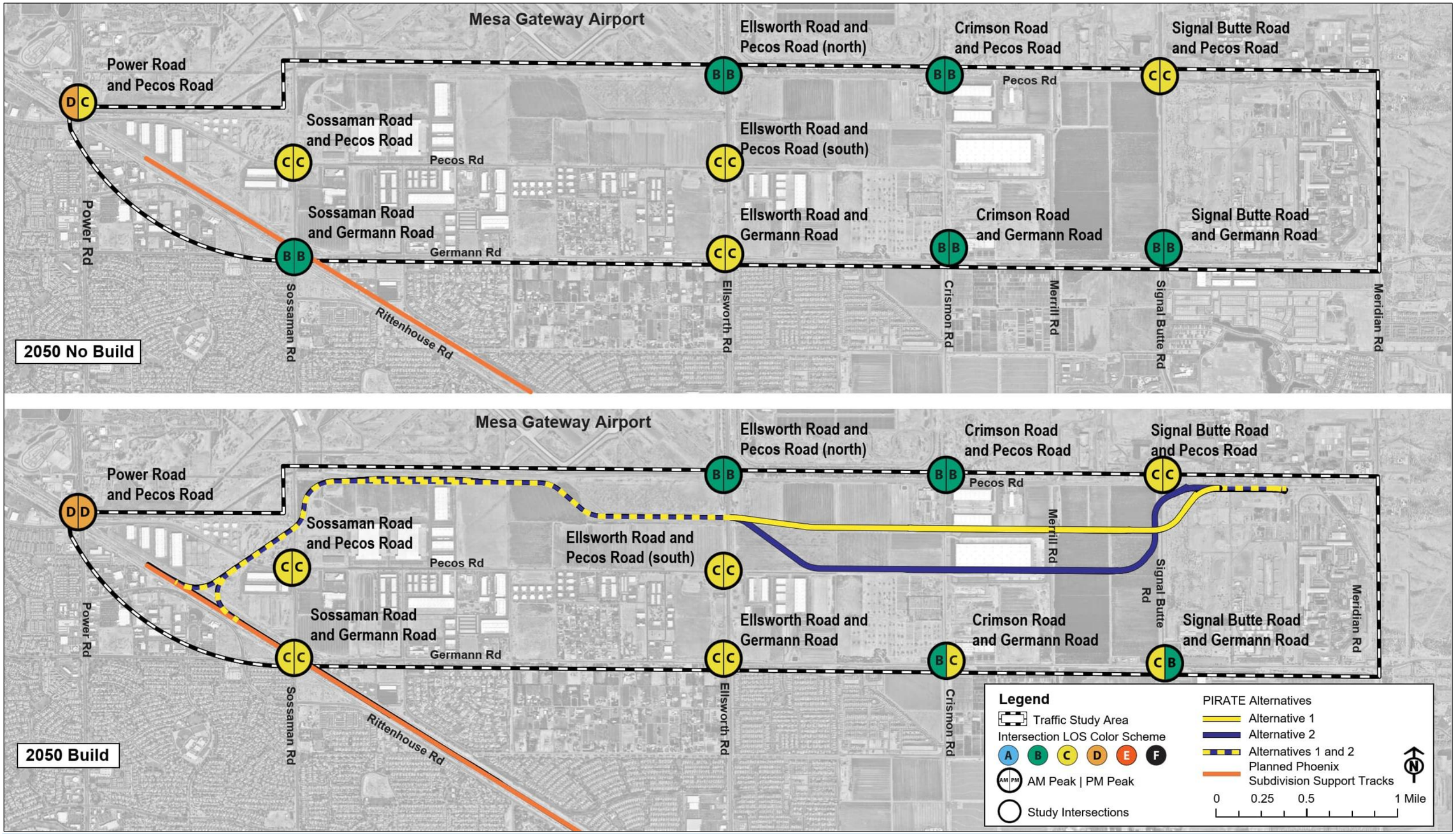
A police station and fire station are located at MGA, and Mesa is planning a future fire station on Pecos Road near the east end of the PAMZ (Mesa 2014). Queen Creek has fire stations on Sossaman and Ellsworth Roads and a police station on Ellsworth Road, all south of the Phoenix Subdivision. Gilbert has a joint police and fire safety training facility adjacent to the Phoenix Subdivision at Power Road and a fire station west of the project limits on Germann Road. Gilbert also has two emergency medical facilities near the project limits: East Valley Hospital on Power Road and Arizona General Hospital on Germann Road. Ambulances operate out of three nearby locations: the Queen Creek fire station on Ellsworth Road and Native Air Ambulance and Air Evac Lifeteam at MGA.

3.1.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Potential impacts of the No-Action Alternative were evaluated using the 2050 No Build scenario, which includes all planned transportation projects in the study area, except for PIRATE and the planned Phoenix Subdivision support tracks. The study area is experiencing tremendous growth. Several commercial and residential developments underway in Queen Creek are expected to influence local travel patterns and roadway demand, as are several planned commercial and industrial developments in Mesa, Queen Creek, and farther south in San Tan Valley. As a result, travel demand in this area is expected to increase substantially by 2050.

The 2050 No Build LOS at key intersections is shown in Table 3-2 and on Figure 3-2. The 2050 No Build scenario includes new roadway alignments, such as the future connection of Signal Butte Road and Williams Field Road to SR 24, and increased capacity at the intersection of Ellsworth Road and Pecos Road (south). As shown in Table 3-2, those projects would result in a higher (improved) LOS at some intersections under the 2050 No Build scenario. Other key intersections in the study area are anticipated to provide a lower (worsened) LOS under the 2050 No Build scenario as development in the area continues to drive traffic increases. The intersection of Sossaman Road and Germann Road would ~~continue to operate at~~ improve to LOS B~~E~~ in the a.m. and p.m. peak periods ~~and would worsen to LOS E in the a.m. peak period~~ in the 2050 No Build scenario.

Figure 3-2. Intersection level of service for 2050 No Build and Build scenarios



Note: This graphic was revised in the Final EA.

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3.1.3 Effects of Alternative 1

Alternative 1 and the planned Phoenix Subdivision support tracks includes the lengthening of the Germann Siding, the planned Phoenix Subdivision working track, the proposed rail line, roadway construction necessary to accommodate the new at-grade rail crossings of PIRATE, and modification of the existing Phoenix Subdivision Sossaman Road at-grade rail crossing. No other modifications to adjacent intersections are proposed, and the roadway configuration under Alternative 1 and the planned Phoenix Subdivision support tracks would remain the same as the 2050 No Build scenario.

3.1.3.1 2050 Build Level of Service

A comparison of traffic operations for the 2050 No Build and Build scenarios is presented in Table 3-3 and on Figure 3-2. The LOS at most intersections would worsen under the 2050 Build scenario should PIRATE be authorized and constructed. However, all intersections would operate at an acceptable LOS D or better during a.m. and p.m. peak hours.~~, except the intersection at Sossaman Road and Germann Road. The intersection at Sossamon Road and Germann Road would operate at LOS E in both the 2050 Build and 2050 No Build scenarios, meaning that that the project would not worsen traffic conditions at this intersection.~~ The approaches at several of the study intersections in the Build scenario would have longer delays when compared to the No Build scenario. The longer delays in the Build scenario are mainly attributed to the new at-grade rail crossings associated with PIRATE. However, the *average* hourly LOS for the Build scenario would meet Mesa and Queen Creek's goal of maintaining traffic operations at LOS D or better.

Table 3-3. Level of service for 2050 No Build and 2050 Build scenarios

Intersection	2050 No Build Average Level of Service		2050 Build Average Level of Service	
Peak Hour	a.m.	p.m.	a.m.	p.m.
Power Road and Pecos Road (south)	D[1]	C[1]	D	D
Sossaman Road and Pecos Road (south)	C	C[2]	C[3] ~~D~~	C[3] ~~D~~
Sossaman Road and Germann Road	B ~~E~~	B ~~E~~	C ~~E~~	C ~~E~~
Ellsworth Road and Pecos Road (north)	B[4] ~~A[1]~~	B ~~A[1]~~	B[5] ~~C[2]~~	B ~~C[2]~~
Ellsworth Road and Pecos Road (south)	C[6] ~~B[3]~~	C ~~B[3]~~	C[7] ~~C[4]~~	C[4]
Ellsworth Road and Germann Road	C	C	C[8] ~~D~~	C[8]
Crismon Road and Pecos Road (north)	B	B	B ~~C~~	B
Crismon Road and Germann Road	B	B	B ~~C~~	C ~~B~~
Signal Butte Road and Pecos Road (north)	C~~[5]~~	C ~~B~~	C~~[6]~~	C~~[6]~~
Signal Butte Road and Germann Road	B ~~C~~	B ~~C~~	C	B ~~C~~

[1] The 2050 No Build southbound and westbound approach at Power Road and Pecos Road (south) would operate at an LOS D during the a.m. peak hour and the westbound approach would operate at an LOS D during the p.m. peak hour.
[2] The 2050 No Build eastbound approach at Sossaman Road and Pecos Road (south) would operate at an LOS D during the p.m. peak hour.
[3] The 2050 Build northbound approach at Sossaman Road and Pecos Road (south) would operate at an LOS D during the a.m. peak hour, and the eastbound approach would operate at an LOS D during the p.m. peak hour.
[4~~1~~] The 2050 No Build westbound approach at the Ellsworth Road and Pecos Road (north) intersection would operate at an LOS D during the a.m.~~ and p.m.~~ peak hour~~s~~.
[5~~2~~] The 2050 Build westbound approach at the Ellsworth Road and Pecos Road (north) intersection would operate at an LOS D~~F~~ during the a.m.~~ and p.m.~~ peak hour~~s~~.
[6~~3~~] The 2050 No Build eastbound approach at the Ellsworth Road and Pecos Road (south) intersection would operate at an LOS D during the a.m. peak hour~~s~~.
[7~~4~~] The 2050 Build eastbound approach at the Ellsworth Road and Pecos Road (south) intersection would operate at an LOS D~~F~~ during the a.m. peak hour.~~ and LOS D during the p.m. peak hour.~~

[8] The 2050 Build westbound and eastbound approaches would operate at LOS D for the a.m. and p.m. peak periods.
~~[5] The 2050 No Build eastbound approach at the Signal Butte Road and Pecos Road intersection would operate at an LOS E during the a.m. peak hour.~~
~~[6] The 2050 No Build eastbound approach at the Signal Butte Road and Pecos Road intersection would operate at an LOS E during the a.m. peak hour and LOS D during the p.m. peak hour.~~

3.1.3.2 2050 Build Delays and Queue Lengths

In the 2050 Build scenario, longer delays ~~and~~or queues would occur during peak hours at the following intersections compared to the 2050 No Build scenario:

- Power Road and Pecos Road (south)
- Sossaman Road and Pecos Road (south)
- Ellsworth Road and Pecos Road (north)
- Ellsworth Road and Pecos Road (south)
- Crismon Road and Pecos Road (north)
- Signal Butte Road and Pecos Road (north)
- Ellsworth Road and Germann Road
- Crismon Road and Germann Road
- Signal Butte Road and Germann Road ~~(increased queueing only)~~

Queuing can occur when trains pass through the at-grade railroad crossings twice each day, and when trains block roadways while turning around at the wye (Pecos Road), entering the PIRATE yard from the west (Sossaman Road), and when moving locomotives on the run-around track (Crismon Road). However, OEA calculated overall intersection performance using the parameter "average control delay" for all the approaches at an intersection over the a.m. and p.m. peak hours.

OEA anticipates that maximum queueing would occur during the peak hours, and the queues would dissipate over the next few cycles of operation. The overall amount of delay would still be within the acceptable range for the intersections. Maximum queueing would occur at higher levels for the Build scenarios compared to No Build scenarios. However, the LOS and overall control delay for the study intersections would not change substantially; as such, the study area intersections are not anticipated to incur blockages due to the construction and operation of PIRATE.

The longer delays in the 2050 Build scenario are mainly attributed to train operations from PIRATE during a.m. and p.m. peak hours (the peak hour results are the worst-case scenario with respect to potential delays; non-peak hour delays would be substantially shorter). To minimize the impact to roadways and intersections, OEA is recommending mitigation to impose timing restrictions for train operations on PIRATE, but not on the Phoenix Subdivision. As discussed in Section 4.5.1, OEA ~~proposes~~ recommend~~s~~~~ed~~ MMs that would limit train operations to occur outside the a.m. and p.m. peak periods ~~whenever possible~~to the maximum extent practicable (MM-TS-1). This proposed mitigation would also minimize potential access impacts to local schools near the at-grade crossings during the a.m. and p.m. peak hours.~~, which include the busiest times for schools of 7:00 to 8:00 a.m. and 3:00 to 4:00 p.m. (EPS Group 2022).~~

The updated traffic analysis in Appendix B, *Traffic Report*, assessed delays associated with the proposed at-grade rail crossings; the results are captured in the queuing analysis results for the

Build scenario. The low volume of school buses (as well as the timing of school bus traffic) results in school bus traffic not being a factor in traffic delays at rail crossings in the a.m. and p.m. peak periods (BFHS 2025; CUSD 2025; HUSD 2025; Jacobs 2025a, 2025b; QCUSD 2025).

Per the school bus routing information collected for all schools within the study area, only the Queen Creek Unified School District (QCUSD) reported buses traveling through the study area. Approximately 10 QCUSD buses travel along Ellsworth Road in the morning (6:15 to 6:45 a.m.) and 20 buses travel along Ellsworth Road in the afternoon (1:20 to 1:50 p.m.). However, both of these periods are outside of the determined peak hours of traffic based on collected traffic counts within the study area (QCUSD 2025).

Due to high traffic volumes on these corridors during the analysis year 2050, queue lengths would likely be longer. However, even the longest queues would dissipate within the first few cycles of the traffic signal operations, resulting in an overall intersection LOS that is within acceptable levels.

3.1.3.3 Traffic Operations During Rail Construction

The impacts of rail construction are expected to be high on heavy-traffic corridors such as Ellsworth Road, Sossaman Road, and Pecos Road. Specifically, detours would be needed to construct at-grade crossings on the following roadways/intersections (refer to Figure 2-8):

- Sossaman Road south of Germann Road
- Pecos Road between Power Road and ~~west of~~ Sossaman Road
- Sossaman Road north of Pecos Road
- Ellsworth Road between Pecos Road (south) and Pecos Road (north)
- Crismon Road between ~~south of~~ Pecos Road and Germann Road
- Signal Butte Road between Pecos Road and Germann Road ~~south of Pecos Road~~

These detours are anticipated to affect other roadways, such as Power Road and~~,~~ Ray Road.~~, and Germann Road.~~ UP's VM and OEA's MMs (VM-TS-3, VM-TS-4, VM-TS-5, and MM-TS-4) ensure that UP coordinates with the respective local agencies to obtain permits to work, identify detour routes, and prepare the temporary traffic control plans for impacts to roadways and to pedestrian facilities at the proposed at-grade crossing locations. Moreover, impacts to traffic operations on local roads would be temporary, occurring only during construction of at-grade crossings during the anticipated 9-month construction period.

3.1.3.4 Transportation Safety and Access Management

Temporary traffic control guidelines and permit requirements established by Mesa, Gilbert, and Queen Creek would stipulate traffic requirements during construction of at-grade crossings. OEA is recommending mitigation (MM-TS-4) to ensure that UP coordinates temporary road closures and detours with Mesa, Gilbert, and Queen Creek 30 days prior to any road closure and follows the guidelines stipulated by local agencies. The temporary traffic control permits would require UP to maintain access to adjacent properties during construction, including those at the at-grade crossing locations, or provide an alternate detour (MM-TS-4).

At-grade rail crossings can increase the potential for pedestrian, bicycle, and vehicular crashes. However, PIRATE includes the installation of warning/control devices such as bells, flashing lights, and gates to reduce the potential for collisions. UP would also install passive warning devices such as crossbucks (the x-shaped signs that mean yield to the train), yield or stop signs, and pavement markings at new at-grade rail crossings (VM-TS-6).

The Arizona Corporation Commission (ACC) has authority over the establishment or modification of public railroad crossings. As shown in Section 4.5.1, UP would be required to consult with ACC and Mesa regarding roadway safety and user expectations~~file for approval of the at-grade crossings proposed for PIRATE~~, which would include a review of the crossings for potential impacts to public safety (VM-TS-5). UP received approval from ACC for the PIRATE at-grade crossings in December 2023. ACC conditioned their approval, in part, by requiring UP to complete annual traffic studies on Ellsworth Road and to construct a grade-separated crossing at Ellsworth Road if traffic delays exceed 24 vehicle-hours per day (ACC 2023b). OEA is recommending mitigation (MM-TS-6) requiring UP to fulfill all commitments imposed during the ACC's railroad crossing review process, as recorded in ACC Docket No. RR-03639A-22-0287 (ACC 2025).

UP anticipates that trains on PIRATE would be approximately ~~2,218~~2,220 feet in length at opening. If demand for rail service on PIRATE increases over time, the train length could increase up to ~~4,435~~4,500 feet in length. Train operations at the wye, PIRATE yard, and run-around track could result in or lengthen delays based on their proximity to certain at-grade crossings. The end of the wye is less than 500 feet from the Pecos Road (south) at-grade crossing. OEA expects that trains could block this crossing if they use the wye to change directions while travelling on the Phoenix Subdivision. At the PIRATE yard, the western entrance is less than 2,000 feet from Sossaman Road. Delays at this at-grade crossing could increase if trains must slow down or unexpectedly wait to enter the PIRATE yard from the west. The eastern end of the PIRATE yard is about 6,000 feet from Ellsworth Road, which is longer than the maximum train length. Therefore, OEA does not expect PIRATE yard operations would increase delays at the Ellsworth Road at-grade crossing. Trains could also block the Crismon Road at-grade crossing when the run-around track is used to move the locomotive(s) from one end of the train to the another.

Blocking at-grade crossings for excessive periods of time can pose safety risks to the community, including delayed emergency response. As discussed earlier in this section, delays and queueing could occur on local roadways and intersections during peak periods when trains are operating. As indicated in Section 4.5.1, OEA is recommending mitigation with timing restrictions for train operations to reduce queuing and resulting delays in emergency response (MM-TS-1). UP has proposed VM to coordinate with local agencies and emergency service providers to reduce delays in emergency response (VM-TS-7). UP's coordination with emergency service providers will include notification of when alternate routes will be required during construction (MM-SOC-1). OEA also continues to recommend~~s~~ mitigation requiring UP to manage train operations to not block ~~no more than one~~at-grade crossings and adjacent signalized intersections ~~at a time~~on major arterials for more than 10 minutes at a time to minimize disruptions to emergency responders (MM-TS-3).

3.1.3.5 Grade Separation Analysis

In response to comments on the Draft EA, OEA conducted a grade separation analysis for the railroad crossings of roads within the study area for PIRATE (refer to Chapter 4 of the *Traffic Report* in Appendix B). The grade separation analysis concludes that none of the proposed crossings meet the criteria for grade separation under the 2050 Build conditions (refer to Chapter 4 and Appendix E of the *Traffic Report* included in Appendix B of this Final EA). Projected traffic volumes, low train speeds (20 miles per hour), and limited train frequency (two trains per day) would result in minimal vehicle delay and low likelihood of train-vehicle crashes. In addition, each intersecting roadway provides adequate sight distance and sufficient capacity. Overall, the findings detailed in the *Traffic Report* show that all proposed crossings can safely and efficiently operate at grade through 2050. However, OEA notes that its model of horizon year 2050 shows the crossing at Ellsworth Road would likely exceed 24 vehicle-hours of delay per day, triggering UP's commitments as part of the ACC review (MM-TS-6).

3.1.4 Effects of Alternative 2

Except for potential impacts to Mesa's ~~future~~ Willis Road project, the effects on transportation and safety from Alternative 2 and the planned Phoenix Subdivision support tracks would be the same as those described for Alternative 1 and the planned Phoenix Subdivision support tracks, during both project construction and during project operation. The findings of the grade separation analysis for Alternative 2 would be the same as those described for Alternative 1.

If Alternative 2 is authorized by the Board, Mesa would have to shift the Willis Road alignment a minimum of 100 feet to the south to accommodate the proposed rail line. Now that 0.50 mile of Willis Road east of Ellsworth Road is paved and open to traffic, this shift would require reconstruction of about 380 feet of existing roadway that would be displaced by the Alternative 2 rail corridor, as well as another 350 feet west of the displaced segment to transition the existing roadway south to the new alignment. Indirect impacts of shifting the existing portion of Willis Road would include loss of sidewalks, road frontage, parking, and an entrance along the northern side of the Brickyards on Ellsworth.

Mesa designed Willis Road to connect directly to The Cubes' western entrance. Shifting the alignment would create an intersection consisting of two opposing, but offset, T-junctions in close proximity (rather than in a "+" shape). Sometimes known as a dog-leg intersection, these offset intersections are often harder for vehicles to navigate. Creating a new intersection for Willis Road at Crismon Road close to the Alternative 2 at-grade crossing would affect the transportation safety, operations, and performance of the new intersection.

3.2 Air Quality and Climate Change

This section addresses the existing conditions and potential short- and long-term impacts related to air quality and climate change and is based upon the findings of the updated *Air Quality Report* in Appendix C. OEA updated the *Air Quality Report* to reflect changes in the construction start year, air quality affected environment, applicable regulatory standards, and analysis tools. Neither the 2022-2023 ground disturbance, nor recent developments and land use changes in the PAMZ, resulted in significant changes to the air quality analysis, impact findings, or MMs.

The air quality analysis evaluated the potential effects of the following types of emissions from construction and operation of PIRATE and the planned Phoenix Subdivision support tracks:

- Criteria pollutants such as:
  - Carbon monoxide (CO)
  - Particulate matter with an aerodynamic diameter equal to or smaller than 10 micrometers (PM_{10}) and 2.5 micrometers ($PM_{2.5}$)
  - Ozone and pollutants that form ozone when exposed to solar radiation (ozone precursors), including nitrogen oxides (NO_x) and volatile organic compounds (VOCs)
- Mobile source air toxics, which are hazardous air pollutants emitted from on-road and non-road vehicles that can cause cancer and noncancer health risks.
- Greenhouse gases (GHG) reported in terms of carbon dioxide equivalents (CO_2e) and calculated as the product of the mass emitted of a given GHG and its specific global warming potential.

EPA classifies regions with respect to each criteria pollutant, depending on whether the area's monitored air quality meets the National Ambient Air Quality Standards (NAAQS). A region that meets the air quality standard for a given pollutant is designated as being in "attainment" for that pollutant. If the region does not meet the air quality standard, it is designated as being in "nonattainment" for that pollutant. An area that was designated as nonattainment and has been redesignated to attainment and has a federally approved maintenance plan is in "maintenance" for that pollutant. The project is located in an area that was previously designated as nonattainment for CO; the former Phoenix CO maintenance area was redesignated as attainment with a maintenance plan in April 2005. The maintenance period for CO ended in April 2025, and the area has met the 20-year maintenance plan requirements.

PIRATE and the planned Phoenix Subdivision support tracks are in a nonattainment area for ozone and PM_{10} ~~and are in a maintenance area for CO~~ under the NAAQS; therefore, the project is subject to general conformity requirements for these two pollutants for construction-related emissions.[20] OEA performed a general conformity applicability analysis for ozone's precursors of NO_x and VOCs, and for PM_{10} ~~and CO~~ from project construction, which would be short-term. Projected construction emissions were compared to the general conformity de minimis thresholds to demonstrate conformity, as shown later in this section in Table 3-7. The table demonstrates that the estimated construction emissions in each area are less than the conformity thresholds. Therefore, the General Conformity Rule does not require further evaluation of conformity. Unlike construction emissions, locomotive emissions from rail operations are not subject to the General Conformity Rule because the Board does not exercise continuing program control over rail operations and would not exercise such control over operation of the project.

PIRATE and the planned Phoenix Subdivision support tracks are also located in the former Phoenix CO maintenance area. Since issuance of the Draft EA in 2023, the area has met the 20-year maintenance plan requirements; the maintenance period ended in April 2025. Therefore, the project is no longer subject to conformity requirements for CO. Nonetheless, to address

[20] Refer to Section 4.3 of the *Air Quality Report* in Appendix C for additional information regarding the general conformity analysis.

comments on the Draft EA regarding vehicles idling when queued for a passing train, OEA evaluated the localized impacts of CO for the intersection(s) where the project would cause traffic conditions to deteriorate. Refer to Section 3.2.3.2, *Long-term Operational Emissions*.

Currently, no national standards have been established regarding GHGs, nor has EPA established criteria or thresholds for ambient GHG concentrations pursuant to its authority to establish motor vehicle emission standards for carbon dioxide (CO_2) under the Clean Air Act (42 U.S.C. §§ 7401-7671q). The Draft EA cited EO 13990, "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis" (2021), which declareds that it is essential that agencies capture the full costs of GHG emissions as accurately as possible, including taking global damages into account. On January 9, 2023, CEQ issued interim guidance for implementing EO 13990 and the with a public comment period endinged April 10, 2023 (88 Fed. Reg. 10097). The Draft EA did not consider the interim guidance due to the timing of issuance relative to preparation of the supporting technical analysis, and both the EO and the interim guidance have since been rescinded. As of February 18, 2026, all federal regulations or guidance related to GHG have been rescinded (91 Fed. Reg. 7686). Nevertheless, to avoid delay in the NEPA process and to ensure that the information contained in this Final EA is accurate, OEA's has retained and updated the analysis is described in Sections 3.2.1 through 3.2.4.

3.2.1 Affected Environment

The study area for air quality and climate change is the Phoenix metropolitan area, including Mesa. The study area is designated as being in moderate nonattainment for 2008 ozone NAAQS, marginal nonattainment for 2012 ozone NAAQS, and serious nonattainment for PM_{10}, and maintenance for CO. Data from the last 5 years that are available (2020 to 20242017 to 2021) were obtained from several ADEQ and Maricopa County Air Quality Department (MCAQD) air monitoring stations located near the proposed rail line (EPA 2025a2022b). The 24-hour average PM_{10} concentration exceeded NAAQS in 2 3 out of the 5 years, and the 8-hour ozone concentrations exceeded NAAQS in all 5 years. NAAQS thresholds were not exceeded for other pollutants.

The two largest sources of GHG emissions in Maricopa County are mobile sources and electricity generation and mobile sources, which represent 42.645.9 percent and 40.740.8 percent of GHGs generated by the community, respectively. In 20202018, Maricopa County generated approximately 51.2746.8 million metric tons of CO_2e (MCAQD 20232020). Based on EPA's Greenhouse Gas Equivalencies Calculator, this is roughly equivalent to CO_2 emissions from 12 coal-fired power plants in 1 year. For additional context, a typical gas-based car that runs at 22 miles per gallon emits about 5 metric tons of CO_2 per year (EPA 2025b2022a).

3.2.2 Effects of the No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Therefore, no project-related construction would occur, and no new emissions or air quality impacts would result from the proposed rail line operations. Current and future businesses in the PAMZ would continue to receive raw materials and ship finished product by trucks. Emissions from truck trips and their associated air quality impacts would continue to increase as industrial and commercial development intensifies.

3.2.3 Effects of Alternative 1

3.2.3.1 Short-term Construction Emissions

Emissions during construction of the project would include engine exhaust from vehicle trips traveled by construction workers and haul trucks, off-road construction equipment, and locomotive use. These emissions would primarily consist of CO, NO_x, PM_{10}, $PM_{2.5}$, sulfur dioxide, VOCs, and GHGs. Construction of Alternative 1 and the planned Phoenix Subdivision support tracks would also cause GHG emissions: an estimated 6,554 metric tons of CO_2e would be emitted during construction. In addition, earth-moving activities and dust from vehicle travel on paved and unpaved roads would result in fugitive dust emissions. Table 3-4 lists the construction emissions from Alternative 1 and the planned Phoenix Subdivision support tracks.

The anticipated construction start year changed from 2023, which was used in the Draft EA, to 2027. The construction emissions changed because the emission factors and the model that OEA used in the analysis changed from Motor Vehicle Emission Simulator Version 3 (MOVES3) to MOVES5.

Table 3-4. Construction emissions from Alternative 1 and the planned Phoenix Subdivision support tracks

Pollutants	VOC (ton/year)	NO_x (ton/year)	CO (ton/year)	SO_x (ton/year)	PM_{10} (ton/year)	$PM_{2.5}$ (ton/year)
Nonroad Construction Equipment	1.18 ~~1.29~~	13.89 ~~15.39~~	2.48 ~~3.12~~	0.013	0.55 ~~0.64~~	0.53 ~~0.62~~
On-road Vehicles	0.50 ~~0.93~~	11.86 ~~18.82~~	8.74 ~~11.27~~	0.011 ~~0.013~~	1.00 ~~1.30~~	0.54 ~~0.75~~
Fugitive Dust	N/A	N/A	N/A	N/A	15.48 ~~18.56~~	2.65 ~~3.00~~
Total Construction Emissions	**1.68** ~~**2.22**~~	**25.75** ~~**34.21**~~	**11.22** ~~**14.39**~~	**0.024** ~~**0.026**~~	**17.02** ~~**20.51**~~	**3.73** ~~**4.37**~~

N/A = not applicable
SO_x = sulfur oxide

Construction-related emissions and potential air quality impacts would be short term, occurring only while construction is in progress. Construction equipment and vehicles used for the project would comply with EPA's emissions standards for on-road vehicles and off-road construction equipment (VM-AIR-2). In addition, UP would comply with applicable dust-control requirements in MCAQD regulations and implements the best management practices (BMPs) to reduce fugitive-dust emissions (VM-AIR-1).

3.2.3.2 Long-term Operational Emissions

Operation of PIRATE would cause emissions from locomotives due to daily train trips coming in and out of the PAMZ and from locomotive operations in the PIRATE yard. However, operation of the proposed rail line would reduce the diesel truck trips to and from the PAMZ. Currently, over 6,100 trucks travel to and from the PAMZ monthly. This includes over 400 trucks per month that travel over 80 miles round trip to and from Loup Logistics' Phoenix transload facility (Mesa 2021b~~d~~). Providing direct rail access within the PAMZ would remove approximately 30,000 truck trips from public roadways in PIRATE's first year of operation (Mesa 2021b~~d~~). The reduced diesel truck trips would reduce emissions in the region, benefiting the region's air quality. Locomotive emission increases would be offset by emission reductions due to reduced truck trips, resulting in net emission decreases of all criteria pollutants starting the first year of PIRATE operations.

Table 3-5 summarizes the operation emissions from the locomotives and the vehicle emission reduction from Alternative 1. Operation of PIRATE would not affect the number of the trips on the Phoenix Subdivision. Therefore, operation of the planned Phoenix Subdivision support tracks would not cause emission increases, and OEA did not include the planned Phoenix Subdivision support tracks in the analysis summarized in Table 3-5. The operational emissions from the reduced truck trips changed because the emission factors and the model that OEA used in the analysis changed between 2023 (which was the anticipated construction start year used for the Draft EA) and 2027 (the current anticipated construction start year).

Table 3-5. Alternative 1 operational emissions

Pollutants	VOC (ton/year)	NO_x (ton/year)	CO (ton/year)	SO_x (ton/year)	PM_{10} (ton/year)	$PM_{2.5}$ (ton/year)
Emission Increase from Locomotives	0.46	7.76	1.16	0.00	0.29	0.28
Emission Reduction - Reduced Truck Trips Overall	-0.58 ~~-0.92~~	-15.46 ~~-20.71~~	-6.55 ~~-7.16~~	-0.01	-1.16 ~~-1.24~~	-0.68 ~~-0.80~~
Net Change in Emissions	**-0.13** ~~**-0.46**~~	**-7.70** ~~**-12.95**~~	**-5.40** ~~**-6.00**~~	**-0.01**	**-0.87** ~~**-0.95**~~	**-0.40** ~~**-0.52**~~

CO emissions tend to accumulate in areas where a large number of vehicles are idling or traveling at low speeds at intersections. As summarized in Section 3.1, *Transportation and Safety*, ~~three~~the Power Road and Pecos Road intersection~~s~~ would have a deteriorated LOS D or worse due to operation of the proposed rail line. The modeling results in Table 3-6 show that the CO concentrations at the ~~three~~ intersection~~s~~ would not cause exceedances of the 1- or 8-hour CO NAAQS in 2050. Other intersections near the project would have LOS C or better or would have improved LOS under the Build scenario (which assumes construction of PIRATE and the planned Phoenix Subdivision support tracks) compared to the No Build scenario and thus would not cause CO hot spots. Therefore, the project would not cause new violations of the NAAQS for CO.

Table 3-6. Maximum predicted CO concentrations[1]

Intersection	2050 No Build Scenario		2050 Build Scenario	
	1 hour (ppm)	8 hour (ppm)	1 hour (ppm)	8 hour (ppm)
(NAAQS for CO)	35	9	35	9
Power Road and Pecos Road (morning peak hour)	2.5	1.7	2.6	1.7
Power Road and Pecos Road (afternoon peak hour)	N/A[2]	N/A	2.5	1.7
~~Sossaman Road and Pecos (morning peak hour)~~	~~2.7~~	~~2.0~~	~~2.9~~	~~2.2~~
~~Sossaman Road and Pecos Road (afternoon peak hour)~~	~~2.8~~	~~2.1~~	~~2.9~~	~~2.2~~
~~Sossaman Road and Germann Road (morning peak hour)~~	~~2.7~~	~~2.0~~	~~2.8~~	~~2.1~~
~~Sossaman Road and Germann Road (afternoon peak hour)~~	~~2.7~~	~~2.0~~	~~2.8~~	~~2.1~~
~~Ellsworth Road and Germann Road (morning peak hour)~~	~~2.9~~	~~2.2~~	~~3.0~~	~~2.3~~

[1] The results in this table include the maximum 1- and 8-hour background concentrations of ~~2.4 ppm and 1.7 ppm~~2.0 ppm and 1.3 ppm, respectively, measured during 2020 to 2024~~2019 to 2021~~ at the EPA monitoring station located at 275 South Ellis Street, Chandler, AZ (ID: 04-013-4004). This monitoring station is housed at the City of Chandler's Fire Station No. 283, about 12 miles west of the project limits.
[2] Not applicable (N/A) because the LOS would be better than D; therefore, CO hot spot modeling is not required.
ppm = parts per million

Localized accumulation of PM_{10}/$PM_{2.5}$ emissions tend to occur at locations where multiple diesel vehicles aggregate. PIRATE would reduce the diesel vehicle trips going to and leaving the PAMZ, and no more than two locomotives would be idling at one single location for more than 6.5 hours per day. Therefore, accumulation of PM_{10}/$PM_{2.5}$ emissions from locomotives or on-road vehicles are not anticipated during project operation.

The general conformity de minimis threshold for a federal action in a moderate ozone nonattainment area is 100 tons per year for each ozone precursor pollutant (NO_x and VOC). The de minimis threshold for PM_{10} is 70 tons per year for serious nonattainment areas~~, and CO is 100 tons per year for a maintenance area~~. Table 3-7 compares the project's updated construction emissions to the applicable general conformity de minimis thresholds. The analysis results indicate that the project would not exceed any of the applicable general conformity de minimis thresholds. Therefore, the project would not cause new violations of the NAAQS, worsening of existing violations of the NAAQS, or delays in attaining the NAAQS. Thus, the project is exempt from further conformity determination requirements under the federal General Conformity Rule.

Table 3-7. Comparison of project emissions increases to general conformity de minimis thresholds

Pollutants	VOC (ton/year)	NO_x (ton/year)	CO (ton/year)	SO_x (ton/year)	PM_{10} (ton/year)	$PM_{2.5}$ (ton/year)
Construction 2027~~2023~~	1.68 ~~2.22~~	25.75 ~~34.21~~	11.22 ~~14.39~~	0.024 ~~0.026~~	17.02 ~~20.51~~	3.73 ~~4.37~~
General Conformity De Minimis Thresholds	100	100	N/A~~100~~	N/A	70	N/A

Operation of PIRATE and the planned Phoenix Subdivision support tracks would cause GHG emissions, which were estimated using EPA's ~~2021~~ 2024 MOVES5~~3~~ program (EPA 2026~~2021~~). Table 3-8 summarizes the GHG emissions estimated for project operations.

Table 3-8. Operational GHG emissions as CO2e

Emission Sources	Alternative 1 CO_2e (metric tons/year)
Locomotive Operation (~~2023~~2027 and beyond)	402
Truck Trip Reduction (~~2023~~2027 and beyond)	-3,928 ~~-3,909~~
Net Change	-3,526 ~~-3,507~~

As shown in Table 3-8, while the project's locomotive operation would cause GHG emissions, the emission increase would be offset by the GHG emission reduction from the reduced diesel truck trips that would not otherwise occur without PIRATE, resulting in a net reduction in GHG emissions. Alternative 1 and the planned Phoenix Subdivision support tracks would reduce GHG emissions compared to the No-Action Alternative. As discussed in Section 3.10, *Environmental Justice*, there will be no impacts to environmental justice populations because none are present within the study area.

3.2.4 Effects of Alternative 2

Construction and operation of Alternative 2 and the planned Phoenix Subdivision support tracks would be similar to Alternative 1 and the planned Phoenix Subdivision support tracks. Therefore, project construction and operational emissions from Alternative 2 would be similar to Alternative 1.

3.3 Noise and Vibration

This section addresses the existing conditions and impacts related to noise and vibration based upon the findings of OEA's updated *Noise and Vibration Analysis* (Appendix D). OEA updated the *Noise and Vibration Analysis* to reflect changes in the construction start year, number of daily trains on the Phoenix Subdivision, and in the existing noise and vibration environment. The ground disturbance conducted in 2022 to 2023 did not change the previous analysis. However, between August 2023 and June 2025, traffic and land use in the study area changed. This included the construction of new sensitive receptors—specifically the Acero Queen Creek Station apartments—adjacent to the planned Phoenix Subdivision support tracks which required a more detailed vibration and noise analysis. Accordingly, OEA has updated its noise and vibration analysis below. OEA has also added a discussion of train horn noise and quiet zones in response to comments on the Draft EA.

The study area for the noise analysis is between ~~200~~100 feet and 1,600 feet from existing and proposed rail lines, depending on the presence of shielding from buildings. The study area for the vibration analysis is between ~~100~~120 feet and 200 feet from existing and proposed rail lines. The PIRATE yard was analyzed as a rail yard to account for potential noise associated with idling, coupling, and decoupling trains, where these activities would largely occur for PIRATE.

To characterize noise impacts, OEA considers not only the source of noise, but also existing background noise levels and sensitivity to noise. Noise especially affects people in certain locations, such as schools, places of worship, libraries, hospitals, residences, retirement communities, and nursing homes. These locations are therefore known as noise-sensitive receptors (hereafter, receptors). The Board's regulations at 49 C.F.R. § 1105.7(e)(6) include two specific thresholds for noise analysis as follows:

- An increase in noise exposure as measured by a day-night average noise level (Ldn), and
- 3 A-weighted decibels (dBA) or more.

If the thresholds are exceeded, OEA identifies the receptors in the study area and quantifies the noise increase for these receptors. An adverse noise impact occurs when the noise level at a receptor increases by 3 dBA or more and reaches or exceeds a noise level of 65 dBA when combined with the existing background noise.[21]

OEA's study methods are also guided by the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (2018) and the FRA's *High-Speed Ground Transportation Noise and Vibration Impact Assessment* (2012) technical guidance manuals. These manuals establish metrics for determining potential project impacts for locations in three land use categories:

- **Category 1** (High Sensitivity) – Land for which a quiet setting is intrinsic to its purpose, or buildings where vibration would interfere with the operations taking place there (i.e., outdoor amphitheaters, concert halls, national historic landmarks with outdoor use).

[21] Although the Board's regulations at 49 C.F.R. § 1105.7(e)(6) indicate that *either* an increase of 3 dBA *or* an increase to 65 dBA Ldn would be an adverse impact, research indicates that *both* conditions must be met or exceeded for an adverse noise impact from rail operations to occur (Board 1998; Coate 1999).

- **Category 2** (Residential) – Where people normally sleep (homes, hotels, hospitals).
- **Category 3** (Institutional) – Institutional land (schools, libraries, theatres, churches, offices located outside of industrial zones).

These manuals also identify criteria to help determine if project-generated noise would result in no impact, a moderate impact, or a severe impact relative to existing noise levels:

- **No Impact** – Project-generated noise is not likely to cause community annoyance. Noise projections in this range are considered acceptable by the FTA/FRA and mitigation is not required.
- **Moderate Impact** – The threshold at which the percentage of people highly annoyed by project noise becomes measurable. The magnitude of the project impact and need for mitigation will depend upon other factors, such as existing noise levels, the predicted future increase in noise levels, and the types and number of land uses affected.
- **Severe Impact** – The percentage of people highly annoyed by project noise increases significantly. Noise mitigation must be considered if it is not practical to change the location of the project or under extenuating circumstances that prevent it (a practical mitigation method does not exist).

In addition, OEA's study methods are guided by the U.S. Department of Housing and Urban Development (HUD) 65 dBA Ldn "threshold of annoyance" (24 C.F.R. Part 51, Subpart B), which is used as the threshold for a suitable living environment and has been incorporated into FTA/FRA guidance documents.

Train horns are required at all public, at-grade roadway crossings under the FRA's Train Horn Rule (49 C.F.R. Part 222), which mandates the routine sounding of locomotive horns to ensure public safety. The rule allows exceptions only where a community has established an FRA-approved quiet zone.

FTA guidance establishes ground-borne vibration (GBV) criteria in vibration decibels (VdB), which are in units of 1 micro-inch per second, and ground-borne noise (GBN) criteria in dBA. Acceptable levels vary by land use category and by the frequency of vibration events. Table 3-9 summarizes the applicable GBV and GBN impact thresholds for Categories 1 through 3, including criteria for frequent, occasional, and infrequent events.

Table 3-9. Ground-borne vibration and ground-borne noise impact criteria

Land Use Category	GBV Impact Levels Frequent Events[1]	GBV Impact Levels Occasional Events[2]	GBV Impact Levels Infrequent Events[3]	GBN Impact Levels Frequent Events[1]	GBN Impact Levels Occasional Events[2]	GBN Impact Levels Infrequent Events[3]
Category 1	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4][5]	N/A[4][5]	N/A[4][5]
Category 2	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: FTA 2018.
[1] Frequent is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
[2] Occasional is defined as between 30 and 70 vibration events of the same source per day. This category includes most commuter trunk lines.
[3] Infrequent is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research requires detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the heating, ventilation, and air conditioning systems and stiffened floors.
[5] Vibration-sensitive equipment is generally not sensitive to GBN.

While ground vibrations from construction activities do not often reach levels that can damage structures, some buildings must receive special consideration because of age and fragility. The construction vibration criteria include consideration of the building condition. The peak particle velocity (PPV) metric provides a means of assessing potential building damage, whereas the root-mean-square velocity in the dB (Lv) metric is an indication of annoyance. Table 3-10 lists suggested limits as a general guideline for assessing potential damage to structures from construction vibration, although the FTA guidance document (2018) expressly states these are not standardized criteria.

Table 3-10. FTA general assessment vibration damage criteria

Building/Structural Category	PPV at 25 feet, inche	Approximate Lv at 25 feet
I. Reinforced concrete, steel, or timber (no plaster)	0.5	102
II. Engineered timber and masonry buildings (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: FTA 2018, Table 7-5.

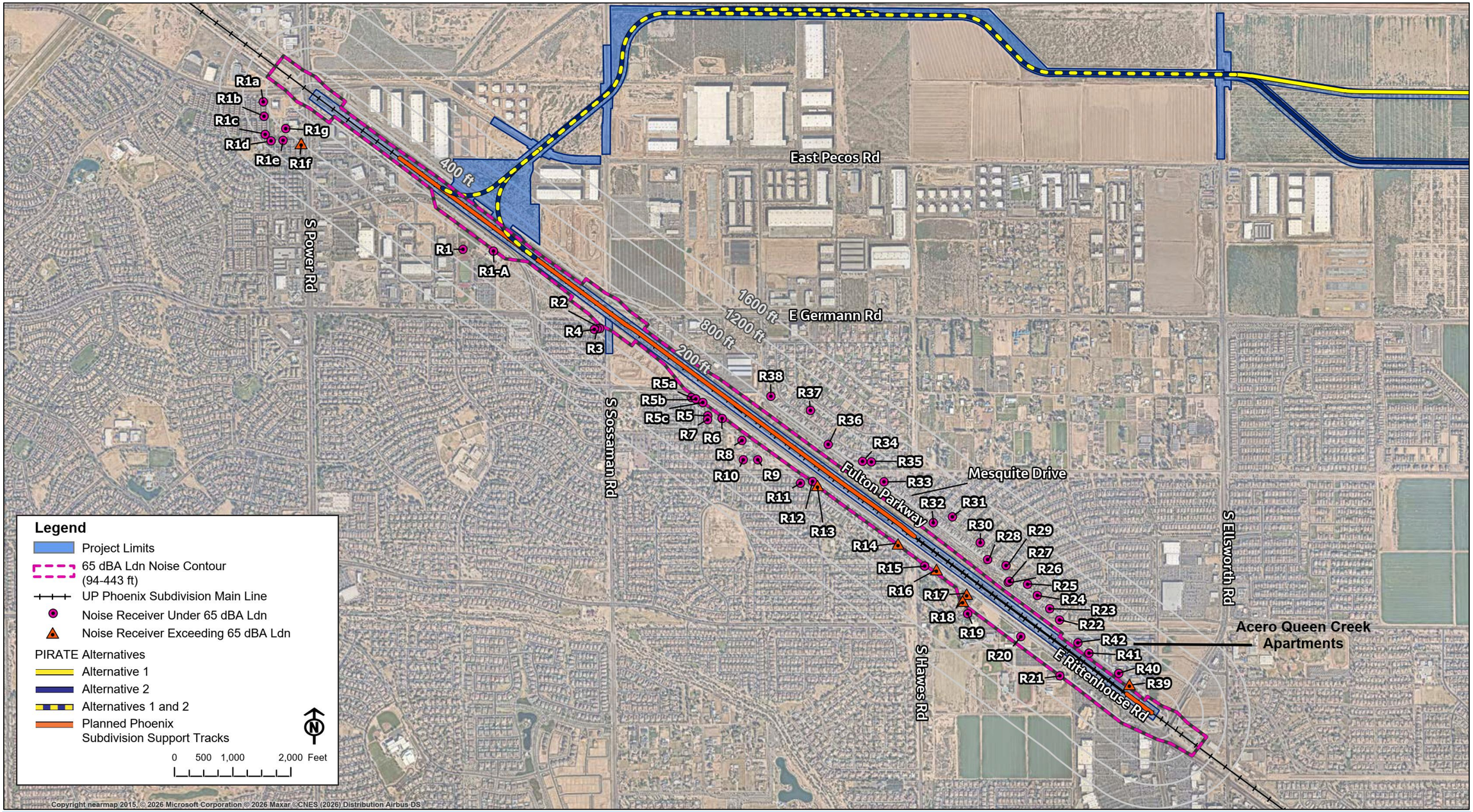
3.3.1 Affected Environment

The area adjacent to the planned Phoenix Subdivision support tracks is comprised of medium-density residential and commercial uses and several schools. The area along PIRATE generally includes ~~active and inactive~~ former agricultural lands ~~that are transitioning toward~~ and manufacturing, industrial, and mixed-commercial uses.

Residences (Category 2) comprise most of the noise-sensitive locations in the study area, followed by institutions (Category 3). A total of ~~185~~ 215 residential receptors and 7 institutional receptors are located in the study area. OEA found no high-sensitivity (Category 1) receptors in the study area. Existing ambient noise can range between 50 to 55 dBA Ldn in the less densely populated areas of the PAMZ and ~~up to~~ 65 dBA Ldn or more in areas closer to existing roadway, railroad, and MGA noise sources. Currently, ~~6~~ 7 Category 2 (residential) receptors in the study area experience noise that exceeds the HUD annoyance threshold (refer to Figure 3-3). This means that existing noise sources, such as roadway traffic, planes, and current train activity, may already be causing annoyance at these locations, which are all adjacent to the Phoenix Subdivision. No noise-sensitive receptors are located along the proposed rail line.

No existing FRA-approved quiet zones are located within the project vicinity, as the local jurisdictions have not pursued the safety features required to qualify for quiet-zone designation.

Figure 3-3. Noise-sensitive receptors in the study area



Note: This graphic was revised in the Final EA.

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~~No vibration-sensitive locations exist in the vibration study area, including the new fine arts auditorium for Benjamin Franklin High School. The closest buildings planned as part of Arizona State University's future Polytechnic Research Park are also outside of the vibration study area.~~ Buildings closest to the limits of the vibration study area are single-story, single-family residential; two-story, multifamily residential; and some two-story and multistory commercial and institutional structures (schools and ancillary facilities); refer to Figure 3-2 in the Noise Report. Soil types in the study area are generally characterized as loose sandy soils that dampen vibration more readily than stiffer clay-type soils. Since 2023, 19 new, residential (Category 2) receptors have been constructed within the vibration study area.

Existing vibration levels in the study area range between 69.4 to 71.8 VdB west of Ellsworth Road, while GBN levels range between 19.4 and 21.8 dBA. Currently, no receptors in the study area experience vibration levels that exceed the 72 VdB GBV or 43 dBA GBN impact criteria for Category 2 receptors (FTA 2018; FTA 2021).

In addition, no vibration-sensitive receptors are located along the proposed rail line. However, the general vibration screening methodology does not apply to construction activities. Therefore, OEA conducted a vibration damage and annoyance assessment of the construction activities to estimate typical construction vibration at vibration-sensitive receptors located near the planned Phoenix Subdivision support tracks as well as PIRATE, the PIRATE yard, and the run-around tracks. This assessment identified three buildings within 100 feet of PIRATE, the PIRATE yard, or the run-around tracks: two Category II buildings (non-engineered timber and masonry, no plaster) east of Ellsworth Road and one Category III building (non-engineered timber and masonry) west of Ellsworth Road.

3.3.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Therefore, the No-Action Alternative would not result in noise and vibration impacts. In the absence of PIRATE and the planned Phoenix Subdivision support tracks, the noise and vibration experienced in the study area would continue to be influenced by existing and future land use and resulting roadway and airport traffic, and some receptors in the study area would continue to experience noise that exceeds the annoyance threshold.

At the ~~6~~ 7 Category 2 receptors where current noise levels exceed the HUD annoyance threshold and range between 65 and 69 dBA Ldn, future noise levels would increase by a maximum of 1 dBA Ldn under the No-Action Alternative, which does not trigger the Board's thresholds under 49 C.F.R. 1105.79(e)(6). The noise level at 1 Category 3 receptor, west of Ellsworth Road, would increase from 65 to 66 dBA Ldn, which would exceed the HUD annoyance threshold. This 1-dbA Ldn increase does not trigger the Board's thresholds under 49 C.F.R. 1105.7(e)(6), however, because the projected incremental increase in noise is less than 3 dBA. The No-Action Alternative vibration levels from freight train activity would not exceed the 72 VdB GBV or 43 dBA impact criteria at any sensitive receptors.

3.3.3 Effects of Alternative 1

No noise-sensitive or vibration-sensitive land use Category 1, 2, or 3 uses are located along Alternative 1. Therefore, the following discussion focuses only on impacts to noise-sensitive or vibration-sensitive land uses from the planned Phoenix Subdivision support tracks.

The planned Phoenix Subdivision support tracks would not result in noise or~~and~~ vibration impacts to any receptors in the study area, including residences and schools. Noise levels associated with the planned Phoenix Subdivision support tracks were evaluated relative to noise levels at the same receptors under existing conditions. ~~Project operations would not further raise the noise levels at the 6 residential receptors located west of Ellsworth Road and adjacent to the Phoenix Subdivision that currently exceed the HUD annoyance threshold for noise. These areas currently experience high noise levels associated with roadway traffic and railroad activity, and project operations would not worsen those noise levels.~~

At the 7 Category 2 receptors, where current noise levels exceed the HUD annoyance threshold, future noise levels would increase by a maximum of 1 dBA Ldn, which does not trigger the Board's thresholds under 49 C.F.R. 1105.7(e)(6). Noise levels at 2 additional receptors in Category 3, west of Ellsworth Road, would exceed the HUD annoyance threshold. However, the 1-dBA increase at these 2 receptors would not trigger the Board's thresholds under 49 C.F.R. 1105.7(e)(6). Therefore, no project-related noise impacts would occur west of Ellsworth Road.

No Category 1, 2, or 3 noise receptors were identified in the noise study area east of Ellsworth Road. Therefore, no project-related noise impacts would occur east of Ellsworth Road. In these circumstances, the planned Phoenix Subdivision support tracks would not cause noise impacts under the Board's environmental regulations because the project would not increase noise levels by 3 dBA or more at any sensitive receptors.

Impacts from train horns at public, at at-grade road crossings can occur, and mitigation must be considered if a moderate noise impact is identified at sensitive receptors and required if a severe noise impact is identified. However, because Alternative 1 would not result in noise impacts, OEA is not recommending any additional noise mitigation in the Final EA.

Under Alternative 1, vibration levels from freight train activity on the planned Phoenix Subdivision support tracks would not exceed the 72 VdB GBV or 43 dBA impact criteria at any sensitive receptors. Therefore, no project-related vibration impacts would occur.

The updated *Noise and Vibration Analysis* (Appendix D) includes~~d~~ a project-level assessment of typical construction noise in the study area. OEA grouped construction activities into five phases (earthwork, paving, hauling, miscellaneous, and track installation) and estimated the maximum noise level (Lmax) that would be generated by the two loudest pieces of equipment in each construction phase. OEA then added the Lmax for each phase to determine a single Lmax for a typical hour of construction. These calculations determined that the noisiest construction would occur during the earthwork and paving phases with an Lmax of about 83 dBA, which is comparable to the noise in a city center. Even if all construction phases overlapped, construction noise levels would not exceed the 90-dBA daytime limit suggested by the FTA for residential and institutional uses or the 100-dBA limit suggested for industrial uses. Total noise for all phases overlapping would slightly exceed FTA's suggested nighttime limit of 80 dBA Lmax for residential properties in the Emperor Estates neighborhood in the town of Queen Creek, southwest of the Phoenix Subdivision and adjacent to Rittenhouse Road.

While operations would not exceed the Board's noise thresholds, construction noise could potentially exceed the Board threshold for an adverse noise impact by increasing noise levels by 3 dBA or more and exceeding a noise level of 65 dBA. This adverse impact would be temporary and occur only if the maximum noise levels occur during any construction phase (except hauling) or with all construction phases occurring at the same time during the entire 9-hour construction day. OEA is recommending mitigation requiring UP to adhere to local time restrictions that limit nighttime construction (MM-NV-2), which would avoid a potential impact at this location. As indicated in Section 4.5.3, OEA also recommends BMPs to reduce noise and vibration during construction (MM-NV-3).

~~Since no vibration-sensitive locations exist or are planned in the vibration study area, no vibration-related operational or construction impacts are predicted to occur.~~

OEA updated the *Noise and Vibration Analysis* (Appendix D) to include a damage and annoyance assessment of construction vibration anticipated to occur during construction of the planned Phoenix Subdivison support tracks, as well as PIRATE, the PIRATE yard, and the run-around tracks). OEA evaluated the potential for building damage by estimating vibration levels for the types of construction equipment anticipated to be used and adjusted those levels to reflect distances to nearby structures (refer to Figure 3-2 in Appendix D, *Noise and Vibration Analysis*). OEA conducted a separate assessment of human annoyance for each equipment type. The assessments were done for each piece of equipment individually. The analysis of five types of construction equipment showed that vibration levels at buildings nearest to construction activities would remain below the building Category II and Category III damage criteria and approximate thresholds of annoyance (refer to Appendix D, *Noise and Vibration Analysis*). Therefore, no construction vibration impacts were identified.

As a result, OEA is not recommending mitigation related to vibration. However, the vibration screening procedure summarized in the updated *Noise and Vibration Analysis* (Appendix D) can be used to guide future development in the area to ensure that vibration-sensitive uses are located outside the setback distance developed for land use Category 1 (120 feet) and land use Category 2 (200 feet) from PIRATE or future development along the Phoenix Subdivision, if possible.

3.3.4 Effects of Alternative 2

The noise and vibration effects of Alternative 2 and the planned Phoenix Subdivision support tracks would be the same as those described for Alternative 1 and the planned Phoenix Subdivision support tracks, during both project construction and during project operation.

3.4 Hazardous Materials and Waste Sites

This section describes the hazardous waste sites in the study area and discusses the potential impacts related to hazardous waste sites from PIRATE and the planned Phoenix Subdivision support tracks, including the potential to affect ongoing remediation and cleanup efforts.

Regulatory Environment

Federal agencies are required to coordinate with EPA and applicable state, interstate, and local environmental protection programs to ensure consistency of major projects with all federal hazardous substances and waste laws, regulations, and EOs. Those that relate to the control and handling of hazardous substances, cleanup of hazardous waste releases, and protecting the public from harm from these materials include the following:

- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA; 42 U.S.C. §§ 9601 – 9675)
- Resource Conservation and Recovery Act (RCRA; 40 C.F.R. Parts 239 - 282)
- Pollution Prevention Act of 1990 Emergency Planning (42 U.S.C. §§ 13101 – 13109) and Community Right-to-Know Act (42 U.S.C. §§ 11001 – 11050)
- Toxic Substances Control Act (15 U.S.C. §§ 2601 – 2697)
- EO 12088 – Federal Compliance with Pollution Control Standards
- EO 12856 – Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements

Under 49 U.S.C.§ 11101, railroads are required to provide transportation to all parties upon reasonable request, including those that transport hazardous materials.

Study Area

The study area for hazardous materials is a 1.0-mile radius around the project limits, which consists of UP's existing and proposed right-of-way and TCEs needed for the construction and operation of PIRATE and the planned Phoenix Subdivision support tracks (refer to Figures 2-4 and 2-5).

3.4.1 Affected Environment

3.4.1.1 Land Use

OEA reviewed historic and current land use to identify potential hazardous materials and waste sites. ~~The northern and western p~~Portions of the PAMZ are ~~mostly~~ occupied by ~~active~~former farmland, which ~~has~~ occurred in this area for nearly 100 years, based on a review of current and historical aerial photographs of the project vicinity. Various pesticides, herbicides, and fertilizers are typically used during agricultural activities, which can leave toxins in the soil for long periods of time and may be present in the agricultural areas of the project limits. The Queens Park neighborhood is a residential development in the southern portion of the PAMZ surrounded by former farmland and increasing light industrial/commercial development. Currently, large industrial companies in the eastern portion of the PAMZ—such as Mitsubishi Gas Chemical, Bridgestone, CMC, and Fujifilm—manufacture chemicals, metals, plastics, rubber, and electrical equipment. The area south of the PAMZ is mainly residential development and agriculture. The Phoenix Subdivision and UP's existing right-of-way run parallel to Rittenhouse Road with a high school and residential development to the west and light-industrial and warehouse development to the east. MGA and Arizona State University's Polytechnic Campus, on the former WAFB, are located north of the PAMZ.

In recent years, the southern portion of the PAMZ has undergone a transition from agricultural and low-intensity uses to industrial, manufacturing, and mixed-commercial development. This transition has introduced new facilities with potential hazardous materials storage, chemical use, and waste-handling activities—particularly near the Pecos Road/Sossaman Road intersection, along the Ellsworth Road corridor, and east of Crismon Road.

As discussed above, OEA discovered ground disturbance within UP's right-of-way via aerial imagery in 2023. This type of ground disturbance, which occurred adjacent to the former WAFB, involving excavation and grading, typically affects the superficial or upper soil layers. Although contamination from hazardous materials is unlikely to be found so close to the surface, OEA continues to recommended mitigation from the Draft EA requiring UP to conduct a Phase I Environmental Site Assessment (MM-HAZ-1) to evaluate the potential to encounter contaminants caused by the ground disturbance within the project limits.

3.4.1.2 Regulatory Database Review

OEA searched the Environmental Data Resources (EDR) database for state and federally listed hazardous materials sites within 1.0 mile of the project limits. Because EDR database findings are considered outdated after about 6 months, OEA conducted a new database search in January 2026. The database produced an updated report of available environmental records on January 16, 2026~~May 25, 2022~~ (Appendix E, *Environmental Data Resources Area/Corridor Report*). The report identified a total of ~~28~~ 64 individual sites, which are referred to in this section as "EDR-listed sites."

The number of EDR-listed sites increased by 36 between 2022 and 2026. This increase is attributed to two main factors: development in the PAMZ that resulted in new infrastructure and busineses with features that are tracked in the relevant databases and EDR system advancements allowing for more accurate and inclusive searches. The total number of screened sites (described below) increased by 34 from 22 to 56. The additional sites did not alter the conclusions in the Draft EA.

The EDR-listed sites were screened for their potential to impact the project or be impacted by the project according to the following review methods:

- Duplicate sites were consolidated.
- Sites located more than 0.25 mile from the project limits were not considered a potential risk to the project since that distance makes it unlikely that contamination would migrate to the project limits in concentrations above regulatory cleanup levels.
- The former WAFB is on the NPL as a Superfund site with numerous sites throughout the former base property. The available site data was reviewed, and those sites located closest to the project limits were included and summarized based on the most recent CERCLA 5-year review dated September 27, 2023 (GSINA and Gilbane 2023)~~June 8, 2017(AMEC 2017)~~.

OEA removed TRW from the screened EDR-listed sites because the company sold a large tract of its property in 2024, and the remaining parcel lies outside the 0.25-mile screening radius. The portion that TRW sold is not included in the EDR-listed sites. Another site (Prisoner of War Camp) was excluded from the screened list because it had been incorrectly identified as within the screening distance in the Draft EA and is located more than 0.25 mile from the project limits. The EDR report findings are summarized in the next two sections and shown on Figure 3-4.

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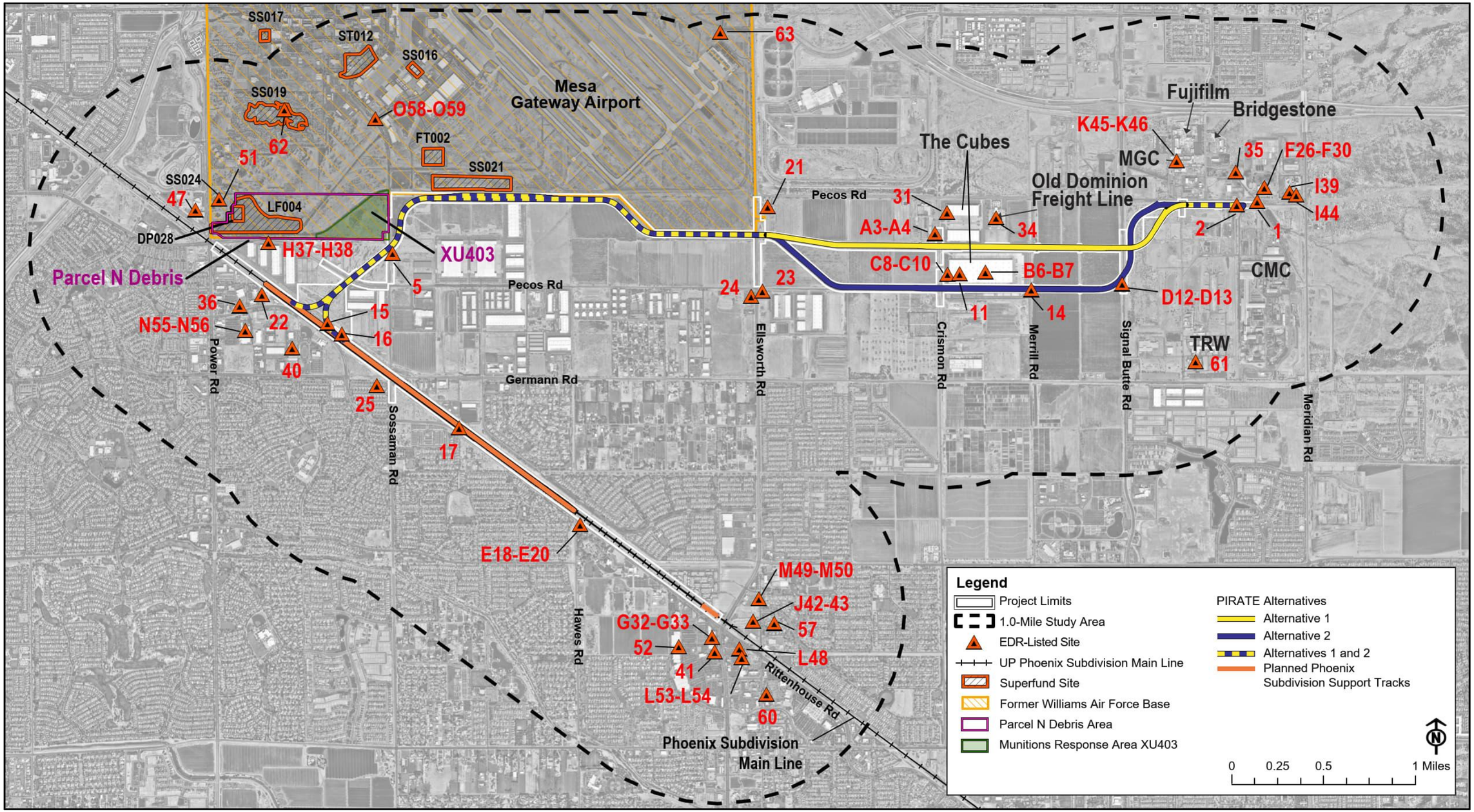
Figure 3-4. EDR-listed sites in the study area



Note: This graphic was revised in the Final EA.

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Former WAFB Superfund Site

Portions of the project limits run along the southern border of the former WAFB. The USAF commissioned the 4,043-acre WAFB as a flight training school in 1941 and operated until it closed in 1993 (EPA n.d.~~-c~~). Discharges and disposal at the site have resulted in soil and groundwater contamination. As a result of identified contamination, the former WAFB was placed on the NPL in 1989. Contaminants from base activities include organic solvents and paint strippers, petroleum spills, metal plating wastes, hydraulic fluids, pesticides, and radiological wastes. Initially, 13 potentially contaminated subsites were identified, including 2 fire training areas, skeet ranges, a fuel storage area with aboveground storage tanks (AST) and underground storage tanks (UST), surface storm drainage areas, hazardous material storage areas, a landfill, a pesticide disposal area, and a radiological disposal area. Over time, new subsites discovered at the base were added to the investigation (EPA n.d.~~-c~~).

Most of the sites initially identified during the Installation Restoration Program, established by the Department of Defense in 1978, have already been addressed through Records of Decision, which document the selected cleanup remedies. The main sites that are still being addressed as part of ongoing remediation efforts consist of the ST012 Fuels Storage Area, the LF004 Landfill, the SS017 Old Pesticide Paint Shop, and the FT002 Fire Training Area, as well as the recently discovered Parcel N Debris Area and the Munitions Response Area XU403. The sites located on the former WAFB that are within 0.25 mile of the project limits include the LF004 landfill and Site DP028; Site SS021; Site SS024; Site FT002; and the Parcel N Debris Area and the Munitions Response Area XU403. Each of these sites is described in greater detail as follows:

- **LF004**, a closed landfill located along the south/southwest boundary of the former WAFB, is currently in active remediation for soil vapor and groundwater impacts. The active soil vapor extraction (SVE) remediation system extends south and east of the former WAFB property boundary. The SVE system includes a subsurface piping system and extensive soil and groundwater monitoring well systems. While the SVE treatment area extends south of southern boundary of the former WAFB, the SVE treatment area does not extend into the project limits.

  Institutional controls are in place, limiting land use to non-residential uses. The September 2023 Five-Year Review revealed that groundwater exhibited concentrations of perfluoroalkyl substances (PFAS) above the lifetime health advisory. The review also found that PFAS were present in surface soil and subsurface soil, but at concentrations below regulatory screening limits (GSINA and Gilbane 2023).

- USAF inspects and maintains the permeable river rock cap over the main landfill and sewage sludge disposal area (former **Site DP028** and now included as part of LF004) on an annual basis, while long-term groundwater monitoring continues to be used to evaluate the effectiveness of the prescribed clean up goals and objectives (EPA n.d.~~-c~~). After a decade, as the water table rose, groundwater monitoring at the site revealed increasing concentrations of trichloroethylene and perchloroethylene, which were beginning to move offsite. The May 2014 amendment to the Record of Decision required SVE in one area of the landfill to treat soils above the water table, in-well air stripping, and in situ chemical oxidation in two other locations to address groundwater contamination (AMEC 2014).

- Groundwater cleanup is approaching attainment of the cleanup objectives specified in the 2014 Record of Decision amendment, and EPA granted a determination of Operating Properly and Successfully in January 2018. In April 2018, however, PFAS commonly used in fire-fighting foams were identified as a new issue in groundwater in the vicinity of the landfill (EPA n.d.~~-c~~). As of September 2023, groundwater concentrations of PFAS remain above the lifetime health advisory but do not exceed the EPA regional screening level. PFAS are also present in surface soil and subsurface soil at concentrations below regulatory screening limits (GSINA and Gilbane 2023).

- **Site SS021** is also located along the southern border of the former WAFB, adjacent to the proposed PIRATE yard (Figure 3-4). Site SS021 was a fire training area that included the use of various petroleum products and was identified as a site because of the presence of VOCs (EPA n.d.~~-c~~). USAF implemented institutional controls prohibiting residential use and requiring appropriate soil management procedures for excavations greater than 5 feet below ground surface.

  Groundwater was sampled in 2018 for PFAS and VOCs and semi-VOCs related to the former fire training activities to verify the completeness of the cleanup. Former firing range facilities are located within **Site SS021**. The 5-year report indicated that the institutional controls are in place to prohibit residential use due to the presence of spent bullets on the surface (GSINA and Gilbane 2023). No further action is required; these firing range facilities are located outside the project limits.

- **Site SS024** is a former entomology building with a Declaration of Environmental Use Restriction (DEUR) that restricts use to non-residential purposes. The site has not had any reported issues or remedial action; institutional controls are in place to prohibit residential use.

- **Site FT002** is a fire training area currently under evaluation for potential PFAS. USAF ~~will~~ evaluated PFAS sampling results obtained from FT002 regarding a new health advisory to determine the potential for unacceptable groundwater impacts and ~~consider~~ conducted groundwater sampling to determine if PFAS are present in groundwater. As of 2023, groundwater sampling results were all reported below detection levels. The area is open space and non-residential, which complies with the DEUR (GSINA and Gilbane 2023).

- The **Parcel N Debris Area** was discovered more recently than the other sites on the former WAFB. The area is currently a vacant lot remaining to be transferred for reuse, and is under remedial investigation for munitions and waste disposal related to military training exercises. The Parcel N Debris Area contains the **Munitions Response Area XU403**, where cleanup actions have been completed.

Other EDR-Listed Sites

Table 3-113~~-9~~ identifies the EDR-listed sites within 0.25 mile of the project limits and summarizes the sites and businesses that have various environmental permits, USTs, ASTs, and reported violations of permits, spills, or other environmentally related issues. In addition to the sites associated with the former WAFB, ~~two~~ one site~~s~~ presents a potential environmental concern to the project: MGC Pure Chemicals America, Inc (**Site ID K45**~~D18~~).~~, and the former TRW Automotive Systems (currently TRW Vehicle Safety Systems, Site ID E23), portions of which are in the project limits.~~

MGC Pure Chemicals America, Inc. has multiple violations regarding shipping and handling of chemical material and a small spill. The facility had ~~7~~ 8 reported manifest violations and 7 inspection violations between 2000 and 2016 and all reported infractions were considered minor and corrected. Most of the reported violations were related to reporting deficiencies. In 2017, approximately 21 gallons (220 pounds) of hydrogen peroxide spilled due to equipment failure on a truck-mounted tank. MCG Pure Chemicals America, Inc. secured the spill, and the cleanup requirements included removing contaminated materials. The reported spill of 65 pounds of ammonia, which occurred in 2018, was minor and did not trigger any long-term cleanup requirements.

~~The TRW complex has a long history of violations, spills, and subsequent cleanup/remedial actions. All past violations and remedial activities have achieved regulatory closure. The violations were associated with various reporting requirements and other compliance issues. Civil action was required to bring TRW into compliance on several violations. Reported spills included anhydrous ammonia and sodium azide, with sodium azide being the main contaminant that required remedial action to achieve regulatory closure. Two sites at the TRW complex have a DEUR that restricts use to non-residential purposes (ADEQ 2006, 2013). The EDR report indicates that remedial activities on the two sites have been completed to levels that allow commercial use, but not residential use.~~

Wells

Figure 3-5 shows the known well locations based on available state and federal water well ~~available~~ data (EDR 2026~~2022c~~) and the Fifth Five-Year Review (GSINA and Gilbane 2023), including remedial and monitoring wells associated with the former WAFB. The Fifth Five-Year Review does not show any groundwater monitoring or other wells south or southwest of Pecos Road. In addition, during OEA's coordination with USAF in August 2024, USAF confirmed that the six monitoring/remediation wells associated with Well ID 76 were never constructed (USAF 2024). This confirmation reduces the number of wells within the project limits.

~~Thirteen~~Seven wells are located within the project limits. Some well ID locations shown on Figure 3-5 have multiple wells associated with them. Well IDs 63, 65, ~~76,~~ and 128 are identified in the EDR well report and two wells shown as ~~LF004~~landfill wells are associated with the LF004 landfill. Well ID 63 is a private production well (the water is for private, not municipal, use). Well ID 65 includes two USAF monitoring/remediation wells. ~~Well ID 76 includes 6 USAF monitoring/remediation wells.~~ Well ID 128 includes three wells, two of which are within the project limits; one is a private production well and one is an ADEQ groundwater monitoring well.

Pipelines

Two natural gas pipelines owned by Kinder Morgan, one active and one abandoned, run parallel to the Phoenix Subdivision. The active line runs along the east side of the tracks, east of the Rittenhouse Channel, and the abandoned line runs along the west side. No leaks or concerns have been reported for either line (EDR 2026~~2022b~~). Both pipelines are managed and operated in accordance with 49 C.F.R. Parts 40 and 190−199, National Fire Protection Association 58 and 59, and U.S. Department of Transportation Pipeline and Hazardous Material Safety Administration (PHMSA) guidelines (USDOT 2025~~2022~~), which were developed to ensure that pipelines are safely operated and maintained to minimize environmental impacts and maximize the safety of operators and the public.

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Table 3-113 9. EDR-listed sites within 0.25 mile of the project limits

Site ID	Site Name	Database Listings	Distance to Project Limits (Direction)	Status
Multiple/ 51 20	**Former WAFB**	**NPL, SEMS, CORRACTS, RCRA-TSDF, RCRA-VSQTP, AZ NPL, SPL**	**Adjacent (north)**	**Multiple open sites[1]**
1	CMC Steel Arizona AN and CMC Rebar Arizona Outfall Pecos Road	EMAP	0 feet (intersects the project limits) 1,441 feet (north)	Stormwater outfall, no violationsnot active as of February 28, 2020
2	CMC Steel Arizona AN	EMAP	1,437 feet (northwest)	Stormwater outfall
2	Outfall NW Corner On Pecos Road	EMAP	0 feet (intersects the project limits)	Stormwater discharge point, active
A3	Komatsu Service And Maintenance Facility Outfall O	EMAP	0 feet (intersects the project limits)	Stormwater discharge point, active
A4	Outfall Outfall 2	EMAP	0 feet (intersects the project limits)	Stormwater discharge point, active
5	Pecos Point Industrial Park Outfall Sossaman Road	EMAP	0 feet (intersects the project limits)	Stormwater discharge point, active
B6	Penske Logistics	EMAP	0 feet (intersects the project limits)	Active trucking company
B7	Lowe's Pro Supply #4545	EMAP	0 feet (intersects the project limits)	Active warehouse
C8	The Cubes At Mesa Gateway Infrastructure	EMAP	0 feet (intersects the project limits)	Active road construction project
C9	Unnamed site	SPDES	0 feet (intersects the project limits)	Arizona NPDES permit with end date of March 1, 2023
C10	The Cubes At Mesa Gateway Infrastructure	SPDES	0 feet (intersects the project limits)	Arizona NDPES permit, terminated March 1, 2023
11	The Cubes At Mesa Gateway - Building C	SPDES	0 feet (intersects the project limitst)	Arizona NPDES permit with end date of April 1, 2023
D12	Signal Butte Between Pecos And Germann	SPDES	0 feet (intersects the project limits)	Arizona NPDES permit with end date of October 20, 2021
D13	Signal Butte Between Pecos And Germann	EMAP	0 feet (intersects the project limits)	Active construction project as reported by EDR
14	Outfall Merril 1	EMAP	0 feet (intersects the project limits)	Active stormwater discharge point
15	XPO Building B Outfall 4 Mesa Drainage	EMAP	0 feet (intersects the project limits)	Active stormwater discharge point
16	XPO Building B Outfall 2 Mesa Drainage	EMAP	0 feet (intersects the project limits)	Active stormwater discharge point

Table 3-113 9. EDR-listed sites within 0.25 mile of the project limits

Site ID	Site Name	Database Listings	Distance to Project Limits (Direction)	Status
17	Heritage Academy Gateway Outfall Queen Creek Wash	EMAP	0 feet (intersects the project limits)	Active stormwater discharge point
E18A7	Canyon State Academy	AST	582148 feet (southwest)	No reported leaks
19	Bed, Bath and Beyond Inc.	EMAP	1,167 feet (south)	Small quantity generator, no violations reported
E19A6	Arizona Boys Ranch	HIST FTTS, ICIS, FINDS, ECHO, RCRA NonGen/NLR	582148 feet (southwest)	No reported issues
E20A8	Arizona Boys Ranch	UST	582148 feet (southwest)	Three closed, removed USTs; no reports of leaks or cleanup actions
214	City of Mesa, AZ	PFAS	5164 feet (east)	Non-detect for PFAS, monitoring well
22	Prisoner of War Camp (Queen Creek)	FUDS	1,601 feet (east-southeast)	Site is not on the NPL list, no reported site[2]
E23	TRW Automotive Systems	RCRA-TSDF, RCRA-LQR, Spills, Manifests	0 feet (intersects project limits)	Multiple violations, spills, remedial actions, DEUR[1] [2]
22	Caliber Collision - Queen Creek #0137	RCRA-VSQG, E Manifest, ECHO, RCRA NonGen/NLR, FINDS	193 feet (southwest)	Hazardous waste generator conditionally exempt SQG, historical RCRA-VSQG, no violation identified
23	Cobblestone Express #17	UST, Financial Assurance	197 feet (south-southeast)	UST tank installed November 30, 2022, 15,000-gallon unleaded gasoline; Tank 2 installed November 30, 2022, 7,000-gallon premium unleaded gasoline, active and insured; notice of violation June 12, 2023; case dismissed
24	Speedway #1509	UST, Financial Assurance	311 feet (south-southwest)	UST program, notice of violations May 9, 2023; case closed July 12, 2023
25	Mobil3 Studio LLC	EDR Historical Auto	332 feet (west)	Gasoline service stations, no open cases
F26, F29, F30 B11	CRM of America	AST, RCRA NonGen/NLR	968351 feet (north-northeast)	Corrosive waste generator, no violations reported; registered AST as of October 26, 2022
F27B12	Maricopa County – Southeast Waste Tire Collection	SWF/LF, SPILLS, ENFORCEMENT, SPDES	968351 feet (north-northeast)	Active waste tire collection facility Spills – tire fire June 16, 1995; notice of violation November 12, 2008; case closed March 18, 2009
F28B13	Crum Rubber Manufacturing	AST– 2	968351 feet (north-northeast)	Two ASTs, permit currently active, no violations reported
31	Lowes Pro MSH $4545	E Manifest	401 feet (north-northeast)	Storage, bulking, and/or transfer waste off site
G32	Petsmart	E Manifest	490 feet (south-southwest)	Storage, bulking, and/or transfer waste off site
G33	Queen Creek, Banfield #1809	E Manifest	490 feet (south-southwest)	Storage, bulking, and/or transfer waste off site
3421	Old Dominion Freight Line Inc.	AST– 2	1,283670 feet (north)	Active permit, 15,000-gallon diesel AST tank installed on December 4, 2020; certificate validated on January 3, 2020 no violations reported.
3510	Mesa Transfer Station	SWF/LF	848796 feet (north)	Active land fill solid waste transfer station, no reported violations; active NPDES permit with stormwater discharge point
369	Queen Creek Smiles	RCRA-NonGen/NLR RCRA-VSQG	807 feet (southwest)	Not a generator; verified, Exempt small quantity generator, no violations reported
H37	Magna Steyr Usa Inc	RCRA-SQG	902 feet (northeast)	Hazardous waste storage, historic SQG, no violations identified
H38	LI-Cycle, Mesa Pecos Warehouse	RCRA NonGen / NLR, ECHO	902 feet (northeast)	Not a generator, verified, recyclable material merchant wholesaler, no violations identified

Table 3-113 9. EDR-listed sites within 0.25 mile of the project limits

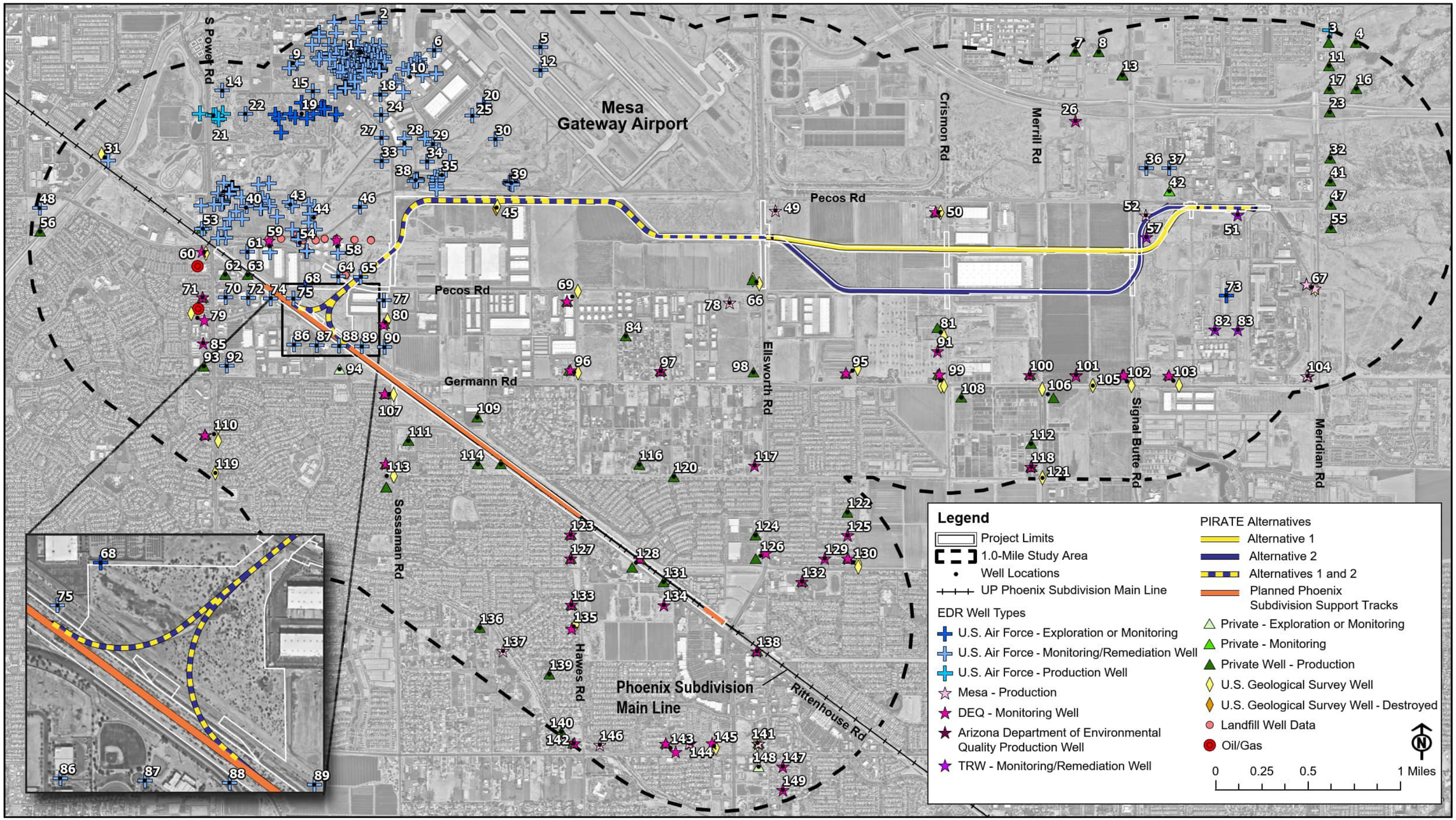
Site ID	Site Name	Database Listings	Distance to Project Limits (Direction)	Status
I39	Mesa Air Separation Unit (ASU)	RCRA-VSQG	908 feet (east-northeast)	No violations identified, hazardous waste storage, historic VSQG
40	Kaizen Collision - Queen Creek	RCRA-VSQG	914 feet (southwest)	Conditionally exempt SQG, no violations found
41	Chipotle #1163-Ritten House	E Manifest	934 feet (south)	Organic waste generated, transfer off site
J4214	Pinto Creek Management	Leaking UST, UST, AST, EMAP	1,125953 feet (east-southeast)	UST site, tank removed, soil only, chemicals of concern levels meet Risk-Based Corrective Action Tier 1 Standards, case closed September 27, 2005; no active USTs as of October 5, 2011; AST certified closed December 31, 2015
J43	Pinto Creek Management	UST FINDER, UST FINDER RELEASE, LUST, UST, AST, EMAP	705 feet (east-southeast)	Two closed USTs, not active as of October 5, 2011
I44	Mesa Air Separation Unit (ASU)	PFAS, ECHO	1,015 feet (east)	Permitted facility, no violations identified
K45D18	**MGC Pure Chemicals America, Inc.**	**RCRA-VSQG, TSCA, TRIS, FINDS, ECHO, EMAP, E M**	**1,1361,044 feet (north)**	**Small quantity generator, historic large quantity generator, various violations for shipping, small spills, and treatment of waste streams[1]**
K46D17	MGC Pure Chemicals America, Inc.	EMAP, Manifest, SPDES	1,1361,044 feet (north)	Hazardous material shipper, no violations reported
47	Town Of Gilbert Public Safety Training Facility	AST	1,104 feet (northwest)	AST certified 11/14/2023; Tank 1, 1,500-gallon gasoline; Tank 2, 1,500-gallon diesel
L48	Sprouts	E Manifest	1,127 feet (southeast)	Storage, bulking, and/or transfer off site
M49C16	Queen Creek United School District #95	AST 2	1,1271,138 feet (east-northeastsoutheast)	Permit active for AST, no violations reported
M50C15	Queen Creek School Maintenance	AST	1,1271,138 feet (east-northeastsoutheast)	Permit active for AST, no violations reported
52	ULTA BeautyEAUTY	E Manifest	1,258 feet (southwest)	Storage, bulking, and/or transfer off site
L53-L54	Happy Beauty Co. 10834	E Manifest, RCRA-VSQG	1,301 feet (southeast)	Recyclables consumer electronics, conditionally exempt SQG
N55-N56	Home Depot 0415	FINDS, ECHO, HAZNET, EMAP, Manifest, RCRA-SQG, E Manifest	1,306 feet (southwest)	No violation identified, regulated hazardous waste storage, bulking, and/or transfer off site

[1] **Bolding** indicates sites that may present an environmental concern to the project.

[2] OEA removed Prisoner of War Camp (Queen Creek) and TRW from the analysis because these sites are greater than 0.25 mile from project limits. That distance makes it unlikely that contamination would migrate to the project limits in concentrations above regulatory cleanup levels; therefore, they are not considered potential risks to the project.

CORRACTS = corrective action report
ECHO = enforcement and compliance history information
EMAP = Environmental Monitoring and Assessment Program
FIFRA = Federal Insecticide, Fungicide, & Rodenticide Act
FINDS = Facility Index System/Facility Registry System
FUDS = formerly used defense sites
HAZNET = facility and manifest data
HIST FTTS = FIFRA/TSCA Tracking System
ICIS = Integrated Compliance Information System
NLR = no longer regulated
NPDES – National Pollutant Discharge Elimination System
SEMS = Superfund Enterprise Management System
SPDES = State Pollutant Discharge Elimination System
SPL = Superfund Program list
SQL = small quantity generator
SWF/LF = solid waste facility/landfill
TSCA = Toxic Substances Control Act
TSDF = treatment, storage and disposal facility
TRIS = Toxic Release Inventory System
VSQG = very small quantity generator

Figure 3-5. Wells in the study area



Note: This graphic was revised in the Final EA.

3.4.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Therefore, no changes would occur to the sites identified in the EDR report (2026~~2022b~~) from construction and operation of the project. Since the project would not be constructed, raw materials and shipment of finished product, including any hazardous raw materials, would continue to be transported using trucks.

3.4.3 Effects of Alternative 1

Construction of PIRATE and the planned Phoenix Subdivision support tracks would require use of materials such as gasoline, diesel, and oil in heavy construction equipment and storage onsite for handheld equipment.[22] To minimize potential impacts related to hazardous materials, UP has proposed VM measures to refuel construction vehicles/equipment within designated areas of the project limits (VM-HAZ-1 and VM-HAZ-4). The use of hazardous materials for construction would be short term. UP has also proposed VM measures to implement appropriate BMPs, a stormwater pollution prevention plan (SWPPP), and a hazardous waste management plan to ensure safe storage, handling, transport, use, and disposal of all hazard materials during construction; spill recovery; and damaged resource restoration in the event of a spill (VM-HAZ-1 and VM-W-3). Finally, UP has proposed VM measures to adhere to local, state, and federal health and safety requirements to minimize hazardous materials risk to the public during construction (VM-HAZ-1, VM-HAZ-2, VM-HAZ-3, VM-HAZ-4, VM-HAZ-5, and VM-HAZ-6).

In addition, UP has proposed VM measures (see Section 4.5.4.1) to appropriately respond to, handle, and dispose of any hazardous material spills related to project construction and operation, including contingency planning to address potential spills (VM-HAZ-2, VM-HAZ-4, VM-HAZ-5, and VM-HAZ-6). UP has also proposed VM measures to (1) ensure that waste materials related to project construction and operation are removed and disposed of in accordance with applicable local, state, and federal regulations (VM-HAZ-1 and VM-HAZ-3), and (2) manage the shipping and storage of hazardous materials as part of project operation and maintenance activities in accordance with all local, state, and federal regulations (VM-HAZ-7).

Shifting the transport of hazardous materials away from public roadways onto rail should improve the overall safety of chemical transport to and from the PAMZ. Transportation of hazardous materials via rail is generally recognized as a safer shipment method than transportation by trucks with fewer incidents of leaks, spills, or releases (FRA 2023~~2021~~). Between 1975 and 2024~~2021~~, truck-related hazardous materials incidents caused over ~~16~~17 times more fatalities than rail (~~380~~396 total fatalities from trucks compared with 23 fatalities from rail accidents). Over the last decade, there have been no hazardous materials fatalities from rail accidents compared to ~~83~~75 fatalities from truck-related hazardous materials incidents~~. Trucks have also caused nearly three times as much property damage as rail incidents since 2000~~ (U.S. Bureau of Transportation Statistics 2025~~2022~~).

[22] Use of these materials is subject to state and local regulatory requirements.

Although MGC Pure Chemicals had multiple reported violations, none of the violations present an environmental concern that would affect the project or be affected by Alternative 1. In addition, Alternative 1 would not conflict with the terms of the DEUR at the TRW Automotive Systems complex. No other sites identified in the EDR report (2026~~2022b~~) have reported spills or other environmental conditions that have the potential to impact either PIRATE or the planned Phoenix Subdivision support tracks.

The project limits contain a large area that is currently, as well as historically, used as agricultural land. Because toxic chemicals may be present in the soil in these areas, OEA is recommending mitigation requiring that UP prepare a Phase I Environmental Site Assessment (MM-HAZ-1) to further evaluate the potential to encounter contaminants within the project limits.

The wye crosses Kinder Morgan's active natural gas pipeline just east of the Rittenhouse Channel and the planned Phoenix Subdivision support tracks are proposed adjacent to Kinder Morgan's abandoned natural gas pipeline. OEA recommends mitigation requiring UP to coordinate with Kinder Morgan during design and construction to ensure compliance with all appropriate regulations and guidelines, to protect worker and public safety, and to avoid impacts to the environment (MM-HAZ-2).

Although multiple sites at the former WAFB are adjacent to the project limits, none of the contaminated soil areas extend outside of the former WAFB or intersect the project limits. The SVE soil remediation system does extend outside of the former WAFB but does not intersect the project limits (GSINA and Gilbane 2023~~AMEC 2017~~). Therefore, the project would not be affected by identified contaminated soil or interfere with associated ongoing remedial mitigation at the former WAFB. Impacted groundwater does extend outside of the former WAFB into the project limits (GSINA and Gilbane 2023~~AMEC 2017~~). However, the project does not include drilling any groundwater wells or use of groundwater from within the project limits. As shown on Figure 3-5, several monitoring and production wells are in the project vicinity, including ~~13~~7 within the project limits.

OEA is recommending mitigation requiring UP to coordinate with the owner/operator of any wells within the project limits, including those that are part of ongoing remedial activities, during the final design phase of the project (MM-HAZ-3). Under that mitigation, any wells within the project limits must either be protected, have a modified top of casing to extend above the new grade, or be relocated outside of the project limits, if possible. If this MM is imposed and implemented, Alternative 1 and the planned Phoenix Subdivision support tracks would not interfere with any remedial actions associated with the former WAFB Superfund site.

3.4.4 Effects of Alternative 2

The effects of Alternative 2 and the planned Phoenix Subdivision support tracks would be the same as those for Alternative 1 and the planned Phoenix Subdivision support tracks for hazardous material and waste management. The Alternative 2 alignment is slightly different from Alternative 1, but the same handling, disposal, transportation, and spill response would be required in accordance with all local, state, and federal regulations. The same MM are recommended for Alternative 2 and the planned Phoenix Subdivision support tracks that were recommended for Alternative 1 and the planned Phoenix Subdivision support tracks.

The potential production or monitoring wells that may be affected by Alternative 2 are slightly different than Alternative 1. However, the recommended MM requiring UP to coordinate with the owner/operator would be the same to determine the appropriate action required to preserve function and purpose of any wells that are within the project limits (MM-HAZ-3).

3.5 Biological Resources

This section addresses existing conditions and impacts to biological resources, including wildlife, migratory birds, native plants, and invasive species. The biological study area encompasses the project limits and all areas that would be affected directly or indirectly by the project. To identify the potential for sensitive and protected species in the biological study area, OEA obtained a U.S. Fish and Wildlife Service (USFWS) Official Species List from USFWS' online Information for Planning and Consultation (IPaC) system on February 25, 2022, and ~~an~~ updated lists on September 15, 2022, and February 15, 2026. OEA also obtained an Arizona Game and Fish Department (AGFD) list of special status species from AGFD's Online Environmental Review Tool on July 19, 2022, and an updated list on February 16, 2026. A Jacobs senior biologist conducted a reconnaissance-level biological resources survey of the biological study area on May 24, 2022. Refer to Appendix F1 for the complete *Biological Evaluation*,[23] including methodology, regulatory context, and the 2022 online species lists, and Appendix F2 for the 2026 online species lists.

3.5.1 Affected Environment

The biological study area is located within the Lower Colorado River Valley subdivision of the Sonoran Desertscrub biotic community (Turner and Brown 1994) at an elevation range of 1,330 to 1,340 feet above mean sea level. Within the Sonoran Desert, this subdivision is the largest and most arid, resulting in vegetation patterns that are open and simple because of the intense competition for water.

Previous and ongoing commercial, industrial, residential, and agricultural development has limited habitat within the project limits to two remaining types: native vegetation in disturbed, vacant areas and non-native vegetation in the agricultural fields. While some of the agricultural fields are still active, including a citrus orchard, most of the fields were fallow at the time of the biological resources survey on May 24, 2022. Due to the disturbed habitat, abundance of non-native invasive species, and lack of riparian areas with perennial water, biological resources are limited in the biological study area. Tables 3-12 and 3-13~~3-10 and 3-11~~ summarize the existing habitat and vegetation in the project limits and the biological resources in the biological study area, respectively.

Following issuance of the Draft EA in May 2023, OEA discovered ground disturbance in the study area that resulted in habitat degradation of approximately 15 acres of disturbed native vegetation and 9 acres of agricultural fields. Prior to the ground disturbance, disturbed native vegetation already included areas of bare ground; therefore, the 15 acres of disturbed native

[23] Because the *Biological Evaluation* (Appendix F1) was not revised as part of the 2025 updates, the acreages presented in Section 3.5 reflect updated project information and may differ from the acreages reported in the 2022 *Biological Evaluation*.

vegetation that were cleared and excavated for the wye drainage basin is still considered disturbed native vegetation. Similarly, agricultural lands are cleared of vegetation periodically; therefore, OEA retained the 9 acres of agricultural lands that were disturbed by the ground disturbance in the agricultural field habitat type. In addition, development occurring since May 2023 has converted 12 acres of agricultural field habitat in the project limits to a built environment.

Table 3-123-10. Existing habitat and dominant vegetation in the project limits

Habitat Type (Location)	Dominant Vegetation
Disturbed native vegetation (Phoenix Subdivision between Power Road and Ellsworth Loop; PIRATE west of Sossaman Road and east of Signal Butte Road)	Foothills palo verde (*Parkinsonia microphylla*), velvet mesquite (*Prosopis velutina*), creosotebush (*Larrea tridentata*), desert broom (*Baccharis sarothroides*), fourwing saltbush (*Atriplex canescens*), brittlebush (*Encelia farinosa*), triangle-leaf bursage (*Ambrosia deltoidea*), snakeweed (*Gutierrezia sarothrae*), and Indian rushpea (*Hoffmannseggia glauca*). Portions of this area include bare ground that lacks vegetation.
Highly disturbed agricultural fields with non-native vegetation (PIRATE between Sossaman and Signal Butte roads)	Russian thistle (*Kali tragus*), common sunflower (*Helianthus annuus*), salt cedar (*Tamarix* spp.), and alfalfa (*Medicago sativa*)

Table 3-133-11. Existing biological resources in the biological study area

Resource	Potential to Occur
Federally listed threatened and endangered species	Four species listed, proposed, or candidates for listing under the Endangered Species Act have the potential to occur in the project vicinity. The California least tern (*Sterna antillarum browni*) is listed as endangered, the yellow-billed cuckoo (*Coccyzus americanus*) and northern Mexican gartersnake (*Thamnophis eques megalops*) are listed as threatened, and the monarch butterfly (*Danaus plexippus*) is ~~a candidate~~proposed for listing.[24] However, none of these species are known to occur within the biological study area. In addition, suitable habitat for the various species (for example, sandy beaches, large trees, dense wetland vegetation, ~~or~~ concentrations of blooming nectar plants, or milkweed) is not present. Therefore, federally listed species are not addressed in the impact evaluations in Sections 3.5.2, 3.5.3, and 3.5.4.

[24] The monarch butterfly was a candidate for listing under the Endangered Species Act when OEA issued the Draft EA in May 2023. On December 12, 2024, the monarch butterfly was proposed for listing as threatened. The *Biological Evaluation* in Appendix F1 was prepared when the species was still a candidate for listing; the updated species list included in Appendix F2 reflects the current Endangered Species Act listing status.

Resource	Potential to Occur
Migratory birds	Multiple species protected under the Migratory Bird Treaty Act are present in the biological study area. Species observed include burrowing owl (*Athene cunicularia hypugaea*), greater roadrunner (*Geococcyx californianus*), common night hawk (*Chordeiles minor*), and red-tailed hawk (*Buteo jamaicensis*). Suitable habitat for burrowing owl is present throughout most of the agricultural fields and vacant land in the biological study area.
Bald and golden eagles	No bald eagles (*Haliaeetus leucocephalus*) or golden eagles (*Aguila chrysaetos*) have been documented within 3 miles of the project limits (AGFD 2022). While eagles may fly over the biological study area, they are not likely to stop because it does not have suitable nesting habitat or a substantial body of water nearby. Therefore, bald and golden eagles are not addressed in the impact evaluations in Sections 3.5.2, 3.5.3, and 3.5.4.
Native plants	Native plants, such as foothills palo verde and velvet mesquite, are present outside of the agricultural fields in the biological study area.
Invasive species	Invasive species, such as Russian thistle and salt cedar, are present in the project limits and are likely to occur in the biological study area as well.

Because OEA concluded that none of the species or critical habitats on USFWS' IPaC Official Species List are present in the biological study area, consultation pursuant to Section 7 of the Endangered Species Act (16 U.S.C. §§ 1531−1544) with USFWS is not required for this project.

3.5.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Current land uses could continue in some areas. However, this region is rapidly developing and Mesa plans for nearly all of the remaining privately owned agricultural lands in the PAMZ to be converted into a built urban environment. Construction activities for new developments would be required to comply with the Migratory Bird Treaty Act (16 U.S.C. §§ 703−712), including avoiding impacts to nesting birds, as well as Arizona's Native Plant Law (Arizona Revised Statutes Title 3, Chapter 3, Article 11). Therefore, the No-Action Alternative would have some minor effects on migratory birds and native plants. In addition, construction activities for the new development that would take place without the proposed rail line could contribute to the introduction or spread of invasive species if preventative measures are not established and enforced. Therefore, the No-Action Alternative could have effects on migratory birds and plant life.

3.5.3 Effects of Alternative 1

Alternative 1 and the planned Phoenix Subdivision support tracks would require vegetation removal and heavy equipment use throughout the ~~254~~255-acre project limits. Most of the vegetation removed would consist of native plants from ~~172~~173 acres of habitat classified as disturbed native vegetation. Trees and shrubs in these areas provide nesting habitat for

migratory birds (refer to Table 3-133~~-11~~). Therefore, Alternative 1 and the planned Phoenix Subdivision support tracks may affect nesting birds if vegetation is cleared during the breeding season (February 1 to September 30) because young that are unable to fly could be injured or killed. In addition, approximately ~~115~~114 acres of burrowing owl habitat are adjacent to the Phoenix Subdivision and in the agricultural land in the area. Burrowing owls are known to be present in the project limits and could be affected by ground-disturbing activities.

UP has proposed and OEA is recommending MMs that, if implemented, would avoid or minimize potential impacts to migratory birds from vegetation removal and to burrowing owls from ground-disturbing activities. These measures include seasonal restrictions or surveys to avoid active nests and species-specific survey protocol for burrowing owls (VM-BIO-2, VM-BIO-3, VM-BIO-4, VM-BIO-5, and MM-BIO-3) (Arizona Burrowing Owl Working Group 2009). Additionally, in response to AGFD's comments on the Draft EA, OEA is recommending a new MM to require shielding, tilting, or cutting lighting to minimize the amount of upward shining light to reduce potential impacts to migratory birds, bats, and other nocturnal animals (MM-BIO-7). With the imposition and implementation of these recommended MMs, Alternative 1 and the planned Phoenix Subdivision support tracks would have a minor effect on migratory birds.

Protected native plants are sparsely scattered within the patches of native vegetation; therefore, a minor amount of protected native plants would be removed during construction. OEA is recommending mitigation requiring UP to obtain an Arizona Department of Agriculture permit and submit a notice of intent to clear land prior to destroying or removing protected native plants (MM-BIO-4). With that mitigation, Alternative 1 and the planned Phoenix Subdivision support tracks would have a minor effect on native plants.

Alternative 1 and the planned Phoenix Subdivision support tracks would disturb approximately ~~254~~255 acres. Equipment used during rail construction would have the potential to track in or carry invasive species out of the project limits or exacerbate existing infestations. Therefore, OEA is recommending mitigation to minimize the potential risk by addressing the spread and control of invasive species through measures such as planned seed mixes, weed management procedures, equipment cleaning protocols, revegetation methods, and monitoring requirements (MM-BIO-6). If these MMs are imposed and implemented Alternative 1 and the planned Phoenix Subdivision support tracks would have a minor potential to spread invasive species.

3.5.4 Effects of Alternative 2

Alternative 2 and the planned Phoenix Subdivision support tracks would increase the total disturbance area by about 6 acres to ~~260~~262 acres. Alternative 2 and the planned Phoenix Subdivision support tracks would increase impacts to native vegetation by about ~~2~~1 acre~~s~~ (174 acres total) and would have the same impacts to burrowing owl habitat ~~in agricultural land by about 7 acres~~ (~~122~~114 acres total). However, if the MMs described in Section 3.5.3 and listed in Section 4.5.5 are implemented, impacts to migratory birds, native plants, and invasive species from Alternative 2 and the planned Phoenix Subdivision support tracks would be similar to those described for Alternative 1 and the planned Phoenix Subdivision support tracks, even though more land would be disturbed.

3.6 Water Resources

This section describes existing water resources and the potential impacts to water resources from the construction and operation of PIRATE and the planned Phoenix Subdivision support tracks. Water resources include surface waters, wetlands, floodplains, and groundwater.

Regulatory Environment

The Clean Water Act (CWA; 33 U.S.C. §§ 1251–1387) is the primary federal statute that regulates the discharge of pollutants into waters of the United States. Section 404 of the CWA regulates the discharge of dredge or fill material into waters of the United States. The extent of the Corps' jurisdiction is generally the ordinary high water mark, which indicates the width and depth of a water of the United States. Section 401 of the CWA requires that any applicant requesting a Section 404 permit for activities that may result in a discharge into waters of the United States also obtain a Section 401 water quality certification from the state in which the discharge originates. ADEQ administers the Section 401 certification program in Arizona on non-tribal lands and verifies that prospective permittees comply with state effluent limitations and water quality standards.

Section 402 of the CWA established the NPDES permit system, which regulates pollutant discharges, including stormwater, into waters of the United States. A NPDES permit establishes specific discharge limits for point-source pollutants into waters of the United States and outlines project-specific conditions and requirements to reduce impacts to water quality. EPA authorized ADEQ to administer a state-level NPDES program called the Arizona Pollutant Discharge Elimination System (AZPDES). AZPDES permits require implementation of erosion control BMPs and preparation of a SWPPP for projects with over 1.0 acre of ground disturbance.

The Federal Emergency Management Agency (FEMA) delineates the location and extent of floodplains through Flood Insurance Rate Maps. A 100-year flood statistically has a 1 percent chance of occurring in any given year, and the 100-year floodplain is the area that would be inundated by a 100-year flood. The FCDMC regulates development within floodplains throughout Maricopa County. FEMA's *Guidelines for Implementing Executive Order 11988, Floodplain Management*, prohibit existing and anticipated development from increasing the 100 year water surface elevation more than 1.0 foot at any point in the community where a project is proposed (FEMA 2015).

Study Area

The study area for surface waters, wetlands, and floodplains is the project limits, plus additional areas surveyed to determine the potential for impacts to water resources adjacent to but not within the project limits. This study area corresponds to where OEA completed its field survey to identify likely waters of the United States and is where PIRATE and the planned Phoenix

Subdivision support tracks could affect these resources.[25] The study area for groundwater resources is the East Salt River subbasin, which encompasses the area of potential impacts to groundwater from construction and operation of PIRATE and the planned Phoenix Subdivision support tracks.

Inventory Methods

OEA used aerial photography, topographical maps, the USFWS's National Wetlands Inventory (USFWS 2025~~2021~~), the National Hydrography Dataset (U.S. Geological Survey 2026~~2022~~), soil maps (NRCS 2026a~~2022~~), and field surveys to identify the presence and extent of likely waters of the United States within the project limits. After conducting field surveys in May 2022, OEA prepared a technical report for water resources and identified Rittenhouse Channel, Ellsworth Channel, and Wash No. 3 as likely waters of the United States (Appendix G, *Jurisdictional Delineation Report Including Wetlands*). OEA used this report and 60 percent rail design, the drainage design shown on a November 2025 Ellsworth Channel TCE exhibit~~s~~ (UP 2025b), and the project drainage report (UP 2022c) to assess impacts to water resources, quantitatively and qualitatively.

3.6.1 Affected Environment

3.6.1.1 Surface Waters and Wetlands

The project limits do not contain any perennial or intermittent streams, and previous development has obliterated nearly all the natural drainages. By 1949, most of the project vicinity had been converted from natural desert to agriculture (Maricopa County 2023~~2022~~). The natural drainages were replaced with constructed channels or storm drains designed to minimize the impacts of flooding to agriculture and other land uses. FCDMC and other entities constructed multiple flood control channels to manage drainage and runoff in the greater project vicinity that historically flowed west and southwest through ephemeral washes (FCDMC 2012).[26] Two of these channels~~, both owned and maintained by FCDMC,~~ intersect the project limits: the Rittenhouse Channel and the Ellsworth Channel. FCDMC owns and maintains the Rittenhouse Channel and Mesa has jurisdiction over and maintains the Ellsworth Channel. Both the Rittenhouse Channel, which parallels the Phoenix Subdivision, and the Ellsworth Channel along Ellsworth Road gather regional and local drainage and runoff. Flows in both channels reach the East Maricopa Floodway, which flows south to the Gila River.

[25] In April 2023, UP submitted a preliminary jurisdictional delineation to the Corps that recommended three watercourses as waters of the United States. The Corps will ultimately determine their jurisdiction over these watercourses ~~and, for the purposes of this analysis,~~ in accordance with the protocol for processing preliminary jurisdictional delineations, which allows for presumption of Corps jurisdiction. Because the preliminary jurisdictional delineation was conducted prior to rulings on waters of the United States that exclude ephemeral watercourses from regulation, and because UP indicated a Section 404 permit will be required (UP 2025b), the three recommended watercourses are referred to as "likely" waters of the United States for the purposes of this analysis.

[26] Ephemeral washes flow only in response to precipitation or snowmelt.

Agricultural fields and associated infrastructure ~~span~~ are interspersed within the project limits between Sossaman and Signal Butte Roads, occurring in scattered parcels among developed and developing areas. The~~se~~ remaining agricultural areas include extensive irrigation ditch systems typically characterized by open, concrete-lined, or unlined, 2- to 3-foot-wide laterals in various states of repair. Many of the ditches and irrigation appurtenances have been abandoned as fields are left fallow or are no longer farmed in anticipation of current and future development. Based on the field survey and a review of aerials, the irrigation ditches appear only to function as part of water delivery systems for agricultural irrigation and do not serve flood protection or drainage functions. Refer to Section 3.8, *Land Use and Farmland*, for additional information regarding utilities within the project limits.

In May 2022, OEA identified three ephemeral surface waters (Rittenhouse Channel, Ellsworth Channel, and Wash No. 3) and three wetland patches in Rittenhouse Channel as likely waters of the United States (Figure 3-6). Table 3-14~~3-12~~ summarizes the type and amount of likely waters of the United States within the study area.

Table 3-14~~3-12~~. Likely waters of the United States within the study area

Type	Acres
Other waters[1]	2.96
Open water[2]	0.00
Wetlands	0.07
Total	**3.03**

[1] In May 2022, ~~O~~other waters ~~are~~ were intermittent or ephemeral waters of the United States.
[2] Open waters are perennial waters of the United States.

Jurisdictional wetlands must meet three criteria: vegetation that grows in wet conditions, soils that develop in wet conditions, and periodic inundation or saturation by surface or groundwater. Based on wetland methodology for the Arid West region, the three wetland patches in Rittenhouse Channel met these conditions in May 2022. Within the project limits, USFWS' National Wetlands Inventory indicated possible wetlands in the southeastern corner of Pecos and Crismon Roads and at the eastern terminus. However, the National Wetlands Inventory-identified wetland in the southeastern corner of Pecos and Crismon Roads was actually an abandoned irrigation tailwater pond that was obliterated in July 2022 as part of site preparation for future industrial development. At the eastern terminus, field survey of Wash No. 3 indicated the presence of upland vegetation not indicative of a wetland. In addition, NRCS soil data indicate that soils in the project limits are not hydric, which means they did not develop under wet or inundated conditions. Therefore, the only wetlands within the project limits are the wetlands delineated in Rittenhouse Channel during the field survey.

No Outstanding Arizona Waters or impaired waters under Section 303(d) of the CWA are present within the project limits (ADEQ n.d.-a, n.d.-b~~2022a, 2022b~~).

3.6.1.2 Floodplains

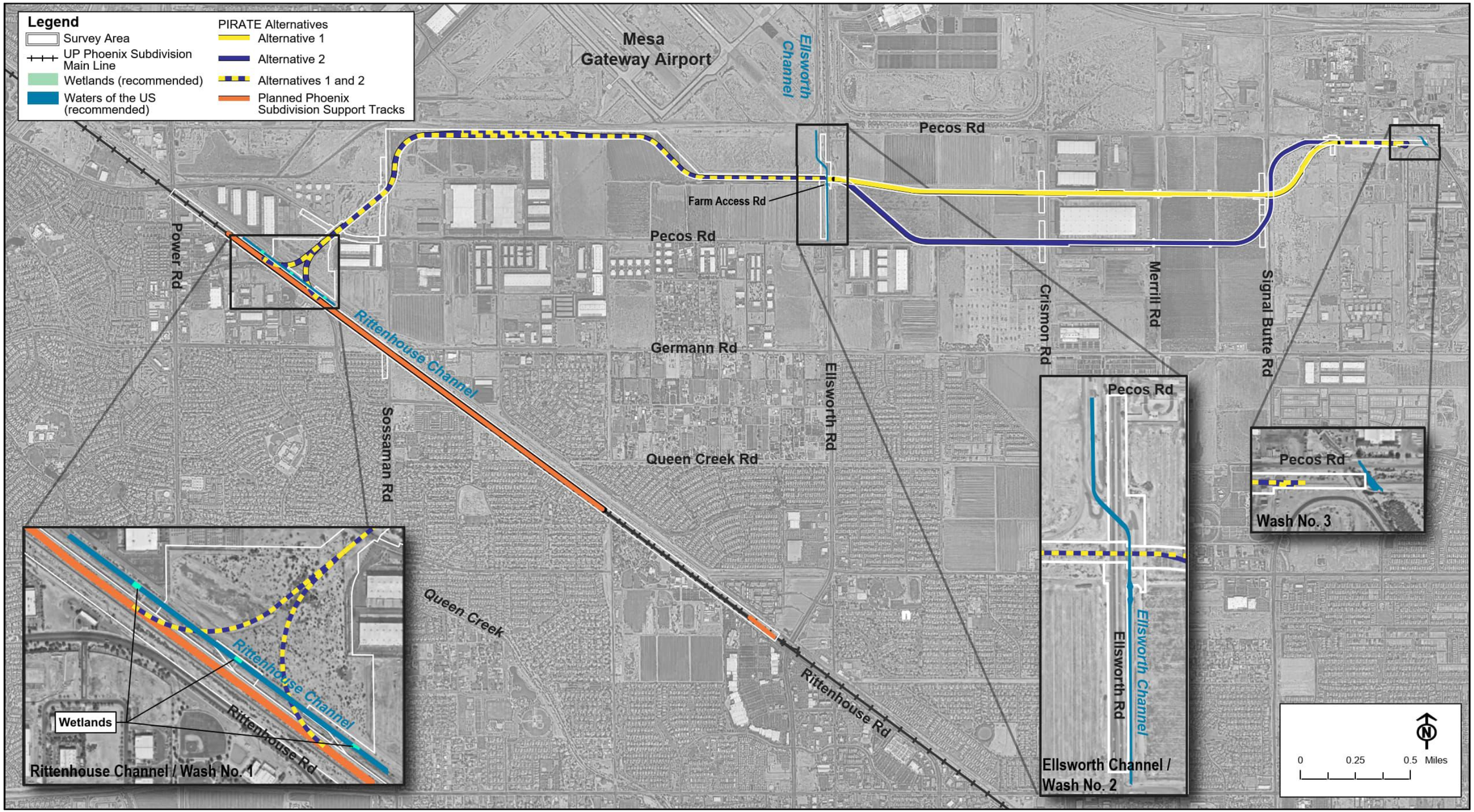
FEMA Flood Insurance Rate Map Panels 04013C2770L and 04013C2790L (effective October 16, 2013) cover the project limits. Based on a review of these maps, the only 100-year floodplain within the project limits is associated with Rittenhouse Channel (Figure 3-7). Within the project limits, the Rittenhouse Channel 100-year water surface elevation ranges from approximately 1,386 to 1,388 feet (UP 2022c). The remainder of the project limits is within a 500-year floodplain (Figure 3-7).

3.6.1.3 Groundwater

Groundwater is subsurface water that saturates pores and cracks in soil and rock and is transmitted via geologic layers known as aquifers. The Arizona Department of Water Resources (ADWR) regulates groundwater use pursuant to the 1980 Arizona Groundwater Code, which established Active Management Areas (AMA) in regions that rely heavily on groundwater (ADWR 2025~~2022a~~). The East Salt River groundwater subbasin is in the broader Salt River Valley, which is in the Phoenix AMA (ADWR 2015~~n.d. a~~). Each AMA establishes a program of groundwater rights and permits for wells and groundwater withdrawals (ADWR 2018~~n.d. c~~). The depth to groundwater in the subbasin is generally between 200 to 300 feet (ADWR 2026~~2023~~). The subbasin contains no sole source aquifers, which EPA defines as aquifers that provide at least 50 percent of the drinking water for its service area (EPA 2015~~n.d. b~~).

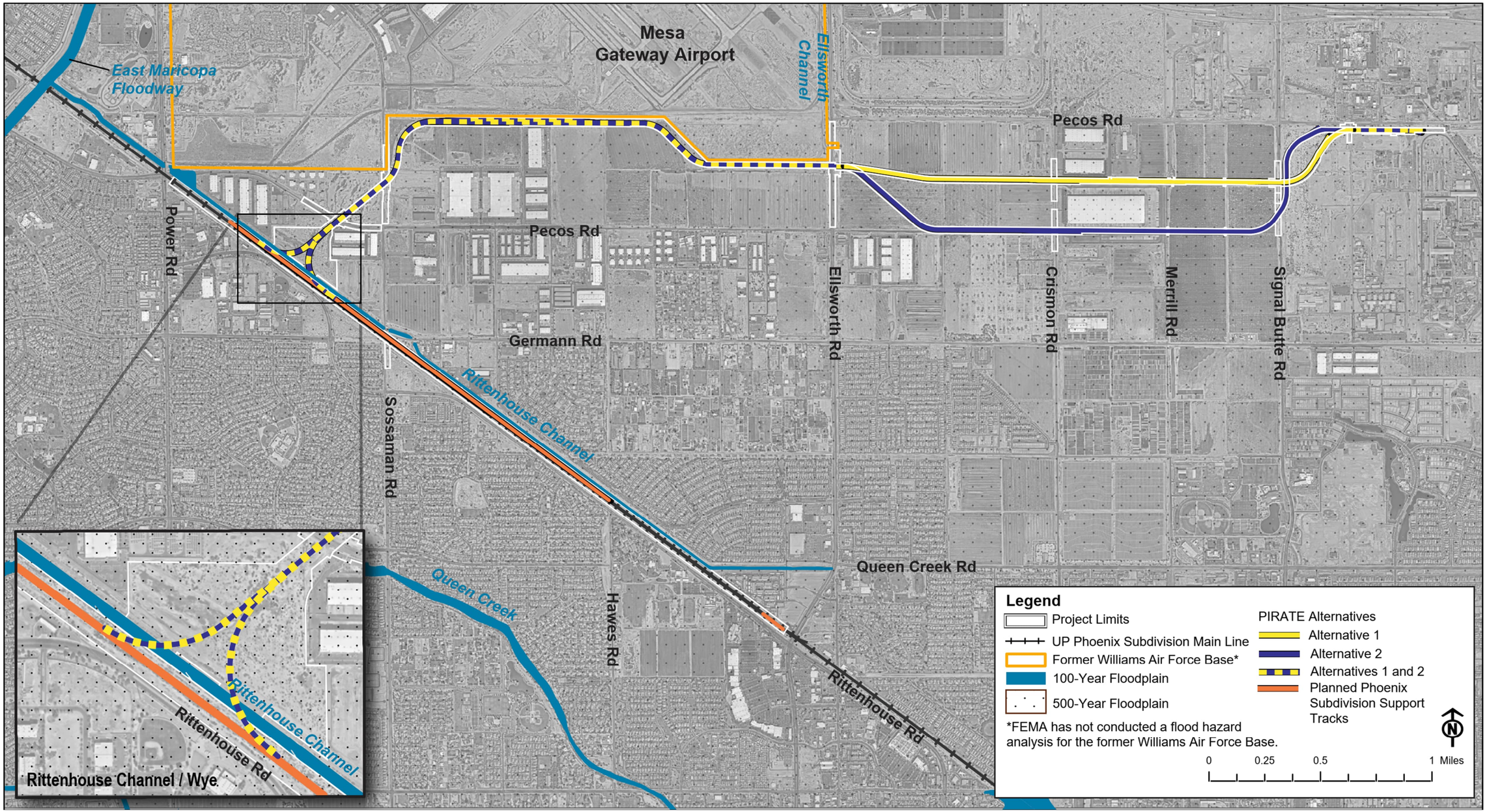
Section 3.4, *Hazardous Materials and Waste Sites,* discusses ongoing groundwater monitoring adjacent to the project limits as part of remediation of the former WAFB Superfund site.

Figure 3-6. Likely wetlands and waters of the United States in the study area



Note: This graphic was revised in the Final EA.

Figure 3-7. Floodplains in the study area



Note: This graphic was revised in the Final EA.

3.6.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Therefore, no new impacts to water resources would occur from the No-Action Alternative. Ongoing development in the project vicinity could continue to affect water resources, subject to applicable federal and state regulations.

3.6.3 Effects of Alternative 1

3.6.3.1 Surface Waters and Wetlands

The planned Phoenix Subdivision support tracks would not affect surface waters or wetlands and are not discussed in this section. Construction of Alternative 1 would affect surface waters through excavation, fill placement, equipment access and maneuvering, and culvert and pipe installation. Alternative 1 also includes a trackside drainage system that would create new drainage patterns throughout the project limits. Generally, the trackside drainage system would direct flows west of Ellsworth Road into Rittenhouse Channel and flows west of Crismon Road into Ellsworth Channel. Runoff west of Ellsworth Road would flow into the PIRATE yard detention basin and excess flows would enter the wye detention basin, eventually entering Rittenhouse Channel. Flows between Signal Butte Road and Merrill Road would flow into an existing tailwater pond east of Merrill Road.

Alternative 1 would cross Rittenhouse Channel and Ellsworth Channel. Alternative 1 would include a culvert beneath each branch of the wye in Rittenhouse Channel (Figure 2-9 for an example of a concrete box culvert). Another drainage structure consisting of four corrugated metal pipes would also drain outfall from an adjacent detention basin into Rittenhouse Channel. In addition, Alternative 1 would include a culvert at its crossing with Ellsworth Channel. To minimize these impacts, OEA is recommending mitigation requiring UP to coordinate with FCDMC and Mesa, respectively, to develop appropriate end treatments for the drainage design in Rittenhouse Channel and Ellsworth Channel (MM-W-2). Alternative 1 would not affect the unnamed ephemeral wash (Wash No. 3) because, while it is within the project limits, it is outside of the construction footprint (Figure 3-6).

OEA is also recommending MMs requiring UP to avoid the wetlands in Rittenhouse Channel and to mark the boundaries of the wetlands to ensure avoidance during construction (MM-W-1). If these recommended MMs are imposed and implemented, Alternative 1 would not permanently or temporarily affect any wetlands.

Construction access must be provided within the project limits and would temporarily affect Rittenhouse Channel and Ellsworth Channel. OEA cannot estimate temporary impacts to Rittenhouse and Ellsworth Channels from construction at this time because UP has not yet developed construction access routes. To address temporary impacts from construction, OEA is recommending mitigation requiring UP to coordinate construction access in Rittenhouse Channel and Ellsworth Channel with FCDMC and Mesa, respectively (MM-W-3 and MM-W-4). If UP cannot use existing ramps for construction access to Rittenhouse Channel, UP would construct temporary or permanent access points per FCDMC standards (MM-W-43). Because the

Ellsworth Channel culvert would truncate the existing access ramp into the channel, OEA is recommending that UP provide a new permanent access point for Mesa~~FCDMC~~ (MM-W-3).

Table 3-15~~3-13~~ summarizes Alternative 1's estimated permanent impacts to the likely waters of the United States within the project limits. Should the Board authorize the proposed rail line and UP builds new access points into either of the channels, permanent impacts may exceed what is shown in Table 3-15~~3-13~~ if new construction extends below the ordinary high water mark. Also, if construction in Rittenhouse Channel and/or Ellsworth Channel exceeds 6 months, the Corps may treat temporary construction impacts as permanent impacts for purposes of Section 404 permitting.

Table 3-15~~3-13~~. Permanent impacts to likely waters of the United States

Likely Waters of the United States	Estimated Permanent Impacts (acres)
Rittenhouse Channel	0.49
Ellsworth Channel	0.04~~0.03~~[1]
Wash No. 3	0.00
Wetlands	0.00
Total	0.53~~0.52~~

[1] OEA updated the estimated impacts in Ellsworth Channel based on a revised drainage exhibit (UP 2025b).~~Estimated impacts assume the end treatments of the Ellsworth Channel culvert would have similar dimensions to the existing culvert beneath the farm access road approximately 200 feet downstream.~~

Impacts to waters of the United States must be authorized by the Corps via a CWA Section 404 permit and the Corps may require UP obtain a Section 404 permit prior to construction (VM-W-4). In April 2023, UP submitted a preliminary jurisdictional delineation and a Section 404 permit application (preconstruction notification) under Nationwide Permit No. 14, Linear Transportation Projects, to the Corps for review. Permanent impacts ~~to~~ less than 0.5 acre within each water of the United States ~~less than 0.5 acre~~ can typically be authorized with a Nationwide Permit. For Nationwide Permits, ADEQ waives the requirement of a Section 401 Individual Water Quality Certification and conditionally certifies that projects authorized by Nationwide Permits would not cause or contribute to an exceedance of surface water quality standards.

UP submitted a preconstruction notification due to the Section 106 adverse effect determination, in compliance with General Condition No. 20, Historic Properties. See Section 3.12, *Archaeological and Historic Resources*, which includes OEA's cultural resources evaluation and discusses the Section 106 adverse effect determination. Because the Board has concluded its Section 106 process, the Corps can now issue the Section 404 permit, which UP has indicated will be a Nationwide Permit No. 14 (UP 2025b).~~Impacts greater than 0.5 acres, including temporary impacts that last longer than 6 months, would trigger a Section 404 Individual Permit, compensatory mitigation, and a Section 401 Individual Water Quality Certification.~~

~~Therefore,~~ UP has proposed VM to obtain its Section 404 permit prior to initiating construction in wetlands or other jurisdictional waters of the United States and to comply with all conditions of its Section 404 permit (VM-W-4). OEA also recommends mitigation requiring UP to coordinate the final drainage design in ~~both~~Rittenhouse ~~c~~Channel~~s~~ with FCDMC and the final drainage design in Ellsworth Channel with Mesa (MM-W-2).

Clearing, excavation, and fill placement during project-related construction could adversely affect water quality in surface waters by temporarily increasing turbidity and sedimentation when ephemeral flows are present. In addition, construction equipment and vehicles could leak or spill gasoline, oil, grease, and other engine materials. The construction of the new trackside drainage system would alter existing drainage patterns and would increase stormwater flows into the Rittenhouse and Ellsworth Channels. Accordingly, UP has proposed MMs to minimize adverse impacts to water quality by implementing an AZPDES permit and a SWPPP with associated BMPs (VM-W-1 and VM-W-3).

3.6.3.2 Floodplains

The planned Phoenix Subdivision support tracks would not affect any 100-year floodplains and are not discussed in this section. Under Alternative 1, construction of the CBCs and the wye tracks would result in the placement of fill and 0.45 acres of permanent impacts within the Rittenhouse Channel 100-year floodplain. While UP designed the proposed culverts and trackside ditches to accommodate the 100-year flow from the project limits into Rittenhouse Channel, similar to existing conditions, the 100-year flood water surface elevation would increase up to 0.19 feet (UP 2022c). However, the increase would comply with FEMA's implementing guidelines for EO 11988 (FEMA 2015).

Accordingly, UP has proposed and OEA is recommending MMs that would require UP to coordinate floodplain impacts with FCDMC and provide FCDMC an opportunity to review and comment on design plans (VM-W-9, VM-W-10, and MM-W-2). UP has also proposed additional recommended MMs to submit the necessary floodplain use permit application materials to FCDMC and to not commence construction within the 100-year floodplain until FCDMC issues the necessary floodplain use permit (VM-W-10). UP has confirmed that it obtained the FCDMC floodplain use permit in August 2025 (UP 2025a). Because UP has already obtained this permit, OEA is deleting VM-W-10 and recommending that the Board impose a condition requiring UP to comply with the conditions in its August 2025 FCDMC Floodplain permit in the Final EA (MM-W-5). Therefore, with imposition and implementation of these MMs, Alternative 1 would result in minor impacts within the floodplain that would not adversely affect the overall conveyance capacity of Rittenhouse Channel.

3.6.3.3 Groundwater

Operation of Alternative 1 and the planned Phoenix Subdivision support tracks would not require water, and UP would use water from offsite sources during construction, which could include water from Mesa's municipal fire hydrants. Therefore, Alternative 1 and the planned Phoenix Subdivision support tracks would not require a new groundwater well within the project limits. However, if UP's offsite water sources used during construction include groundwater from sources in the Phoenix AMA, such as Mesa's municipal fire hydrants, the water provider may be subject to groundwater withdrawal requirements. The availability of Mesa's water in particular

would be subject to the conditions of Mesa's municipal water conservation requirements (ADWR n.d.~~-b~~).

Offsite withdrawals from sources in the Phoenix AMA would be managed in accordance with the Arizona Groundwater Code and the Phoenix AMA's groundwater program for administering groundwater rights and permits. Therefore, OEA anticipates that impacts to groundwater from Alternative 1 would be temporary and minor. As noted in the hazardous materials and surface waters and wetlands sections, UP has also proposed a MM requiring UP to implement an AZPDES permit and a SWPPP with associated BMPs to minimize the potential for temporary impacts to groundwater quality (VM-W-1 and VM-W-3).

3.6.4 Effects of Alternative 2

The planned Phoenix Subdivision support tracks would not affect surface waters, wetlands, or 100-year floodplain. Alternative 2 would have the same impacts to likely waters of the United States and the Rittenhouse Channel 100-year floodplain as Alternative 1 because all potentially affected watercourses and floodplains are west of Ellsworth Road and this segment of the two alternatives is identical.

Alternative 2 and the planned Phoenix Subdivision support tracks would have similar impacts to groundwater supplies as Alternative 1 and the planned Phoenix Subdivision support tracks because the two alternatives have about a ~~less than~~ 5 percent difference in track length and project acreage. Alternative 2 and the planned Phoenix Subdivision support tracks would have similar impacts to water quality as Alternative 1 and the planned Phoenix Subdivision support tracks because an AZPDES permit and SWPPP would be required (VM-W-1 and VM-W-3).

3.7 Geology and Soils

This section describes the geology, soils, and seismic hazards in the study area, as well as the potential impacts to geology and soils from the construction and operation of the project. The study area for geology and soils includes portions of the city of Mesa, the town of Queen Creek, and the town of Gilbert in southeastern Maricopa County and western Pinal County. No federal, state, or local regulations apply to geology and soils. OEA reviewed topographical maps and soil maps (NRCS 2026a~~2022~~) to identify geologic and soil resources in the study area and to assess potential impacts from the project.

3.7.1 Affected Environment

The study area is in the Sonoran Desert section of the Basin and Range Physiographic Province (Fenneman and Johnson 1946). The terrain in the project limits is mostly flat with elevations ranging about 10 feet, from 1,330 feet to 1,340 feet above mean sea level. However, several mountain ranges about 15 to 20 miles away are visible because of the slight grade between the project limits and these geologic features. The gently sloping terrain in the study area is bordered by the McDowell Mountains to the northwest, the Usery Mountains to the north, the Goldfield Mountains to the northeast, the Superstition Mountains to the east, and the San Tan Mountains to the south.

The soil in the study area consists of young, fine-grained deposits from the Holocene and late Pleistocene era primarily composed of loams, sand, silt, and fine gravel, with some areas of clay

loam (Arizona Geological Survey n.d.; NRCS 2026a~~2022~~). These soils developed on floodplains, alluvial fans, and fan terraces created by runoff and drainage from the surrounding mountains. No active fault lines, earth fissures, landslides, or other known geologic hazards are in the project limits (Arizona Geological Survey 2025~~2023~~). Although, the Hawk Rock land subsidence feature and associated fissures are in the study area, approximately 4.0 miles north of the eastern terminus (ADWR 2022~~b~~; Arizona Geological Survey 2019~~2017~~).

Table 3-16~~3-14~~ summarizes the soil types within the project limits. All soils within the project limits are nonhydric, meaning they did not form in wet or inundated conditions, and are well-drained (NRCS 2026a~~2022~~). Section 3.8, *Land Use and Farmland*, discusses prime and unique farmland within the project limits.

Two types of characteristics key to evaluating the potential suitability of local soils for development are corrosivity and erosion potential. Soils with high potential for corrosivity can damage concrete and steel, and soils with high potential for erosion can undermine the railbed. About 8 percent (~~23.5~~23.4 acres) of soils in the project limits are highly corrosive to steel and almost 7 percent (~~20.0~~19.9 acres) are highly corrosive to concrete (NRCS 2026a~~2022~~). Soils near the Phoenix Subdivision's Sossaman Road crossing and Alternative 2's Crismon Road crossing (Vint loamy fine sand) are highly corrosive to steel, and soils along both alternatives east of Signal Butte Road (Mohall loam) are highly corrosive to steel and concrete. Soils within the project limits are moderately susceptible to water erosion across soil types and generally have a moderate to low susceptibility to wind erosion (Institute of Water Research 2002; USDA 2019).

Table 3-16~~3-14~~. Soil characteristics within project limits

Soil Type	Acres[1] (Percent)	Corrosion of Steel	Corrosion of Concrete	Water Erosion[2]	Wind Erosion (tons/acre/ year)[3]
Antho sandy loam, 0 to 1 percent slopes	3.5 ~~3.4~~ (1.1)	Moderate	Low	0.28	86
Contine clay loam	13.5 ~~13.4~~ (4.4)	Moderate	Low	0.32	48
Gilman fine sandy loam, 0 to 2 percent slopes	35.2 ~~35.3~~ (11.6)	Moderate	Low	0.32	86
Gilman loam	226.7 ~~225.6~~ (74.5) ~~(74.4)~~	Moderate	Moderate ~~Low~~	0.37	86
Glenbar clay loam, 0 to 2 percent slopes	2.1 (0.7)	Moderate	Low ~~Moderate~~	0.37	86

Soil Type	Acres[1] (Percent)	Corrosion of Steel	Corrosion of Concrete	Water Erosion[2]	Wind Erosion (tons/acre/ year)[3]
Mohall loam MLRA 40	19.9 ~~20.0~~ (6.5) ~~(6.6)~~	High	High	0.43	86
Vint loamy fine sand	3.5 (1.1) ~~(1.2)~~	High	Low	0.28	134

Source: NRCS 2026a~~2022~~.
[1] The area includes ~~303.0~~304.4 acres, which covers the existing and proposed right-of-way and TCEs for both alternatives.
[2] Soil erosion is measured by the K factor, which indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible that soil type is to erosion by water.
[3] The wind erodibility index is a numerical value that indicates the susceptibility of soil to wind erosion by the tons per acre per year that can be expected to be lost to wind erosion.

3.7.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Therefore, the No-Action Alternative would not affect geology or soils because no construction or ground-disturbing activities would occur. Ongoing development in the PAMZ and natural processes, such as erosion, could continue to affect soils in the study area.

3.7.3 Effects of Alternative 1

Construction of Alternative 1 and the planned Phoenix Subdivision support tracks would require excavation and fill that would change the local topography slightly within the project limits, resulting in sections of the proposed rail line elevated on railbeds up to 15 feet above existing ground surface. However, Alternative 1 and the planned Phoenix Subdivision support tracks would not affect the overall topography, geologic landforms, or soil types in the study area.

Alternative 1 and the planned Phoenix Subdivision support tracks would disturb soil during excavation and placement of fill during construction. Alternative 1 and the planned Phoenix Subdivision support tracks would require approximately ~~110,000~~150,000 cubic yards of fill and ~~390,000~~331,000 cubic yards of excavation, resulting in an excess of ~~280,000~~181,000 cubic yards of excavated material. Excavating and stockpiling soil mixes and soil layers causes compaction, which may result in minor adverse impacts to soil quality and the physical, biological, and chemical properties of soil. Disturbed soil is also more susceptible to wind and water erosion. Accordingly, UP has proposed MMs requiring UP to obtain and implement a construction stormwater permit and prepare and comply with a SWPPP to minimize adverse impacts to soil (VM-W-2 and VM-W-3). The SWPPP shall include implementation of soil erosion and

sediment control BMPs, such as dust suppression and soil stabilization or reseeding, to reduce potential soil erosion and runoff (VM-W-3).

As described in Section 3.6, *Water Resources*, operation of Alternative 1 and the planned Phoenix Subdivision support tracks would not require water and UP would use water from offsite sources during project-related construction. Because offsite withdrawals from sources in the Phoenix AMA would be managed in accordance with the Arizona Groundwater Code and the Phoenix AMA's groundwater program, Alternative 1 and the planned Phoenix Subdivision support tracks would not contribute to groundwater subsidence in the study area, i.e., the gradual settling or sudden sinking of land due to groundwater extraction.

Based on a review of the soil characteristics and ratings, about ~~8~~6 percent (~~23.5~~14.7 acres) of soil within ~~the project limits~~Alternative 1 and the planned Phoenix Subdivision support tracks have high corrosivity to concrete or steel. In these areas near the southern Sossaman Road ~~and Crismon Road~~[27] crossing~~s~~ and east of Signal Butte Road, buried or partially buried construction elements like culverts, light poles and foundations, electrical poles and pads, and wayside signs may be vulnerable to corrosion. Therefore, OEA is recommending mitigation requiring UP to comply with relevant FRA inspection and maintenance requirements to identify and mitigate any threats to the safe operation of the project, including those resulting from corrosive soils (MM-GS-1).

3.7.4 Effects of Alternative 2

Alternative 2 and the planned Phoenix Subdivision support tracks would have comparable impacts to geology and soils as Alternative 1 and the planned Phoenix Subdivision support tracks. Alternative 2 and the planned Phoenix Subdivision support tracks would require similar amounts of fill and excavation as Alternative 1 and the planned Phoenix Subdivision support tracks due to similar track length and project acreage (~~less than~~about 5 percent difference) and homogenous topography. Alternative 2 and the planned Phoenix Subdivision support tracks likewise may increase erosion and sedimentation during construction. BMPs would be similar to those implemented for Alternative 1 and the planned Phoenix Subdivision support tracks (VM-W-3).

Alternative 2 and the planned Phoenix Subdivision support tracks would also cross an additional ~~0.6~~2.4 acres of soil with high corrosivity to concrete and steel compared to Alternative 1 and the planned Phoenix Subdivision support tracks, including a third area near the Crismon Road crossing. Based on a review of the soil characteristics and ratings, about 6 percent (17.1 acres) of soil within Alternative 2 and the planned Phoenix Subdivision support tracks have high corrosivity to concrete or steel, which may pose potential hazards to Alternative 2 and the planned Phoenix Subdivision support tracks construction elements that are buried or partially buried underground. Accordingly, OEA is recommending the same MMs for Alternative 2 and the planned Phoenix Subdivision support tracks as those recommended for Alternative 1 and the planned Phoenix Subdivision support tracks to comply with FRA inspection and maintenance

[27] Crismon Road was removed from the Alternative 1 analysis because it was included in error in the Draft EA. High-corrosivity soils were identified only in the vicinity of Alternative 2 near Crismon Road and not along the Alternative 1 alignment.

requirements to identify and mitigate any threats to the safe operation of the project, including those from corrosive soils, if Alternative 2 is authorized and built (MM-GS-1).

3.8 Land Use and Farmland

This section addresses the existing conditions and impacts on land use and zoning, farmland, recreation, and utilities. Several planning and zoning documents outline land use designations that direct development in and adjacent to the PAMZ; these plans and their applicability to PIRATE are discussed in Section 3.8.1, *Affected Environment*. The Farmland Protection Policy Act (FPPA) (7 U.S.C. § 4201) was enacted to minimize the unnecessary and irreversible conversion of prime and unique farmland and land of statewide or local importance to nonagricultural uses. The proposed rail line would cross an active agricultural lease on ASLD-administered land between Merrill and Signal Butte Roads. The study area for land use and farmland is the project vicinity which includes portions of the city of Mesa, the town of Queen Creek, the town of Gilbert, Maricopa County, and Pinal County.

Since OEA issued the Draft EA in 2023, rapid development has occurred within the PAMZ and and the ground disturbance that was discovered within the UP right-of-way changed the land use within the disturbed areas. In addition, in December 2025, NRCS directed OEA to calculate farmland conversion based upon farmland soil characteristics alone, rather than taking current land use into account as was done in the 2023 Draft EA (NRCS 2025 and Appendix A). As a result, the land use and farmland analysis in the Draft EA has been updated to account for these changes. These updates do not result in any new impacts and do not alter the conclusions in the Draft EA.

3.8.1 Affected Environment

3.8.1.1 Land Ownership, Land Use, and Zoning

Land within the PIRATE portion of the project limits is primarily privately owned (about 130 acres) with approximately ~~5~~7 acres owned by Mesa, a flood control channel under Mesa's jurisdiction, 8 acres administered by ASLD, and ~~two~~a flood control channel owned by FCDMC ~~channels~~. Refer to Figure 1-2 for land ownership and jurisdiction and Section 3.6, *Water Resources*, for more information on the Rittenhouse and Ellsworth Channels.

Existing land use adjacent to the Phoenix Subdivision is primarily residential, institutional (i.e., schools), and commercial, though areas northeast of the Phoenix Subdivision within the PAMZ are transitioning to industrial uses. Land use along the proposed rail line is ~~mostly a combination of active and fallow~~former agriculture transitioning toward~~s~~ manufacturing, industrial, and mixed commercial uses. These former croplands are flanked by ~~vacant land~~new industrial and commercial development west of Sossaman Road, MGA between Sossaman and Ellsworth Roads, and existing industrial complexes east of Signal Butte Road. This landscape reflects the area's transition from its historically dominant agricultural uses to a more industrial base.

Table 3-17~~3-15~~ summarizes the planning and zoning designations applicable to the PAMZ, the Phoenix Subdivision between Power Road and Ellsworth Loop, and adjacent areas. Figures 3-8 and 3-9 depict the current zoning in the project vicinity and, as of February 2026~~June 2022~~, the existing land use in the PAMZ.

Table 3-173-15. Planned land use and zoning in the study area

Planning/Zoning Document	Applicability	Relevant Designations
Mesa 2040 General Plan (June 2014)	PIRATE would be constructed and operated in Mesa.	The PAMZ is in the Gateway economic activity district, which Mesa identifies as a growth area. The PAMZ is designated as an employment district, except for the areas north of SR 24 designated as neighborhood and mixed-use activity districts. Employment districts cater primarily to industrial, warehousing, office, and related uses. Adjacent planned land use to the north includes specialty (ASU and PMGA), mixed-use community (Bell Bank Park), and neighborhood (north of Williams Field Road) districts.
Tomorrow's Mesa 2050 General Plan (May 2024)	PIRATE would be constructed and operated in the city of Mesa.	The PAMZ includes areas designated as industrial, urban center, employment center, and residential. The residential areas are limited to the Queens Park neighborhood on Germann Road and Destination at Gateway north of SR 24. Employment centers cater primarily to light industrial, office, and medical facilities, supported by dining, retail, and warehouses. Adjacent designations to the north include regional centers (Arizona State University and Arizona Athletic Grounds) and mixed residential (north of SR 24).
Mesa Gateway Strategic Development Plan (December 2008)	PIRATE would be constructed and operated in the Mesa Gateway planning area.	The PAMZ and PIRATE are located in the Logistics & Commerce District of the planning area, where Mesa intends to develop an agglomeration of industrial, business park, and commercial land uses compatible with increasing MGA flight volumes. Manufacturing, warehouses, and distribution facilities are key examples and the plan notes that "greater intensity and high density uses will be encouraged" toward the northern part of this district.

Table 3-173-15. Planned land use and zoning in the study area

Planning/Zoning Document	Applicability	Relevant Designations
Southeast Mesa Land Use and Transportation Plan (June 2019)	PIRATE would be constructed and operated in southeastern Mesa.	This 2019 plan incorporates the land use and districts outlined in the 2008 *Mesa Gateway Strategic Development Plan* and the 2014 *Mesa 2040 General Plan*, as well as Mesa's existing zoning, to create an updated framework for future land use. (Note: Mesa's 2040 general plan has been superceded by its 2050 general plan.) The PAMZ and PIRATE continue in the updated Logistics & Commerce District, which has a similar land use emphasis to the 2008 strategic plan. The plan shows nearly all the remaining vacant and former agricultural land in the PAMZ used for industrial, commercial, or employment purposes.
Mesa zoning regulations (January 2026February 2023)	PIRATE would be constructed and operated in the city of Mesa.	The PAMZ and adjacent areas to the north are mostly zoned as general or light industrial, with some pockets of agricultural, residential, heavy industrial, and commercial zoning. Several parcels between Rittenhouse and Ellsworth Roads are zoned as employment opportunity districts, which are intended to facilitate and accommodate large-scale developments providing substantial job growth. Two pPortions of the PAMZ also have an airfield zoning overlay, intended to encourage land use compatible with MGA flight operations and minimize impacts to navigable air space from nearby developments.

Table 3-173-15. Planned land use and zoning in the study area

Planning/Zoning Document	Applicability	Relevant Designations
Queen Creek *2018 General Plan* (September 2024May 2018)	Southeast of Sossaman Road, the planned Phoenix Subdivision support tracks would be constructed and operated in the Queen Creek town limits in Maricopa County, and the eastern end of PIRATE would be constructed and operated adjacent to Queen Creek's planning area in Pinal County.	Areas adjacent to the Phoenix Subdivision are designated as neighborhood, commercial, industrial, public, or urban. The presence of the Phoenix Subdivision is acknowledged throughout the plan. Land in Pinal County is designated as industrial or as a special district on ASLD land within the town limits.
ASLD Queen Creek Specific Area Plan – Supplement 1 (March 2021)	The eastern end of PIRATE would be constructed and operated adjacent to Queen Creek's planning area in Pinal County.	The portions of the planning area closest to PIRATE are designated as a 745-foot-wide industrial compatibility area and an urban employment district between the industrial compatibility area and Ironwood Road. The urban employment designation allows for offices, industrial parks, and commercial uses.
Queen Creek zoning regulations (February 2025January 2023)	Southeast of Sossaman Road, the planned Phoenix Subdivision support tracks would be constructed and operated in the Queen Creek town limits in Maricopa County, and the eastern end of PIRATE would be constructed and operated adjacent to Queen Creek's planning area in Pinal County.	Areas adjacent to the Phoenix Subdivision are zoned as mostly residential with some pockets of commercial, office, public, and mixed-use zoning. Queen Creek has not zoned the Phoenix Subdivision between Sossaman Road and Ellsworth Loop. Land in Pinal County is zoned as residential or as having a specific plan on the ASLD land within the town limits.
Plan For Our Future: 2020 Gilbert General Plan (February 2020)	Construction and operation of PIRATE would occur adjacent to the Gilbert town limits.	Areas adjacent to the western end of the PAMZ are designated as parks/open space or commercial, and the presence of the Phoenix Subdivision is acknowledged throughout the plan.

Table 3-173-15. Planned land use and zoning in the study area

Planning/Zoning Document	Applicability	Relevant Designations
Gilbert zoning regulations (April 2022March 2023)	Construction and operation of PIRATE would occur adjacent to the Gilbert town limits.	Areas adjacent to the western end of the PAMZ are zoned as public facility/institutional and commercial. In Gilbert, the Phoenix Subdivision is also zoned as public facility/institutional.
Land Use Compatibility Plan Update (PMGA) (January 2017)	Construction and operation of PIRATE would occur adjacent to MGA and in the airport's planning area.	This plan is a guide to protect MGA from encroachment by incompatible land uses that could present hazards to aircraft in flight, such as glare, lighting that mimics airport facilities, visual obstructions, and electromagnetic interference. PIRATE would traverse airport overflight areas (AOA) 1 and 2, where mixed-use, non-residential development is allowed. Southeast of the runway protection zones adjacent to the PAMZ, the maximum allowable structure height along the proposed rail line is between 16 feet and 116 feet.
Phoenix-Mesa Gateway Airport Master Plan (June 2020)	Construction and operation of PIRATE would occur adjacent to MGA and in the airport's planning area.	The plan shows SkyBridge and the runway protection zones immediately adjacent to PIRATE between Sossaman and Ellsworth Roads. SkyBridge will ultimately include a joint U.S.-Mexico Customs inspection facility, retail/office, and aeronautical industrial development on 435 acres of MGA. The development concept MGA adopted in 2020 as part of the plan includes a preliminary north-south road alignment between the airport boundary and Pecos Road (south) that would allow Skybridge to link its on- and off-airport properties and provide another access point to the on-airport facilities from Pecos Road (south).

Table 3-173-15. Planned land use and zoning in the study area

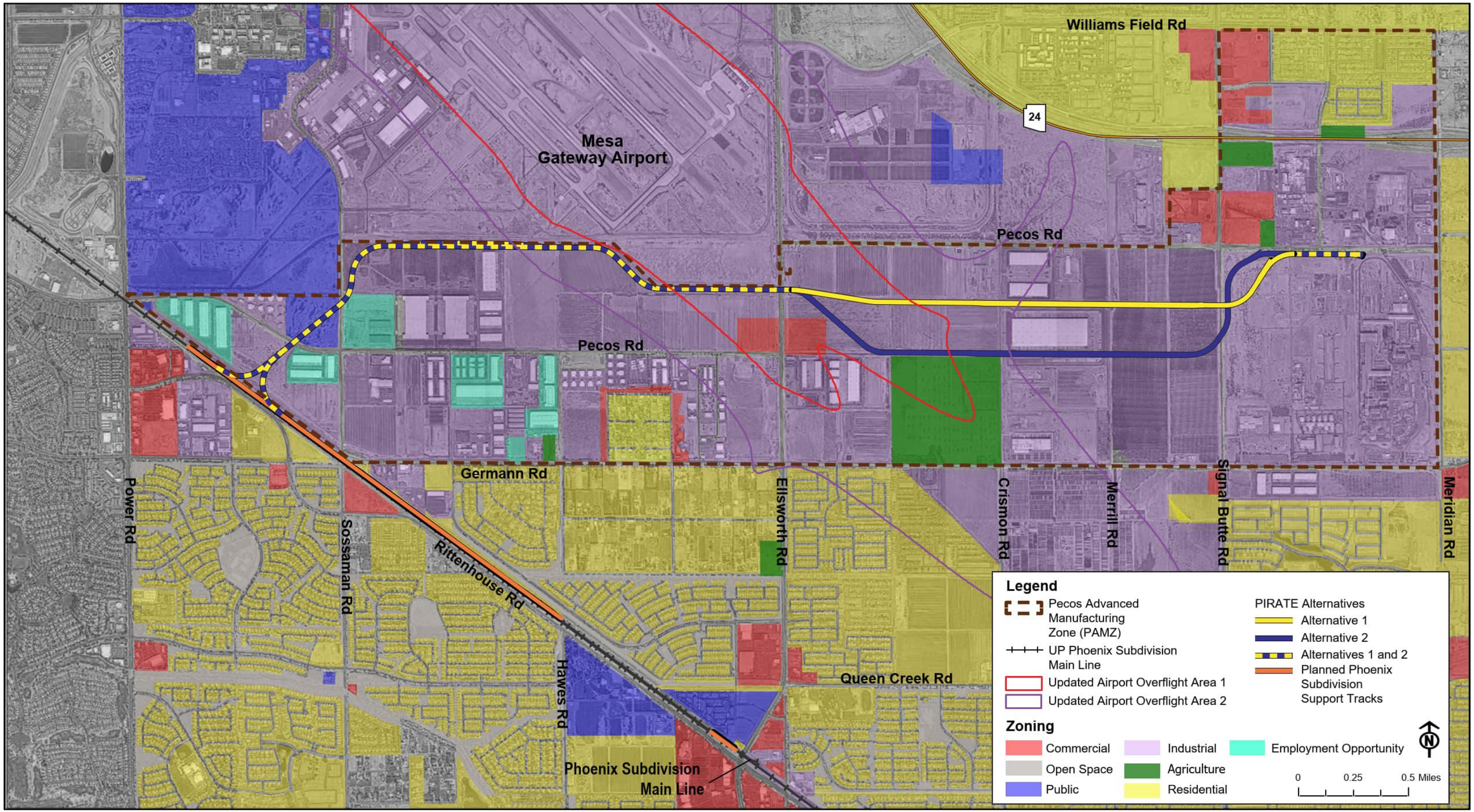
Planning/Zoning Document	Applicability	Relevant Designations
Vision 2030, Maricopa County Comprehensive Plan; Queen Creek Area Plan (January 2016)	In Maricopa County, the Phoenix Subdivision traverses an unincorporated county island between Power and Sossaman Roads. Other unincorporated Maricopa County islands are adjacent to the Phoenix Subdivision and north of the PAMZ.	Maricopa County adopted the most recent land use plan for unincorporated county islands in 1996. The County did not designate a land use for the Phoenix Subdivision, but did designate the adjacent unincorporated areas as residential, along with other unincorporated areas near Williams Field and Mountain Roads. The County designated the land use north of the PAMZ and west of Signal Butte Road in accordance with previous uses: the "Williams Gateway Airport" (now MGA) west of Ellsworth Road and the General Motors Proving Ground (now Arizona Athletic Grounds ~~Bell Bank Park~~, SR 24, and the Eastmark master-planned community) between Ellsworth and Signal Butte Roads.
Maricopa County zoning regulations (November 2024~~March 2022~~)	In Maricopa County, the Phoenix Subdivision traverses an unincorporated county island between Power and Sossaman Roads. Other unincorporated Maricopa County islands are adjacent to the Phoenix Subdivision and north of the PAMZ.	Maricopa County has not zoned the county island between Power and Sossaman Roads. Unincorporated county land along the Phoenix Subdivision (in Queen Creek) is zoned as residential and commercial. Unincorporated county land north of the PAMZ, generally between Ellsworth and Meridian Roads, is zoned as residential, industrial, or airport district.

Table 3-173-15. Planned land use and zoning in the study area

Planning/Zoning Document	Applicability	Relevant Designations
We Create Our Future, Pinal County Comprehensive Plan (August 2025November 2021)	Construction and operation of PIRATE would occur adjacent to the Pinal County boundary and unincorporated Pinal County land at Meridian Road.	Unincorporated Pinal County land east of Meridian Road is designated as moderate low-density residential in the Gateway/Superstition Vistas growth area and the Superstition Vistas planning area. The plan also shows an employment corridor along SR 24. If land use transitions to ensure compatibility are implemented, Pinal County does allow for more intensive uses in the moderate low-density residential areas: medium- and high-density residential, commercial, office, and light industrial. Light industrial uses are allowed within 0.5 mile of a railroad.
Pinal County zoning regulations (January 2026December 2022)	Construction and operation of the PIRATE would occur adjacent to the Pinal County boundary and unincorporated Pinal County land at Meridian Road.	A 750-foot-wide strip of unincorporated Pinal County land (between the Maricopa County boundary and the Queen Creek town limits) is zoned as general rural. While general rural does not allow industrial uses, it can be used to classify areas pending more intensive development.

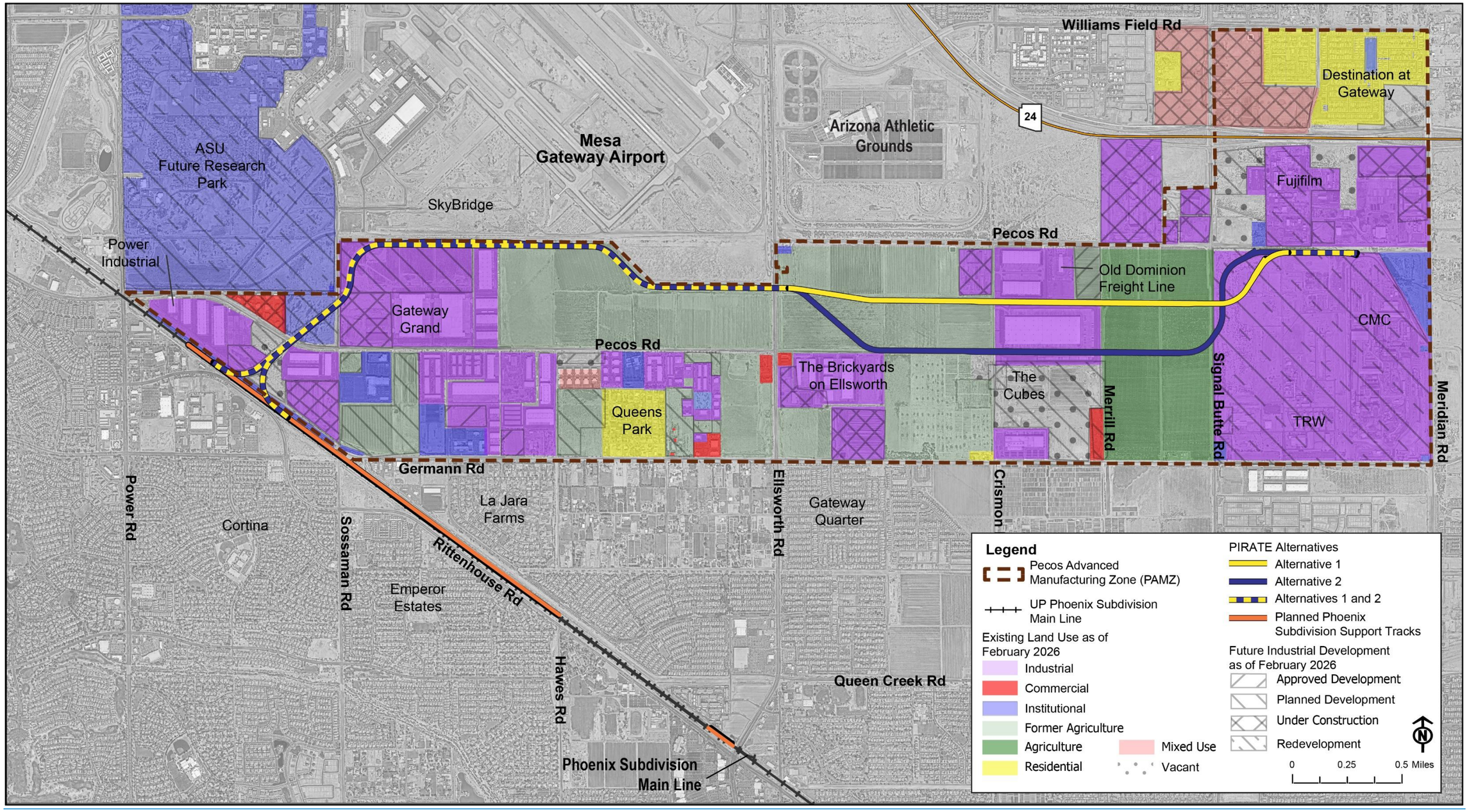
Sources: Gilbert 2019, 2020, 2022; Kimley-Horn et al. 2019; Maricopa County 2016, 20242022; Mesa 2008, 2014, 2022b, 2022c, 2024, 2026a; Pinal County 2025, 20262021, 2022; PMGA 2020; Queen Creek 2018, 2020, 2024b, 2025, n.d. a, n.d. b; Ricondo & Associates 2017; The WLB Group, Inc. 2021.

Figure 3-8. Zoning in the project vicinity



Note: This graphic was revised in the Final EA.

Figure 3-9. Existing and future land use in the PAMZ



Note: This graphic was revised in the Final EA.

As mentioned in Chapter 1, *Purpose and Need,* and shown on Figure 1-2, the project limits traverse a subset of the PAMZ between Rittenhouse and Ellsworth Roads called the Pecos Road Employment Opportunity Floating Zone, and the entire PAMZ is in the Gateway Area Opportunity Zone, where development is afforded an expedited entitlement and zoning review process (Mesa 2017; 2019b). Some pockets of land are not currently planned for development, including the citrus orchard on ASLD land and a few privately owned former agricultural fields. However, the area surrounding the project limits is planned for moderate-intensity development by 2050~~2040~~ (Mesa 2024~~2014~~) and is in the Mesa Gateway planning area where development is directed by the *Mesa Gateway Strategic Development Plan* (Mesa 2008). This planning area is concurrent with the Gateway Area Opportunity Zone and focuses on industrial, manufacturing, and distribution land uses.

Approximately ~~7.3~~15.2 million square feet of industrial, manufacturing, data management, and mixed-use development on ~~900~~1,600 acres has been completed or is under construction for completion in 2026~~2022~~. An additional ~~10.3~~2.1 million square feet of these uses on ~~1,005~~300 acres has been approved or will be under construction in the Mesa Gateway area in the next 2 to 3 years, ~~26.1 million square feet on 1,996 acres is planned for completion by 2024,~~ and ~~12~~2.2 million square feet on ~~1,310~~260 acres is planned or approved with no known completion date (Mesa 2026a~~2022b~~). Figure 3-9 shows the future industrial development in the PAMZ, including The Cubes, a 260-acre master-planned industrial park that ~~is currently under construction~~has been partially constructed between Crismon and Merrill Roads.

3.8.1.2 Farmland Characteristics

Prime farmland has the best combination of physical and chemical characteristics for producing food, forage, fiber, feed, and oilseed crops. Farmland of unique importance is not prime farmland but is used to produce high-value fiber and food crops including citrus, fruits, vegetables, nuts, etcetera. In 2023, ~~T~~the project limits contained about 50 acres of active or fallow agricultural land, all between Sossaman and Signal Butte Roads. Since 2024, after OEA issued the Draft EA, only the ASLD land has been cultivated and is considered active agriculture. The other (now former) agricultural lands are considered shrubland (USDA 2025). The ASLD land is leased as an organic citrus orchard; other crops formerly grown in the area surrounding the project limits included forage crops to feed animals, cotton, and wheat.

OEA coordinated with NRCS in fall 2025 to update the farmland analysis. ~~Based on soil characteristics,~~NRCS indicated that all ~~agricultural land~~ soils within the project limits are~~is~~ classified~~designated~~ as prime farmland if irrigated and protected from flooding or as farmland of unique importance ~~(NRCS 2022)~~. Furthermore, NRCS clarified that all lands with prime or other important farmland soils are subject to the FPPA unless they are in a designated urban area or used for water storage (NRCS 2025, 2026a). NRCS also clarified that current land use should not be taken into account in the calculation of FPPA-regulated land. In addition, TCEs are not subject to the FFPA because they would not result in the permanent conversion of farmland to non-farm use and would remain farmable after construction (NRCS 2026b). The existing Phoenix Subdivision right-of-way is also not subject to the FFPA because rights-of-way established prior to 1984 are exempt from FFPA requirements (NRCS 2026b). As a result of this change in guidance, the amount of land within the project limits subject to the FPPA since the Draft EA was published increased from 50 acres to 145 acres. ~~The ASLD land is leased as a~~

~~citrus orchard; other crops grown in the area surrounding the project limits include forage crops to feed animals, cotton, and wheat.~~

3.8.1.3 Recreation

No recreational facilities are currently located within the project limits. ~~However, Mesa is planning a shared-use path along Signal Butte Road that would cross the project limits between Pecos and Germann Roads (Arizona Department of Transportation [ADOT] 2018a).~~Recreational facilities within 0.25 mile of the project limits include Gilbert's Desert Sky Park, Arizona Athletic Grounds~~Bell Bank Park~~, privately owned neighborhood parks and greenbelts, and school fields and facilities. No parks or recreational areas acquired pursuant to Section 6(f) of the Land and Water Conservation Fund Act of 1965 are present within the project limits.

3.8.1.4 Utilities

Existing utilities in the project vicinity include Mesa, Queen Creek, and Gilbert potable water and wastewater, Queen Creek Irrigation District canals (south of Germann Road), Salt River Project (SRP) electricity, Western Area Power Administration transmission lines (between Meridian and Ironwood Roads), Cox Communications and ~~CenturyLink~~Lumen cable, and Southwest Gas and Magma Gas natural gas infrastructure. Two Kinder Morgan pipelines, one abandoned and one in-use, parallel the Rittenhouse Channel and the Phoenix Subdivision (refer to Section 3.4, *Hazardous Materials and Waste Sites*, for more information on the Kinder Morgan pipelines). In addition, since 2022, SRP ~~is planning~~has completed two~~three new~~ electricity projects, and is planning a third, adjacent to or intersecting the project:

- The new Southeast Power Link 230-kilovolt (kV) transmission line ~~would~~ runs north-south through the PAMZ about 65 feet east of Crismon Road.
- A new substation would be constructed west of the intersection of Power and Pecos Roads, outside of the project limits.
- The Abel-Pfister-Ball project along Rittenhouse Road ~~would~~ replaced ~~the~~ existing smaller poles and 69-kV transmission line with larger poles and a 230-kV line and ~~would~~ crosses over the Phoenix Subdivision at Ryan Road.

~~All three~~ The two transmission line projects are now considered past actions in Section 3.13, *Cumulative Impacts*. Chapter 5, *Consultation and Coordination*, summarizes OEA's coordination with SRP during this environmental review process.

3.8.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Therefore, no impacts to land use, zoning, farmlands, recreational facilities, or utilities would occur from construction and operation of the project. However, planned land use and development would continue in accordance with Mesa's zoning and future land use plans. ~~Farml~~Land subject to the FPPA within the project limits would not be converted for rail purposes, but would potentially be converted to other land uses in time consistent with the development in the area. Refer to Section 3.13, *Cumulative Impacts*, for OEA's analysis of reasonably foreseeable development in and adjacent to the PAMZ.

3.8.3 Effects of Alternative 1

All planned construction and operational changes on the Phoenix Subdivision would occur within UP's existing right-of-way and a ~~1.5~~1.6-acre TCE within paved and previously disturbed areas along Sossaman Road. Therefore, this portion of the project would not affect land subject to the FPPA~~farmland~~ or recreation. Impacts from Alternative 1 are summarized in the following sections, and the planned Phoenix Subdivision support tracks are included in the land use and zoning conformance determinations and utility impacts.

3.8.3.1 Impacts to Land Use and Zoning

Alternative 1 would permanently change vacant, former agricultural, manufacturing, and industrial land uses within UP's proposed right-of-way for PIRATE to a rail line use. UP would acquire approximately ~~142~~144 acres of new right-of-way or permanent easement and would use about 29 acres of TCEs. However, no business or residential displacements or relocations would occur. Construction in the Rittenhouse ~~and Ellsworth~~ Channel~~s~~ would require FCDMC right-of-way use permits to ensure consistency with FCDMC's allowable uses and alterations to its regional drainage network. Since issuance of the Draft EA, OEA clarified that Ellsworth Channel is under the jurisdiction of Mesa and not FCDMC. ~~Accordingly~~To reflect this, OEA ~~is recommending mitigation that would~~ has revised MM-LU-2 requiring~~e~~ UP to coordinate with FCDMC and obtain right-of-way use permits before starting construction in the Rittenhouse Channel in this Final EA~~or Ellsworth Channel (MM-LU-2)~~. OEA has also revised MM-W-3 requiring UP to provide a new, permanent Mesa access point into the Ellsworth Channel to replace the access ramp that would be displaced by construction of the PIRATE channel crossing in this Final EA.

Table 3-18~~3-16~~ summarizes whether Alternative 1 and the planned Phoenix Subdivision support tracks would conform to or conflict with the land use plans and zoning regulations identified in Table 3-17~~3-15~~. Construction and operation of the project is consistent with planned industrial land uses and zoning classifications identified in nearly all of the applicable plans and zoning regulations. Generally, OEA does not anticipate conflicts with residential land uses because they are outside the area of direct noise or visual impacts, or they are far enough away from the project that the distance and intervening land uses would serve as barriers to potential impacts.

OEA did identify one conflict during its conformance evaluation: the proposed rail line would prevent SkyBridge from constructing and operating the preliminary road alignment shown in the *Phoenix-Mesa Gateway Airport Master Plan* (Mead & Hunt 2020a) because UP has not included an at-grade crossing in this location. Therefore, OEA is recommending mitigation requiring UP to coordinate with MGA to resolve this conflict as well as to address the compatibility of PIRATE with airspace, navigation facilities, height restrictions, and lighting requirements (MM-LU-3).

As discussed in Section 5.1.1, OEA met with MGA in March 2022 to discuss the project. During this meeting, MGA confirmed all lighting should be directed downward to avoid glare for landing planes. MGA provided OEA with additional information after this discussion regarding height and lighting restrictions. After considering this requirement and the evaluation in Table 3-18~~3-16~~, OEA has determined that Alternative 1 and the planned Phoenix Subdivision support tracks would conform to each of the applicable plans and zoning regulations.

OEA also considered the potential for the proposed rail line to induce development. As shown on Figure 3-9 and documented in Table 3-173~~-15~~, industrial and commercial development is already planned throughout the PAMZ. Section 3.9, *Socioeconomics*, includes data demonstrating the PAMZ's potential to be an economic generator regardless of the proposed rail line. Alternative 1 may result in more companies that ship and receive freight via rail locating in the PAMZ, but many businesses in the PAMZ that might use rail service if it were available are already being built or proposed. Thus, PIRATE would not by itself induce development that would not already be taking place. Rather, PIRATE is a response to the increasing need for rail service in a rapidly developing area. Refer to Section 1.2, *Purpose and Need*, and Section 2.2.1, *Alternatives Development,* for analysis of the role that CMC's request for rail service played in UP's project development process. Therefore, OEA determined that Alternative 1 would not induce development or adversely affect land use in or adjacent to the PAMZ. Refer to Section 3.13, *Cumulative Impacts*, for OEA's analysis of reasonably foreseeable development in and adjacent to the PAMZ.

Table 3-183~~-16~~. Alternative 1 and the planned Phoenix Subdivision support tracks conformance with planned land use and zoning

Planning Document	Conformance Determination
Tomorrow's Mesa 2050 General Plan ~~*Mesa 2040 General Plan*~~	PIRATE would be compatible with and would support the development of the future industrial land uses designated in the PAMZ. OEA does not expect conflicts with the neighborhood district north of SR 24 due to distance (0.6 mile), the intervening land uses (industrial and manufacturing), and SR 24 serving as barriers between the proposed rail line and the Destination at Gateway neighborhoods.
Mesa Gateway Strategic Development Plan	PIRATE would support the goals of the Logistics & Commerce District by serving the freight needs of manufacturing, warehouses, and distribution facilities while being compatible with increasing MGA flight volumes.
Southeast Mesa Land Use and Transportation Plan	PIRATE would support the goals of the updated Logistics & Commerce District by serving the freight needs of manufacturing, warehouses, and distribution facilities while being compatible with increasing MGA flight volumes.
Mesa zoning regulations	PIRATE would be compatible with the industrial, employment opportunity, and commercial zoning in the PAMZ. ~~While the proposed rail line and PIRATE yard would convert land zoned for agriculture to a rail use (see the *Impacts to Farmland* discussion after this table), future industrial development is planned for nearly all remaining agricultural zoning in the PAMZ to implement the land use goals outlined in three previous plans in this table.~~ OEA is recommending mitigation requiring UP to coordinate with MGA to minimize potential impacts to navigable air space from PIRATE construction and operation (MM-LU-3).

Table 3-183-16. Alternative 1 and the planned Phoenix Subdivision support tracks conformance with planned land use and zoning

Planning Document	Conformance Determination
2018 General Plan (Queen Creek)	The planned Phoenix Subdivision support tracks would be compatible with existing and future land uses that have developed and will develop around the pre-existing tracks. While the project does not include a grade-separated crossing at Sossaman Road (as shown in this plan), the results of the traffic analysis in Appendix B (*Traffic Report*) do not indicate the need for grade-separated crossings. PIRATE would be compatible with and could support the development of the future industrial land uses in western Pinal County. The special district on ASLD land is addressed under the next plan in this table.
ASLD Queen Creek Specific Area Plan – Supplement 1	PIRATE would be compatible with the special district on ASLD land because of the land use transition afforded by the industrial compatibility area and the more intensive land uses allowed in the urban employment district.
Queen Creek zoning regulations	The planned Phoenix Subdivision support tracks would be compatible with the zoning that Queen Creek assigned around the pre-existing tracks. PIRATE would be compatible with the specific plan zoning on ASLD land for the reasons cited for the *ASLD Queen Creek Specific Area Plan – Supplement 1*. PIRATE would end about 1,000 feet west of the residential zoning and existing, dispersed homes in Pinal County. It would not conflict with existing or future homes because they are outside the area of potential noise and vibration impacts and views of trains would be intermittent and consistent with other industrial land uses in the PAMZ.
Plan For Our Future: 2020 Gilbert General Plan	The planned Phoenix Subdivision support tracks would be compatible with existing and future land uses that have developed and will develop adjacent to the pre-existing tracks.
Gilbert zoning regulations	The planned Phoenix Subdivision support tracks would be compatible with the zoning that Gilbert assigned adjacent to the pre-existing tracks.
Land Use Compatibility Plan Update (PMGA)	PIRATE would comply with MGA's requirements for AOA 1 and AOA 2 because it does not involve residential development. In addition, OEA is recommending mitigation requiring UP to coordinate with MGA to minimize potential impacts to navigable air space from PIRATE construction and operation (MM-LU-3). This coordination will include a review of structure height to ensure compliance with the maximum height allowed adjacent to the runway protection zones.

Table 3-183~~3-16~~. Alternative 1 and the planned Phoenix Subdivision support tracks conformance with planned land use and zoning

Planning Document	Conformance Determination
Phoenix-Mesa Gateway Airport Master Plan	PIRATE would conflict with SkyBridge's preliminary road alignment between the airport boundary and Pecos Road (south) because UP has not included an at-grade crossing in this location. OEA is recommending mitigation requiring UP to coordinate with MGA regarding the compatibility of PIRATE with airspace, navigation facilities, height restrictions, and lighting requirements associated with AOA 1 and AOA 2 and to address the conflict between PIRATE and the proposed SkyBridge road (MM-LU-3).
Vision 2030, Maricopa County Comprehensive Plan; Queen Creek Area Plan	The planned Phoenix Subdivision support tracks would be compatible with the existing and future land uses that have developed and will develop on unincorporated land adjacent to the pre-existing tracks. OEA does not expect PIRATE to conflict with the residential areas north of the PAMZ due to distance (1.0 mile), the intervening land uses (industrial, manufacturing, and residential), and SR 24 serving as barriers between the proposed rail line and the Superstition View Ranchettes neighborhood.
Maricopa County zoning regulations	The planned Phoenix Subdivision support tracks would be compatible with the zoning that Maricopa County assigned to unincorporated land adjacent to the pre-existing tracks. PIRATE would be compatible with the industrial and airport district zones on unincorporated land north of the PAMZ. OEA does not expect PIRATE to conflict with residential zoning on unincorporated land north of the PAMZ because Mesa has identified those areas as earmarked for industrial, manufacturing and distribution, or commercial development.
We Create Our Future, Pinal County Comprehensive Plan	PIRATE would end about 1,000 feet west of the moderate low-density residential zoning and existing, dispersed homes in Pinal County. It would not conflict with existing or future homes because they are outside the area of potential noise and vibration impacts and views of trains would be intermittent and consistent with other industrial land uses in the PAMZ. PIRATE could support more intensive uses near Meridian Road because the plan allows for light industrial uses within 0.5 mile of a railroad if land use transitions are implemented to buffer less intensive uses like the existing large-lot residential.

Table 3-183-16. Alternative 1 and the planned Phoenix Subdivision support tracks conformance with planned land use and zoning

Planning Document	Conformance Determination
Pinal County zoning regulations	PIRATE would end about 1,000 feet west of the general rural zoning in Pinal County. It could be compatible with this zoning if Pinal County has assigned this classification because more intensive development is planned along Meridian Road. If this zoning is intended for the less intensive allowable uses (like residential), OEA does not expect PIRATE to conflict with such uses because they are outside the area of potential noise and vibration impacts and views of trains would be intermittent and consistent with other industrial land uses in the PAMZ.

3.8.3.2 Impacts to Farmland

Alternative 1 would directly convert approximately 50145 acres of farmland subject to the FPPA based on its soil characteristics.[28] However, less than half of the land bordering the project limits has been farmed 5 of the last 10 years, and only the ASLD land has been cultivated since 2024 (USDA 2025). The project's 9-acre reduction in workable farmland would not reduce demand for agricultural services in the area because the former agricultural fields in and adjacent to the project limits are no longer considered active and have not been farmed since before 2024 in preparation for future light-industrial and warehouse developmentgiven the amount of farmable land to the south in the city of Mesa, the town of Queen Creek, and Pinal County. In addition, OEA does not expect Alternative 1 to induce the conversion of farmland outside of the project limits because the majority of the existing agricultural land in the PAMZ is is now considered former farmland and is already earmarked for future industrial development. The organic citrus orchard on ASLD land is not currently planned for future development. However, Alternative 1 would convert 2.4 percent of the orchard to rail use, leaving enough remaining cropland (about 300 acres) and irrigation infrastructure that it would continue to be viable for agricultural use.

Alternative 1 would affect the western and northern edges of land zoned agricultural east of Sossaman Road. However, rRail lines can be compatible with farming activities because agricultural use can still occur in the areas immediately adjacent to a rail line. The proposed rail line would cross the organic citrus orchardsagricultural fields, creating a barrier to access between the bisected portions. FarmersThe orchard lease-holder and employees would have to travel to rail crossings on surface streets, resulting in longer travel time and street-legal requirements for vehicles. These requirements would adversely affect how these fields can be worked as farms but would not preclude use of the remaining farmland for agricultural use. The loss of crops, access disruptions, and other impacts to farming activities are financially accounted for during the right-of-way acquisition process. Refer to Section 3.9, *Socioeconomics*, for additional discussion on access and out-of-direction travel impacts to farmland.

[28] In December 2025, NRCS directed OEA to calculate farmland conversion based upon soils characteristics alone, rather than taking current land use into account as was done in the 2023 Draft EA (Appendix A).

The proposed rail line would accommodate existing and planned businesses and would not lead to the conversion of more farmland than might otherwise take place because nearly all agricultural land in the PAMZ is now considered former farmland and is zoned or earmarked for future industrial development. In coordination with the NRCS, OEA completed a Farmland Conversion Rating Form to identify whether there was a need to take measures to protect farmland as a result of this project, based on criteria such as the amount of farmland, nearby development, and if conversion would facilitate additional conversion to non-agricultural uses in the area. At the outset of this process, NRCS advised OEA that the form should be completed only once an agency identifies its preferred alternative. Early in OEA's analysis, OEA had no preference between Alternative 1 and Alternative 2. After completing its technical analyses and comparing the type and potentiality of impacts across various resource areas, OEA identified its preferred alternative as Alternative 1 (refer to Section 1.1, *Introduction*). OEA then completed its *Farmland Conversion Form CPA-106* in 2022, with Parts II, IV, and V completed by NRCS (Appendix H). Alternative 1 received a rating of 43.61 out of the 260-point maximum.

OEA completed the form again in 2026 to account for minor changes in the project limits and NRCS's current implementation of the FPPA. In 2026, Alternative 1 received a rating of 104 out of 260, reflecting a reduction in farmland in the PAMZ since the Draft EA. Sites receiving a score of less than 160 need not be given further consideration for protection, and no additional agricultural areas need to be evaluated. Therefore, no mitigation to protect farmland is required under the FPPA.

Where Alternative 1 would cross ASLD land, the agricultural lease on the citrus orchard would be reduced by approximately 9 acres. As part of right-of-way negotiations for PIRATE, UP compensated ASLD and its lessee for the loss of this area and associated impacts to farm operations, including the loss of citrus trees. ASLD uses market value, annual production, and age of the citrus trees to determine the monetary value of a potential loss, which would be based on a 1-year return. UP has also proposed VM (VM-LU-2) to coordinate with ASLD to develop irrigation infrastructure protection or relocation plans. Because NRCS determined that farmland protection is not required and UP has compensated ASLD's lessee for agricultural losses, Alternative 1 would have minor impacts on farmland.

3.8.3.3 Impacts to Recreation

No recreational facilities are currently located in the project limits, and nearby recreational facilities would not be affected by Alternative 1 or the planned Phoenix Subdivision support tracks because no changes in access or noticeable changes in noise levels would occur from project construction and operation. The wye and/or the planned Phoenix Subdivision support tracks would be visible from the Benjamin Franklin High School (BFHS) track and ballfields, as well as from several neighborhood parks adjacent to Rittenhouse Road. ~~The proposed rail line would be visible to recreationists in the future using the shared-use path along Signal Butte Road.~~

However, Alternative 1 would be visually compatible with the increasingly industrial setting and the planned Phoenix Subdivision support tracks would be similar to and visually compatible with the existing tracks. Therefore, no impacts to recreation would occur, and no mitigation is recommended. Refer to Section 3.3, *Noise and Vibration*, for a discussion of ambient noise

levels in the study area; Section 3.1, *Transportation and Safety*, for a discussion of proposed detours that could delay recreationists on their way to area parks; and Section 3.11, *Visual Quality*, for a discussion of visual impacts from the project.

3.8.3.4 Impacts to Utilities

The proposed rail line and the planned Phoenix Subdivision support tracks would cross utility corridors at numerous locations throughout the project limits. The maximum height of proposed rail line elements (crossing gates, lights, signs, and signal electronics) would be 32 feet tall and thus the project would not affect or encroach on the vertical clearance of overhead transmission or phone lines. Relocation of utilities and adjustment of valves, maintenance holes, and other appurtenances, would be required.

During OEA's coordination with SRP, the agencies determined the new poles associated with SRP's Abel-Pfister-Ball project could be sited outside of UP's existing right-of-way. Since SRP did so, ~~Therefore,~~ the planned Phoenix Subdivision support tracks would not affect or conflict with the completed Abel-Pfister-Ball project. The agencies also determined that SRP's planned substation near Power and Pecos Roads would not be affected because it is outside of the project limits. The PIRATE crossing of Crismon Road would be about 80 feet west of SRP's ~~planned~~ completed Southeast Power Line 230-kV transmission line~~, however, would cross PIRATE near Crismon Road.~~ The new powerline has a ground clearance of about 50 feet below the wires. The crossing safety features, at a maximum vertical height of 32 feet and a distance of 80 horizontal feet, would be outside the area of concern for the new powerline. Therefore, OEA is no longer recommending mitigation requiring UP to coordinate with SRP to avoid conflicts between PIRATE and the placement of SRP's poles or other infrastructure for the Southeast Power Link project and has deleted ~~(~~Draft EA MM-LU-5~~)~~ from Section 4.5.8, *Land Use and Farmland*.

PIRATE would require connection to power to operate warning signals, lights, and crossing gates at five new crossings of existing roads, and the planned Phoenix Subdivision support tracks would require modifications to the existing utilities at the Sossaman Road at-grade crossing. OEA is recommending mitigation requiring UP to coordinate directly with utility providers to ensure existing utility infrastructure is adequate to accommodate the additional demand for utilities associated with the project (MM-LU-4).

UP has proposed and OEA is recommending MMs to coordinate with potentially affected utility companies during final design to verify utility corridors and resolve any conflicts the project would have with existing utilities, to ensure that industry standards are met, and to minimize disruptions where relocations or alterations to utilities are required (VM-LU-1 and MM-LU-4). If the recommended mitigation is imposed, OEA concludes that utility impacts would be minor.

3.8.4 Effects of Alternative 2

Alternative 2 and the planned Phoenix Subdivision support tracks would result in similar impacts to land use and farmland and the same impacts to recreation and utilities as described for Alternative 1 and the planned Phoenix Subdivision support tracks. UP would acquire about ~~151~~152 acres of right-of-way or permanent easement, which is ~~9~~7 acres more than Alternative 1, as well as about ~~25~~28 acres of TCEs. While Alternative 2 and the planned Phoenix Subdivision support tracks would conform to the applicable plans and zoning regulations for generally the same reasons as Alternative 1 and the planned Phoenix Subdivision support tracks, Alternative 2

would result in site-specific impacts to The Cubes master-planned industrial park, to Willis Road, and to the largest remaining parcel in the PAMZ still zoned for agriculture. The Cubes stamped and sealed design plans (dated March 1, 2022) incorporate a future railroad easement along the Alternative 1 alignment but not along Alternative 2 (Stock & Associates Consulting Engineers, Inc. 2022). ~~Detention basins and onsite drainage are planned~~Since 2022, detention basins, on-site drainage, and paved parking areas have been constructed where Alternative 2 would cross The Cubes, which means it would bisect the site in an area without infrastructure or freight circulation for rail access (CRG 2022). If the Board were to authorize Alternative 2, PIRATE would encroach upon and displace approximately 30 percent of the parcel (26 out of 83 acres). The alignment of the rail corridor would preclude access to, use of, and functionality of the freight bays on the south side of the existing building (approximately 40 percent of all the bays). Furthermore, the access, parking, and circulation south of Alternative 2 would also be blocked and nonfunctional.~~The Cubes would have to revise its design plans and possibly reconstruct portions of the site depending on the progress of construction at the time of the Board's decision.~~

The Cubes' design plans also show a sewer access drive starting at the existing short segment of Willis Road (east of Ellsworth Road) and extending east directly to an ~~planned~~ entrance on Crismon Road into The Cubes. OEA assumes this access drive will ~~would also~~ provide temporary access from the west until Willis Road can be completed because it is only about 20 feet south of the future Willis Road centerline (Stock & Associates Consulting Engineers, Inc. 2022). Alternative 2 occupies nearly the same alignment as the future segment of Willis Road and would either eliminate the temporary access drive or require The Cubes to revise its design plans. Refer to Section 3.1, *Transportation and Safety*, for more discussion on potential impacts to Willis Road.

OEA learned about The Cubes during the agency coordination meetings after it had developed the Action Alternatives for agency feedback. Based on its evaluation during this environmental review process, which included a review of November 2025 aerial photography to confirm the existing buildings, parking, and circulation patterns at The Cubes, OEA has determined that Alternative 2 would adversely affect The Cubes. Adverse effects to The Cubes would not change Alternative 2's conformance with applicable plans and zoning regulations because the site could still be used for industrial purposes consistent with Mesa's goals for the PAMZ. OEA is recommending mitigation (MM-LU-5)[29] requiring UP to coordinate directly with the owner of The Cubes to resolve conflicts with ongoing and future development if Alternative 2 is selected.

Alternative 2 would require UP to acquire approximately 3 acres (2 percent) of the 156-acre parcel ~~border, but would not affect, land~~ zoned agricultural west of Crismon Road. The acquisition would be a narrow strip across the northern border that would not prevent farming of the rest of the parcel, but would restrict access to Crismon or Germann Roads. Similar to Alternative 1, Alternative 2 would cross ASLD land, reducing the agricultural use of approximately 8 acres (1 acre more than Alternative 1). Similar to Alternative 1, if Alternative 2 is selected, ASLD would require compensation for the loss of crops and any associated impact to farm operations.

[29] As noted above, OEA deleted MM-LU-5; accordingly, MM-LU-6 has been renumbered and is now MM-LU-5 in this Final EA.

Alternative 2 would directly convert ~~3~~7 acres more ~~prime farm~~land subject to the FPPA based on its soil characteristics than Alternative 1, for a total of approximately ~~53~~152 acres ~~of prime farmland~~. The rating on the Farmland Conversion Form is the same as Alternative 1, so no further consideration of protection for prime farmland is necessary under the FPPA.

3.9 Socioeconomics

This section addresses the existing conditions and potential impacts on the social and economic characteristics of the study area. The study area for socioeconomics encompasses the town of Gilbert, the town of Queen Creek, the city of Mesa, and Maricopa County. NEPA requires that environmental considerations, including social and economic impacts of a project, are given due weight in the decision-making process (42 U.S.C. §§ 4321–4370m-11 and, prior to recission, 40 C.F.R. Parts 1500−1508).

3.9.1 Affected Environment

The towns of Gilbert and Queen Creek are predominantly white, have a higher median household income, and have lower residential vacancy rates compared to the city of Mesa or Maricopa County. Mesa is also predominantly white, but with a Hispanic or Latino population, median household income, and vacancy rate closer to statewide averages (Maricopa Association of Governments 2024~~2022~~; U.S. Census Bureau 2023a~~2020~~). Gilbert has the lowest median age and highest percent of population in the workforce, when compared to Queen Creek, Mesa, and Maricopa County.

Mesa, Gilbert, and Queen Creek recently have experienced rapid population growth and expect this trend to continue (Gilbert 2020; Mesa 2024~~2014~~; Queen Creek 2024~~2018~~; U.S. Census Bureau 2023a~~2020~~). The proposed rail line would traverse the PAMZ, an area Mesa plans to build out with moderate-intensity commercial and industrial development by 2040 per its designation as an "Employment" area (Mesa 2024~~2014~~). Currently, large industrial companies in the PAMZ manufacture chemicals, metals, plastics, rubber, and electrical equipment. As shown on Figure 1-2 and discussed in Section 3.8, *Land Use and Farmland*, the PAMZ is part of the larger Mesa Gateway Area and the Gateway Area Opportunity Zone and contains an Employment Opportunity Floating Zone, which are all intended to encourage investment and commercial and industrial development (Mesa 2025b~~n.d. b~~). Approximately ~~780~~1,380 acres of the 4,000-acre PAMZ are currently in commercial and industrial use and more than 1,000 acres are available for development (Mesa 2019a~~n.d. d~~). Section 3.8, *Land Use and Farmland*, also provides more detail on the future land use in the PAMZ.

As shown on Figure 3-9, the Queens Park neighborhood and Destination at Gateway master-planned community are~~is~~ the only existing residential areas in the PAMZ, with more homes planned north of SR 24~~the Destination at Gateway master-planned community currently under construction~~ in the northeast corner of the PAMZ. The areas west of and south of the PAMZ are mostly residential subdivisions in Queen Creek, with the Emperor Estates and Cortina neighborhoods located west of the Phoenix Subdivision and the Gateway Quarter and La Jara Farms neighborhoods located south of Germann Road.

3.9.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Therefore, no changes to the social and economic characteristics in the study area would result from project construction and operation. In the absence of the proposed rail line, private land and farmland within the project limits would not be converted for freight rail purposes but would eventually be converted to other commercial or industrial land uses based on the purpose of the PAMZ. Without PIRATE, growth and development in and adjacent to the PAMZ are expected to continue, with thousands of new jobs projected in the study area by 2030, as shown in Table 3-193~~-17~~ (Rounds Consulting Group Inc. 2021). Each new job would contribute to population growth in this quickly developing area. Indeed, in 2022, Maricopa County ~~is already one of~~was the fastest-growing county~~ies~~ in the United States (Maricopa County 2022~~n.d.-a~~). The indirect increase in the demand for workers as the PAMZ is built out may also increase housing demand and values in the study area.

Table 3-193~~-17~~. 10-year employment forecast scenarios in the PAMZ

Alternative[1]	2020 Employment	2030 Primary Employment[2]	2030 Secondary Employment[2]	Total Wages[3]	Total Economic Output[4]	Total Tax Revenues[5]
No-Action	1,921	5,064	7,420	$1.89 billion	$8.04 billion	$281 million
Alternatives 1 and 2	1,921	10,644	20,594	$4.61 billion	$19.7 billion	$686 million

Source: Rounds Consulting Group, Inc. 2021.
[1] The analysis conducted for the "mostly likely" scenario of economic growth associated with build-out did not distinguish between Alternatives 1 and 2. This review assumes the same amount of economic growth would occur.
[2] Total primary and secondary jobs supported over 10 years.
[3] Total wages earned over 10 years.
[4] Total economic output generated over 10 years.
[5] Total state and local tax revenue generated over 10 years.

3.9.3 Effects of Alternative 1

Alternative 1 would increase the rate and quality of economic growth in the PAMZ and surrounding communities in comparison to the No-Action Alternative, which would result in a slower projected growth rate (Rounds Consulting Group, Inc. 2021). As shown in Table 3-193~~-17~~, PIRATE is projected to more than double jobs, wages, economic output, and tax revenues in the PAMZ compared to the No-Action Alternative.

~~Under~~For Alternative 1, UP ~~would~~has already begun to acquire about ~~142~~144 acres of land or permanent easements from private landowners, Mesa, FCDMC, and ASLD, but ~~it~~these aquisitions would not displace residents or businesses. The purchase of right-of-way would primarily benefit private property owners, with a reimbursement to the lessee of State Trust land administered by ASLD to account for the loss of productive cropland. Alternative 1 would convert approximately ~~50~~ 7 acres of active farmland to rail right-of-way. Regardless of whether

or not PIRATE is authorized and constructed, this farmland conversion would occur in the future as the PAMZ is developed per its designation as an "Employment" area in Mesa's ~~2040~~2050 General Plan (Mesa 2024~~2014~~). Therefore, farmland conversion in the PAMZ as a result of the construction and operation of PIRATE would not result in an adverse economic impact because the conversion would occur regardless of whether PIRATE is authorized and constructed.

As the proposed rail line traverses properties between Sossaman and Signal Butte Roads, including ASLD land, it would create a permanent barrier across several private farm roads, as well as Mesa's public right-of-way along Merrill Road. These permanent access changes would adversely affect the use of these properties. Lessees or owners of vacant, former agricultural land between Palm Gateway and Ellsworth Road~~adjacent to Sossaman Road~~ would need to change their point(s) of access to Pecos Road (south). Lessees or owners east of Ellsworth Road would need to travel in street-legal vehicles to new at-grade crossings on Ellsworth Road, Crismon Road, or Signal Butte Road to access the adjacent lands on the other side of the proposed rail line. ASLD's lessee would have the longest out-of-direction travel between the remaining parts of the orchard north and south of the proposed rail line and run-around track: almost 3 miles. These impacts would remain in place until these properties are redeveloped and the future industrial site plans are developed around the proposed rail line and run-around track.

In addition, Alternative 1 would cut off the northern access to TRW (refer to Figure 2-5), potentially having an adverse impact on the future build-out of the property. However, the main entrance to TRW from Germann Road would remain intact.

Future land use designations and incompatible noise levels from MGA flights generally prevent residential growth in the PAMZ, and no existing or planned neighborhoods are or would be located ~~in the northern portion of the PAMZ~~ where the rail line is proposed. All planned work along the Phoenix Subdivision would occur within UP's existing right-of-way, where neighborhoods have established themselves around pre-existing rail and flood control infrastructure. Therefore, neither Alternative 1 nor the planned Phoenix Subdivision support tracks would have a direct impact on community cohesion. Alternative 1 would also increase housing demand and property values in the communities surrounding the PAMZ due to the indirect increase in the demand for workers as the PAMZ is built out.

While some traffic delays and temporary road closures would occur during rail construction, access to local streets and businesses in the study area would be maintained. Construction could have a temporary beneficial impact on some existing businesses (e.g., restaurants, grocery stores, convenience stores) in the study area due to the influx of construction workers and through detour routes that create increase drive-by traffic (refer to Figure 2-8). However, some businesses could experience temporary adverse impacts if detour routes divert customers away, such as the businesses located near the intersection of Ellsworth Road and Pecos Road. Construction detours could also extend the duration of commutes to work and school in the study area, as discussed in the Section 3.1, *Transportation and Safety*. As detailed in Section 4.5.9, OEA is recommending mitigation requiring UP to alert schools, emergency service providers, and adjacent landowners prior to any road closures or use of detours (MM-SOC-1).

3.9.4 Effects of Alternative 2

~~Under~~For Alternative 2, UP ~~would~~has already begun to acquire about ~~151~~152 acres of land from private landowners, Mesa, FCDMC, and ASLD, including conversion of ~~53~~8 acres of active farmland. Alternative 2 is a slightly longer route than Alternative 1, but it would still extend to ~~Fujifilm and~~ CMC at the eastern end of the PAMZ and produce approximately the same local and regional socioeconomic growth as Alternative 1 (refer to Table 3-19~~3-17~~). Alternative 2 would bisect the ASLD land, similar to Alternative 1, but 0.25 mile south of Alternative 1. Alternative 2 would be constructed and would operate the same as Alternative 1; therefore, all other socioeconomic impacts for Alternative 2 would be the same as described for Alternative 1.

3.10 Environmental Justice

This section addresses the presence of and potential impacts on environmental justice populations in the study area. EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (1994) requires that federal agencies administer and implement its programs, policies, and activities that affect human health or the environment to identify and avoid "disproportionate and adverse" effect on minority populations and low-income populations.[30]

The study area for this analysis includes the ~~12~~nine Census tracts that are adjacent to or overlap~~surrounding~~ the project limits to capture residents and businesses that could experience temporary or long-term impacts associated with construction and operation of the proposed rail line and the planned Phoenix Subdivision support tracks. OEA compared the study area demographics to the communities of Gilbert, Queen Creek, Mesa, and Maricopa County to help determine if minority and low-income populations are present.[31]

For purposes of this analysis, minority and low-income populations are defined as follows:

- A **minority** is an individual who is, or individuals who are, members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic (CEQ 1997b).

[30] ~~For this analysis~~In the Draft EA, OEA considered EO 12898; EO 14008, "Tackling the Climate Crisis at Home and Abroad"; EO 13985, "Advancing Racial Equity and Support for Underserved Communities through the Federal Government"; EO 14096, "Revitalizing Our Nation's Commitment to Environmental Justice for All"; and the 2016 "Promising Practices" guidance from the Federal Interagency Working Group on Environmental Justice and NEPA Committee. The referenced EOs have been rescinded, and environmental justice analyses are no longer required in NEPA documents. However, as explained above, OEA has retained and updated this analysis to avoid delaying the NEPA process and to ensure that the information included in this Final EA is accurate. The updated analysis has no bearing on the conclusions reached in the Final EA.

[31] OEA did not consider Pinal County in the analysis because few people who reside in the adjacent Pinal County Census tracts live near the project vicinity.

- A **minority population** is identified when (1) the minority population of the study area is greater than 50 percent, or (2) the minority population is meaningfully greater than nearby communities (CEQ 1997b).
- A **low-income** household/family is one that meets the U.S. Department of Health and Human Services definition of poverty. The ~~2021~~2023 definition of poverty for a family of four in the continuous 48 states is an annual income below $31,200~~$26,496~~ (U.S. Census Bureau 2023b~~2021~~).
- A **low-income population** is identified when the percentage of low-income families in the study area is meaningfully greater than the percentage of low-income families in nearby communities.

An environmental justice population is defined by the presence of a minority population and/or low-income population.

For the Draft EA, ~~A~~additional analysis was performed using the EPA Environmental Justice Screening and Mapping Tool (EJScreen; ~~n.d. a~~no longer available on EPA's website), the Centers for Disease Control and Prevention's (CDC) Social Vulnerability Index (SVI; CDC 2022~~2020~~), and U.S. Census data. EJScreen 2.0 is a tool created by EPA and now hosted by Harvard University's Public Environmental Data Partners (PEDP) that combines environmental indicators and demographic data (EPA 2024~~2015, n.d. a~~; PEDP 2025). The purpose is to identify communities in a study area that may have a high combination of environmental burdens and vulnerable populations compared to the state, EPA region, and nation. CDC SVI is a similar tool to EJScreen in that it uses geospatial data to identify vulnerable populations (CDC 2024~~2020~~).

3.10.1 Affected Environment

Table 3-20~~3-18~~ summarizes the demographics for the study area and nearby communities. The study area contains an overall minority population of ~~29~~28 percent, which does not exceed the 50 percent criterion defining an environmental justice population. Moreover, the study area minority population is ~~similar to, but~~ not meaningfully greater than~~,~~ nearby communities, including Gilbert (~~30~~34 percent), Queen Creek (~~25~~28 percent), Mesa (~~28~~39 percent), and Maricopa County (~~31~~47 percent). These data indicate that a minority population is not present in the study area.

Table 3-203-18. Demographic data for study area and nearby communities

Demographic[1]	Study Area[2]	City of Mesa	Town of Gilbert	Town of Queen Creek	Maricopa County
Total Population	37,987 ~~44,922~~	507,478 ~~508,918~~	271,118 ~~248,349~~	66,369 ~~52,162~~	4,491,987 ~~4,412,779~~
Low Income Population[3]	1,732 (5%) ~~(7%)~~	52,812 (11%) ~~(13%)~~	13,827 (5%)	2,358 (4%) ~~(5%)~~	497,877 (11%) ~~(13%)~~
Minority Population	10,665 (28%) ~~12,922~~ ~~(29%)~~	199,201 (39%) ~~198,360~~ ~~(28%)~~	91,036 (34%) ~~75,641~~ ~~(30%)~~	18,600 (28%) ~~12,857~~ ~~(25%)~~	2,094,522 (47%) ~~1,374,312~~ ~~(31%)~~
White Alone	27,322 (72%) ~~32,000~~ ~~(71%)~~	308,277 ~~310,558~~ (61%)	180,082 (66%) ~~172,708~~ ~~(70%)~~	47,769 (72%) ~~39,305~~ ~~(75%)~~	2,397,465 (53%) ~~2,407,398~~ ~~(55%)~~
Hispanic or Latino of any Race	5,992 (16%) ~~6,879~~ ~~(15%)~~	134,936 (27%) ~~140,500~~ ~~(28%)~~	47,527 (18%) ~~43,078~~ ~~(17%)~~	11,180 (17%) ~~7,523~~ ~~(14%)~~	1,387,720 ~~1,374,312~~ ~~(31%)~~
Black Alone	842 (2%) ~~1,717~~ ~~(4%)~~	20,842 ~~21,340~~ (4%)	8,716 (3%) ~~9,523~~ ~~(4%)~~	2,002 ~~1,752~~ (3%)	246,536 ~~236,764~~ (5%)
American Indian Alone	211 ~~129~~ (~~<~~1%)	7,734 ~~10,716~~ (2%)	1,935 ~~1,113~~ (~~<~~1%)	189 ~~135~~ (<1%)	60,061 (1%) ~~67,940~~ ~~(2%)~~
Asian Alone	1,644 ~~1,640~~ (4%)	11,524 ~~10,256~~ (2%)	17,638 (7%) ~~13,278~~ ~~(5%)~~	1,859 ~~1,349~~ (3%)	192,107 ~~183,082~~ (4%)
Pacific Islander Alone	36 ~~77~~ (<1%)	1,165 ~~1,691~~ (<1%)	92 ~~420~~ (<1%)	310 ~~15~~ (<1%)	8,409 ~~8,904~~ (<1%)

Demographic[1]	Study Area[2]	City of Mesa	Town of Gilbert	Town of Queen Creek	Maricopa County
Some Other Race and Two or More Races Alone	1,940 (5%) ~~2,480 (6%)~~	23,000 (5%) ~~13,857 (3%)~~	15,128 (6%) ~~8,229 (3%)~~	3,060 (5%) ~~2,083 (4%)~~	199,689 (4%) ~~134,379 (3%)~~

[1] Demographic data from the U.S. Census Bureau (2023a), American Community Survey 5-year data, 2019-2023~~2016–2020~~. PEDP's EJScreen and CDC SVI use~~s~~ American Community Survey 5-year data, 2018-2022~~2015–2019; CDC SVI uses 2014–2018~~.

[2] Census tracts in Maricopa County overlapping or adjacent to the project limits: 8169.03~~1~~, 8169.04~~2~~, 8176, ~~8171.01, 8171.02, 8171.03,~~ 8156.01, ~~8156.02~~, 8166, 8168, 5228.01, 5228.02, and 8158.

[3] Low-income population was~~is~~ available only as a percentage in the 2016-2020 American Community Survey data used in the Draft EA. The 2019-2023 data used in this Final EA include the absolute numbers.

Only ~~7~~ 5 percent of the individuals in the study area have incomes below the poverty level. This low-income indicator is slightly greater than the percentage identified in Gilbert (5 percent) and Queen Creek (~~both 5~~ 4 percent), but less than the percentage identified in the larger communities of Mesa and Maricopa County (~~13~~11 percent). These data indicate that a low-income population is not present in the study area.

EJScreen ranks the study area as experiencing an average relative environmental burden compared to the statewide burden. Therefore, the percentiles of the study area do not need to be compared against the percentiles of nearby communities. Refer to the *EJScreen Report* (Appendix I). For example, the study area is in the ~~5th~~42nd percentile for particulate matter. That means ~~95~~58 percent of the Arizona population scores a higher value (i.e., higher potential exposure to particulate matter) for that indicator. The tool has limitations, but any environmental justice index above the 80th percentile warrants closer consideration (EPA 2024~~2015~~). OEA did not identify any indicators above the 80th percentile in the study area. While the updated EJScreen results are provided for public disclosure purposes, they do not require additional analysis under the current regulatory framework (refer to Footnote 27 at the beginning of this Section 3.10, *Environmental Justice*).

CDC SVI indicates that the individual Census tracts composing the study area have low to medium vulnerability scores, presented as percentiles, ranging from 0.0027 to 0.2687~~0.0651 to 0.3863~~, with 1.0000 being the highest vulnerability. The vulnerability score is the degree to which a community exhibits certain social conditions. The study area experiences a low relative vulnerability to hazards. In comparison, Maricopa County has an SVI of 0.7130~~0.6354~~, which represents a medium to high level of vulnerability to environmental hazards (CDC 2022~~2020~~).

The study area does not meet the definition of an environmental justice population because minority and low-income populations are not present. Data from EJScreen and CDC SVI also indicate that the study area currently experiences a low-to-average level of environmental hazards.

3.10.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. No environmental justice populations are present in the study area. Therefore, no impacts to environmental justice populations would result from the No-Action Alternative.

3.10.3 Effects of Alternative 1

The study area does not contain an environmental justice population. Therefore, Alternative 1 and the planned Phoenix Subdivision support tracks would not result in disproportionate and adverse human health or environmental effects on minority and/or low-income populations.

3.10.4 Effects of Alternative 2

Similar to Alternative 1, the study area does not contain an environmental justice population. Therefore Alternative 2 and the planned Phoenix Subdivision support tracks would not result in disproportionate and adverse human health or environmental effects on minority and/or low-income populations.

3.11 Visual Quality

This section addresses existing conditions and impacts to the visual resources, character, and quality of the study area, called the area of visual effect (AVE). Title 1 of NEPA states that the federal government should "use all practicable means" to "assure for all Americans … aesthetically and culturally pleasing surroundings" (Sec. 01 [42 U.S.C. § 4331]). However, no regulations exist at the national or state level that define requirements for analyzing impacts to visual quality. Therefore, OEA's visual impact assessment (VIA) is guided by the Federal Highway Administration's *Guidelines for the Visual Impact Assessment of Highway Projects* (2015) due to the similar linear nature of rail and highway projects.

A VIA analyzes changes to a landscape's visual character and resulting visual quality as impacts to people with views of the project. The AVE includes areas where PIRATE and the planned Phoenix Subdivision support tracks would be visible to viewers; these areas are determined by the physical constraints of the environment and the physiological limits of human sight (Federal Highway Administration 2015). The project AVE extends up to about 3.5 miles from the project limits unless views are blocked by buildings, structures, or crops.

The AVE's visual character is defined by the natural, cultural, and project environments; its visual quality is defined by the landscape's vividness, intactness, and unity. Viewer sensitivity also factors into the analysis because some viewers may be more sensitive to visual changes than others. The degree of viewer sensitivity varies based on factors such as proximity to the view, number of viewers, duration of view, focus, and attention (Federal Highway Administration 2015). The *Abbreviated Visual Impact Assessment* (Appendix J) describes these elements generally and in more detail at ~~seven~~five key observation points (KOPs), which provide the basis for analysis. OEA prepared a VIA in 2023 for the Draft EA. Because of subsequent development within the AVE, OEA updated the VIA in Appendix J, *Abbreviated Visual Impact Assessment,* of this Final EA.

For the 2023 VIA, OEA selected~~The~~ KOPs ~~were selected~~ at seven locations ~~with~~that had the potential for sensitive viewers or at locations where the view was~~is~~ representative of the visual character of the AVE. Since OEA issued the Draft EA in May 2023, light-industrial and commercial development and land use changes throughout the AVE eliminated some locations with the potential for sensitive viewers and blocked potential views of PIRATE. Because of these land use changes, OEA removed two of the seven KOPs that were evaluated in the 2023 VIA from consideration: KOP 1 because new buildings north of Germann Road would block views of the project by residents and other viewers located south of Germann Road, and KOP 5 because the residences in the northwestern corner of Germann Road and Merrill Road have been demolished and the land use changed to a contractor's staging and storage area. OEA retained KOPs 2, 3, 4, 6, and 7 in the 2026 VIA. Refer to Appendix J for more details.

3.11.1 Affected Environment

The project AVE consists of agricultural, industrial, commercial, and residential land uses. The AVE's topography is mostly flat, limiting views to no more than approximately 3.5 miles. However, mountains are visible in the distance on all sides except to the west where light-industrial warehouses constructed since OEA issued the Draft EA limit or block the mountain views from areas south of Pecos Road and Germann Road. The AVE is transitioning from primarily vacant land and former agricultural fields to two- to three-story, light-industrial warehouses west of Sossaman Road and north of Rittenhouse Road. Refer to Appendix J for pictures that illustrate typical warehouse developments and how the AVE has changed at various locations.

Tall, broad citrus trees occupy ~~some of~~ the remaining former farmlands, obscuring farther views. In other areas, remnant, former farmlands are no longer cultivated~~lay fallow or may be in various stages of crop growth~~, providing unobstructed views but little visual interest. ~~Small a~~Areas of residential, ~~and~~ commercial, and light-industrial warehouse development exist between 85th Place and Ellsworth Road north of Germann Road. Industrial land uses, more warehouses, and former agricultural fields occupy the eastern side of the AVE between Germann Road and Pecos Road. Vegetation in these areas primarily consists of a few relatively small landscaped deciduous trees and shrubs, ~~or~~ remnants of native desertscrub, and expanses of non-native desertscrub. Overall, the ground disturbance conducted in 2022 and 2023 to construct the wye and PIRATE yard detention basins reduced the amount of vegetation in the project limits by approximately 24 acres.

South of Germann Road, tightly spaced residential and ~~some~~ commercial developments have changed the open nature of the farming landscape. Dense residential areas are particularly concentrated in the southeast corner of Ellsworth Road and Germann Road and the southwest corner of Hawes Road and Germann Road. A broad area of low-density residential development exists between these two high-density areas.

MGA, located northwest of the intersection of Ellsworth Road with Pecos Road (north), currently has three 10,000-foot runways and ~~1,000~~600 acres of developable land (Mesa Gateway Airport Authority 2026)~~(BEX Events 2019)~~. MGA, ~~and~~ industrial land uses, and the proliferation of warehouses throughout the AVE introduce visually contrasting elements into the previously agricultural setting. Views of freight trucks also contribute to the industrial nature of

the AVE. More than 6,100 trucks use local streets, particularly Pecos and Germann Roads, each month (approximately 73,200 per year; Mesa 2021b~~d~~), temporarily blocking farther views for viewers in the immediate foreground.

West of Rittenhouse Road, the AVE is fully developed with densely spaced residential areas and a few commercial and educational facilities. Houses are typically two stories tall and solid, with approximately 6-foot-tall walls surrounding most of these residential areas. Landscaping adds visual interest. Some residences are immediately adjacent to the Phoenix Subdivision; its slightly elevated railbed is sporadically visible beyond landscaped vegetation.

Overall, the AVE lacks memorable visual elements. The background mountains add some visual interest but are not as prominent as the surrounding landscape, including warehouses, due to distance. The former agricultural landscape ~~is primarily intact east of Sossaman Road but~~ is being encroached upon and fragmented by industrial developments, and the remaining former farmlands are no longer cultivated. The resulting ~~B~~broad, weedy expanses of vacant land are visually chaotic. These disparate land uses lack unity due to their contrasting visual elements. However, landscaping in residential areas west of Rittenhouse Road enhances visual quality. Therefore, visual quality in the AVE ranges from low to moderately high.

Viewers in the AVE have varying degrees of sensitivity and include residents, school and church attendees, employees, park users, and drivers. KOPs were selected to represent views of the project from nearby schools, neighborhoods, and a place of worship (refer to Appendix J, *Abbreviated Visual Impact Assessment*, Figure 3-10).

3.11.2 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Accordingly, UP would not construct the wye, elevated tracks, crossing gates, support tracks, or other associated features. Therefore, no changes would occur to visual resources from construction and operation of the proposed rail line or the planned Phoenix Subdivision support tracks. Approximately 73,200 trucks per year would continue to use local streets to transport industrial materials to and from the PAMZ (Mesa 2021a~~b~~). These trucks would continue to temporarily block farther views for viewers in the immediate foreground and increase the industrial nature of the landscape, which also would become increasingly industrial with planned future development.

3.11.3 Effects of Alternative 1

Under Alternative 1 and the planned Phoenix Subdivision support tracks, the train tracks would be elevated no higher than approximately 15 feet above the existing ground and the trains would be single stack (UP 2025d), resulting in minimal visual impact from most viewpoints. The new tracks would be about 30 feet wide, expanding up to about 110 feet depending on location. The proposed rail line (including the wye) would mostly affect vacant and agricultural land, as well as industrial areas that are visible to few sensitive viewers.

Potential visual impacts could result from intermittent, recurring views of parked rail cars, such as at the PIRATE yard, and from views of the new wye and road-crossing devices. Long-term visual impacts would also occur from views of detention basins at the wye~~,~~ and the PIRATE yard~~, and TRW Vehicle Safety Systems~~. Some viewers may see these basins as a beneficial

impact, as water features are uncommon in the AVE. OEA determined these impacts would not be adverse because typical viewers near the PIRATE yard, like drivers or employees, are likely to have low sensitivity. Viewers such as students, athletes, and spectators at the BFHS baseball diamond and running track would have the most direct view of the wye. However, OEA expects visual impacts at this location would be negligible because new warehouses and commercial buildings built since 2023 along Pecos Road are visible in front of the distant mountains and would reduce the contrast and visibility of trains on the Phoenix Subdivision or using the wye. The existing visual character and low visual quality would not change because the tracks associated with the wye would be only slightly perceptible and trains currently travel on the Phoenix Subdivision. In addition, viewer focus would be on the ballfields or on the Phoenix Subdivision, and such viewing opportunities would be sporadic (i.e., only when a game is in process).

Approximately ~~50 acres of agricultural vegetation (including~~ 7 acres of mature citrus trees~~)~~, ~~90~~75 acres of native desertscrub, 34 acres of non-native shrublands (former agricultural fields), and 2 acres of vegetation on developed land would be removed during construction of PIRATE. No visually distinctive native vegetation, such as tall cacti, would be affected.

Intermittent, recurring visual impacts would also occur from views of rail cars as they move through the AVE and temporarily block farther views. However, these impacts would be minor due to their intermittent timing and the distance between viewers and the proposed rail line. Viewers would see a single stack of 30 to 35 cars per train during initial service and 70 cars per train at full PAMZ build-out. Trains would be approximately 4,500 feet long and 15 feet high at full future buildout. Additional visual changes would result from removing approximately 30,000 truck trips from local roads the first year of operation. Construction activities would create temporary visual impacts from views of staging areas, heavy equipment, and personnel.

No change to visual quality is expected from project construction and operation at ~~six of~~ the ~~seven~~five KOPs analyzed for visual impacts in this Final EA. Since OEA issued the Draft EA in May 2023, light-industrial warehouse development has changed the visual character and quality at KOP 2 and would partially block views of PIRATE. Warehouse and commercial development has resulted in minor changes to the visual character and no change to visual quality at KOP 7. However, PIRATE would not affect the current visual character or quality at either KOP 2 or KOP 7 (refer to Appendix J, *Abbreviated Visual Impact Assessment*).~~A minor impact to visual character is expected where parked trains would be visible north of the Germann Road and Merrill Road intersection (see the discussion of KOP 5 in Appendix J, *Abbreviated Visual Impact Assessment*). However, OEA does not expect views of the parked trains to change the existing moderate visual quality at this KOP because the mountains in the background would help visually absorb the presence of the trains.~~ Most importantly, the AVE will continue to transition to a primarily industrial landscape due to planned future industrial development. This type of development is compatible with the rail construction and operation that would result from PIRATE.

While OEA did not identify any adverse effects related to visual resources or visual quality, MGA indicated during the agency coordination meetings in March 2022 that restrictions apply to off-airport lighting installed in close proximity to runways. To address this concern, OEA is recommending MMs to address visual impacts in the form of potential hazards from off-airport

lighting to aircraft in flight. These MMs require UP to comply with federal, state, and local regulations to preserve visibility around airports (MM-VQ-1 and MM-VQ-2) and to provide MGA an opportunity to review and approve the final lighting plans for the project (MM-VQ-3).

3.11.4 Effects of Alternative 2

Under Alternative 2 and the planned Phoenix Subdivision support tracks, impacts would generally be the same as Alternative 1 and the planned Phoenix Subdivision support tracks except where the proposed rail line would be 0.25 mile closer to viewpoints along Germann Road. Although the tracks would appear as a horizontal line on the horizon, trains would appear slightly larger. However, no change would occur to visual character or quality from the proposed rail line under Alternative 2 because the appearance of trains generally would be compatible with views from Germann Road. Alternative 2 would remove an additional 3 acres of non-native desertscrub (former agricultural vegetation) (~~53~~37 acres total), ~~including~~and an additional acre of mature citrus trees from the ASLD orchard (about 8 acres total). Construction impacts would be the same as Alternative 1 and the planned Phoenix Subdivision support tracks but slightly more prominent from viewpoints on Germann Road due to closer proximity. Therefore, OEA is recommending the same MMs as those described in Section 3.11.3 and listed in Section 4.5.10.

3.12 Archaeological and Historic Resources

This section addresses the existing conditions and impacts on cultural resources, including archaeological and historic resources.

Regulatory Environment

Section 106

The Board's decision whether to grant authority for UP to construct and operate PIRATE is a federal action under NEPA and is also a federal undertaking under Section 106 of the NHPA (54 U.S.C. § 306108). The Section 106 regulations at 36 C.F.R. Part 800 require federal agencies to consider the effects of their undertakings on historic properties that are listed in or are eligible for listing in the National Register of Historic Places (NRHP).

Historic properties can include prehistoric and historic archaeological sites, buildings, districts, objects, and structures, as well as TCPs and cultural landscapes that are eligible for listing on the NRHP. The term "historic property" includes properties of religious or cultural significance to Native American Tribes. In this case, OEA has~~is~~ integrated~~ing~~ the environmental review process under NEPA with the Section 106 process, and the NEPA term "cultural resources" as used in this section is interchangeable with the Section 106 term "historic properties." OEA increases the efficiency of its environmental review process by concurrently reviewing cultural resources under NEPA and Section 106.

To be determined eligible for inclusion in the NRHP, a cultural resource must be important in American history, architecture, archaeology, engineering, or culture; must possess integrity of location, design, setting, materials, workmanship, feeling, or association; and must meet at least one of the following four criteria (36 C.F.R. Part 800):

A. It is associated with events that have made a significant contribution to the broad patterns of our history.

B. It is associated with the lives of persons significant in our past.

C. It embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant distinguishable entity whose components may lack individual distinction.

D. It has yielded, or may be likely to yield, information important in prehistory or history.

Properties may be of local, state, or national importance. Typically, historic properties are at least 50 years old, but younger properties may be considered for listing if they are of exceptional importance (Criteria Consideration G). Further, a property must be evaluated by its association with an important historic context and retain integrity of those features necessary to convey its significance (National Park Service 1991).

As defined by *National Register Bulletin 38*, a TCP is a property that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that are rooted in the community's history, and are important in maintaining the continuing cultural identity of the community (National Park Service 1990, revised 2025). A TCP can also incorporate a larger, more regional cultural landscape, such as the Queen Creek Delta area.

Section 110(k)

Section 110(k) of the NHPA (54 U.S.C. § 306108) requires federal agencies to determine whether an applicant has intentionally damaged or destroyed a historic property to avoid the Section 106 process (also known as anticipatory demolition). As noted above, OEA identified ground disturbance within archaeological sites in PIRATE's APE in July 2023. To aid in evaluating the extent of the damage to archaeological sites, Jacobs, OEA's third-party contractor, conducted damage assessments (refer to Section 3.12.2, *Archaeological Site Damage in the APE*). The Board issued a Section 110(k) decision on June 3, 2025, stating that "no determination that Section 110(k) is applicable will be issued under 36 C.F.R. § 800.9(c)," and that "the Board will continue with the Section 106 process" (Union Pac. R.R.—Constr. & Operation Exemption—in Maricopa Cnty., Ariz., FD 36501 (STB served June 3, 2025)).

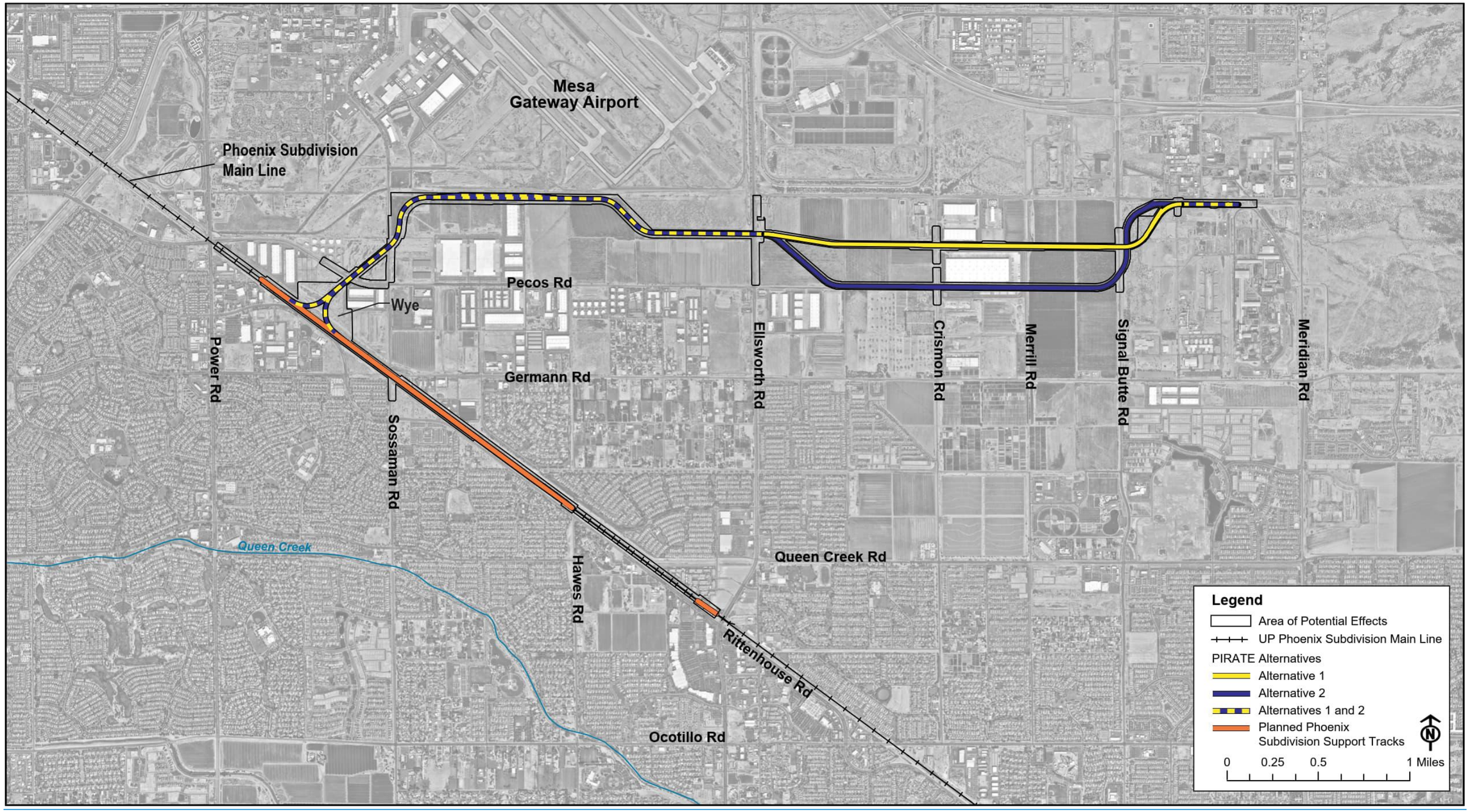
Study Area~~: Area of Potential Effects~~

The EA uses the Section 106 APE as ~~T~~the study area for cultural resources. ~~is called the area of potential effects (APE) and it~~ The APE includes the project limits and adjacent areas in which PIRATE and the planned Phoenix Subdivision support tracks may directly or indirectly affect cultural resources. Figure 3-10 shows the 449-acre APE~~, which generally includes the project limits and a buffer up to 100 feet wide.~~

Inventory Methods

After defining the APE, OEA determined that an intensive, pedestrian field survey (called a Class III survey) would be required to identify if cultural resources listed in or eligible for listing in the NRHP were present. Prior to the Class III cultural resources survey, Jacobs, OEA's third-party contractor, conducted background research for the project APE and a 0.5-mile radius.

Figure 3-10. APE for the cultural resources analysis and Section 106 consultation



Note: This graphic was revised in the Final EA.

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The purpose of the background research was to identify any cultural resources projects and previously recorded cultural resources sites. The following sources were consulted:

- AZSITE, Arizona's electronic cultural resources database;
- Archaeological Records Office of the Arizona State Museum (ASM);
- NRHP database;
- General Land Office plats;
- Archival U.S. Geological Survey topographic maps; and
- Historic aerial photographs on file with the Maricopa County Assessor's Office.

Following completion of the background research, Jacobs conducted a Class III cultural resources survey of the project APE on behalf of OEA. The survey occurred on May 23 through May 27, May 31, and June 14, 2022. Jacobs systematically surveyed the APE using pedestrian transects aligned in various directions depending on the APE configuration. The transect spacing varied from 16 feet (5 meters) to a maximum of 66 feet (20 meters). These methods provided complete (100 percent) coverage of the APE in areas that could be surveyed. Jacobs was not able to survey a 0.5-mile section of Alternative 1 immediately west of Crismon Road due to knee-high vegetation covering the ground surface. Jacobs was also not able to survey a narrow strip along the edge of the wye because the landowner would not grant right-of-entry to the property.

In total, 15.39 acres (3.4 percent) of the APE in two discontinuous areas~~parcels~~ could not be investigated at the time of the 2022 Class III survey due to poor ground visibility and restricted access. In spring 2023, Jacobs was able to conduct ~~a~~ Class III addendum surveys of ~~one of the~~two previously unsurveyed areas~~parcels~~.[32] On April 14 and May 10, 2023, Jacobs surveyed all of the 0.5-mile section of Alternative 1 immediately west of Crismon Road shortly after the vegetation had been removed from the area~~parcel~~. In the other unsurveyed area, adjacent to the wye, Jacobs was only able to survey a small portion because access was still restricted.

The 2023 surveys added ~~10.48~~12.99 acres to the surveyed areas within the APE. Jacobs was not able to survey the remainder of the previously unsurveyed area, which includes narrow strips along the edge of the wye~~) (4.91 acres)~~ because the landowner continued to restrict access to their property.~~ was still restricted.~~ Therefore, 2.35 acres in the APE were not inventoried during the Class III surveys. UP provided a letter to OEA stating that the unsurveyed areas will not be acquired or accessed during construction of PIRATE and will be avoided during any future construction, operations, or maintenance activities related to PIRATE (refer to MOA Attachment B in Appendix K1 of this Final EA). ~~However, the 4.91-acre parcel is within the buffer portion of the APE, not the project limits, and will not be acquired by UP or be subject to project ground disturbance. Therefore, the 4.91-acre parcel was not included in the Class III addendum survey. The additional parcel included in the Class III addendum survey reduced the unsurveyed acreage in the APE to 4.91 acres (1.1 percent).~~

[32] The Class III addendum survey report covers both of the two additional areas surveyed in April and May 2023. The text of this Final EA refers to "surveys" because Jacobs surveyed two separate areas.

Under Section 106, agencies are required to consult with parties potentially affected by and/or interested in impacts to cultural resources at key milestones in the Section 106 process, such as defining the APE, identifying historic properties through cultural resource surveys, assessing adverse effects as documented in cultural resource reports, ~~developing the cultural resources survey and addendum reports,~~ and developing measures to resolve adverse effects by avoiding, minimizing~~e~~, or mitigating~~e~~ impacts. Chapter 5, *Consultation and Coordination,* summarizes OEA's Section 106 outreach and consultation efforts.

3.12.1 Affected Environment

This section provides a brief summary of human habitation related to cultural resources in the APE and then inventories the NRHP-eligible archaeological and historic properties identified during the Class III cultural resources surveys.

3.12.1.1 Prehistoric and Historic Settlements

Prehistoric human habitation in south-central Arizona dates back to ca. 12,000 before Common Era (CE); however, the earliest cultural resources identified in the APE are associated with the culture that archaeologists have labeled the "Hohokam." The Hohokam occupied an extensive portion of central and southern Arizona from approximately 1 CE to 1450 CE, the core of which was the riverine areas of the Phoenix Basin (McGuire 1991).

Occupation of the APE by the Hohokam appears to have begun in the late 800s and early 900s; at this time, the Hohokam resided in dwellings partially built into the ground called pithouses (Crown 1984; Haury 1976). Between 1150 and 1350, adobe structures within walled compounds primarily replaced pithouses (Eighmy and McGuire 1989; Haury 1976). However, after 1350, when the Hohokam experienced a population decline, house styles reverted to pithouses rather than adobe structures (Crown and Sires 1984). During the earlier Hohokam periods, plain wares and red-on-buff pottery with intricate design motifs were the primary styles, while red ware ceramics became more prevalent in later periods (Figure 3-11). It is generally accepted that the Hohokam cultural occupation does not appear in the archaeological record after 1450.

Figure 3-11. Examples of Hohokam Red-on-buff and Red ware pottery

Source: American Southwest Virtual Museum 2026~~2022~~.

The Queen Creek Delta was first settled by Euro-American and Mexican immigrants in the late nineteenth century. Early settlement consisted of cattle and hay ranches, as well as stagecoach stations, generally located near springs and wells (Lindly 2017; Rand McNally 1889). Settlement of this area was sparse until the establishment of the Phoenix and Eastern Railroad in 1904. The line extended east from Phoenix, with several stops in and near modern Queen Creek (Myrick 1980). The Phoenix and Eastern Railroad was purchased by the Southern Pacific Railroad in 1907 and is currently operated by UP as the Phoenix Subdivision (Myrick 1980).

Population growth led to the establishment of large farms and ranches, along with a bank, shops, and telephone service (Salge 2007). The initial community encompassing the area of shops and other facilities was named the Rittenhouse District near Ocotillo Road and Ellsworth Road. The region continued to grow due to its importance as an agricultural production area through the Second World War (Sossaman 1996). The Rittenhouse District was eventually incorporated as Queen Creek in 1947.

3.12.1.2 Cultural Resources in the APE

The Class III surveys resulted in the identification of 4 previously recorded sites, 2 in-use historic structures, and 53 isolated artifacts and isolated archaeological features in the APE. Using the eligibility criteria described earlier in Section 3.12, all cultural resources observed during the survey were evaluated for eligibility for inclusion in the NRHP.

The 4 previously recorded sites include 2 Hohokam habitations and 2 artifact scatters~~;~~. ~~all~~Three of the 4 sites are eligible for the NRHP for their information potential (Criterion D), and 1 consolidated site is already listed on the NRHP. In addition, since OEA issued the Draft EA in May 2023, the Gila River Indian Community shared that one of the four sites is a TCP. ~~These~~All 4 sites have the potential to contain varying amounts of data that can inform research questions related to Hohokam settlement patterns, land use, trade and interaction, subsistence strategies, and social organization, among other topics. If the Board approves PIRATE, OEA ~~is~~will continue~~ing~~ government-to-government consultation on the~~se~~ other ~~four~~ sites to determine whether any of them—or any other physical features in the APE—would qualify as TCPs or contribute to a larger, regional cultural landscape.

Old Rittenhouse Road, one of the in-use historic structures, has been previously determined ineligible for the NRHP and no further cultural resources work is recommended. Therefore, it is not evaluated in OEA's impact analysis. The other in-use historic structure is the Mesa to Winkelman Spur of the Southern Pacific Railroad, currently operating as the Phoenix Subdivision. That rail line was previously determined to be eligible under Criterion A because of its association with the early development of rail transportation in Arizona. In the APE, the Phoenix Subdivision retains integrity of location, workmanship, and design.

The isolated artifacts and isolated archaeological features consist of both prehistoric artifacts and historic artifacts and features (utility lines, irrigation canals/ditches, and unpaved roads). The isolated artifacts and isolated archaeological features are not considered significant. They do not meet the ASM site definition, and mapping and recording have exhausted their data potential. No further cultural resources work is recommended for the 53 isolated artifacts and isolated archaeological features, and they are not evaluated in this impact analysis.

Table 3-21~~3-19~~ summarizes the archaeological and historic resources identified during the surveys.

Table 3-213-19. Cultural resources sites in the APE

Site No. or Name	Site Type	Eligibility Determination[1]	~~Location in APE~~Project Element
Cultural Resources Sites			
AZ U:10:2(ASM)	Hohokam habitation	Eligible under Criterion D	Phoenix Subdivision, Alternatives 1 and 2
AZ U:10:69(ASM)	Hohokam habitation	~~Eligible~~Listed under Criterion D	Alternatives 1 and 2
AZ U:10:152(ASM)	Hohokam artifact scatter	Eligible under Criterion D	Alternatives 1 and 2
AZ U:10:275(ASM)	Hohokam artifact scatter	Eligible under Criterion D	Alternative 1
In-use Historic Structures			
Old Rittenhouse Road	Road	Ineligible	Phoenix Subdivision
Mesa to Winkelman Spur of the Southern Pacific Railroad	Railroad	Eligible under Criterion A	Phoenix Subdivision
Isolated Artifacts and Isolated Archaeological Features			
53 Isolated Artifacts and Isolated Archaeological Features	Prehistoric and historic artifacts and historic features	Ineligible	Phoenix Subdivision, Alternatives 1 and 2

[1] If the Board approves PIRATE, OEA ~~is~~will engage~~ing~~ in ongoing government-to-government consultation with Native American Tribes to determine whether any or all of these sites qualify as TCPs.

3.12.2 Archaeological Site Damage in the APE

On July 28, 2023, OEA discovered ground disturbance within the APE. In August 2023, OEA and Jacobs identified five damage areas within two archaeological sites: extensive damage across approximately 15 acres of AZ U:10:2(ASM), the NRHP-eligible archaeological site that is also a TCP; and moderate damage across 10 acres of AZ U:10:152(ASM), another NRHP-eligible site. AZ U:10:69(ASM) or AZ U:10:275(ASM) were not disturbed. The Board took swift action to protect the archaeological sites from further damage by requiring implementation of protective fencing, signage (do not enter, private property), security patrols, and regular field inspections and reporting (Board 2023a, 2023b).

In November, 2023, OEA, working with the Section 106 consulting parties, developed, distributed, and finalized a proposed framework for a non-invasive damage assessment. ACHP suggested that the Board consider the applicability of Section 110(k) to the archaeological site damage on November 17, 2023, and the Board initiated this process on December 11, 2023.

Between November 2023 and January 2025, OEA conducted a non-invasive field investigation (Powell 2024) and an invasive field investigation (Luhnow et al. 2025) to thoroughly evaluate and document the extent of the damage to the archaeological sites. OEA also consulted extensively with the Tribes, SHPO, and the other Section 106 consulting parties. The results of these studies identified extensive damage in two of the five damage areas, moderate damage in one, and minor damage in two.

During government-to-government consultation (refer to Chapter 5, *Consultation and Coordination*), the Gila River Indian Community and Salt River Pima-Maricopa Indian Community Tribal Historic Preservation Officers (THPOs) expressed grave concern about the loss of archaeological data, disturbance of Huhugam ancestors, and the intangible effects of the ground disturbance on traditional tribal values. Despite the significant loss of data potential and cultural damage to the Four Southern Tribes due to the ground disturbance, AZ U:10:2(ASM) still retains its NRHP eligibility and TCP values.

On June 3, 2025, the Board issued a decision finding that "no determination that Section 110(k) is applicable will be issued under 36 C.F.R. § 800.9(c)" and that "the Board will continue the Section 106 process…" After the Board's decision, OEA resumed the Section 106 process.

~~3.12.2~~3.12.3 Effects of No-Action Alternative

Under the No-Action Alternative, the Board would not authorize PIRATE, and UP would not construct and operate the proposed rail line or the planned Phoenix Subdivision support tracks. Therefore, cultural resources would not be affected by construction and operation of the proposed rail line or the planned Phoenix Subdivision support tracks. However, ~~the areas in and adjacent to~~ the APE is located within the PAMZ, which is~~are~~ rapidly developing ~~and the agricultural and vacant lands are likely to be converted into a built urban environment. The PAMZ totals 4,000 acres~~ and includes about ~~2,600~~1,500 acres ~~are~~ slated for new industrial development. In addition, another ~~1,000~~600 acres adjacent to the PAMZ is available for development at MGA~~ for development~~. If ~~the~~ new development in these areas proceeds without Section 106 oversight, the development could adversely affect cultural resources.

~~3.12.3~~3.12.4 Effects of Alternative 1

As summarized in Table 3-22~~3-20~~, Alternative 1 and the planned Phoenix Subdivision support tracks would adversely affect the 4 archaeological ~~cultural resources~~ sites but would not affect the in-use eligible historic structure (existing railroad). Avoidance is not feasible because Alternative 1 and/or the planned Phoenix Subdivision support tracks intersect each of the Hohokam sites.~~Because each of the Hohokam sites covers the entire width of the Alternative 1 and/or the planned Phoenix Subdivision portions of the APE, avoidance of these sites is not feasible.~~

If the Board authorizes PIRATE and Alternative 1 is selected, treatment measures to mitigate the project's adverse effects on cultural resources would be included in the project's MOA and HPTP, as explained in more detail in Section 4.5.11. OEA developed the MOA and is currently drafting the ~~MOA and~~ HPTP in consultation with the Arizona SHPO, Native American Tribes, and other federal, state, and local agencies. In a letter dated December 22, 2022, the ACHP indicated that it does not need to participate in the Section 106 consultation regarding the resolution of adverse effects.

The MOA was fully executed on February 23, 2026, and is included in this Final EA as Appendix K1, *Section 106 Memorandum of Agreement*. Execution of the MOA and its formal filing with ACHP ~~will~~ completed the Board's Section 106 review process. The Board and signatories to the MOA ~~would then be~~ are legally obligated to meet their responsibilities as defined in the MOA and the HPTP. UP submitted VM agreeing to comply with the requirements of the MOA and HPTP (VM-AHR-1), and OEA is recommending that the Board impose this condition in any decision authorizing construction and operation of PIRATE.

Table 3-22~~3-20~~. Impacts to cultural resources from Alternative 1 and the planned Phoenix Subdivision support tracks

Site No. or Name Site Type	Impacts	Recommended Treatment Measures
Cultural Resources Sites		
AZ U:10:2(ASM) Hohokam habitation	Physical impacts from site preparation, excavation, and construction of the railbeds, road crossings, access roads, drainage structures and ditches, and detention basins. Avoidance is not feasible ~~because the site encompasses 152 acres (35 percent) of the APE~~.	The project's MOA and HPTP would outline treatment measures for this site.
AZ U:10:69(ASM) Hohokam habitation	Physical impacts from site preparation, excavation, and construction of the railbed, an access road, and drainage ditches. Avoidance is not feasible ~~because the site extends across the 300-foot width of the APE~~.	The project's MOA and HPTP would outline treatment measures for this site.
AZ U:10:152(ASM) Hohokam artifact scatter	Physical impacts from site preparation, excavation, and construction of the railbed, an access road, and drainage ditches. Avoidance is not feasible ~~because the site extends across the 320-foot width of the APE~~.	The project's MOA and HPTP would outline treatment measures for this site.
AZ U:10:275(ASM) Hohokam artifact scatter	Physical impact from site preparation, excavation, and construction of the railbed, a road crossing, access roads, and drainage ditches. Avoidance is not feasible ~~because the site extends across the 250-foot width of the APE~~.	The project's MOA and HPTP would outline treatment measures for this site.

Site No. or Name Site Type	Impacts	Recommended Treatment Measures
In-Use Historic Structure		
Mesa to Winkelman Spur of the Southern Pacific Railroad	Physical impacts from site preparation, excavation, and construction of two railbeds, a road crossing, and drainage structures and ditches. However, the project would not adversely affect the railroad's NRHP eligibility because the location, workmanship, and design of the Phoenix Subdivision main line track would not change.	No further cultural resources work is recommended for this site.

~~3.12.4~~3.12.5 Effects of Alternative 2

As summarized in Table 3-23~~3-21~~, Alternative 2 and the planned Phoenix Subdivision support tracks would adversely affect three archaeological ~~cultural resources~~ sites and would not affect the in-use eligible historic structure (existing railroad). Avoidance is not feasible because Alternative 2 and/or the planned Phoenix Subdivision support tracks intersect three of the Hohokam sites.~~Three of the Hohokam sites cover the entire width of the Alternative 2 and/or Phoenix Subdivision portions of the APE; therefore, avoidance of these sites is not feasible.~~ Hohokam artifact scatter AZ U:10:275(ASM) would not be affected by Alternative 2 because the site~~only~~ is intersected~~s~~ only by Alternative 1. ~~and therefore would not be affected by Alternative 2.~~

If the Board authorizes PIRATE and Alternative 2 is selected, treatment measures to mitigate the project's adverse effects on AZ U:10:2(ASM), AZ U:10:69(ASM), and AZ U:10:152(ASM) would be included in the project's MOA and HPTP, as explained in more detail in Section 4.5.11. As in Alternative 1, OEA developed the MOA and is currently drafting the ~~MOA and~~ HPTP in consultation with the Arizona SHPO, Native American Tribes, and other federal, state, nd local agencies. In a letter dated December 22, 2022, the ACHP indicated that it does not need to participate in the Section 106 consultation regarding the resolution of adverse effects.

The MOA was fully executed on February 23, 2026, and is included in this Final EA as Appendix K1, *Section 106 Memorandum of Agreement*. Execution of the MOA and its formal filing with ACHP ~~will~~ completed the Board's Section 106 review process. The Board and signatories to the MOA ~~would then be~~ are legally obligated to meet their responsibilities as defined in the MOA and the HPTP. UP submitted VM agreeing to comply with the requirements of the MOA and HPTP (VM-AHR-1), and OEA is recommending that the Board impose this condition in any decision authorizing construction and operation of PIRATE.

Table 3-233-21. Impacts to cultural resources from Alternative 2 and the planned Phoenix Subdivision support tracks

Site No. or Name Site Type	Impacts	Recommended Treatment Measures
Cultural Resources Sites		
AZ U:10:2(ASM) Hohokam habitation	Physical impacts from site preparation, excavation, and construction of the railbeds, road crossings, access roads, drainage structures and ditches, and detention basins. Avoidance is not feasible ~~because the site encompasses 152 acres (35 percent) of the APE~~.	The project's MOA and HPTP would outline treatment measures for this site.
AZ U:10:69(ASM) Hohokam habitation	Physical impacts from site preparation, excavation, and construction of the railbed, an access road, and drainage ditches. Avoidance is not feasible ~~because the site extends across the 300-foot width of the APE~~.	The project's MOA and HPTP would outline treatment measures for this site.
AZ U:10:152(ASM) Hohokam artifact scatter	Physical impacts from site preparation, excavation, and construction of the railbed, an access road, and drainage ditches. Avoidance is not feasible ~~because the site extends across the 320-foot width of the APE~~.	The project's MOA and HPTP would outline treatment measures for this site.
In-Use Historic Structure		
Mesa to Winkelman Spur of the Southern Pacific Railroad	Physical impacts from site preparation, excavation, and construction of two railbeds, a road crossing, and drainage structures and ditches. However, the project would not adversely affect the railroad's NRHP eligibility because the location, workmanship, and design of the Phoenix Subdivision main line track would not change.	No further cultural resources work is recommended for this site.

3.13 Cumulative Impacts

This section describes cumulative impacts from implementation of the Action Alternatives and the planned Phoenix Subdivision support tracks. The *CEQ Regulations for Implementing NEPA* (40 C.F.R. §§ 1500−1508) defined cumulative effects as "Effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 C.F.R. § 1508.1[g]).[33]

3.13.1 Methodology

The methodology for analyzing cumulative impacts is based on CEQ's *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997a) and involves establishing the geographic scope and time frame for analysis; identifying other past, present, and reasonably foreseeable future actions affecting the resources analyzed; and evaluating the cumulative effects of those actions when combined with this project for affected resources.

OEA reviewed all resources evaluated in this ~~Draft~~ EA to identify those that would experience direct or indirect impacts under the Action Alternatives and the planned Phoenix Subdivision support tracks, and that are likely to experience the effects of other past, present, and reasonably foreseeable future actions. After this review, OEA determined that the following resources should be included in the cumulative impact analysis: transportation, burrowing owls, farmland, visual quality, and cultural resources.

If the project would not result in direct or indirect impacts on a particular resource, then cumulative impacts on that resource would not occur because a cumulative analysis is an additive process (refer to Figure 3-12). In addition, temporary impacts are not evaluated in a cumulative analysis because such impacts are short term, and therefore would have no long-term additive effect.

Figure 3-12. Cumulative impacts additive process

OEA did not evaluate the following resources for cumulative impacts because OEA does not expect direct or indirect impacts, or the expected impacts would not be cumulatively adverse: air quality, noise and vibration, hazardous materials and waste sites, water resources, geology and soils, land use, socioeconomics, and environmental justice. The only biological resource included in the cumulative impact analysis is the burrowing owl, which is a migratory bird.

[33] As explained in Chapter 1 above, CEQ has rescinded its NEPA implementing regulations. Moreover, the Supreme Court has recently limited the scope of review required under NEPA to the "project at hand." *See Seven Cnty. Infrastructure Coal. v. Eagle Cnty.* 605 U.S. at 182. Nevertheless, to avoid delay in the NEPA process and to ensure that the information contained in this Final EA is accurate, OEA has retained and updated the cumulative impacts analysis in this chapter.

Based on the review in Section 3.5, *Biological Resources*, OEA does not expect impacts to threatened and endangered species, bald and golden eagles, plant life, or other migratory birds to be cumulatively adverse. Refer to Section 3.5.3, *Effects of Alternative 1*, and Section 3.5.4, *Effects of Alternative 2,* for more detailed explanations.

3.13.2 Affected Environment

3.13.2.1 Spatial Boundary

The spatial boundary, or geographic study area, for cumulative impacts is shown on Figure 3-13. This study area was based on the resources selected for analysis, existing development that acts as a barrier to the influence of other actions, and the areas associated with other reasonably foreseeable actions.

3.13.2.2 Temporal Boundaries

The time frame for analyzing cumulative impacts coincides with construction of WAFB in 1941, which was eventually converted to MGA, because it spurred development in this area of Mesa. The time frame ends in 2040 with the planning horizon of the *Mesa 2040 General Plan* (2014), which provides "policy direction" for development in Mesa.

3.13.3 Other Past, Present, and Reasonably Foreseeable Future Actions

3.13.3.1 Past Actions

The study area has experienced substantial growth in the last ~~80~~85 years, since 1941, when the former WAFB was constructed, as indicated by the population increases summarized in Table 3-24~~3-22~~.

Table 3-24~~3-22~~. Population growth in the cumulative impacts study area

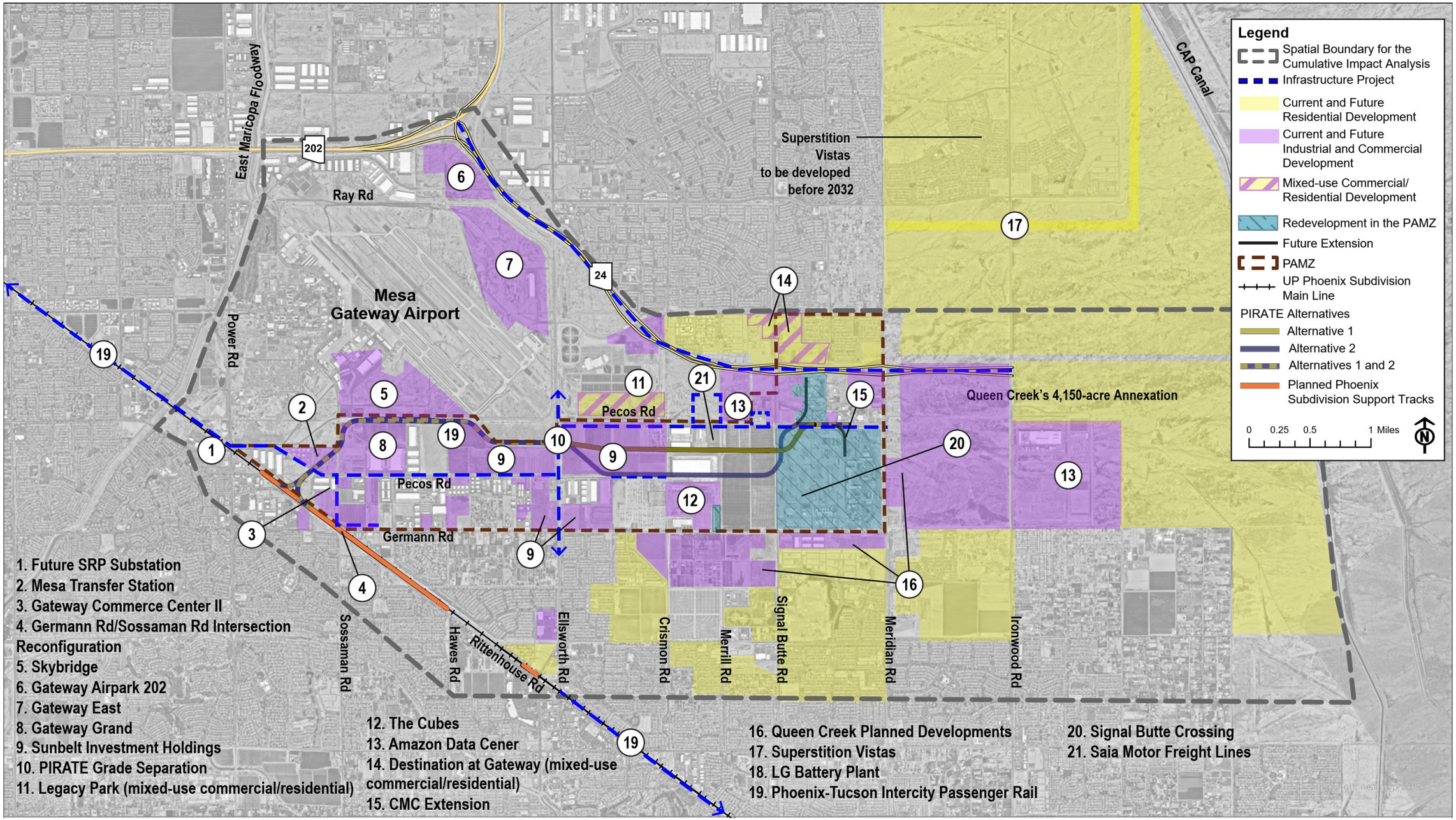
Geography	1940	1970	2026~~2022~~[1]	Change from 1940 – 2026~~2022~~(%)
Mesa	7,224	63,049	517,151 ~~517,302~~	6,036 ~~7,061~~
Queen Creek[2]	—	2,700	83,781 ~~66,151~~	3,122 ~~2,350~~
Maricopa County	186,193	967,522	4,788,038 ~~4,541,258~~	2,472 ~~2,339~~
Pinal County	28,841	67,916	568,796 ~~435,162~~	1,872 ~~1,409~~

Sources: World Population Review 2026~~2022~~; U.S. Census Bureau 1996~~, 2022~~.
[1] The 2026~~2022~~ populations are projected.
[2] Queen Creek had a population of 2,700 in 1990, shortly after incorporating in 1989. The percent change shown covers the ~~32~~35-year period from 1990 to 2025~~2022~~.

MGA, at the northwestern end of the study area originally served as the WAFB (Mead & Hunt 2020a; ADEQ 2025~~2021~~). Prior to the end of World War II, agriculture had been Mesa's dominant industry and the foundation of its economy since the early 1900s (Mark 2015). After World War II, Mesa's economy began to change from agriculture to the high tech, tourism, and service industries (Mesa Historical Museum 2022). Per historic aerial imagery, the study area remained primarily agricultural until 2000, with industrial areas between Pecos and Germann Roads appearing in the future PAMZ and denser residential areas appearing in Queen Creek. Similar land use changes continued through 2010, but to a smaller degree. Growth increased rapidly by 2020, with dense residential development in Queen Creek extending farther north to Germann Road (Maricopa County 2023~~2022b~~).

Following the closure of WAFB in 1993 and conversion to civilian use in 1994 (Mead & Hunt 2020a; ADEQ 2025~~2021~~), Mesa extended infrastructure to the airport area, including roads, water treatment plants, and "massive electricity" (Seward 2022). The airport began providing commercial passenger air service in 2007, with 1.7 million passengers in 2019 and nearly 1.5 million passengers after air travel resumed during the COVID-19 pandemic in 2021 (Coffman Associates 2009~~n.d.~~; Mead & Hunt 2020b).

Figure 3-13. Cumulative impacts geographic boundary



Note: This graphic was revised in the Final EA.

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SR 202 forms the northern boundary of the study area. Construction began in 1999 and was completed in 2006, when "the surrounding area was mainly green fields." SR 202 provided access to MGA, resulting in substantially increased use of the airport and to large, new outlying developments. "Profound" land use changes have since occurred along the corridor. In cities such as Mesa, much of the area's growth was dependent on the freeway, which enabled the East Valley and its expanding airport areas to compete for a number of projects that required direct freeway access (AASHTO 2022).

As discussed in Section 1.2*, Purpose and Need*, and Section 3.8*, Land Use and Farmland*, Mesa has been planning for industrial and commercial development in and adjacent to the PAMZ for over 20 years. Mesa's efforts to redevelop MGA in particular date back to the base closure in 1993 and the subsequent 1997 designation of Foreign Trade Zone No. 221 between Power, Ray, Ellsworth, and Pecos Roads. This planned development is supported by the documents and regulations listed in Table 3-173~~-15~~ and by the economic instruments Mesa has leveraged to attract businesses to the area like the Gateway Area Opportunity Zone, PAMZ, and Pecos Road Employment Opportunity Floating Zone (Mesa 2025b, 2025c, 2026b~~n.d.-b, n.d.-c, n.d.-d~~).

Industrial development in the PAMZ began with the TRW complex in 1992. Queens Park began to develop in 1993, with most homes built in the mid-1990s. A few industrial parcels were developed in the 1990s, followed by waves of building from 2007 to 2009, 2013 to 2015, and ~~most recently~~ 2018 to 2020. The light-industrial warehouse boom in the PAMZ that started in 2022 is continuing apace into 2026 with little signs of slowing. Since OEA issued the Draft EA in May 2023, multiple roadway, sewer, drainage, and utility projects have been completed in the cumulative analysis study area and more are planned to support the land use changes in and adjacent to the PAMZ. In addition, 650 acres of the PAMZ have been developed or are under construction for light-industrial warehouses or commercial buildings, and multiple projects have been constructed adjacent to the PAMZ and at MGA. Development that began ~~earlier in 2022~~in 2025 is mostly ongoing and thus is treated as a "present" action in this analysis.

3.13.3.2 Present and Reasonably Foreseeable Future Actions

The study area growth continues to outpace state and national growth rates. Mesa continues to be~~is~~ the second fastest-growing city (population >100,000) in the state (Strategistico 2026~~2022~~). Queen Creek was~~is~~ the third fastest-growing large city (population >50,000) in the nation between 2015 and 2023 (Li 2025~~Hing 2022~~). Maricopa County ~~was the fastest-growing county~~recorded the third-largest population increase of counties in the United States from 2023 to 2024~~2020 to 2021~~, with spillover effects in Pinal County, which ~~is the "fastest-growing area in the state for jobs and people"~~ posted the nation's fifth-fastest percentage growth rate (U.S. Census Bureau 2025~~Stanbridge 2022; Backer 2022~~). Maricopa County is projected to experience steady population growth between 1.7 and 1.8 percent annually through 2036; Pinal County is projected to experience the greatest amount of growth, above approximately 2.0 percent. Pinal County is "poised for considerable population growth resulting from the recent economic diversification in the service, manufacturing, and trade industries, and geographic location between Arizona's two most populous counties" (Maricopa and Pima) (ADOT 2018~~b~~).

Mesa has attracted a variety of new construction projects in recent years, transforming "this former bedroom community into a booming employment mecca" (Seward 2022). In the PAMZ, aerial imagery shows ~~slight~~substantial conversions of land use between Pecos and Germann

Roads between 2020 and 2026~~2021~~. Due to urbanization, "little remains of [Mesa's] agrarian past" (Mark 2015) although former agricultural fields and associated infrastructure span the PAMZ between Sossaman and Signal Butte Roads because of limitations on residential development related to MGA's overflight areas.

As discussed in Section 3.8, *Land Use and Farmland*, growth is already planned for the study area through establishment of the PAMZ, which the proposed rail line would serve. Because Mesa planned to transition land use in the PAMZ from agricultural to industrial and commercial independently of PIRATE, impacts associated with those plans are not direct or indirect impacts of the proposed rail line. Therefore, OEA has evaluated PIRATE as a response to Mesa's establishment of the PAMZ and not as a project that would induce development in the PAMZ. However, PIRATE may accelerate or intensify this growth, which could result in cumulative impacts. Mesa ~~provided~~maintains a database~~list~~ of developments that are either pending approval, have been approved, have been issued permits, or have completed construction (Mesa 2025a~~2022b~~). Because the approval process is iterative, the status of these projects is in constant flux. Therefore, projects that have the greatest potential to affect the study area are described in Table 3-25~~3-23~~, including other projects beyond Mesa's boundary. Table 3-25~~3-23~~ summarizes the present and future actions relevant to this analysis grouped by type of development.[~~34~~]

[~~34~~] ~~In 2016, FRA issued a Record of Decision for ADOT's Tucson-to-Phoenix passenger rail corridor study, which would utilize the Phoenix Subdivision adjacent to the PAMZ as part of its route (ADOT 2016). In their general plans, Mesa (2008), Queen Creek (2018), and Gilbert (2020) each show future commuter rail along the Phoenix Subdivision as well, and Queen Creek shows a commuter rail station where the Phoenix Subdivision crosses the Ellsworth Loop. This project is not currently programmed or funded (ADOT n.d.). Therefore, OEA does not consider it reasonably foreseeable and has not considered it in the cumulative effects analysis.~~

Table 3-253-23. Present and reasonably foreseeable future actions

Name *Status*	Description
Infrastructure Projects	
Tucson-to-Phoenix Passenger rail	In 2016, FRA issued a Record of Decision for the Arizona Department of Transportation's (ADOT) Tucson-to-Phoenix passenger rail corridor study, which would utilize the Phoenix Subdivision adjacent to the PAMZ as part of its route (ADOT 2016). In their municipal plans, Mesa (2008), Queen Creek (2024), and Gilbert (2020) each show future commuter rail along the Phoenix Subdivision as well, and Queen Creek shows a commuter rail station where the Phoenix Subdivision crosses the Ellsworth Loop. In June 2025, FRA approved ADOT's Step 1 work plan, clearing the way for development of a detailed Service Development Plan once a federal grant is awarded. That plan will take 2 to 3 years to complete with FRA oversight and public input. Afterward, ADOT would move into preliminary engineering and environmental review. These steps indicate that intercity passenger rail between Phoenix and Tucson is actively progressing and reasonably likely to move forward (ADOT 2025).
Mesa transfer station	Mesa plans to construct and operate a refuse transfer station that also accepts recyclable materials in the northwestern corner of Pecos and Sossaman Roads. Mesa's conceptual plan showed a 70-foot-wide gap through the transfer station for PIRATE that would not have accommodated UP's planned 150- to 200-foot-wide right-of-way between Pecos and Sossaman Roads (Mesa 2023). UP had purchased this segment of right-of-way prior to Mesa sending the conceptual plan to OEA. Therefore, OEA assumes Mesa will revise its design plan, and PIRATE would not conflict with the transfer station project.
SR 24 widening *Planned*	ADOT is planning to widen SR 24 between Loop 202 and Ironwood Drive and build bridges over major cross streets. The project is currently planned for construction in late 2026.
~~SR 24~~ ~~*Complete August 2022*~~	~~ADOT completed the new freeway between SR 202 and Ironwood Road in August 2022. Pinal County notes that extending SR 24 to Ironwood Road will allow Superstition Vistas (also described in this table) to become economically viable. Existing and future intersections with each of the major roadways in the PAMZ allows direct and more convenient access from SR 202.~~

Table 3-253-23. Present and reasonably foreseeable future actions

Name *Status*	Description
Sossaman Road and Germann Road intersection reconstruction *Planned*	Queen Creek is planning to reconfigure the existing intersection, including an extension of Germann Road from the west to connect with Sossaman Road. The ultimate build-out of the new intersection configuration is planned for Fiscal Years 2027-2028 (ClearGov 2025).anticipated in 2025-2030.
Germann Road widening *Planned*	Mesa plans to widen Germann Road from Rittenhouse Road to 0.5 mile east of Sossaman Road.
Sossaman Road widening *Planned*	Mesa plans to widen Sossaman Road from Rittenhouse Road to Pecos Road.
PIRATE grade separation at Ellsworth Road *Planned*	UP has committed to constructing a grade-separated rail crossing at Ellsworth Road if the total delay at the crossing reaches 24 vehicle-hours per day. The terms of UP's commitment are recorded in ACC Docket No. RR-03639A-22-0287 (ACC 2023b, 2025). Based on UP's filings to ACC, UP plans to design a railroad underpass beneath Ellsworth Road (ACC 2023a).
Ellsworth Road widening *Under construction*	Mesa is currently widening Ellsworth Road from two to three lanes in each direction, with capacity increases at the signalized intersections. Mesa anticipates project completion by 20272023, which should provide adequate capacity at all the study intersections.
Willis Road (future) *Partially Constructed* *Planned*	Mesa constructed the western 0.5 mile of Willis Road into a two-lane interim configuration andis plansning to extend it another 0.5 mile Pecos Road (south) from its east end at Ellsworth Road east through agricultural land to Crismon Road. This new connection, Willis Road, would ultimately consist of five lanes and would terminate at Crismon Road across from one of The Cubes' western entrances with direct access to a loading and unloading area.
Crismon Road paving *Under construction*	Mesa is paving Crismon Road between Pecos and Germann Roads.

Table 3-253-23. Present and reasonably foreseeable future actions

Name *Status*	Description
Signal Butte Road paving *Under construction*	In conjunction with SR 24, Mesa will connect Signal Butte Road to the new freeway by reconstructing the existing road segment between Williams Field Road and SR 24 and widening and paving the segment between SR 24 and Germann Road. The project is intended to "improve connectivity, increase traffic flow, and promote development in southeast Mesa."
Meridian Road paving *Complete August 2022*	Pinal County and Queen Creek constructed a new two-lane section of Meridian Road adjacent to the PAMZ from SR 24 to Germann Road.
Pecos Road (south) sewer installation *Planned*	Mesa plans to install new sewer lines along Pecos Road (south) between Power and Ellsworth Roads.
Pecos Road (north) sewer installation *Under construction*	Mesa is installing a new sewer line along Pecos Road (north).
Pecos Road (north) drainage basin and storm drain installation *Planned*	Mesa plans to construct three new drainage basins and install 3 miles of new storm drain along Pecos Road (north) between Ellsworth and Meridian Roads.
SRP substation *Planned* transmissions projects *Various stages*	As described in Section 3.8, *Land Use and Farmland,* SRP is planning to construct a substation near the intersection of Power and Pecos Roadsthree projects to increase the utility's capacity in southeastern Mesa.

Table 3-253 ~~3-23~~. Present and reasonably foreseeable future actions

Name *Status*	Description
Residential Projects	
Destination at Gateway *Under construction*	The developer is constructing a mixed-use, master-planned community of over 700 homes on 250 acres. Approximately 150 acres of this sold-out development is complete and the remaining 100 acres is under construction.
Superstition Vistas *Planned; first 2,560 acres by 2032*	Pinal County identifies Superstition Vistas as a Growth Area and has planned 175,000 acres of residential development and supporting services northeast of the PAMZ on land administered by ASLD. While water development and market trends will influence the timing of development, the population is estimated to reach 15 million by 2060. Less than 1.5% of Superstition Vistas currently has an assured water supply, which will limit what areas can be developed. Residential construction has started on about 1,500 acres east of Meridian Road.
Queen Creek's annexation of ASLD land *Rezoning process*	Queen Creek's planned annexation of 4,150 acres of ASLD land will include over 10,000 residential lots on about 2,500 acres between Ironwood Road and the CAP Canal.
Multiple residential developments in Queen Creek *Under construction and planned*	Queen Creek has identified multiple residential developments between Germann and Queen Creek Roads in various stages of development. These developments ~~will~~ are in the process of converting most of the agricultural land that remains adjacent to the PAMZ to residential use.

Table 3-253-23. Present and reasonably foreseeable future actions

Name *Status*	Description
Industrial and Commercial Projects	
Phoenix-Mesa Gateway Airport Master Plan *Planned*	Passenger boardings are forecast to reach 2.2 million "within 20 years" and potentially 5 million beyond that. The airport currently has three 10,000-foot runways and 1,000600 acres of developable land. MGA is planning several projects involving the airfield, airfield support facilities, parking, roadway, and passenger terminals. A new terminal would be built on the east side of the airport with 10 to 14 gates. In addition, 230 acres of undeveloped property in the southwest area is planned to support aviation- and non-aviation-related businesses. Approximately 1,251 on-airport jobs are expected as a result of the expansion, which would also bring retail and entertainment options, thereby increasing traffic. Potential phasing includes a start date of 2021 with completion in 2025, although the new terminal might not open until 2031. Future Pprojects include SkyBridge; Gulfstream's $100 million maintenance and repair hub that broke ground in June 2022; the planned, 160-acre Gateway Airpark 202 that would include offices, a hotel, residential, and commercial; and 270 acres of the 400-acre Gateway East development area. MGA has a 40-year master development agreement for Gateway East to include industrial (50 percent) and office (32 percent) uses, as well as some retail and hospitality.

Table 3-253-23. Present and reasonably foreseeable future actions

Name *Status*	Description
Redevelopment in the PAMZ *Under construction and planned*	• In January 2022, CMC broke ground on a $300 million expansion of its existing steel micro-mill, which is expected to create 185 jobs in Mesa and increase its production capacity by almost 20 percent when it opens in 2023. • Signal Butte Crossing, formerly part of TRW, is being redeveloped as a 200-acre "rail served land opportunity" with 8 buildings totalling approximately 2.5 million square feet and over 1 mile of future railroad frontage (0.4 mile along PIRATE) (CBRE 2025). • ZF, which purchased the TRW facility, is planning to redevelop part of the property with a 2,000,000-square-foot manufacturing and distributing facility. • MCG Chemicals America is expanding its Mesa operations to include 16 new buildings totaling approximately58,700 square feet, machinery to support semiconductor production, and a railcar station. • Fujifilm acquired 11 additional acres in 2025 and is expanding its Mesa operations across the entire 31-acre site to include a tank farm and new buildings up to 110 feet tall. • CMC and Fujifilm plans to construct a segments of connecting track outside of the PIRATE right-of-way to serve their existing facilityies in the PAMZ. OEA anticipates that other future customers would construct similar segments of connecting track outside of the PIRATE right-of-way once the proposed rail line is complete. Therefore, OEA considers the segments of track connecting to CMC and Fujifilm to be representative of other future connections to customers. While CMC and Fujifilm each planned their connecting track to be about 2,000 feet long (consisting of segments of connecting track within and outside of the PIRATE right-of-way), other segments of connecting track could vary in length depending on individual site needs.
New developments in and adjacent to the PAMZ *Various stages of planning, design, or construction*	As discussed in Section 3.8, *Land Use and Farmland,* in May 2022 Mesa identified over 30 new industrial and commercial developments in the cumulative impacts study area. About 25 of those are in the PAMZ, which Mesa anticipates will be built out by 2030. Subsequent reviews in A November 2022 and February 2026review of Mesa's Active Development Sites webpage indicated 9 more projects in the PAMZ in Mesa's pipeline in 2022, followed by 40 more projects in or adjacent to the PAMZ in 2026. Also in February 2026, Queen Creek's industrial property website shows 10 projects

Table 3-253-23. Present and reasonably foreseeable future actions

Name *Status*	Description
	adjacent to the PAMZ, mostly south of Germann Road. Major or notable developments include the following: • Sunbelt Investment Holdings is offering ~~nearly 640~~600 acres as land that is "currently available for build-to-suit" or "well-suited for industrial or business park uses." The company's brochure for these parcels shows Alternative 1 bordering the ~~229~~206-acre parcel west of Ellsworth Road and ~~bisecting the 308-acre~~running between two 145-acre parcels east of Ellsworth Road. In January 2022, Sunbelt Investment Holdings split their parcels west of Ellsworth Road to create a new parcel with the same boundaries as UP's proposed right-of-way. The legal description on the deed identifies the new parcel as "Proposed UPRR Right-of-Way." • ~~Site preparation has already begun on~~ The Cubes, a 268-acre and 4,000,000-square-foot master-planned industrial park, is partially constructed. Three warehouses on 128 acres are complete. The site ~~will~~ caters to bulk distribution, e-commerce fulfillment, and specialized manufacturing businesses. ~~• Madison Ventures is planning a 148-acre industrial office and industrial development in the northwest corner of Crismon and Germann Roads adjacent to The Cubes.~~ • In 2021, the previous owners of the Gateway Grand industrial park received approval to rezone 155 acres east of Sossaman Road from agricultural to general industrial. The site plan was revised to accommodate PIRATE, and in January 2022 the owners split one of their parcels to create a new parcel with the same boundaries as UP's proposed right-of-way east of Sossaman Road. This development, currently under construction with two out of the three planned buildings complete, is expected to include approximately 2.2 million square feet in three buildings. • Queen Creek is also planning the 66-acre Germann and Meridian Industrial Park directly south of TRW and CMC to hold 13 light industrial buildings totaling 1.1 million square feet. Phase I (5 buildings totaling 400,000 square feet) is complete. Construction on Phase II (7 buildings totaling 630,000 square feet) has not yet started ~~is planned to start in December 2022~~. • In Queen Creek, nine other planned industrial, office park, and commercial developments near the wye or adjacent to the southeast corner of the PAMZ.

Table 3-253-23. Present and reasonably foreseeable future actions

Name *Status*	Description
	• In Mesa, a 450,000-square-foot Amazon data center on 71 acres; 200-acre Legacy Park mixed-use development; and the 13-acre Saia Motor Freight Lines trucking terminal and maintenance facility. • A cluster of commercial services is developing at the intersection of Pecos (south) and Ellsworth Roads. A gas station, two car washes, fast food, and future retail either opened in 2021/2022 or are planned to open in 2023.
New developments in and adjacent to the PAMZ *Various stages of planning, design, or construction* (continued)	If the Board approves PIRATE and it is potentially built by 20272024, the presence of the proposed rail line could accelerate build-out in the PAMZ or intensify the development already planned on certain parcels. Developments could lease more quickly and the number of workers, cars, and round trips to the PAMZ could increase faster than originally estimated.
Queen Creek's annexation of ASLD Land *Rezoning process or under construction*	Queen Creek's planned annexation of 4,150 acres of ASLD land will include residential, urban, and urban employment areas, as well as a location for LG Energy Solution's 650-acre battery manufacturing plant, which is expected to employ "a few thousand people." when it opens in summer 2026.

Sources: ASLD 2021; AZBEX 2022, 2025; BEX Events 2019; Black & Veatch 2025; *Business Real Estate Weekly of Arizona* 2019; Casa Grande Valley Newspapers Inc. 2022; Coffman Associates 2009n.d.; Cornett 2020; Fisher and Cowling 2021; Gray 2024; Mesa Gateway Airport Authority 2026; Maricopa County Assessor 20252022; Maricopa County Recorder 2022; Mead & Hunt 2020a, 2020b; Mesa 2018a, 2018b, 2019a, 2021b, 2021c, 2021d, 2022a, 2022b, 2022c, 2026a, 2026c, 2026d n.d.-e, n.d.-f; Pazera 2022; O'Donnell 2020; Pinal County 20252021; Queen Creek 2024, n.d.-a; *Real Estate Daily News* 2022; Scanlon 2021a, 2021b; Sharp 2022; Shumaker 2022; Sunbelt Investment Holdings 20252022; The WLB Group Inc. 2021; UP 2022b; Walsh 2021.

3.13.4 Cumulative Impact Analysis

3.13.4.1 Transportation

Project Transportation Impacts

No railroad crossings currently exist in the study area east of the Phoenix Subdivision and therefore, there are no associated queues or delays. As noted under Section 3.1, *Transportation and Safety*, under Alternatives 1 and 2, the addition of five new at-grade crossings would result in increased delays and queueing during peak hours at intersections along Pecos Road (at Sossaman, Ellsworth [both Pecos Road north and south], Crismon, ~~and~~ Signal Butte, and Power Roads) and Germann Road (at Ellsworth, Crismon, and Signal Butte Roads). Delays and queues ~~w~~could occur daily each time a train on PIRATE passes through one of the at-grade crossings for approximately ~~10~~ 4 minutes once the project is complete.

Other Past, Present, and Reasonably Foreseeable Future Project Transportation Impacts

Completion of SR 24 will provide direct access to the PAMZ through interchanges with Ellsworth, Crismon, Signal Butte, and Meridian Roads. The recently completed ~~P~~paving of Signal Butte Road between Germann and Williams Field Roads ~~will not only~~has provided a connection to SR 24 and is predicted to~~, but will~~ "increase traffic flow and promote development in southeast Mesa" (Mesa 2019a~~n.d. e~~). These new access points are expected to accommodate substantial commercial and industrial growth, such as The Cubes, Gateway Grand, and the CMC expansion. Developments in the PAMZ could lease more quickly and the number of workers, cars, and round trips to the PAMZ could increase faster than originally estimated. Increased traffic is expected as a result, particularly on Pecos Road, as employees and non-freight suppliers travel to these facilities and other planned facilities.

When loading and unloading at CMC~~, Fujifilm,~~ or other future rail customers on segments of connecting track outside of the PIRATE right-of-way, trains could block public roads if they were long enough to extend past a crossing. As mentioned in Section 3.1.3.4, *Transportation Safety and Access Management*, UP anticipates that trains on PIRATE would range from ~~2,218~~2,220 feet up to ~~4,435~~4,500 feet long. These blockages could result in impacts to transportation and safety, and impacts would increase if train frequency increases on PIRATE. ~~For example, assuming that t~~Trains servicing ~~Fujifilm and~~ CMC that stop at the end of their ~~respective~~ segment~~s~~ of connecting track outside of the PIRATE right-of-way~~, only trains servicing Fujifilm would block at-grade crossings of public roads~~. ~~A 2,218-foot-long train would block the at-grade crossing at Pecos Road, while a 4,435-foot-long train would block the at-grade crossings at both Pecos and Signal Butte Roads. Trains servicing CMC~~ are not expected to block any at-grade crossings of public roads. ~~because t~~The end of CMC's segment of connecting track outside of the PIRATE right-of-way is more than ~~4,435~~4,500 feet east of Signal Butte Road.

Other blockages could occur along PIRATE once more rail customers develop their facilities. Sunbelt Holdings and The Cubes are good examples because they worked with UP to realign UP's earlier alignments so more of their properties could have access to rail. About 5,300 feet of the proposed rail line would traverse Sunbelt Holdings' property between Ellsworth and Crismon Roads (refer to Figure 3-13, *Cumulative impacts geographic boundary*). OEA does not know if future customers would need segments of connecting track outside of the PIRATE right-of-way.

If the future customer facilities are close enough to Ellsworth Road or Crismon Road, trains servicing these facilities could block traffic. Similarly, about 2,700 feet of the proposed rail line would traverse The Cubes between Crismon and Merrill Roads; UP is not currently proposing an at-grade crossing of Merrill Road. Any train longer than 2,700 feet would block Crismon Road when stopped on the proposed rail line.

Recently developed densely spaced residential areas have caused increased traffic along Germann Road and Ellsworth Road. Any future development, particularly high-density residential, farther east along Germann Road would further increase traffic along Germann Road and its intersections with Crismon and Signal Butte Roads. In addition, few major transportation routes serve Queen Creek to the south of Germann Road, resulting in a funneling effect to routes like Ellsworth and Germann Roads.

Cumulative Transportation Impacts

When the delays and queuing expected from the project are combined with future traffic increases, delays and queuing along Pecos Road would further increase at the intersections with Sossaman Road and Crismon Road due to increased traffic expected in the area. Increased traffic is expected while Gateway Grand is under construction on Sossaman Road and The Cubes is under construction on Crismon Road. Continued expansion of existing enterprises on the east side of the PAMZ, such as CMC, would also increase delays in combination with the project, particularly at Signal Butte and Pecos Roads.

Ellsworth Road, ~~A~~as one of the few north-south through-roads in the study area, would incur increased delays from the project ~~would increase~~ when combined with increased traffic ~~at Ellsworth Road~~ at its intersections with both Pecos and Germann Roads. Traffic studies prepared for the project indicate that Ellsworth Road carries the highest amount of traffic through the study area, and provides access to destinations to the north, including Germann and Pecos Roads to travel east and west. However, the Ellsworth Road widening project currently underway should provide adequate capacity at all the study intersections. Faster development in the PAMZ due to the construction of PIRATE could increase traffic volumes before some of the local roadway widening and capacity increases would be implemented, which would put more strain on the regional transportation network. When increased traffic from the other past, present, and reasonably foreseeable future actions is combined with the expected delays from the project, traffic congestion would increase in the study area during train crossings, resulting in an adverse cumulative impact. However, the project's contribution to overall cumulative impacts to transportation and safety would be minor if OEA's recommended MMs to avoid train operations during peak traffic times, minimize blocking of at-grade crossings, and consult and comply with local transportation planning agencies are implemented.

3.13.4.2 Burrowing Owls

Project Burrowing Owl Impacts

Alternative 1 and the planned Phoenix Subdivision support tracks would remove approximately ~~115~~114 acres of burrowing owl habitat in the agricultural lands within the project limits. Under Alternative 2 and the planned Phoenix Subdivision support tracks, ~~approximately 7 more acres~~the same approximate amount ~~(122 acres total)~~ of burrowing owl habitat would be removed. If the recommended mitigation is imposed, impacts under both alternatives are expected to be minor.

Other Past, Present, and Reasonably Foreseeable Future Project Burrowing Owl Impacts

Although listed as a state species of concern, burrowing owls are widely distributed in south-central Arizona (Forquer 2022; Ditch n.d.). Extermination of prairie dogs by early farmers and ranchers, as well as encroachment by later urban development, affected burrowing owls, who relied on prairie dog burrows for their nests. The drastic decline in natural burrows has led to owls living in drainpipes and ditches, electrical boxes, and other makeshift burrows. As a result, their reproduction slowed, mortality increased, and their populations continued to decline. Use of rodenticide also increased burrowing owl mortality (Stone 2020).

Despite federal protections under the Migratory Bird Treaty Act, burrowing owls remain threatened by land development. They prefer the edges of ditches along roads in agricultural areas, which can affect the stability of populations when suburban sprawl occurs. In the Phoenix area, conversion of agricultural fields into housing developments usually displaces any nesting burrowing owls (Ditch n.d.). Prolonged drought has also reduced vegetation that supports the insects and rodents the owls rely on for sustenance. In Maricopa County, a substantial number of burrowing owls inhabit agricultural land slated for development. Because they live underground, developers are not always aware of their presence, "which puts them particularly at risk as development continues at a rapid pace across metro Phoenix" (Stone 2020; Forquer 2022). When alerted to their presence and potential impacts from impending development, a local organization has been relocating burrowing owls to other areas with suitable habitat, which is becoming scarcer due to expanding development (Forquer 2022).

Large facilities with broad areas of impervious surfaces, such as MGA, have eliminated substantial acreage of habitat, as has ever-increasing industrial and residential development. Planned future development in the study area (i.e., segments of track outside of the proposed right-of-way connecting to future customers; airport expansion; new, large industrial complexes; and development of ASLD land in Pinal County) coupled with continued effects of climate change is likely to further exacerbate conditions for the owl, despite relocation efforts.

Cumulative Burrowing Owl Impacts

When the impacts of the past, present, and reasonably foreseeable future actions described in the previous section, particularly a decline in natural burrows, prolonged drought, and development, are combined with the impacts of the project, cumulative impacts to burrowing owls would be adverse. The project would result in the removal of approximately ~~115 to 122~~114 acres of burrowing owl habitat. However, the project's contribution to overall cumulative impacts to burrowing owls would be minor if OEA's recommended MMs to avoid and minimize impacts to burrowing owls are implemented.

3.13.4.3 Farmland

Project Farmland Impacts

As noted in Section 3.8, PIRATE would permanently change agricultural land uses within the project limits. The proposed rail line would directly convert approximately ~~50~~145 acres of land subject to the FPPA based on its soil characteristics ~~farmland~~ under Alternative 1 and ~~53~~152 acres under Alternative 2. Although no protection of these farmlands is warranted under the FPPA, both alternatives would result in minor impacts to farmland.

Other Past, Present, and Reasonably Foreseeable Future Project Farmland Impacts

Past actions, including the ground disturbance associated with the PIRATE yard detention basin, have substantially affected farmland in the study area. WAFB not only converted land to aviation use but helped spur development in the surrounding area. This trend continued after the airport was converted to civilian use in 1994, and the city extended infrastructure to the airport area. The airport offers a transportation incentive to potential businesses looking to locate in the area, further influencing adjacent development. Construction of SR 202 also influenced use of the airport and substantial adjacent land use changes due to direct freeway access. In addition, substantial population growth since 1940 in the study area has led to the conversion of extensive amounts of farmland to residential, commercial, industrial, and other uses. Mesa's actions to designate the PAMZ and encourage development within it has resulted in, and will continue to result in, more conversion of farmland to industrial and commercial uses.

Present and future actions, as well as projected growth in Maricopa and Pinal Counties, will continue this trend. The recent completion of SR 24 created direct access to the PAMZ, which will lead to further conversion of farmland.

Cumulative Farmland Impacts

When the impacts of the past, present, and reasonably foreseeable future actions described in the previous section, particularly conversion of farmlands to other uses due to development, are combined with the impacts of PIRATE, cumulative impacts to farmland would be adverse. However, the impacts from this project would be minimal compared to the impacts of other projects on farmland because PIRATE would not induce additional farmland conversion outside of the project limits and impacts to farmland within the project limits would be minor.

3.13.4.4 Visual Quality

Project Visual Quality Impacts

The project would result in minimal visual impacts from most viewpoints, and OEA does not expect changes to visual character or quality. Although the project would not change the area's visual character or quality, the proposed rail line would contribute to the overall transition to a more industrial landscape. Potential impacts could result from long-term views of parked rail cars and detention basins. ~~A minor impact is expected where parked trains would be visible near the northwest intersection of Germann Road and Merrill Road.~~ Under Alternative 2, the proposed rail line would be approximately 0.25 mile closer to viewpoints along Germann Road, and trains would appear slightly larger. Rail lines may be associated with industrial areas but are not typically considered visually compatible with residential areas.

Other Past, Present, and Reasonably Foreseeable Future Project Visual Quality Impacts

The landscape has been transitioning from a primarily agricultural landscape to an industrial and commercial one, a trend that is expected to continue. Development of the airport, industrial and commercial areas, and more recently, densely spaced residential areas, have changed the ~~mostly~~formerly agricultural landscape that had been Mesa's dominant industry since the early 1900s. Projects such as the Gateway Commerce Center II, Power Industrial, The Cubes, Gateway Grand, Superstition Vistas, and other developments within the study area are expected

to transform the remaining former agricultural and vacant land into industrial, commercial, and residential uses, with associated changes to visual character. Resulting changes to the landscape's vividness, intactness, and unity would also alter its overall visual quality.

Cumulative Visual Quality Impacts

Drivers on the future Willis Road would travel adjacent to Alternative 2, with direct views of the railroad. Residents south of Germann Road would have views of additional truck traffic on Willis Road, a route that currently does not exist and will connect to The Cubes. This impact would be combined with the visual impacts of the proposed rail line, which would be closer and therefore more prominent under Alternative 2.

As more residential areas are constructed within view of industrial and, to a lesser extent, commercial areas, conflicting visual elements will increasingly populate the landscape. For these reasons, visual impacts from the project would be adverse when combined with the impacts of other actions listed in Table 3-253-23. These impacts would be more noticeable where trains would be parked, particularly under Alternative 2, where the proposed rail line would be closer to viewpoints along Germann Road.

3.13.4.5 Cultural Resources

The cumulative impacts study area includes 95 previously recorded archaeological sites consisting of prehistoric artifact scatters, prehistoric villages, historic trash scatters and features, and multicomponent artifact scatters. Additionally, the cumulative impacts study area includes at least two known TCPs. However, since TCPs are highly sensitive and generally not disclosed, it is likely that there are additional undocumented TCPs within the greater cumulative impacts study area. During consultation efforts, the Four Southern Tribes, descendants of the Huhugam, have indicated that this area is important to them as the setting for O'Odham songs and oral history – which is critical as part of their history and identity (Lewis and Anton 2024).

Project Cultural Resources Impacts

OEA conducted cultural resource surveys of the APE in 2022 and 2023 that included all but 2.35 acres of the 449-acre APE, noting that 48 surveys were previously conducted within the APE. OEA identified a total of four NRHP-listed or -eligible archaeological sites within the APE. The project would adversely affect three (Alternative 2 and the planned Phoenix Subdivision support tracks) or four (Alternative 1 and the planned Phoenix Subdivision support tracks) NRHP-listed or -eligible archaeological sites. Treatment measures would be implemented to mitigate adverse effects. Each of these resources is a, all of which are Hohokam habitations or Hohokam artifact scatters.

Treatment measures, including data recovery, are included in the executed MOA, will be developed in the HPTP, and will be implemented to mitigate the potential adverse effects.

Other Past, Present, and Reasonably Foreseeable Future Project Cultural Resources Impacts

The Hohokam occupied an extensive portion of central and southern Arizona from approximately 1 to 1450 CE, the core of which was riverine areas in the Phoenix Basin (McGuire 1991). In particular, large Hohokam villages have been documented on the Queen Creek Delta. Some of the largest sites contain important features (Schaafsma and Countryman 2018). The eligible and listed sites within the APE are associated with the Hohokam, and other Hohokam sites are spread throughout the cumulative impacts study area as well.

Impacts on cultural resources can occur from natural processes such as flooding and erosion, but most predominantly from human processes such as land development.

~~In Arizona, only three types of projects are subject to regulations that require cultural resources protection:~~

- ~~Federal actions that involve consultation under Section 106 of the NHPA (as described in Section 3.12, *Archaeological and Historic Resources*);~~
- ~~Actions that would affect Arizona state, county, or municipal land must comply with the Arizona Antiquities Act of 1960 and the State Historic Preservation Act; and~~
- ~~State and local agency projects that would affect properties eligible for or listed on the Arizona Register of Historic Places must allow for SHPO review and comment.~~

~~Therefore, s~~Some past actions have likely led to the destruction or burial of Hohokam sites because private developers are not required to conduct cultural resources surveys or data recovery prior to construction in accordance with Section 106 unless there is a federal undertaking~~and/or other cultural resources regulations~~.

A review of projects triggering regulatory review shows extensive development plans or projects, both past and present, within the APE and cumulative impacts study area. Table 3-26 provides information on previous impacts to the four archaeological sites within the APE based on a review of prior projects (e.g., previous disturbance within the site by construction or development).

Table 3-26. Summary of previous impacts to archaeological sites within the APE

Site Number	AZ U:10:2(ASM)	AZ U:10:69(ASM)	AZ U:10:152(ASM)	AZ U:10:275(ASM)
Type of Site	Prehistoric habitation	Prehistoric habitation	Prehistoric artifact scatter	Prehistoric habitation
Acreage	1,504	433	69	347
Acreage in APE	153	8	14	5
Projects[1]	39	7	2	4
Current Impacts	Residential, industrial, and commercial development	MGA	MGA	Arizona Athletic Grounds
Portion of Site in APE	Central	Newly extended edge of site boundary	Newly extended edge of site boundary	Newly extended edge of site boundary
Percentage of Site Affected	10.0	0.2	20.0	1.0

[1] Number of previous archaeological projects that intersect individual site boundaries.

Remnants of a Hohokam settlement were discovered near MGA, where a large industrial manufacturing complex was planned. Archaeologists discovered thousands of artifacts in an "unusually dense" concentration on the surface of a planned 3-mile road route that was expected to pave over the settlement (Emerson 2004). Although awareness of the importance of cultural resources may have become more widespread in recent years, it is likely that present and reasonably foreseeable future actions will continue to destroy or bury such sites. In addition, vandals and artifact hunters have also adversely affected these resources (Emerson 2004).

Of the present and future projects identified in Table 3-253 23, only the infrastructure and agency projects would trigger any of the statutes that protect cultural resources in Arizona. OEA did not identify any industrial developments that would have a federal or state nexus for cultural resources protection, especially in the PAMZ where the industrial projects, including the future extensions to rail customers, are likely to be privately funded on privately owned land without any other federal or state nexus. This means that by PAMZ build out in 2030, up to 2,0002,500 more acres within the PAMZ could be subject to ground-disturbing activities and development without any cultural resources review, potentially resulting in adverse effects to cultural resources.

Cumulative Cultural Resources Impacts

While OEA determined that PIRATE would result in adverse effects to historic properties (three NRHP-eligible archaeological sites and one NRHP-listed archaeological site), it would also contribute to adverse cumulative impacts when combined with other actions in the study area, particularly within the PAMZ. While the project would affect a relatively small portion (between 125 and 128 acres) of the larger Hohokam region, it would contribute to adverse cumulative impacts when combined with other actions in the study area. However, in the study area, the project's adverse impacts cover a relatively small area when compared to the thousands of acres of desert to be developed as part of Superstition Vistas and Queen Creek's 4,150-acre annexation. Therefore, because of the relative size of the areas adversely affected by the project and the mitigation measures to document the sites, the project's contribution to overall cumulative impacts on cultural resources would be minor.

PAMZ development, including construction of PIRATE, would result in ground disturbance which is expected to adversely affect both known and potential archaeological sites.

Although the project would contribute to cumulative impacts on archaeological resources, the mitigation measures included in the MOA would increase knowledge and extensively document cultural resources within the cumulative impacts study area. Specifically, the MOA includes archaeological data recovery in addition to other measures to mitigate the adverse effect. The MOA was developed with input from all of the Section 106 consulting parties and was executed on February 23, 2026.

3.14 Conclusion

Based on the information provided from all sources to date and the analysis presented in this Draft EA, OEA preliminarily concludes that construction and operation of PIRATE, if all of OEA's final recommended mitigation is imposed and implemented, would have no significant environmental impacts. Therefore, preparation of an EA is appropriate, and an EIS is not required.

Chapter 4
Recommended Mitigation

4.1 Introduction and Approach

This chapter describes voluntary mitigation (VM) measures offered by Union Pacific Railroad Company (UP) and mitigation measures (MMs) developed by OEA that, if imposed by the Board, would avoid or minimize potential environmental impacts resulting from construction and operation of PIRATE and the planned Phoenix Subdivision support tracks identified in OEA's environmental review.

OEA is recommending that the Board impose all the measures set forth below, including UP's VM and OEA's final additional recommended mitigation, on any decision authorizing UP's petition to construct and operate PIRATE. ~~OEA's recommended mitigation is preliminary. OEA will finalize its recommended MMs in the Final EA after considering comments received on this Draft EA.~~ Unless otherwise noted, the ~~preliminary~~final recommended MMs set forth below apply to either action alternative.

4.2 Conditioning Power of the Board

The Board has the authority to impose conditions to mitigate environmental impacts. As a government agency, the Board can only impose conditions that are consistent with its statutory authority. Accordingly, any mitigation measure the Board imposes must relate directly to the transaction before the Board, must be reasonable, and must be supported by the record before the Board. The Board's consistent practice has been to mitigate only those impacts that result directly from the proposed action. The Board typically does not require mitigation for pre-existing environmental conditions, such as the effects of existing rail operations. Other agencies are mentioned in some of OEA's final~~preliminary~~ recommended mitigation because certain MMs would require UP to consult, apply for a permit from, or obtain approval from these agencies prior to project-related construction and operation.

4.3 Voluntary Mitigation and Negotiated Agreements

OEA encourages applicants seeking Board authority to propose VM to address the potential environmental impacts of their proposals. In some situations, VM can be more far-reaching than MMs the Board could unilaterally impose to address potential environmental issues and local concerns. The Board's practice is to require compliance with any VM agreed to by applicants in any final decision authorizing the proposed action. OEA made minor modifications to the VM wording for consistency, correctness, and clarity without changing the meaning or intent.

OEA also encourages applicants to negotiate mutually acceptable agreements with affected communities and other government entities. Negotiated agreements can be with neighborhoods, communities, counties, cities, regional coalitions, states, and other entities. In this case, if UP informs the Board that any negotiated agreements have been reached, the Board would require

compliance with the terms of the agreements as environmental conditions in any final decision authorizing PIRATE.

4.4 ~~Preliminary Nature of Environmental~~The Mitigation Process

OEA based its final recommended MMs on information available to date, consultation with appropriate agencies, and the environmental analysis presented in this ~~Draft~~Final EA. The final recommended mitigation in this chapter includes both UP's VM and MMs developed by OEA.~~OEA emphasizes that the identified mitigation measures are preliminary and invites public and agency comments on these proposed mitigation measures. For OEA to assess the comments effectively, it is critical that commenters be specific regarding any desired mitigation and the reasons why the suggested mitigation would be appropriate.~~

In response to comments received on the Draft EA, OEA added four new MMs: MM-TS-6, MM-TS-7, MM-BIO-7, and MM-W-5 in this Final EA. OEA also removed MM-LU-5 because it is no longer applicable and renumbered MM-LU-6 to MM-LU-5 in this Final EA. In addition, OEA modified 12 MMs to update existing conditions and in response to comments on the Draft EA (MM-TS-1 through MM-TS-5, MM-W-2 through MM-W-4, MM-LU-2, MM-LU-3, MM-VQ-2, and MM-VQ-3). Furthermore, OEA deleted VM-W-10 because UP already obtained its floodplain use permit from FCDMC and replaced it with a new MM requiring UP to comply with the conditions in the permit (MM-W-5).

~~OEA will make its final recommendations on mitigation to the Board in the Final EA after considering all agency and public comments on this Draft EA. OEA's final recommendations will include a recommendation~~Based on all information available to date, the Draft EA, this Final EA, and all comments received, OEA recommends that the Board impose the~~any~~ VM ~~measures and/or negotiated agreements~~ submitted by UP and the final mitigation developed by OEA set forth below in an any decision authorizing the proposed rail line. After ~~OEA concludes its environmental review process~~ issuance of this Final EA, the Board will make its final decision regarding PIRATE and any conditions it might impose. In making its final decision, the Board will consider both the transportation merits and the full environmental record, which includes th~~e~~~~is~~ Draft EA, thi~~s~~~~e~~ Final EA, all public and agency comments received, and OEA's final recommended mitigation.

4.5 Mitigation Measures

The following sections include VM measures offered by UP and OEA's final recommended ~~preliminary~~ MMs to address project-related impacts discussed in the ~~Draft~~ EA. OEA has made minor edits to UP's VM measures for clarity and to match the numbering style in th~~e~~~~is Draft~~ EA. The term "project" throughout the MMs refers to both the proposed rail line and the planned Phoenix Subdivision support tracks, and "project limits" refers to UP's existing and proposed right-of-way and temporary construction easements.

OEA does not address the No-Action Alternative in this chapter because the Board would not be taking an action and this alternative would not result in any impacts apart from those already occurring in the existing environment.

4.5.1 Transportation and Safety

4.5.1.1 UP's Voluntary Mitigation Measures

VM-TS-1. UP will follow all applicable federal Occupational Safety and Health Administration, Federal Railroad Administration, and operational safety regulations to minimize the potential for accidents and incidents during project-related construction and operation.

VM-TS-2. UP will consult with appropriate federal, state, and local transportation agencies to determine the final design of the at-grade crossing warning devices. Warning devices on public roadways will be subject to review and approval, depending on location, by the Arizona Corporation Commission, City of Mesa, and Town of Queen Creek. UP will follow standard safety designs for each at-grade crossing for proposed warning devices and signs. These designs will follow the Federal Highway Administration's *Manual on Uniform Traffic Control Devices for Streets and Highways* (2023~~2022~~) and the American Railway Engineering and Maintenance-of-Way Association's guidelines for railroad warning devices. UP will also comply with applicable Arizona Corporation Commission, City of Mesa, and Town of Queen Creek requirements.

VM-TS-3. Prior to construction of road crossings, when reasonably practical, UP and its contractor(s) will consult with local transportation officials regarding construction phasing and temporary traffic control. UP's contractor(s) will be responsible for local agency coordination of construction schedules, detours, and temporary traffic control, as well as obtainment of necessary temporary traffic control permits from the City of Mesa and Town of Queen Creek. As appropriate, UP's contractor(s) will maintain egress or traffic routing to allow for passage of emergency and other vehicles.

VM-TS-4. Prior to project-related construction, UP will consult with the Flood Control District of Maricopa County to determine the final details and reasonable signage for private at-grade crossings along access roads.

VM-TS-5. Prior to project-related construction, UP will consult with the Arizona Corporation Commission and City of Mesa regarding roadway safety and user expectations, which includes items such as pavement markings, signing, delineators, and active warning devices for vehicles, pedestrians, and bicyclists at proposed at-grade crossings.

VM-TS-6. Prior to and during project-related construction, in accordance with temporary traffic control permitting requirements, UP's contractor(s) will install temporary traffic control, including pavement markings, signing, and detours, throughout the project limits and applicable work zones.

VM-TS-7. Prior to and during construction and operation of the project, UP will work with the local agencies to facilitate the development of cooperative agreements with other emergency service providers to share services areas and emergency call response.

4.5.1.2 OEA's ~~Preliminary~~Final Recommended Mitigation

MM-TS-1. UP shall conduct train operations on or over the PIRATE at-grade crossings outside the a.m. (~~7~~6:00 a.m. to 9:00 a.m.) and p.m. (3:00 p.m. to ~~6~~7:00 p.m.) peak periods to the maximum extent practicable.

MM-TS-2. Prior to increasing the frequency of trains on PIRATE beyond ~~one~~two per day (one in each direction) or routinely conducting train operations at at-grade crossings on or over PIRATE during peak periods (~~7~~6:00 a.m. to 9:00 a.m. or 3:00 p.m. to ~~6~~7:00 p.m.), UP shall consult with and comply with the reasonable requirements of the Arizona Corporation Commission.

MM-TS-3. UP shall not block at-grade crossings and adjacent signalized intersections on major arterials for more than 10 minutes at a time, when reasonably practicable~~practical~~, unless mechanical failure, an obstruction on the track, or a similar emergency condition prevents a train from being moved clear of the crossing. Major arterials include Pecos Road (south and north), Sossaman Road, Germann Road, Ellsworth Road, Crismon Road, and Signal Butte Road.

MM-TS-4. UP shall conduct the consultations required in mitigation measures VM-TS-3, VM-TS-4, and VM-TS-5 at least 30 days prior to intersection or roadway closures and comply with any reasonable requirements of those agencies, unless it is not reasonably practicable~~practical~~. Additionally, the requirements in mitigation measures VM-TS-3, VM-TS-4, and VM-TS-5, as needed, shall also apply to the Town of Gilbert.

MM-TS-5. If Alternative 2 is authorized by the Board, prior to project-related construction, UP shall coordinate with the City of Mesa regarding any impacts to ~~the future~~ Willis Road and the remaining part of the Willis Road project.

MM-TS-6. UP shall fulfill all commitments imposed during the Arizona Corporation Commission's railroad crossing review process, as recorded in Arizona Corporation Commission Docket No. RR-03639A-22-0287.

MM-TS-7. At least 30 days prior to any project-related construction on Sossaman Road, UP and UP's contractor shall notify the Mesa Gateway Airport Authority of the construction schedule and estimated timeline for completion. UP's contractor shall also notify Mesa Gateway Airport Authority when construction on Sossaman Road is complete.

4.5.2 Air Quality and Climate Change

4.5.2.1 UP's Voluntary Mitigation Measures

VM-AIR-1. In accordance with Maricopa County dust control permitting requirements, UP's contractor(s) will implement appropriate dust control measures to reduce fugitive dust emissions created during project-related construction. UP will require its construction contractor(s) to regularly operate water trucks on haul roads to reduce dust generation.

VM-AIR-2. UP will work with its contractor(s) to make sure that construction equipment is properly maintained and that mufflers and other required pollution-control devices are in working condition in order to limit construction-related air pollutant emissions.

4.5.2.2 OEA's ~~Preliminary~~Final Recommended Mitigation

OEA did not identify additional mitigation measures related to air quality and climate change.

4.5.3 Noise and Vibration

4.5.3.1 UP's Voluntary Mitigation Measures

VM-NV-1. UP will comply with Federal Railroad Administration regulations (49 C.F.R. Part 210) establishing decibel limits for train operation.

VM-NV-2. UP will work with its contractor(s) to make sure that project-related construction and maintenance vehicles are maintained in good working order with properly functioning mufflers to control noise.

4.5.3.2 OEA's ~~Preliminary~~Final Recommended Mitigation

MM-NV-1. During project-related construction, UP's daily construction schedule shall adhere to time restrictions that limit construction noise prior to 7:00 a.m. or after 5:00 p.m. to the maximum extent practicable, as set forth in Town of Gilbert Municipal Code Section 42-63, City of Mesa Municipal Code Section 6-12-6(G), and Town of Queen Creek Ordinance 282-04.

MM-NV-2. Prior to project-related construction outside of local time restrictions within Mesa city limits, UP shall consult with and comply with the reasonable requirements of the City of Mesa for a special use permit to allow nighttime construction.

MM-NV-3. During project-related construction, UP shall implement the following best management practices: (a) constructing temporary sound barriers around work along the Phoenix Subdivision, (b) routing construction-related truck traffic to minimize use of residential streets, (c) minimizing idling construction equipment and placing as far from receptors (e.g., homes, schools, and other publicly accessible areas that typically have low noise) as possible, (d) operating earthmoving equipment as far from receivers as possible, (e) minimizing simultaneous noise and vibration-generating activities, and (f) avoiding nighttime activities to the extent possible.

4.5.4 Hazardous Materials and Waste Sites

4.5.4.1 UP's Voluntary Mitigation Measures

VM-HAZ-1. Prior to initiating any project-related construction, UP's contractor(s) will prepare a hazardous waste management plan detailing the manner in which hazardous wastes will be managed and describing the types and volumes of hazardous wastes anticipated to be managed. The hazardous waste management plan will address both onsite and offsite hazardous waste management and include the following: description of the methods to be used to ensure accurate piece counts or weights of shipments; waste minimization methods; facilities to be used for treatment, storage, and disposal; onsite areas designated where hazardous wastes are to be handled; identify whether transfer facilities are to be used, and if so, how the wastes will be tracked to ultimate disposal. Additionally, UP's contractor(s) will document hazardous waste inspections on a weekly basis.

VM-HAZ-2. In accordance with UP contractor's hazardous waste management plan and emergency management plan, and in the event of a spill over the applicable reportable quantity, UP's contractor(s) will comply with its spill prevention, control, and countermeasures plan and applicable federal, state, and local regulations pertaining to spill containment, appropriate clean-up, and notifications.

VM-HAZ-3. UP will require its construction contractor(s) to implement measures to protect workers' health and safety and the environment in the event that undocumented hazardous materials are encountered during construction. UP will document all activities associated with hazardous material spill sites and hazardous waste sites and will notify the appropriate state and local agencies according to applicable regulations. The goal of the measures is to ensure the proper handling and disposal of contaminated materials, including contaminated soil, groundwater, and stormwater, if such materials are encountered. UP will use disposal methods that comply with applicable solid and hazardous water regulations.

VM-HAZ-4. UP's contractor(s) will responsibly handle and store gasoline, diesel fuel, oil, lubricants, and other petroleum products to reduce the risk of spills contaminating soils or surface waters. If a petroleum spill occurs in the project limits as a result of project-related construction, operation, or maintenance and exceeds specific quantities or enters a waterbody, UP's contractor(s) will be responsible for promptly cleaning up the spill and notifying responsible agencies in accordance with federal and state regulations.

VM-HAZ-5. UP will prepare a hazardous materials emergency response to address potential derailments or spills. This plan will address the requirements of the Pipeline and Hazardous Materials Safety Administration and Federal Railroad Administration requirements for comprehensive oil spill response plans. UP will distribute the plan to federal, state, and local emergency response agencies. This plan shall include a roster of agencies and people to be contacted for specific types of emergencies during project-related construction, operation and maintenance activities, procedures to be followed by particular rail employees, emergency routes for vehicles, and the location of emergency equipment.

VM-HAZ-6. In the event of a reportable hazardous materials release, UP will notify appropriate federal and state environmental agencies as required under federal and state law.

VM-HAZ-7. UP will comply with applicable Federal Railroad Administration, Pipeline and Hazardous Materials Safety Administration, and Transportation Security Administration regulations for the safe and secure transportation of hazardous materials.

4.5.4.2 OEA's ~~Preliminary~~Final Recommended Mitigation

MM-HAZ-1. Prior to project-related construction, UP shall complete an ASTM International E1527-21 Phase I Environmental Site Assessment for any commercial real estate to be acquired with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. § 9601) and petroleum products.

MM-HAZ-2. During project-related construction, UP shall coordinate with Kinder Morgan to ensure that appropriate U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration guidelines (n.d.) and other applicable regulations (49 C.F.R. Parts 40 and 190−199; National Fire Protection Association 58 and 59) are followed regarding protecting closed and active pipelines in close proximity to the project limits.

MM-HAZ-3. During the final design phase of the project, UP shall coordinate with the owner/operator of any active exploration, monitoring, remediation, or production monitoring wells within the project limits to either protect the well, modify the top of casing to be above the new grade, or relocate the well outside of the project limits.

4.5.5 Biological Resources

4.5.5.1 UP's Voluntary Mitigation Measures

VM-BIO-1. UP will comply with any conditions and mitigation commitments contained in this Environmental Assessment, recommended by the Arizona Game and Fish Department and/or the U.S. Fish and Wildlife Service, for sensitive species, including plants, that could potentially be impacted by the project.

VM-BIO-2. UP will require its contractor(s) to comply with the requirements of the Migratory Bird Treaty Act as applicable. The following measures will be taken by UP and/or its contractor(s):

a. Where practical, any ground-disturbing, ground-clearing activities or vegetation treatments will be performed before migratory birds begin nesting or after all young have fledged.

b. If such activities must be scheduled to start during the migratory bird breeding season, UP will not take steps to prevent migratory birds from establishing nests in the potential impact area. UP or its agents will not haze or exclude nest access for migratory birds and other sensitive avian species.

c. If such activities must be scheduled during the migratory bird breeding season, a qualified biologist will perform a site-specific survey for nesting birds starting no more than 7 days prior to ground-disturbing activities or vegetation treatments. Birds with eggs or young will not be hazed, and nests with eggs or young will not be moved until the young are no longer dependent on the nest.

d. If nesting birds are found during the survey, UP will establish appropriate seasonal or spatial buffers around nests. Vegetation treatments or ground-disturbing activities within the buffer areas will be postponed, where feasible, until the birds have left the nest. A qualified biologist will confirm that all young have fledged.

VM-BIO-3. Within 30 days prior to project-related construction, qualified biologists will survey for the federal- and state-protected burrowing owl (*Athene cunicularia*) following guidelines provided by the Arizona Game and Fish Department (AGFD). Survey results will be provided to AGFD.

VM-BIO-4. If burrowing owls are observed at burrows in the project limits, a 100-foot buffer of no activity will be established around the burrow for the duration of the project.

VM-BIO-5. If an active burrowing owl burrow is in an area that requires impact, a local, qualified biologist will be contacted to remove the owls from the project limits with the appropriate state and federal permits. The burrows will be collapsed by the biologist to prevent further nesting activities.

4.5.5.2 OEA's ~~Preliminary~~Final Recommended Mitigation

MM-BIO-1. UP shall provide the results of the survey described in VM-BIO-3 to the Arizona Game and Fish Department (AGFD) within 30 days of survey completion, in accordance with the AGFD *Burrowing Owl Project Clearance Guidance for Landowners* (Arizona Burrowing Owl Working Group 2009).

MM-BIO-2. UP shall review updated U.S. Fish and Wildlife Service and Arizona Game and Fish Department species lists within 3 months of the start of project-related construction to see if any special status species were added after issuance of the Final EA. If new species are identified, UP shall notify OEA so that appropriate action can be taken if warranted.

MM-BIO-3. During implementation of mitigation measure VM-BIO-2, UP shall not remove any trees or large tree limbs or conduct vegetation removal activities, such as grubbing or shrub clearing, between February 1 and September 30 until a biologist has conducted a bird nest search of grasses, shrubs, trees, and tree limbs and has determined that no active bird nests are present. Vegetation may be mowed or removed if it has been surveyed within 7 calendar days prior to removal as long as only inactive bird nests, if any, are present. Between October 1 and January 31, grubbing, shrub clearing, and tree/limb removal activities are not subject to these restrictions.

MM-BIO-4. Prior to project-related construction, UP shall conduct a native plant inventory throughout the project limits to determine if protected native plants will be affected by project-related construction and consult with the Arizona Department of Agriculture (AZDA) to determine if a permit is required. If protected native plants will be affected and an AZDA native plant permit is required, UP shall comply with the reasonable requirements of AZDA prior to project-related construction.

MM-BIO-5. UP shall ensure that all disturbed soils are landscaped, seeded with a native seed mix, or otherwise permanently stabilized following project-related construction.

MM-BIO-6. Prior to any project-related construction, UP shall develop and implement a mitigation plan to address the spread and control of non-native invasive plants during the construction. This plan shall address the following: (a) planned seed mixes, (b) weed prevention and eradication procedures, (c) equipment cleaning protocols, (d) revegetation methods, and (e) protocols for monitoring revegetation. For any project-related construction on lands managed by the Arizona State Land Department (ASLD), UP shall seek input on the plan and approval from ASLD prior to construction.

MM-BIO-7. During any project-related construction, UP shall use only the minimum amount of light needed for safety. To the maximum extent possible and in accordance with Mesa Gateway Airport's lighting requirements, UP shall use narrow spectrum lighting. UP shall shield, tilt, or cut lighting to minimize the amount of upward shining light.

4.5.6 Water Resources

4.5.6.1 UP's Voluntary Mitigation Measures

VM-W-1. UP's contractor(s) will submit a Notice of Intent to request permit coverage under Arizona Pollutant Discharge Elimination System Construction Activity General Permit (CGP) AZG2020-001 CGP for construction stormwater management.

VM-W-2. UP's contractor(s) will submit an application for coverage under the National Pollutant Discharge Elimination System stormwater construction permits pursuant to Section 402 of the Clean Water Act for construction stormwater management.

VM-W-3. UP's contractor(s) will develop a stormwater pollution prevention plan, which will include construction best management practices to control erosion and reduce the amount of sediment and pollutants entering surface waters, groundwater, and waters of the United States. UP will require its construction contractor(s) to follow all water quality control conditions identified in all permits, including the Section 404 permit from the U.S. Army Corps of Engineers and the Section 401 Water Quality Certification from the Arizona Department of Environmental Quality.

VM-W-4. UP will obtain a permit from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act before initiating project-related construction in wetlands and other jurisdictional waters of the United States. UP will comply with all conditions of the Section 404 permit.

VM-W-5. UP will obtain a Section 401 Water Quality Certification from the Arizona Department of Environmental Quality. UP will incorporate the conditions of the Section 401 Water Quality Certification into its construction contract specifications and will monitor the project for compliance.

VM-W-6. UP will minimize impacts to wetlands to the extent practicable in the final design. After all practicable steps have been taken to minimize impacts to wetlands, UP agrees to prepare a mitigation plan for any remaining wetland impacts in consultation with the U.S. Army Corps of Engineers, where applicable.

VM-W-7. UP's contractor(s) will construct stream crossings during low-flow periods, when practical.

VM-W-8. When practical and in consultation with the Flood Control District of Maricopa County and the U.S. Army Corps of Engineers (Corps), UP's contractor(s) will minimize impacts to streams where impacts are unavoidable, where applicable. After all practicable steps have been taken to minimize impacts to streams, UP agrees to prepare a mitigation plan for any remaining stream impacts in consultation with the Corps, where applicable.

VM-W-9. For streams and rivers within a floodplain regulated by the Flood Control District of Maricopa County, UP will design the stream crossing with the goal of not impeding floodwaters and not raising water surface elevations to levels that would change the regulated floodplain boundary. If flood elevations change, UP will coordinate with the Federal Emergency Management Agency and/or local floodplain managers to obtain a Letter of Map Revision where construction of bridges, culverts or embankments results in an unavoidable increase greater than 1 foot to the 100-year water surface elevations.

~~**VM-W-10.** UP will obtain a permit from Flood Control District of Maricopa County before initiating project-related construction in a floodplain regulated by Federal Emergency Management Agency. UP will comply with all conditions of the floodplain permit.~~

4.5.6.2 OEA's ~~Preliminary~~Final Recommended Mitigation

MM-W-1. Prior to project-related construction, to minimize impacts to waters of the United States, UP shall (a) mark the boundaries of the wetlands within Rittenhouse Channel to ensure avoidance during project-related construction, (b) mark the construction limits authorized in the Section 404 permit to ensure impacts within waters of the United States do not extend outside the permitted limits, (c) ensure that all vehicles and heavy equipment used during construction use spill containment equipment, (d) not stage or stockpile within waters of the United States, and (e) not dispose of any material within waters of the United States or place materials in a location where they may reenter waters of the United States through drainage or erosion.

MM-W-2. Prior to project-related construction, UP shall provide Flood Control District of Maricopa County an opportunity to review and comment on final design plans, including proposed culverts, associated end treatments, and other work in the Rittenhouse ~~and Ellsworth~~ Channel~~s~~.

MM-W-3. UP shall provide a new, permanent ~~Flood Control District of Maricopa County (FCDMC)~~ City of Mesa access point into the Ellsworth Channel to replace the access ramp that would be displaced by construction of the PIRATE channel crossing.

MM-W-4. If UP cannot use existing ramps for construction access to Rittenhouse Channel, UP shall construct temporary or permanent access points per ~~FCDMC~~Flood Control District of Maricopa County standards.

MM-W-5. During any project-related construction in a floodplain regulated by the Federal Emergency Management Agency, UP shall comply with the reasonable conditions in its August 2025 floodplain permit from the Flood Control District of Maricopa County.

4.5.7 Geology and Soils

4.5.7.1 UP's Voluntary Mitigation Measures

VM-GS-1. UP's contractors(s) will limit ground disturbance to only the areas necessary for project-related construction.

VM-GS-2. During project-related earth-moving activities, UP's contractors(s) will remove topsoil and excess earthen material for safe and legal disposal to an offsite location.

VM-GS-3. UP's contractor(s) will stockpile excavated soil in areas away from environmentally or culturally sensitive areas and will use appropriate erosion control measures to prevent or contain erosion.

VM-GS-4. UP's contractors(s) will perform finish grading and surface disturbed areas with appropriate best management practices, where practical and in consultation with the City of Mesa and Town of Queen Creek, when construction is completed.

4.5.7.2 OEA's ~~Preliminary~~Final Recommended Mitigation

MM-GS-1. UP shall comply with relevant Federal Railroad Administration inspection and maintenance requirements to identify and mitigate any threats to the safe operation of the project, including those resulting from corrosive soils, where present.

4.5.8 Land Use and Farmland

4.5.8.1 UP's Voluntary Mitigation Measures

VM-LU-1. Prior to project-related construction, UP will secure agreements with utility owners to establish responsibility for protecting or relocating existing utilities, if impacted by construction.

VM-LU-2. Prior to project-related construction, UP will coordinate with Arizona State Land Department to develop irrigation infrastructure protection or relocation plans.

4.5.8.2 OEA's ~~Preliminary~~Final Recommended Mitigation

MM-LU-1. UP shall consult with the National Geodetic Survey at least 90 days prior to beginning project-related construction that would disturb or destroy geodetic marks E68, F517, DU2011, DU0687, and any other geodetic marks identified in or adjacent to the project limits.

MM-LU-2. UP shall coordinate with the Flood Control District of Maricopa County and the City of Mesa and comply with their respective reasonable requirements prior to beginning project-related construction within the Rittenhouse Channel or the Ellsworth Channel.

MM-LU-3. At least 45 days prior to project-related construction, UP shall coordinate with the ~~Phoenix~~ Mesa Gateway Airport to address potential impacts to the preliminary road alignment between SkyBridge and Pecos Road (south); confirm the need for Form FAA 7460-1 (Notice of Proposed Construction or Alteration); and review compatibility with airspace, navigation facilities, height restrictions, and lighting requirements associated with the airport overflight areas.

MM-LU-4. Prior to beginning project-related construction, UP shall coordinate with utility providers to verify the adequacy of existing utility infrastructure to accommodate increased demand, ensure that industry standards are met, and minimize disruptions.

~~**MM-LU-5.** Prior to project-related construction, UP shall coordinate with the Salt River Project (SRP) to avoid conflicts between PIRATE and the placement of SRP's poles or other infrastructure for the Southeast Power Link project.~~

MM-LU-5~~6~~. If Alternative 2 is authorized by the Board, UP shall coordinate with the owner of The Cubes at Mesa Gateway to resolve conflicts with ongoing or future development prior to project-related construction.

4.5.9 Socioeconomics

4.5.9.1 UP's Voluntary Mitigation Measures

VM-SOC-1. UP will appoint a liaison to consult with communities, businesses, agencies, tribal governments, educational institutions, and nonprofit organizations to provide general project information, progress on construction, information on rail operations and safety as needed and will seek to develop cooperative solutions to local concerns regarding project-related construction.

VM-SOC-2. UP and its contractor(s) will consult with appropriate adjacent landowners for coordination of construction schedules and temporary access during project-related construction.

4.5.9.2 OEA's ~~Preliminary~~Final Recommended Mitigation

MM-SOC-1. At least 2 weeks prior to each temporary road closure, UP shall alert the following of the road closure and the use of detours: (1) schools and emergency service providers within 3 miles of the detour and (2) landowners adjacent to any part of that proposed detour.

MM-SOC-2. At least 90 days prior to project-related construction, UP shall make the name and contact information for the community liaison identified in VM-SOC-1 available to the public. UP shall also promptly notify OEA once the community liaison is identified.

4.5.10 Visual Quality

4.5.10.1 UP's Voluntary Mitigation Measures

UP did not provide VM measures related to visual quality.

4.5.10.2 OEA's ~~Preliminary~~Final Recommended Mitigation

MM-VQ-1. UP shall design and utilize lighting during project-related construction and operation in compliance with applicable regulations to preserve visibility around airports, including Federal Aviation Administration requirements at 14 C.F.R. Part 77 (Safe, efficient use, and preservation of the navigable airspace), Arizona Revised Statutes § 28-8462 (Airport hazard; public nuisance; prevention and elimination), and Arizona Revised Statutes § 49-1102 (Shielding of outdoor light fixtures; exemptions).

MM-VQ-2. UP shall ensure project lighting complies with the zoning provisions of Mesa's Airfield Overlay District, which prohibit land uses that "impair visibility in the vicinity" of ~~Phoenix~~ Mesa Gateway Airport.

MM-VQ-3. Prior to project-related construction, UP shall provide ~~Phoenix~~ Mesa Gateway Airport an opportunity to review and approve the final project lighting design plans.

4.5.11 Archaeological and Historic Resources

4.5.11.1 UP's Voluntary Mitigation Measures

VM-AHR-1. UP and UP's contractor(s) will comply with the requirements of the Memorandum of Agreement and the historic properties treatment plan developed by OEA, Arizona State Historic Preservation Office, Native American tribal representatives, and other federal and state agencies in consultation with other consulting parties.

4.5.11.2 OEA's ~~Preliminary~~Final Recommended Mitigation

OEA did not identify additional mitigation measures related to archaeological and historic resources.

Chapter 5
Consultation and Coordination

This chapter summarizes the agency, tribal, and public outreach during the NEPA process, leading to the issuance of this ~~Draft~~Final EA. OEA prepared the~~is Draft~~ EA with assistance from their third-party consultant, Jacobs (Appendix L, *List of Preparers*).

5.1 Agency and Tribal Consultation

5.1.1 NEPA

This section summarizes OEA's efforts to apprise potentially affected and interested federal, state, and local agencies, as well as Native American Tribes, of the project and obtain relevant feedback.

5.1.1.1 Initial Agency Consultation Letters

On December 10, 2021, OEA distributed initial consultation letters to agencies and Native American Tribes to inform each entity about the project, as well as to solicit input on alternatives development, potential concerns, and any permits and approvals that UP may need to construct or operate the project. Copies of the letters, attachments, and distribution list are available at www.stb.gov under Docket No. FD 36501.

5.1.1.2 Agency Coordination Meetings

In March 2022, OEA held four virtual coordination meetings based on agency jurisdiction and resource topics to provide interested agencies with further information about the project, its purpose and need, and the range of alternatives that OEA would consider during the environmental review. Agencies also had the opportunity to provide feedback and pose questions for follow-up throughout the review process. Copies of the agenda, minutes, sign-in sheet, presentation, and supporting materials for each meeting are available at www.stb.gov under Docket No. FD 36501. Table 5-1 identifies the dates and attendees of each of these agency meetings.

As listed in Table 5-1, OEA also held or attended additional virtual meetings with Queen Creek and Mesa and to discuss potential traffic impacts and with SRP to discuss the utility's proposed transmission line projects in the project vicinity. During the April 2022 meeting, Queen Creek presented a summary of population growth and traffic concerns in southeastern Maricopa County and adjacent Pinal County. The town requested that OEA's review include a traffic impact analysis to evaluate potential safety and traffic impacts at six arterial crossings, including the intersection of Sossaman and Germann Roads, and the need for grade separations where necessary. ~~Based upon the results of the traffic analysis, OEA determined that traffic impacts do not necessitate the need for grade-separated crossings.~~ Queen Creek also requested that OEA consider vibration impacts to ASLD land and lighting and noise impacts along the proposed rail line.

Table 5-1. PIRATE agency coordination meetings

Meeting Focus Meeting Date	Agency Attendees[1]
Project vicinity~~area~~ utilities March 28, 2022	Cox Communications, Queen Creek Irrigation District, SRP, and Western Area Power Administration
Project vicinity~~area~~ schools March 28, 2022	BFHS, Heritage Academy, QCUSD, and J.O. Combs Unified School District
Municipal, regional, and state agencies March 29, 2022	ADOT, ASLD, Arizona State University, Central Arizona Governments, Mesa, FCDMC, Maricopa Association of Governments, MGA, Pinal County, Gilbert, and Queen Creek
Former WAFB Superfund site March 30, 2022	EPA, USAF, and MGA
Regional traffic impacts in Queen Creek April 20, 2022	Queen Creek
Traffic modeling assumptions May 12, 2022	Mesa and Queen Creek
Upcoming SRP projects June 16, 2022	SRP
Impacts to ASLD-owned property March 23, 2023	ASLD
SRP project status update September 20, 2024	SRP

[1] OEA participated in all meetings.

The May 2022 meeting focused on logistics and parameters for building and running the traffic model and for analyzing the results. Mesa and Queen Creek requested that the model account for recent and near-term development that may not be included in the currently available transportation demand data. Potential traffic impacts are addressed in Section 3.1, *Transportation and Safety*, and Appendix B, *Traffic Report*. Potential noise and vibration impacts are addressed in Section 3.3, *Noise and Vibration*, and Appendix D, *Noise and Vibration Analysis*. Lighting is addressed in the MMs listed in Section 4.5.5, *Biological Resources*, and Section 4.5.10, *Visual Quality*.

In June 2022, OEA and SRP addressed potential impacts to SRP's three projects adjacent to or intersecting PIRATE: Southeast Power Link parallel to Crismon Road, a new substation west of Power and Pecos Roads, and Abel-Pfister-Ball along Rittenhouse Road. The agencies determined that the project would not affect or conflict with the Abel-Pfister-Ball project because the new poles and transmission line could be sited outside the existing Phoenix Subdivision right-of-way. OEA met with SRP again in September 2024 for a project status update and learned that SRP's Southeast Power Link and Abel-Pfister-Ball transmission line projects were completed since issuance of the Draft EA in May 2023. OEA's utility analysis is addressed in Section 3.8, *Land Use and Farmland*.

In March 2023, OEA and ASLD discussed potential impacts to ASLD-owned land if PIRATE is constructed, including removing access to two farm roads. ASLD confirmed its lessee had been compensated by UP for the acquisition of their land, including any associated impacts, such as loss of citrus trees and access modifications. ASLD offered to follow-up with its lessee to confirm if they had any concerns that had not been addressed. OEA has not been made aware of any additional concerns to date from ASLD's agricultural lessee.

OEA learned of the presence of Kinder Morgan's pipelines after finishing its initial outreach efforts. To ensure that Kinder Morgan has the opportunity to provide feedback on the project and potential impacts to its infrastructure, OEA notified Kinder Morgan of the availability of the~~is~~ Draft EA. Throughout the resource analyses in Chapter 3, OEA incorporated agency feedback received in response to the agency consultation letters, calls, and meetings. Agency comments addressed a range of issues, including the following:

- Impacts to local traffic at roadway crossings during loading and unloading of product and consideration of grade-separated crossings (refer to Section 3.1, *Transportation and Safety;* note that based upon the results of the traffic analysis, traffic impacts would not necessitate the need for grade-separated crossings);
- Impacts to air quality, specifically with respect to potential GHG emissions and climate change impacts (refer to Section 3.2, *Air Quality and Climate Change*);
- Noise impacts to nearby schools and residents and consideration of a quiet zone (refer to Section 3.3, *Noise and Vibration;* note that based upon the results of the noise analysis, impacts from train or horn noise are not anticipated to necessitate the need for a quiet zone);
- Incorporation of educational elements into the project to benefit local students;
- Vibration impacts to nearby existing and proposed land uses (refer to Section 3.3, *Noise and Vibration*);
- Ongoing remediation of hazardous materials on the former WAFB (refer to Section 3.4, *Hazardous Materials and Waste Sites*);
- Impacts to aquatic resources and groundwater (refeer to Section 3.6, *Water Resources*);
- Construction and planned development in the project vicinity (refer to Section 3.8, *Land Use and Farmland*);
- Utility conflicts (refer to Section 3.8, *Land Use and Farmland*);
- Impacts to potential environmental justice populations (refer to Section 3.10, *Environmental Justice*); and
- Lighting requirements due to the proximity of MGA (refer to the MMs in Section 4.5.10, *Visual Quality*).

Since issuance of the Draft EA, OEA coordinated with USAF, NRCS, Maricopa Association of Governments, QCUSD, Mesa Public Schools, Chandler Unified School District, Higley Unified School District, BFHS, Heritage Academy, and Sierra Schools.

5.1.1.3 Draft and Final EA Notifications

OEA notified agencies, including Native American Tribes, and elected officials of the availability of the~~is~~ Draft EA and requested comments via email and postcard with a link to the Board's website. Elected officials include state and federal senators and representatives, as well as local mayors from Mesa, Queen Creek, and Gilbert.

The 30-day public and agency review and comment period began~~begins~~ with the service of the~~is~~ Draft EA on May 31, 2023, and ended~~s~~ on June 30, 2023. OEA received comments from 10 commenters, comprised of individuals, local agencies, state agencies, and businesses. OEA responded to the substantive comments received in Appendix M and made appropriate changes to the Draft EA in this Final EA. ~~After the comment period concludes,~~ OEA ~~will prepare the Final EA to address comments received and~~ notified~~y~~ agencies, Native American Tribes, and elected officials of publication of this~~e~~ Final EA via email and/or postcard.

5.1.2 NHPA Section 106 Consultation

OEA also consulted with appropriate agencies under Section 106 of the NHPA. The Section 106 consultation process formally began on April 6, 2022, when OEA distributed initial consultation letters to a group of potential consulting parties inviting them to participate in Section 106 consultation and soliciting comments regarding the proposed APE for cultural resources. Appendix K2, *Section 106 Consultation Documentation*, includes an example of the letter and the distribution list. OEA followed up on the initiation letters by email and telephone to determine whether each invited party wished to participate in Section 106 consultation.

As of the issuance of this ~~Draft~~Final EA, the following agencies participated in the Section 106 process as consulting parties:

- Arizona Museum of Natural History;
- ASLD;
- ASM;
- Bureau of Indian Affairs;
- Corps;
- FAA;
- FCDMC;
- City of Mesa (Historic Preservation Office and Office of Economic Development);
- Mesa Historical Museum;
- ~~Mesa Office of Economic Development;~~
- MGA Authority;
- SRP;
- San Tan Historical Society;
- SHPO;
- Queen Creek; and
- UP.

OEA distributed an informational memorandum in May 2022 to the Section 106 consulting parties that outlined the field and reporting methods to be employed during the Class III cultural resources survey of the APE (Appendix K2, *Section 106 Consultation Documentation*). OEA distributed another Section 106 consultation letter in September 2022 to solicit comments regarding APE revisions, the Class III survey report, OEA's NRHP eligibility determinations, treatment recommendations, finding of adverse effect, and development of an MOA for the project (Appendix K2, *Section 106 Consultation Documentation*). In October 2022, OEA

distributed another informational memorandum to request input from consulting parties on development of an MOA and HPTP, including scheduling recurring meetings to develop the MOA. Given that there was no formal action on Bureau of Indian Affairs-administered land, the Bureau of Indian Affairs declined to participate further in the Section 106 process on October 22, 2022.

In November 2022, OEA convened the first MOA development meeting and distributed an additional Section 106 consultation letter with the revised and final Class III survey report and NRHP eligibility determinations. In December 2022, OEA distributed an initial draft of the MOA and held a meeting in January 2023 to discuss comments on the MOA. Based on feedback received from the consulting parties, OEA distributed a revised MOA in February 2023 and a new stipulation in March 2023.

The Corps replied to OEA's consultation letters in September and October 2022, indicating that its involvement in the Section 106 process was contingent upon the need for a CWA Section 404 permit for the project. OEA contacted the Corps in April 2023, following UP's submittal of a preliminary jurisdictional delineation and Section 404 permit application to the Corps. OEA met with the Corps on April 19, 2023, to share information, provide a summary of the process completed to date, and coordinate their involvement in the process moving forward.

All agencies that have responded to the Section 106 consultation letters to date have concurred with OEA's NRHP eligibility recommendations, determination of effects, and the need for an MOA and HPTP.

OEA has made additional follow-up telephone calls and emails to each consulting party following each round of formal Section 106 consultation. This outreach provides an opportunity for each agency to ask questions and to ensure that all agencies received the consultation materials.

In May 2023, OEA distributed an addendum to the Class III survey report for unsurveyed areas within the APE for feedback on the report's adequacy and a continued project finding of "adverse effect." Additionally, OEA distributed revised drafts of the MOA in May and July 2023 to address the project finding of "adverse effect."

On September 13, 2023, OEA distributed a Section 106 consultation letter regarding the archaeological site damage and held a virtual consulting parties meeting on October 4, 2023. Following the meeting, OEA put the Section 106 consultation process on hold until the damage assessment could be addressed.

OEA resumed Section 106 consultation on August 15, 2025, with a consultation letter describing the Board decision on Section 110(k) and held a virtual consulting parties meeting on September 15, 2025 to address revisions to the MOA and HPTP. OEA then distributed the revised draft MOA to the consulting parties for review and comment on November 26, 2025. Comments were received from SHPO and the City of Mesa and fully addressed in a Final MOA transmitted to consulting parties on February 9, 2026. The Final MOA was executed on February 23, 2026.

5.1.3 Tribal Coordination and Consultation

This section summarizes OEA's coordination and consultation with Native American Tribes in accordance with NEPA, EO 13175, "Consultation and Coordination with Indian Tribal Governments," and Section 106.

5.1.3.1 Tribal Consultation under NHPA Section 106

OEA identified 11 federally recognized Native American Tribes that may have current or historic interest in the APE. On April 6, 2022, OEA formally invited the following Native American Tribes to participate in the Section 106 process:

- Ak-Chin Indian Community;
- Gila River Indian Community;
- Hopi Tribe;
- Mescalero Apache Tribe;
- Pascua Yaqui Tribe;
- Pueblo of Zuni;
- Salt River Pima-Maricopa Indian Community;
- Tohono O'odham Nation;
- Tonto Apache Tribe;
- White Mountain Apache Tribe; and
- Yavapai-Apache Nation.

The White Mountain Apache Tribe declined OEA's invitation to participate in Section 106 consultation.

OEA also participated in the Four Southern Tribes Cultural Resource Working Group meetings on ~~July 15, 2022;~~ January 19, 2023; ~~and~~ April 21, 2023; and December 18, 2025. The Four Southern Tribes Cultural Resource Working Group includes representatives of the Ak-Chin Indian Community, the Tohono O'odham Nation, the Salt River Pima-Maricopa Indian Community, the Gila River Indian Community, and other interested agencies and professionals that discuss potential cultural resources issues or concerns relevant to Native American Tribes. OEA virtually participated in the July 2022 meeting as a continuance of the Section 106 consultation process and provided an overview of PIRATE and Class III survey results, as well as solicited feedback about ongoing Section 106 consultation communication preferences and schedule. During the January 2023 and April 2023 in-person meetings, OEA provided an update on the progress of the project and solicited comments on the MOA and HPTP.

In response to the September 2022 Section 106 consultation letters, the Gila River Indian Community did not concur with OEA's NRHP recommendation of "unevaluated" for the newly recorded portions of sites AZ U:10:69(ASM) and AZ U:10:275(ASM). Instead, the Gila River Indian Community requested that OEA recommend both sites as eligible for the NRHP under Criterion D in their entirety. The Gila River Indian Community also requested that OEA extend the boundary of AZ U:10:152(ASM) and recommend it as eligible for the NRHP under Criterion D in its entirety. The Salt River Pima-Maricopa Indian Community agreed with the Gila River Indian Community's recommendations. Both Native American Tribes concurred with the overall finding of project effect ("adverse effect") and the need for an MOA and HPTP. OEA has not received any other formal feedback from Native American Tribes in response to Section 106 correspondence letters to date.

Following each round of formal Section 106 consultation, OEA followed up with each consulting Native American Tribe via telephone calls and email. This outreach provided an opportunity for each Native American Tribe to ask questions and ensured that each Native American Tribe received the consultation materials.

OEA ~~has~~ notified Native American Tribes of availability of the Draft EA through email and letters. OEA ~~will use the same methods to notify~~notified Native American Tribes of the availability of the Final EA ~~when it is issued~~.

The Native American Tribes that participated as consulting parties under NHPA Section 106 consultation received the same consultation letters in May 2023, regarding the Class III survey addendum report and revised draft MOA, as the other agencies who have participated as consulting parties.

In addition, in June 2023, OEA distributed a letter requesting government-to-government meetings with the tribal consulting parties regarding TCPs that may be within the APE. On August 15, 2025, OEA notified Native American Tribes of the resumption of Section 106 consultation and formally invited them to a virtual consulting parties meeting on September 15, 2025. The meeting resumed the Section 106 process, and focused on the remaining Section 106 components and revisions to the MOA and development of the HPTP. OEA will continue consultation with Native American Tribes during implementation of the MOA.

5.1.3.2 Government-to-Government Consultation

OEA consulted with federally recognized Native American Tribes, consistent with NEPA, NHPA, and EO 13175, during preparation of this Draft EA. EO 13175 requires that federal agencies conduct government-to-government consultation with federally recognized Native American Tribes in the development of federal policies (including regulations, legislative comments or proposed legislation, and other policy statements or actions) that have tribal implications. Through government-to-government consultation, Native American Tribes can discuss potential concerns about significant resources that may not otherwise be raised during the Section 106 process.

On September 1, 2022, OEA invited the 10 Native American Tribes listed in Section 5.1.3.1 that accepted the invitation to participate as Section 106 consulting parties to also participate in government-to-government consultation. OEA sent letters to tribal leaders, THPOs, and cultural resources officials along with a response form to identify points of contact and indicate a preference for participation in the government-to-government consultation process and/or the Section 106 process. Appendix K2, *Section 106 Consultation Documentation*, includes an example of the letter and the list of tribal recipients. OEA also called recipients to ensure that the Native American Tribes received the letters and to answer questions.

The Gila River Indian Community, Salt River Pima-Maricopa Indian Community, Hopi Tribe, and Pascua Yaqui Tribe requested government-to-government consultation. Pascua Yaqui deferred government-to-government consultation to the Gila River Indian Community. OEA met with the Salt River Pima-Maricopa Indian Community in January 2023 and with the Gila River Indian Community in April 2023. OEA ~~will~~ continued to meet with the Native American Tribes to discuss issues or concerns they may have had regarding the project.

On August 16, 2023, OEA and Jacobs conducted an in-person field visit for the Gila River Indian Community and Salt River Pima-Maricopa Indian Community THPOs and SHPO.

5.1.4 NHPA Section 110(k) Consultation

OEA also consulted with appropriate agencies and Native American Tribes under Section 110(k) of the NHPA. The Section 110(k) consultation process formally began on March 22, 2024, when OEA distributed initial consultation letters to the consulting parties inviting them to participate in Section 110(k) consultation and soliciting comments regarding the damage assessment process, as described in Section 3.12.2. A consultation letter or email was prepared for each step of the damage assessment process.

The following agencies and Native American Tribes participated in the Section 110(k) process as consulting parties:

- Ak-Chin Indian Community;
- Arizona Museum of Natural History;
- ASLD;
- ASM;
- City of Mesa (Historic Preservation Office and Office of Economic Development);
- Corps;
- FAA;
- FCDMC;
- Gila River Indian Community;
- Hopi Tribe;
- Mescalero Apache Tribe;
- MGA Authority;
- Mesa Historical Museum;
- Pascua Yaqui Tribe;
- Pueblo of Zuni;
- Queen Creek;
- SRP;
- Salt River Pima-Maricopa Indian Community;
- San Tan Historical Society;
- SHPO;
- Tohono O'odham Nation;
- Tonto Apache Tribe;
- UP;
- White Mountain Apache Tribe; and
- Yavapai-Apache Nation.

The White Mountain Apache had declined to be a consulting party for Section 106 and did not participate during the Section 110(k) consultation.

During the damage assessment process, OEA provided fieldwork summaries to the Native American Tribes, and presented at the Four Southern Tribes Cultural Resource Working Group meetings on August 18, 2023 and December 19, 2024.

OEA also continued government-to-government consultation with Native American Tribes and met with Gila River Indian Community and Salt River Pima-Maricopa Indian Community to discuss the cultural values of concern regarding the damage assessment, the proposed damage assessment methodology, and the status of the Board's consideration of the applicability of Section 110(k).

Through government-to-government consultation, Native American Tribes have provided significant input regarding the methodology and concerns for documentation of the damage to archaeological sites.

5.2 Public Involvement

5.2.1 Public Notification

OEA announced the availability of the Draft EA for review and the 30-day public comment period in the following formats:

- Postcards to agencies, businesses, tenants, residents, and parcel owners within and adjacent to the project limits;
- Press releases to local media outlets;
- Flyers posted in schools/childcare centers, senior living facilities, community centers, and local stores;
- Newspaper advertisements; and
- Online banner advertisements.

OEA's public notification efforts included sending postcards to approximately 2,200 private, public, and city or town mailing addresses within 0.25 to 0.50 mile of the project limits and to representatives from 42 agencies, schools, and utility companies. The postcard notifieds the public and businesses of the Draft EA review and comment period, as well as how to provide comments. In addition, the Board's Railroad Map Depot at (Bit.ly/3pNXz9s) offereds a user-friendly platform with information available in the Draft EA, how to access the Draft EA, and how to submit comments on the Draft EA.

~~OEA analyzed demographic data to determine if minority and/or low-income populations are present within the affected area that may warrant targeted outreach. For this analysis, the affected area included Census tracts surrounding the project limits to engage residents that could experience temporary construction-related impacts as well as long-term impacts associated with railroad operations. As discussed in Section 3.10, *Environmental Justice,* environmental justice populations are not present within the study area. The study area has a minority population of 29 percent and a low-income population of 7 percent. OEA determined that these percentages are not meaningfully greater than the percentages in the nearby communities of Mesa, Gilbert, Queen Creek, and Maricopa County. Similarly, Census tract data shows that English proficiency is likely not a concern within the study area because less than 1 percent of each language group speak English not well or not at all. Therefore, translation is not needed for project outreach materials. However, any materials will be translated upon request.~~

~~The public will have 30 days to review the Draft EA and provide comments. When OEA publishes the Final EA,~~ OEA ~~will provide~~ notified the public~~notification~~ of ~~its~~ the availability of the Final EA using email, postcards, and a press release.~~using the same methods as notification regarding publication of the Draft EA.~~

~~5.2.2 Public Comment Period~~

~~OEA is providing a 30-day comment period on this Draft EA to allow interested parties to review the Draft EA and provide comments. Written comments on this Draft EA must be postmarked by **June 30, 2023**. Electronically filed comments must be received by **June 30, 2023**. The entire Draft EA is available on the Board's website (www.stb.gov) by clicking "Search STB Records" near the top of the home page and then searching for "Decisions" using Docket Number "FD 36501." The Draft EA will be listed as an Environmental Document under the~~

~~Decision Type category. An interactive StoryMap of the environmental review is also available at the Board's Railroad Map Depot at (Bit.ly/3pNXz9s). In addition, a physical copy of the Draft EA is available at the local government offices and libraries identified in Table 1-1, which includes address, telephone number, website, and operating hours for each location. For detailed information about how to submit comments on this Draft EA, see Section 1.4, *Request for Comments*.~~

Chapter 6
References

6.1 References Cited in the 2026 Final EA

Advisory Council on Historic Preservation. 2013. *NEPA and NHPA: A Handbook for Integrating NEPA and Section 106.* March. https://www.achp.gov/digital-library-section-106-landing/nepa-and-nhpa-handbook-integrating-nepa-and-section-106.

AMEC Environment & Infrastructure, Inc. 2014. *Final Record of Decision Amendment Operable Unit 1 (OU-1) Site LF004 Former Williams Air Force Base Mesa, Arizona.* https://semspub.epa.gov/work/09/2313144.pdf.

American Association of State Highway and Transportation Officials. 2022. "Project: Santan Freeway: part of Maricopa RTP, AZ." https://planningtools.transportation.org/290/view-case-study.html?case_id=43.

American Southwest Virtual Museum. 2026. American Southwest Virtual Museum Image Galleries. February 5. https://swvirtualmuseum.nau.edu/photos/.

Arizona Burrowing Owl Working Group. 2009. *Burrowing Owl Project Clearance Guidance for Landowners*. https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/nongame/eagles/BurrowingOwlClearanceProtocol_2009.pdf.

Arizona Corporation Commission. 2023a. Union Pacific Railroad Company's *amended* application for authority to construct five (5) at-grade crossings and improve one (1) existing at-grade crossing in Mesa, Arizona. Docket No. RR-03639A-22-0287. Transcript Exhibit A-2. March 29. https://docket.images.azcc.gov/0000209146.pdf?i=1691014573458.

Arizona Corporation Commission. 2023b. Decision No. 79186─Opinion and Order. Docket No. RR-03639A-22-0287. December 12. https://docket.images.azcc.gov/0000210355.pdf?i=1771233743801.

Arizona Corporation Commission. 2025. *Docket Details – RR-03639A-22-0287.* January 22. https://edocket.azcc.gov/search/docket-search/item-detail/26561.

Arizona Department of Environmental Quality. 2006. *Declaration of Environmental Use Restriction for Property with Institutional Control*. February 9. https://static.azdeq.gov/wpd/deur/trw.pdf.

Arizona Department of Environmental Quality. 2013. *Amendment to a Declaration of Environmental Use Restriction*, p. 40. May 9. https://static.azdeq.gov/wpd/deur/trw.pdf.

Arizona Department of Environmental Quality. 2025. "Former Williams Air Force Base | Site History." September 29. http://www.azdeq.gov/former-williams-air-force-base-site-history.

Arizona Department of Environmental Quality. n.d.-a. Impaired Waters eMap. https://experience.arcgis.com/experience/3c9e82aad5b4402e9be1ae0b5499936d/page/Main. Accessed October 8, 2025.

Arizona Department of Environmental Quality. n.d.-b. Outstanding Arizona Waters eMap. https://experience.arcgis.com/experience/3c9e82aad5b4402e9be1ae0b5499936d/page/Main?views=Release-Notes. Accessed October 8, 2025.

Arizona Department of Transportation. 2016. *Arizona Passenger Rail Corridor Study: Tucson to Phoenix, Final Tier 1 Environmental Impact Statement, Record of Decision*. December. https://azdot.gov/sites/default/files/2019/08/aprcs-record-of-decision.pdf.

Arizona Department of Transportation. 2018. *State Aviation System Plan Update, Appendix D: Arizona Demographics*. https://azdot.gov/sites/default/files/2019/08/adot-sasp-appendix-d.pdf.

Arizona Department of Transportation. 2025. "Phoenix-Tucson Intercity Passenger Rail Corridor Study." https://azdot.gov/planning/transportation-programs/state-rail-plan/passenger-rail-study-tucson-phoenix.

Arizona Department of Water Resources. 2015. Map - State of Arizona Groundwater Basins and Sub-basins. July 1. https://infoshare.azwater.gov/docushare/dsweb/Get/WellRegDoc-371997/GW%20Basin%20and%20Sub-Basin%20map.pdf.

Arizona Department of Water Resources. 2018. "Overview of the Arizona Groundwater Management Code." August 15. https://www.azwater.gov/sites/default/files/media/Arizona%20Groundwater_Code_1.pdf.

Arizona Department of Water Resources. 2022. Map - Land Subsidence Rate in the Hawk Rock Area, Maricopa and Pinal Counties Based on Radarsat-2 Satellite Interferometric Synthetic Aperture Radar (InSAR) Data, Time Period of Analysis 1.0 Years 04/11/2021 to 04/06/2022. April 21. https://www.azwater.gov/sites/default/files/2022-08/HawkRockAreaRate04-2021to04-2022_8x11.pdf.

Arizona Department of Water Resources. 2025. "Active Management Areas." January. https://new.azwater.gov/ama.

Arizona Department of Water Resources. 2026. Arizona Groundwater Site Inventory. https://azwatermaps.azwater.gov/gwsi. Website frequently updated; accessed January 21, 2026.

Arizona Department of Water Resources. n.d. "Municipal Program." https://new.azwater.gov/ama/municipal-program. Accessed October 18, 2022.

Arizona Game and Fish Department. 2022 . Scoping letter response to Jacobs regarding project-related biological resources impacts. January 31.

Arizona Geological Survey. 2019. Earth Fissure Map of the Apache Junction Study Area: Pinal and Maricopa Counties, Arizona v2.0. June. http://hdl.handle.net/10150/630890.

Arizona Geological Survey. 2025. Natural Hazards in Arizona Interactive Map. August 20. https://uagis.maps.arcgis.com/apps/webappviewer/index.html?id=98729f76e4644f1093d1c2cd6dabb584. Accessed January 21, 2026.

Arizona Geological Survey. n.d. Browse Graphic of Geologic Data for the Southeast Phoenix Metropolitan Area, Maricopa County, Arizona. Compiled by Stephen Richard, Tim Orr, Erin Moore, and Charles Ferguson. Accessed August 23, 2022.

Arizona State Land Department. 2021. *Retained Property at Superstition Vistas, Master Planned Community Plan*. August 30. https://www.apachejunctionaz.gov/DocumentCenter/View/25051/2-Retained-Parcel-MPC.

AZBEX. 2022. "Unbound Gateway Revised to Accommodate Rail Project." January 21. https://azbex.com/planning-development/unbound-gateway-revised-to-accommodate-rail-project/.

AZBEX. 2025. Fujifilm Planning Mesa Facility Expansion on 31 Acres. November 12. https://azbex.com/planning-development/fujifilm-planning-mesa-facility-expansion-on-31-acres/.

Benjamin Franklin High School. 2025. Personal communication (email) regarding school bus routes and schedules in the PIRATE study area from David Craig, Transportation Coordinator, Benjamin Franklin High School, to Bailey Homan, Transportation Analyst, Jacobs. December 4.

Black & Veatch. 2025. *City of Mesa Integrated Master Plan*. April. https://issuu.com/mesawaterresources/docs/2025_mesa_integrated_master_plan?fr=sMTM3Mjg2NzQxMzI.

Casa Grande Valley Newspapers Inc. 2022. "$1.4 billion car battery plant announced in Pinal; some residents skeptical." April 20. https://www.pinalcentral.com/san_tan_valley_sentinel/local_news/1-4-billion-car-battery-plant-announced-in-pinal-some-residents-skeptical/article_dbf844eb-356d-5ad2-bd6c-48ad480ed6ec.html.

CBRE Investment Management. 2025. *Signal Butte Crossing.* March 7. https://images1.cityfeet.com/d2/.

Centers for Disease Control and Prevention. 2022. *CDC/ATSDR Social Vulnerability Index Interactive Map 2022 Database Arizona*. Agency for Toxic Substances and Disease Registry/Geospatial Research, Analysis, and Services Program. https://www.atsdr.cdc.gov/place-health/php/svi/svi-interactive-map.html. Accessed on February 15, 2026.

Centers for Disease Control and Prevention. 2024. "CDC/ATSDR SVI 2022 Documentation." https://www.atsdr.cdc.gov/place-health/media/pdfs/2024/10/SVI2022Documentation.pdf. Agency for Toxic Substances and Disease Registry. October 10.

Chandler Unified School District. 2025. Personal communication (email) regarding school bus routes and schedules in the PIRATE study area from CUSD Routing, Chandler Unified School District, to Bailey Homan, Transportation Analyst, Jacobs. December 2.

City of Mesa. 2008. *Mesa Gateway Strategic Development Plan.* December 8. https://www.mesaaz.gov/business/development-services/planning/long-range-planning/gateway-strategic-development-plan.

City of Mesa. 2014. *Mesa 2040 General Plan*. June. https://www.mesaaz.gov/files/assets/public/v/1/business-development/planning/generalplan/mesa2040generalplan.pdf.

City of Mesa. 2017. Pecos Road Employment Opportunity Zone. Creation of New Employment Opportunity (EO) District for the Pecos Road Corridor Application Narrative. January 20.

City of Mesa. 2019a. "Pecos Advanced Manufacturing Zone." August 20. Office of Economic Development. https://www.selectmesa.com/home/showpublisheddocument/34192/637019096877770000.

City of Mesa. 2019b. AerialSphere Gateway South Map. Updated November 2019. https://ondemand.aerialsphere.com/city-of-mesa/gateway-south/.

City of Mesa. 2021a. Economic Development Advisory Board Meeting Minutes May 4, 2021. May 4. http://apps.mesaaz.gov/meetingarchive/ArchiveDocuments/Documents/%7B0A4CBDFC-8BDA-43DE-8A8B-CAB08720568B%7D_0.pdf.

City of Mesa. 2021b. "Pecos Industrial Rail Access and Train Extension Project, 2021 RAISE Grant Project Narrative." July.

City of Mesa. 2021c. "CRG Acquires 268 Acres for 4 Million-Square-Foot Industrial Development in Southeast Mesa." October 4. https://www.selectmesa.com/Home/Components/News/News/7736/5282?arch=1-2953&npage=14-2953&widgetId=2953.

City of Mesa. 2021d. "Pecos Industrial Rail Access and Train Extension (PIRATE) Project." Presentation to Mesa City Council, November 18.

City of Mesa. 2022a. Personal communication (email) regarding the Willis Pecos Road alignment map from Erik Guderian, Deputy Transportation Director for Engineering, City of Mesa to Anil Mudigonda, Transportation Specialist, Jacobs. March 29.

City of Mesa. 2022b. Personal communication (email) regarding the Gateway development map and master spreadsheet from J.D. Beatty, Senior Project Manager, City of Mesa, to Adam Assenza, Environmental Protection Specialist, Surface Transportation Board Office of Environmental Analysis. May 25.

City of Mesa. 2022c. City of Mesa Natural Gas Areas Map. July 28. https://gis.mesaaz.gov/energy/serviceareas/Gas_Service_Area.pdf.

City of Mesa. 2023. Personal communication (email) regarding the Joint Materials Recycling Facility and Transfer Station Project (CP 1146) from M. Bryce Albretsen, Engineering Project Manager, City of Mesa to Maggie Buckley, Environmental Project Manager, Jacobs, August 28.

City of Mesa. 2024. *Tomorrow's Mesa 2050 General Plan*. May. https://www.mesalistens.com/mesa-general-plan.

City of Mesa. 2025a. *Engineering & Design Standards*. Engineering Procedure Manual. City of Mesa Engineering Department, Mesa, AZ. August. https://www.mesaaz.gov/files/assets/public/v/2/business-development/engineering/designstandards/engdesstands2025.pdf.

City of Mesa. 2025b. "Opportunity Zones." September 10. Office of Economic Development. https://www.selectmesa.com/business-environment/incentives-programs/opportunity-zones.

City of Mesa. 2025c. "Pecos Advanced Manufacturing Zone, A Smart Location for Manufacturers." Office of Economic Development. September 10. https://www.selectmesa.com/business-districts/mesa-gateway-area/pecos-advanced-manufacturing-zone.

City of Mesa. 2026a. Capital Improvement Projects. January 6. https://maps.mesaaz.gov/VertiGISStudio/Web/?app=6b5eb0d51ed7495fb95e8cb005aa87fd.

City of Mesa. 2026b. City of Mesa Planning and Zoning. January 6. https://www.arcgis.com/apps/mapviewer/index.html?panel=gallery&layers=dfb036672a6f42b2a807caa1f289b206.

City of Mesa. 2026c. "Active Development Sites." Last updated January 2026. https://gis.mesaaz.gov/storymaps/developmentsites/.

City of Mesa. 2026d. "City Projects and Initiatives." https://www.mesaaz.gov/business/engineering/projects. Accessed January 20, 2026.

ClearGov. 2025. *A0904: Sossaman Road and German Road Intersection*. December. https://cleargov.com/arizona/maricopa/town/queen-creek/projects/5348/a0904:-sossaman-road-and-germann-road-intersection.

Coate, D. 1999. Annoyance Due to Locomotive Warning Horns. Transportation Research Board, Transportation Noise and Vibration Subcommittee A1FO4. San Diego, CA. August 1-4, 1999.

Coffman Associates. 2009. *Phoenix-Mesa Gateway Airport, Airport Master Plan Executive Summary*. February 13. https://www.gatewayairport.com/documents/documentlibrary/current%20planning%20studies/phoenix-mesa%20gateway%20airport%20-%20airport%20master%20plan%20executive%20summary.pdf.

Cornett, Nicole. 2020. "CMC Steel to Build $300M Micro Steel Mill in Mesa, Arizona." *Expansion Solutions Magazine*. August 17. https://www.expansionsolutionsmagazine.com/steel-micro-mill-mesa-arizona/.

Council on Environmental Quality. 1997a. *Considering Cumulative Effects Under the National Environmental Policy Act*. Executive Office of the President. January. https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/G-CEQ-ConsidCumulEffects.pdf.

Council on Environmental Quality. 1997b. *Environmental Justice Guidance Under the National Environmental Policy Act*. Executive Office of the President. December 10. https://www.energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf.

Council on Environmental Quality. 2025. *Memorandum for Heads of Federal Departments and Agencies: Implementation of the National Environmental Policy Act*. February 19. https://ceq.doe.gov/docs/ceq-regulations-and-guidance/CEQ-Memo-Implementation-of-NEPA-02.19.2025.pdf.

CRG. 2022. The Cubes, Mesa Gateway. February 16. https://www.realcrg.com/wp-content/uploads/2022/02/The-Cubes-at-Mesa-Gateway-Brochure.pdf.

Crown, Patricia L. 1984. "Hohokam Subsistence and Settlement in the Salt-Gila Basin." In *Hohokam Archaeology Along the Salt-Gila Aqueduct, Central Arizona Project, Vol. IX: Synthesis and Conclusions*. Lynn S. Teague and Patricia L. Crown, editors. Archaeological Series No. 150, Vol. 9, pp. 87–113. Arizona State Museum, University of Arizona, Tucson. http://hdl.handle.net/10150/656794.

Crown, Patricia L., and Earl W. Sires. 1984. "The Hohokam Chronology and Salt-Gila Aqueduct Project Research." In *Hohokam Archaeology along the Salt-Gila Aqueduct Central Arizona Project, Vol. IX: Synthesis and Conclusions.* Lynn S. Teague and Patricia L. Crown, editors. Archaeological Series No. 150, Vol 9, pp. 73–85. Arizona State Museum, University of Arizona, Tucson. https://repository.arizona.edu/handle/10150/656794.

Daily Independent. 2022. "CMC Steel Arizona – Breaking Ground on the World's First Combination Micro Mill." January 6. https://www.yourvalley.net/stories/cmc-steel-arizona-breaking-ground-on-the-worlds-first-combination-micro-mill,279239.

Ditch, Richard. n.d. "Burrowing Owl." Maricopa Audubon Society. https://www.maricopaaudubon.org/burrowing-owl. Accessed January 29, 2026.

Emerson, Jason. 2004. "Ancient Hohokam ruins in road's path." *East Valley Tribune*. April 4. https://www.eastvalleytribune.com/news/ancient-hohokam-ruins-in-road-s-path/article_f7c3e4e5-29cc-53dd-8880-3ce5aeca84d3.html.

Environmental Data Resources. 2026. EDR / Corridor Report, UPRR PIRATE, Mesa Arizona, Mesa, AZ 85634. Inquiry Number 8225728.5s. January 16.

Executive Order 12898 of February 11, 1994. "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." *Federal Register,* Vol. 59, No. 32 (February 16, 1994). https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf.

Executive Order 13985 of January 20, 2021. "Advancing Racial Equity and Support for Underserved Communities through the Federal Government." *Federal Register,* Vol. 86, No. 14 (January 25, 2021). https://www.govinfo.gov/content/pkg/FR-2021-01-25/pdf/2021-01753.pdf.

Executive Order 13990 of January 20, 2021. "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis." *Federal Register,* Vol. 86, No. 14 (January 25, 2021). https://www.govinfo.gov/content/pkg/FR-2021-01-25/pdf/2021-01765.pdf.

Executive Order 14008 of January 27, 2021. "Tackling the Climate Crisis at Home and Abroad." *Federal Register,* Vol. 86, No. 19 (February 1, 2021). https://www.energy.gov/sites/default/files/2021/02/f83/eo-14008-tackling-climate-crisis-home-abroad.pdf.

Executive Order 14096. "Revitalizing Our Nation's Commitment to Environmental Justice for All." *Federal Register,* Vol. 88, No. 80 (April 26, 2023). https://www.govinfo.gov/content/pkg/FR-2023-04-26/pdf/FR-2023-04-26.pdf.

Federal Emergency Management Agency. 2015. *Guidelines for Implementing Executive Order 11988, Floodplain Management, and Executive Order 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*. October 8. https://www.fema.gov/sites/default/files/documents/fema_implementing-guidelines-EO11988-13690_10082015.pdf.

Federal Highway Administration. 2015. *Guidelines for the Visual Impact Assessment of Highway Projects*. Document FHWA-HEP-15-029. January. https://www.environment.fhwa.dot.gov/env_topics/other_topics/VIA_Guidelines_for_Highway_Projects.aspx#appd.

Federal Highway Administration. 2023. *Manual on Uniform Traffic Control Devices for Streets and Highways*. Eleventh Edition. U.S. Department of Transportation. December. https://mutcd.fhwa.dot.gov/pdfs/11th_Edition/mutcd11thedition.pdf.

Federal Interagency Working Group on Environmental Justice & NEPA Committee. 2016. *Promising Practices for EJ Methodologies in NEPA Reviews*. March. https://www.epa.gov/sites/default/files/2016-08/documents/nepa_promising_practices_document_2016.pdf.

Federal Railroad Administration. 2012. *High-Speed Ground Transportation Noise and Vibration Impact Assessment*. Report No. DOT/FRA/ORD-12/15. September. https://railroads.dot.gov/elibrary/high-speed-ground-transportation-noise-and-vibration-impact-assessment.

Federal Railroad Administration. 2013. *Guide to the Quiet Zone Establishment Process.* September 19. https://railroads.dot.gov/sites/fra.dot.gov/files/2020-05/QuietZoneBrochure.pdf.

Federal Railroad Administration. 2021. "Guidance on Assessing Noise and Vibration Impacts." August 6. https://railroads.dot.gov/environment/noise-vibration/guidance-assessing-noise-and-vibration-impacts.

Federal Railroad Administration. 2023. "Hazardous Materials Transportation." Updated March 8, 2023. https://railroads.dot.gov/program-areas/hazmat-transportation/hazardous-materials-transportation.

Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123. September. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

Fenneman, N. M., and D. W. Johnson. 1946. Physiographic Divisions of the Coterminous U.S. Map. https://water.usgs.gov/GIS/metadata/usgswrd/XML/physio.xml.

Fisher, Kelly, and Mark Cowling. 2021. "Superstition Vistas: Past, present and visions for the future." *Tri Valley Dispatch*. February 15, 2017; updated August 6, 2021. https://www.pinalcentral.com/trivalley_dispatch/news/superstition-vistas-past-present-and-visions-for-the-future/article_1b85bee9-054c-572a-a318-32da1295aa3c.html.

Flood Control District of Maricopa County. 2012. A Partnership in Flood Protection, Flood Control District of Maricopa County and Town of Queen Creek. September 5. https://www.queencreekaz.gov/home/showdocument?id=11312.

Gray. 2024. MPCA AZ4 Expansion Overall Site Plan. October 18. https://mesa.legistar.com/View.ashx?M=F&ID=13575884&GUID=56DB3635-17F4-4723-8CB7-75803ED87513.

GSINA and Gilbane. 2023. *Fifth Five Year Review, Former Williams Air Force Base, Mesa, Arizona.* Final. September 27. Prepared for U.S. Air Force Civil Engineering Center, Base Realignment and Closure Environmental Construction and Optimization Services Southwest. https://semspub.epa.gov/work/09/100037235.pdf.

Haury, Emil W. 1976. *The Hohokam: Desert Farmers and Craftsmen, Excavations at Snaketown, 1964–1965*. University of Arizona Press, Tucson. https://doi.org/10.2307/j.ctv1mgmcjv.

Higley Unified School District. 2025. Personal communication (email) regarding school bus routes and schedules in the PIRATE study area from Josh Crosby, Director of Transportation, Higley Unified School District, to Bailey Homan, Transportation Analyst, Jacobs. December 3

Institute of Water Research. 2002. "K Factor." In *Technical Guide to RUSLE use in Michigan*, NRCS-USDA State Office of Michigan. http://www.iwr.msu.edu/rusle/kfactor.htm.

Jacobs. 2025a. Personal communication (phone call) regarding school bus routes and schedules in the PIRATE study area from Bailey Homan, Transportation Analyst, Jacobs, to Denise Ayer, Site Supervisor, Transportation Department, Mesa Public Schools. September 29.

Jacobs. 2025b. Personal communication (phone call) regarding school bus routes and schedules in the PIRATE study area from Bailey Homan, Transportation Analyst, Jacobs, to Brianna Tiemann, Sierra School of Gateway. December 19.

Kimley-Horn, Matrix Design Group, and Rounds Consulting Group, Inc. 2019. *Southeast Mesa Land Use and Transportation Plan.* Final. July. Prepared for City of Mesa, Arizona. 637478470758170000 (mesaaz.gov).

Kuntzman, Gersh. 2020. StreetsBlog NYC, "Levels of Service." October 21. https://nyc.streetsblog.org/level-of-service-chart-source-utah-dot/.

Li, Reia. 2025. "This small city is Arizona's top boomtown. Why it's growing so fast." *azcentral.com.* December 15. https://www.azcentral.com/story/entertainment/life/2025/12/15/queen-creek-arizona-boomtown-population-growth-what-to-know/87735716007/.

Lindly, John M. 2017. "History of the Queen Creek Delta Area." In *Phase II Data Recovery at Pozos de Sonoqui/AZ U:14:49(ASM), within the Proposed Alignment of Riggs Road in Queen Creek, Maricopa County, Arizona*. Mark L. Chenault, editor. Maricopa County DOT Environmental Program Archaeological Report, Phoenix, pp. 513–517.

Luhnow, Glennda Gene, and Kris Powell. 2024. *Invasive Cultural Resources Damage Assessment Work Plan for AZ U:10:2(ASM), Mesa, Maricopa County, Arizona*. Jacobs Report No. 2024-011. August.

Luhnow, Glennda Gene, Kris Powell, and Matthew Steinkamp. 2025. *Invasive Cultural Resources Damage Assessment Technical Report for AZ U:10:2(ASM), Mesa, Maricopa County, Arizona*. Jacobs Report No. 2024-017. October 2024, revised January 2025.

Maricopa Association of Governments. 2024. "MAG Community Data Explorer." February 26. https://azmag.gov/Programs/Maps-and-Data/Community-Profiles.

Maricopa County. 2016. *Vision 2030, Maricopa County Comprehensive Plan*. January 13. https://www.maricopa.gov/ArchiveCenter/ViewFile/Item/6126.

Maricopa County. 2018. Maricopa County Air Pollution Control Regulations Regulation III - Control of Air Contaminants, Rule 316 NonMetallic Mineral Processing. https://www.maricopa.gov/DocumentCenter/View/5378/Rule-316---Nonmetallic-Mineral-Processing-PDF?bidId=.

Maricopa County. 2022. Maricopa County Quick Facts. https://www.maricopa.gov/3598/County-Quick-Facts.

Maricopa County. 2023. GIS Portal, historical aerial photography. Updated July 5, 2023. https://gis.maricopa.gov/GIO/HistoricalAerial/index.html.

Maricopa County. 2024. What's My Zoning? November 20. https://experience.arcgis.com/experience/905ef9d0a9b646739d6b4458f7eb2910/.

Maricopa County. n.d. PlanNet. https://gis.maricopa.gov/pnd/PlanNet/index.html. Accessed September 24, 2025.

Maricopa County Air Quality Department. 2023. *Maricopa County 2020 Community Greenhouse Gas Emissions Inventory*. September. https://www.maricopa.gov/DocumentCenter/View/62545/GHG_Inventory_Report_Draft_v9-PDF.

Maricopa County Assessor. 2025. Maricopa County Assessor's Office Parcel Viewer. https://maps.mcassessor.maricopa.gov/. Accessed November 16, 2025.

Maricopa County Recorder. 2022. Recorded document search detail for special warranty deed no. 20220329876. January 11. https://legacy.recorder.maricopa.gov/UnOfficialDocs/pdf/20220329876.pdf.

Mark, Jay. 2015. "Mesa history: Remnants of Mesa's agricultural past still remain." *The Republic*. January 8. https://www.azcentral.com/story/news/local/mesa/2015/01/08/mesa-history-agriculture-past/21482101/.

McGuire, Randall H. 1991. "On the Outside Looking." In: The Concept of Periphery in Hohokam Archaeology. In *Exploring the Hohokam: Prehistoric Desert Peoples of American Southwest*, edited by George G. Gumerman, pp. 347–82. University of New Mexico Press, Albuquerque.

Mead & Hunt. 2020a. *Phoenix-Mesa Gateway Airport Master Plan*. Resolution Number 20-19. June. Prepared for Phoenix-Mesa Gateway Airport. https://gatewayairport.com/documents/masterplan/pmgaa_amp_plan_doc_june2020-adopted.pdf.

Mead & Hunt. 2020b. *Phoenix-Mesa Gateway Airport, Airport Master Plan Update, Executive Summary*. June. Prepared for Phoenix-Mesa Gateway Airport. https://www.gatewayairport.com/documents/masterplan/pmgaa_amp_executive_summary_doc_june2020-final.pdf.

Mesa Gateway Airport Authority. 2026. "Airport Overview." https://www.choosegatewayairport.com/airportoverview.

Mesa Historical Museum. n.d. "History of Mesa." https://www.mesahistoricalmuseum.com/history-of-mesa. Accessed September 15, 2022.

MesaNow. 2022. "Two-Million-Square-Foot Gateway Grand Breaks Ground in Southeast Mesa." June 28. https://www.mesanow.org/news/public/article/2968.

Myrick, David F. 1980. *Railroads of Arizona, Vol. II*. Howell-North Books, San Diego.

National Park Service. 2024. *National Register Bulletin: Identifying, Evaluating, and Documenting Traditional Cultural Places.* December 10. https://irma.nps.gov/DataStore/DownloadFile/713282.

National Park Service. 1991. *How to Apply the National Register Criteria for Evaluation.* National Register Bulletin 15. NPS, Washington, DC.

Natural Resources Conservation Service. 2025. Personal communication (email) regarding land subject to the Farmland Protection Policy Act from Steve Campbell, Soil Scientist, West National Technology Support Center, to Sabra McNeish, Environmental Planner, Jacobs. December 17.

Natural Resources Conservation Service. 2026a. *Custom Soil Resource Report for Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties; and Eastern Maricopa and Northern Pinal Counties Area, Arizona*. January 8.

Natural Resources Conservation Service. 2026b. Personal communication (email) regarding land subject to the Farmland Protection Policy Act from Steve Campbell, Soil Scientist, West National Technology Support Center, to Sabra McNeish, Environmental Planner, Jacobs. February 17.

O'Donnell, Paul. 2020. "Commercial Metals to invest $300 million in new steel micro mill." *The Dallas Morning News*. August 13. https://www.dallasnews.com/business/local-companies/2020/08/13/commercial-metals-to-invest-300-million-in-new-steel-micro-mill/.

Pazera, Justin. 2022. "Apache Junction leader clarifies construction on Superstition Vistas." abc 15 Arizona. April 6. https://www.abc15.com/weather/impact-earth/apache-junction-leader-clarifies-construction-on-superstition-vistas#:~:text=Apache%20Junction%20leader%20clarifies%20construction%20on%20Superstition%20Vistas,-%2D%2D%3E&text=Bryant%20Powell%2C%20Apache%20Junction%20City,the%20south%20by%20Ray%20Road.

Phoenix-Mesa Gateway Airport. 2020. "Phoenix-Mesa Gateway Airport Celebrates Best Year Ever with Double Digit Passenger Growth in 2019." January 9. https://www.gatewayairport.com/pressrelease?id=179.

Phoenix-Mesa Gateway Airport. 2022. Personal communication (email) from Tony Bianchi, Planning Manager, Phoenix-Mesa Gateway Airport, to Adam Assenza, Environmental Protection Specialist, Surface Transportation Board Office of Environmental Analysis. April 5. Email transmittal of the APO Terminal Area Forecast Detail Report, March 2022.

Pinal County. 2025. *We Create Our Future: Pinal County Comprehensive Plan*. August 1. Originally adopted 2009, re-adopted 2019, and updated 2021 and 2025. https://www.pinal.gov/DocumentCenter/View/25289/Comprehensive-Plan-Document-2019-PDF.

Pinal County. 2026. Pinal County GIS Interactive Map Viewers – Zoning Viewer. January 25. https://www.pinalcountyaz.gov/informationtechnology/pages/gis.aspx.

Powell, Kris. 2024. *Noninvasive Cultural Resources Damage Assessment for AZ U:10:2(ASM) and AZ U:10:152(ASM), Mesa, Maricopa County, Arizona*. Jacobs Report No. 2024-001. May.

PR Newswire. 2022. "Loup Logistics Acquires Phoenix Transload Facility." January 25. https://www.prnewswire.com/news-releases/loup-logistics-acquires-phoenix-transload-facility-301468127.html.

Public Environmental Data Partners. 2022. EJScreen (Version 2.3). February 7. https://pedp-ejscreen.azurewebsites.net/. Accessed February 16, 2026.

Queen Creek Unified School District. 2025. Personal communication (email) regarding school bus routes and schedules in the PIRATE study area from Alexander Jewett, Dispatcher, Queen Creek Unified School District, to Bailey Homan, Transportation Analyst, Jacobs. September 29.

RailPros. 2022. *Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead.* September 23. Arizona Corporation Commission Docket No. RR-03639A-22-0287. https://edocket.azcc.gov/search/docket-search/item-detail/26561.

Rand McNally. 1889. *National Atlas of Arizona 1889*. Rand McNally, Chicago.

Real Estate Daily News. 2022. "Unbound sells 154 acre industrial development near Phoenix Mesa Gateway Airport." March 22. https://realestatedaily-news.com/unbound-sells-154-acre-industrial-development-near-phoenix-mesa-gateway-airport/.

Ricondo & Associates. 2017. *Airport Land Use Compatibility Plan Update*. Prepared for Phoenix-Mesa Gateway Airport Authority. January. https://www.gatewayairport.com/documents/documentlibrary/current%20planning%20studies/airport%20land%20use%20compatibility%20plan%20update.pdf.

Rounds Consulting Group, Inc. 2021. *Updated Economic Impact Analysis of Project PIRATE.*

Salge, David. 2007. *Around San Tan Mountain*. Arcadia Publishing, Charleston, South Carolina.

Scanlon, Tom. 2021a. "Mesa development: more jobs, more road projects." *The Mesa Tribune*. February 14. https://www.eastvalleytribune.com/news/mesa-development-more-jobs-more-road-projects/article_a58cd07c-6d6c-11eb-adce-73777605111f.html.

Scanlon, Tom. 2021b. "Mega project approved despite railroad protest." *The Mesa Tribune*. November 4. https://www.eastvalleytribune.com/news/mega-project-approved-despite-railroad-protest/article_66f5a790-39e9-11ec-b1da-d774b3cee867.html.

School Site Locator. n.d. *Queen Creek Unified School District.* https://www.schoolsitelocator.com/apps/queencreek/?data_id=dataSource_1-ssl_test_mapImageService_4376%3A3. Accessed January 30, 2026.

Seward, Jennifer. 2022. Innovations Drive Mesa's Growth Curve. *Engineering News-Record*. March 1. https://www.enr.com/articles/53674-innovations-drive-mesas-growth-curve.

Sharp, Jordan. 2022. "Thompson Thrift Commercial Purchases Land to Develop Industrial Parcel Near Phoenix." June 1. https://www.thompsonthrift.com/pressroom/thompson-thrift-commercial-purchases-land-to-develop-industrial-parcel-near-phoenix.

Shumaker, Scott. 2022. "Gateway Airport opens up 270 acres for development." June 26. EastValley.com. https://www.eastvalleytribune.com/news/gateway-airport-opens-up-270-acres-for-development/article_45a49bce-f3f6-11ec-9bf4-0b60c397e59c.html.

Sossaman, Sue. 1996. *Queen Creek: A History*. San Tan Historical Society.

Stock & Associates Consulting Engineers, Inc. 2022. The Cubes at Mesa Gateway Grading, Paving, and Utility Plans, Crismon Road (Phase 1), Pecos Road (Phase 2) & Germann Road (Phase 3), Mesa, Arizona. March.

Stone, Erin. 2020. "Burrowing owls are losing their habitat to growth, but there's hope for the quirky bird." March 24. https://www.azcentral.com/story/news/local/arizona-environment/2020/03/24/arizona-burrowing-owls-face-threats-development-but-theres-hope/4968877002/.

Strategistico. 2026. "12 Fastest Growing Cities in Arizona in 2026 (& 3 Up and Coming Cities in Arizona for 2030." January 12. https://www.strategistico.com/fastest-growing-cities-in-arizona/.

Sunbelt Investment Holdings Inc. 2025. "Mesa Gateway Logistics Center." May 9. https://sihilive.wpenginepowered.com/wp-content/uploads/454-254-Mesa-Ellsworth-brochure-1.pdf.

Surface Transportation Board. 1998. *Final Environmental Impact Statement No. 980194, Conrail Acquisition* (Finance Docket No. 33388) by CSX Corporation and CSX Transportation Inc., and Norfolk Southern Corporation and Norfolk Southern Railway Company. July.

Surface Transportation Board. 2023a. Letter regarding Docket No. FD 36501, Union Pacific Railroad Company - Construction and Operation Exemption in Maricopa County, Arizona; Recently Discovered Ground Disturbance Within the APE. From Danielle Gosslein, Director, Office of Environmental Analysis, Surface Transportation Board to Kevin Rice, Senior Manager M/W Environmental, Union Pacific Railroad. August 1.

Surface Transportation Board. 2023b. Memorandum regarding Docket No. FD 36501, Union Pacific Railroad Company Pecos Industrial Rail Access and Train Extension – Security Patrol Guidance. From Alan Tabachnick, Federal Preservation Officer, Surface Transportation Board to Kevin Rice, Senior Manager M/W Environmental, Union Pacific Railroad. Deember 12.

Town of Gilbert. 2020. *Plan for our Future, 2020 Gilbert General Plan*. Ratified August 2020. http://general.gilbertaz.gov/generalplan2020/index.html.

Town of Gilbert. 2022. Zoning. April 4. https://data-tog.opendata.arcgis.com/datasets/TOG::zoning/about.

Town of Queen Creek. 2020. *Traffic Impact Analysis Guidelines*. January. https://www.queencreekaz.gov/home/showpublisheddocument/31209/637171044469100000.

Town of Queen Creek. 2024a. *2018 General Plan*. Approved May 15, 2018; updated September 2024. https://www.queencreekaz.gov/home/showpublisheddocument/39892/638683109098500000.

Town of Queen Creek. 2024b . Industrial Property for Sale and Lease. https://storymaps.arcgis.com/stories/85ce5857407340579abcda14a896e451.

Town of Queen Creek. 2025. Queen Creek Zoning and General Plan Maps. https://qcgis.maps.arcgis.com/apps/MapSeries/index.html?appid=b4245334b2614b089f70d3ea0c30ae8e. Updated February 4, 2025. Accessed January 30, 2026.

Town of Queen Creek. n.d. Queen Creek Development Map. https://qcgis.maps.arcgis.com/apps/View/index.html?appid=69f33e00224d4ad78c462be9f412d628. Accessed January 30, 2026.

Turner, R. M., and D. E. Brown. 1994. "Sonoran Desertscrub." *in Biotic Communities: Southwestern United States and Northwestern Mexico* (edited by D. E. Brown). University of Utah Press, Salt Lake City, Utah. Pp. 181–192.

Union Pacific Railroad Company. 2022a. Alternatives Analysis Memorandum regarding STB Docket No. FD 36501, Union Pacific Railroad - Description of Alternatives Analysis Process and Considerations. From Kevin Rice, Senior Manager M/W Environmental, Union Pacific Railroad to Maggie Buckley, Environmental Project Manager, Jacobs. February 3.

Union Pacific Railroad Company. 2022b. Letter regarding STB Docket No. FD 36501, Union Pacific Railroad - Explanation of Design Changes and Clarification of Construction and Operation Activities with Respect to Adjacent Property. From Kevin Rice, Senior Manager M/W Environmental, Union Pacific Railroad to Adam Assenza, Environmental Protection Specialist, Office of Environmental Analysis, Surface Transportation Board. April 5.

Union Pacific Railroad Company. 2022c. *Hydrologic and Hydraulic Evaluation Construct Industrial Lead Track Mesa, Arizona MP 934.79 to MP 937.83 Phoenix Subdivision*. Prepared by Olsson, Omaha, NE. June.

Union Pacific Railroad Company. 2022d. Union Pacific Railroad Company's Petition for Exemption. Filed with the Surface Transportation Board on June 30, 2022, as part of Finance Docket No. 36501. www.stb.gov.

Union Pacific Railroad Company. 2025a. Letter regarding STB Docket No. FD 36501, Union Pacific Railroad – Responses to information requests. From Kevin Rice, Senior Manager M/W Environmental, Union Pacific Railroad to Danielle Gosslein, Director, Office of Environmental Analysis, Surface Transportation Board. October 3.

Union Pacific Railroad Company. 2025b. Letter regarding STB Docket No. FD 36501, Union Pacific Railroad – Responses to information requests. From Kevin Rice, Senior Manager M/W Environmental, Union Pacific Railroad to Danielle Gosslein, Director, Office of Environmental Analysis, Surface Transportation Board. November 21.

Union Pacific Railroad Company. 2025c. Letter regarding STB Docket No. FD 36501, Union Pacific Railroad – Responses to information requests. From Kevin Rice, Senior Manager M/W Environmental, Union Pacific Railroad to Danielle Gosslein, Director, Office of Environmental Analysis, Surface Transportation Board. December 9.

Union Pacific Railroad Company. 2025d. Personal communication (email) regarding single-stack trains from Kevin Rice, Senior Manager M/W Environmental, Union Pacific Railroad to Betsi Phoebus, Senior Environmental Planner, Jacobs. December 9.

U.S. Air Force. 2024. Personal communication (email) regarding groundwater monitoring wells in the former Williams Air Force Base Superfund site from Joe Reyna, Branch Chief, Base Realignment and Closure Western Region Branch, to Adam Assenza, Environmental Protection Specialist, Surface Transportation Board Office of Environmental Analysis. August 13.

U.S. Bureau of Transportation Statistics. 2025. "Hazardous Materials Fatalities, Injuries, Accidents, and Property Damage Data." https://www.bts.gov/content/hazardous-materials-fatalities-injuries-accidents-and-property-damage-data. Accessed January 7, 2026.

U.S. Census Bureau. 1996. *Population of States and Counties of the United States: 1790-1990.* Compiled and edited by Richard L. Forstall. March. https://www2.census.gov/library/publications/decennial/1990/population-of-states-and-counties-us-1790-1990/population-of-states-and-counties-of-the-united-states-1790-1990.pdf.

U.S. Census Bureau. 2023a. "American Community Survey. 5-Year Data 2019-2023." https://www.census.gov/data/developers/data-sets/acs-5year.html.

U.S. Census Bureau. 2023b. "Poverty Thresholds, Poverty Thresholds by Size of Family and Number of Children, 2023." https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html.

U.S. Census Bureau. 2025. "Growth in Metro Areas Outpaced the Nation." March 13. https://www.census.gov/newsroom/press-releases/2025/population-estimates-counties-metro-micro.html.

U.S. Department of Agriculture. 2019. "Part 618 - Soil Properties and Qualities." In *Dust Mitigation Handbook*. https://dust.swclimatehub.info/files/Exhibit_5-2.pdf.

U.S. Department of Agriculture. 2025. "Cropland Data Layer Viewer." National Agricultural Statistics Service. Updated March 19, 2025. https://www.nass.usda.gov/Research_and_Science/Cropland/Viewer/index.php.

U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration. 2025. "PHMSA Guidance." https://www.phmsa.dot.gov/guidance. Accessed December 8, 2025.

U.S. Environmental Protection Agency. 2015. Interactive Map of Sole Source Aquifers. https://experience.arcgis.com/experience/1bfab371d71e4b868fc9ae7df62a16fe. Accessed December 8, 2025.

U.S. Environmental Protection Agency. 2024. EJSCREEN Technical Documentation for Version 2.3. July 31. https://www.epa.gov/system/files/documents/2024-07/ejscreen-tech-doc-version-2-3.pdf.

U.S. Environmental Protection Agency. 2025a. "Outdoor Air Quality Data, Monitor Values Report." March 28. https://www.epa.gov/outdoor-air-quality-data/monitor-values-report. Accessed December 8, 2025.

U.S. Environmental Protection Agency. 2025b. "Greenhouse Gas Emissions from a Typical Passenger Vehicle." June 12. https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle. Accessed February 17, 2026.

U.S. Environmental Protection Agency. 2026. "MOVES5: Latest Version of Motor Vehicle Emission Simulator." Office of Transportation and Air Quality. Ann Arbor, MI. January 8. https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves.

U.S. Environmental Protection Agency. n.d. "Superfund Site: Williams Air Force Base, Chandler, AZ." https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0900890#bkground. Accessed October 5, 2022.

U.S. Fish and Wildlife Service. 2025. "National Wetlands Inventory." https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC. Accessed December 8, 2025.

U.S. Geological Survey. 2026. USGS National Hydrography Dataset. January. https://apps.nationalmap.gov/viewer/. Accessed January 20, 2026.

U.S. National Geodetic Survey. n.d. NGS Web Map. https://geodesy.noaa.gov/datasheets/ngs_map/. Accessed October 30, 2022.

Walsh, Jim. 2021. "Massive 40-acre project unfolding at Gateway Airport." January 19. *East Valley Tribune*. https://www.eastvalleytribune.com/news/massive-400-acre-project-unfolding-at-gateway-airport/article_08bc3488-59b5-11eb-a13b-8fdc30a1360e.html.

The WLB Group, Inc. 2021. *Arizona State Land Department, Queen Creek Specific Plan, Queen Creek, AZ, Supplement 1*. April 30. Prepared for the Arizona State Land Department. https://land.az.gov/sites/default/files/media/53-121916_plan_2.pdf.

World Population Review. 2026. "Population of Counties in Arizona (2026)." https://worldpopulationreview.com/us-counties/states/az.

6.2 References Cited in the 2023 Draft EA

Amec Foster Wheeler Environment & Infrastructure, Inc. 2017. *Forth Five-Year Review Report, Former Williams Air Force Base, Mesa, Arizona.* June 8.

Arizona Department of Environmental Quality. 2021. "Former Williams Air Force Base | Site History." January 26. http://www.azdeq.gov/former-williams-air-force-base-site-history.

Arizona Department of Transportation. 2018a. *Reevaluation of the Final Environmental Assessment for STP-024 A(200)T, 024 MA 001 H8915 01L/02L, SR 24, Ellsworth Road to Ironwood Road, Phase II Interim.* January 24. https://azdot.gov/sites/default/files/2019/08/sr-24-reevaluation-final-ea.pdf.

Backer, Kyle. 2022. "Here's how manufacturing in Pinal County is gaining momentum." *AZ Big Media.* August 5. https://azbigmedia.com/business/economy/manufacturing-in-pinal-county/#:~:text=%E2%80%9CPinal%20County%20is%20the%20fastest,Arizona%20Commerce%20Authority%20(ACA).

BEX Events. 2019. 2019 Public Works Conference. https://bex-events.com/wp-content/uploads/2019/10/Central-Arizona-Project-CAP.pdf. October.

Business Real Estate Weekly of Arizona. 2019. "Destination at Gateway in Mesa Targeted for 700+ Homes." May 31. https://brewaz.com/breaking-news/destination-at-gateway-in-mesa-targeted-for-700-homes/.

Centers for Disease Control and Prevention. 2022. "CDC SVI Documentation 2018." Agency for Toxic Substances and Disease Registry. January 19.

City of Mesa. 2018a. *City of Mesa 2018 Water Master Plan Update*. Water Resources Department. August. https://www.mesaaz.gov/home/showpublisheddocument/28797/636692515050100000.

City of Mesa. 2018b. *City of Mesa 2018 Wastewater Master Plan Update*. Water Resources Department. November. https://www.mesaaz.gov/home/showpublisheddocument/31837/636791086402730000.

City of Mesa. 2021a. *Engineering & Design Standards*. Engineering Procedure Manual. City of Mesa Engineering Department, Mesa, AZ. March. https://www.mesaaz.gov/home/showpublisheddocument?id=42795.

Environmental Data Resources. 2022a. The EDR - City Directory Abstract, UPRR PIRATE, Mesa Arizona, Mesa, AZ 85212. Inquiry Number 6992684.9. May 24.

Environmental Data Resources. 2022b. EDR / Corridor Report, UPRR PIRATE, Mesa Arizona, Mesa, AZ 85142. Inquiry Number 6992684.10s. May 25.

Environmental Data Resources. 2022c. EDR Datamap™ Well Search Report, UPRR PIRATE, Mesa Arizona, Mesa, AZ 85212. Inquiry Number 6992684.10w. May 25.

Environmental Data Resources. 2022d. EDR Historical Topo Map Report with QuadMatch™, UPRR PIRATE, Mesa Arizona, Mesa, AZ 85212. Inquiry Number 6992684.5. May 25.

Environmental Data Resources. 2022e. The EDR Aerial Photo Decade Package, UPRR PIRATE, Mesa Arizona, Mesa, AZ 85212. Inquiry Number 6992684.8. May 26.

EPS Group. 2022. *Traffic Impact Analysis, Heritage Gateway Charter School.* March 1. On file in Docket No. FD 36501 at www.stb.gov.

Federal Highway Administration. 2022. *Manual on Uniform Traffic Control Devices for Streets and Highways*. U.S. Department of Transportation. 2009 Edition with Revisions 1 (May 2012), 2 (May 2012), and 3 (July 2022). https://mutcd.fhwa.dot.gov/kno_2009r1r2r3.htm.

Hing, Geoff. 2022. "These 5 Arizona cities are among the fastest growing in the U.S. Here's what to know." *azcentral.com.* May 27. https://www.azcentral.com/story/news/local/phoenix/2022/05/26/arizona-cities-population-growing-2021/9938427002/.

Maricopa County Air Quality Department. 2020. *Maricopa County 2018 Community Greenhouse Gas Emissions Inventory*. August. https://www.maricopa.gov/DocumentCenter/View/62545/GHG_Inventory_Report_Draft_v9-PDF.

Stanbridge, Alexia. 2022. "Maricopa County led nation in population growth; Pinal, Yavapai surged." *Cronkite News*. March 24. https://cronkitenews.azpbs.org/2022/03/24/maricopa-county-led-nation-in-population-growth-pinal-yavapai-surged/.

Strategistico. 2022. "12 Fastest Growing Cities in Arizona in 2022 (& 3 Up and Coming Cities in Arizona for 2030." May 23. https://www.strategistico.com/fastest-growing-cities-in-arizona/.

Sunbelt Investment Holdings Inc. 2022. "SIHI Land Sites." https://sihiproperties.com/properties/land-sites/.

Town of Gilbert. 2019. Town of Gilbert Zoning Map. June 18. https://www.gilbertaz.gov/home/showpublisheddocument/1560/636964508616030000.

Town of Queen Creek. 2020. Town Boundary Map. July 23. https://www.queencreekaz.gov/business/town-boundary-map.

U.S. Census Bureau. 2020. "American Community Survey. 5-Year Data 2014-2020." http://data.census.gov/cedsci.

U.S. Census Bureau. 2021. "Poverty Thresholds." https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html. Accessed October 31, 2022.

U.S. Census Bureau. 2022. "QuickFacts, Arizona." https://www.census.gov/quickfacts/AZ.

U.S. Environmental Protection Agency. 2015. EJSCREEN Technical Documentation. https://www.epa.gov/ejscreen/technical-documentation-ejscreen. Accessed September 6, 2022.

U.S. Environmental Protection Agency. 2021. *Using MOVES3 in Project-Level Carbon Monoxide Analyses*. EPA-420-B-21-047. December. https://nepis.epa.gov/Exe/ZyPDF.cgi/P1013NP8.PDF?Dockey=P1013NP8.PDF.

U.S. Environmental Protection Agency. n.d.-a. EJScreen Environmental Justice Mapping and Screening Tool. http://www.epa.gov/ejscreen/mapper. Accessed September 6, 2022.

World Population Review. 2022. "Population of Counties in Arizona (2023)." https://worldpopulationreview.com/us-counties/states/az. Accessed September 15, 2022.