

APPENDIX A - ROUTE SELECTION PROCESS

INTRODUCTION

The objective of the route selection process was to identify an environmentally preferred route for the transmission line, starting at the Shiprock Substation in the Four Corners area of northwestern New Mexico and ending at either the Mead Substation or the Marketplace Substation, both of which are located in southeastern Nevada. The following sections describe the regional corridor siting study and the NEPA environmental process (shown in Figure 2-10).

REGIONAL ENVIRONMENTAL FEASIBILITY STUDY

In 1991 and 1992, DPA retained a consulting firm to complete a regional environmental feasibility study between the Four Corners area of New Mexico and southeastern Nevada to identify potential alternative corridors for initial consideration. A regional study area was defined and included approximately 38,000 square miles across portions of New Mexico, Arizona, Utah, and Nevada. Boundaries were roughly Farmington, New Mexico on the east; Las Vegas, Nevada on the west; the Arizona-Utah state border on the north; and Flagstaff, Arizona on the south. (The Grand Canyon area was excluded.) Because existing corridors are often used as alternative locations for transmission lines, corridors of existing high-voltage transmission lines (230kV and larger), interstate pipelines, and fiber optic cables were identified. In some locations, new corridors were conceptually delineated to connect existing corridors or to avoid a potentially sensitive area. About 1,800 miles of alternative study corridors were identified during the regional study.

The study relied heavily on information resulting from previous studies in the region. Federal land management plans supplemented the studies. No field review or verification was conducted for this level of study. For purposes of this study, four environmental resource disciplines were evaluated—land use, visual, biological and cultural resources. Evaluation of these resources provided (1) critical information needed to identify opportunities and constraints to routing a transmission line, and (2) parameters for more detailed studies at later stages of transmission line siting. Data gathered for the alternative study corridors were mapped and analyzed to determine resource sensitivity. The sensitivity of a resource is defined as a measure of the probable adverse response of each resource to direct and indirect impacts associated with construction, operation, and maintenance of a 500kV transmission line. Criteria considered in the sensitivity analysis included the value of the resource, protected status, and present and future use.

The study resulted in the identification of feasible alternative study corridors for further consideration and indicated areas of potential environmental concern. Potential constraints included various national parks, national monuments, wilderness and wilderness study areas, highly populated areas, and others. The feasibility study provided a substantial knowledge of the environment of the region and of the issues that would arise during later environmental investigations. The results of the study were documented in the *Navajo Transmission Project Regional Environmental Feasibility Study* (June 1992).

NEPA ENVIRONMENTAL PROCESS

In late 1992, DPA invited Western to participate in the project. As a Federal agency and project participant, Western determined that an EIS should be prepared for the project in accordance with NEPA (42 U.S.C. 4321), CEQ regulations for implementing NEPA (40 CFR 1500-1508), DOE NEPA implementing procedures (10 CFR 1021), and other applicable regulations. The intent of the NEPA environmental process is to assist in making decisions on proposed actions based on an understanding of the environmental consequences, and to ensure that Federal entities take actions to protect, restore, and enhance the environment.

SCOPING

Scoping, the first step of the NEPA environmental process, was conducted early in the project to identify the range, or scope, of issues to be addressed during the environmental studies and in the EIS (40 CFR 1501.7). The public participation program was integrated with the environmental process for NTP (refer to Figure 5-1). Western solicited comments from relevant governmental agencies and the public, organized and analyzed the comments received, and identified and summarized the issues and concerns.

The process and results are documented in the *Navajo Transmission Project Scoping Report* (January 1994) and described in Chapter 5. Generally, comments and issues identified related to need for the project, benefits, siting the alternative transmission line routes and the effects of those routes on the environment, right-of-way acquisition and use, and health and safety concerns.

The results of the regional environmental feasibility study and scoping served as the basis to develop a work plan, which provides the approach and schedule to accomplish the environmental studies and prepare the EIS.

Alternatives Added and Eliminated as a Result of Scoping and Agency Review

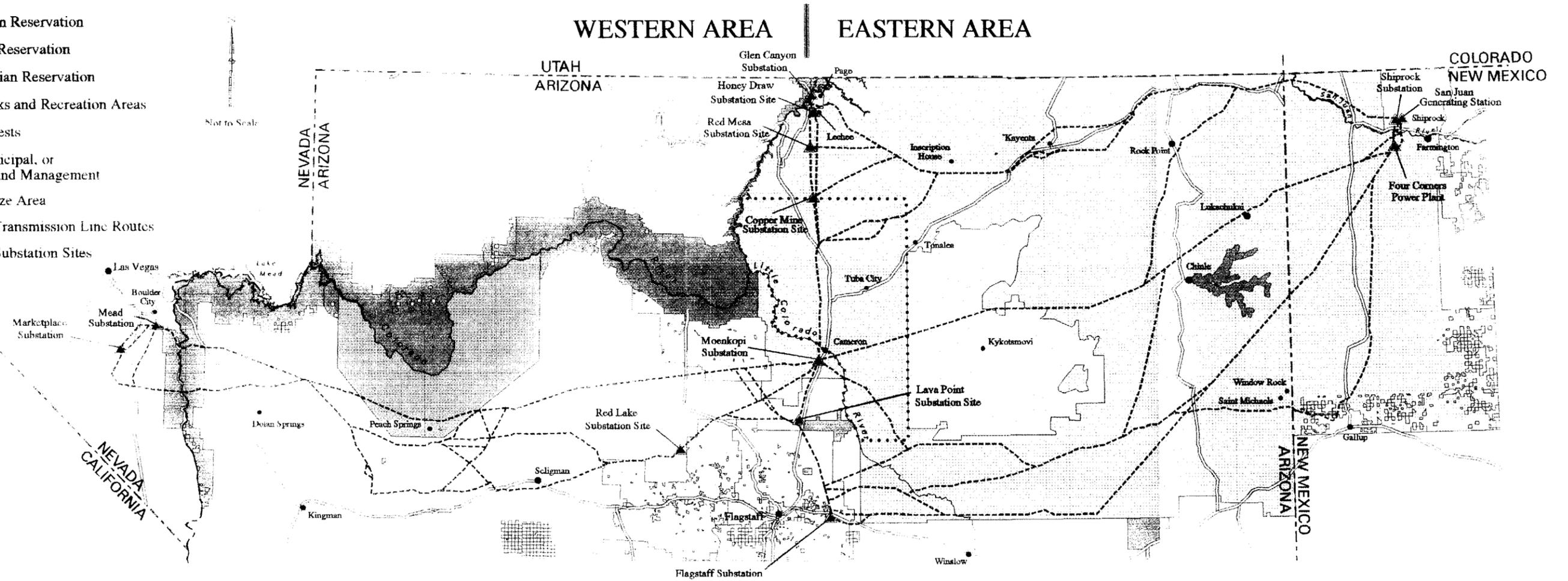
The segments of alternative routes added as a result of scoping and agency review are explained and shown in Appendix B.

Also as a result of agency review and comments received from scoping, several segments of alternative routes were eliminated after each alternative had been reviewed for environmental issues, public acceptability, and/or engineering limitations.

Following scoping, the remaining alternative routes were approved for further study (Figure A-1).

Legend

-  Navajo Indian Reservation
-  Hopi Indian Reservation
-  Hualapai Indian Reservation
-  National Parks and Recreation Areas
-  National Forests
-  Private, Municipal, or Bureau of Land Management
-  Bennett Freeze Area
-  Alternative Transmission Line Routes
-  Alternative Substation Sites



Alternative Routes Studied
Navajo Transmission Project
Figure A-1

RESOURCE INVENTORY

Resource inventories (Table A-1), conducted primarily between July 1993 and June 1994, were developed within alternative study corridors in sufficient detail to assess potential impacts that could result from the proposed project. The width of the study corridor along each alternative route differed for each of the resource disciplines depending on the area that potentially could be affected. The precise location of the reference centerline will be determined through engineering surveys of the final route prior to construction. Water, earth, biological, and paleontological resources were inventoried within a one-mile-wide study corridor (0.5 mile on each side of the reference centerline). Land use, visual, and cultural resources were inventoried within a six-mile-wide study corridor (three miles on each side of the reference centerline).

**TABLE A-1
ENVIRONMENTAL RESOURCES STUDIED**

Natural Environment	Human Environment	Cultural Environment
Air	Land Use <ul style="list-style-type: none"> ■ existing land use ■ future land use ■ parks, preservation, and recreation 	Archaeology and History
Water Resources <ul style="list-style-type: none"> ■ springs ■ streams ■ 100-year floodplains 	Socioeconomics <ul style="list-style-type: none"> ■ demographics ■ housing ■ employment ■ taxation 	Special-status Sites
Earth Resources <ul style="list-style-type: none"> ■ soils ■ erosion potential ■ mineral resources ■ geotechnical hazards 	Visual Resources <ul style="list-style-type: none"> ■ scenic quality ■ views ■ viewer sensitivity ■ agency visual management objectives 	Traditional Cultural Places
Biological Resources <ul style="list-style-type: none"> ■ vegetation ■ wildlife ■ special-status species ■ important or unique habitat ■ wetlands 	Noise	
Paleontological Resources	Health and Safety	

To facilitate analysis, the alternative routes were divided into discrete segments called links, referred to throughout the DEIS. The links are numbered along a study corridor from east to west. The other resources (i.e., air, socioeconomics, and noise) are addressed regionally rather than by route. The initial efforts of the investigation consisted of gathering and reviewing published and unpublished reports documenting previous studies and projects. Existing maps of various scales and aerial photographs were reviewed and interpreted for the area within the alternative study corridors.

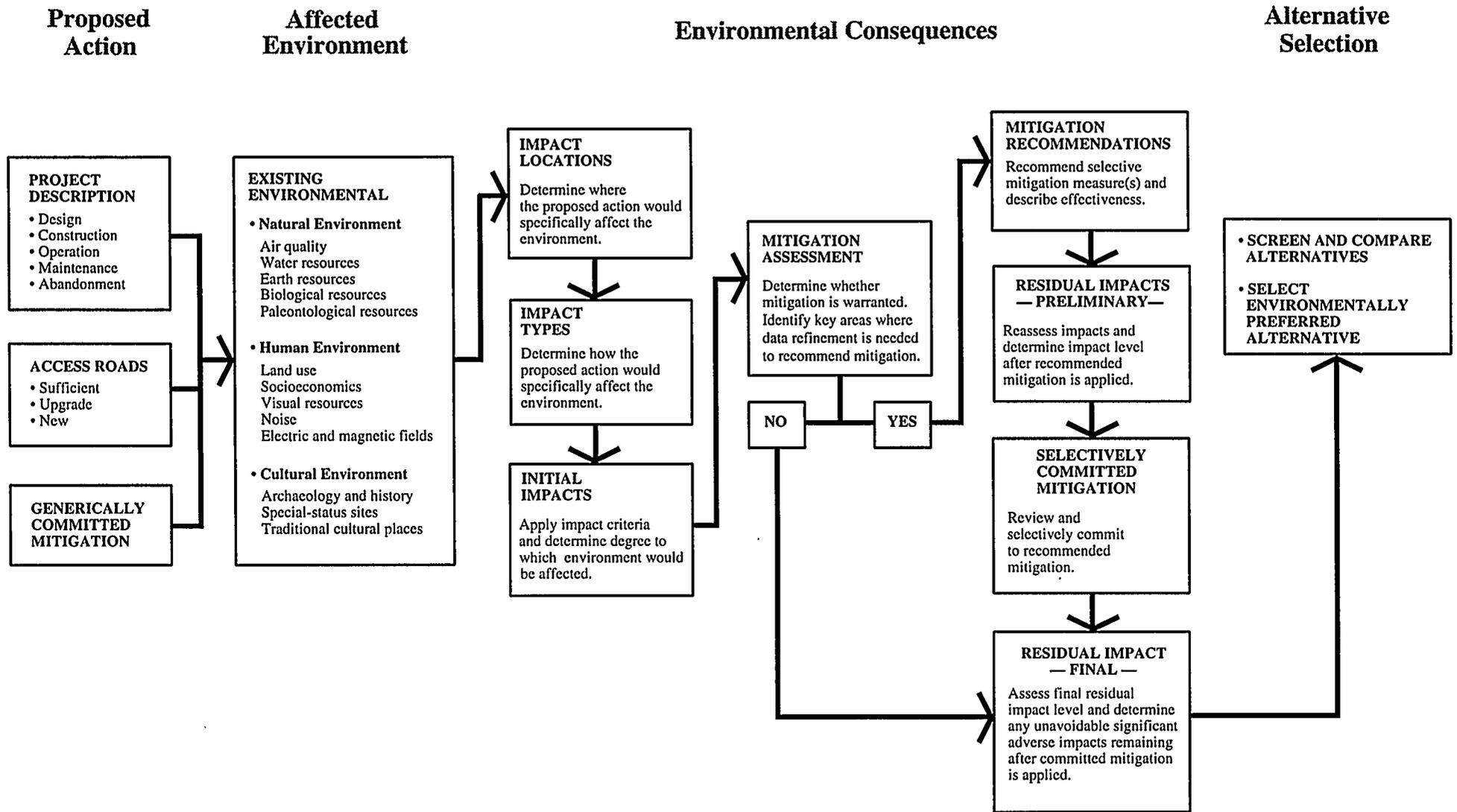
Following the initial inventory effort, relevant Federal, state, tribal, and local land and resource management agencies were contacted to update, refine, and verify information, and to solicit information regarding agency issues, concerns, policies, and regulations. Comprehensive land and resource management plans were reviewed. The data obtained were compiled and mapped on 7.5-minute and 1:100,000 scale U.S. Geological Survey (USGS) topographic maps. All data were entered (digitized) into a geographic information system (GIS) (Arc/Info version 6.1 software) used for data storage, management, and analytic and graphic output.

The preliminary results of the inventory of resources were documented by link in the resource inventory summaries. The summaries and maps (1:250,000 scale) were distributed to the cooperating agencies who provided comments on adequacy and accuracy prior to proceeding with impact assessment and mitigation planning.

IMPACT ASSESSMENT AND MITIGATION PLANNING

Potential environmental consequences from the project were determined through a systematic analysis that included assessing impacts of the project on the environment, and how the impacts could be mitigated most effectively. This impact assessment and mitigation planning process is summarized below and illustrated in Figure A-2.

Impacts to the environment can result directly or indirectly from the project action and can be permanent, long-lasting (long term) or temporary (short term). Long-term impacts are defined as those that would substantially remain for the life of the project (50 years) or beyond. Short-term impacts are defined as those changes to the environment during construction that generally would revert to preconstruction condition at or within a few years of the end of construction. Impacts can be beneficial (positive) or adverse (negative) and can vary in significance from no change or only slightly discernible change, to a full modification of the environment.



Impact Assessment and Mitigation Planning Process

Navajo Transmission Project

Proposed Action—The first step was to understand the proposed action and determine the types and amount of disturbance that could occur; that is, the design and typical specifications of the project facilities, construction techniques and equipment used, extent of construction, requirements for operation of the transmission line, activities associated with routine maintenance, and activities associated with abandonment if or when the facilities are no longer needed. The majority of potential impacts that could occur would result from the activities associated with construction and include the following:

- upgrading existing roads or constructing roads for access where needed
- preparing tower sites, staging areas, batch plant sites
- assembling and erecting tower structures
- stringing conductors (e.g., wire-pulling and -splicing sites)

In addition, following construction, impacts on some resources would result from the presence of the transmission line. Also, periodic maintenance activities could cause temporary impacts.

As part of the project description, the proponents, DPA and Western, commit to undertake certain measures to protect the environment as standard practice for the entire project. These measures are referred to as "generic mitigation" and are summarized in Table 2-3.

The amount of ground that could be disturbed as a result of project activities was estimated. Six levels of ground disturbance were identified based on the extent of access road constructed or upgraded, as well as disturbance at tower sites, staging areas, batch plant sites, etc. (see Table 2-4). Where the proposed transmission line would parallel an existing linear facility such as a transmission line and/or existing access roads, new ground disturbance would be minimal, resulting in less potential impact. However, if the proposed transmission line were sited in an area where there is no or little disturbance, new ground disturbance would be greater. Refer to Figures 3-3 and 3-4 for locations of existing utility corridors along the alternative routes.

A preliminary location of the transmission line within the alternative study corridors was established by Western in 1993 and verified through aerial reconnaissance. This location was used as a "reference" centerline for purposes of assessment. Figure 3-5 shows the location of the proposed transmission line with respect to existing conditions (new corridor or parallel to existing facilities).

Initial Impacts—Given an understanding of the project description (Chapter 2) and the inventoried information reflecting the existing environment (Chapter 3), each resource specialist determined the types and amounts of impacts that could occur on their respective resources. Computer-assisted models were developed to (1) estimate the level of disturbance that could result from construction activities and (2) assess the impacts of construction on resources. Each specialist used the general methods designed for the NTP EIS studies as a guideline and tailored the methods appropriately to the specific needs and requirements of each resource study. Qualitative and quantitative variables of resource sensitivity, resource quantity, and estimated ground disturbance were considered in predicting the magnitude of impacts, which are described generally in three levels—low, moderate, and high. A low impact results when the proposed action is expected to cause slight or insignificant adverse change to the resource. A moderate impact results when the proposed project action is expected to cause some adverse change that may be substantial and mitigation may be warranted. A high impact results when the proposed action

is expected to result in substantial or significant change to the resources and mitigation is warranted in most cases. These levels were defined for each resource.

Mitigation—Once "initial" impacts were identified for each resource along the reference centerlines of the alternative routes, measures to mitigate moderate or high impacts to the extent practicable were recommended. In a limited number of instances, mitigation was recommended for low impacts. Also through this process, a few key areas were identified that needed further refinement and evaluation of data in order to recommend effective mitigation. "Selective" mitigation includes those measures or techniques to which the project proponents commit on a case-by-case, or selective, basis after impacts are identified and assessed. These measures provide a planning tool for minimizing potential adverse impacts. Selective mitigation measures are shown in Table 2-7.

Once a preferred route is selected for construction of the transmission line, Western and DPA would coordinate with the applicable regulatory and/or land-managing agency to discuss how the mitigation measures would be implemented on a site- or area-specific basis. For example, in a case where road closure is recommended, Western and DPA would work with the applicable agency to refine the measure and determine the specific method of road closure most appropriate for the site or area (e.g., barricading with a locking gate, obstructing access on the road using an earthen berm or boulders, revegetating the roadbed, or obliterating the road and returning it to its natural contour and vegetation).

Mitigation planning also is addressed in the *Navajo Transmission Project Mitigation Plan*, distributed to the cooperating agencies in conjunction with this DEIS. The purpose of the *Mitigation Plan* is to clarify the mitigation planning approach and the documentation of preliminary mitigation measures recommended at this stage of the project. Table 2-9 summarizes the total number of miles for which each measure was recommended and committed along each alternative route. As the project progresses, the plan would be refined and finalized in coordination with the agencies, and the detailed mitigation would be incorporated into the COMP prior to construction.

Residual Impacts—The impacts remaining after mitigation has been applied are referred to as "residual." Potential residual impacts were reported on maps and tables that identify the locations and magnitudes of potential resource impacts along the reference centerline.

The preliminary results of impact assessment and mitigation planning were documented by link in resource technical summaries. The summaries and maps (1:250,000 scale) were distributed to the cooperating agencies to review and provide comments prior to proceeding with the comparison of alternatives and selection of the preliminary environmentally preferred route.

COMPARISON OF ALTERNATIVE ROUTES

The comparison of alternatives is based on a screening approach designed to assist in narrowing the number of alternatives, making choices, and ranking the remaining alternative routes. Individual links of the routes evaluated were combined into segments of routes and ultimately entire routes, for purposes of comparison.

The screening and comparison process was implemented through a series of meetings conducted with the interdisciplinary team of resource specialists (third-party consultant under Western's direction) representing the natural, human, and cultural resource studies under investigation for the NTP EIS. Separate meetings were held to characterize impacts and to screen, compare, and rank alternatives.

For ease of comparison and presenting results, the project area was divided into eastern and western areas. The Moenkopi Substation area represents the central point in the network of links connecting the eastern and western areas. It is the end point of the eastern alternative routes and the beginning point of the western alternative routes. Three levels of screening were completed, as illustrated on Figure B-2. Level 1 screening focused on route comparisons in localized areas, while Level 2 screening areas focused on larger subregional areas. Level 3 screening involved combining the most suitable routes from the first two levels of screening, along with connecting links, to form complete routes in the eastern and western portions of the project area. At each level of screening, impacts were characterized for each alternative, and alternatives were compared and ranked according to preference. Less preferable alternatives were eliminated from further consideration. The reasons for eliminating these alternative routes are provided in Appendix B.

The results of the screening process established the basis for (1) characterizing the impacts of remaining, complete alternative routes; (2) comparing and ranking those alternative routes; and (3) identifying the environmentally preferred alternative route(s).

Characterizing Impacts

The first step in comparing alternative routes was to characterize the impacts on resources in the areas crossed by alternative routes. Simply stated, the purpose was to assign general impact levels to routes or route segments so that the magnitude of potential impacts could be clearly distinguished. General impact levels also were assigned to the connecting links that join routes or route segments. During interdisciplinary team meetings, each resource specialist (e.g., for water, earth, paleontological, biological, land use, visual, and cultural resources) reviewed the residual impacts (particularly high and moderate impacts), baseline data, and key issues associated with the impacts. Key issues were those identified through scoping, agency and public comments, and the environmental studies (see Table 2-6). Considering the magnitude of potential impact, effectiveness of mitigation, and degree of concern associated with the issues, the data were synthesized using professional judgment into one of five general levels of potential impact for each resource (lowest to highest) on a case-by-case (area-by-area) basis. Then, considering cumulatively the magnitudes and amounts (miles) of potential adverse effects, one overall general impact level could be determined for each resource by route segments in each screening area.

Comparing Alternative Routes

Through the comparison process, alternative routes were first ranked for preference by resource and then by the interdisciplinary study team. There was no explicit numeric weighting used in the comparison process; rather, the relative importance of specific resource issues was viewed in context with other

resource impacts and issues within a geographic setting. "Tradeoffs" of resource concerns were evaluated on a case-by-case basis and varied depending on the magnitude and type of localized issues, environmental setting, severity of impacts, and potential to effectively mitigate individual resource impacts and issues. For example, in one location substantial concern for an intensely sensitive traditional cultural place may outweigh adverse impacts on viewers traveling through a scenic area; while in another area, potentially adverse impacts on scenic quality due to the presence of a transmission line may outweigh adverse impacts on an archaeology site because in this instance impacts on the archaeology site can be mitigated more effectively than the impacts on scenic quality.

Ranking of the alternative routes for overall environmental preference was then completed by the interdisciplinary study team. The results of the comparison process highlighted routes with (1) the best individual resource rankings, (2) locations that best addressed local and regional key issues, and (3) the greatest opportunity for effective mitigation. As a result of the ranking, four eastern and six western preliminary alternative routes were retained and reviewed with the public and agencies during meetings in May and June 1995.

Public Review

Following the comparison of alternatives and identification of the preliminary environmentally preferred alternative routes, public meetings were held in 20 locations near the alternative routes to update area residents regarding the siting process; present the alternative routes; provide information about administrative, engineering, and environmental elements of the project; and solicit questions and comments to learn and understand the issues and concerns of the public regarding the project, particularly along the alternative routes. Presentations, questions, and answers were translated into native languages when appropriate or requested. Comments were documented, compiled, and analyzed. Although the content of the questions and comments are often interrelated, they can be summarized into general categories, similar to those from scoping. The general categories included administrative and financial, need, benefits, siting, engineering, right-of-way and access, and health and safety. These are briefly described in Chapter 5. The results of the public meetings have been used in the environmental planning process and will be used in decision making.

Further Resource Investigations

Comments from the public meetings and agencies prompted further investigation and refinement of data for resources such as biological resources, land use, and traditional cultural places, primarily in the eastern area.

In addition, the Bennett Freeze was reasserted in September 1995. The Bennett Freeze is a restriction, or "freeze," on development in an area (western portion of the 1934 reservation created by the 1934 boundary bill that defined the borders of the Navajo Nation) disputed by the Navajo and Hopi. The law associated with the land dispute does not preclude all development; rather, it prohibits development of lands *without written consent of both tribes*. The four alternative routes in the eastern portion of the project area would cross and could be affected by the Bennett Freeze. In the event that the Bennett Freeze

is not lifted in the near future or results of the litigation affects development of the transmission line, Western and DPA developed an alternative to facilitate implementation of NTP. Two segments of alternative routes across Kaibito Plateau north of the Bennett Freeze area were identified and studied. Also, two potential substations sites were identified along Western's 345kV Glen Canyon-Moenkopi-Pinnacle Peak transmission lines. The proposed NTP line could connect into the preferred intermediate substation and NTP power could be "wheeled" over the existing transmission lines avoiding immediate construction in the Bennett Freeze area.

The interdisciplinary team reviewed the results of the investigations, and re-evaluated the screening and comparison of the alternatives routes in the eastern area (including the Kaibito Plateau alternatives). The alternative routes compared in this DEIS are listed in Table 2-9 and shown in Figures 2-11 and 2-12. The results of the comparison are shown by resource for each alternative route in Tables A-2 and A-3, and summarized in Tables 2-14 and 2-15. The environmentally preferred alternative route is described in Chapter 2.

**TABLE A-2
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
EASTERN AREA**

No Action	GLEN CANYON 1 (GC1)	KAIBITO 1 (K1)	CENTRAL 1 (C1)	CENTRAL 2 (C2)
LOCATION				
No location.	GC1 is the longest of the four alternatives, 260.6 miles which is 73.9 miles longer than the most direct alternative, C1. Approximately 19% of GC1 would be new transmission line corridor. The majority of this route, 255.1 miles (98%) crosses the Navajo Reservation.	K1 is the second longest alternative, 244.7 miles, which is 58 miles longer than the most direct alternative route, C1. Approximately 27%, or 65.9 miles of K1 would be new transmission line corridor. Almost the entire route (99%) crosses the Navajo Reservation.	C1 is the most direct alternative between Shiprock and Moenkopi. C1 is 186.7 miles long and parallels existing transmission line or pipeline corridors for approximately 94% (176 miles) of the route. Only 10.7 miles (6%) of this route would be new transmission line corridor, the least of any alternative. Alternative route C1 crosses 150.7 miles (81%) of the Navajo Reservation and 33.1 miles (18%) of the Hopi Reservation.	C2 is the second most direct route between Shiprock and Moenkopi. C2, 211 miles long, parallels existing transmission lines for 69% (145.3 miles) of the route. C2 crosses 175.9 miles (83%) of the Navajo Reservation and 33.1 miles (16%) of the Hopi Reservation.
WATER RESOURCES				
There would be no impacts on water resources.	Resource Preference/Ranking: 1 Impacts on water resources would be low. GC1 crosses the San Juan River, and two springs are known within 600 feet of the reference centerline. Impacts would be avoided by spanning and carefully placing the towers.	Resource Preference/Ranking: 1 Impacts on water resources would be low. K1 crosses the San Juan River, and three springs are known within 600 feet of the reference centerline. Impacts would be avoided by spanning and carefully placing the towers.	Resource Preference/Ranking: 1 Impacts on water resources would be low. C1 crosses the San Juan River, and has the most springs (5) within 600 feet of the reference centerline. Impacts would be avoided by spanning and carefully placing the towers.	Resource Preference/Ranking: 1 Impacts on water resources would be low. C2 crosses the San Juan River, and two springs are known within 600 feet of the reference centerline. Impacts would be avoided by spanning and carefully placing the towers.

**TABLE A-2
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
EASTERN AREA**

No Action	GLEN CANYON 1 (GC1)	KAIBITO 1 (K1)	CENTRAL 1 (C1)	CENTRAL 2 (C2)
EARTH RESOURCES (SOILS)				
<p>There would be no impacts on soils.</p>	<p>Resource Preference/Ranking: 2 Impacts on soils are generally characterized as low, with moderate impacts associated with the Marsh Pass area where new corridor would be required in steep terrain. GC1 is one of the least preferred routes, because it crosses the greatest amount of soils with high/severe erosion potential, 181.5 miles (70%).</p>	<p>Resource Preference/Ranking: 2 Impacts on soils are generally characterized as low, with a section of moderate along the same area described in GC1. K1 crosses the second greatest distance of soils with high/severe erosion potential, 172.6 miles (71%).</p>	<p>Resource Preference/Ranking: 1 Impacts are generally characterized as low. C1 crosses 126.2 miles (68%) of soils with high/severe erosion potential. The preference is based on a combination of the least amount of ground disturbance in relation to the amount of erosive soils. The limited amount of ground disturbance is because the existing transmission line would be paralleled.</p>	<p>Resource Preference/Ranking: 1 Impacts on soils are generally characterized as low. C2 crosses 116.9 miles of soils with high/severe erosion potential (55%). While C2 crosses the least amount of highly erosive soils, there would be greater amount of ground disturbance along Link 462, which would be a new corridor.</p>
BIOLOGICAL RESOURCES				
<p>There would be no impacts on biological resources.</p>	<p>Resource Preference/Ranking: 1 Impacts along this route are characterized as low. Special status species habitats primarily exist in three areas along GC1. Mesa Verde Cactus and the Mancos milkvetch occurs (potentially) in the area of The Hogback (Links 100 and 120). Raptor habitat exists on Black Mesa and other cliffs in the area (Links 504 and 561). Special status fish species inhabit the San Juan River. GC1 crosses 62.6 miles of big game habitat. The combination of avoiding sensitive resources associated with the Chuska Mountains, and reducing ground disturbance by paralleling existing transmission corridors resulted in ranking GC1 as first preference for biological resources.</p>	<p>Resource Preference/Ranking: 1 Impacts along this route are generally characterized as low, and similar to GC1, K1 has been ranked a first preference for biological resources. Potential impacts on special status species are generally the same as GC1. This alternative crosses the Kaibito Plateau where no additional special status species or habitat have been identified. K1 crosses 62.6 miles of big game habitat.</p>	<p>Resource Preference/Ranking: 2 Impacts are characterized as low. C1 is the least preferred of the eastern area alternatives for biological resources. C1 crosses the greatest amount of known special status species habitat, including Mexican spotted owl and Chuska tassel-eared squirrel in the Chuska Mountains, and Mesa Verde Cactus in The Hogback area. C1 also crosses the only area of ponderosa pine in the project area along Link 700 in the Chuska Mountains. C1 crosses 103.9 miles of big game habitat, which is the most of the eastern area alternatives.</p>	<p>Resource Preference/Ranking: 1 Impacts are characterized as low. C2 was ranked as a first preference along with GC1 and K1 for biological resources. C2 minimizes potential impacts on sensitive biological resources by avoiding the Chuska Mountains (C1) and the northern portion of Black Mesa (GC1 and K1). However, using Link 462 would result in 65.7 miles of new corridor and could disturb potential habitat for Tusayan rabbitbrush, Tusayan flameflower, and Navajo sedge.</p>

**TABLE A-2
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
EASTERN AREA**

No Action	GLEN CANYON 1 (GC1)	KAIBITO 1 (K1)	CENTRAL 1 (C1)	CENTRAL 2 (C2)
PALEONTOLOGICAL RESOURCES				
<p>The environment would remain as it presently exists. This alternative would forego the opportunity to develop detailed inventories of potentially important paleontological resources.</p>	<p>Resource Preference/Ranking: 2 Potential impacts on paleontological resources along GC1 are generally characterized as low. GC1 crosses 196.7 miles (75% of the route) of deposits with a high potential for scientifically important fossils in New Mexico and Arizona, especially in the Chinle Formation along Links 1383 and 1384. This alternative, along with K1 has the greatest potential to encounter fossils during construction and is ranked second or least preferred.</p>	<p>Resource Preference/Ranking: 2 Impacts along K1 have been generally characterized as low. Similar to GC1, K1 crosses 194.7 miles (80% of the route) of deposits with a high potential for scientifically important fossils. Similar to GC1, this alternative is ranked second or least preferred.</p>	<p>Resource Preference/Ranking: 1 Impacts are generally characterized as low. C1 crosses 160.5 miles (86% of the route) of deposits with a high potential for scientifically important fossils. The preference for this route is based on the potential to minimize impacts on fossils by paralleling an existing transmission line.</p>	<p>Resource Preference/Ranking: 1 Impacts are generally characterized as low. C2 crosses 170.9 miles (81% of the route) of deposits with a high potential for scientifically important fossils. Impacts are generally characterized as low. This alternative would require 65.7 miles of new corridor; however, this does not result in a substantial difference in impacts in comparison with C1, and also has been ranked as preferred.</p>
LAND USE				
<p>There would be no impacts on land use.</p>	<p>Resource Preference/Ranking: 2 Impacts along GC1 are characterized as low-to-moderate and moderate along much of the route. Approximately 1,436 acres of potential rangeland would be disturbed short term and about 135 acres of potential rangeland would be displaced long term along the entire alternative. Twenty-one residences are located within 500 feet; however, all direct impacts on residences within the NTP right-of-way would be avoided through mitigation. GC1 crosses lands planned for open space (0.8 mile) and industrial (0.9 miles) in the city of Page. GC1 has been given a ranking of second, or least preferred due primarily to its length and planned land use in the Page and Lechee areas.</p>	<p>Resource Preference/Ranking: 1 Impacts are characterized as low and moderate. Approximately 1,374 acres of potential rangeland would be disturbed short term and about 152 acres of potential rangeland would be displaced long term along the entire alternative. K1 has 19 residences within 500 feet and impacts on potential residences within the right-of-way could be mitigated. K1 was ranked as first preference along with routes C1 and C2.</p>	<p>Resource Preference/Ranking: 1 Overall, impacts are characterized as low and moderate. Approximately 1,018 acres of potential rangeland would be disturbed short term and about 86 acres of potential rangeland would be displaced long term along the entire alternative. C1 crosses the most irrigated (1.6 miles) agriculture. There are 32 residences within 500 feet of the reference centerline. However, direct impacts to residences within the right-of-way could be mitigated. About 50.9 acres of lands are suitable for timber harvest. In the Chuska Mountains, impacts are characterized as low-to-moderate and moderate and C1 is ranked first preference along with routes K1 and C2.</p>	<p>Resource Preference/Ranking: 1 Based on mitigation potential, impacts are characterized as low-to-moderate. Approximately 1,207 acres of potential rangeland would be disturbed short term and about 153 acres of potential rangeland would be displaced long term along the entire alternative. C2 has the least number of residences within 500 feet (10), and direct impacts to residences within the right-of-way could be mitigated. C2 is ranked as first preference with K1 and C1.</p>

**TABLE A-2
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
EASTERN AREA**

No Action	GLEN CANYON 1 (GC1)	KAIBITO 1 (K1)	CENTRAL 1 (C1)	CENTRAL 2 (C2)
VISUAL RESOURCES				
<p>There would be no impact on visual resources.</p>	<p>Resource Preference/Ranking: 3 The impacts along much of this route are characterized as low to moderate; moderate based on existing transmission lines paralleled. GC1 would, however, result in 14.5 miles of high impact on scenic quality in areas of new corridor at Red Point Mesa Cliffs and along the northern edge of Black Mesa near Marsh Pass. GC1 crosses the greatest amount of residential views within 0.0 to 0.5 miles (72.5 miles) resulting in high impacts for 25.8 miles in areas of new corridor. High impacts on highly sensitive roads total 1.2 miles. Based on these high impacts, GC1 has been given a ranking of third preference for visual resources.</p>	<p>Resource Preference/Ranking: 3 K1 is very similar to GC1 with the exception of the crossing of the Kaibito Plateau. The impacts along most of this route is also characterized as low to moderate; moderate based on existing transmission lines paralleled. High impacts associated with K1 include 14.5 miles of high impact on scenic quality. K1 crosses the second greatest amount of views within 0.0 to 0.5 miles from residences (63.8 miles) and results in 24.4 miles of high impacts in areas of new corridor. 1.2 miles of high impact on highly sensitive roads would result. Based on the similarity to GC1, this alternative was given a ranking of third preference for visual resources.</p>	<p>Resource Preference/Ranking: 1 C1 parallels existing transmission lines almost entirely (95%). Because of these existing conditions, a majority of this alternative would result in low impacts on visual resources with only limited areas of moderate and high impacts. High impacts are restricted to 0.6 miles of views from residences in a localized area of new corridor located to the west of The Hogback. The predominance of low impacts on scenic quality, and views from residences, roads, and recreation areas has resulted in ranking C1 as a first preference for visual resources.</p>	<p>Resource Preference/Ranking: 2 Impacts on visual resources along C2 are generally low to moderate, with some high impacts resulting in areas of new corridor along Link 462 in the vicinity of Sweetwater, Carson Mesa and the Chinle Valley. C2 crosses 23.8 miles of high impacts on residential views in this area and also would result in 1.1 miles of high impact on moderately sensitive roads. This alternative was ranked as a second preference for visual resources.</p>

**TABLE A-2
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
EASTERN AREA**

No Action	GLEN CANYON 1 (GC1)	KAIBITO 1 (K1)	CENTRAL 1 (C1)	CENTRAL 2 (C2)
CULTURAL RESOURCES				
Archaeology and History				
<p>The environment would remain as it presently exists and conflicts with heritage preservation would be avoided. This alternative would forego the opportunity to develop detailed inventories and recovery of archaeological data that might be undertaken to mitigate impacts.</p>	<p>Resource Preference/Ranking: 2 Impacts on archaeological and historical sites are rated as moderate for 96.8 miles and low for 163.8 miles. These ratings are based on the use of helicopter construction techniques to avoid blading of new roads in unroaded, high sensitivity areas for about 15.4 miles along Links 504 and 561 on the northern edge of Black Mesa.</p>	<p>Resource Preference/Ranking: 2 K1 is ranked the same as GC1 and has 112.3 miles of moderate impacts and 132.4 miles of low. K1 is essentially the same as GC1 except K1 would be new transmission line corridor across the Kaibito Plateau resulting in more miles of moderate impacts.</p>	<p>Resource Preference/Ranking: 1 C1 is ranked as preferred, along with C2. The potential to satisfactorily mitigate impacts to archaeological and historical sites is high, and residual impacts are not projected to be significant.</p>	<p>Resource Preference/Ranking: 1 Impacts on archaeological and historical sites are similar to those of C1, although C2 is somewhat longer and 14.6 more miles are rated as having moderate impacts and 9.7 more miles as low impacts.</p>
Special Status Sites				
<p>The environment would remain as it presently exists and conflicts with heritage preservation would be avoided.</p>	<p>Resource Preference/Ranking: 1 GC1 would result in low impacts on a single special status cultural resource—the Cameron Bridge, which is listed on the National Register of Historic Places.</p>	<p>Resource Preference Ranking: 1 Impacts on special status resources would be low and identical to those of GC1.</p>	<p>Resource Preference Ranking: 2 Impacts on special status cultural resources are rated as moderate (Hopi Taawa tribal park) or low (Cameron Bridge, listed on the National Register of Historic Places; Pictured Cliffs site and Mitten Rock Archaeological District, both listed on the New Mexico state register).</p>	<p>Resource Preference Ranking: 2 C2 and C1 are projected to have moderate impacts on Hopi Taawa tribal park and low impacts on the Cameron Bridge. C2 avoids the Pictured Cliffs site and Mitten Rock Archaeological District.</p>

**TABLE A-2
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
EASTERN AREA**

No Action	GLEN CANYON 1 (GC1)	KAIBITO 1 (K1)	CENTRAL 1 (C1)	CENTRAL 2 (C2)
Traditional Cultural Places				
<p>The environment would remain as it presently exists and conflicts with heritage preservation would be avoided. This alternative would forego the opportunity to develop detailed inventories.</p>	<p><u>Navajo</u></p> <p>Resource Preference/Ranking: 1 A special study of Navajo traditional cultural places projects that GC1 would have 9.4 miles of high impacts in the Marsh Pass area along Links 504 and 561. GC1, along with K1, are ranked as the most preferred. High impacts are in areas where the route goes through sacred areas or follows routes of travel recounted in ceremonial stories, or where new corridor would be built through moderate and high sensitivity zones.</p>	<p><u>Navajo</u></p> <p>Resource Preference/Ranking: 1 K1 also has 9.4 miles of high impacts in the Marsh Pass area and is ranked as preferred along with GC1.</p>	<p><u>Navajo</u></p> <p>Resource Preference/Ranking: 3 C1 is ranked as the least preferred. High impacts are projected for 74 miles. The most sensitive areas are in the Chuska Valley and Chuska Mountains (Link 700) and Black Mesa (Link 780).</p>	<p><u>Navajo</u></p> <p>Resource Preference/Ranking: 2 C2 is projected to have 46 miles of high impacts. C2 avoids the highly sensitive areas in the Chuska Valley and Chuska Mountains crossed by C1, but does cross the sensitive areas on Black Mesa (Link 780).</p>
<p>The environment would remain as it presently exists and conflicts with heritage preservation would be avoided. This alternative would forego the opportunity to develop detailed inventories.</p>	<p><u>Hopi</u></p> <p>Resource Preference/Ranking: 3 GC1, is ranked as least preferred based on impact scores determined by a special study of Hopi traditional cultural places. The GC1 impact score is 185, reflecting the presence within a six-mile-wide study corridor of 48 known ritual places, of which 12 are likely to be directly crossed, and 12 nonritual traditional use areas, of which 6 are likely to be directly crossed.</p>	<p><u>Hopi</u></p> <p>Resource Preference/Ranking: 2 K1 along with C2 is ranked as second preference. The K1 impact score is 168 reflecting the presence of 44 ritual places, of which 12 are likely to be directly crossed, and 13 nonritual areas, of which 7 are likely to be directly crossed.</p>	<p><u>Hopi</u></p> <p>Resource Preference/Ranking: 1 C1 is ranked as preferred. The impact score is 134, reflecting the presence within a six-mile-wide study corridor of 64 known traditional ritual places, of which one is likely to be directly crossed, and five nonritual use areas, none of which are likely to be directly crossed.</p>	<p><u>Hopi</u></p> <p>Resource Preference/Ranking: 2 C2 has an impact score of 169, reflecting the presence within a six-mile-wide corridor of 66 known ritual places, of which one is likely to be directly crossed, and 4 nonritual traditional use areas, none of which are likely to be directly crossed.</p>

**TABLE A-3
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
WESTERN AREA**

NO ACTION	MOENKOPI TO MARKETPLACE ALTERNATIVES			MOENKOPI TO MEAD ALTERNATIVES		
	NORTHERN 1 WEST (N1W)	NORTHERN 2 (N2)	SOUTHERN 2 (S2)	NORTHERN 3 (N3)	NORTHERN 4 (N4)	SOUTHERN 4 (S4)
LOCATION						
No location.	N1W is 217.0 miles in length, and is the most direct route between the Moenkopi and Marketplace substations. N1W parallels existing transmission line corridors for the entire distance (100%). This route crosses several jurisdictions, including BLM (49.2 miles), Forest Service (19.1 miles), NPS (10.9 miles), Navajo Reservation (13.3 miles), Hualapai (35.1 miles), state lands (16.7 miles), and private (71.5 miles).	N2 is the second longest alternative to the Marketplace Substation at 225.1 miles. Approximately 82%, or 183.6 miles, of N2 parallels existing transmission corridors. N2 crosses several jurisdictions, including state land (20.1 miles) BLM lands (73.2 miles) Forest Service (19.1 miles), NPS (10.9 miles), and Navajo Reservation (13.3 miles). The remainder of the route would cross private lands (87.3 miles).	S2 is the longest of the three alternatives to Marketplace at 247.7 miles. This alternative parallels existing transmission or pipeline corridors for 161.4 miles, or 65%, of the route, resulting in the greatest amount of new transmission line corridor (35%) among the Marketplace alternatives. Jurisdictions crossed by S2 include state land (56.1 miles), BLM (58.2 miles), Forest Service (20.6 miles), NPS (10.9 miles), Navajo Reservation (19.5 miles). The remainder crosses private lands (81.7 miles).	N3 is the most direct alternative between Moenkopi and Mead, 199.3 miles. This alternative parallels an existing transmission line corridor for the entire distance (100%). Jurisdictions crossed by this alternative include state land (18.2 miles), BLM land (33.4 miles), Forest Service (19.1 miles), NPS (13.3 miles) Navajo Reservation (13.3 miles), and Hualapai Reservation (35.1 miles).	N4 is 207.4 miles in length and parallels existing transmission corridors for 165.9 miles, or 80%, of the route. Jurisdictions crossed by N4 include state land (21.6 miles), BLM (60.2 miles), Forest Service (19.1 miles), NPS (13.3 miles), and Navajo Reservation (13.3 miles).	S4 is the longest of the Mead alternatives (230 miles) and parallels existing transmission corridors for 143.7 miles, or 62%, of the route, which is the least of the three Mead alternatives. Jurisdictions crossed by this route include state land (57.6 miles), BLM (42.4 miles), Forest Service (20.6 miles), NPS (13.3 miles), and Navajo Reservation (19.5 miles).
WATER RESOURCES						
There would be no impacts on water resources.	Resource Preference/Ranking-1 Impacts on water resources would be low. N1W crosses the Colorado River and in proximity to one spring. Impacts would be avoided by spanning the river and carefully placing the towers.	Resource Preference/Ranking-1 Impacts on water resources would be low. N2 crosses the Colorado River, and no springs are known within 600 feet of the reference centerline. Impacts would be avoided by spanning the river.	Resource Preference/Ranking-1 Impacts on water resources would be low. S2 crosses the Colorado River and no springs are known within 600 feet of the reference centerline. Impacts would be avoided by spanning the river.	Resource Preference/Ranking-1 Impacts on water resources would be low. N3 crosses the Colorado River and one spring is known within 600 feet of the reference centerline. Impacts would be avoided by spanning the river and carefully placing the towers.	Resource Preference/Ranking-1 Impacts on water resources would be low. N4 crosses the Colorado River and no springs are known within 600 feet of the reference centerline. Impacts would be avoided by spanning the river.	Resource Preference/Ranking-1 Impacts on water resources would be low. S4 crosses the Colorado River and no springs are known within 600 feet of the reference centerline. Impacts would be avoided by spanning the river.
EARTH RESOURCES (SOILS)						
There would be no impacts on soils.	Resource Preference/Ranking-1 Impacts on soils are characterized as low. Seventeen percent (37.5 miles) of N1W crosses areas of high/severe erosion potential, similar to N2. However, it parallels existing transmission lines and disturbance from construction would be minimized. N1W to Marketplace is ranked as a first preference for soils.	Resource Preference/Ranking-2 Impacts on soils are generally characterized as low. Eighteen percent (39.6 miles) of N2 crosses areas of high/severe erosion potential. This is the second preference to Marketplace because there would be about 41.5 miles of construction in new corridor.	Resource Preference/Ranking-3 Impacts on soils are generally characterized as low. S2 crosses the least amount of high/severe erosion potential (29.8 miles, or 12%), yet would result in the greatest amount (86.3 miles) of construction in new corridor. S2 is the least preferred of the alternative routes to Marketplace.	Resource Preference/Ranking-1 Impacts on soils are characterized as low. N3 crosses areas subject to high/severe erosion potential for approximately 39.6 miles, or 19%, of the route. This is the preferred route to Mead because it parallels existing transmission lines and disturbance from construction would be minimized.	Resource Preference/Ranking-2 Impacts on soils are generally characterized as low. N4 crosses areas of high/severe erosion potential for 41.7 miles, or 20%, of the route. N4 to Mead is the second preference because there would be about 41.5 miles of construction in new corridor.	Resource Preference/Ranking-3 Impacts are generally characterized as low. S4 crosses high/severe erosion potential for 31.9 miles, or 14%, of the route. This is the least preferred route to Mead because there would be the greatest amount (86.3 miles) of construction in new corridor.

**TABLE A-3
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
WESTERN AREA**

NO ACTION	MOENKOPI TO MARKETPLACE ALTERNATIVES			MOENKOPI TO MEAD ALTERNATIVES		
	NORTHERN 1 WEST (N1W)	NORTHERN 2 (N2)	SOUTHERN 2 (S2)	NORTHERN 3 (N3)	NORTHERN 4 (N4)	SOUTHERN 4 (S4)
BIOLOGICAL RESOURCES						
There would be no impacts on biological resources.	<p>Resource Preference/Ranking-1 N1W parallels existing transmission lines for the entire distance and is the preferred route for biology among the Marketplace alternatives. Impacts are characterized as low with potentially moderate impacts (0.2 mile) on Sonoran desert tortoise along Link 2060. All of the western alternatives traverse the riparian and aquatic habitats associated with the Colorado River, which support special status wildlife species. N1W crosses 2.0 miles of riparian vegetation. N1W crosses 139.4 miles of big game habitat. Each of the Marketplace alternatives cross the same amount (21.1 miles) of Mojave desert tortoise habitat and 1 mile of Sonoran desert tortoise habitat. NPS prefers Link 2060 rather than Link 2040 because Link 2060 has lower densities of Sonoran desert tortoise. Impacts on biological resources along all routes would be mitigated by paralleling existing transmission lines, using existing access roads, carefully placing towers, and preconstruction surveys to identify sensitive areas and specific mitigation. The loss of habitat as well as impacts to individual special status plants and animals would be minimized.</p>	<p>Resource Preference/Ranking-3 N2 is ranked second because of the potential impacts associated with construction in new corridor (18% of route). Impacts on biological resources are characterized as low with moderate impacts (0.2 mile) associated with Sonoran desert tortoise along Link 2060 (1 mile). N2 is very similar to N1W and S2, with the exception of crossing a greater amount of sensitive species habitat (38.8 miles of known listed wildlife species and 20.1 miles of known candidate species). N2 crosses the most big game habitat (148.3 miles). Potential adverse effects on the big game habitat along Links 1742, 1800, and 1980 are of specific concern to the BLM because of the potential for increased human access.</p>	<p>Resource Preference/Ranking-2 S2 is ranked second preference. Impacts are characterized as low. Impacts would result from disturbance from construction in new corridor (35% of route). S2 crosses raptor habitat along Link 2000. S2 crosses the most riparian vegetation (2.3 miles) and the least amount of big game habitat (113.3 miles) among the Marketplace alternatives.</p>	<p>Resource Preference/Ranking-1 N3 parallels existing transmission line corridor for the entire distance and is the preferred route among the alternatives to Mead. Impacts are generally characterized as low. It crosses 8.3 miles of known listed wildlife species habitat and 140.4 miles of big game habitat. N3, N4, and S4 would cross 5.7 miles of Mojave desert tortoise, and 6.4 miles of Sonoran desert tortoise habitat. N3 crosses 3.3 miles of riparian vegetation.</p>	<p>Resource Preference/Ranking-3 N4 is least preferred of the Mead alternatives. Impacts are characterized as low. N4 crosses the most miles (148.9) of big game habitat of the Mead alternatives.</p>	<p>Resource Preference/Ranking-2 S4 is ranked second among the Mead alternatives, because of the amount of construction in new corridors (39% of the route). Impacts are characterized as low. S4 crosses 113.9 miles of big game habitat, 3.6 miles of riparian vegetation, and 8.3 miles of known habitat for listed wildlife species.</p>

**TABLE A-3
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
WESTERN AREA**

NO ACTION	MOENKOPI TO MARKETPLACE ALTERNATIVES			MOENKOPI TO MEAD ALTERNATIVES		
	NORTHERN 1 WEST (N1W)	NORTHERN 2 (N2)	SOUTHERN 2 (S2)	NORTHERN 3 (N3)	NORTHERN 4 (N4)	SOUTHERN 4 (S4)
PALEONTOLOGICAL RESOURCES.						
The environment would remain as it presently exists. This alternative would forego the opportunity to develop detailed inventories of potentially important paleontological resources.	Resource Preference/Ranking-1 Impacts are generally characterized as low. N1W crosses 78.5 miles (36%) of deposits with a high potential for scientifically important fossils, especially in the Chinle Formation, Kaibab Limestone, and Coconino Sandstone. This is the preferred route to Marketplace because it parallels existing transmission lines and disturbance from construction would be minimized.	Resource Preference/Ranking-2 Impacts are generally characterized as low. N2 crosses 75.6 miles (33% of the route) of deposits with a high potential for scientifically important fossils. This is the second preference to Marketplace because there would be about 41.5 miles of construction in new corridor.	Resource Preference/Ranking-3 Impacts are generally characterized as low. S2 crosses 62.3 miles (25% of the route) of deposits with a high potential for scientifically important fossils. S2 is the least preferred of the alternative routes to Marketplace because there would be about 86.3 miles of construction in new corridor.	Resource Preference/Ranking-1 Impacts are generally characterized as low. N3 crosses 78.5 miles (39% of the route) of deposits with a high potential for scientifically important fossils. This is the preferred route to Mead because it parallels existing transmission lines and disturbance from construction would be minimized.	Resource Preference/Ranking-2 Impacts are generally characterized as low. N4 crosses 75.6 miles (36% of the route) of deposits with a high potential for scientifically important fossils. This is the second preference to Marketplace because there would be about 41.5 miles of construction in new corridor.	Resource Preference/Ranking-3 Impacts are generally characterized as low. S4 crosses 62.3 miles (27% of the route) of deposits with a high potential for scientifically important fossils. This is the least preferred route to Mead because there would be the greatest amount (86.3 miles) of construction in new corridor.
LAND USE						
There would be no impacts on land use.	Resource Preference/Ranking-1 The primary land use concerns are potential effects on grazing and proximity to residences. Impacts on land uses are characterized as low. Approximately 1,189 acres of rangeland would be disturbed short term and 106 acres would be displaced long term. No residences have been identified within approximately 500 feet of the NTP line, or within the NTP right-of-way. N1W crosses 0.2 mile of the Lake Mohave Ranchos subdivision (undeveloped).	Resource Preference/Ranking-2 Impacts on land uses are characterized as low. Approximately 1,279 acres of rangeland would be disturbed short term and 155 acres would be displaced long term. One residence is located within 500 feet of N2; but none are within the right-of-way. Link 1980 is not within a BLM designated utility corridor. N2 crosses the Lake Mead Ranchos, Realsite Arizona Ranchettes, and Lake Mohave Ranchos (undeveloped subdivisions) for a total distance of 1.0 mile.	Resource Preference/Ranking-3 Impacts on land uses are characterized as low. The most short-term disturbance (1,403 acres) and long-term displacement (166 acres) of rangeland would result along S2. Also, S2 would result in the largest permanent displacement of AUMs in the western portion of the project area. There are seven residences within 500 feet of S2, but none would be within the right-of-way. S2 crosses the Sunny Highlands, Lake Mead Ranchos, Realsite Arizona Ranchettes, and Lake Mohave Ranchos undeveloped subdivisions for a distance of 1.9 miles.	Resource Preference/Ranking-1 Impacts on land uses are characterized as low. The least short-term disturbance (1,074 acres) and long-term displacement (79 acres) of rangeland in the western portion of the project area would result along N3. N3 is the same as N1W with regard to residences.	Resource Preference/Ranking-2 Impacts on land uses are characterized as low. Approximately 1,164 acres of rangeland would be disturbed short term and 128 acres would be displaced long term. N4 is the same as N2 with regard to residences. Link 1980 is not within a BLM designated utility corridor. N4 crosses the Lake Mead Ranchos, Realsite Arizona Ranchettes, and Lake Mohave Ranchos (undeveloped subdivision) for a distance of 0.8 mile.	Resource Preference/Ranking-3 Impacts on land uses are characterized as low. Approximately 1,287 acres of rangeland would be disturbed short term and 139 acres would be displaced long term. S4 is the same as S2 with regard to residences. S4 crosses the Sunny Highlands, Lake Mead Ranchos, Realsite and Arizona Ranchettes (undeveloped subdivisions) for a distance of 1.7 miles.

**TABLE A-3
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
WESTERN AREA**

NO ACTION	MOENKOPI TO MARKETPLACE ALTERNATIVES			MOENKOPI TO MEAD ALTERNATIVES		
	NORTHERN 1 WEST (N1W)	NORTHERN 2 (N2)	SOUTHERN 2 (S2)	NORTHERN 3 (N3)	NORTHERN 4 (N4)	SOUTHERN 4 (S4)
VISUAL RESOURCES						
There would be no impacts on visual resources.	Resource Preference/Ranking-1 N1W is considered preferable for visual resources because of the opportunity to parallel an existing transmission line corridor for the entire route in visually sensitive areas, thus avoiding potentially high impacts. Impacts on visual resources are characterized as low for the majority of the route. Regarding specific visual issues, N1W crosses 15.8 miles of Class A scenery, 2.4 miles of views from residences within 0.5 mile, and 14.8 miles of views from high sensitivity roads. N1W also crosses 0.8 mile of Forest Service retention area and 13.4 miles of partial retention area (lowest among the Marketplace alternatives along with N2), and 4.9 miles of BLM Class II area.	Resource Preference/Ranking-2 N2 is less preferable than N1W because of the amount of new transmission line corridor (18% of the route), resulting in high impacts on scenic quality, views from residences and highways (including views from Route 66). Impacts on visual resources are generally characterized as low-to-moderate and moderate for the route. Regarding specific visual issues, N2 crosses 14.3 miles of Class A scenery, 4.8 miles of views within 0.5 mile from residences, and 5.1 miles of views from high sensitivity roads. N2 crosses 13.4 miles of partial retention area (same as N1W), and 7.7 miles of BLM Class II (most among the Marketplace alternatives).	Resource Preference/Ranking-3 S2 is the least preferable among the Marketplace alternatives because of the amount of new transmission line corridor (38% of the route), in conjunction with the highest impacts on views from residences, highways, and recreation areas. Impacts on visual resources are generally characterized as moderate and moderate-to-high, with segments of low and low-to-moderate. S2 crosses 10.8 miles of Class A scenery and 7.1 miles of views from high sensitivity roads. S2 crosses 0.2 mile of Forest Service retention area 23.5 miles of Forest Service partial retention area and 4.9 miles of BLM Class II areas. Approximately 15 miles are crossed where views from residences would be within 0.5 mile; this is the most among the Marketplace alternatives.	Resource Preference/Ranking-1 Like alternative N1W to Marketplace, N3 is most preferable for visual resources to Mead because of the opportunity to parallel existing transmission line corridor through visually sensitive areas and avoid high visual impacts. Impacts on visual resources along N3 are characterized as generally low-to-moderate and low. Regarding specific issues, N3 crosses the most amount of Class A scenery (17.3 miles) and views from high sensitivity roads (18.6 miles) within 0-0.5 mile.	Resource Preference/Ranking-2 N4 is less preferable than N3 because of the amount of new transmission line corridor (20% of the route), and high impacts on scenic quality and views from residences and highways. Impacts on visual resources are generally characterized as low-moderate and moderate. Regarding specific issues, N4 crosses the second least views from residences (4.6 miles) and highways (8.9 miles) within 0-0.5 mile, as well as 2.8 miles of BLM Class II area.	Resource Preference/Ranking-3 S4 is the least preferable alternative to Mead because of the amount of new transmission line corridor (39% of the route), and the high visual impacts on views from residences and highways and recreation areas. Regarding specific issues, S4 crosses the most area (14.8 miles) of views from residences within 0-0.5 mile.
CULTURAL RESOURCES						
Archaeological and Historical Sites						
The environment would remain as it presently exists and conflicts with heritage preservation would be avoided. This alternative would forego the opportunity to develop detailed inventories and recovery of archaeological data that might be undertaken to mitigate impacts.	Resource Preference/Ranking-1 N1W is ranked as the preferred of the alternatives to Marketplace. Because of high mitigation potential, residual impacts on archaeological and historical sites are projected to be low.	Resource Preference/Ranking-3 N2 is ranked as least preferred. Residual impacts on archaeological and historical sites are projected on be low-to-moderate.	Resource Preference/Ranking-2 S2 is ranked as less preferred than N1W but more preferred than N2. As with N2, residual impacts on archaeological and historical sites are projected to be low-to-moderate.	Resource Preference/Ranking-1 N3 is similar to N1W.	Resource Preference/Ranking-3 N4 is similar to N2.	Resource Preference/Ranking-2 S4 is similar to S2.

**TABLE A-3
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
WESTERN AREA**

NO ACTION	MOENKOPI TO MARKETPLACE ALTERNATIVES			MOENKOPI TO MEAD ALTERNATIVES		
	NORTHERN 1 WEST (N1W)	NORTHERN 2 (N2)	SOUTHERN 2 (S2)	NORTHERN 3 (N3)	NORTHERN 4 (N4)	SOUTHERN 4 (S4)
SPECIAL STATUS CULTURAL RESOURCES						
The environment would remain as it presently exists and conflicts with heritage preservation would be avoided.	Resource Preference/Ranking-1 Residual impacts at a single special status cultural resource, the historic Moqui Stage Station site, are projected to be moderate.	Resource Preference/Ranking-2 Residual impacts on special status cultural resources are expected to be high at a crossing of historic Route 66 and a crossing of the historic Beale Wagon Road, and moderate at another crossing of historic Route 66 and at the Moqui Stage Station. The moderate residual impacts reflect construction in a new corridor across the Truxton Plain (Link 1980).	Resource Preference/Ranking-3 S2 is projected to have high residual impacts at a crossing of the historic Beale Wagon Road near the Russell Tank campsite (near junction of Links 1680 and 1720), moderate residual impacts at two crossings of historic Route 66 adjacent to pipelines or transmission lines (Links 1720 and 2006), and low impacts at two other crossings of the Beale Wagon Road where it is poorly preserved (Links 1680 and 2002), as well as on Wupatki National Monument (Link 1420).	Resource Preference/Ranking-1 N3 is similar to N1W.	Resource Preference/Ranking-3 N4 is similar to N2.	Resource Preference/Ranking-2 S4 is similar to S2.
Traditional Cultural Places						
The environment would remain as it presently exists and conflicts with heritage preservation would be avoided. This alternative would forego the opportunity to develop detailed inventories.	<u>Navajo</u> Resource Preference/Ranking-1 N1W is ranked as slightly preferred, along with N2. N1W is projected to have moderate impacts on Navajo traditional places for 24 miles where the route goes through sacred areas or follows routes of travel recounted in ceremonial stories. These sensitive areas are at the eastern end of the route (Link 1400).	<u>Navajo</u> Resource Preference/Ranking-1 N2 is the same as N1W, N3, and N4.	<u>Navajo</u> Resource Preference/Ranking-2 S2 is ranked as somewhat less preferred than N1W and N2 because S2 is projected to have moderate impacts on Navajo traditional places for about 48 miles of its length. The most sensitive areas are at the eastern end of the route (Link 1420).	<u>Navajo</u> Resource Preference/Ranking-1 N3 is the same as N1W, N2, and N4.	<u>Navajo</u> Resource Preference/Ranking-1 N4 is the same as N1W, N2, and N3.	<u>Navajo</u> Resource Preference/Ranking-2 S4 is the same as S2.

**TABLE A-3
COMPARISON AND RANKING OF ALTERNATIVE ROUTES
WESTERN AREA**

NO ACTION	MOENKOPI TO MARKETPLACE ALTERNATIVES			MOENKOPI TO MEAD ALTERNATIVES		
	NORTHERN 1 WEST (N1W)	NORTHERN 2 (N2)	SOUTHERN 2 (S2)	NORTHERN 3 (N3)	NORTHERN 4 (N4)	SOUTHERN 4 (S4)
	<p><u>Hopi</u></p> <p>Resource Preference/Ranking-1 N1W is ranked as slightly preferred, along with N2. The study of traditional Hopi cultural places scored impacts as 3, reflecting the presence within a six-mile-wide study corridor of a single traditional ritual place, and a single nonritual use area, neither of which are likely to be directly crossed. These places are at the eastern end of the route Link 1400).</p> <p><u>Hualapai</u></p> <p>Resource Preference/Ranking-1 N1W is ranked as preferred. Impacts on traditional Hualapai places are projected to be moderate for about 176 miles, reflecting traditional occupation, resource collection, and burial areas in the vicinity of the Hualapai Reservation and adjacent lands. N1W is preferred because it uses an existing corridor through traditional Hualapai territory (subject to confirmation when supplemental traditional cultural place study is completed).</p>	<p><u>Hopi</u></p> <p>Resource Preference/Ranking-1 N2 is the same as N1W, N3, and N4.</p> <p><u>Hualapai</u></p> <p>Resource Preference/Ranking-2 N2 is projected to have high impacts on traditional Hualapai places along approximately 50 miles of the route, and is ranked as less preferred than N1W because it requires a new corridor through traditional Hualapai territory.</p>	<p><u>Hopi</u></p> <p>Resource Preference/Ranking-2 S2 is ranked as somewhat less preferred than N1W and N2. The study of traditional Hopi cultural places scored impacts as 6, reflecting the presence within a six-mile-wide study corridor of 2 traditional ritual places, and 1 nonritual traditional use area, none of which are likely to be directly crossed. These places are at the eastern end of the route (Link 1420).</p> <p><u>Hualapai</u></p> <p>Resource Preference/Ranking-3 S2 is ranked as less preferred than N1W, and N2. S2 is projected to have high impacts on traditional Hualapai places along approximately 82 miles of the route, and is ranked as less preferred than N1W and N2 because it requires a greater distance of new corridor through traditional Hualapai territory.</p>	<p><u>Hopi</u></p> <p>Resource Preference/Ranking-1 N3 is the same as N1W, N2, and N4.</p> <p><u>Hualapai</u></p> <p>Resource Preference/Ranking-1 N3 is the same as N1W.</p>	<p><u>Hopi</u></p> <p>Resource Preference/Ranking-1 N4 is the same as N1W, N2, and N3.</p> <p><u>Hualapai</u></p> <p>Resource Preference/Ranking-2 N4 is the same as N2.</p>	<p><u>Hopi</u></p> <p>Resource Preference/Ranking-2 S4 is the same as S2.</p> <p><u>Hualapai</u></p> <p>Resource Preference/Ranking-3 S4 is the same as S2.</p>