San Juan County Four Corners Freight Rail Project

Task 5: Environmental Analysis

Feasibility Study

San Juan County, New Mexico
October 22, 2024

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TASK 5: ENVIRONMENTAL ANALYSIS SUMMARY MEMORANDUM

OVERVIEW

San Juan County (the County) has engaged in further project development and analysis for the route options identified through Task 3 for further consideration in Task 5: Environmental Analysis, based on the Task 5 methodology approved by FRA on June 30, 2024. HDR Engineering, Inc. (HDR) contracted with SWCA Environmental Consultants (SWCA) to perform a critical issues analysis (CIA) that summarizes the potential resource constraints for the Four Corners Freight Rail Project (project). The project includes five proposed route options and two spur connection routes (project area options) that will be developed to access industries or businesses across McKinley and San Juan Counties, New Mexico. The purpose of the project is to construct a new rail line between the Four Corners area and the BNSF national freight network, which parallels Interstate 40.

The results of this CIA prepared by SWCA are presented in **Appendix A**. This analysis summarizes potential environmental resource constraints for development of the project. Using desktop analyses, SWCA assessed the potential for environmental impacts of the alternatives developed and analyzed in the Preliminary Alternatives Analysis Report, the Task 3 deliverable. Alternatives may vary in terms of routes, physical infrastructure investments ("Investment Options"), which will be comprised of multiple individual infrastructure projects or "component investments", and design ("Design Options"). The design options are described individually below:

- The Navajo Mine Connection has two variations that would connect the below routes to the Navajo Mine. This connector would be located on Navajo Nation Tribal (tribal) land in San Juan County, New Mexico. The routes connecting the BSNF and NAPI would also utilize the Navajo Mine Connection and the length of the Navajo Mine Connection for each route is accounted for in the totals listed below.
- The El Segundo Route project area is approximately 676,334 feet long (101 miles) and located on Bureau of Land Management (BLM) Farmington Field Office (FFO) land (1,745 feet), New Mexico State Land Office (NMSLO) land (18,049 feet), tribal land (571,074 feet), and private lands (85,466 feet) in McKinley and San Juan Counties, New Mexico.
- The Defiance Via Indian Creek Route project area is approximately 736,143 feet (116 miles) long and located on NMSLO land (1,090 feet), tribal land (729,672 feet), and private lands (5,381 feet) in McKinley and San Juan Counties, New Mexico.
- The Defiance Via Highway 491 Route project area is approximately 693,113 feet (110 miles) long and located on NMSLO land (1,090 feet), tribal land (686,642 feet), and private lands (5,381 feet) in McKinley and San Juan Counties, New Mexico.

- The Star Lake Route project area is approximately 688,685 feet (96 miles) long and located on BLM FFO land (161,854 feet), NMSLO land (26,105 feet), tribal land (413,599 feet), and private lands (87,127 feet) in McKinley and San Juan Counties, New Mexico.
- The Defiance Via Highway 371 Route project area is approximately 769,123 feet (123 miles) long and located on BLM FFO land (16,234 feet), NMSLO land (6,307 feet), tribal land (735,122 feet), and private lands (11,460 feet) in McKinley and San Juan Counties, New Mexico.
- The Farmington Connection project area is approximately 75,346 feet (14 miles) and located on BLM FFO land (4,949 feet), tribal land (67,596 feet), and private lands (2,801 feet) in San Juan County, New Mexico.

SUMMARY OF POTENTIAL SITE CONSTRAINTS

Based on SWCA's preliminary review of data sources and potential environmental constraints, there are no resources identified at the desktop level that would prevent any of the project area options from being constructed if the appropriate federal, state, and local permits are granted. Biological surveys would confirm the presence of suitable sensitive species habitat and aquatic resources in the project areas.

If cultural or paleontological resources are within the preferred alternative alignment, it is recommended that these resources are avoided. If biological surveys indicate the presence of suitable habitat for any listed species, reducing disturbance to suitable habitat to the greatest extent possible is recommended. Please refer to Table 1 for the design option resource constraints comparison matrix. Conclusions and recommendations from the CIA prepared by SWCA are listed below:

Land Use and Zoning

Conclusion: The El Segundo Route, Star Lake Route, Defiance via Highway 371 Route and the Farmington Connection Route all intersect lands managed by the BLM FFO. Due to the federal action, National Environmental Policy Act (NEPA) compliance would be required. All the project area options would traverse medium to densely populated areas. In addition, all the design options intersect tribal lands. Tribes are considered sovereign entities and government-to-government consultation is necessary for discussing alternatives development on tribal lands. The El Segundo route has the least amount of residences within 1 mile (225) and the Farmington Connection has the most amount of residences within 1 mile (546).

Recommendation: An agency kickoff call would determine the lead federal agency for the project and the level of effort for NEPA. SWCA recommends coordinating with landowners and land management agencies to confirm permitting needs and the extent of public outreach, specifically to the surrounding communities.

Geology

Conclusion: All route options intersect areas of PFYC 3 and 5. Additionally, all routes, other than the Farmington Connect intersect PFYC 4 and the Defiance Via Highway 491 Route project area intersects areas of unknown PFYC. No soil concerns are present.

Recommendation: Paleontological surveys would likely be required for project areas located on federal lands within PFYC 5 and 4. Paleontological surveys in PFYC 3 or U areas may require surveys. SWCA recommends coordinating with the agencies to determine paleontological survey needs.

Aquatic Resources

Conclusion: No perennial waterbodies are mapped within the route option project areas, however several ephemeral and intermittent streams are mapped within the project areas. In addition, NWI-mapped wetland features also intersect the project areas. All routes other than the Farmington Connection intersect areas mapped as FEMA 100-year floodplains.

Recommendation: Aquatic surveys would confirm the presence of potentially jurisdictional surface water features in the project areas. If any potentially jurisdictional surface water features are observed, compliance with CWA would be required if avoidance is not feasible. Stream or wetland crossings may be permittable through the use of NWP 14. Consultation with USACE is recommended.

Vegetation

Conclusion: Common habitat types within the project area options include sagebrush shrublands, badlands, pinyon-juniper woodlands and savannas, agricultural fields, and developed areas including major roadways, residences, and commercial development. The vegetation observed within the project area options is not expected to be rare compared to the vegetation or habitat types in the vicinity of the project area options.

Recommendation: Noxious weed mitigations are recommended during construction to reduce the potential spread of noxious weeds and potential impacts to native vegetation from the establishment of noxious weeds. It is recommended to adhere to agency guidelines and best management practices for reducing the spread of noxious weeds.

Wildlife

Conclusion: Based on SWCA's desktop analysis, one USFWS proposed threatened species, two state-listed endangered plant species, and two state-listed threatened avian species may occur in the project area options. In addition, six BLM sensitive species and four NNDFW sensitive species may occur in the project area options.

Recommendation: Appropriately timed biological surveys would confirm the presence of suitable habitat for the listed species along with the species' potential to occur in the proposed project areas.

Due to the project being a federal action, the project would need to comply with ESA Section 7. Monarch butterfly (designated candidate species at the time of this CIA) has the potential to occur in the project area. If the monarch butterfly receives a proposed listing, the project would need to comply with Section 7 review of the species, which may include consultation or species-specific surveys. In addition, USFWS-designated critical habitat is within the vicinity of the route options. Avoidance of critical habitat is recommended. Coordination with the agencies for the species-specific timing considerations and level of effort is recommended. If any state-listed species are known to occur in the project area after appropriately timed biological surveys, coordination with the lead agency and NMDGF is recommended. If harm or take is expected to any state-listed plant species, an incidental take permit may be required and coordination with NMDGF and/or EMNRD is recommended. If any BLM sensitive species or NNDFW sensitive species are known to occur within the project areas after appropriately timed surveys, coordination with the BLM or NNDFW would be required. Mitigations to reduce impacts to listed species habitat could be developed with the involved agencies or avoidance of habitat is not feasible.

Cultural Resources

Conclusion: Each of the route options intersect cultural sites. The Defiance via Indian Creek route and Defiance via Highway 371 route project areas intersect the most amount of eligible sites. These two routes also intersect the most cultural sites, including not eligible, unevaluated, and unlisted cultural sites. The Star Lake route project is the only route option intersecting known TCPs.

Recommendation: Cultural resources surveys would be required on federal lands and state lands where qualifying survey has not been performed. Avoidance or mitigation of resources is recommended. Please note that this information is based on NMCRIS data and does not include comprehensive information specific to the Navajo Nation. Agency coordination to develop the area of potential effects and survey protocol is recommended. In addition, coordination to confirm no local parks or recreational areas would be impacted by the design options is recommended.

Section 4(f)

Section 4(f) of the Department of Transportation Act of 1966 requires avoidance of the “use” of properties such as public parks, recreation areas, wildlife and waterfowl refuges, and historic properties (cultural resources that are eligible for inclusion in the NRHP). Use of land from such properties for a proposed undertaking cannot be approved by the FHWA unless there is no feasible and prudent alternative, in which case all possible planning must occur to minimize the harm to a Section 4(f) property. There are no known existing public parks, recreation areas, or wildlife/waterfowl refuges in the design options; however, a number of historic properties intersect the design options (see Table 1). Chaco Canyon National Monument is approximately 7.6 miles northeast of the El Segundo Route and 11.4 miles southwest of the Star Lake Route.

Recommendation: Additional coordination to confirm no local parks or recreational areas would be impacted by the design options is recommended.

Table 1. Design Option Resource Constraint Comparison Matrix.

Resource Constraints	Design Options*					
	El Segundo Route	**Defiance Via Indian Creek Route**	**Defiance Route Via Highway 491 Route**	**Stake Lake Route**	**Defiance Highway Via Highway 371**	**Farmington Connector**
Landowners	• BLM FFO • NMSLO • Private • Tribal	• NMSLO • Private • Tribal	• NMSLO • Private • Tribal	• BLM FFO • NMSLO • Private • Tribal	• BLM FFO • NMSLO • Private • Tribal	• BLM FFO • Private • Tribal
Residences within 1 mile of the Routes	225	337	332	289	361	546
Existing Infrastructure	• Oil and Gas Infrastructure • Highway 371 • Highway 9 • Highway 509 • County roads • Existing Rail	• Oil and Gas Infrastructure • Highway 371 • Highway 491 • Highway 264 • County roads • Existing Rail	• Oil and Gas Infrastructure • Highway 371 • Highway 491 • Highway 264 • County roads • Existing Rail	• Oil and Gas Infrastructure • Highway 371 • Highway 550 • Highway 57 • Highway 9 • Highway 509 • County roads • Existing Rail	• Oil and Gas Infrastructure • Highway 371 • Highway 491 • Highway 264 • County roads • Existing Rail	• Highway 371 • County roads
Paleontology	• PFYC Class 3 (moderate) • PFYC Class 4 (High) • PFYC Class 5 (Very High)	• PFYC Class 3 (moderate) • PFYC Class 4 (High) • PFYC Class 5 (Very High)	• PFYC Class 3 (moderate) • PFYC Class 4 (High) • PFYC Class 5 (Very High) • PFYC Class U (Unknown)	• PFYC Class 3 (moderate) • PFYC Class 4 (High) • PFYC Class 5 (Very High)	• PFYC Class 3 (moderate) • PFYC Class 4 (High) • PFYC Class 5 (Very High)	• PFYC Class 3 (moderate) • PFYC Class 5 (Very High)
Aquatic Resources	• Ephemeral Drainages: 3 • Canals/Ditches: 6 • Intermittent Drainages: 186 • Perennial Drainages: 0 • Waterbodies: 2	• Ephemeral Drainages: 2 • Canals/Ditches: 6 • Intermittent Drainages: 177 • Perennial Drainages: 0 • Waterbodies: 3	• Ephemeral Drainages: 2 • Canals/Ditches: 6 • Intermittent Drainages: 194 • Perennial Drainages: 0 • Waterbodies: 2	• Ephemeral Drainages: 0 • Canals/Ditches: 8 • Intermittent Drainages: 197 • Perennial Drainages: 0 • Waterbodies: 6	• Ephemeral Drainages: 2 • Canals/Ditches: 5 • Intermittent Drainages: 187 • Perennial Drainages: 0 • Waterbodies: 2	• Ephemeral Drainages: 0 • Canals/Ditches: 0 • Intermittent Drainages: 20 • Perennial Drainages: 0 • Waterbodies: 0

	• Wetland Riverines: 51 • Wetland Freshwater ponds: 0 • Freshwater Emergent Wetlands: 0 • Floodplain Zone A: Present	• Wetland Riverines: 46 • Wetland Freshwater ponds: 0 • Freshwater Emergent Wetlands: 1 • Floodplain Zone A: Present	• Wetland Riverines: 50 • Wetland Freshwater ponds: 0 • Freshwater Emergent Wetlands: 0 • Floodplain Zone A: Present	• Wetland Riverines: 58 • Wetland Freshwater ponds: 1 • Freshwater Emergent Wetlands: 1 • Floodplain Zone A: Present	• Wetland Riverines: 60 • Wetland Freshwater ponds: 0 • Freshwater Emergent Wetlands: 1 • Floodplain Zone A: Present	• Wetland Riverines: 12 • Wetland Freshwater ponds: 0 • Freshwater Emergent Wetlands: 0 • Floodplain Zone A: Absent
Wildlife Concerns	Sensitive species that may occur and require agency coordination: • Monarch butterfly (USFWS PT, BLM S) • Bald eagle (NM T, NESL G2) • Bendire's thrasher (BLM S) • Ferruginous hawk (NESL G3) • Golden eagle (NESL G3) • Gray vireo (NM T) • Pinyon jay (BLM S) • Virginia's warbler (BLM S) • Gunnison's prairie dog (BLM S) • Kit fox (NESL G4) • Pronghorn (NESL G3)	Sensitive species that may occur and require agency coordination: • Monarch butterfly (USFWS PT, BLM S) • Bald eagle (NM T, NESL G2) • Ferruginous hawk (NESL G3) • Golden eagle (NESL G3) • Gray vireo (NM T) • Kit fox (NESL G4) • Pronghorn (NESL G3)	Sensitive species that may occur and require agency coordination: • Monarch butterfly (USFWS PT, BLM S) • Bald eagle (NM T, NESL G2) • Ferruginous hawk (NESL G3) • Golden eagle (NESL G3) • Gray vireo (NM T) • Kit fox (NESL G4) • Pronghorn (NESL G3)	Sensitive species that may occur and require agency coordination: • Monarch butterfly (USFWS PT, BLM S) • Bald eagle (NM T, NESL G2) • Bendire's thrasher (BLM S) • Ferruginous hawk (NESL G3) • Golden eagle (NESL G3) • Gray vireo (NM T) • Pinyon jay (BLM S) • Virginia's warbler (BLM S) • Gunnison's prairie dog (BLM S) • Kit fox (NESL G4) • Pronghorn (NESL G3)	Sensitive species that may occur and require agency coordination: • Monarch butterfly (USFWS PT, BLM S) • Bald eagle (NM T, NESL G2) • Bendire's thrasher (BLM S) • Ferruginous hawk (NESL G3) • Golden eagle (NESL G3) • Gray vireo (NM T) • Pinyon jay (BLM S) • Virginia's warbler (BLM S) • Gunnison's prairie dog (BLM S) • Kit fox (NESL G4) • Pronghorn (NESL G3)	Sensitive species that may occur and require agency coordination: • Monarch butterfly (USFWS PT, BLM S) • Bald eagle (NM T, NESL G2) • Bendire's thrasher (BLM S) • Ferruginous hawk (NESL G3) • Golden eagle (NESL G3) • Gray vireo (NM T) • Pinyon jay (BLM S) • Virginia's warbler (BLM S) • Gunnison's prairie dog (BLM S) • Kit fox (NESL G4) • Pronghorn (NESL G3)

Vegetation	Habitats likely to be present across the design options include: sagebrush shrublands, badlands, pinyon-juniper woodlands, pinyon-juniper savannas, agricultural fields, and developed areas					
	Sensitive species that may occur and require agency coordination: • Aztec gilia (NM Endangered; NESL G3, BLM S) • Clover's cactus (NM E, NESL G3, BLM S) • San Juan milkweed (BLM S)	Sensitive species that may occur and require agency coordination: • Aztec gilia (NM Endangered; NESL G3, BLM S) • Clover's cactus (NM E, NESL G3, BLM S)	Sensitive species that may occur and require agency coordination: • Aztec gilia (NM Endangered; NESL G3, BLM S) • Clover's cactus (NM E, NESL G3, BLM S)	Sensitive species that may occur and require agency coordination: • Aztec gilia (NM Endangered; NESL G3, BLM S) • Clover's cactus (NM E, NESL G3, BLM S) • San Juan milkweed (BLM S)	Sensitive species that may occur and require agency coordination: • Aztec gilia (NM Endangered; NESL G3, BLM S) • Clover's cactus (NM E, NESL G3, BLM S) • San Juan milkweed (BLM S)	Sensitive species that may occur and require agency coordination: • Aztec gilia (NM Endangered; NESL G3, BLM S) • Clover's cactus (NM E, NESL G3, BLM S) • San Juan milkweed (BLM S)
Cultural Resources within 2 miles of the Routes	• Eligible Sites: 479 • Not Eligible Sites: 170 • Unevaluated Sites: 1,101 • Unlisted Sites: 95 • TCPs: 0	• Eligible Sites: 588 • Not Eligible Sites: 199 • Unevaluated Sites: 1,477 • Unlisted Sites: 133 • TCPs: 0	• Eligible Sites: 360 • Not Eligible Sites: 106 • Unevaluated Sites: 2,355 • Unlisted Sites: 130 • TCPs: 0	• Eligible Sites: 249 • Not Eligible Sites: 85 • Unevaluated Sites: 1,490 • Unlisted Sites: 178 • TCPs: 2	• Eligible Sites: 599 • Not Eligible Sites: 205 • Unevaluated Sites: 1,492 • Unlisted Sites: 137 • TCPs: 0	• Eligible Sites: 42 • Not Eligible Sites: 24 • Unevaluated Sites: 243 • Unlisted Sites: 22 • TCPs: 0

*All design options other than the Farmington Connector would utilize the Navajo Mine Connector. Therefore, resource constraints for the Navajo Mine Connector are considered in each of the routes that would utilize this connector.

RECOMMEDATION FOR NEPA CLASS OF ACTION

Based on the reviews and findings to date, an Environmental Assessment (EA) NEPA Class of Action is recommended.

APPENDICES

Appendix 1: Critical Issues Analysis, prepared by SWCA Environmental Consultants

Critical Issues Analysis for the San Juan Four Corners Freight Rail Line Project in McKinley and San Juan Counties, New Mexico

REVISED AUGUST 2024

PREPARED FOR

HDR Engineering, Inc.

PREPARED BY

SWCA Environmental Consultants

CRITICAL ISSUES ANALYSIS FOR THE SAN JUAN FOUR CORNERS FREIGHT RAIL LINE PROJECT IN MCKINLEY AND SAN JUAN COUNTIES, NEW MEXICO

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INTRODUCTION

This critical issues analysis (CIA) summarizes the potential resource constraints for the San Juan Four Corners Freight Rail Line Project (project). The project includes five proposed route options and two spur connection routes (project area options) that will be developed to access industries or businesses across McKinley and San Juan Counties, New Mexico (Figure A.1 in Appendix A). The purpose of the project is to construct a new rail line between San Juan County and the BNSF national freight network, which parallels Interstate 40. SWCA Environmental Consultants (SWCA) has been contracted by HDR Engineering, Inc. (HDR), to investigate the potential concerns for the project area options. The results of this CIA are presented below.

Project Setting

The general setting of the project area options and vicinity is characterized by shrubland, evergreen woodland, wildlife habitat, some recreation, public lands, grassland (ranching and livestock grazing), some irrigated cropland habitat, some residential and commercial development, barren land, and livestock grazing. The project area options are described individually below:

- The Navajo Mine Connection has two variations that would connect the below routes to the Navajo Mine. This connector would be located on tribal land in San Juan County, New Mexico (Figures A.1, through A.6 in Appendix A). The routes connecting the BSNF and NAPI would also utilize the Navajo Mine Connection and the length of the Navajo Mine Connection for each route is accounted for in the totals listed below.
- The El Segundo Route project area is approximately 676,334 feet long (101 miles) and located on Bureau of Land Management (BLM) Farmington Field Office (FFO) land (1,745 feet), New Mexico State Land Office (NMSLO) land (18,049 feet), Navajo Nation Tribal (tribal) land (571,074 feet), and private lands (85,466 feet) in McKinley and San Juan Counties, New Mexico . (Figures A.1 and A.2 in Appendix A).
- The Defiance Via Indian Creek Route project area is approximately 736,143 feet (116 miles) long and located on NMSLO land (1,090 feet), tribal land (729,672 feet), and private lands (5,381 feet) in McKinley and San Juan Counties, New Mexico (Figures A.1 and A.3 in Appendix A).
- The Defiance Via Highway 491 Route project area is approximately 693,113 feet (110 miles) long and located on NMSLO land (1,090 feet), tribal land (686,642 feet), and private lands (5,381 feet) in McKinley and San Juan Counties, New Mexico (Figures A.1 and A.4 in Appendix A).
- The Star Lake Route project area is approximately 688,685 feet (96 miles) long and located on BLM FFO land (161,854 feet), NMSLO land (26,105 feet), tribal land (413,599 feet), and private lands (87,127 feet) in McKinley and San Juan Counties, New Mexico (Figures A.1 and A.5 in Appendix A).
- The Defiance Via Highway 371 Route project area is approximately 769,123 feet (123 miles) long and located on BLM FFO land (16,234 feet), NMSLO land (6,307 feet), tribal land (735,122 feet), and private lands (11,460 feet) in McKinley and San Juan Counties, New Mexico (Figures A.1 and A.6 in Appendix A).
- The Farmington Connection project area is approximately 75,346 feet (14 miles) and located on BLM FFO land (4,949 feet), tribal land (67,596 feet), and private lands (2,801 feet) in San Juan County, New Mexico (Figures A.1 and A.7 in Appendix A).

Resource Analysis

The sections below summarize the potential for the following types of sensitive areas to occur within the project area options based on a preliminary desktop review: groundwater, wetlands and surface water features, frequently flooded areas, soils, paleontological resources, vegetation, listed fish and wildlife species and their habitat, and cultural resources. Sensitivity thresholds are defined within their respective sections. Any developments within sensitive areas could be subject to review by the counties or other regulatory agencies. Additional requirements for survey and analysis are also summarized for any sensitive areas determined to be potentially present within the project area options.

Land Use

RESIDENCES

The project area options are in the vicinity of several residences. Table 1 discloses the number of residences within 1.0 mile of each of the project area options.

Table 1. Residences within a 1-mile Buffer of the Project Area Options

Project Area Options	Number of Residences within a 1-mile Buffer of Project Area Options
El Segundo Route Project Area	225
Defiance Via Indian Creek Route Project Area	337
Defiance Via Highway 491 Route Project Area	332
Star Lake Route Project Area	289
Defiance Via Highway 371 Route Project Area	361
Farmington Connection Project Area	546

EXISTING INFRASTRUCTURE

Based on data from the New Mexico Oil Conservation District, there is a significant amount of oil and gas infrastructure in the project vicinity as the project area options are within the San Juan Basin (New Mexico Oil Conservation District 2023). There are brownfield sites in Gallup, Farmington, and Bloomfield, New Mexico (U.S. Environmental Protection Agency [EPA] 2023).

Soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey data, the dominant soil types throughout the project area options include fine sandy soils, dune land, badlands, loamy complexes, Escavada associations, and rocky outcrops (NRCS 2019). There are no soils with hydric components in the Farmington Connection project area. All other project areas from BSNF to NAPI headquarters contain soils with hydric components (Table 2). Hydric soils are likely correlated with mapped wetlands or surface water features. More details about these features can be found in the Aquatic Resources section below. The soils in the project area options range from excessively well drained to well drained.

Table 2. Summary of Hydric Soils within the Project Area Options

Map Unit Name	Map Unit Symbol
El Segundo Route Project Area	
Notal-Hamburn complex, 0 to 2 percent slopes	235
Sparank-San Mateo-Zia complex, 0 to 3 percent slopes	114
Yelives fine sandy loam, 1 to 3 percent slopes	111
Defiance Via Indian Creek Route Project Area	
Notal-Hamburn complex, 0 to 2 percent slopes	235
Sparank-San Mateo-Zia complex, 0 to 3 percent slopes	114
Yelives fine sandy loam, 1 to 3 percent slopes	111
Defiance Via Highway 491 Route Project Area	
Notal-Hamburn complex, 0 to 2 percent slopes	235
Sparank-San Mateo-Zia complex, 0 to 3 percent slopes	114
Sparank-San Mateo-Zia complex, 0 to 3 percent slopes	230
Yelives fine sandy loam, 1 to 3 percent slopes	111
Star Lake Route Project Area	
Notal-Hamburn complex, 0 to 2 percent slopes	235
Sparank-San Mateo-Zia complex, 0 to 3 percent slopes	230
Tsosie-Councelor-Blancot fine sandy loams, 1 to 3 percent slopes	10
Defiance Via Highway 371 Route Project Area	
Notal-Hamburn complex, 0 to 2 percent slopes	235
Sparank-San Mateo-Zia complex, 0 to 3 percent slopes	114
Yelives fine sandy loam, 1 to 3 percent slopes	111

Sources: NRCS (2019).

Paleontological Resources

The BLM has assigned a Potential Fossil Yield Classification (PFYC) ranking (1–5 or unknown [U]) to each geologic unit (formation, member, or other distinguishable unit) based on the taxonomic diversity and abundance of previously recorded scientifically significant paleontological resources associated with the unit and the potential for future discoveries, with a higher-class number indicating higher paleontological resource potential and higher resource management concerns (Table 3). The PFYC system provides baseline guidance for predicting, assessing, and mitigating paleontological resources in areas of development.

Table 3. Summary of the BLM's Potential Fossil Yield Classification

PFYC Ranking	Designation	Management Summary
1	Very Low Potential	Assessment or mitigation is usually unnecessary except in very rare or isolated circumstances.
2	Low Potential	Assessment or mitigation is usually unnecessary except in rare or isolated circumstances. Ground-disturbing activities are not likely to require mitigation.
3	Moderate Potential	Assessment may include mitigation or avoidance. Surface-disturbing activities may require assessment, including records searches, pre-disturbance surveys, and monitoring, avoidance, or other mitigation.

PFYC Ranking	Designation	Management Summary
4	High Potential	A field survey by a qualified paleontologist is usually needed to assess local conditions. Mitigation often would be necessary before and/or during ground-disturbing actions. Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered.
5	Very High Potential	A field survey by a qualified paleontologist is usually necessary prior to surface-disturbing activities or land tenure adjustments, along with monitoring during ground-disturbing activities. Mitigation often would be necessary before and/or during such activities. Official designation of areas of avoidance, special interest, and concern may be appropriate.
U	Unknown Potential	Surface-disturbing activities may require field assessment to determine the appropriate course of action. It is often necessary to perform a field survey of the area. The survey recommendations can be used to change the PFYC ranking based on the results of the survey. A survey report is necessary to support the reclassification of a PFYC ranking.

Portions of all project areas intersect PFYC 5 geologic units, where there is a very high likelihood of significant paleontological resources. The Farmington Connect is the only route that does not intersect PYFC 4 geologic units, where there is a high likelihood of significant paleontological resources. The Defiance Via Highway 491 route project area intersects PFYC U geologic units, where there is an unknown likelihood of significant paleontological resources. If the proposed project is outside a pre-existing right-of-way (ROW) and occurring in a PYFC 4 or PFYC 5 area, a paleontological survey would likely be required by the lead agency. Paleontological survey may also be required in portions of the PFYC U areas where creeks or arroyos cut into the surficial sediments exposing older geologic units and in PFYC 3 areas if there are previously documented paleontological localities nearby. However, any areas that are within a pre-existing ROW may not require a paleontological survey. Table 4 outlines the PFYC classes within the project area options.

Table 4. PFYC Classes within the Project Area Options

Geologic Unit	Map Symbol	PFYC Class
El Segundo Route Project Area		
Cliff House Sandstone	Kch	Class 3 - Moderate
Lewis Shale	Kls	Class 3 - Moderate
Ojo Alamo Formation	Toa	Class 3 - Moderate
Pictured Cliffs Sandstone	Kpc	Class 3 - Moderate
Point Lookout Sandstone	Kpl	Class 3 - Moderate
Menefee Formation	Kmf	Class 4 - High
Kirtland and Fruitland Formations	Kkf	Class 5 - Very High
Nacimiento Formation	Tn	Class 5 - Very High
Defiance Via Indian Creek Route Project Area		
Cliff House Sandstone	Kch	Class 3 - Moderate
Lewis Shale	Kls	Class 3 - Moderate
Ojo Alamo Formation	Toa	Class 3 - Moderate
Pictured Cliffs Sandstone	Kpc	Class 3 - Moderate
Crevasse Canyon Formation	Kcc	Class 4 - High
Menefee Formation	Kmf	Class 4 - High

Geologic Unit	Map Symbol	PFYC Class
Kirtland and Fruitland Formations	Kkf	Class 5 - Very High
Nacimiento Formation	Tn	Class 5 - Very High
Defiance Via Highway 491 Route Project Area		
Cliff House Sandstone	Kch	Class 3 - Moderate
Lewis Shale	Kls	Class 3 - Moderate
Ojo Alamo Formation	Toa	Class 3 - Moderate
Pictured Cliffs Sandstone	Kpc	Class 3 - Moderate
Crevasse Canyon Formation	Kcc	Class 4 - High
Menefee Formation	Kmf	Class 4 - High
Kirtland and Fruitland Formations	Kkf	Class 5 - Very High
Nacimiento Formation	Tn	Class 5 - Very High
Alluvium	Qa	Class U - Unknown
Star Lake Route Project Area		
Cliff House Sandstone	Kch	Class 3 - Moderate
Lewis Shale	Kls	Class 3 - Moderate
Ojo Alamo Formation	Toa	Class 3 - Moderate
Pictured Cliffs Sandstone	Kpc	Class 3 - Moderate
Point Lookout Sandstone	Kpl	Class 3 - Moderate
Menefee Formation	Kmf	Class 4 - High
Kirtland and Fruitland Formations	Kkf	Class 5 - Very High
Nacimiento Formation	Tn	Class 5 - Very High
Defiance Via Highway 371 Route Project Area		
Cliff House Sandstone	Kch	Class 3 - Moderate
Lewis Shale	Kls	Class 3 - Moderate
Ojo Alamo Formation	Toa	Class 3 - Moderate
Pictured Cliffs Sandstone	Kpc	Class 3 - Moderate
Crevasse Canyon Formation	Kcc	Class 4 - High
Menefee Formation	Kmf	Class 4 - High
Kirtland and Fruitland Formations	Kkf	Class 5 - Very High
Nacimiento Formation	Tn	Class 5 - Very High
Farmington Connection Project Area		
Ojo Alamo Formation	Toa	Class 3 - Moderate
Kirtland and Fruitland Formations	Kkf	Class 5 - Very High
Nacimiento Formation	Tn	Class 5 - Very High

Source: BLM 2022.

Aquatic Resources

GROUNDWATER

The project area options are within multiple Hydrologic Unit Code (HUC)–10 watersheds within multiple declared groundwater basins (Table 5). The groundwater basins within the project area options overlap the Colorado Plateau aquifer, a large aquifer system approximately 110,000 square miles in size in western Colorado, northwestern New Mexico, northeastern Arizona, and eastern Utah (U.S. Geological Survey [USGS] 2023).

Table 5. HUC-10 Watersheds and Groundwater Basins within the Project Area Options

Watershed	Hydrologic Unit Code (HUC)	Groundwater Basin
El Segundo Route Project Area		
Ojo Amarillo Canyon-San Juan River	1408010505	San Juan
Gallegos Canyon	1408010120	
Sanostee Wash-Chaco River	1408010618	
Hunter Wash	1408010614	
Coyote Wash-Chaco River	1408010615	
De-na-zin Wash	1408010607	
India Creek	1408010608	
Outlet Kim-me-ni-oil Wash	1408010605	
Headwaters Kim-me-ni-oil Wash	1408010604	
Dead Man's Wash-Chaco River	1408010620	
Headwaters Arroyo Chico	1302020502	Rio Grande
Defiance Via Indian Creek Route Project Area		
Ojo Amarillo Canyon-San Juan River	1408010505	San Juan
Gallegos Canyon	1408010120	
Sanostee Wash-Chaco River	1408010618	
Hunter Wash	1408010614	
Coyote Wash-Chaco River	1408010615	
De-na-zin Wash	1408010607	
India Creek	1408010608	
Figueredo Wash	1408010609	
Standing Rock Wash	1408010611	
Headwaters Coyote Creek	1408010610	
Dead Man's Wash-Chaco River	1408010620	

Watershed	Hydrologic Unit Code (HUC)	Groundwater Basin
Defiance Draw-Upper Puerco River	1502000604	Gallup
Defiance Via Highway 491 Route Project Area		
Ojo Amarillo Canyon-San Juan River	1408010505	San Juan
Gallegos Canyon	1408010120	
Sanostee Wash-Chaco River	1408010618	
Captain Tom Wash	1408010616	
Coyote Wash-Chaco River	1408010615	
Outlet Coyote Creek	1408010613	
Red Willow Wash	1408010612	
Figueredo Wash	1408010609	
Headwaters Coyote Creek	1408010610	
Defiance Draw-Upper Puerco River	1502000604	Gallup
Star Lake Route Project Area		
Ojo Amarillo Canyon-San Juan River	1408010505	San Juan
Gallegos Canyon	1408010120	
De-na-zin Wash	1408010607	
Escavada Wash	1408010603	
Canada Alemita-Chaco Wash	1408010601	
Fajada Wash	1408010602	
Headwaters Kim-me-ni-oil Wash	1408010604	
Kim-me-ni-oil Wash – Chaco River	1408010606	
Dead Man's Wash-Chaco River	1408010620	
Headwaters Arroyo Chico	1302020502	Rio Grande
Defiance Via Highway 371 Route Project Area		
Ojo Amarillo Canyon-San Juan River	1408010505	San Juan
Figueredo Wash	1408010609	
Gallegos Canyon	1408010120	
Headwaters Coyote Creek	1408010610	
Captain Tom Wash	1408010616	
Sanostee Wash-Chaco River	1408010618	
Red Willow Wash	1408010612	
Hunter Wash	1408010614	

Watershed	Hydrologic Unit Code (HUC)	Groundwater Basin
Coyote Wash-Chaco River	1408010615	
De-na-zin Wash	1408010607	
Dead Man's Wash-Chaco River	1408010620	
Standing Rock Wash	1408010611	
India Creek	1408010608	
Outlet Kim-me-ni-oil Wash	1408010605	
Defiance Draw-Upper Puerco River	1502000604	Gallup
Farmington Connection Project Area		
Ojo Amarillo Canyon-San Juan River	1408010505	San Juan

WETLANDS AND SURFACE WATER FEATURES

SWCA reviewed the National Hydrology Dataset (NHD) (USGS 2016), National Wetlands Inventory (NWI) (USFWS 2023a), and Federal Emergency Management Agency (FEMA) flood zones (FEMA 2023) to assess the surface water features within the project area options. The mapped features are outlined below in Table 6. Aquatic features are shown in Figures A.8–A.13 in Appendix A.

Table 6. NHD- and NWI-Mapped Hydrologic Features and FEMA Floodplains within the Project Area Options

Mapped By NHD/NWI/FEMA	Surface Water Feature Type	Number of Features/Present (yes or no)
El Segundo Route Project Area		
NHD	Ephemeral drainages	3
	Canal/Ditch	6
	Intermittent drainages	186
	Perennial drainages	0
	Waterbodies	2
NWI	Riverines	51
	Freshwater ponds	0
	Freshwater emergent wetlands	0
FEMA	Floodplain Zone A	Yes
	Floodplain Zone D	Yes
	Floodplain Zone X	Yes
Defiance Via Indian Creek Route Project Area		
NHD	Ephemeral drainages	2
	Canal/Ditch	6
	Intermittent drainages	177
	Perennial drainages	0
	Waterbodies	3

Mapped By NHD/NWI/FEMA	Surface Water Feature Type	Number of Features/Present (yes or no)
NWI	Riverines	46
	Freshwater ponds	0
	Freshwater emergent wetlands	1
FEMA	Floodplain Zone A	Yes
	Floodplain Zone D	Yes
	Floodplain Zone X	Yes
Defiance Via Highway 491 Route Project Area		
NHD	Ephemeral drainages	2
	Canal/Ditch	6
	Intermittent drainages	194
	Perennial drainages	0
	Waterbodies	2
NWI	Riverines	50
	Freshwater ponds	0
	Freshwater emergent wetlands	0
FEMA	Floodplain Zone A	Yes
	Floodplain Zone D	Yes
	Floodplain Zone X	Yes
Star Lake Route Project Area		
NHD	Ephemeral drainages	0
	Canal/Ditch	8
	Intermittent drainages	197
	Perennial drainages	0
	Waterbodies	6
NWI	Riverines	58
	Freshwater ponds	1
	Freshwater emergent wetlands	1
FEMA	Floodplain Zone A	Yes
	Floodplain Zone D	Yes
	Floodplain Zone X	Yes
Defiance Via Highway 371 Route Project Area		
NHD	Ephemeral drainages	2
	Canal/Ditch	5
	Intermittent drainages	187
	Perennial drainages	0
	Waterbodies	2
NWI	Riverines	60
	Freshwater ponds	0
	Freshwater emergent wetlands	1
FEMA	Floodplain Zone A	Yes

Mapped By NHD/NWI/FEMA	Surface Water Feature Type	Number of Features/Present (yes or no)
	Floodplain Zone D	Yes
	Floodplain Zone X	Yes
Farmington Connection Project Area		
NHD	Ephemeral drainages	0
	Canal/Ditch	0
	Intermittent drainages	20
	Perennial drainages	0
	Waterbodies	0
NWI	Riverines	12
	Freshwater ponds	0
	Freshwater emergent wetlands	0
FEMA	Floodplain Zone A	No
	Floodplain Zone D	Yes
	Floodplain Zone X	Yes

Sources: USGS (2016), USFWS (2023a), FEMA (2023).

Waters of the United States

A CWA Section 401 (Water Quality Certification) or Section 404 (dredge and fill) permit action could be required if Waters of the United States (WOTUS) are present within the proposed project areas. On September 8, 2023, the "Revised Definition of 'Waters of the United States'" rule, as amended (2023 Amended Rule) (EPA 2023), went into effect and is currently applicable in the state of New Mexico.

WOTUS regulations, including the current 2023 Amended Rule, do not clearly define the differences between flow duration regimes (ephemeral and intermittent and perennial). Because the 2023 Amended Rule removes the former significant nexus test, there is no longer a tool to assess connectivity for certain features where continuous connectivity is questionable. Currently, the USACE is developing guidance for how districts will assess non-relatively permanent waters (ephemeral and intermittent) and non-adjacent wetland waters.

In general, WOTUS include traditional navigable waters, wetlands adjacent to traditional navigable waters, and tributaries and wetlands adjacent to navigable waters that have a continuous surface connection and standing or continuously flowing water.

Wetlands are special aquatic sites defined by the USACE as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987:9). To meet the basic definition of a wetland, an area must contain the following three parameters under normal circumstances: 1) the presence of wetland hydrology indicators showing regular inundation, 2) a dominance of hydrophytic (water-loving) vegetation, and 3) soil characteristic and indicators of frequent saturation (i.e., hydric soils) (USACE 1987). To verify the presence of wetlands in the proposed project area, the presence of wetland criteria would need to be investigated during a field survey using wetland determination methods provided in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West (Version 2.0) (Regional Supplement)* (USACE 2008a).

The presence of ordinary high-water marks (OHWMs) would need to be investigated during a field survey to determine if any water features in the proposed project areas are potentially jurisdictional. An OHWM is a line on a shore or bank established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (USACE 2008b). The OHWM is a defining element for identifying the lateral limits of non-wetland waters. Federal jurisdiction over a non-wetland WOTUS typically extends to the OHWM. If an OHWM is observed in the field, a biologist would need to delineate the OHWM to determine the lateral extents of potential jurisdictional WOTUS. To verify the lack of mapped streams in the proposed project area, the presence of an OHWM would need to be investigated during a field survey using methods provided in USACE Regulatory Guidance Letter No. 05-05 (USACE 2005), *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008b), and *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2010).

Additionally, for any surface water features that do exhibit an OHWM, a streamflow duration assessment (SDAM) should be conducted in the field using the *User Manual for a Beta Streamflow Duration Assessment Method for the Arid West of the United States* (Mazor et al. 2023). The SDAM is a rapid, field-based method to determine flow duration class at the reach scale in the absence of long-term hydrologic data. Use of the SDAM may inform a range of activities where information on streamflow duration is useful, including certain jurisdictional determinations under the CWA; however, the SDAM is not a jurisdictional determination (Mazor et al. 2023). The method relies on indicators to determine streamflow classification as perennial, intermittent, ephemeral, at least intermittent, and need more information. During SDAM, the status of indicators on a field form for every stream feature in the survey area with an OHWM, except for streams known to be perennial or intermittent, are completed. The combination of the OHWM delineation results and SDAM are required to determine if water features are ephemeral, intermittent, or perennial, which is required for WOTUS determinations.

Clean Water Act Section 401 Water Quality Certification

Section 401 of the CWA regulates water quality of WOTUS and is a provision that requires the state or authorized entity to certify that any activity that may discharge into WOTUS will comply with State water quality standards. In New Mexico, Water Quality Certification or a waiver could be required with the NMED Surface Water Quality Bureau (SWQB), authorized Tribes, or the EPA, depending on land jurisdiction. as the certifying authorities responsible for individual, expedited, or waived/exemption of Water Quality Certification in accordance with Section 401 of the CWA (NMED SWQB 2019). Section 401 certification ensures that the federal permit complies with State or water quality regulations. The use of an NWP under CWA Section 404 would trigger USACE coordination, NHPA Section 106 consultation, and coordination with the NMED SWQB.

Clean Water Act Section 402 National Pollutant Discharge Elimination System, Stormwater Construction General Permit

The National Pollutant Discharge Elimination System (NPDES) permit program, issued under Section 402 of the CWA, requires operators to obtain NPDES permit coverage for discharges of stormwater runoff to WOTUS. This includes (but is not limited to) permits for discharges from municipal separate storm sewer systems, construction activities, and industrial activities. Depending on the discharge and activity type, and eligibility conditions, operators may apply for coverage under a construction general permit, a multi-sector general permit, or an individual permit for stormwater discharges (among others).

These permits require operators to take steps to prevent stormwater runoff from washing sediment and other pollutants from their project area(s) into local surface water.

In the state of New Mexico, the EPA is the NPDES permitting authority. In February 2022, the EPA issued an updated Construction General Permit (CGP), which provides permit coverage to eligible construction stormwater discharges in the areas where EPA is the NPDES permitting authority. Construction activities that will disturb 1 acre or more of land or that disturb less than 1 acre of land but are part of a common plan of development that will ultimately disturb a total of 1 or more acres of land and have been designated by EPA as needing permit coverage under 40 CFR 122.26(a)(1)(v) or 40 CFR 122.26(b)(15)(ii) may be eligible for coverage under the EPA's CGP (EPA 2022). The 2022 CGP updates include the requirement to demonstrate an eligibility criterion has been met for compliance with the ESA, as well as a historic property screening for compliance with Section 106 of the NHPA.

Section 9 of the CGP outlines permit conditions applicable to specific states, Indian country lands, or territories. In EPA Region 6, permit NMR100000 offers coverage for stormwater discharges from construction activity within the State of New Mexico, excluding Indian country, for a period of 5 years. To obtain coverage under the CGP, Operators of these sites are required to request coverage under the CGP for construction activities in the state where the site is located. The Operator shall be fully responsible for compliance with the CGP. Should a fine or penalty be assessed against it because of a local, state, or federal enforcement action due to noncompliance with the CGP, the Operator shall take full responsibility.

For the proposed project to operate in accordance with NPDES regulations, submittal of an NOI to the EPA would be required. The CGP eligibility conditions also require the preparation and implementation of a stormwater pollution prevention plan (SWPPP), including the selection of appropriate stormwater controls to be implemented for the proposed project. Although the SWPPP does not need to be submitted with the NOI, it should be completed prior to submittal of the NOI and is required to be on-site for reference during an inspection. The purpose of a SWPPP is to identify potential sources of stormwater pollution and practices to reduce pollutants in stormwater discharges, and to outline procedures the operator would implement to comply with the terms and conditions of the NPDES permit (USACE 2007). All stormwater controls should be planned to avoid any cultural resources eligible for or of undetermined eligibility for the National Register of Historic Places (NRHP). If ground-disturbing activities occur outside of the area already surveyed for cultural resources for the placement of erosion controls (such as dikes, berms, catch basins, ponds, ditches, trenches, culverts, channels, perimeter drains, or swales), cultural resources surveys would be required where there are no previous qualifying surveys within those areas of disturbance, and subsequent consultation with the USACE and State Historic Preservation Office (SHPO) will be needed. This consultation would occur once the cultural resources report for the survey has been submitted and the NOI has been filed. The SHPO consultation is a 7- to 14-day process (EPA 2023).

Based on what is currently known about the project, an NOI would be submitted to the EPA Region 6 office. The NOI would need to be submitted at least 14 days prior to construction and must be submitted through the EPA's online permit application system. Unless notified by the EPA that the authorization is delayed or denied, the permit is granted 14 calendar days after the EPA notification of receipt of a complete NOI.

Clean Water Act Section 404 Dredge and Fill

A CWA Section 404 permit (nationwide or individual) would be required for any impacts to WOTUS under the USACE's current interpretation of WOTUS.

A USACE Department of the Army Permit pursuant to CWA Section 404 is required for regulated impacts to WOTUS, unless an exemption applies. Depending on the scope and level of potential impacts, regulated impacts would require either an NWP, a Regional General Permit (RGP), or an individual permit prior to the discharge of fill material. If impacts to WOTUS are determined to be less than 0.5 acre per individual crossing, the project would likely qualify for coverage under NWP 14 (Linear Transportation Projects). This NWP has a 0.5-acre impact threshold per individual crossing. For the use of NWP 14, if impacts are greater than 0.1 acre, the proponent would need to submit a Pre-Construction Notice to the USACE. If NWP 14 is used and impacts are below 0.1 acre, the proponent would be responsible for adhering to the general and regional conditions associated with NWP 14 in WOTUS during construction and maintenance activities, but a PCN to the USACE would not be required. Additional notification triggers, including but not limited to effects on biological or cultural resources, also apply. If impacts to WOTUS are greater than 0.5 acre at each individual crossing, the project would require an individual permit with a USACE-compliant alternatives analysis.

Each of the route options intersect hydrologic features that could be potential WOTUS (see Tables 9 and 10). During a site visit, SWCA biologists could determine if any mapped features are potentially jurisdictional. If needed, an Approved Jurisdictional Determination, or NWP could be obtained. However, avoidance of potentially jurisdictional WOTUS may eliminate the need for an NWP or RGP. An Approved Jurisdictional Determination would document jurisdiction of features and whether avoidance or mitigation of impacts is necessary. SWCA assumes that an Individual Permit would not apply.

FREQUENTLY FLOODED AREAS

Based on the review of FEMA 100-year flood zone data, the project area options are within multiple mapped FEMA floodplains: Zone A, Zone D, and Zone X (see Table 3). FEMA Zone A areas are high risk areas with 1% annual chance of flooding and a 26% chance of flooding over a 30-year period. Zone D areas are areas with possible but undetermined flood hazards and for which no analysis has been completed. Zone X areas are those areas of minimal flood hazard between the limits of the base floodplain and the 0.2% annual chance areas (or 500-year floodplain) and are at higher elevations than the 0.2% annual chance areas (FEMA 2023).

Biological Resources

General Vegetation

Common habitat types within the project area options include sagebrush shrublands, badlands, pinyon-juniper woodlands and savannas, agricultural fields, and developed areas including major roadways, residences, and commercial development. Dominant vegetation within the project area options is expected to be sagebrush (*Artemisia* sp.), fourwing saltbush (*Atriplex canescens*), creosote bush (*Larrea tridentata*), western wheatgrass (*Pascopyrum smithii*), grama grasses (*Boutelou* sp.), oneseed juniper (*Juniperus monosperma*), twoneedle pinyon (*Pinus edulis*), winterfat (*Krascheninnikovia lanata*), soapweed (*Yucca glauca*), broom snakeweed (*Gutierrezia sarothrae*), and prickly Russian thistle (*Salsola tragus*). Table 7 outlines the specific EPA Level IV ecoregions within the project area options.

Table 7. EPA Level IV Ecoregions within the Project Area Options

Project Area Option	Level IV Ecoregion
El Segundo Route Project Area	Arizona/New Mexico Plateau: San Juan/Chaco Tablelands and Mesas
	Arizona/New Mexico Plateau: San Juan/Chaco Tablelands and Mesas

Project Area Option	Level IV Ecoregion
Defiance Via Indian Creek Route Project Area	Arizona/New Mexico Plateau: Semiarid Tablelands
Defiance Via Highway 491 Route Project Area	Arizona/New Mexico Plateau: San Juan/Chaco Tablelands and Mesas
	Arizona/New Mexico Plateau: Semiarid Tablelands
Star Lake Route Project Area	Arizona/New Mexico Plateau: San Juan/Chaco Tablelands and Mesas
Defiance Via Highway 371 Route Project Area	Arizona/New Mexico Plateau: San Juan/Chaco Tablelands and Mesas
	Arizona/New Mexico Plateau: Semiarid Tablelands
Farmington Connection Project Area	Arizona/New Mexico Plateau: San Juan/Chaco Tablelands and Mesas

Source: Griffith et al. (2006)

Threatened and Endangered Species

To determine the potential for listed species to occur in the project area options, SWCA reviewed the New Mexico Department of Game and Fish (NMDGF) data (Biota Information System of New Mexico [BISON-M] 2023), New Mexico Energy, Minerals and Natural Resources Department (EMNRD) – Forestry Division data (EMNRD 2021), Navajo Nation special-status species list (Navajo Natural Heritage Program [NNHP] 2020) and USFWS Information for Planning and Consultation (IPaC) data (USFWS 2023b). All listed species from the resources stated above were included to present all potential sensitive species in the areas. In addition, it is the lead agency's discretion to determine the sensitive species under review.

Based on a review of available data sources, there are no USFWS critical habitats within the project area options (USFWS 2022c). However, USFWS-designated critical habitat for the Colorado pikeminnow (*Ptychocheilus lucius*; USFWS threatened) is approximately 5.3 miles north of the routes from the BNSF to NAPI Headquarters, and 0.3 mile north of the Farmington Connection project area (Figures A.8–A.13 in Appendix A) (USFWS 2023c). One USFWS-designated candidate species and four state-listed species may occur in the project area options; however, appropriately timed biological surveys would confirm if suitable habitats for these species are present within the project area options. In addition, six BLM-listed species and four NNDFW-listed species may occur in the project area options. Table 8 outlines all species with potential to occur in the project area options and provides SWCA's rationale for likelihood of occurrence. The federally listed and state-listed species with potential to occur in the project area options are discussed in detail below.

AZTEC GILIA (*ALICIELLA FORMOSA*)

Aztec gilia is a state-listed endangered species and an NESL Group 3 species. This species occurs at elevations between 5,000 and 6,400 feet above mean sea level (amsl) in San Juan County, New Mexico (New Mexico Rare Plant Technical Council 1999). Aztec gilia occurs in sandy clay Nacimiento Formation soils in salt desertscrub communities. It is often found with Clover's cactus (*Sclerocactus cloverae*). Suitable habitat for this species occurs within the San Juan Basin, a region of intensive energy development, which is the most significant current and active threat to most populations of the species (New Mexico Rare Plant Technical Council 1999). The northern portions of the routes intersect the BLM habitat model for Aztec gilia. Coordination with the involved agencies and potentially EMNRD is required to determine the need for species-specific surveys. At a minimum, biological survey would determine whether there is suitable habitat for this species in the project area options, but species-specific surveys may be required to determine presence/absence of this species in the project areas. .

CLOVER'S CACTUS (*SCLEROCACTUS CLOVERAE*)

Clover's cactus is listed as Sensitive by the BLM and endangered by the State of New Mexico and is undergoing the 12-month review process with the USFWS to determine whether the species should be listed as threatened or endangered under the Endangered Species Act (86 Federal Register 25833-25836). This species typically occupies sandy clay Nacimiento Formation soils found in yellow/tan hills grassland, open sagebrush shrubland, and woodlands; valley grassland and open shrubland; dry wash grassland; and mesa top grassland. It can also occupy mesa top open shrubland and woodlands, gray/white hills woodlands and open shrubland, red hills woodlands, valley dense shrubland, and dry wash woodlands and open shrublands (BLM 2017). In New Mexico, this species is known to occur only in the northwestern portion of the state where the Nacimiento Formation exists in San Juan, Sandoval, and Rio Arriba Counties (EMNRD 2021). The northern portions of the routes intersect the BLM habitat model for Clover's cactus. Coordination with the involved agencies and potentially EMNRD is required to determine the need for species-specific surveys. At a minimum, biological survey would determine whether there is suitable habitat for this species in the project area options, but species-specific surveys may be required to determine presence/absence of this species in the project areas. .

MONARCH BUTTERFLY (*DANAUS PLEXIPPUS PLEXIPPUS*)

Monarch butterfly is designated as a BLM Sensitive species (BLM 2018) and a USFWS-designated candidate species (USFWS 2023b). This species was listed because of the decline in populations across North America resulting from habitat reduction and fragmentation. The monarch butterfly is important ecologically for plant population stability as it is an opportunistic pollinator. This species is known to occur throughout New Mexico during seasonal migration and the breeding season during the warmer months of April to October but is not known to overwinter within the state (Cary and Delay 2016). The species is especially tied to the presence of milkweed (*Asclepiadaceae*) species during the breeding season since milkweed species are the sole source of food for monarch caterpillars (BISON-M 2023). This species can possibly be found in all project area options if nectar-producing plant species and/or milkweed vegetation are present. Monarch butterflies may occur in the project areas due to the likely presence of nectar-producing vegetation and the options are within the migratory path for this species. A biological survey would determine whether there is suitable foraging or breeding habitat for this species in the project area options.

BALD EAGLE (*HALIAEETUS LEUCOCEPHALUS*)

The bald eagle is listed as Threatened by the state of New Mexico and is also protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Breeding is limited in New Mexico but has increased in recent years. Bald eagles may occur locally in summer at several locations throughout the state, including primarily Colfax and Sierra Counties. The species is relatively common in the winter and during migration along water courses and reservoirs. In New Mexico, bald eagles typically nest in large trees, often ponderosa pine (*Pinus ponderosa*) or cottonwood (*Populus* sp.), with exposed branches strong enough to support their large nests. Foraging areas have tall, easily accessible trees for perching. Most perch trees used are live trees, although dead trees are preferred if available (BISON-M 2023; Stahlecker and Walker 2010). Suitable foraging habitat may be present in the project areas, however suitable nesting habitat is unlikely to be present as bald eagles rarely nest in New Mexico. A biological survey would determine whether there is suitable habitat for this species in the project area options.

GRAY VIREO (*VIREO VICINIOR*)

Gray vireo is designated as a Threatened species by the State of New Mexico and is protected under the Migratory Bird Treaty Act. In New Mexico, the species is locally distributed across the western two-thirds of the state. It is known to occur within the BLM FFO planning area as a summer resident and/or during the breeding-nesting season (mid- to late April through August) (New Mexico Avian Conservation Partners [NMACP] 2017a). Suitable habitat includes mixed pinyon-juniper woodland, oak (*Quercus* spp.) scrub, and/or chaparral in hot, arid mountains, high plains shrublands, or open pinyon-juniper woodlands with widely spaced trees (BISON-M 2023). Breeding habitat is generally associated with open woodlands/shrublands featuring evergreen trees and shrubs of various kinds, including a well-developed grass component (BISON-M 2023). There is potential for suitable breeding and foraging habitat to occur in the project areas. A biological survey would determine whether there is suitable habitat for this species in the project area options.

Table 8. Federally Listed and State-Listed Special-Status Species for McKinley and San Juan Counties, New Mexico

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Plants				
Acoma fleabane (*Erigeron acomanus*)	NESL G3 BLM S		Occurs in sandy soil at the base of the Entrada Sandstone cliffs. Endemic to Bluewater Canyon in McKinley and Valencia Counties, New Mexico.	Unlikely to occur in the proposed project area options due to the lack of Entrada sandstone cliffs and the proposed project being outside of the species' known range.
Alcove bog-orchid (*Platanthera zothecina*)	NESL G3		Occurs in seeps, hanging gardens, and moist stream areas from desert shrub to pinyon-juniper and ponderosa pine-mixed conifer communities between 4,000 and 7,200 feet amsl. Known populations found in Emery, Garfield, Grand, Uintah, and San Juan Counties, Utah; Moffat County, Colorado; and Navajo, Coconino, and Apache Counties, Arizona.	Unlikely to occur in the project area options due to a lack of seeps and moist perennial streams.
Alcove death camas (*Anticlea vaginatus*)	NESL G3		Occurs in hanging gardens in seeps and alcoves, mostly on Navajo sandstone between 3,700 and 6,700 feet amsl. Endemic to the Colorado Plateau in southern Utah and northern Arizona.	Unlikely to occur in the project area options due to a lack of seeps and moist perennial streams.
Aztec gilia (*Aliciella formosa*)	--	State E	Occurs in salt desert shrublands on soils derived from the Nacimiento Formation. Known to occur in the BLM FFO planning area, but not south of Angel Peak.	May occur in each of the proposed project area options due to the presence of soils derived from the Nacimiento formation and the proposed project is within the BLM FFO's mapped potential habitat zone (BLM 2022). A biological survey would determine whether there is suitable habitat for this species in the project area options.
	NESL G3 BLM S			
Barneby Marble Canyon milkvetch (*Astragalus cremnophylas* var. *hevroni*)	NESL G3		Occurs in crevices and depressions with shallow soils on Kaibab limestone on rim-rock benches at the Marble Canyon edge in Great Basin desertscrub communities around 5,000 feet amsl. Known from the Rims of Marble Canyon near Shinumo Wash in Coconino County, Arizona.	Unlikely to occur in the project area options because the options are not located near the Shimuno Wash.
Brady's plains cactus (*Pediocactus bradyi*)	NESL G2		Occurs in areas of Kaibab limestone chips overlaying soils derived from Moenkopi shale and sandstone. Typically found on gently sloping benches and terraces with sparse vegetation between 3,340 and 5,200 feet amsl. Current known distribution is within Coconino County, Arizona, within the vicinity of the Marble Canyon rim.	Unlikely to occur in the proposed project area options due to a lack of Kaibab limestone chips or Moenkopi shale and sandstone.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Clipped wildbuckwheat *(Eriogonum lachnogynum* var. *colobum)*	BLM S		Occurs in sandy or gypseous limestone ridges and edges of mesas in pinyon-juniper woodland. Endemic to McKinley and Taos Counties, New Mexico.	Unlikely to occur in the proposed project area options due to the lack of sandy or gypseous limestone ridges and mesa edges and the proposed project being outside of the species' known range.
Clover's cactus (*Sclerocactus cloverae*)	NESL G3 BLM S	State E	Occurs in salt desert shrublands on soils derived from the Nacimiento Formation. Known to occur in the BLM FFO planning area.	May occur in each of the proposed project area options due to the presence of soils derived from the Nacimiento formation and because the proposed project is within the BLM FFO's mapped potential habitat zone (BLM 2022). A biological survey would determine whether there is suitable habitat for this species in the project area options.
Cronquist milkvetch (*Astragalus cronquistii*)	NESL G3		Occurs in salt desert shrub and blackbrush (*Coleogyne ramosissima*) communities on sandy or gravelly soils derived from the Cutler and Morrison Formations or Mancos Shale from 4,750 to 5,800 feet amsl. Found in San Juan County, Utah, and Montezuma, Mesa, and Garfield Counties, Colorado.	Unlikely to occur in the proposed project area options because the elevations within the project area options are above the known elevation range for this species and the project area options are not in the known distribution of this species.
Cutler's milkvetch (*Astragalus cutleri*)	NESL G2		Occurs in warm desert shrub communities on sandy, seleniferous soils with level to moderate slopes on the Shinarump and Chinle Formations around 3,800 feet amsl. Known to occur in San Juan County, Utah.	Unlikely to occur within the project area options due to a lack of Shinarump and Chinle formations within the project area options.
Golden lady's slipper (*Cypripedium parviflorum* var. *pubescens*)	--	State E	Occurs in bogs, swamps, and damp woods; near river/canal banks; and in wet meadows.	Unlikely to occur in the proposed project area options due to a lack of perennial rivers, wetlands, or swamps.
Goodding's onion (*Allium gooddingii*)	State E NESL G3		Occurs at the base of steep slopes and within moist drainage bottoms associated with spruce-fir (*Picea* and *Abies* spp.) and mixed conifer forests and aspens (*Populus* spp.) at an elevation of 6,500–10,000 feet amsl.	Unlikely to occur in the proposed project area options due to a lack of steep slopes with moist drainage bottoms in spruce-fur habitats.
Knowlton's Cactus (*Pediocactus knowltonii)*	--	USFWS E	On rolling, gravelly hills in a pinyon-juniper-sagebrush community at about 6,200–6,300 feet amsl. Current known distribution is near Los Pinos River in San Juan County.	Unlikely to occur in the proposed project area options because they are outside of the current known distribution of this species.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Mancos milkvetch (*Astragalus humillimus*)	--	State E	In New Mexico, occurs on sandstone rim rock ledges and mesa tops within pinyon-juniper and desert shrubland vegetative communities in San Juan County. Known populations within the BLM FFO planning area are located within the Hogback Area of Critical Environmental Concern.	Unlikely to occur within the proposed project area options due to the lack of suitable habitat and the project area options are not within the Hogback Area of Critical Environmental Concern.
	USFWS E NESL G2			
Mancos saltbush (*Proatriplex pleiantha*)	BLM S		Inhabits desert badlands with saline clay soils of the Mancos and Fruitland Formations at an elevation of 5,000–5,500 feet amsl. Known to occur in the BLM FFO planning area.	Unlikely to occur in the project areas because there are no soils derived from the Mancos and Fruitland Formations and the proposed project. In addition, elevations within the project area options are above the known elevation range for this species.
Mesa Verde cactus (*Sclerocactus mesae-verdae*)	--	USFWS T State E	Salt desertscrub communities, mostly found on the tops of hills or benches and along slopes. Occurs in soils derived from the Mancos, Fruitland, and Lewis Shale Formations, between 4,900 and 5,500 feet amsl. Known populations within the BLM FFO planning area are located within the Hogback Area of Critical Environmental Concern.	Unlikely to occur within the proposed project area options due to the lack of suitable habitat and because the project area options are not within the Hogback Area of Critical Environmental Concern.
	NESL G2			
Naturita milkvetch (*Astragalus naturitensis*)	NESL G3		Occurs in sand-filled pockets of sandstone slickrock and rimrock pavement along canyons within pinyon-juniper habitat between 5,000 and 7,000 feet amsl. Known from McKinley and San Juan Counties, New Mexico, and southwestern Colorado and southeastern Utah.	Unlikely to occur in the project area options due to a lack of slick rock and rim rock pavement along canyons.
Navajo bladderpod (*Physaria navajoensis*)	NESL G3		Typically occurs on windward, windswept mesa rims and nearby habitat with little vegetative cover and high insolation. It has also found at the base and slopes of small hills of the Chinle Formation. Typically, only found in a combination of Todilto limestone overlaying Entrada sandstone or Chinle outcrops within pinyon-juniper communities. Known populations occur in Apache County, Arizona, and McKinley County, New Mexico.	Unlikely to occur in the project area options as they do not occur in the Chinle Formation.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Navajo penstemon (*Penstemon navajoa*)	NESL G3		Occurs in rocky, open places in ponderosa pine, aspen, and Douglas fir (*Pseudotsuga menziesii*) communities from 7,000 to 10,300 feet amsl. Known from Navajo Mountain and upper Dark Canyon in San Juan County, Utah, and the Manti-LaSal National Forest near Moab, Utah.	Unlikely to occur in the project area options due to the locations not overlapping with the Navajo Mountains and upper Dark Canyon.
Navajo sedge (*Carex specuicola*)	NESL G3		Typically found in seeps and hanging gardens on vertical sandstone cliffs and alcoves from 4,600 to 7,200 feet amsl. Known from northern Arizona and San Juan County, Utah.	Unlikely to occur in the proposed project area options as they are outside of the known distribution of this species.
Parish's alkali grass (*Puccinellia parishii*)	State E BLM S		Occurs in alkaline springs, seeps, and seasonally wet areas that occur at the heads of drainages or on gentle slopes at 2,600–7,200 feet amsl range-wide. The species requires continuously damp soils during its late winter to spring growing period. It frequently grows with saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), sedges (*Carex* sp.), bulrushes (*Scirpus* sp.), rushes (*Juncaceae* sp.), spike rushes (*Eleocharis palustris*), and yerba mansa (*Anemopsis californica*). Potentially occurs within the BLM FFO planning area in San Juan County, New Mexico.	Unlikely to occur in the proposed project area options due to lack of springs, seeps, or seasonally wet areas.
Round dunebroom (*Errazurizia rotundata*)	NESL G3		Known from several types of outcrops ranging from sandy soils in sandstone, gravelly soils in calcareous outcrops, to deep, alluvial cinders in sandstone breaks. Generally found in exposed habitats in the semi-arid environment of the Great Basin desertscrub from 4,600 to 5,200 feet amsl. Known from Coconino and Navajo Counties, Arizona, near Tuba City, Winslow, Holbrook, and Wupatki National Monument.	Unlikely to occur in the proposed project area options as they are outside of the known distribution of this species.
San Juan milkweed (*Asclepias sanjuanensis*)	BLM S		Grows in juniper savannas or Great Basin desertscrub vegetation communities with sandy loam soils at an elevation of 5,000–5,500 feet amsl. Usually associated with disturbed areas. Known to occur in the BLM FFO planning area in San Juan County.	May occur in each of the proposed project area options due to the potential for suitable desertscrub habitat to be present. A biological survey would determine whether there is suitable habitat for this species in the project area options.
Sivinski's blazingstar *(Mentzelia sivinskii)*	BLM S		Occurs in volcanic pumice and unconsolidated pyroclastic ash in pinyon-juniper woodlands and lower montane coniferous forest. Endemic to New Mexico in Los Alamos, northeastern Sandoval and northwestern Santa Fe Counties, and the Jemez Mountains.	Unlikely to occur in the proposed project area options due to the lack of volcanic pumice and unconsolidated pyroclastic ash and the proposed project being outside of the species' known range.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Welsh's milkweed (*Asclepias welshii)*	NESL G3		Occurs in active sand dunes derived from Navajo sandstone in sagebrush, juniper, and ponderosa pine communities from 5,000 to 6,230 feet amsl. Known from northern Arizona and Kane County, Utah.	Unlikely to occur in the proposed project area options as they are outside of the known distribution of this species.
Zuni fleabane (*Erigeron rhizomatus)*	State E USFWS T NESL G2		Nearly barren detrital clay hillsides with soils derived from shales of the Chinle or Baca Formations (often seleniferous). In the Datil/Sawtooth mountains *Erigeron rhizomatus* occurs mostly on or adjacent to the poorly defined transition zone between the Baca Formation below and the Spears Group above. The species is most often found on north- or east-facing moderate to steep slopes in open pinyon-juniper woodlands and ponderosa pine forests at 7,300–8,300 feet amsl but can be found on all exposures.	Unlikely to occur in the proposed project area options due to lack of shales of the Chinle or Baca Formations.
Invertebrates				
Great Basin silverspot (*Speyeria nokomis*)	USFWS T NESL G3		Occurs in perennially wet meadows associated with seeps, springs, and streams that are variable in size (0.1 hectare to > 1.2 hectares), relatively open, and dominated by grasses with few shrubs. Violets (*Viola nephrophylla*) found in wet soils in shady areas beneath shrubs or within stream banks are a necessary component of the habitat as the host plant for the larvae. Known from eastern Utah, western Colorado, northern Arizona, and New Mexico.	Unlikely to occur in the proposed project area options due to a lack of perennial waterbodies.
Monarch butterfly (*Danaus plexippus plexippus*)	USFWS C BLM S		Occurs throughout the state but most abundant in southeastern New Mexico. In New Mexico, migration peaks in April and subsides by mid-May. Breeding occurs within the state, and a new generation matures in New Mexico by July. The southward migration to Mexico begins in late August and September. During the breeding season, monarch butterfly caterpillars require milkweed as a food source. There is currently no evidence that monarchs overwinter in New Mexico.	May occur in each of the project area options if suitable milkweed habitat or an abundance of flowering plants is present. A biological survey would determine whether there is suitable habitat for this species in the project area.
Fish				
Colorado pikeminnow (*Ptychocheilus lucius*)	--	USFWS E State E NESL G2	Occurs in medium to large rivers within the Upper Colorado River Basin, including the San Juan River. No pikeminnows have been detected in the BLM FFO planning area. Designated critical habitat exists in San Juan County, New Mexico.	Although critical habitat for this species is in the vicinity of the project area options, it is unlikely to occur in the proposed project area options due to a lack of perennial rivers intersected by the project areas.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Humpback chub (*Gila cypha*)	NESL G2		First-year chubs are found in shallow waters along edges of deeper waters. Adults use a variety of habitats including pools, riffles, and eddies and seem to prefer whitewater reaches with deep, swirling eddies and the turbulent waters near boulders and submerged rocks. Spawning is thought to occur over gravel beds in swift water. The species is restricted to the Colorado River and a few of its narrow, canyon-bound tributaries in Arizona, Utah, and Colorado. The largest population is found at the confluence of the Little Colorado River and Colorado River. Nearly all successful spawning downstream of the Glen Canyon Dam occurs within the lower 8 miles of the Little Colorado River.	Unlikely to occur in the proposed project area options due to a lack of perennial waterbodies suitable for this species.
Razorback sucker (*Xyrauchen texanus)*	USFWS E NESL G2		The razorback sucker is a suckerfish found in rivers and lakes in the southwestern United States. It is currently restricted to the Colorado River upstream of the Grand Canyon and to four reservoirs, Lake Mead, Lake Mohave, Lake Havasu, and Lake Powell.	Although critical habitat for this species is in the vicinity of the project area options, it I unlikely to occur in the proposed project area options due to a lack of perennial waterbodies suitable for this species.
Roundtail chub (*Gila robusta*)	--	State E	Occurs in the San Juan and Gila River Basins and was also formerly present in the Zuni and San Francisco River drainages. In the San Juan Basin, this chub is currently found in the mainstem of the San Juan River from Navajo Reservoir downstream to the Four Corners area and in the Mancos, Navajo, and Animas Rivers in San Juan and Rio Arriba Counties.	Unlikely to occur in the proposed project area options due to a lack of perennial waterbodies suitable for this species.
	NESL G2 BLM S			
Zuni bluehead sucker (*Catostomus discobolus yarrowi*)	State E	--	Occurs in low-velocity pools and pool-runs of streams with seasonally dense algae. Designated critical habitat is present in McKinley County, New Mexico, and the species is known to occur in this county.	Unlikely to occur in the proposed project area options due to a lack of perennial waterbodies suitable for this species.
	USFWS E NESL G2			
Birds				

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
American dipper (*Cinclus mexicanus*)	NESL G3		Nests near clear, unpolluted streams usually less than 45 feet in length and 2 feet deep with a variety of riffles, pools, and waterfalls with substrate of rocks, sand, and rubble. Instream and streamside boulders are necessary for perches. Nests are placed on ledges or in crevices on stream-bank structures of small cliffs, large rocks, fallen logs, and tree roots. Streams used in winter may be larger and deeper, but lack of ice is a major selection factor. Known from the east and west faces of the Chuska Mountains, the upper Canyon de Chelly, the Little Colorado River, and upper Piute Canyon near Navajo Mountain. Potential to occur where perennial streams have the proper habitat parameters.	Unlikely to occur in the proposed project area options due to a lack of perennial waters including riffles, pools, and waterfalls.
Baird's sparrow (*Ammodramus bairdii*)	--	State T	A winter resident in New Mexico, it has been found on Otero Mesa and in the Animas Valley and may occur in other areas of suitable winter habitat, particularly in the southern portion of state. Generally prefers dense, extensive grasslands with few shrubs. Avoids heavily grazed areas. Potential migrant through the BLM FFO planning area.	Unlikely to occur in the proposed project area options as they are outside of the known distribution of this species.
Bald eagle (*Haliaeetus leucocephalus*)	State T NESL G2		Occurs in New Mexico year-round. Breeding is restricted to a few areas mainly in the northern part of the state along or near lakes. In migration and during winter months, the species is found chiefly along or near rivers and streams and in grasslands associated with large prairie dog (*Cynomys* sp.) colonies. Typically perches in trees. Bald eagles are known to migrate through and winter in the BLM FFO planning area. Roosting sites are present within the BLM FFO Bald Eagle Area of Environmental Concern.	May occur in the proposed project area options if suitable foraging habitat is present, specifically the presence of prairie dog colonies. In addition, there are perennial water sources in the vicinity of the project area options. Nesting habitat is not likely to occur in the proposed project area options. A biological survey would determine whether there is suitable habitat for this species in the project area.
Bendire's thrasher (*Toxostoma bendirei*)	BLM S		Inhabits sparse, desert shrublands and open woodlands with scattered shrubs. Avoids riparian areas and arroyos with dense shrub cover. In New Mexico, the species breeds in scattered locations in the central and western portions of the state and inhabits a variety of habitats including sagebrush shrubland with scattered juniper, desert habitat with medium to large shrubs, degraded desert grasslands, desert shrublands with little grass cover, and cholla stands (NMACP 2017b). Potential to occur in the BLM FFO planning area during the breeding-nesting season.	May occur in each of the proposed project area options due to the presence of suitable habitat. A biological survey would determine whether there is suitable habitat for this species in the project area.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Broad-billed hummingbird (*Cynanthus latirostris*)	--	State T	Occurs in riparian habitat or dense mesquite in canyons in southwestern New Mexico. Found in Guadalupe Canyon in Hidalgo County and rarely found in the Peloncillo Mountains. Not known to occur in the BLM FFO planning area.	Unlikely to occur in the proposed project area options as they are outside of the known distribution of this species.
Brown pelican (*Pelecanus occidentalis*)	--	State E	There are records from 20 New Mexico counties, with most from large lakes or along major rivers, including in the San Juan River, Gila River, Rio Grande, Canadian River, and Pecos River drainages (NMDGF 2012). The brown pelican is usually found in marine habitats in warmer waters in North America, except for the lower Colorado Basin and vicinity. It only rarely occurs inland.	Unlikely to occur in the proposed project area options as they are outside of the known distribution of this species and a lack of perennial waterbodies.
Chestnut-collared longspur (*Calcarius ornatus*)	BLM S		Migrant and winter resident in New Mexico, primarily in southeastern New Mexico. Occurs in grasslands. Has the potential to occur in the BLM FFO planning area during migration but is outside the common migration path (National Audubon Society 2021).	Unlikely to occur in the proposed project area options as they are outside of the known distribution of this species.
Common black hawk (*Buteogallus anthracinus)*	--	State T	The southwestern United States is the northern extent of this species' range. Occurs in New Mexico almost exclusively during the breeding season and in migration. Breeding populations are known chiefly from the Gila River Valley in the southwestern portion of the state and from along the Mimbres River and the Rio Hondo watersheds. Strongly tied to cottonwood gallery forests. In New Mexico, it is an uncommon summer resident and generally restricted to the mountainous riparian habitats of the San Francisco River, Gila River, and Mimbres River drainages. Not known to occur in the BLM FFO planning area.	Unlikely to occur in the proposed project area options as they are outside of the known distribution of this species.
Costa's hummingbird (*Calypte costae)*	State T	--	Occurs in shrubland and canyons between 2,800 and 5,500 feet amsl with open to dense vegetation of shrubs and low trees. It usually breeds in arid habitats and occasionally in agricultural areas. They are rare, irregular, and generally localized to Guadalupe Canyon in the extreme southwest corner of New Mexico during spring and summer.	Unlikely to occur in the proposed project area options due to the proposed project being outside of the species' known distribution and elevation range.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Ferruginous hawk (*Buteo regalis*)	NESL G3		Occurs year-round in New Mexico. During the breeding season it is present in grasslands and badlands and along the ecotone between grasslands and pinyon-juniper woodlands, especially in the vicinity of prairie dog colonies. During the winter, ferruginous hawks are primarily associated with grasslands but may be found in other habitat types such as ponderosa pine forest. Prairie dogs are important year-round in the diet. Known to occur in the BLM FFO planning area as a permanent resident.	May occur in each of the proposed project area options due to the potential for suitable pinyon-juniper or grasslands habitat. A biological survey would determine whether there is suitable habitat for this species in the project area.
Golden eagle (*Aquila chrysaetos*)	NESL G3		Occurs year-round in New Mexico. During the breeding season, occurs in areas of mountain cliffs or canyons adjacent to open desert or grassland areas. In New Mexico, nests along steep-walled mountain canyons. During the winter, forages in open grassland or shrubland habitat (NMACP 2017c). Known to occur in the BLM FFO planning area as a permanent resident.	May occur in each of the proposed project area options due to the potential for suitable foraging habitat. Nesting habitat is not likely to be present. A biological survey would determine whether there is suitable habitat for this species in the project area.
Gray vireo (*Vireo vicinior*)	State T		Strongly associated with pinyon-juniper and scrub oak habitats. Distributed mainly across the western two-thirds of the state. Prefers gently sloped canyons, rock outcrops, ridge tops, and moderate scrub cover. Known to occur in the BLM FFO planning area during the breeding-nesting season.	May occur in each of the proposed project area options due to the potential for suitable foraging and nesting habitat. Nesting habitat is not likely to be present. A biological survey would determine whether there is suitable habitat for this species in the project area options.
Least tern (*Sterna antillarum*)	State E		Migratory species occurring in North America during the breeding season when it is associated with water (e.g., lakes, reservoirs, and rivers). In New Mexico, breeding is restricted to the Pecos River Basin, primarily at Bitter Lake National Wildlife Refuge in Chaves County. May occur in the BLM FFO planning area during migration but has not been recorded there. Suitable habitat along rivers consists of bare sandy shorelines and salt flats.	Unlikely to occur in the proposed project area options due to lack of lakes, rivers, or reservoirs.
Mexican whip-poor-will *(Antrostomus arizonae)*	BLM S		Predominantly associated with pine and oak woods in the mountains and canyons. Mexican whip-poor-wills lay eggs on the ground in the woods, near the edge of clearings with open soil covered with dead leaves or pine needles. Has been known to occur in southern New Mexico in the breeding season. Has the potential to occur in the BLM FFO planning area.	Unlikely to occur in the proposed project area options due to lack of pine and oak woodlands in mountains and canyons.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Mexican spotted owl (*Strix occidentalis lucida*)	USFWS T NESL G3		Predominantly associated with closed-canopy forests, such as old-growth mixed conifer forests. Spotted owls roost and nest in large trees associated with chaparral and pinyon woodlands, including deep, steep-walled canyons.	Unlikely to occur in the project area options because of the lack of mountainous habitat or deep canyons dominated by mixed-conifer, ponderosa pine (*Pinus ponderosa*), and Gambel oak (*Quercus gambelii*) forests.
Peregrine falcon (*Falco peregrinus*)	State T		Found in New Mexico year-round. All nests in New Mexico are found on cliffs. In migration and during winter months, New Mexico's peregrine falcons are typically associated with water and large wetlands.	Unlikely to occur in the proposed project area options due to the proposed project being outside of the species' known distribution and elevation range.
Pinyon jay (*Gymnorhinus cyanocephalus*)	BLM S		Predominantly associated with the pinyon-juniper woodland vegetation community, especially twoneedle pinyon. May occur in areas with ponderosa pine, sagebrush, and chaparral vegetation. Breeding sites consist of dense, mature stands of pinyon-juniper woodlands (NMACP 2020). Known to occur in the BLM FFO planning area as a permanent resident.	May occur in each of the proposed project area options due to the presence of suitable sagebrush shrubland foraging habitat and the presence of pinyon-juniper woodlands. A biological survey would determine whether there is suitable habitat for this species in the project area.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	USFWS E State E NESL G2		Breeds and migrates through dense riparian tree and shrub communities associated with rivers, swamps, and other wetlands, including lakes and reservoirs. Historically nested in native vegetation including willows, seepwillow, boxelder (*Acer negundo*), buttonbush (*Cephalanthus occidentalis*), and cottonwood. This subspecies nests in native vegetation or thickets dominated by non-native tamarisk (*Tamarix* sp.) and Russian olive (*Elaeagnus angustifolia*) or in mixed native and non-native stands of vegetation. In New Mexico, the species is known to breed along the Gila River and Rio Grande.	Unlikely to occur in the project area options because of the lack of suitable riparian habitat.
Virginia's warbler (*Vermivora virginiae)*	BLM S		Occurs in New Mexico during the breeding season (April–May) at middle elevations where coniferous woodland or forests mix with deciduous shrubs or trees. A dense, tall shrub layer is critical for nesting and foraging, and the species does not occur where there is not a deciduous component (NMACP 2017d). The species is typically associated with pinyon-juniper and oak woodlands with a dense understory but will extend upward into mixed conifer habitat with Gambel oak, New Mexico locust (*Robinia neomexicana*), maple (*Acer* spp.), or other shrubby deciduous vegetation (NMACP 2017d).	May occur in each of the proposed project area options due to the presence of pinyon-juniper woodlands. A biological survey would determine whether there is suitable habitat for this species in the project area.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Western burrowing owl (*Athene cunicularia*)	BLM S		Present mainly during the breeding season in the north half of the state and present year-round in the south half. Found in grasslands especially in association with prairie dog colonies, in desertscrub, and in agricultural and semi-urban environments. Depends on prairie dogs, rock squirrels (*Otospermophilus variegatus*), and other fossorial mammals for the availability of burrows. Known to occur in the BLM FFO planning area during the breeding-nesting season.	May occur in each of the proposed project area options due to the presence of potentially suitable habitat and potential for burrows to exist. A biological survey would determine whether there is suitable habitat for this species in the project area.
Yellow-billed cuckoo (*Coccyzus americanus*)	USFWS T NESL G2		Only the western population beyond the Pecos River drainage has been listed as threatened under the Endangered Species Act. Breeds and migrates in and through riparian habitat and associated drainages, springs, developed wells, and earthen ponds supporting mesic vegetation. Also occurs in deciduous woodlands with cottonwoods and willows. Dense understory foliage is important for nest site selection. Nests in and forages in willow, mesquite, cottonwood, and hackberry. Requires patches of at least 25 acres for breeding.	Unlikely to occur in the project area options because of the lack of suitable riparian habitat.
Amphibians				
Northern leopard frog (*Lithobates (Rana) pipiens)*	NESL G2 BLM S		Breeds in wetlands usually with permanent water and aquatic vegetation (especially cattails [*Typha* spp.]), ranging from irrigation ditches and small streams to rivers, and from small ponds and marshes to lakes or reservoirs. Potential exists throughout the Navajo Nation where suitable habitat exists.	Unlikely to occur in the proposed project area options due to a lack of perennial waterbodies.
Mammals				
Gunnison's prairie dog (*Cynomys gunnisoni*)	BLM S		Occurs in grassland and shrub-steppe habitat at elevations ranging from semi-desert to montane between 4,500 and 10,000 feet amsl. Found in a variety of habitats including montane grasslands, juniper savannas, plains-mesa grasslands, Great Basin desertscrub, plains-mesa sand scrub, desert grasslands, and in urban and cultivated areas. They prefer predominantly graminoid and herbaceous plant cover with few or no trees and variable shrub density (NMDGF 2008).	May occur in each of the proposed project area options due to the potential of suitable habitat. A biological survey would determine whether there is suitable habitat for this species in the project area.

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Kit fox (*Vulpes macrotis*)	NESL G4		Known on the Navajo Nation to occur east of the Chuska Mountains and in the Chinle Valley in Arizona and Utah but has potential to occur in all desertlands on the Navajo Nation. Dens are excavated in desertscrub or desert grasslands with soft, alluvial or silty-clay soils and often with sparse saltbush, shadescale, greasewood, or sagebrush, and grasses.	May occur in each of the proposed project area options due to the potential for suitable desertscrub, sagebrush or grasslands habitat to be present. A biological survey would determine whether there is suitable habitat for this species in the project area.
Mexican gray wolf (*Canis lupus baileyi*)	USFWS E		Wolves in the Southwest generally have been associated with montane forests and woodlands. West of the New Mexico plains, they are most prevalent in high mountain country capped with conifer forest. The historic distribution of the gray wolf included much of North America, extending from northern tundra regions southward through New Mexico to Durango, Mexico.	Unlikely to occur in the project area options due to the lack of suitable mountainous woodland habitat.
New Mexico meadow jumping mouse (*Zapus hudsonius luteus*)	--	USFWS E State E†	The New Mexico meadow jumping mouse is endemic to New Mexico, Arizona, and a small area of southern Colorado. The mouse appears to use only two riparian community types: 1) persistent emergent herbaceous wetlands (i.e., beaked sedge [*Carex utriculate*] and reed canary grass [*Phalaris arundinacea*] alliances) and 2) scrub-shrub wetlands (i.e., riparian areas along perennial streams that are composed of willows and alders [*Alnus* sp.]).	Unlikely to occur in the proposed project area options due to the lack of suitable perennial wetlands.
Pronghorn (*Antilocapra americana*)	NESL G3		Found in grasslands or desertscrub areas with rolling or dissected hills or small mesas usually scattered with shrubs and trees, especially juniper and sagebrush.	May occur in each of the proposed project area options due to the potential for small mesas with scattered shrubs and trees. However, there is likely a lack of suitable extensive grassland habitat for this species to forage in. A biological survey would determine whether there is suitable habitat for this species in the project area.
	--	State T		

Common Name (*Scientific name*)	Status*		Range or Habitat Requirements	Potential for Occurrence in the Proposed Project Area Options
	McKinley County	San Juan County		
Spotted bat (*Euderma maculatum*)	BLM S		In New Mexico, spotted bats have been taken in areas near cliffs, including areas with pinyon-juniper woodlands, and from streams or water holes within ponderosa pine or mixed coniferous forest. The species has also been recorded over cattle tanks in a meadow surrounded by mixed coniferous forest and near a ridge with cliffs and limestone outcroppings. Foraging habitat is typically found in areas near wetlands, water sources, and moist depressions that contain a higher level of prey availability compared to the surrounding landscape (Luce and Keinath 2007). It also may use rivers or desert washes as travel corridors. Known to occur in the BLM FFO planning area as a permanent resident.	Unlikely to occur in the proposed project area options due to lack of suitable roosting habitat, such as cliffs and limestone outcroppings, dense forests, or water sources.
Townsend's big-eared bat (*Corynorhinus townsendii*)	BLM S		Found in a variety of xeric to mesic habitats, including scrub-grassland, desertscrub, semi-desert shrublands, chaparral, saxicoline brush, tundra, open montane forests, spruce-fir, mixed hardwood-conifer, and oak woodlands and forests. This species is strongly correlated with the availability of spacious caves or cave-like habitat, such as abandoned buildings and bridges, for roosting (Gruver and Keinath 2006). Known to occur in the BLM FFO planning area as a permanent resident.	Unlikely to occur in the proposed project area options due to lack of suitable roosting habitat such as cliffs or caves.

Sources: BISON-M (2023); Cartron (2010); NatureServe (2023); New Mexico Rare Plant Technical Council (1999); NMDGF (2020); USFWS (2023b).

Note:

*Federal (USFWS): C= candidate; E = endangered; T = threatened; EXPN = Experimental population

State (NMDGF): E = endangered; T = threatened

NNDFW NESL status definitions: G2 = Endangered (a species or subspecies whose prospects of survival or recruitment are in jeopardy). G3 = Endangered (a species or subspecies whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future). G4 = Any species or subspecies for which the NNDFW does not currently have sufficient information to support their being listed as G2 or G3, but for which the NNDFW has reason to consider the species or subspecies.

- Species listed by NNDFW are listed for both counties under review.

BLM S = sensitive species listed by the BLM FFO (McKinley and San Juan Counties)

†USFWS listed for the designated county, but not listed by the NMDGF for the designated county.

Cultural Resources

SWCA conducted a desktop review of known cultural resources for six proposed route options for the San Juan Four Corners Freight Rail Line project. Using the New Mexico Cultural Resource Information System (NMCRIS), each route was analyzed for cultural resources and their eligibility for the National Register of Historic Places (NRHP). Additionally, the routes were analyzed for known Traditional Cultural Places (TCPs). Each route was analyzed with a two-mile buffer from the center line; all resources listed intersect this area. This investigation includes the total resources possibly affected within the two-mile buffer and does not indicate that the route options intersect all these resources. If routes are moved within this two-mile buffer the actual resources affected will vary.

During the current investigation previous qualifying surveys were not analyzed, and it is assumed that all land will need survey, including federal, tribal, state, and private lands. Previously qualifying survey coverage can be analyzed once the route choices have been reduced. The number of sites per route and eligibility are detailed in the table below (Table 9). The eligibility is categorized as Eligible, Not Eligible, Unevaluated, and Unlisted for the NRHP. Unevaluated and unlisted archaeological sites will be treated as eligible until the eligibility is determined. This information does not include data held by the Navajo Nation Heritage and Historic Preservation Department (NNH&HPD) as the data is restricted and can only be searched once a permit to conduct cultural resources has been received. At that time an in-person visit to the NNH&HPD in Window Rock would be needed to access any files. NMCRIS contains some sites located in the NNH&HPD database, but it is not comprehensive. The known TCPs were also analyzed in regard to the potential routes (see Table 9). The Star Lake route project area is the only route intersecting known TCPs. It is very likely that there are more TCPs throughout the area, and the Navajo Nation and BLM FFO will be consulted when the route choices have been reduced.

Table 9. Cultural Resource Sites Known in the Project Area Options

Routes	Eligible Sites	Not Eligible Sites	Unevaluated	Unlisted	Total sites	TCPs
El Segundo Route Project Area	479	170	1101	95	1845	-
Defiance Via Indian Creek Route Project Area	588	199	1477	133	2397	-
Defiance Via Highway 491 Route Project Area	360	106	2355	130	2951	-
Star Lake Route Project Area	249	85	1490	178	2002	2
Defiance Via Highway 371 Route Project Area	599	205	1492	137	2433	-
Farmington Project Area	42	24	243	22	331	-

Regulatory Framework

Projects that are federally permitted, licensed, funded, or partially funded must comply with Section 106 of the National Historic Preservation Act. Section 106 requires federal agencies consider the effects of their undertakings on historic properties, defined as any property listed in or eligible for listing in the NRHP. The NRHP is a listing of historic properties maintained by the Secretary of the Interior and includes historic buildings, structures, objects, and districts, as well as archaeological sites. As stipulated in the Section 106 implementing regulations in 36 Code of Federal Regulations 800 (“Protection of Historic Properties”), compliance includes the identification and evaluation of historic properties.

The cultural resources surveys on federally managed lands will need to comply with current agency specific guidance and requirements, such as the BLM's current (2005) *Procedures for Performing Cultural Resource Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities*. Projects on State Trust land that are managed by the NMSLO are guided by New Mexico Administrative Code (NMAC) 4.10.15. The NMSLO requires that an archaeological survey be conducted to current standards for the project's areas of potential effects pursuant to and in compliance with the NMAC 4.10.15, to ensure that cultural properties are not inadvertently excavated, damaged, or destroyed by any person. Surveys within NMDOT ROW will also need to be conducted in accordance with NMAC 4.10.15, as well as the NMDOT's current (2018) *Guidelines for Cultural Resource Investigations*. Any work conducted on Navajo Nation lands are pursuant to the Navajo Nation Cultural Resources Protection Act (NN Code Title 19, Section 1001 [Chapter 8]).

Anticipated Cultural Resources Investigation Requirements

Cultural resources investigations of the project segments would include updated background reviews of previously conducted surveys and previously documented sites, which would be conducted just before the survey investigations. Background reviews would include accessing the NMCRIS online database, as well as searching the cultural resources data files maintained by the individual agencies, such as the BLM, NMSLO, and NNH&HPD. These agencies would also need to be consulted regarding the required level of effort for the cultural resources field investigations and reporting on the portions of the project area options on their lands.

Following completion of surveys, the agencies would be consulted regarding site-specific preservation and protection requirements depending on the results of the field investigation and potential impacts from the proposed project. For NRHP-eligible or potentially eligible sites and historic cultural properties, plans to avoid, minimize or mitigate adverse effects would be developed in consultation with the applicable land-managing agency.

SUMMARY OF POTENTIAL SITE CONSTRAINTS

Based on SWCA's preliminary review of data sources and potential environmental constraints, there are no resources at the desktop level that would prevent any of the project area options from being constructed if the appropriate federal, state, and local permits are granted. Biological surveys would confirm the presence of suitable sensitive species habitat and aquatic resources in the project areas. If cultural or paleontological resources are within the preferred alternative alignment, it is recommended that these resources are avoided. If biological surveys indicate the presence of suitable habitat for any listed species, reducing disturbance to suitable habitat to the greatest extent possible is recommended. Conclusions and recommendations are listed below in Table 10.

Table 10. Critical Issues—Conclusions and Recommendations by Resource

Land Use and Zoning	
Conclusion	All the route options intersect federally managed lands (BLM and tribal). Due to the federal action, National Environmental Policy Act (NEPA) compliance would be required. All the project area options would traverse medium to densely populated areas. The El Segundo route has the least amount of residences within 1 mile (225) and the Farmington Connection has the most amount of residences within 1 mile (546).
Recommendation	An agency kickoff call would determine the lead federal agency for the project and the level of effort for NEPA. SWCA recommends coordinating with landowners and land management agencies to confirm permitting needs and the extent of public outreach, specifically to the surrounding communities.
Geology	

Conclusion	All route options intersect areas of PFYC 3 and 5. Additionally, all routes, other than the Farmington Connect intersect PFYC 4 and the Defiance Via Highway 491 Route project area intersects areas of unknown PFYC. No soil concerns are present.
Recommendation	Paleontological surveys would likely be required for project areas located on federal lands within PFYC 5 and 4. Paleontological surveys in PFYC 3 or U areas may require surveys. SWCA recommends coordinating with the agencies to determine paleontological survey needs.
Aquatic Resources	
Conclusion	No perennial waterbodies are mapped within the route option project areas, however several ephemeral and intermittent streams are mapped within the project areas. In addition, NWI-mapped wetland features also intersect the project areas. All routes other than the Farmington Connection intersect areas mapped as FEMA 100-year floodplains.
Recommendation	Aquatic surveys would confirm the presence of potentially jurisdictional surface water features in the project areas. If any potentially jurisdictional surface water features are observed, compliance with CWA would be required if avoidance is not feasible. Stream or wetland crossings may be permittable through the use of NWP 14. Consultation with USACE is recommended.
Vegetation	
Conclusion	Common habitat types within the project area options include sagebrush shrublands, badlands, pinyon-juniper woodlands and savannas, agricultural fields, and developed areas including major roadways, residences, and commercial development. The vegetation observed within the project area options is not expected to be rare compared to the vegetation or habitat types in the vicinity of the project area options.
Recommendation	Noxious weed mitigations are recommended during construction to reduce the potential spread of noxious weeds and potential impacts to native vegetation from the establishment of noxious weeds. It is recommended to adhere to agency guidelines and best management practices for reducing the spread of noxious weeds.
Wildlife	
Conclusion	Based on SWCA's desktop analysis, one USFWS candidate species, two state-listed endangered plant species, and two state-listed threatened avian species may occur in the project area options. In addition, six BLM sensitive species and four NNDFW sensitive species may occur in the project area options.
Recommendation	Appropriately timed biological surveys would confirm the presence of suitable habitat for the listed species along with the species' potential to occur in the proposed project areas. Due to the project being a federal action, the project would need to comply with ESA Section 7. Monarch butterfly (designated candidate species at the time of this CIA) has the potential to occur in the project area. If the monarch butterfly receives a proposed listing, HDR would need to comply with Section 7 review of the species, which may include consultation or species-specific surveys. In addition, USFWS-designated critical habitat is within the vicinity of the route options. Avoidance of critical habitat is recommended. Coordination with the agencies for the species-specific timing considerations and level of effort is recommended. If any state-listed species are known to occur in the project area after appropriately timed biological surveys, coordination with the lead agency and NMDGF is recommended. If harm or take is expected to any state-listed plant species, an incidental take permit may be required and coordination with NMDGF and/or EMNRD is recommended. If any BLM sensitive species or NNDFW sensitive species are known to occur within the project areas after appropriately timed surveys, coordination with the BLM or NNDFW would be required. Mitigations to reduce impacts to listed species habitat could be developed with the involved agencies or avoidance of habitat is not feasible.
Cultural Resources	
Conclusion	Each of the route options intersect cultural sites. The Defiance via Indian Creek route and Defiance via Highway 371 route project areas intersect the most amount of eligible sites. These two routes also intersect the most cultural sites, including not eligible, unevaluated, and unlisted cultural sites. The Star Lake route project is the only route option intersecting known TCPs.
Recommendation	Cultural resources surveys would be required on federal lands and state lands where qualifying survey has not been performed. Avoidance or mitigation of resources is recommended. Please note that this information is based on NMCRIS data and does not include comprehensive information specific to the Navajo Nation. Agency coordination to develop the area of potential effects and survey protocol is recommended.

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APPENDIX A

MAPS

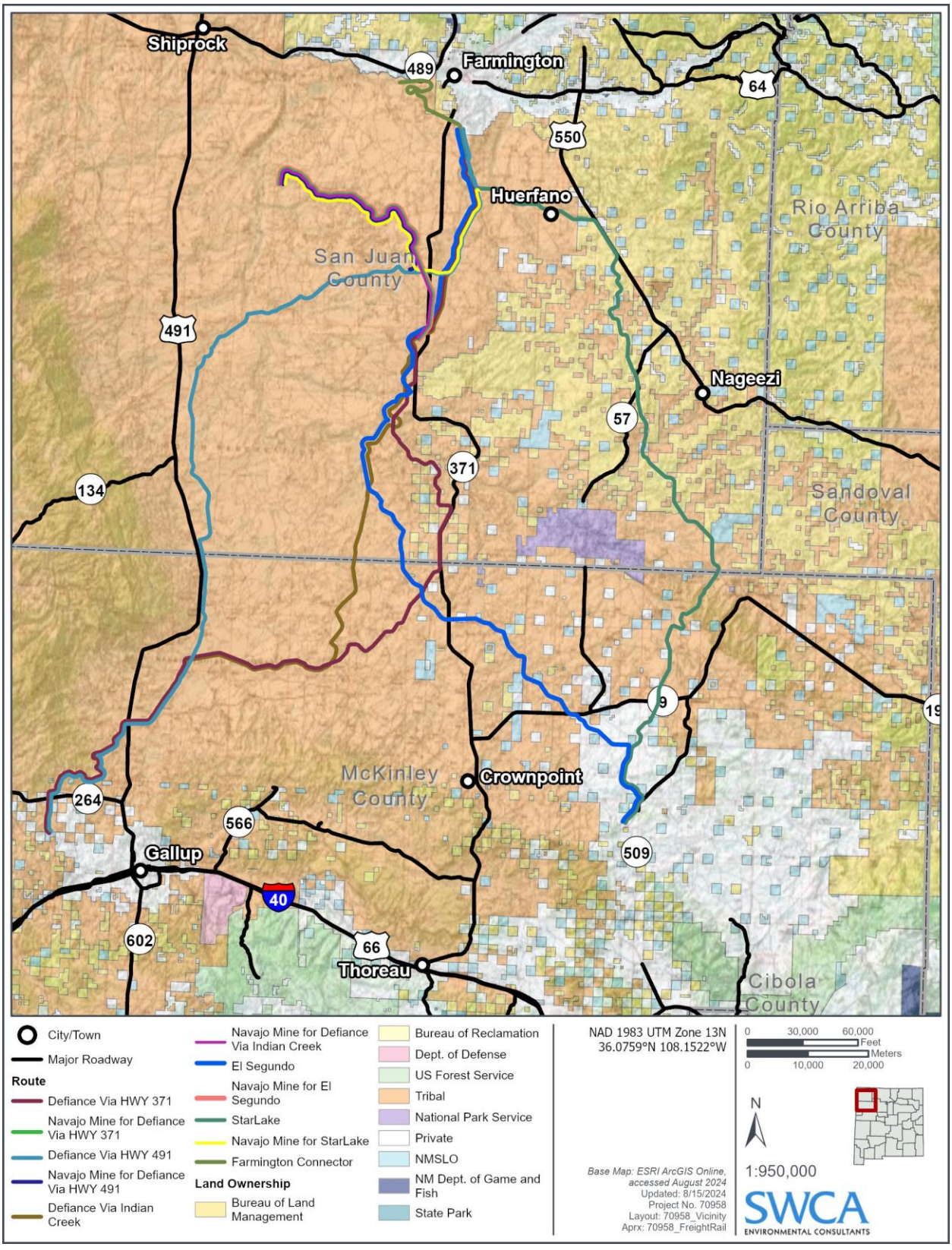

Figure A.1. Project vicinity map.

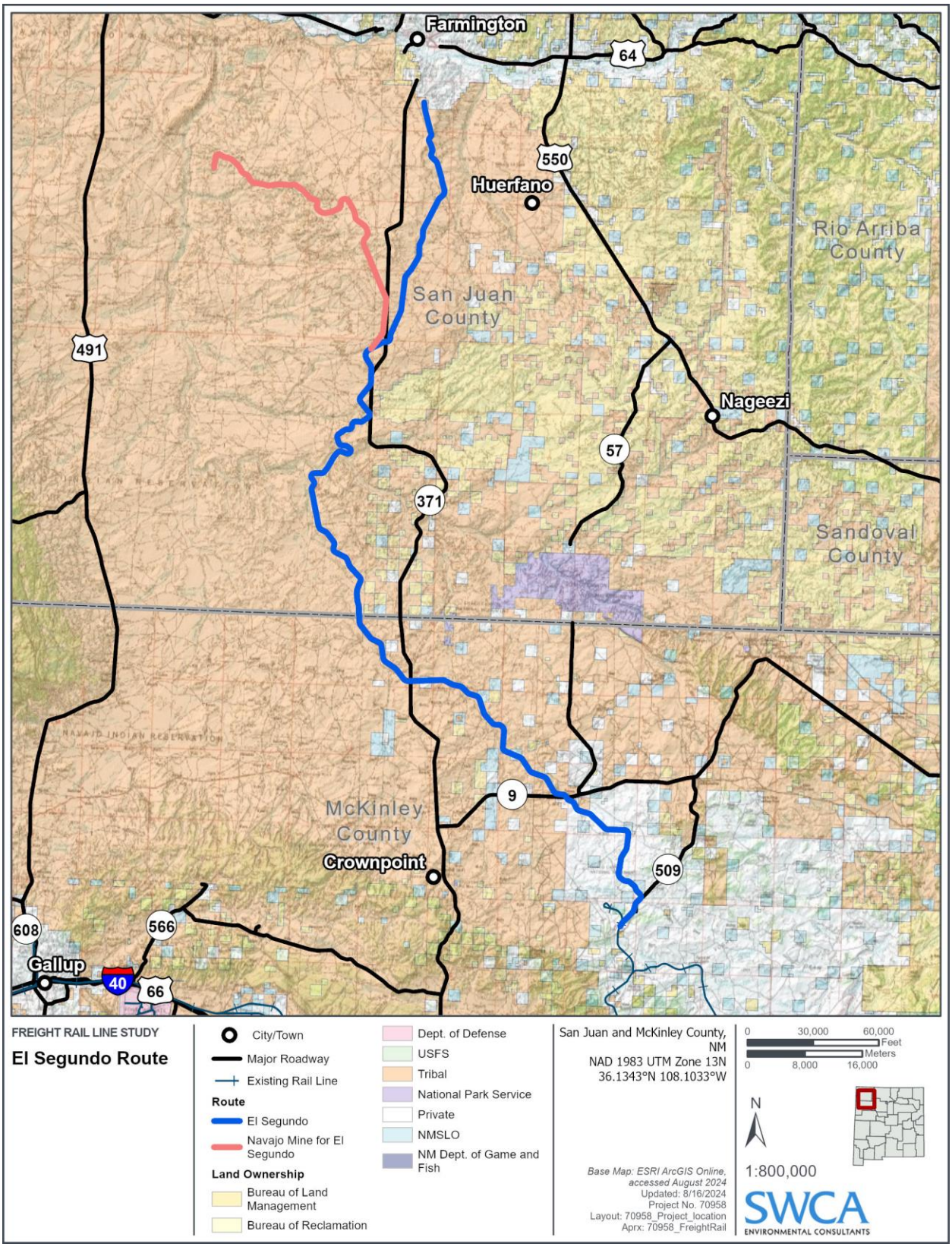

Figure A.2. El Segundo Route project area.

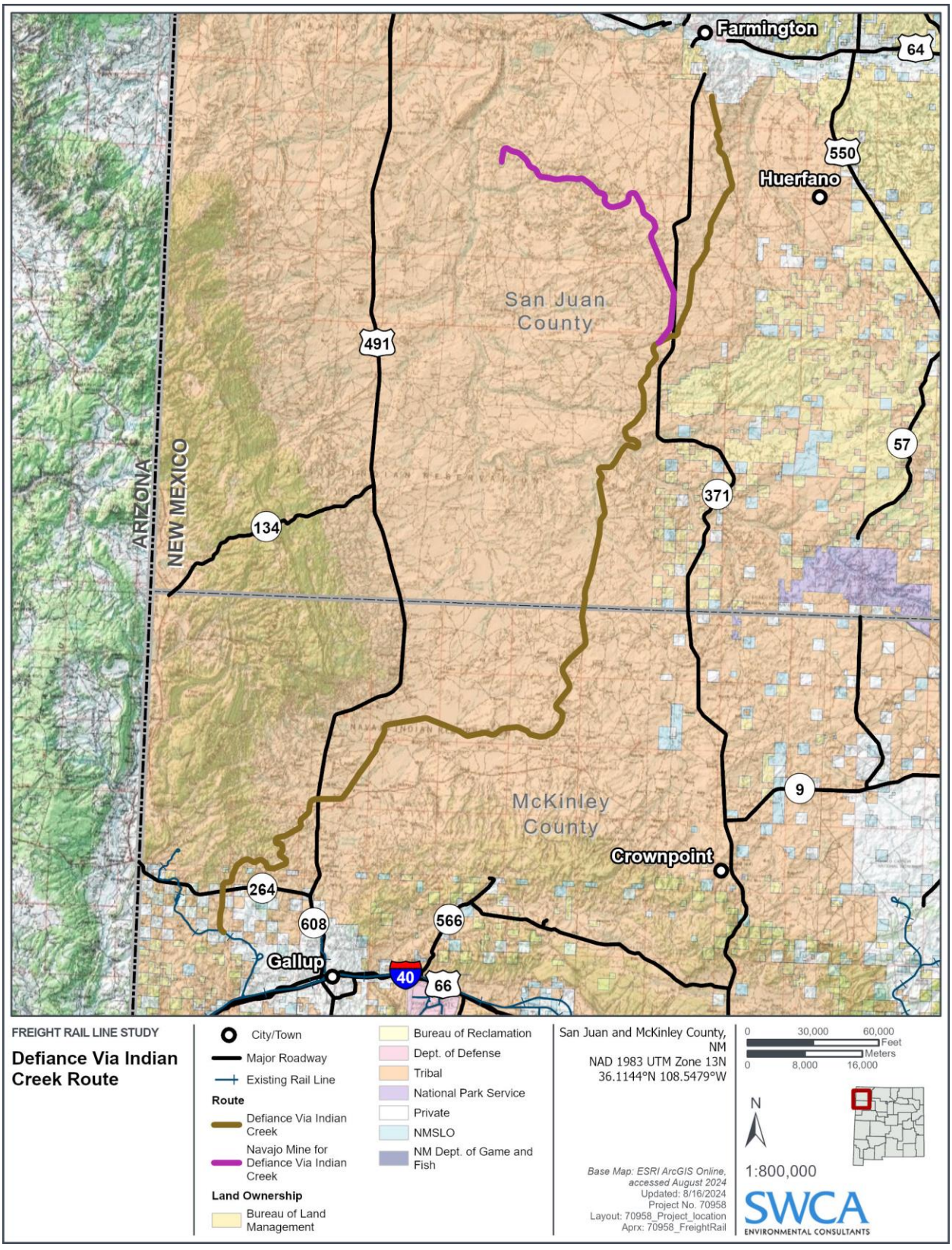

Figure A.3. Defiance Via Indian Creek Route project area.

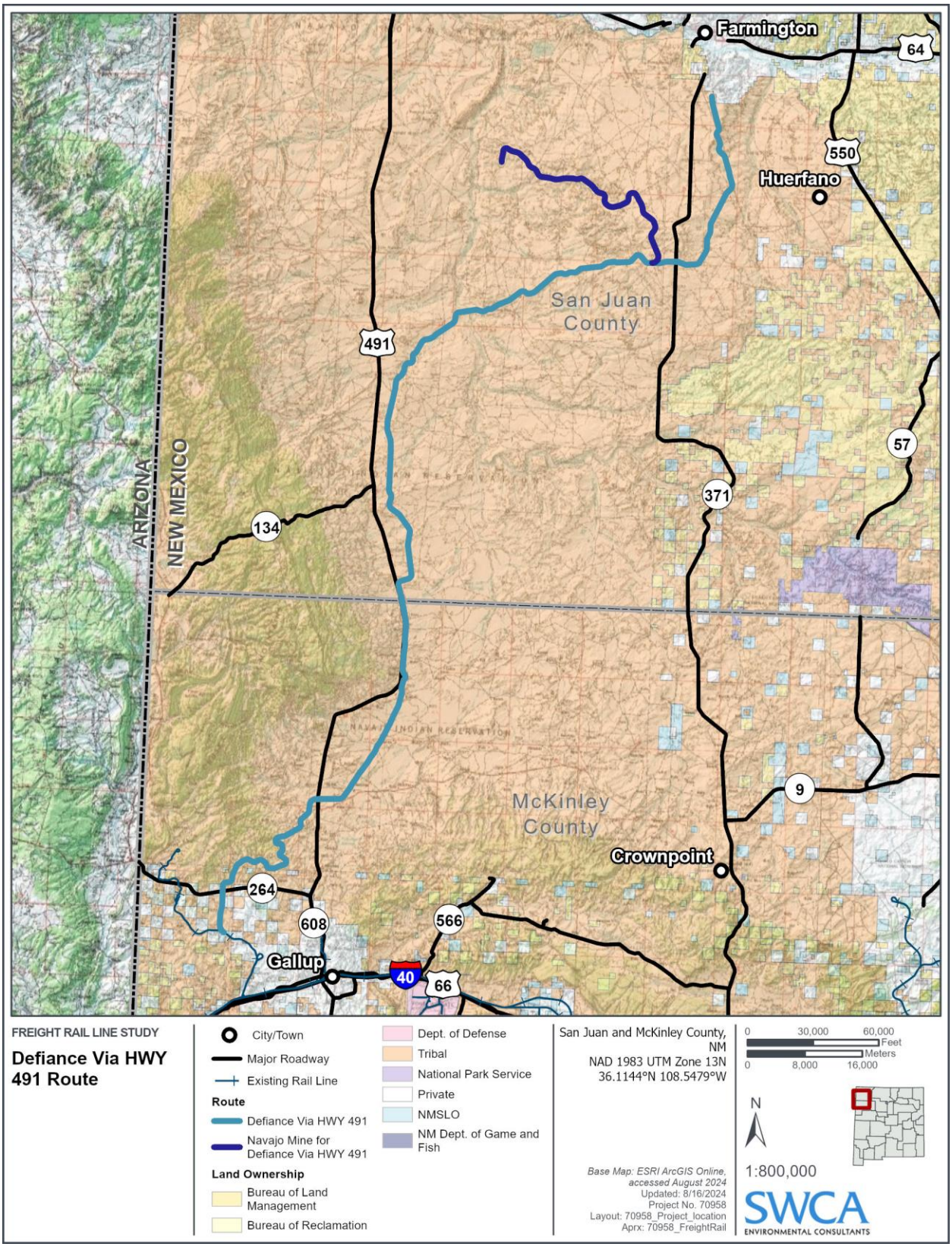

Figure A.4. Defiance Via Highway 491 Route project area.

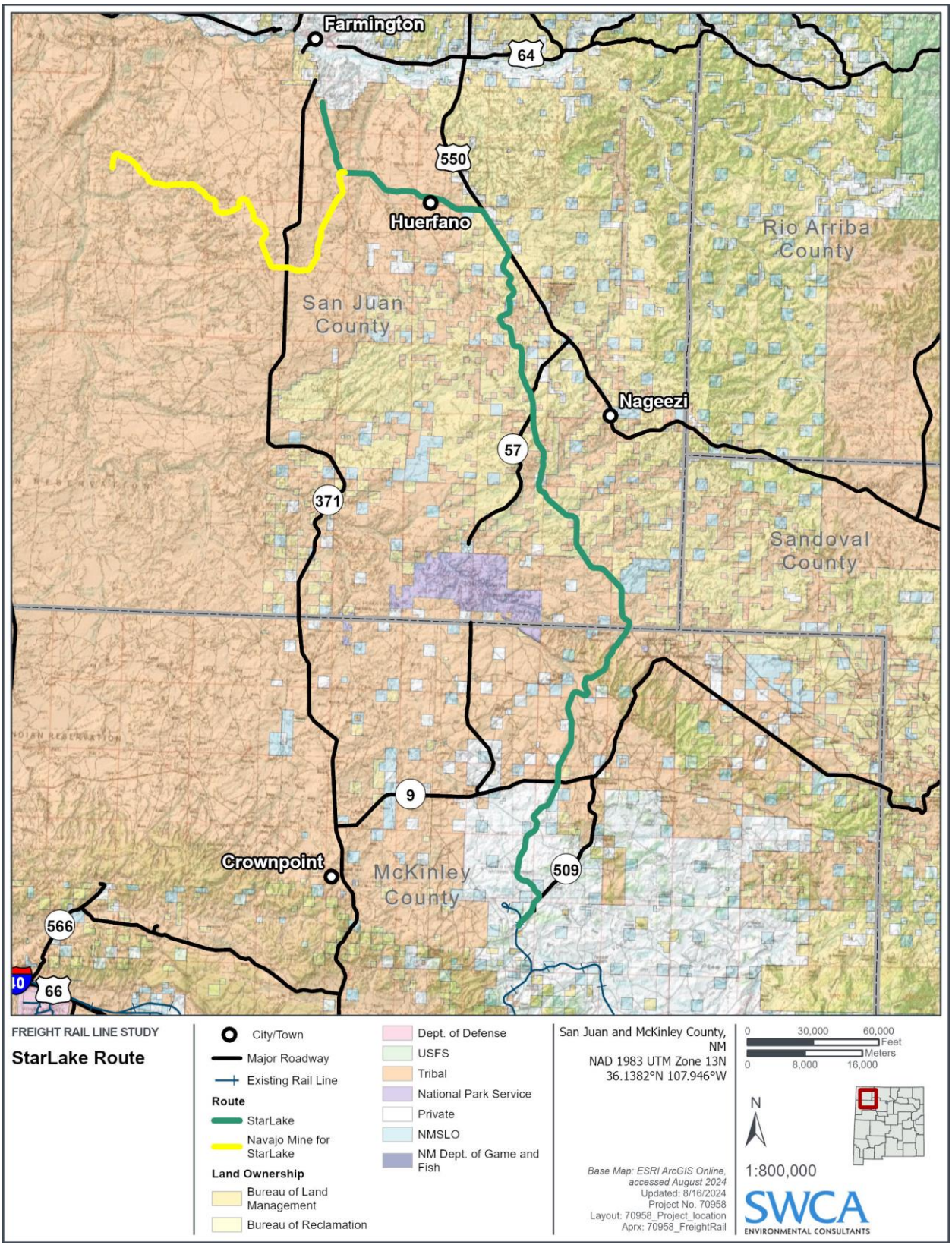

Figure A.5. Star Lake Route project area.

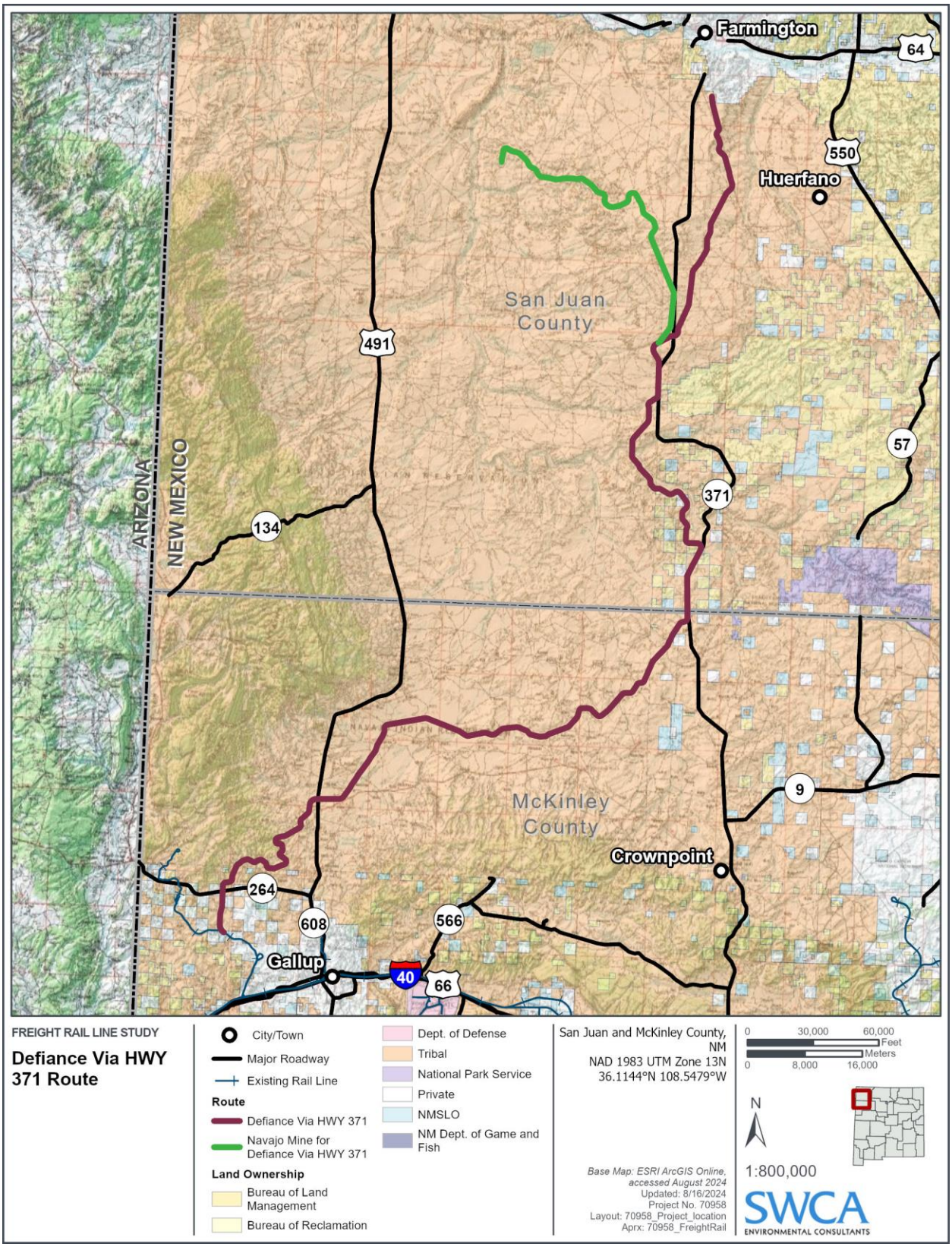

Figure A.6. Defiance Via Highway 371 Route project area.

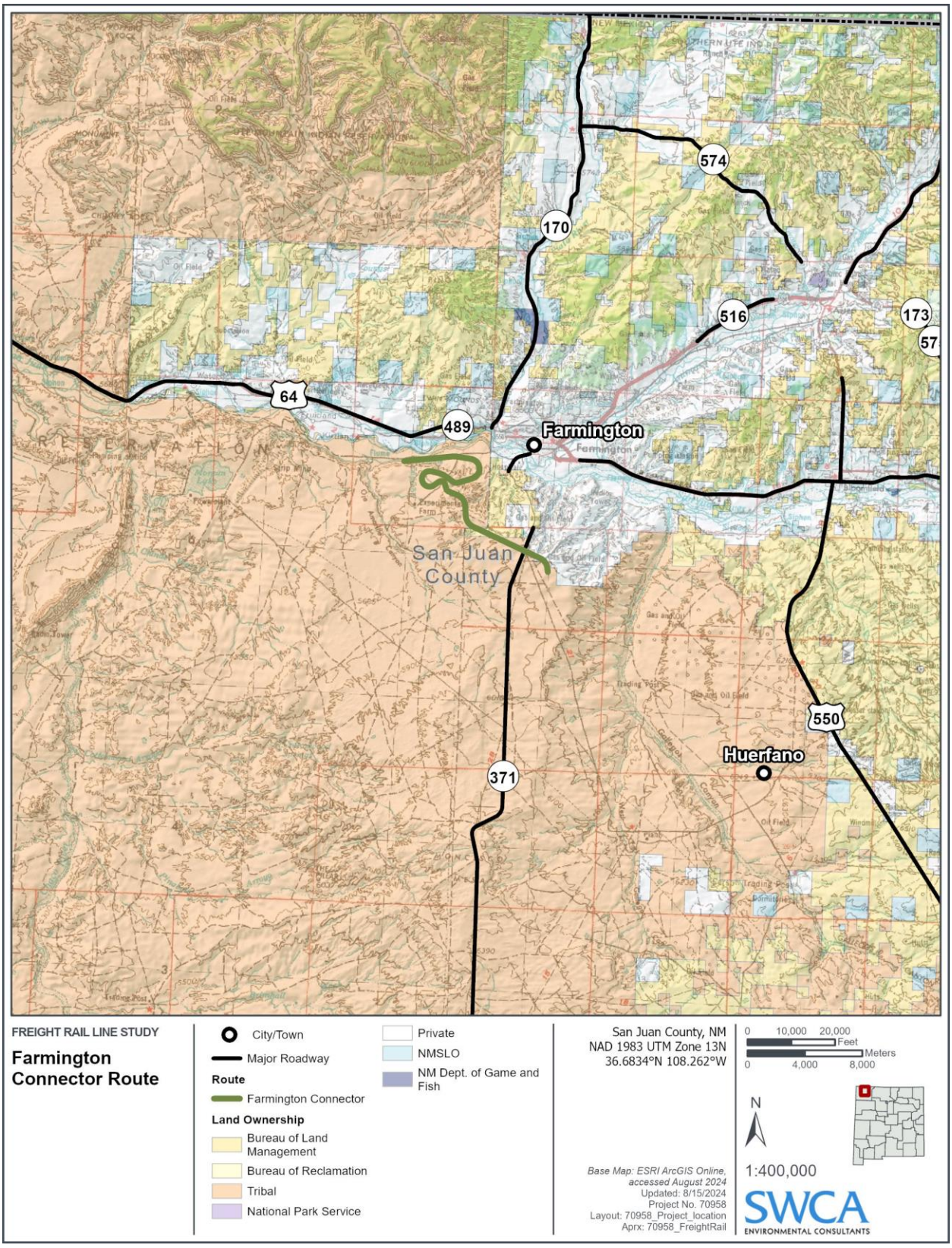

Figure A.7. Farmington Connection project area.

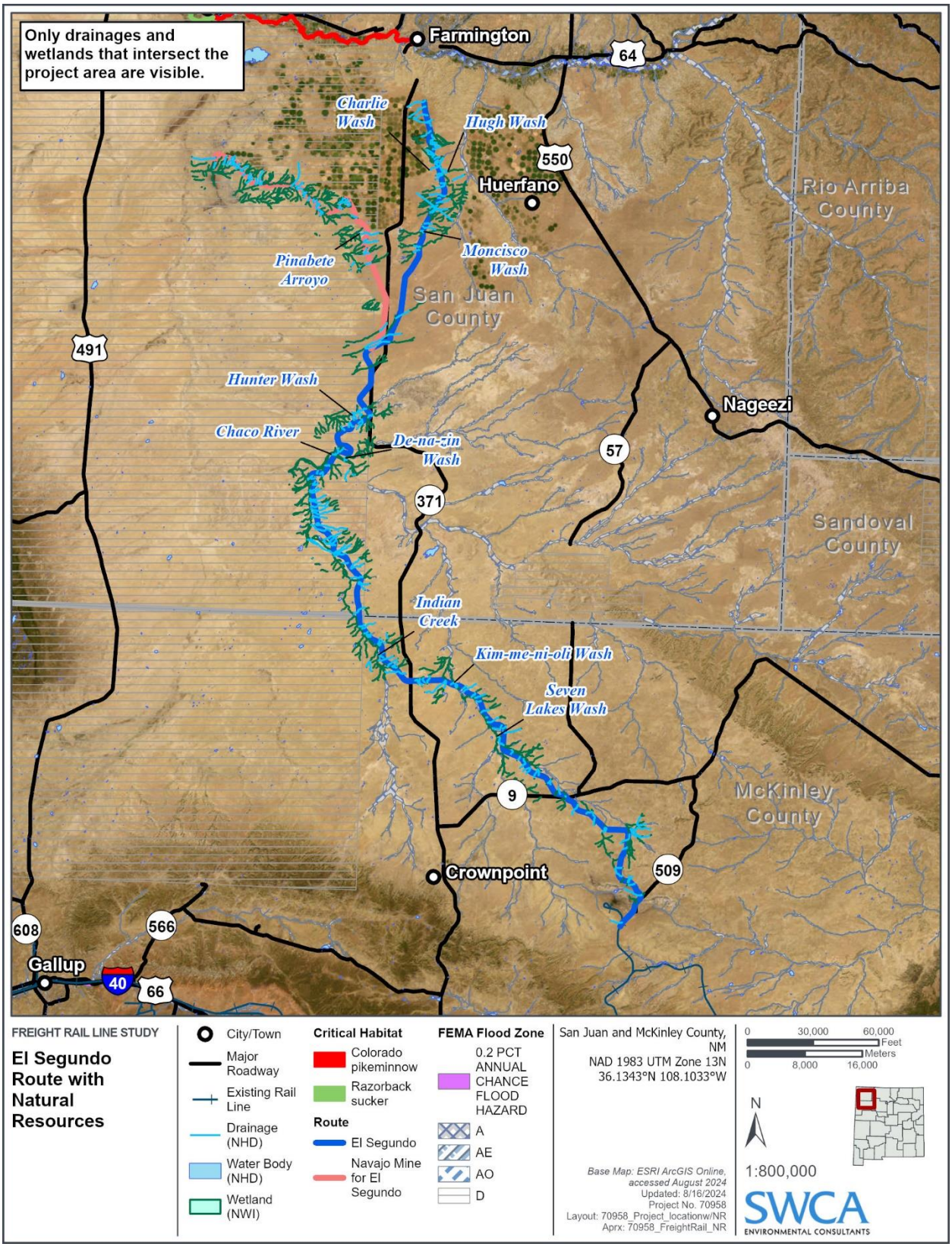

Figure A.8. El Segundo Route project area with natural resources.

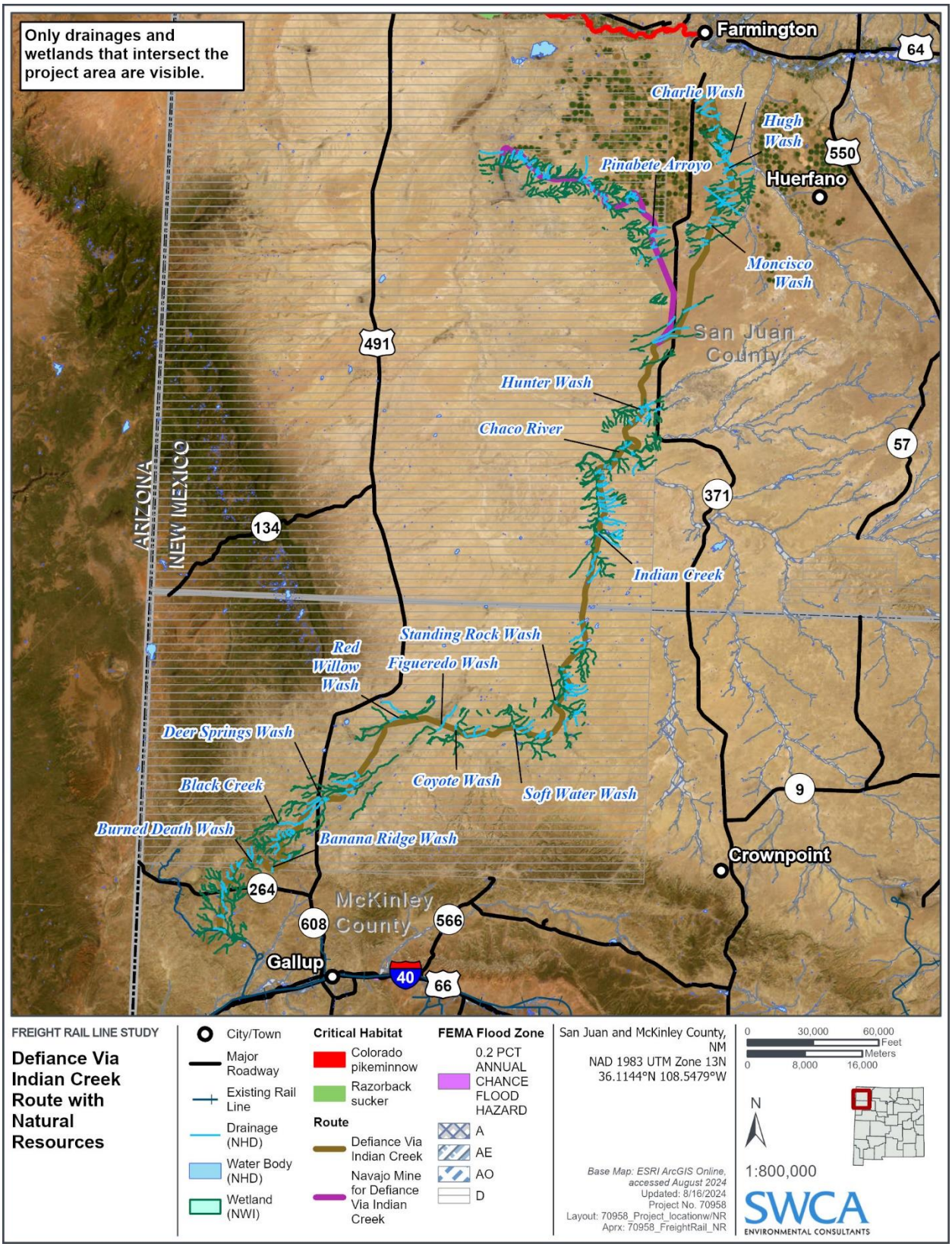

Figure A.9. Defiance Via Indian Creek Route project area with natural resources.

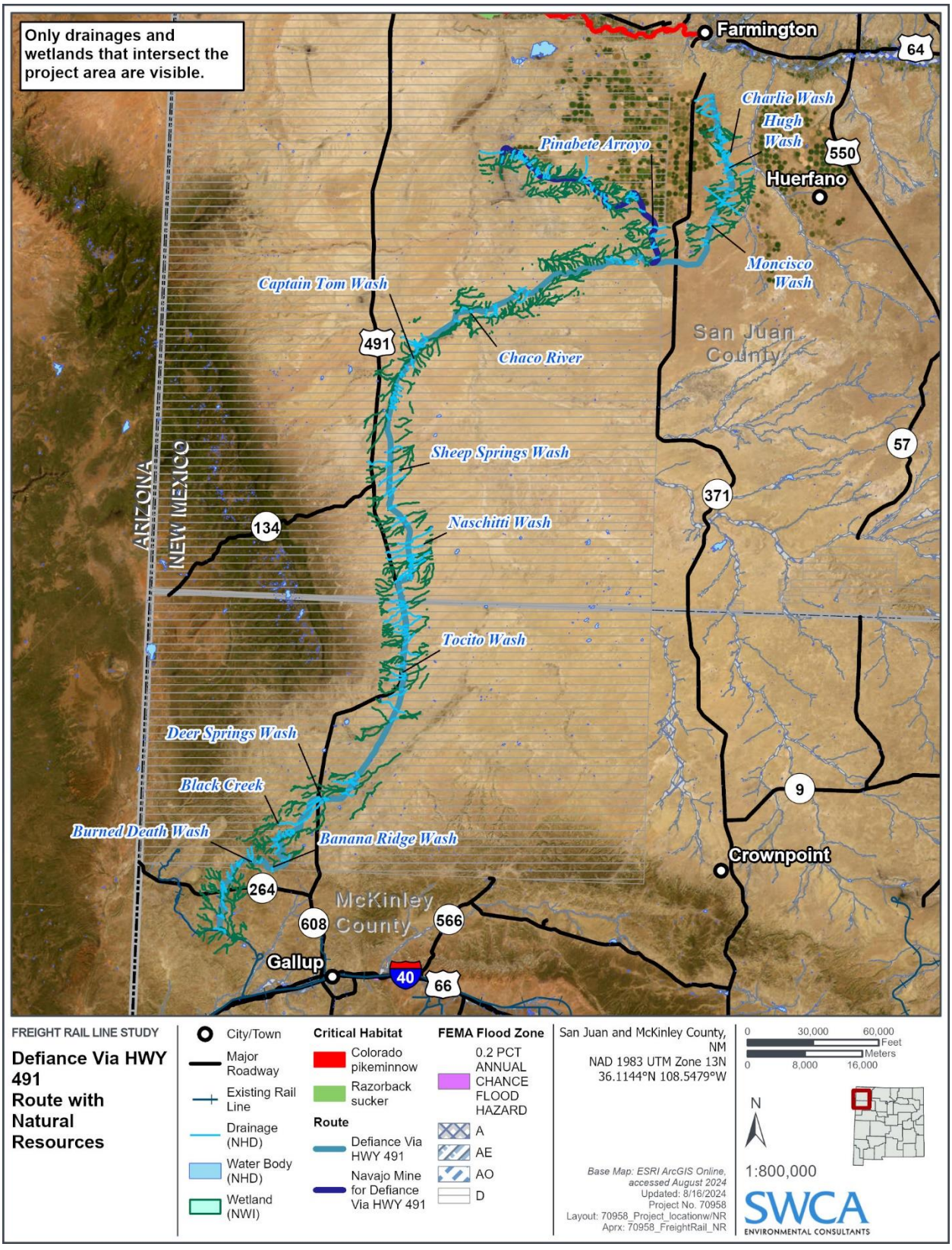

Figure A.10. Defiance Via Highway 491 Route project area with natural resources.

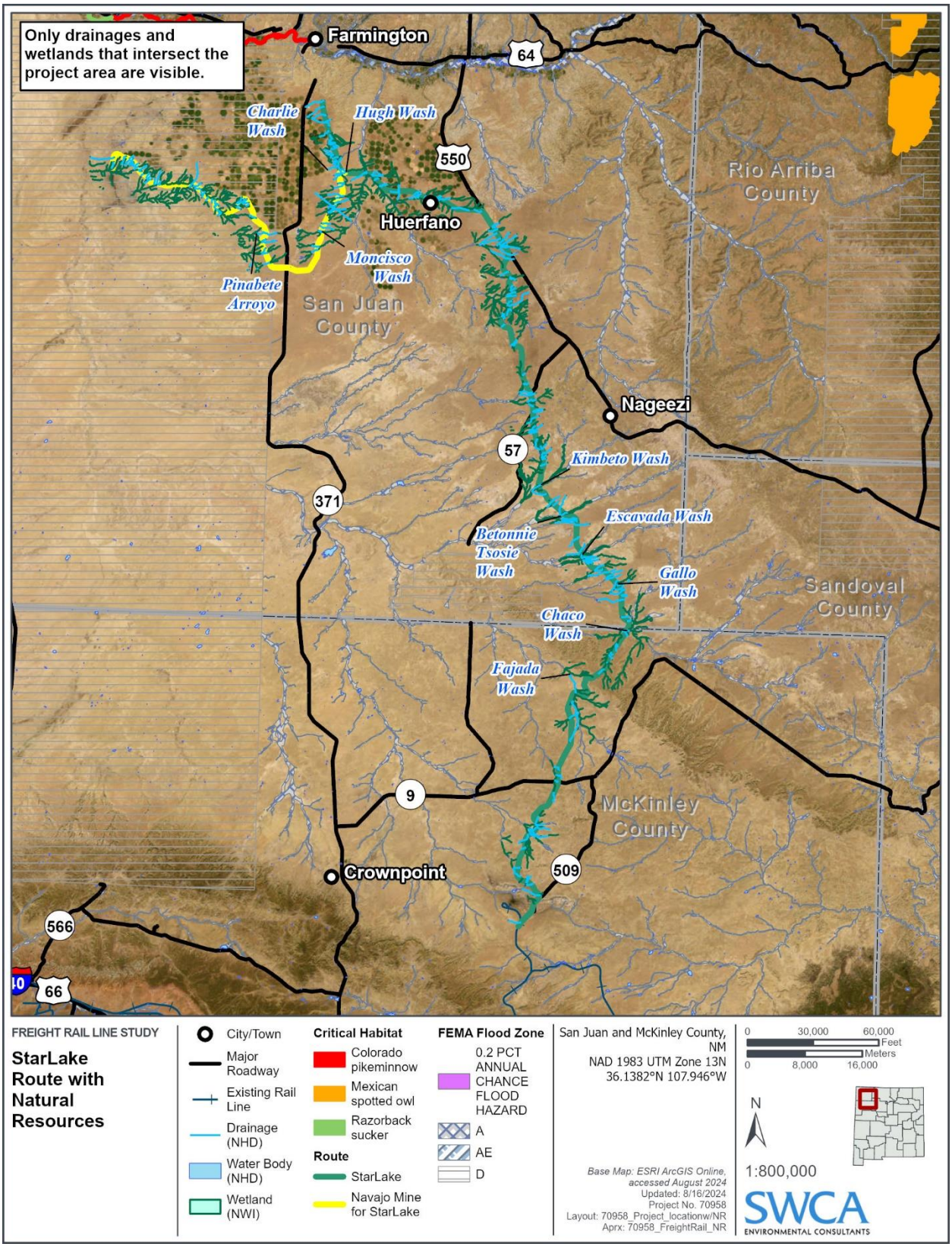

Figure A.11. Star Lake Route project area with natural resources.

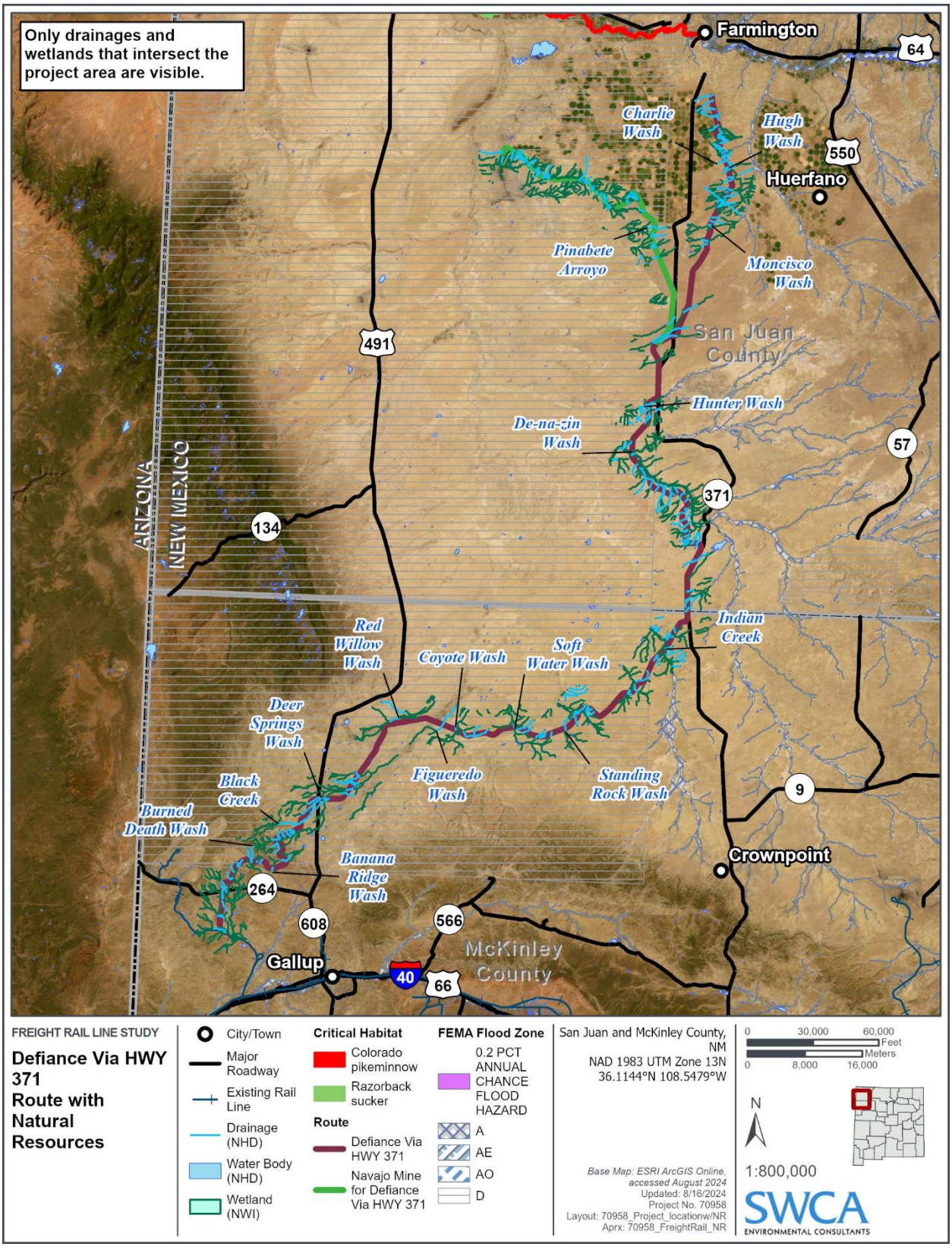

Figure A.12. Defiance Via Highway 371 Route project area with natural resources.

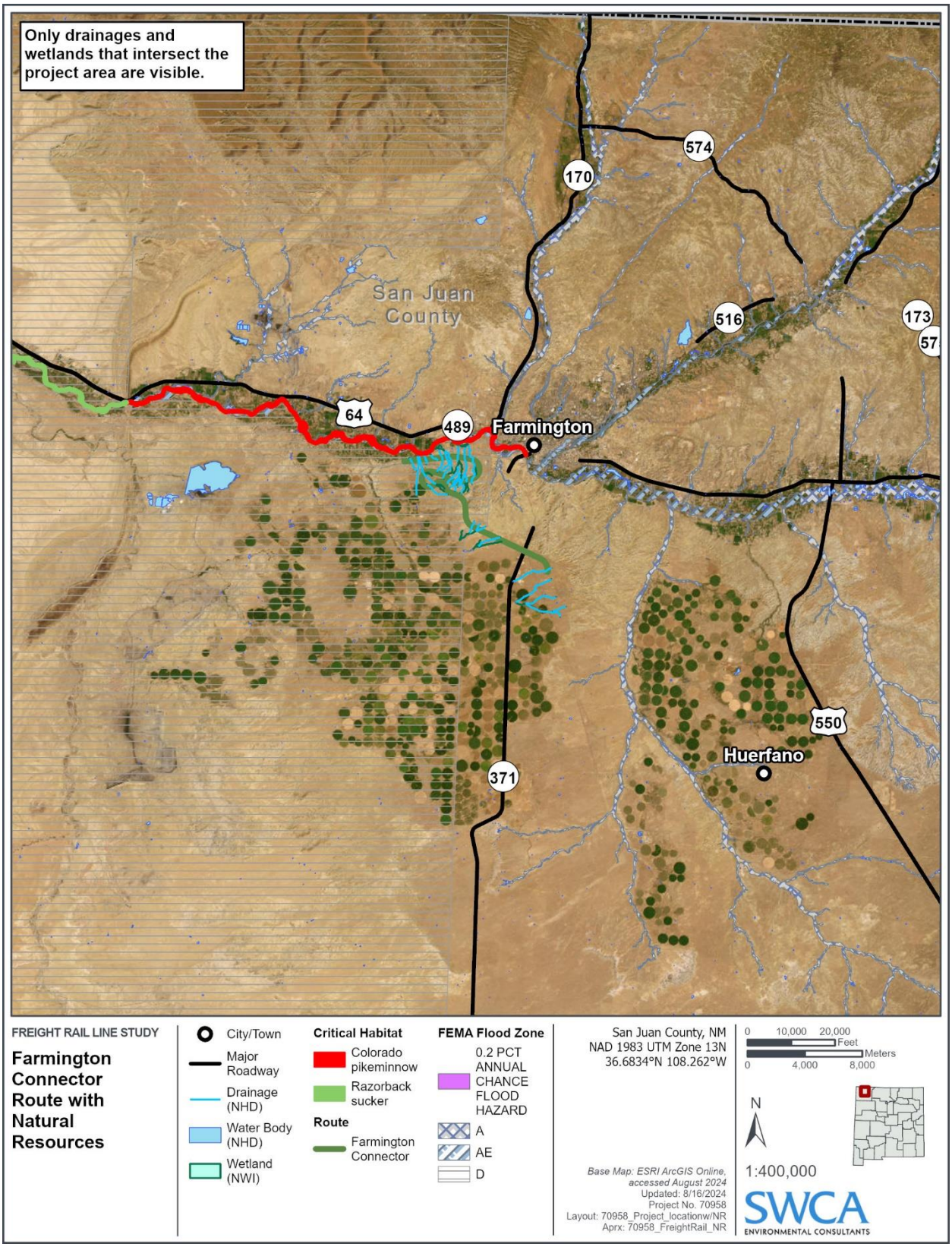

Figure A.13. Farmington Connection project area with natural resources.