



1 **3.12 Geology, Soils, and Prime and Unique Farmlands**

2 **3.12.1 Summary of Draft Tier 1 EIS**

3 The impacts associated with geology, soils, and prime and unique farmlands would be similar
4 for the Build Corridor Alternatives. Each Build Corridor Alternative would encounter geologic
5 features and soils that would impact the design and construction process. All Build Corridor
6 Alternatives would impact agricultural lands through direct conversion during construction. As
7 part of the Tier 2 analysis, field investigations will determine the exact resource characteristics
8 and how to avoid, minimize, and mitigate associated effects during the design process.

9 Potential effects of the project on surface and near surface geologic resources, soils, and prime
10 and unique farmlands would be similar for all Build Corridor Alternatives. Potential effects
11 include the following:

- 12 • Loss of geologic material (rock or soil) through removal
- 13 • Loss of access to surface geologic material as part of the construction process (i.e.,
14 covering by pavements or improved right-of-way areas)
- 15 • Cut slope instability
- 16 • Loss of soil through removal
- 17 • Loss of access to soil by covering
- 18 • Loss of soil by water and wind erosion
- 19 • Reduced soil stability by disturbance
- 20 • Direct conversion of farmland
- 21 • Cumulative impacts by isolation of remnant parcels
- 22 • Indirect (secondary) impacts resulting from the acquisition of adjacent land

23 Excavation and removal of existing geologic materials and soils would be required for
24 construction. This would result in loss of native materials from the environment. Access to
25 surface and near-surface geologic materials and soils would be lost following construction of
26 roadway pavements, bridge and wall structures, and other coverings such as engineered fills
27 and landscape materials. Slopes resulting from excavations and fills would be designed in Tier 2
28 to mitigate erosion-prone or unstable slope conditions. Operation and maintenance of a new or
29 expanded roadway system as the result of a Build Corridor Alternative would generally not be
30 expected to affect the geology or soil resources within the Project Area.

31 Prime and unique farmlands occupy portions of all the Build Corridor Alternatives. Direct
32 conversion of farmland would occur through construction of the project. Agricultural parcels
33 bisected by the project would result in separated parcels, which might become too isolated or

1 too small for continued economic use and/or result in the need to transport equipment using the
2 existing local road network to gain access to opposite sides of the project. If prudent, a grade-
3 separated crossing could be provided for access between separated parcels. Potential
4 mitigation is further discussed in **Section 3.12.6**. Land adjacent to the project would likely be
5 developed, which could result in loss of agricultural land.

6 **3.12.2 Summary of Changes Since Draft Tier 1 EIS**

7 BLM provided two comments on the geology section of the Draft Tier 1 EIS as contained in the
8 DOI review comments letter dated July 8, 2019, BLM Comments 25 and 26. See **Appendix H**
9 (Comments on Draft Tier 1 EIS and Responses) for the full comments and responses.

10 BLM indicated that the Build Corridor Alternatives are expected to have minimal to negligible
11 impacts to salable and locatable minerals, respectively. Except for impacts to the existing
12 access to one aggregate operation located in Township 2 South, Range 3 West, Section 12, no
13 adverse impacts to salable minerals are expected. Rather, the project is expected to create
14 demand for and enhance access to and movement of salable minerals to customers. The
15 project is expected to have negligible impact to locatable minerals because the Build Corridor
16 Alternatives either avoid areas of high locatable mineral potential or cross such areas where no
17 active locatable mineral operations exist and avoid creating new disturbance to previously
18 mined/prospected areas.

19 As discussed in **Section 3.12.6.1**, active mining operations will be analyzed in detail in the Tier
20 2 process.

21 **3.12.3 No Build Alternative**

22 The No Build Alternative would not impact geology, soil, or prime and unique farmlands. Urban
23 growth of metropolitan areas encompassed by the Project Area over the long term is projected
24 to continue and expected to impact geology, soil, or prime and unique farmlands through
25 conversion to residential, commercial, and industrial uses. These are considered indirect and
26 cumulative effects and are further discussed in **Section 3.17** (Indirect and Cumulative Effects).

27 **3.12.4 Recommended Alternative**

28 Between Sahuarita and Marana, the Recommended Alternative would encounter bedrock earth
29 fissures and would encounter more prime and unique farmland than the west option of the
30 Preferred Alternative due to the location of the I-10 connection for the Recommended
31 Alternative. The Recommended Alternative would also cross less prime and unique farmland
32 between Casa Grande and Buckeye than the Preferred Alternative. There are no substantial
33 differences between the Recommended and Preferred Alternatives in any of the other
34 geographies.

35 **3.12.5 Preferred Alternative**

36 Between Sahuarita and Marana, the west option would encounter bedrock earth fissures and
37 the east option would not. Both the east and west options of the Preferred Alternative would
38 cross more prime and unique farmland between Sahuarita and Marana, and between Casa



1 Grande and Buckeye, than the Recommended Alternative. There are no substantial differences
2 between the Recommended and Preferred Alternatives in any of the other geographies.

3 **3.12.6 Mitigation and Tier 2 Analysis**

4 **3.12.6.1 Tier 2 Analysis Commitments**

5 FHWA and ADOT completed an initial level of analysis in this Final Tier 1 EIS to identify a
6 2,000-foot-wide preferred Build Corridor Alternative. Additional analysis in Tier 2 will inform
7 (1) the selection of a specific alignment (approximately 400 feet wide) within the selected
8 2,000-foot-wide corridor and (2) the selection of the west option or east option in Pima County.
9 Tier 2 analysis will also identify measures to avoid, minimize, or mitigate geology, soils, and
10 farmland impacts. Specifically, ADOT commits to carrying out the following analysis during the
11 Tier 2 process:

- 12 • **T2-Soils-1:** Identify and review regulations related to geologic resources based on local land
13 ownership and the intended use.
- 14 • **T2-Soils-2:** As part of design and geotechnical investigations, determine the amount of
15 ground disturbance anticipated and factors that affect the potential for soils to erode by
16 water and wind, including physical characteristics, slope gradient, vegetative cover, surface
17 roughness, and rainfall or wind intensity.
- 18 • **T2-Soils-3:** Evaluate existence and status of mining claims and active mining operations.
- 19 • **T2-Soils-4:** Identify and determine the extent of impacts to specific geologic, soil, and
20 farmland resources.
- 21 • **T2-Soils-5:** Conduct site-specific field investigations during design to validate interpretations
22 and confirm soil characteristics.
- 23 • **T2-Soils-6:** Collect any additional or refined data (NRCS, USGS, or other sources) on
24 geotechnical conditions that could affect design and performance such as shrink/swell,
25 compression/collapse, and corrosion potential.
- 26 • **T2-Soils-7:** Identify the number of irrigated acres for refinement of potential prime or unique
27 farmland impacts through NRCS completion of USDA Form AD-1006 (Farmland Conversion
28 Impact Rating form).
- 29 • **T2-Soils-8:** Identify areas of current and planned development that should be removed from
30 prime and unique farmland categorization through the analysis of local land use and zoning
31 maps.

32 **3.12.6.2 Mitigation Commitments**

33 As required by NEPA, FHWA and ADOT considered measures to avoid, minimize, and mitigate
34 geology, soils, and farmland impacts from the Project (generally referred to as mitigation
35 measures) during this Tier 1 process. Specific mitigation that ADOT is committing to implement
36 if a Build Alternative is selected includes:



- 1 • **MM-Soils-1:** Monitor disturbance and erosion areas during construction and through
2 restoration.
- 3 • **MM-Soils-2:** Avoid known land subsidence areas when feasible.
- 4 • **MM-Soils-3:** Avoid known earth fissures when feasible.
- 5 • **MM-Soils-4:** Develop and implement a reclamation and revegetation plan.
- 6 • **MM-Soils-5:** Coordinate with NRCS as part of compliance with the Farmland Protection
7 Policy Act.

8 **3.12.6.3 Additional Mitigation to be Evaluated in Tier 2**

9 During the Tier 2 process, ADOT will evaluate mitigation measures in addition to those listed
10 above, to include best practices, permit requirements, and/or other mitigation strategies
11 suggested by agencies or the public. Examples of measures that ADOT may evaluate in Tier 2
12 include:

- 13 • Avoid steep slopes and known bedrock outcrops.
- 14 • Evaluate and design for safe, stable excavated slopes in bedrock.
- 15 • Design to avoid or mitigate geotechnical-related construction constraints.
- 16 • Design and excavate slopes in accordance with accepted practices.
- 17 • Design and place fills in accordance with accepted safety practices.
- 18 • Protect excavation and fill slopes against erosion.
- 19 • Design subgrade and foundations in accordance with accepted practices.
- 20 • Monitor potential erosion or settlement areas during construction and through restoration.
- 21 • Develop and implement dust control and erosion control strategies.
- 22 • Stockpile topsoil for use in reclamation.
- 23 • Protect excavation and fill slopes against erosion.
- 24 • Design alignment within or near existing linear transportation features or planned urban
25 areas to avoid agricultural areas.
- 26 • Work with local landowners to facilitate land swaps and purchases as applicable to avoid
27 fragmented parcels with barriers to equipment access.
- 28 • Provide access for farm equipment between divided agricultural parcels, where feasible.

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