

**ENVIRONMENTAL ANALYSIS
OF THE
CHANGES TO THE PROPOSED
MEAD-PHOENIX TRANSMISSION PROJECT**

February 1990

**U.S. Department of Energy
Western Area Power Administration**

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CHAPTER 1 - PURPOSE AND NEED



CHAPTER I - PURPOSE AND NEED FOR ACTION

INTRODUCTION

Western Area Power Administration (Western), Salt River Project (SRP), Southern California Public Power Authority (SCPPA), and M-S-R Public Power Agency (Modesto-Santa Clara-Redding) (collectively referred to as the Project Sponsors) propose to construct a 500 kilovolt (kV) alternating current (AC) transmission line with the capability to be upgraded later to 500kV direct current (DC). This transmission line will connect the Westwing Substation, located north of Phoenix, Arizona, with a new McCullough II Substation, located approximately 14 miles west of Boulder City, Nevada.

This project is a modification of the Mead-Phoenix project, a 500kV DC project approved in February 1986. That project would have had a transmission line capacity of over 2,000 megawatts (MW) from Eastwing AC/DC Terminal north of Phoenix to Mead AC/DC Substation near Boulder City. The AC/DC terminals themselves would have been initially constructed with less than the transmission line capacity and would have been sized to the participants' needs at the time of construction.

A federal Environmental Impact Statement (EIS) was prepared for the Mead-Phoenix 500kV DC transmission line, but to date, the participants' election to proceed has not occurred and therefore, no record of decision has been filed. Additionally, a State of Arizona Certificate of Environmental Compatibility was approved November 26, 1985; a Clark County, Nevada Special Use Permit was approved October 17, 1985; and a State of Nevada Public Utilities Construction Permit was approved November 12, 1985 for the Mead-Phoenix 500kV transmission line.

Since 1986, load growth in the areas served by the proposed Mead-Phoenix 500kV DC transmission project has slowed. It now appears that a much longer time will elapse before the full transmission capacity provided by this project will be needed. Accordingly, it is now proposed to construct the Mead-Phoenix project as a 500kV AC transmission line with a capacity in the 1000 to 1300 MW range and change termination (end points) to the existing Westwing Substation or, if necessary, to the proposed Eastwing Terminal Site, two miles east of Westwing and the proposed site for the converter station when the transmission system is converted to DC operation. This saves the expense of constructing the AC/DC conversion equipment at the terminals. The line terminations selected are the existing Westwing Substation, about two miles west of the proposed Eastwing Terminal along the approved Mead-Phoenix route, and the proposed McCullough II Substation, about 13.5 miles southwest of Mead Substation along another approved 500kV line route known as the Mead/McCullough and El Dorado substations. The McCullough II Substation will be constructed in the immediate vicinity of the existing McCullough and El Dorado substations. The McCullough II to Westwing 500kV transmission line will also be interconnected into Mead Substation, located approximately three miles south of Boulder City, Nevada.

The new substation, McCullough II, will be constructed in conjunction with the Mead to Adelanto Transmission Project. The 500kV transmission line will pass immediately north of Mead Substation and only a few new structures will be required to "loop-in and loop-out" (interconnect) into Mead Substation. A new 500kV Yard will need to be constructed at Mead and this 500kV Yard may be constructed in the existing substation (inside the fence) or adjacent to the existing substation.

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The resulting transmission line will be operated at 500kV AC on an interim basis, until the system need grows to the point that the cost of the AC/DC conversion equipment can be justified. At that time, two AC/DC terminals will be constructed at Mead and Eastwing and the existing transmission line will be operated as a DC line at a higher capacity that could be achieved with the interim AC transmission line. The upgrading will not require reconstruction of the interim transmission line, but will require construction of the two new AC/DC terminals.

The purpose of this environmental study is (1) to look at the environmental effects of terminating at different substations along the previously approved route; (2) to examine the effects of initially building the project as an AC project instead of as a DC project; (3) to look at the previous environmental data and compare it to conditions along the route today to see what might have changed that would affect the previous decisions; and (4) to see whether these decisions are still valid. The data in this environmental study will be used to supplement the data in the previously issued EIS documents for both the Mead-Phoenix project and the Mead/McCullough-Victorville/ Adelanto project in order to issue a record of decision for the revised Mead-Phoenix project.

PURPOSE AND NEED

Electric utilities have a responsibility to provide adequate supplies of reliable and economical electricity to all classes of customers. The Western Systems Coordinating Council (WSCC) has projected that by 1995, peak firm loads will have increased over those of 1988 in the following amounts: for the California-Southern Nevada WSCC Power Area - 3226 MW; for the Arizona-New Mexico WSCC Power Area - 2279 MW. This represents increases of 7 and 21 percent, respectively. This load growth in California, Arizona and Nevada, coupled with difficulties in building new generating resources and interregional transfers of surplus energy, reinforce the need of utilities to secure firm transmission on a long-term basis. Additionally, the dependency of California utilities on oil and natural gas as primary fuel sources emphasizes the need to assess the reliability and economics of such practice.

The uncertain availability in the near and distant future of both foreign and domestic oil and natural gas supplies amplifies the need for obtaining a more diversified fuel mix. There is also an increasing need for regional utilities to work cooperatively to maintain greater flexibility and enhance reliability through interconnections. California utilities must strengthen their systems by developing additional transmission paths to take advantage of sources of electricity outside their own systems.

Electric rates charged to California customers are among the highest in the nation. To decrease use of expensive oil and natural gas, California utilities must fully use economy energy markets and coal and nuclear generation wherever possible. At the same time, Arizona utilities look to California markets for sales of excess off-peak coal and nuclear capacity to the year 2000.

The proposed project would serve the following purposes:

1. Help reduce dependence on oil and natural gas for electricity consumed in the SCPPA member and M-S-R service areas.
2. Furnish access by all Project Sponsors to the economy energy market.



3. Provide a path for sale of SRP's off-peak surplus capacity to California markets.
4. Provide a path for Western to sell economy energy and firm transmission from the Phoenix area to Southern California.
5. Help provide a link for movement of power and energy between the Pacific Northwest, the Desert Southwest, and Southern California.
6. Enhance system reliability.
7. Help meet the forecast need for power of SCPA and M-S-R members by providing firm, long-term transmission capacity.
8. Provide out-of-basin support during Los Angeles' air quality Stage III episodes.

Specific purposes and needs of each Project Sponsor are presented below. Figure 1-1 shows the location of each Project Sponsor's principal office.

Furnish Access to the Economy Energy Market

The members of SCPA and M-S-R are committed to provide their customers with the most economical electricity available by decreasing the use of expensive fuel and fully using economy energy markets.

The proposed project would provide SCPA and M-S-R members transmission capability for obtaining lower-cost power available during off-peak periods in Arizona from entities such as SRP. The present interconnected transmission system does not have sufficient capacity for the transfer of additional power and energy between the Arizona and Nevada areas. Additional firm transmission capacity would enable SCPA and M-S-R members to purchase surplus low-cost coal-fired generation available in Arizona and New Mexico. The low-cost surplus energy would permit California utilities to: (1) displace a portion of the high-priced oil- and natural gas-fired generation; (2) supply a portion of the projected peak load demand and energy requirement; and (3) provide for the retirement of obsolete, less efficient oil-fired generating units.

At the same time, the nature of SRP's generation mix renders excess capacity attractive for economy energy sales. A very high percentage of SRP's installed capacity is or will be base load coal-fired and nuclear generation. SRP's coal-fired and nuclear capacity currently totals nearly 80 percent of the annual peak load; this high percentage, in conjunction with loads varying significantly over the day and year, results in excess energy being available a good part of the time both presently and in the future. The Mead-Phoenix project is needed to deliver this excess low-cost energy to markets in California, Nevada, and the Pacific Northwest.



1-4



LOCATION OF PRINCIPAL OFFICES OF PROJECT SPONSORS

Figure 1-1



Sale of Off-Peak Surplus Capacity

SRP will use the Mead-Phoenix project to buy and sell excess capacity and economy energy as well as facilitating prospects for firm sales and purchases to utilities in California, Nevada, and the Pacific Northwest. SRP currently has, and at times will continue to have, capacity in excess of its loads and 20 percent reserve requirements for the next 10 to 20 years. This excess capacity and energy is attributable to several factors, including the seasonal nature of SRP's peak demand and slower customer load growth than originally projected during the late 1960s and early 1970s when several generation units were planned and sized.

The Mead-Phoenix project would provide the needed capacity for SRP to market its excess capacity. Further, it is very likely that the existing Arizona-California-Nevada transmission system will be heavily used through the year 2000 as the energy market in California continues to increase. This will make the competition for available transmission capacity to California more intense and should increase the value of the Mead-Phoenix project to SRP. Additionally, the proposed project could also benefit SRP's transmission system by offering an opportunity for a firm transmission path to and from the Pacific Northwest in the future for sales of excess off-peak capacity.

Increase in Firm Transmission from Phoenix to Southern Nevada and Southern California

Western and its customers will benefit significantly from increased transmission capability between its various areas. This line will aid in increasing on-peak fuel replacement sales, which often are limited to 30 to 40 MW from the Phoenix area to the west because of transmission constraints. There are over 400 MW of requests for firm transmission capability from the Phoenix area to southern California which could be accommodated by this line.

Western presently owns and operates two systems between the southern Nevada area and the Phoenix area: the Mead to Liberty 345kV system and the Parker-Davis and Central Arizona Project underlying 230/161kV system. The Mead to Liberty system has bidirectional transmission capacity of 450 MW, and the underlying 230/161kV system is capable of transmitting 250 MW east to west and 480 MW west to east. Western has a total east-to-west transfer capability of 700 MW which is fully committed. Thus, the proposed project would provide flexibility in delivering economy energy sales and firm transmission commitment.

Provide a Link to Movement of Power and Energy Between the Pacific Northwest, the Desert Southwest, and Southern California

In September 1982, the House Appropriations Committee encouraged the Bonneville Power Administration (BPA) and Western to cooperate with non-federal utilities in expediting reinvestigation of previously approved interties between the Pacific Northwest and the Pacific Southwest. This direction was an outgrowth of the escalating costs and shortages of electric power in California and the Pacific Southwest, the projected excess of relatively low-cost hydroelectric power in the Pacific Northwest in the late 1980s and early 1990s, and insufficient transmission and intertie capacity between the two areas. The proposed Mead-Phoenix project is an important link in tying the Southwest with the Northwest; that importance will be significantly increased if and

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when the DC transmission system between Celilo Substation (at The Dalles Dam on the Columbia River) and Mead Substation in southern Nevada is developed by Western, BPA and other utilities, as encouraged by the Committee, or an alternative project is developed.

Enhance System Reliability

The proposed electric transmission link between SRP, SCPPA members, Western and M-S-R systems would permit capacity and energy exchanges during operating emergencies, and would improve the efficiency and economy of all four systems. Reliability would be increased by providing an additional firm transmission path between Arizona, Nevada, California and New Mexico. Primary fuel sources would be diversified so that impacts resulting from the interruption of any one type of fuel supply would be minimized. Voltage regulation, frequency control, stability margins, and opportunity for reserve sharing would further be improved, thus enhancing system reliability for all sponsors.

Help Meet the Forecast Need for Power While Reducing Dependence on Oil and Gas Consumption for Generating Electricity

The Powerplant and Industrial Fuel Use Act (PIFUA) of 1978 discourages the use of fuel oil and gas for generating electricity. Oil- and gas-generated resources (including existing generation and purchased power) available to SCPPA members could be replaced by coal and nuclear generation through SCPPA's participation in the Mead-Phoenix project. The electricity expected to be received over the Mead-Phoenix transmission line will thus be used to displace a portion of the oil- and natural gas-generated energy currently being purchased from the Southern California Edison Company (SCE) by the cities of Anaheim, Azusa, Banning, Colton, Riverside and Vernon. The proposed project would, therefore, be in accord with PIFUA by providing access to coal-based energy in Arizona and New Mexico.

The proposed project would provide all sponsors with firm long-term transmission capacity between resources and loads in Arizona, Nevada and California.

As previously indicated, SRP is in need of firm capacity for sales and purchases of power to western markets in California. Western is in need of firm capacity into Arizona to transmit the increase in Hoover Dam power as it becomes available. Both SCPPA members and M-S-R are in need of long-term, firm transmission capacity to shift their generation/purchase mix from oil and gas while meeting forecasted load growth. Both will look to Arizona and New Mexico utilities to provide a portion of this power from coal and nuclear resources.

M-S-R Public Power Agency

M-S-R was formed to acquire, construct, maintain and operate facilities for the generation and transmission of electric energy for the benefit of any one or more of its members. M-S-R is authorized to finance, acquire, construct and maintain any project, including generation plants and transmission systems, for the purpose of providing electric energy to its members.



The objective of M-S-R is to minimize power costs of the members by supplying power through the development or acquisition of generating facilities and through the arrangement of contractual power entitlements for its members. Long-run savings to the members are anticipated as resources become available or operational by providing methodical replacement of wholesale power purchases currently made by the members with power supply resources developed or acquired by M-S-R. At the same time, M-S-R is studying various transmission alternatives such as the Mead-Phoenix project to bring eastern resources to their member utilities.

M-S-R is committed to assisting its members in meeting their projected load growth through acquiring lower-cost coal resources from New Mexico and Arizona rather than higher-cost supplemental oil- and gas-generated power from Pacific Gas and Electric (PG&E).

M-S-R has an ownership interest equivalent to approximately 143 MW of capacity in the San Juan Generating Station Unit No. 4 in northern New Mexico. M-S-R's power from this existing unit has been sold to others through April 1995; however, M-S-R may recall a portion of the generation upon one month's advance notice and another portion upon three years advance notice. Additionally, M-S-R has contractual commitments with Tucson Electric Power (TEP) to buy 400, 500, 600 and 800 gigawatt hours (gwh)/year from TEP's coal-fired system each year through 1995 and additional amounts of energy which have been deferred from prior years' allocations. M-S-R has the right to purchase from TEP up to 138 MW of designated combustion turbine capacity through April of 1995. The TEP and San Juan power may be delivered to M-S-R at several delivery points, including the Palo Verde Nuclear Generating Station (PVNGS), Moenkopi, Mead, and the Westwing Substation. M-S-R is investigating several alternatives for delivery of this power to California from these delivery points, including delivery over the proposed Mead-Phoenix transmission system. Also, M-S-R has the ability to sell energy to others or defer deliveries due to transmission limitations.

Modesto Irrigation District

The Modesto Irrigation District is a 50-percent sponsor in M-S-R and has been providing electrical energy to the Modesto service area for more than 50 years. Modesto presently owns approximately 195 MW of its total 430 MW requirement, rendering it dependent on others for supplying approximately 235 MW. Power requirements of the Modesto system have grown rapidly, with annual load growth projected to be approximately 2.6 percent between now and the year 2000, for an increase in peak load from the present 430 MW to 580 MW in 2000. Loads and resource projections for Modesto show a continued need for supplemental purchased power through 2000, with the TEP/San Juan Project resources the most likely alternative to more costly wholesale PG&E oil- and natural gas-fired generation.

As shown in Table 1-1, Modesto's source plan calls for a decrease in dependence on natural gas, and in purchases from the current 83 percent of total resources to 74 percent in 2000. At the same time, coal will contribute 11 percent of total resources in 2000. Even with the projected generation mix, Modesto will purchase 55 percent of its total resources, demonstrating the need for economical coal- and nuclear-generated resources available in Arizona and New Mexico.



**TABLE 1-1
MODESTO GENERATION MIX
(Percent of Total Resources)**

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>
Coal	0	0	0	0	4	4	4	13	12	12	12	12	11
Natural Gas	27	26	27	26	25	23	23	22	21	21	20	20	19
Cogeneration	0	0	0	0	0	0	0	0	0	0	0	0	0
Geothermal	5	11	11	10	10	9	9	9	8	8	8	8	8
Wind	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydro	12	10	10	9	9	9	8	8	8	8	7	7	7
Purchases	<u>56</u>	<u>53</u>	<u>52</u>	<u>55</u>	<u>52</u>	<u>55</u>	<u>56</u>	<u>48</u>	<u>51</u>	<u>51</u>	<u>53</u>	<u>53</u>	<u>55</u>
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100	100

**TABLE 1-2
SANTA CLARA GENERATION MIX
(Percent of Total Resources)**

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>
Coal	0	0	0	3	4	4	4	7	7	7	7	7	7
Natural Gas	16	15	14	13	12	12	11	11	10	11	11	11	10
Cogeneration	2	1	1	1	1	1	1	1	1	1	1	1	1
Geothermal	26	25	22	22	20	19	18	18	17	17	17	17	17
Wind	0	0	0	0	0	0	0	3	3	3	3	3	3
Hydro	2	2	15	15	14	13	13	12	14	15	15	15	14
Purchases	<u>54</u>	<u>57</u>	<u>48</u>	<u>46</u>	<u>49</u>	<u>51</u>	<u>53</u>	<u>48</u>	<u>48</u>	<u>46</u>	<u>46</u>	<u>46</u>	<u>48</u>
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100	100



Santa Clara

The City of Santa Clara is a 35 percent sponsor in M-S-R, relying heavily on power contracts with other utilities to provide all but about 205 MW of its present approximately 400 MW peak load. Based on an average annual load growth of approximately 2.0 percent through 2000, Santa Clara will continue to purchase power at its present rate from such resources as the San Juan Project. The city's primary alternative to the San Juan Project is purchase of power from PG&E and the Pacific Northwest.

As shown in Table 1-2, Santa Clara's resource plan calls for a reduction in power purchases from the present 54 percent to 48 percent in the year 2000. With power purchases totaling at least 60 percent of total resources through 2000, Santa Clara is looking to inland Southwest utilities for supplying economical coal-generated resources.

Redding

The City of Redding is a 15-percent sponsor in M-S-R and currently purchases all of its 116 MW of its power requirement from Western's Central Valley Project. Redding owns a 3 MW hydroelectric generating plant and is presently developing other power supply resources. Redding's present peak demand is about 155 MW, with an annual load growth of 2.6 percent between 1988 and 2000 for an increase in peak demand to about 210 MW. As in the case of Modesto and Santa Clara, Redding will use its share of the San Juan Project and still be purchasing about 50 percent of its resources, as shown on Table 1-3.

Southern California Public Power Authority

As in the case with M-S-R, SCPPA's demonstrated need for additional capacity to meet forecasted load growth relates directly to loads and resource forecasts for each member utility. All Project Sponsors, with the exception of the City of Vernon, anticipate growth in loads over the next 20 years. The City of Vernon has been notified by one of its major industrial customers that it intends to close down its operations in Vernon. This closure could result in a decrease in Vernon's forecasted energy requirements by approximately 18 percent. Because of the difference in geographic and economic factors, the rate at which individual loads are anticipated to grow varies widely. Even within closely located geographic areas, differing economic projections and types of areas served have resulted in substantially different estimated growth rates.

The service area of each SCPPA member is geographically small; since the major resource additions which will meet base load capacity and energy requirements will be coal- and nuclear-fueled generation, future power sources will be remote from the SCPPA member's service area. The future replacement of obsolete gas- and oil-fired generating units within the service area will require new power sources outside the service area of the SCPPA members.

Transmission planning by SCPPA members must provide for a reliable transmission system which will deliver power from remote generation sources to bulk power stations in the service areas of SCPPA's members. The Mead-Phoenix project would serve to deliver coal- and nuclear-generated eastern capacity to Los Angeles' transmission system for delivery to SCPPA members.



TABLE 1-3
 REDDING GENERATION MIX
 (Percent of Total Resources)

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>
Coal	0	0	0	0	0	9	7	7	7	7	7	6	6
Natural Gas	0	0	0	0	0	11	9	9	9	9	9	9	9
Cogeneration	0	0	0	0	21	17	14	14	13	13	13	13	13
Geothermal	0	0	0	0	0	0	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydro	1	1	1	1	1	0	19	19	18	18	22	23	23
Purchases	<u>99</u>	<u>99</u>	<u>99</u>	<u>99</u>	<u>78</u>	<u>62</u>	<u>51</u>	<u>51</u>	<u>53</u>	<u>53</u>	<u>49</u>	<u>49</u>	<u>49</u>
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100	100



Los Angeles' transmission system, consisting of existing and planned interconnecting transmission lines, will permit optimization of the number of lines and bulk power stations required to deliver power to each member's delivery point. This will permit better planning and use of new power sources as they become available than is possible with long radial transmission lines from individual generation sources to each of the other SCPPA member's service area.

Los Angeles

The proposed Mead-Phoenix project is not required for transmission of Los Angeles' or SCPPA's PVNGS capacity and energy; however, the proposed facility would allow SCPPA members to efficiently and economically take advantage of other existing and future potential eastern power supply resources. Various members presently receive power from eastern generating resources at Los Angeles' McCullough and Victorville switching stations; additional SCPPA members will also receive power from the eastern sources at these switching stations with the completion of the Mead-Phoenix project.

Los Angeles currently has a net dependable system capability of over 6800 MW, of which approximately 47 percent is oil- and gas-fueled, 16 percent is coal-fueled, 28 percent is hydroelectric, and 9 percent is purchased peaking capacity.

Los Angeles' resource plan is designed to provide an adequate power supply to meet projected electric load growth reliably and economically, provide a sufficient reserve margin to maintain reliability, and to reduce dependence on oil and natural gas as fuels for the generation of electricity. Los Angeles' resource plan through 1990 calls for a 12 percent reduction in dependence on oil and natural gas, an 89 percent increase in out-of-basin joint ownership coal-generated capacity, and a total addition of 361 MW of PVNGS capacity. Thus, the existing load and 447 MW projected load growth (or 10 percent cumulative growth from 1982 to 1990) will be met through power imports with resultant significant shifts in the generation mix, as shown in Table 1-4.

According to Los Angeles' resource plan, by the year 2000 the oil- and gas-fired steam-generating Harbor Units Nos. 1 through 5 and Valley Units Nos. 1 and 2 will be deactivated, and most of the remaining oil-fueled generating units will be placed on hot or cold standby reserve. The current plan includes generation from PVNGS, the Intermountain Power Project (IPP) and White Pine Power Plant, but these "identifiable projects," together with the existing out-of-basin resources, will supply only approximately 60 percent of the peak load demand forecasted for the year 2000. Therefore, most of the remaining 17 percent peak demand will be supplied from nonidentifiable generation located outside the Los Angeles Basin.

Anaheim

Anaheim loads and resources plan projects an increase in peak demand from 493 MW in 1989 to 746 MW in the year 2009. The resource plan for Anaheim is based on the least expensive supply generation available, regardless of whether it is a purchase or project ownership.



TABLE 1-4
CITY OF LOS ANGELES DEPARTMENT OF
WATER AND POWER GENERATION MIX
(Percent of Total Resources)

	<u>1989</u>	<u>1990</u>	<u>1995</u>	<u>2000</u>
Oil and Gas	43	42	38	33
Hydroelectric	20	25	25	23
Joint Coal Facilities	25	24	24	22
PVNGS	5	5	5	4
Purchases	<u>7</u>	<u>4</u>	<u>8</u>	<u>18</u>
Total (%)	100	100	100	100

TABLE 1-5
CITY OF ANAHEIM GENERATION MIX
(Percent of Total Resources)

	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>
Nuclear (SONGS)	11	11	11	10	10	10
Coal (IPP)	34	32	32	31	30	30
Natural Gas (comb. turbine)	0	0	6	6	6	6
Hydro (pumped storage)	0	0	0	3	3	3
Purchases	<u>55</u>	<u>57</u>	<u>51</u>	<u>50</u>	<u>51</u>	<u>51</u>
Total	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>
Nuclear (SONGS)	10	10	9	9	9	9
Coal (IPP)	29	28	28	28	27	27
Natural Gas (comb. turbine)	6	6	6	5	5	5
Hydro (pumped storage)	3	3	3	3	3	3
Purchases	<u>52</u>	<u>53</u>	<u>54</u>	<u>55</u>	<u>56</u>	<u>56</u>
Total	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>



In 1989, Anaheim's generation resources included a 3.16 percent ownership in San Onofre Nuclear Generation Station (SONGS) units 2 and 3 (with capacity available to the City of 33.8 and 34.1 MW, respectively); purchases of 105.8 MW of firm power from each of the IPP's two units; an entitlement in Hoover Dam (40 MW); long-term purchases (through 1994) from Deseret Generation and Transmission Cooperative of up to 90 MW; and purchases from PG&E (20 MW) and CDWR (30 MW). Anaheim is currently attempting to permit a 48.3 MW combustion turbine located in Anaheim, scheduled for operation in 1992, and is investigating other power supply alternatives. SCE supplies any additional capacity required to meet City loads.

Anaheim's resource mix is shown on Table 1-5.

The Mead-Phoenix project will provide Anaheim: (1) a transmission path to utilities that have interties in Arizona; (2) intertie capabilities with utility companies in the Arizona, New Mexico and west Texas region that will allow the purchase of capacity and energy to displace predominately oil-fired energy; and (3) opportunities to purchase and market surplus power to interconnecting utilities on a daily and seasonal basis, thus reducing and maintaining lower utility rates.

Anaheim does not own any transmission facilities. Anaheim has a long-term transmissions service agreement with Southern California Edison for its ownership interest in SONGS. Anaheim also has entitlements in the Southern Transmission System (STS) and Northern Transmission System (NTS) which are used to transmit power from IPP and Deseret. The Los Angeles Department of Water and Power (LADWP) delivers the power from the southern terminus of the STS to Edison's system.

Edison provides transmission service for LADWP's other firm resources on a point-to-point basis and interruptible transmission for non-firm purchases. However, the amount and duration of firm transmission capacity Edison is willing to provide is insufficient to meet Anaheim's requirements. Anaheim has been unable to import power from the Phoenix area. The proposed project would provide Anaheim with the capability to negotiate firm capacity and non-firm energy sources without depending on Edison for transmission.

Burbank, Glendale and Pasadena

Burbank, Glendale and Pasadena supply electricity to their respective electric systems through a combination of oil- and gas-fired generating facilities located in the Los Angeles Basin, hydroelectric generation at the Hoover Dam Project, coal-fired power from IPP, and nuclear energy from the Palo Verde Project. In addition, long-term firm power arrangements are in place with BPA and, in the cases of Burbank and Glendale, with Portland General Exchange. Pasadena generates electric energy from the Azusa Hydroelectric Plant.

Loads and resource projections through 1990 predict a 140 MW or 22 percent increase in load over 1982. The resource plan calls for reduction in dependence on oil and gas from 79 percent of total resources in 1982 to 58 percent in 1990. At the same time, resource requirements from additional sources will increase from 121 MW in 1982 to 182 MW in 1990.



TABLE 1-6
CITY OF GLENDALE GENERATION MIX
(Gwh expressed as percent)

	<u>1990-91</u>	<u>1992-93</u>	<u>1994-95</u>	<u>1995-96</u>	<u>1997-98</u>
Oil and Gas	15	15	15	15	15
Hydroelectric	7	6	6	6	6
Nuclear	6	6	5	5	5
Coal	20	19	19	25	30
Purchases	<u>52</u>	<u>54</u>	<u>55</u>	<u>49</u>	<u>44</u>
Total	100	100	100	100	100



The proposed project will: (1) permit delivery of firm and nonfirm economy energy from utilities in Arizona, New Mexico and west Texas; (2) provide access to inexpensive base load energy sources, thereby reducing oil and natural gas usage; and (3) provide a firm transmission path for Burbank, Pasadena and Glendale's share of the capacity and energy output of the Palo Verde Project.

Vernon, Azusa, Banning and Colton

The cities of Vernon, Azusa, Banning and Colton are each municipal corporations which own and operate electric utilities, providing electric service to virtually all of the electric customers within their respective city limits. Currently, all electricity for these four cities is purchased at wholesale rates from SCE, except for interruptible energy which is purchased from other public and private electric utilities and governmental agencies when it is available at an economically attractive price. The capacity and energy expected to be received over the proposed Mead-Phoenix project will be used to displace a portion of the power currently purchased from SCE.

Loads and resource projections for the four cities show a decreasing dependence on oil- and gas-generated electricity as participation in coal and nuclear projects begins. All four entities will participate under SCPPA in PVNGS. Additionally, participation in IPP will serve to displace oil and gas purchases.

The proposed project will provide all four cities: (1) a firm long-term transmission path for delivery of their PVNGS entitlement; (2) intertie capabilities with Arizona, New Mexico and west Texas to allow the purchase of capacity and energy to displace predominately oil-fired electrical power with less expensive nuclear and coal-fired energy; and (3) opportunities to purchase and market surplus power to interconnecting utilities on a daily and seasonal basis, thus reducing and maintaining lower utility rates.

Riverside

The City of Riverside is a municipal corporation which owns and operates electric utilities, providing electric service to the electric customers within the city limits.

The city currently supplies 64 percent of its annual capacity requirements and 96.5 percent of total energy requirements from sources outside of the Edison Control Area, utilizing contractual transmission paths. Approximately 36 percent of the city's annual capacity requirements and 3.5 percent of annual energy requirements are purchased at wholesale rates from SCE.

Loads and resource planning through 2000 for Riverside shows a planned decreasing dependence on oil- and gas-generated electricity as participation in coal and nuclear projects and purchases from now gas-priced utilities increases. Riverside is under SCPPA in PVNGS and has allocations from Hoover Dam while Riverside alone is a sponsor in the SONGS, and a participant in IPP which serve to displace oil and gas purchases. The shift in fuel mixture through 1999 is shown in Table 1-7.



Provide Support During Air Quality Emergency Episodes

The Mead-Phoenix transmission line will help satisfy the California South Coast Air Quality Management District's "Emergency Episode Plan." Part of the plan states that utilities serving the Los Angeles area (during a Stage III episode) should demonstrate measures to reduce generation in oil- and gas-fired power plants within the Los Angeles Basin by shifting generation to plants outside the basin to the extent consistent with health, safety and welfare.

TABLE 1-7
CITY OF RIVERSIDE
Percent of Total Resources Available for Load Relative to
Yearly Peak Demand

	<u>1990</u>	<u>1992</u>	<u>1994</u>	<u>1996</u>	<u>1999</u>
Nuclear (PVNGS/SONGS)	11	10.6	10.2	9.9	9.4
Coal (IPP & Other)	25.8	24.9	24	23.2	31.5
Hydro (Hoover)	5.6	6.2	6	5.8	5.5
Gas Turbine	0	0	0	9.9	18.7
Purchases (SCE & Others)	<u>57.6</u>	<u>58.3</u>	<u>59.8</u>	<u>51.2</u>	<u>34.9</u>
Total (%)	100	100	100	100	100



CHAPTER 2 - UPDATED INFORMATION ON ENVIRONMENTAL RESOURCES



CHAPTER 2 - UPDATED INFORMATION ON ENVIRONMENTAL RESOURCES

INTRODUCTION

The purpose of this Environmental Analysis (EA) is to document any significant changes in potential impacts to environmental resources along the certified, final route for the Mead-Phoenix 500kV transmission line. This update is being done because approximately three and one-half years have passed since the Final EIS was completed for the project, and because of the interim changes to the project (described in Chapter 1).

Most environmental resources will not have changed substantially in less than four years. For example, soils, geology, water resources, and cultural resources are not very dynamic over short periods of time. However, land uses, visual resources, and biological resources do change relatively rapidly; therefore, these three categories of resources were evaluated for this EA. The purpose of the inventory was to determine the extent of any changes between the time of the original Mead-Phoenix project assessment (1983-1986) and now.

For the portion of the line from Phoenix to Mead Substation, original baseline data and impact assessment information are contained in the following documents:

- Draft Environmental Impact Statement for the Mead-Phoenix 500kV DC transmission line project, November 1983 (USDOE 1983a), and Map Volume (USDOE 1983b)
- Technical reports for the Draft Environmental Impact Statement (Volumes 1-4), November 1983 (USDOE 1983c, 1983d, 1983e, 1983f)
- Final Environmental Impact Statement for the Mead-Phoenix 500kV DC transmission line project, February 1986 (USDOE 1986)

In addition, information for the Arizona portion of the line route is contained in the Application for a Certificate for Environmental Compatibility (CEC), prepared in June of 1985 (SRP 1985).

For the portion of the line from the Mead Substation to the McCullough II Substation in Nevada, original baseline and impact assessment information can be found in these documents:

- Draft Environmental Report for the Mead/McCullough-Victorville/Adelanto transmission project, June 1985 (USDI and LADWP 1985a), and Map Volume (USDI and LADWP 1985b)
- Technical reports for the Draft Environmental Impact Statement (Volumes I-IV), June 1985 (USDI and LADWP 1985c, 1985d, 1985e, 1985f)
- Final Environmental Report for the Mead/McCullough-Victorville/Adelanto transmission project, May 1986 (USDI and LADWP 1986)

Changes in land uses, visual resources, and biological resources are described below. These resources were inventoried within a four-mile-wide corridor, two miles on either side of the final, certified centerline route of the Mead-Phoenix transmission line.



Resource changes were also inventoried within a four-mile-wide corridor between the Mead and McCullough substations in Nevada. All resource maps referenced in this chapter are contained in Appendix C.

In the original environmental documents, the final route between the Mead Substation and Phoenix was identified by a combination of links. This route and the original link numbers are shown on Figure C-1 in Appendix C. The approved route consists of Links 76, 1, 2, 3/5, 10/20, 13, 14a, 14b, 14c/17/58/18, 21a, 78, 77, 35/36/37c, and 68.

The link between the Mead and McCullough substations was originally numbered as Link 0, and is shown as such on Figure C-1.



LAND USE

Introduction

This report summarizes the update of existing and future land use data along the final (certified) Mead-Phoenix transmission line route, as described in the Draft (1983) and Final (1986) EIS documents. Additionally, an update to the land use assessment was carried out along the proposed extension of the transmission line between the Mead and McCullough substations, as described in the Mead/McCullough-Victorville/Adelanto Draft (1985) and Final (1986) ER.

Dames & Moore resource staff conducted the inventory and assessment for this update in June and July of 1989. The purpose of this update was to determine the changes in land use and to update the land use assessment. The study included existing and future land use, jurisdiction, utilities/linear features, and parks, preservation, and recreation resources. The inventory included the area within a corridor four miles wide (i.e., two miles on either side of the proposed centerline), to be consistent with the original study corridor width.

The update of existing land uses included aerial reconnaissance as well as ground reconnaissance in selected areas where land use changes were identified. Aerial photographs for a portion of the route in Maricopa County, provided by SRP (photo date 1986) and by Landis Aerial Survey (photo date 1988), were interpreted to identify existing land uses. USGS 7.5-minute quadrangle maps and 15-minute topographic maps (various dates) were also used to inventory land uses.

Future land use (including parks, preservation, and recreation) and jurisdiction/land ownership data were obtained from representative federal, state, county, and local government agencies administering lands along the study corridors.

The land use inventory for the Mead-Phoenix 500kV DC Transmission Line EIS was initially completed in 1983, and subsequently updated in 1985. Tables in Appendix B of this report combine the 1983 data with the 1985 and 1989 updates; features which have changed between 1983 and 1989 are annotated for reference.

Land Jurisdiction

Current land jurisdiction along the proposed line route is illustrated in Figure C-2. Changes in jurisdiction have resulted from land exchanges, transfers, or exchanges between state (Arizona State Trust Lands) and federal (BLM) agencies, and also from federal or state to private ownership. The Town of Surprise has annexed previously unincorporated lands along two miles of the proposed route. The City of Peoria has annexed lands within two miles of the proposed centerline, although the line would not cross that incorporated area. A listing of changes in land jurisdiction and ownership by location is provided in Tables B-1, B-2, and B-3 in Appendix B.

In summary, lands crossed by 0.9 mile of the route have transferred from BLM to the State of Arizona, while lands along 5.9 miles have transferred from state to BLM ownership. Lands along 6.1 miles were exchanged from BLM to private land, and lands along 2.5 miles changed from state to private ownership.



Changes in land ownership crossed by the proposed route are summarized below:

<u>Jurisdiction</u>	<u>Miles Changed</u>
BLM	decreased by 1.1 miles
BLM/Federal Withdrawal	no change
National Park Service	no change
State of Arizona	decreased by 7.5 miles
Private	increased by 8.6 miles

Existing Land Use

Affected Environment

Most of the changes in existing land use have occurred in the rural, urbanizing, or semi-rural residential areas of the northwest Phoenix metropolitan area. These areas include the communities of Peoria, Surprise, and unincorporated portions of Maricopa County. Minor changes have occurred in rural areas of Mohave and Yavapai counties, as well as in Boulder City, Nevada.

These changes are described below, and summarized in Table B-4. Tables B-5 and B-6 provide detailed descriptions of these changes. Figure C-3 shows existing land uses along the transmission line route.

Residential

A total net increase of 57 single residential units within one mile of the proposed transmission line route has resulted since 1985 (137 units were present in the one-mile corridor in 1983, and 11 units were added by 1985.) The majority of this increase is located in the Whispering Ranch area, an unsubdivided land tract sales area located west of the Hassayampa River, along Links 21a and 78.

A total net increase of 1,431 residential units within two miles of the line route has resulted since 1985. (A total of 1,187 units were located in the one-to-two-mile corridor in 1983.) Most of these additional units are located in Sun City West, Whispering Ranch, and Boulder City. Residential construction activity was taking place in both Boulder City and Sun City West at the time of recent field surveys. (Undeveloped lots in these subdivisions are located in areas described in the Future Land Use section.)

In the Whispering Ranch area, 17 residences are located within approximately 0.25 mile of the proposed transmission line along the Link 21a centerline (mileposts 2.2-5.5 and 8.0-10.3). The proposed route would follow the existing unpaved road which provides access to many of these dwellings. These units are typically rural residences on large tracts, both mobile homes and conventional single-family dwellings. The Whispering Ranch area is characterized by a 1.0-mile by 0.25-mile grid of unpaved roads. No utilities (water, electricity, natural gas, telephone, sewer) are available. Some houses have water wells although most of the residents transport and store water in tanks for domestic use.



Approximately 1,500 residential units have been added in the continuing development of Sun City West (unincorporated). The majority of these new units are found at least 1.2 miles from Link 68, although portions of this development are also found 1.0 to 2.0 miles from the eastern portion of Link 35/36/37c. These units are both single-family detached and attached dwellings in a previously platted subdivision described in the Draft EIS (1983) section on future land use. Other residential additions in the corridor include dispersed single-family and mobile home units, generally located in the areas settled prior to 1983. Several units in the vicinity of the Westwing Substation have since been abandoned.

Public and Quasi-Public

Changes in public or quasi-public land uses include the Boulder City Municipal Airport and the Northwest (Maricopa County) Regional Landfill. These are described in the following two sections. In addition, the Bell Road Parkway (also known as the Sun Valley Parkway) has now been completed and is located 1 mile south of the first 8.5 miles of Link 35/36/37c.

Commercial and Industrial

The Northwest Regional Landfill is located one mile west of the Town of Surprise, north of the Beardsley Road alignment. The proposed transmission line route crosses the landfill along Link 77 (milepost 8.8 to 10.3), parallel and adjacent to an existing transmission line. The landfill opened in March 1989 and is operated by Maricopa County. The landfill was designed to accommodate the existing and proposed transmission line rights-of-way in its operations plan.

Other industrial uses added since 1983 include two extractive sites within a mile of the proposed line on Link 14b, and two storage and gas tanks located on Link 10/20. Also, a light industrial building and a machinery storage yard are crossed on Link 14b (milepost 1.5-1.7).

In addition, an automobile testing facility (Volvo) has been developed approximately two miles north of Link 35/36/37c.

Air Facilities

The Boulder City Municipal Airport, located within two miles northwest of the Mead Substation, was recently completed and is scheduled to open in late 1989. The clear zones for this airport extend neither east of Buchanan Boulevard nor south of the Boulder City limits, but the approach zones for the two runways are located over the existing Boulder City-Adelanto transmission line.

Harts Field is a restricted airport located approximately 2.5 miles northeast of Beardsley, immediately south of Link 35/36/37c and the Beardsley Canal. A special use zoning was granted for an airport landing area and the sales, service, and flight training of ultralight aircraft at this site.



Agriculture

No significant changes to agricultural uses were identified in this update. Grazing allotments exist within the proposed corridor in the Stateline, Kingman, and Lower Gila resource areas of BLM.

Environmental Consequences

No significant impacts to existing land uses resulting from the construction and operation of the proposed project have been identified as a result of the 1989 update. Changes in potential impacts based on the updated land use database are described below. These changes are annotated on Table B-7 in Appendix B. Impacts to existing land uses are shown on Figure C-4.

A number of rural residences have been added in the Whispering Ranch area along Link 21a. While no direct land use impacts would result from crossing or displacing any of these units, the proposed transmission line would be located along the existing unpaved access road to many of these units. It would, therefore, be in close proximity to these dwellings, within one-quarter mile of approximately 17 units. Refer to the Visual Resources section of this report for a discussion of visual impacts resulting from this condition.

The proposed transmission line crosses the recently opened Northwest Regional (Maricopa County) Landfill along Link 36/36/37c, near Surprise, Arizona. Since the landfill was designed to accommodate the proposed project right-of-way, there would be no impact on the landfill operations or future planned expansion.

No additional airports or airstrips were identified within the study corridor of the updated links. Harts Field, however, a restricted airport located approximately 2.5 miles northeast of Beardsley and immediately south of portions of Link 35/36/37c, has since been changed through rezoning (a special use in Rural-43 Zoning District in Maricopa County) to an airport landing area and the sales, service and flight training of ultralight vehicles. It must be realized that there would be some safety hazards associated with this ultralight airport and a 500kV transmission line. However, there are two existing high-voltage lines closer to the landing area now. After reviewing the comments associated with the airport zoning case, SRP had indicated there would be safety risks and hazards to both the ultralight aircraft pilot as well as the possibility of an electrical blackout resulting in an ultralight aircraft/transmission line collision. Apparently, the application representative involved in this zoning change felt that because of the relatively slow speed and high maneuverability of these aircraft that the occurrence of such an accident happening would be unlikely. Based upon the granting of this zoning and the feeling by the applicant of the unlikely occurrence of an ultralight aircraft collision with a transmission line, it is assumed impacts associated with this ultralight airport would be low.

Grazing allotments found in the Stateline, Kingman, and Lower Gila resource areas would not be significantly affected due to the existing transmission line and the dispersed nature of grazing. All ranch allottees whose allotments would be affected by this project will be contacted prior to the start of construction. Likewise, all mining claimants whose claims would be affected by this project will also be contacted prior to construction.



Future Land Use

Affected Environment

Changes in future land use plans and proposed development since 1985 have occurred primarily in two areas — the northwest Phoenix metropolitan area and Boulder City, Nevada. A summary of these changes is provided in Table B-8, and described below. Tables B-9 and B-10 provide a detailed description of these changes. Future land uses are shown on Figure C-5.

The Development Guide Plan for the Town of Surprise, Arizona was adopted in 1987. According to this plan, lands within the four-mile corridor of the proposed transmission line (Link 35/36/37c) are planned for general industrial/business park, and medium and low density residential. The route also crosses a newly annexed portion of the Town of Surprise to the north, as well as additional lands proposed for annexation to the west, but the town has not yet adopted a land use plan for these areas.

Other future land uses along Link 35/36/37c include a proposed truck yard and race track located within one mile of the proposed centerline.

The route crosses through a proposed future mixed-use development area known as Sun Valley, located west of the Town of Surprise (Links 35/36/37c, 77, and 78). Formerly, this area was known as the Douglas Ranch Property. While no formal development plan for Sun Valley has been submitted to Maricopa County as of June 1989, the City of Buckeye has proposed annexing the Sun Valley area.

Along Link 68, lands located in newly annexed portions of the City of Peoria lie within two miles of the proposed route. Peoria's General Land Use Plan designates lands in this area for urban residential and commercial uses.

The Future Land Use Plan (1981) for Boulder City included designated areas for planned single-family residential expansion within the area between one and two miles north of Mead Substation and east of Buchanan Boulevard. Partial expansion has occurred in this area since 1985 in Boulder City Estates (Subdivision #49), Units 1-3. The area west of Buchanan Boulevard and south of US Highway 93/466 to the southern city boundary, which includes the Boulder City Municipal Airport, has been purchased from BLM by Boulder City. The land use plan for this area is described in Boulder City's draft Airport Area Plan (1988). Planned land uses within two miles of the proposed transmission line and Mead Substation include a municipal maintenance/storage yard area, a veterans cemetery, a community park, and low-medium density residential areas surrounding the airport. No development in this area, other than the airport and wastewater treatment plant, has yet occurred.

Environmental Consequences

No impacts would result from changes in future land use plans or proposed developments based on the 1989 update. The major changes in future land use, in Boulder City and near Phoenix, would not be directly affected by the construction or operation of the proposed route as they are not crossed by the proposed line.



Land use plans for the potential Sun Valley mixed-use development have not yet been defined, and therefore it is assumed that such plans would accommodate the existing and proposed transmission line rights-of-way in any future development.

Future uses designated in the Boulder City Airport Area Plan would not be affected by the proposed transmission line, as they would not be crossed by the project.

Table B-11 summarizes the changes in potential impacts to future land uses. Impacts are shown on Figure C-6.

Utilities

No changes in utilities crossed or paralleled by the proposed transmission line were identified in the study.

Parks, Preservation, and Recreation Resources

Affected Environment

Changes in parks, recreation and preservation land uses, although limited, have occurred in a number of places along the entire route. Changes are described in Tables B-12, B-13, and B-14, and in the following discussion. Figure C-7 shows these land uses.

The Mead to McCullough portion of the route (Link 0) passes through a Nevada Natural Heritage Site (McCullough Mountains). A Natural Heritage Site is a designation given by the Nevada State Parks to areas that best represent examples of Nevada's natural heritage including plants, animals, and geologic formation, as well as scenic and scientific areas. The status of this site is unchanged since the original project assessment.

As part of a flood mitigation plan, the National Park Service has proposed moving the existing development of Willow Beach (Link 1) to other sites. This would include moving the trailer village and building a new campground approximately one mile above the river.

U.S. 66 from Kingman to Seligman, which crosses Link 3/5 at milepost 28.9-29.0, has changed from an Arizona Potential Candidate Road for Scenic, Historic or Parkway Designation to a designated Arizona Historic Highway.

The proposed action in the Upper Sonoran Final Wilderness EIS (1987), for the Lower Burro Creek Wilderness Study Area (WSA) Unit #2-60, would designate the entire area as outlined in the 1983 Mead-Phoenix study except that the boundary along Highway 93 would be drawn back 0.25 mile to allow for expansion of the utility corridor. The All Wilderness alternative for the Lower Burro Creek WSA is similar to the Proposed Action except that the boundary would remain along Highway 93.

In the same general area, BLM has identified two potential interpretive overlooks. The Burro Creek Overlook Interpretive Site is to be located northeast of U.S. Highway 93 and west of Burro Creek, within a mile of the transmission line route. The second overlook would be located along Highway 93 between Burro Creek and Wickieup, Arizona. The Big



Sandy Lake Bed Formation overlook is to be located within one mile to the southwest of Link 14b.

Also on Link 14b (milepost 14.9 to 19.3), BLM has designated an area as the Burro Creek Riparian Management Area. The area encompasses 37,146 acres and contains a diverse assemblage of biological resources, including several threatened and endangered plants and animals. Special management actions are provided for riparian protection and perpetuation.

The proposed action for BLM WSA Unit #2-59/2-68 (Arrastra Mountain) would designate approximately 110,000 acres as wilderness although none of this designated land would come within two miles of Link 14c/17/58/18. In the All Wilderness alternative, the northern boundary of the designated wilderness would follow Highway 93, thus would be within two miles of Link 14c/17/58/18.

The proposed action for BLM WSA Unit #2-204 (Block Mountain/Ives Peak) has also changed since the original Mead-Phoenix study. Under the proposed action, none of the lands in the corridor would be designated as wilderness. The Enhanced Wilderness alternative would designate as wilderness the lands that come within one to two miles of Link 10/20.

Other park, recreation and preservation land use changes include two new golf courses under construction in Sun City West and Happy Trails, both of which are located one to two miles from Link 35/36/37c.

Environmental Consequences

There have been relatively few changes in park, recreation and preservation land uses within the four-mile-wide corridor since the Mead-Phoenix project EIS. Impacts are described below and in Table B-15, and are shown on Figure C-8.

Link 3/5 crosses U.S. 66 which has changed from an Arizona Potential Candidate Road for Scenic, Historic or Parkway Designation to an Arizona Historic Highway. Because of the existing transmission line corridor, there would be no additional impact to the Historic Highway.

The Final Upper Sonoran Wilderness EIS for BLM WSA Unit #2-60 (along Link 14b) recommends in the proposed action that the WSA boundary along the 345kV transmission line be receded by 0.25 mile, thereby allowing for a wider utility corridor. No significant land use impact would result according to this proposal.

Since the original Mead-Phoenix EIS, the BLM's proposed Burro Creek Riparian Management Area along Link 14b has been designated as a BLM Riparian Management Area. Such a designation has not changed management guidelines for the area, however. No significant land use impact would result in this area.



VISUAL RESOURCES

Introduction

The original visual studies for the Mead-Phoenix 500kV transmission line project were completed in late 1982 to mid 1983. The current study was an update only of the preferred, certified alignment between the Westwing Substation in Arizona and the McCullough II site in Nevada.

The study methodology followed was the BLM's VRM classification as described in the 8411 Manual. Because the proposed project generally follows existing structures for the majority of its alignment, no significant change in levels of impact is predicted. Where the alignment does not parallel existing transmission lines, however, additional analysis was completed to determine potential changes in visual sensitivity and, ultimately, visual management classes. Only Links 21a, 77, and 78 of the proposed project do not parallel existing transmission lines.

Affected Environment

Visual management classes were reevaluated along Links 21a, 77, and 78. Since scenic quality was not expected to change, only distance zones and sensitivity levels were evaluated as a result of the updated land use studies. Because of the additional residences in close proximity to the line, the high visual sensitivity resulted in a change in the visual management class from Class IV to the more restrictive Class III. These changes are shown on Table B-16 in Appendix B. Visual management classes are illustrated on Figure C-9.

Other changes in land use which could potentially result in visual impact changes were also evaluated. These include additional residential development and the draft Airport Area Master Plan in Boulder City, north of the Mead Substation. Also, BLM plans for two interpretive overlook sites, Burro Creek and Big Sandy Lakehead Formation, were evaluated with respect to potential changes in visual impact.

Environmental Consequences

No change in the viewer sensitivity, management class, or previously predicted impacts are anticipated along Link 77. On Link 21a, between milepost 1.3 and 10.7, the management class has changed from Class IV to Class III because of new residences (high sensitivity) within two miles. Distance zones were increased from seldom seen to background and foreground/midground along Links 21a and 78.

As a result of the change in management classes, increased visual sensitivity, and residences in close proximity to the proposed project, a higher level of impact is anticipated in a few areas (assuming commitment of mitigation). Along Link 21a between milepost 1.3 and 1.9, the revised impact level is moderate and between milepost 1.9 and 10.7 the impact is anticipated to be high. Along Link 78, the impact is expected to be high between milepost 0.0 and 1.6, and moderate between milepost 1.6 and 3.1.

No changes in visual impact would result from either the existing residential development or the planned residential use in southern Boulder City. These uses are



located more than a mile north of the Mead Substation and proposed transmission line route, and separated from the project by the established Boulder-Adelanto transmission line corridor. The proposed route would follow an existing transmission line in this area. Therefore, views from Boulder City would not be altered significantly as a result of the proposed project.

Two interpretive overlook sites are planned by the BLM - Kingman Resource Area. The first is a plan, approved in April 1985, for the Burro Creek Overlook Interpretive Site. This site would be located northeast of US Highway 93 and west of Burro Creek, within a mile of the transmission line corridor along Link 14b. Since the focus of this overlook would be to the northeast, opposite the location of the proposed project, no significant visual impacts are predicted.

The second overlook site would be located along Highway 93 between Burro Creek and Wickieup, Arizona. The Big Sandy Lakehead Formation scenic overlook site would be located approximately 0.75 mile west of the proposed project and an existing transmission line corridor. The focus of this overlook would be eastward, directly toward the proposed line route. This would result in a visual intensification of the existing transmission line in the background when viewed from the proposed site. The main focus of the overlook, however, would be in the immediate foreground view.

Changes in potential visual impacts along the approved line route are summarized on Table B-17 in Appendix B. Impacts are illustrated on Figure C-10.



BIOLOGICAL RESOURCES

Introduction

The original biological inventory for the Mead-Phoenix and the Mead/McCullough-Victorville/Adelanto transmission projects identified those biological resources likely to be affected within the project study area (USDOE 1983a; USDI and LADWP 1985). Major vegetation types were described along with the associated characteristic species and habitats of particular concern. Sensitive features such as special-status plant and wildlife species and highly diverse, important habitats were identified.

This update addresses biological features that have changed since the original biological inventory and technical report were completed, and focuses on only those species and habitats that may be affected within the approved corridor.

Information was obtained for this report from existing data and agency contacts. Literature reviewed is listed in Appendix A. Contacts were made with the U.S. Fish and Wildlife Service (USFWS), Nevada Department of Wildlife, Arizona Game and Fish Department (AGFD), and the BLM in the Phoenix and Las Vegas District offices and the Kingman Resource Area office.

Vegetation

Affected Environment

The vegetation of the project area is characterized by Sonoran and Mohave Desert Scrub communities with occurrences of Semidesert Grassland, and Great Basin Conifer Woodland. Non-desert scrub types (e.g., grasslands and woodlands) are largely restricted to higher elevations along the eastern edge of the project area (e.g., Hualapai, Peacock, Music, Cottonwood, and Aquarius mountains). Within each of these biotic communities are limited, local occurrences of riparian woodlands. Emergent plant communities of bulrush and/or cattail are also locally present along the Colorado River and at other scattered localities (irrigation ditches and stock ponds). Vegetation of the region is more fully described in the Draft EIS (1983) and technical reports.

The section of the transmission corridor from Mead to McCullough is characterized by creosote bush scrub which consists of widely spaced, even-sized creosote bush (Larrea tridentata) shrubs with various smaller shrub species distributed in the open intervening spaces. The vegetation of the region is more fully described in the Draft ER (1985) and Volume 2 of the technical reports.

Special-Status Plant Species

Since the original Mead-Phoenix project assessment, some plant species have been dropped from the federal list of threatened, endangered, or candidate species. One species that may occur in the project area, the Burro Creek cliffrose (Cowania subintegra), has been added to the list of federally threatened and endangered plants since 1983.



Species that were previously addressed in the EIS and have now been dropped from the list of federal candidate species include: Arizona sophora (Sophora arizonica), California snakeweed (Colubrina californica), biscuit cactus (Coryphantha vivipara rosea), ragged rock flower (Crossosoma parviflorum), fragrant ash (Fraxinus cuspidata var. macropetala), varied fishhook cactus (Mammillaria viridiflora), prickly pear (Opuntia phaeacantha var. bosphina), and beardtongue (Penstemon bicolor bicolor).

Table 2-1 lists those plant species under review for listing as threatened or endangered (candidate species) which may occur in the project area.

Two plant species have been added to the list of sensitive species occurring in the area: yellow-flowered desert poppy (Arctomecon californica) and Murphey agave (Agave murpheyi). The yellow-flowered desert poppy is a federal candidate species which occurs in Mohave desert scrub on limestone substrates and gypsum soils. It is known from the White Hills, Grand Wash Cliffs and the Lake Mead area. The Murphey agave occurs mostly on bajadas in lower Sonoran desert scrub and Lower Colorado desert vegetation. It is known from the Bradshaw Mountains north of the project area (S. Ruttman, personal communication). The USFWS is currently considering a petition to add the Murphey agave to its list of federal candidate species.

There are no legally protected plant species known to occur within the Mead to McCullough section of the project route. Penstemon bicolor roseus, a federal candidate species, occurs in the McCullough Mountains southeast of the McCullough Substation, but is unlikely to occur on the project route.

Environmental Consequences

The Burro Creek cliffrose, a federally endangered plant species, is known to occur north of the project area, but there is no known habitat on the preferred route and this species should not be affected (S. Ruttman, personal communication). There are no records of any other federally listed or sensitive plant species on the preferred corridor, and pre-construction surveys on the final route will minimize the potential for disturbance to any sensitive plant species in the project area.

Wildlife

Affected Environment

Wildlife species occurring in the project area are characteristic of Sonoran and Mohave Desert Scrub, Semidesert Grassland, and Great Basin Conifer Woodland communities. Some habitats of particular concern to wildlife occur within the project area. Riparian scrublands, washes traversing creosote flats, and riparian woodlands such as those found along Burro Creek and the Big Sandy and Santa Maria rivers provide important habitat for birds and other wildlife. The Colorado River and associated lakes are also important



TABLE 2-1
FEDERAL CANDIDATE PLANT SPECIES IN PROJECT AREA

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>
<u>Astragalus titanophilus</u>	Limestone Milkvetch	C2
<u>Cereus greggii</u>	Night-blooming Cereus	C2
<u>Coryphantha vivipara</u> var. <u>buofloma</u>	Bagdad Biscuit Cactus	C3B
<u>Eriogonum ripleyi</u>	Ripley Fleabane	C2
<u>Opuntia whipplei</u> var. <u>multigenicula</u>	Whipple Cholla	C2
<u>Opuntia wigginsii</u>	Wiggins Cholla	C2
<u>Penstemon bicolor roseus</u>	Cerbat Beardtongue	C2
<u>Arctomecon californica</u>	Yellow-flowered Desert Poppy	C2
<u>Agave murpheyi</u>	Murphey Agave *	

Sources: USDI, Fish & Wildlife Service. 1985. "Endangered and Threatened Wildlife and Plants; Plant Notice of Review 50 CFR 39526.
USDI, Fish & Wildlife Service. 1989. Endangered and Threatened Wildlife and Plants 50 CFR 17.11, 17.12.

Status Codes:

- C2 = Additional data needed; data available suggest appropriateness of listing.
- C3B = On the basis of current taxonomic understanding, does not represent a valid taxon.
- * = USFWS currently reviewing petition for listing as a federal candidate species.



nesting, foraging and watering areas for waterfowl and wintering bald eagles (Haliaeetus leucocephalus). Rocky uplands are home to bighorn sheep (Ovis canadensis), desert tortoise (Xerobates agassizi), golden eagles (Aquila chrysaetos), and peregrine falcons (Falco peregrinus). The Hualapai Valley is also used by an array of raptor species. Some, such as Swainson's hawks (Buteo swainsoni) and ferruginous hawks (Buteo regalis), nest in the valley and many others nest in the nearby Grand Wash Cliffs and Cerbat Mountains.

Figure C-11 shows the inventory of wildlife species and habitats along the proposed line route.

Special-Status Wildlife Species

Two species which occur in the area of the project route have been added to the list of federally threatened and endangered wildlife species: the Hualapai (mexican) vole (Microtus mexicanus hualapaiensis) and the desert pupfish (Cyprinodon macularis). The California leaf-nosed bat (Macrotis californicus) has been added to the list of federal candidate species. Table 2-2 is a list of federally listed endangered wildlife species and candidate species that potentially occur in the project area.

Since the original project assessment, changes have also been made to the list of threatened native wildlife of Arizona (AGFD 1988). Sensitive species in Arizona are now classified by the AGFD as threatened, endangered or candidate species instead of the previous classification into Groups 1 through 4. Table 2-3 is an updated list of species which are likely to occur in the project area.

Several species that were previously listed as candidate species in the State of Arizona have subsequently been dropped. These include the black-crowned night heron (Nycticorax nycticorax), Swainson's hawk, and Gila monster (Heloderma suspectum). One species, the California leaf-nosed bat, has been added to the list of candidate species in Arizona.

The BLM no longer maintains a separate list of sensitive species and instead considers only those on federal or state lists in its land use planning.

Desert Tortoise

Three environmental organizations petitioned the USFWS in June 1989 to list the desert tortoise as an endangered species throughout its range in the United States. In response to this petition, the USFWS determined the Mohave population of the desert tortoise to be an endangered species via an emergency rule issued on August 4, 1989. The Mohave population includes all desert tortoises north and west of the Colorado River and therefore includes the Nevada portion of the proposed transmission line. The USFWS decided not to change the status of the Sonoran population; therefore, this population



TABLE 2-2
FEDERALLY LISTED ENDANGERED
AND CANDIDATE WILDLIFE SPECIES IN PROJECT AREA

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>
Endangered Species		
<u>Falco peregrinus</u>	Peregrine Falcon	E
<u>Haliaeetus leucocephalus</u>	Bald Eagle	E
<u>Pelecanus occidentalis</u>	Brown Pelican	E
<u>Rallus longirostris yumanensis</u>	Yuma Clapper Rail	E
<u>Gila elegans</u>	Bonytail Chub	E
<u>Ptychocheilus lucius</u>	Colorado Squawfish	E
<u>Plagopterus argentissimus</u>	Woundfin	E
<u>Cyprinodon macularius</u>	Desert Pupfish	E
<u>Microtus mexicanus hualapaiensis</u>	Hualapai Vole	E
<u>Xerobates agassizi*</u>	Desert Tortoise	E
Candidate Species		
<u>Buteo regalis</u>	Ferruginous Hawk	C2
<u>Charadrius alexandrinus nivosus</u>	Western Snowy Plover	C2
<u>Charadrius montanus</u>	Mountain Plover	C2
<u>Plegadis chihi</u>	White-faced Ibis	C2
<u>Numenius americanus</u>	Long-billed Curlew	C2
<u>Felis concolor browni</u>	Yuma Puma	C2
<u>Macrotis californicus</u>	California Leaf-nosed Bat	C2
<u>Euderma maculata</u>	Spotted Bat	C2
<u>Xyrauchen texanus</u>	Razorback Sucker	C1
<u>Eumeces gilberti arizonensis</u>	Gilbert's Skink	C2

Sources: USDI, Fish & Wildlife Service. 1989. "Endangered and Threatened Wildlife and Plants" 50 CFR 17.11, 17.12.
USDI, Fish & Wildlife Service. 1989. Endangered and Threatened Wildlife and Plants; Animal Notice of Reviews 50 CFR Part 17.

Status Codes:

- E = Endangered
- C1 = Sufficient information is available to support the biological appropriateness of listing the species.
- C2 = Additional data needed; data available suggests appropriateness of listing.

* Nevada population listed in August 1989.



TABLE 2-3
SPECIAL-STATUS NATIVE WILDLIFE OF ARIZONA IN PROJECT AREA

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>
<u>Casmerodius albus egretta</u>	Great Egret	E
<u>Eumeces gilberti arizonensis</u>	Gilbert's Skink	E
<u>Felis concolor browni</u>	Yuma Puma	E
<u>Xyrauchen texanus</u>	Razorback Sucker	E
<u>Egretta thula brewsteri</u>	Snowy Egret	T
<u>Buteo regalis</u>	Ferruginous Hawk	T
<u>Coccyzus americanus occidentalis</u>	Western Yellow-billed Cuckoo	T
<u>Accipiter gentilis</u>	Goshawk	C
<u>Buteogallus arthracinus</u>	Common Black Hawk	C
<u>Xerobates agassizi</u>	Desert Tortoise	C
<u>Euderma maculata</u>	Spotted Bat	C
<u>Macrotis californicus</u>	California Leaf-nosed Bat	C
<u>Uma scoparia</u>	Mohave Desert Fringe-toed Lizard	C

Status Codes:

E = Endangered
T = Threatened
C = Candidate



remains a candidate for listing. The Sonoran population includes all desert tortoise south and east of the Colorado River and encompasses the Arizona portion of the proposed transmission line (USDI, USFWS 1989).

The AGFD classifies the desert tortoise as a candidate species. The AGFD does not believe the Sonoran population should be listed by the federal government since AGFD feels there is no evidence of population declines (AGFD 1988).

In November 1988, the BLM issued the "Desert Tortoise Habitat Management on the Public Lands: A Rangeland Plan" which outlined how the BLM will manage for the desert tortoise. The Rangeland Plan established the goals and criteria for categorizing desert tortoise Habitat Areas on BLM administered lands. Tortoise habitat is categorized according to four criteria: (1) importance of habitat to maintaining viable populations, (2) resolvability of conflicts, (3) tortoise density, and (4) population trend (increasing, stable, or decreasing). A description of the management goals and criteria for defining three categories of Habitat Areas is reproduced from the Rangeland Plan in Table 2-4. It should be noted that the BLM also delineates areas that do not contain tortoise habitat. These areas, in essence, constitute a fourth category. The BLM is committed to maintaining viable tortoise populations in Categories I and II by implementing specific management actions. The information presented here represents an interim categorization. The BLM will continue to update its information through 1989 (USDI, BLM 1988).

Currently available information on tortoise populations and the status of potential habitat in the project area encompassed by the BLM's Kingman Resource Area have been incorporated into this study. This information was provided by the BLM's Kingman office. These changes are summarized on Table B-18 in Appendix B.

Approximately seven miles of the proposed route in the Lake Mead Recreation Area on the Arizona side was surveyed in September 1989 by a Dames & Moore biologist. This is a mountainous area of volcanic origin which is typically not good tortoise habitat due to the lack of cover sites and/or friable soils. No tortoise sign was located during this survey.

A field survey for desert tortoise was conducted on the Nevada portions of the proposed route from August 30 to September 2, 1989 by two Dames & Moore biologists. The surveys covered the area from the Mead Substation to the Colorado River, and from the Mead Substation to the McCullough Substation. The basic technique was to walk strip-transects along the proposed route and record all tortoise locations and all tortoise sign. Also several shorter strip-transects were walked in washes or areas of volcanic tuff adjacent to the proposed route. Approximately 20 hours of survey (15 miles) were walked on the Mead-McCullough route, and 32 hours (24 miles) were walked on the Mead-River route.

One tortoise burrow was located on the Mead-McCullough portion of the proposed line. The burrow was located approximately 1.5 miles north of the McCullough Substation and was within two yards of the proposed centerline. Portions of this route had friable soils. The presence of kit fox dens, as well as burrows of other animals along this route, further identifies portions of this route as suitable desert tortoise habitat. However, a well developed caliche layer (hardpan) covers much of the area. These areas are not suitable for tortoise. Also, much of the centerline area of this route has been severely impacted by off-road vehicle use and, to a lesser extent, by feral burros.



TABLE 2-4
Goals and criteria for three Categories of desert tortoise
Habitat Areas. The criteria are ranked by importance to the
categorization process, with Criterion 1 being the most important.

	<u>Category I Habitat Areas</u>	<u>Category II Habitat Areas</u>	<u>Category III Habitat Areas</u>
Category Goals	Maintain stable, viable populations and protect existing tortoise habitat values; increase populations where possible.	Maintain stable, viable populations and halt further declines in tortoise habitat values.	Limit tortoise habitat and population declines to the extent possible by mitigating impacts.
Criterion 1	Habitat Area essential to maintenance of large, viable populations.	Habitat Area may be essential to maintenance of viable populations.	Habitat Area not essential to maintenance of viable populations.
Criterion 2	Conflicts resolvable.	Most conflicts resolvable.	Most conflicts not resolvable.
Criterion 3	Medium to high density or low density contiguous with medium or high density.	Medium to high density or low density contiguous with medium or high density.	Low to medium density not contiguous with medium or high density.
Criterion 4	Increasing, stable, or decreasing population.	Stable or decreasing population.	Stable or decreasing population.

Reproduced From: USDI, BLM 1988. Desert Tortoise Habitat on the Public Lands: A Rangeland Plan.



Tortoise habitat exists in the washes and in the upland areas containing volcanic tuff on the proposed line route from Mead to the Colorado River crossing. Live tortoise, tortoise burrows or tortoise scat were located in four areas along this route. The areas were located between proposed towers #18-#19, #21-#22, #24-#25 and #26-#27. The first three locations were in washes which would be spanned by the towers. The fourth location (a burrow containing two live tortoise) was located in an area of volcanic tuff about 60 feet from proposed tower #27.

The bajada between the Mead Substation and proposed tower #16 is also potential tortoise habitat. The large wash between towers #14 and #16 is an area where local residents have reported seeing many tortoise after heavy rains.

Raptors

Since publication of the Mead-Phoenix Final EIS (1986), new nesting of ferruginous and Swainson's hawks has occurred in Hualapai Valley (T. Cordery, personal communication). A nesting attempt by a pair of bald eagles at Burro Creek was reported in 1988 (B. Palmer, personal communication) and peregrine falcons were recently observed nesting along the Colorado River in the project area (B. Padilla, personal communication). These changes are noted on Table B-18 in Appendix B.

Environmental Consequences

Desert Tortoise

In Arizona, the line route crosses interim Category I and II desert tortoise habitat. Approximately 4.8 miles of Category I habitat are crossed in Link 17/58/18 (milepost 0.0 to 4.8). Approximately 20.3 miles of Category II are crossed in Link 17/58/18 (milepost 4.8 to 15.5), Link 10/20 (milepost 33.2 to 39.0), and Link 21a (milepost 6.2 to 10.5). In Nevada, approximately 9 miles of the line route are in occupied desert tortoise habitat between the Mead Substation and the Colorado River. The remainder of the line route in Nevada is in nonhabitat or extremely disturbed habitat. Committed mitigation measures (as shown in Table B-19) for all Category I and II habitats in Arizona and all tortoise habitat in Nevada are:

2. No widening or upgrading of existing access roads will be taken.
8. In designated areas, structures will be placed so as to avoid sensitive features and/or to allow conductors to clearly span the features, within limits of standard tower design. This would minimize the amount of sensitive feature disturbed and/or reduce visual contrast.
11. In designated areas, if deemed appropriate by pre-construction surveys (see 13 below), construction activities will be modified during breeding or non-hibernation season of sensitive, listed or proposed threatened or endangered species. This would reduce disturbance to sensitive species.
13. Prior to construction, an ecological field review of tower and access-road design will be conducted by a qualified professional to identify site-specific impacts to threatened, endangered, or otherwise sensitive vegetation and wildlife and to



determine the most effective means to mitigate those impacts. Possible mitigation measures could include minor adjustments in tower and road locations, closing access roads, relocating sensitive species, habitat improvement, etc.

16. Any Category I or II desert tortoise habitat lost to construction will be compensated for in accordance with BLM requirements.
17. In areas where Category I or II desert tortoise habitat is crossed, a biologist will be present, especially when clearing and leveling of tower pads and clearing of access roads takes place. The biologist will assist in removing tortoise from burrows and relocating them when necessary.

In Arizona, with the implementation of mitigation measures, residual impacts to desert tortoise will be reduced to low or moderate levels. Residual impacts are those impacts that remain after mitigation measures have been applied. Indirect impacts to tortoise will result from the removal of vegetation. Since the amount of vegetation removed is quite small relative to the size of the habitat areas, this impact is expected to be low to negligible in Category II and III habitat areas. Given the relative importance of Category I habitat, the removal of even small amounts of vegetation may have an effect and were therefore rated as moderate.

In Nevada, impacts to tortoise can be reduced to indiscernible levels through implementation of the committed mitigation measures listed above in conjunction with the following specific avoidance measures agreed to by the project participants. Between Mead Substation and the Colorado River, the main construction access will be by means of the existing access road. The road will be rehabilitated as necessary within the existing right-of-way. Between towers 16 and 27, new spur roads (if any) will avoid the wash bottoms. Areas of volcanic tuff between Mead Substation and the Colorado River will be located and marked. Permanent disturbance to these important areas of friable soil will be avoided wherever possible. By avoiding all washes and areas of volcanic tuff, activity in undisturbed tortoise habitat can be avoided.

Raptors

Based on the commitment of recommended mitigation measures, residual impacts to raptors are expected to be low to minimal. Potential impacts can be expected along Link 1 where peregrine falcons nest on the Colorado River, but mitigation would reduce these impacts to low levels. A pre-construction survey will be conducted between mileposts 7 and 11 to determine whether active nests are present along the line route. If active nests are found within one mile of the line route, construction in those areas would be delayed until fledging has occurred.

To reduce the potential collision hazard to birds, it is also recommended that high visibility balls be placed on static lines from milepost 7 to 11. The only residual impact to peregrine falcons would be the long-term but low possibility of collisions with power lines.

There is a potential for impacts in the Hualapai Valley (Link 3/5) where nesting ferruginous and Swainson's hawks may be disturbed. Mitigation measures can reduce these potential impacts to low or indiscernible levels. Pre-construction surveys will be conducted along Link 3/5 to determine the presence of any active nests. If active nests



are found within one mile of the line route, construction will be delayed in those areas until fledging has occurred.

There is a potential for impacts along Link 14b (mileposts 17 to 19) where there is a possibility of disturbance to nesting bald eagles. However, these impacts can be reduced to low or indiscernible levels. Pre-construction surveys will be conducted to identify any nests within one mile of the final route. If active nests are found, construction will be delayed in those areas until fledging occurs. Residential impacts after mitigation should be low to indiscernible.

Table B-19 in Appendix B summarizes potential impacts to wildlife, and impacts are shown on Figure C-12.

SUMMARY

Land uses along the certified project route are occurring as predicted in the original EIS. In those areas where development has occurred, visual impacts have increased accordingly. Biological resources have remained largely the same since the original assessment, with some changes in special status. Mitigation measures have been modified as needed to avoid or reduce the level of any new, potential effect on biological resources.

Based on this environmental analysis, conditions along the certified route have remained the same or development has occurred as anticipated in the original EIS. Therefore, it does not appear that the basis of the original route decision has changed in any significant manner since route certification.



CHAPTER 3 - ELECTRICAL EFFECTS



CHAPTER 3 - ELECTRICAL EFFECTS

The operation of a 500kV AC transmission line causes electrical effects that result from corona and electromagnetic fields (electrical fields and magnetic fields). Corona is the discharge of ions from an energized line that occurs when the voltage gradient at the conductive surface exceeds the breakdown strength of air. Corona activity results in the generation of audible noise, photochemical oxidants, and radio and television interference. Corona activity for an AC transmission line is greatest during rainy weather conditions.

AUDIBLE NOISE

Audible noise results from increased corona activity and is thus greatest during rainy weather conditions. The audible noise from a transmission line consists of both a broad-band noise which is perceived as a crackling sound, and a 120 Hz component which is perceived as a humming sound. The lateral attenuation of noise from a line source attenuates at a rate of 3 decibels per doubling of distance from the line. Because the air absorbs the higher frequency crackling noise more efficiently, this sound attenuates more rapidly than the lower frequency 120 Hz component resulting in an overall attenuation of somewhat greater than 3 decibels with each doubling of distance. In fair weather, the audible noise is expected to be 20 decibels at the edge of the right-of-way. In rainy weather, the audible noise is expected to be 45 decibels at the edge of the right-of-way.

PHOTOCHEMICAL OXIDANTS

Transmission lines generate minute amounts of photochemical oxidants as a result of corona discharge. Approximately 90 percent of the oxidants are ozone, while the remaining 10 percent are composed of nitrogen oxides. In carefully prepared tests, the ozone produced by transmission lines can be detected, but generally the nitrogen oxides have been below the detection limit. The concentrations of each, however, are insignificant and no effects are anticipated as a result of the transmission line.

RADIO AND TELEVISION INTERFERENCE

The radio-noise level of a 500kV transmission line will be highest during heavy rain, lower in fair weather, and lowest just after a rain which has washed foreign particles off the conductors and the water has dried off of the conductors. Radio interference is more pronounced in areas of weak signal strength where the noise generated by the transmission line becomes more significant compared to the radio signal. Antennas located near transmission lines also cause radio interference to be more pronounced.

AM signals are more prone to interference than FM signals. Television pictures are more affected by transmission line noise than is television sound, since the television picture signals are AM and the television sound signals are FM. Television interference is most likely to affect channels 2-6, but is not likely to interfere with channels 7-83. AM radios are also more likely to be affected, since FM signals are highly resistant to transmission line interference.



Mitigation for interference is available upon customer request. Tightening line hardware to eliminate gap discharges, inspecting conductor surface for irregularities, relocating the customer's antenna, and installation of improved antennas are all used where problems occur. Experience with the many existing 500kV AC transmission lines has shown that such problems can be solved on a case-by-case basis.

ELECTROMAGNETIC FIELDS

Electric Fields

The maximum electric field calculated for this transmission line is 8.3kV/m and occurs in the corridor where it parallels the Mead-Liberty 345kV AC line. The maximum level is found between the two lines, 40 feet from the centerline of the Mead-Phoenix towers. At the edge of the right-of-way, the electric field is calculated to be 1.8kV/m. The maximum total induced body current in a person would be .13 mA in the 8.3kV/m field and .03 mA in the 1.8kV/m field, both of which are below the level of perception. The induced short circuit current in a camper truck parked directly in the 8.3kV/m electric field would be about 2.3 mA which would be perceptible but only about half of the 5 milliamp standard set by the National Electric Safety Code. Thus, the short circuit current would be perceptible if a grounded person touched a camper truck parked at the maximum electric field point, but would still be far below the let-go threshold of 21.5 mA for men, 13 mA for women, and 5 mA for children. This short-circuit current would only be about .5 mA for a camper truck parked at the edge of the right-of-way. Thus, ordinary vehicles parked within the right-of-way do not present a shock hazard.

With respect to long-term biological effects of electric fields, years of operating experience with 500kV transmission lines have not revealed any identifiable biological hazard. Numerous studies of employee health and numerous studies of test animals and fundamental biological mechanisms in the laboratory do not indicate that these transmission lines pose a long-term biological hazard. These studies continue, and will continue into the future, but nothing to date indicates any reason to suspect that there is any long-term health effect that can be linked to the effects of electric fields from 500kV transmission lines.

Magnetic Fields

The magnetic field contributions from the transmission line are related to its electrical loading. The maximum loading that the transmission participants have committed to is 1,300 Megawatts, which will cause a current of approximately 1,580 amps to flow on the line. This will be the maximum predicted current under normal operating conditions.

At 1,580 amps, the maximum magnetic field calculated for this line is 273 milligauss. This maximum level also occurs in the corridor where the Mead-Phoenix line parallels the Mead-Liberty 345kV AC line, between the two lines and 120 feet from the east edge of the right-of-way.

At the edge of the right-of-way, the maximum magnetic field is calculated to be 54 milligauss. This is well below the levels of exposure provided from ordinary household appliances, such as microwave ovens (which range from 75-215 milligauss). Overall



levels 200 feet from the transmission line are in the same range as those found in typical public buildings.

Several studies performed in Colorado have suggested a correlation between the incidence of childhood cancer and proximity of homes to high current-carrying distribution and service lines. A similar study done in Rhode Island found no relationship between childhood leukemia and electric power line configurations. Several additional studies are underway to determine if any such effect can be identified, and to identify possible biological mechanisms for any effects. This area of research is extremely active at the present time. Until more is known, projects are proceeding on the basis that exposures to magnetic fields from transmission lines are in the same range as exposures to other electrical equipment encountered in everyday life. Long experience with such equipment has not demonstrated any pattern of health problems. The very difficulty now being experienced in identifying any linkage between magnetic fields and health problems shows that if an effect exists, it is not a strong one.

Based upon a review of the literature and discussions with investigators active in this research area, it can be concluded that magnetic field exposure due to a 500kV transmission line is of the same order of magnitude as normal ambient levels found in everyday life and thus do not cause any significantly greater risk to biological organisms than the environment without a 500kV transmission line. This would suggest that if any hazards do exist, they are certainly small compared to other environmental factors. Finally, no one has proven any physical mechanisms by which magnetic fields could cause harm to biological organisms.



APPENDIX A - REFERENCES



REFERENCES

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APPENDIX B - SUPPLEMENTAL RESOURCE DATA



**TABLE B-1
LINK DESCRIPTION**

RESOURCE STUDY: Land Use: Uses Crossed: Land Jurisdictions

Page 1

<u>Link Number</u>	<u>Length</u>	<u>Mileposts</u>		<u>Description</u>
		<u>Begin</u>	<u>End</u>	
0	13.5	0.0	13.5	public land (federal agency protective withdrawal - BLM)
(Link 0 was not a part of the original route.)				
76	0.7	-	-	no changes
1	16.7	-	-	no changes
2	30.1	1.0	1.5	0.5 mile from public land (BLM) to Arizona State Trust Land
3/5	34.4	-	-	no changes
13	14.6	7.0	8.0	1.0 mile changed from Arizona State Trust Land to private and other land
14a	25.0	8.9	9.3	0.4 mile transferred to state from BLM
14b	22.4	1.1 13.9	1.5 14.8	0.4 mile from public land to private and other lands 0.9 mile transferred from Arizona State Trust Land to public land (BLM)
14c/17 58/18	16.8	4.3	5.3	1.0 mile Arizona State Trust Land transferred to public land (BLM)
10/20	42.5	1.3	5.3	4.0 miles Arizona State Trust Land transferred to public land (BLM)
21a	10.5	2.5	5.7	3.2 miles from public land (BLM) to private and other land



TABLE B-1 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Land Jurisdictions

Page 2

<u>Link Number</u>	<u>Length</u>	<u>Mileposts</u>		<u>Description</u>
		<u>Begin</u>	<u>End</u>	
78	3.1	2.0	3.1	1.1 miles from public land (BLM) to private and other land. The Town of Buckeye is in the process of annexing this portion of the route as part of the proposed Sun Valley Mixed Use Development
77	4.6	0.0	1.0	1.0 mile from public land (BLM) to private and other land. The Town of Buckeye is in the process of annexing this portion of the route as part of the proposed Sun Valley Mixed Use Development
		4.3	4.5	0.2 mile from public land (BLM) to private and other land. The Town of Buckeye is in the process of annexing this portion of the route as part of the proposed Sun Valley Mixed Use Development
35/36/37c	16.2	2.3	7.3	The Town of Surprise has listed this area as part of a larger area which is to be annexed
		8.8	10.3	1.5 miles from Arizona State Trust lands to private and other land
		11.3	13.3	The Town of Surprise annexed this portion of land in 1988
68	2.4	-	-	no changes



**TABLE B-2
LINK DESCRIPTION**

RESOURCE STUDY: Land Use: Uses Crossed: Land Jurisdictions

Page 1

Link Number	Length	Mileposts		Description
		Begin	End	
0	13.5	0.0	13.5	public land (federal agency protective withdrawal - BLM)
76	0.7	0.0	0.7	public land (federal agency protective withdrawal - BLM)
1	16.7	0.0	0.9	public land (federal agency protective withdrawal - BLM)
		0.9	16.6	NPS (Lake Mead National Recreation Area)
		16.6	16.7	public land (BLM)
2	30.1	0.0	1.0	(2) public land (BLM)
		1.0	3.0	(2) Arizona State Trust Land
		3.0	12.4	public land (BLM)
		12.4	13.4	private and other land
		13.4	15.6	public land (BLM)
		15.6	16.6	private and other land
		16.6	18.8	public land (BLM)
		18.8	19.8	private and other land
		19.8	20.6	public land (BLM)
		20.6	20.9	private and other land
		20.9	22.0	public land (BLM)
		22.0	23.0	private and other land
		23.0	23.6	public land (BLM)
		23.6	24.1	private and other land
		24.1	25.2	public land (BLM)
		25.2	26.2	private and other land
26.2	26.7	public land (BLM)		
26.7	27.2	private and other land		
27.2	28.3	public land (BLM)		
28.3	29.4	private and other land		
29.4	29.7	public land (BLM)		
29.7	30.1	private and other land		

(2) Indicates 1989 changes.



TABLE B-2 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Land Jurisdictions

Page 2

Link Number	Length	Mileposts		Description
		Begin	End	
3/5	34.4	0.0	0.4	private and other land
		0.4	4.6	public land (BLM)
		4.6	4.7	private and other land
		4.7	7.2	public land (BLM)
		7.2	7.4	private and other land
		7.4	8.7	public land (BLM)
		8.7	8.9	private and other land
		8.9	10.1	public land (BLM)
		10.1	10.3	private and other land
		10.3	11.5	public land (BLM)
		11.5	11.7	private and other land
		11.7	12.9	public land (BLM)
		12.9	13.1	private and other land
		13.1	14.2	public land (BLM)
		14.2	14.6	public land (BLM)
		14.6	15.8	public land (BLM)
		15.8	16.0	private and other land
		16.0	17.2	public land (BLM)
		17.2	17.3	private and other land
		17.3	18.7	public land (BLM)
		18.7	18.9	private and other land
		18.9	19.9	public land (BLM)
		19.9	20.9	private and other land
		20.9	22.0	public land (BLM)
		22.0	23.0	private and other land
		23.0	24.0	public land (BLM)
		24.0	25.0	private and other land
		25.0	25.2	public land (BLM)
		25.2	26.0	private and other land
		26.0	26.4	public land (BLM)
		26.4	27.7	private and other land
		27.7	27.9	public land (BLM)
		27.9	28.9	private and other land
28.9	29.9	public land (BLM)		
29.9	30.0	private and other land		
30.3	31.0	public land (BLM)		
31.0	31.6	private and other land		
31.6	32.3	Arizona State Trust Land		
32.3	33.0	private and other land		
33.0	33.3	public land (BLM)		
33.3	34.4	private and other land		



TABLE B-2 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Land Jurisdictions

Page 3

Link Number	Length	Mileposts		Description
		Begin	End	
13	14.6	0.0	2.0	Arizona State Trust Land
		2.0	3.0	private and other land
		3.0	4.0	Arizona State Trust Land
		4.0	5.0	private and other land
		5.0	6.0	Arizona State Trust Land
		6.0	8.0	(2) private and other land
		8.0	9.0	Arizona State Trust Land
		9.0	10.0	private and other land
		10.0	10.4	Arizona State Trust Land
		10.4	10.8	private and other land
		10.8	11.0	Arizona State Trust Land
		11.0	12.0	private and other land
		12.0	13.0	Arizona State Trust Land
13.0	13.9	private and other land		
13.9	14.6	Arizona State Trust Land		
14a	25.0	0.0	0.2	Arizona State Trust Land
		0.2	1.2	private and other land
		1.2	2.2	Arizona State Trust Land
		2.2	3.2	private and other land
		3.2	3.8	Arizona State Trust Land
		3.8	4.2	private and other land
		4.2	5.2	Arizona State Trust Land
		5.2	6.2	private and other land
		6.2	7.2	Arizona State Trust Land
		7.2	8.3	private and other land
		8.3	8.5	public land (BLM)
		8.5	9.3	(2) Arizona State Trust Land
		9.3	10.3	private and other land
		10.3	11.3	Arizona State Trust Land
		11.3	11.7	private and other land
		11.7	12.3	Arizona State Trust Land
		12.3	14.3	private and other land
14.3	18.4	public land (BLM)		
18.4	19.4	private and other land		
19.4	23.1	public land (BLM)		
23.1	23.3	private and other land		
23.3	25.0	public land (BLM)		

(2) Indicates 1989 changes.



TABLE B-2 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Land Jurisdictions

Page 4

Link Number	Length	Mileposts		Description
		Begin	End	
14b	22.4	0.0	2.0	(2) private and other land
		2.0	5.7	public land (BLM)
		5.7	6.9	private and other land
		6.9	7.2	public land (BLM)
		7.2	8.0	private and other land
		8.0	9.1	public land (BLM)
		9.1	9.2	private and other land
		9.2	10.2	public land (BLM)
		10.2	11.4	private and other land
		11.4	11.7	public land (BLM)
		11.7	12.5	private and other land
		12.5	13.7	public land (BLM)
		13.7	13.9	(2) Arizona State Trust Land
		13.9	14.8	(2) public land (BLM)
		14.8	15.6	private and other land
		15.6	16.0	public land (BLM)
16.0	17.0	private and other land		
17.0	22.4	public land (BLM)		
14c/17	16.8	0.0	9.1	public land (BLM)
58/18		9.1	16.8	(2) Arizona State Trust Land
10/20	42.5	0.0	1.3	(2) Arizona State Trust Land
		1.3	5.3	(2) public land (BLM)
		5.3	25.2	(2) Arizona State Trust Land
		25.2	27.2	public land (BLM)
		27.2	31.5	Arizona State Trust Land
		31.5	32.1	private and other land
		32.1	34.2	Arizona State Trust Land
		34.2	42.5	public land (BLM)

(2) Indicates 1989 changes.



TABLE B-2 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Land Jurisdictions

Page 5

Link Number	Length	Mileposts		Description
		Begin	End	
21a	10.5	0.0	2.5	(2) public land (BLM)
		2.5	5.7	(2) private and other land
		5.7	10.6	private and other land
78	3.1	0.0	2.0	Arizona State Trust Land
		2.0	3.1	(2) private and other land. The Town of Buckeye is in the process of annexing this portion of the route as part of the proposed Sun Valley Mixed Use Development
77	4.6	0.0	1.0	(2) private and other land. The Town of Buckeye is in the process of annexing this portion of the route as part of the proposed Sun Valley Mixed Use Development
		1.0	2.0	Arizona State Trust Land
		2.0	4.3	public land (BLM)
		4.3	4.6	(2) private and other land. The Town of Buckeye is in the process of annexing this portion of the route as part of the proposed Sun Valley Mixed Use Development
35/36/37c	16.2	0.0	1.8	public land (BLM)
		1.8	2.3	private and other land
		2.3	3.7	Arizona State Trust Land
		3.7	7.3	private and other land. The Town of Surprise has listed this area as part of a larger area which is to be annexed
		7.3	8.8	(2) Arizona State Trust Land
		8.8	10.7	(2) private and other land
		10.7	11.3	Arizona State Trust Land

(2) Indicates 1989 changes.



TABLE B-2 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Land Jurisdictions

Page 6

Link Number	Length	Mileposts		Description
		Begin	End	
35/36/37 continued				
		11.3	11.5	private and other land. The Town of Surprise has listed this area as part of a larger area which is to be annexed
		11.5	11.8	Arizona State Trust Land
		11.8	14.3	private and other land. The Town of Surprise has listed this area as part of a larger area which is to be annexed
		14.3	15.1	Arizona State Trust Land
		15.1	16.2	private and other land
68	2.4	0.0	1.1	private and other land
		1.1	2.1	Arizona State Trust Land
		2.1	2.2	(2) private and other land

(2) Indicates 1989 changes.



TABLE B-3
LAND JURISDICTION: TRANSFERS, SALES, AND EXCHANGES

Link Number	Miles Crossed			
	Federal (BLM) to State	State to Federal (BLM)	State to Private	Federal (BLM) to Private
2	0.5			
14a	0.4			
14b		0.9		
14c/17/58/18		1.0		
10/20		4.0		
13			1.0	
14b				0.6
21a				3.2
78				1.1
77				1.2
35/36/37c			1.5	
TOTAL	0.9	5.9	2.5	6.1

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**TABLE B-4
LINK DESCRIPTION**

RESOURCE STUDY: Land Use: Other Existing Land Uses
 Note: Milepost designations are identified if feature is crossed.

Page 1

Link Number	Length	Mileposts		Description
		Begin	End	
0	13.5	0.0	0.2	extractive area for construction of previous transmission lines 1 airport (Boulder City) 1 cemetery 1 military reservation
		-	-	
		-	-	
		-	-	
(Link 0 was not part of the original Mead-Phoenix route, so although these are not necessarily "new" uses, they are listed here.)				
76*	0.7	-	-	(2) 200 single dwelling units, an increase of 97 units - Boulder City Estates, Unit 3 under development
1	16.7	-	-	(2) 9 NPS-related buildings (vacant residences)
2	30.1	-	-	no changes
3/5	34.4	4.6	4.7	(1) corral
13	14.6	-	-	(2) 11 single dwelling units found within 1 mile, an increase of 1 since original study
14a	25.0	-	-	(1) 34 single dwelling units found within 1 mile, an increase of 1 from the original study to the 1985 update

*Includes area surrounding Mead Substation, approximate location of transmission line at terminal.

(1) Indicates 1985 changes.

(2) Indicates 1989 changes.



TABLE B-4 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Other Existing Land Uses

Page 2

Link Number	Length	Mileposts		Description
		Begin	End	
14a (continued)				
		-	-	(2) 19 single dwelling units found within 1 to 2 miles, an increase of 3 single dwelling units since the original study
14b	22.4	1.5	1.7	(1) 2 light-industry buildings and machinery storage area (temporary)
		-	-	(1,2) 28 single dwelling units found within 1 mile of route, an increase of 8 since the original study
		-	-	(1) 2 extractive uses
14c/17/ 58/18	16.8	-	-	(2) 11 single dwelling units found within 1 mile of route, an increase of 1 since the original study
10/20	42.5	-	-	(1,2) 6 single dwelling units found within 1 mile of route, a decrease of 2 since the original study
		-	-	(2) 5 single dwelling units with no net change between original study, 1985 update, and 1989 update
		-	-	(1) 2 storage and gas tanks
21a	10.5	-	-	(2) 56 single dwelling units within 1 mile of the route, an increase of 56 single dwelling units since the original study
		-	-	(2) 23 single dwelling units 1 to 2 miles of route, an increase of 19 single dwelling units since the original study

(1) Indicates 1985 changes.
(2) Indicates 1989 changes.



TABLE B-4 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Other Existing Land Uses

Page 3

Link Number	Length	Mileposts		Description
		Begin	End	
78	3.1	-	-	(2) 7 single dwelling units with 1 to 2 miles of route, an increase of 6 from the original study (2) 1 church
77	4.6	-	-	no change
35/36/37c	16.2	-	-	(1,2) 55 single dwelling units within 1 mile of route, a decrease of 5 single dwelling units since the original study
		-	-	(2) 560 single dwelling units within 1 to 2 miles of route, an increase of 469 single dwelling units since the original study
		8.8	10.3	(2) 1 industrial landfill (Northwest Regional Landfill)
		-	-	(1) ultra light airport
68	2.4	0.0	0.3	crosses ultra light airport area (Harts Field)
		-	-	(1,2) 16 single dwelling units found within 1 mile of route, an increase of 7 single dwelling units since the original study
		-	-	(2) 1,230 single dwelling units within 1 to 2 miles of route, an increase of 816 single dwelling units since the original study
		-	-	(2) 270 multi-family dwelling units within 1 to 2 miles of route, an increase of 270 multi-family dwelling units since the original study

(1) Indicates 1985 changes.
(2) Indicates 1989 changes.



TABLE B-5
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Other Existing Land Uses

Page 1

Link Number	Length	Mileposts		Description
		Begin	End	
0	13.5	0.0	13.5	extractive area for construction of previous transmission lines
76	0.7	0.0	0.7	none
1	16.7	0.0	16.7	none
2	30.1	0.0	30.1	none
3/5	34.4	0.0	4.6	none
		4.6	4.7	(1) corral
		4.7	4.9	none
		4.9	5.0	stock tank
		5.0	31.2	none
		31.2	31.3	cemetery
31.3	34.4	none		
13	14.6	0.0	14.6	none
14a	25.0	0.0	12.3	none
		12.3	12.4	stock tank
		12.4	25.0	none
14b	22.4	0.0	1.5	none
		1.5	1.7	(1) 2 light industry (temporary building and machinery storage area)
		1.7	22.4	none
14c/17/ 58/18	16.8	0.0	1.3	none

(1) Indicates 1985 changes.



TABLE B-5 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Other Existing Land Uses

Page 2

Link Number	Length	Mileposts		Description
		Begin	End	
10/20	42.5	0.0	34.0	none
		34.0	34.1	2 water tanks, 2 recreational vehicles
		34.1	42.5	none
21a	10.5	0.0	10.5	none
78	3.0	0.0	3.0	none
77	4.6	0.0	4.6	none
35/36/37c	16.2	0.0	8.8	none
		8.8	10.3	(2) Northwest Regional Landfill
		10.3	11.0	none
		11.0	11.2	truck yard under construction - uncertain of ROW location
		11.2	13.1	none
		13.1	16.2	parallels McMicken Dam (levee) flood control structure (McMicken Dam outlet channel)
		15.2	15.7	crosses ultra light airport interference zone (Harts Field)
68	2.4	0.0	0.3	crosses ultra light airport area (Harts Field)
		0.3	2.4	none

(2) Indicates 1989 changes.



TABLE B-6
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Other Existing Land Uses

Page 1

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
0 (Mead-Adelanto)	13.5		1 airport (Boulder City) 1 cemetery 1 military reservation 1 extractive industry
76*	0.7	1 heavy industry (waste-water treatment plant)	(2) 200 single dwelling units (+97) (Boulder City Estates, Unit 3 under development)
1	16.7	-	5 commercial 1 heavy industry (sewage treatment) (2) 9 NPS-related buildings (vacant residences)
2	30.1	1 extractive 1 single dwelling unit	1 extractive 2 single dwelling units 2 mining-related buildings 1 abandoned airstrip 1 ranch-related building
3/5	34.4	abandoned airstrip 1 light industry (pipeline monitoring structure) 2 public/quasi-public (school/cemetery) 13 single dwelling units 3 extractive uses 1 industrial-related building	1 mining-related building 1 extractive use 24 single dwelling units 3 abandoned airstrips 1 heavy industry (dump) 4 commercial uses 2 residential-related buildings 2 agriculture-related buildings

*Includes area surrounding Mead Substation, approximate location of transmission line at terminal.

(1) Indicates 1985 changes.

(2) Indicates 1989 changes.



TABLE B-6 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Other Existing Land Uses

Page 2

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
13	14.6	(2) 11 single dwelling units (+1) 1 heavy industry (oil compressor station/ sump/sewage disposal pond) 1 airstrip	7 single dwelling units 2 extractive 1 airstrip
14a	25.0	(1) 34 single dwelling units (+1) agricultural land agricultural land out of production 1 extractive 3 commercial 29 ranch-related buildings	(2) 19 single dwelling units (+3) agricultural land agricultural land out of production 1 extractive 12 ranch-related buildings
14b	22.4	(1,2) 28 single dwelling units (+8) agricultural land out of production agricultural land 1 heavy industry (oil pumping station/ switchyard) 1 agriculture-related building 2 ranch-related buildings (1) 2 extractive uses	74 single dwelling units agricultural land out of production agricultural land 2 vacant commercial 1 public/quasi-public (cemetery) 1 airstrip 2 extractive 3 commercial uses 3 heavy industries (junkyard, auto salvage, substation) 10 residential-related buildings 3 agriculture-related buildings
14c/17/ 58/18	16.8	(2) 11 single dwelling units (+1) ranch-related buildings 1 commercial agricultural land	2 single dwelling units

*Includes area surrounding Mead Substation, approximate location of transmission line at terminal.

(1) Indicates 1985 changes.

(2) Indicates 1989 changes.



TABLE B-6 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Other Existing Land Uses

Page 3

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
14c/17/ 58/18 (cont.)	16.8	1 light industry (Arizona Department of Transportation highway maintenance yard)	
10/20	42.5	(1,2) 6 single dwelling units (-2) 1 residential auxiliary building 1 agricultural-related building (1) 2 storage and gas tanks	(2) 5 single dwelling units (0) 1 airstrip agricultural land 1 extractive 1 airport
21a	10.5	(2) 56 single dwelling units (+56) agricultural land out of production agricultural land	(2) 23 single dwelling units (+19) 1 governmental 1 airstrip
78	3.1	none	(2) 7 single dwelling units (+6) 1 church 1 airport (Luke Auxiliary Field No. 4 - abandoned)
77	4.6	5 single dwelling units 1 airstrip 1 extraction activity	1 extraction activity
35/36/37c	16.2	(1,2) 55 single dwelling units (-5) numerous auxiliary buildings agricultural land	(2) 560 single dwelling units (+469) 1 commercial agricultural land agricultural land out of production

*Includes area surrounding Mead Substation, approximate location of transmission line at terminal.

(1) Indicates 1985 changes.

(2) Indicates 1989 changes.



TABLE B-6 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Other Existing Land Uses

Page 4

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
35/36/37c (cont.)	16.2	agricultural land out of production several commercial uses 2 landing strips 1 airport (Luke Auxiliary Field No. 2 - closed) 3 extractive uses 1 heavy industry (Hassayampa pumping plant) 8 industrial-related buildings (2) 1 industrial-landfill (NW Regional Landfill) (1) ultralight airport	several commercial uses 1 airstrip 1 airport (Luke Auxiliary Field No. 2 - closed)
68	2.4	(1,2) 16 single dwelling units (+7) agricultural land agricultural land out of production	(2) 1,230 single dwelling units (+816) (2) 270 multi-family units (+270) agricultural land agricultural land out of production 1 heavy industry (sewage treatment plant) 1 extractive

*Includes area surrounding Mead Substation, approximate location of transmission line at terminal.

(1) Indicates 1985 changes.

(2) Indicates 1989 changes.



TABLE B-7
IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: LAND USE: OTHER EXISTING LAND USES CROSSED

PAGE NO. 1

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s) ²	Prel. Residual Impact	Significant Impact	Committed Mitigation Measure(s) ²	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
0	13.5	0.0-0.2	1	L	No	crosses extractive site	No	L	-	-	L	-	
76	0.7	0.0- 0.7	-	N	No	none	No	-	-	-	N	-	
1	16.7	0.0-16.7	-	N	No	none	No	-	-	-	N	-	
2	30.1	0.0-30.1	-	N	No	none	No	-	-	-	N	-	
3/5	34.4	*4.6- 4.7	1*	L*	No*	crosses corral*	B*	L*	-	B*	L*	-	
		31.2-31.3	1	H	Yes	crosses and could displace cemetery	B	L	-	B	L	-	
13	14.6	0.0-14.6	-	N	No	none	No	-	-	-	N	-	
14a	25.0	0.0-25.0	-	N	No	none	No	-	-	-	N	-	
14b	22.4	0.0-22.4	-	N	No	none	No	-	-	-	N	-	
14c/17/ 58/18	16.8	0.0-16.8	-	N	No	none	No	-	-	-	N	-	

*Indicates 1989 changes

Impact Levels:

- H = High
- M = Moderate
- L = Low
- N = Negligible



TABLE B-7 (continued)
 IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: LAND USE: OTHER EXISTING LAND USES CROSSED

PAGE NO. 2

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s) ²	Prel. Residual Impact	Significant Impact	Committed Mitigation Measure(s) ²	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
10/20	42.5	0.0-42.5	-	N	No	none	No	-	-	-	N		
21a	10.5	0.0-20.5	-	N	No	none	No	-	-	-	N		
78	3.1	0.0- 3.1	-	N	No	None	No	-	-	-	N		
77	4.6	0.0- 4.6	-	N	No	None	No	-	-	-	N		
35/36/37c	16.2	8.8-10.3	1	N	No	crosses MW Regional Landfill	No	N	-	-	N		
68	2.4	0.0- 0.3	4	N	No	crosses airport area (Hart's Field)	10	N	-	10	N		

¹Indicates 1989 changes

²Impact types:

1. Displaces, alters, or otherwise physically affects any existing, developing, or planned (officially recorded) residential, commercial, industrial, or institutional use or activity.

²Mitigation Measures:

8. In designated areas structures will be placed so as to avoid sensitive features and/or to allow conductors to clearly span the features, within limits of standard tower design. This would minimize amount of sensitive feature disturbed and/or reduce visual contrast.

Impact Levels:

H = High

M = Moderate

L = Low

N = Negligible



**TABLE B-8
LINK DESCRIPTION**

RESOURCE STUDY: Land Use: Other Future Land Uses
 Note: Milepost designations are identified if feature is crossed.

Page 1

<u>Link Number</u>	<u>Length</u>	<u>Mileposts</u>		<u>Description</u>
		<u>Begin</u>	<u>End</u>	
0	13.5	-	-	no changes
76	0.7	-	-	Boulder City Estates, Units 1-3, Subdivision #49 Boulder City Draft Airport Area Master Plan - residential, municipal services, airport, and Veterans Cemetery (March 1988)
1	16.7	-	-	no changes
2	30.1	-	-	no changes
3/5	34.4	-	-	no changes
13	14.6	-	-	no changes
14a	25.0	-	-	no changes
14b	22.4	-	-	no changes
14c/17/ 58/18	16.8	-	-	no changes
10/20	42.5	-	-	no changes
21a	10.5	-	-	no changes
78	3.1	-	-	proposed Sun Valley Mixed Use Development
77	4.6	-	-	proposed Sun Valley Mixed Use Development



TABLE B-8 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Other Future Land Uses

Page 2

<u>Link Number</u>	<u>Length</u>	<u>Mileposts</u>		<u>Description</u>
		<u>Begin</u>	<u>End</u>	
35/36/37c	16.2	-	-	proposed Sun Valley Mixed Use Development general industrial/business park (Comprehensive Development Plan - Town of Surprise) medium density residential (Compre- hensive Development Plan - Town of Surprise) low density residential (Compre- hensive Development Plan - Town of Surprise) proposed truck yard under construction
68	2.4	-	-	Sun City West recorded subdivisions



TABLE B-9
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Other Future Land Uses

Page 1

Link Number	Length	Mileposts		Description
		Begin	End	
0	13.5	1.0	1.2	airport interference zone Colorado River Commission - plan pending
		0.0	13.5	
76	0.7	0.0	0.7	none
1	16.7	0.0	16.7	none
2	30.1	0.0	11.3	none
		11.3	11.5	recorded subdivision (Sunny Lake Ranchos Unit 1) - undeveloped
		11.5	30.1	none
3/5	34.4	0.0	4.5	none
		4.5	4.7	recorded subdivision (Hualapai Valley Estates Unit 1) - undeveloped
		4.7	7.2	none
		7.2	7.4	recorded subdivision (Realsite Arizona Ranchettes Unit 4) - undeveloped
		7.4	8.7	none
		8.7	8.9	recorded subdivision (Realsite Arizona Ranchettes Unit 1) - undeveloped
		8.9	10.1	none
		10.1	10.3	recorded subdivision (Realsite Arizona Ranchettes Unit 1) - undeveloped
		10.3	11.5	none
		11.5	11.7	recorded subdivision (Realsite Arizona Ranchettes Unit 2) - undeveloped
		11.7	14.3	none
		14.3	14.5	recorded subdivision (Lake Mead Rancheros Unit 17) - undeveloped
		14.5	15.8	none
15.8	16.0	recorded subdivision (Lake Mead Rancheros Unit 13) - undeveloped		
16.0	17.2	none		



TABLE B-9 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Other Future Land Uses

Page 2

Link Number	Length	Mileposts		Description
		Begin	End	
3/5 (continued)				
		17.2	17.4	recorded subdivision (Lake Mead Rancheros Unit 1) - undeveloped
		17.4	27.9	none
		27.9	28.9	recorded subdivision (Sunny Highlands Estates Tract No. 1132) - undeveloped
		28.9	34.4	none
13	14.6	0.0	14.6	none
14a	25.0	0.0	25.0	none
14b	22.4	0.0	5.8	none
		5.8	6.9	recorded subdivision (Accolade Ranches) - undeveloped
		6.9	11.6	none
		11.6	12.5	recorded subdivision (Sandy River Rancheros) - undeveloped
		12.5	13.7	none
		13.7	13.8	recorded subdivision (Sandy River Rancheros) - undeveloped
		13.8	22.4	none
14c/17/ 58/18	16.8	0.0	16.8	none
10/20	42.5	0.0	42.5	none
21a	10.5	0.0	5.6	none
		5.6	10.5	unsubdivided land sales area (Whispering Ranch, partially settled)



TABLE B-9 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed: Other Future Land Uses

Page 3

Link Number	Length	Mileposts		Description
		Begin	End	
78	3.1	0.0	2.0	none
		2.0	3.1	(2) potential Sun Valley Mixed Use Development
77	4.6	1.0	2.0	(2) potential Sun Valley Mixed Use Development
		2.0	3.0	none
		3.0	4.6	(2) potential Sun Valley Mixed Use Development
35/36/37c	16.2	0.0	1.3	(2) potential Sun Valley Development
		1.3	7.3	none
		7.3	10.3	rural residential (White Tanks/ Agua Fria Policy and Development Guide - Maricopa County)
		10.3	11.5	major detention basin (Tribly Wash)
		11.5	16.2	rural residential (White Tanks/ Agua Fria Policy and Development Guide - Maricopa County)
68	2.4	0.0	2.4	rural residential (White Tanks/ Agua Fria Policy and Development Guide - Maricopa County) floodplain (White Tanks/Agua Fria Policy and Development Guide - Maricopa County)

(2) Indicates 1989 changes.



**TABLE B-10
LINK DESCRIPTION**

RESOURCE STUDY: Land Use: Nearby Uses: Other Future Land Uses

Page 1

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
0	13.5	1 proposed Airport Interference Zone Colorado River Commission - Plan pending	1 proposed Airport Interference Zone Colorado River Commission - Plan pending
76*	1.0	General Plan Pending (Amendment to the General Plan - Eldorado Valley, Nevada, 1969)	recorded subdivisions (Boulder City Subdivision No. 11; Boulder City Subdivision No. 32, Unit 10 (being Lewis Homes, Boulder City No. 14; LaMancha Unit 4; LaMancha Unit 5 (amended); LaMancha Unit 6 and Nelson Addition Unit 3 (2) Boulder City Estates, Units 1-3, Subdivision #49 Area of Boulder City planned for urban residential (2) Boulder City Draft Airport Area Master Plan - residential, municipal services, airport, and Veterans Cemetery (March 1988) General Plan Pending
1	16.7	potential pumped storage site General Plan Pending (Amendment to the General Plan - Eldorado Valley, Nevada, 1969)	potential pumped storage site General Plan Pending (Amendment to the General Plan - Eldorado Valley, Nevada, 1969)

(2) Indicates 1989 changes.



TABLE B-10 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Other Future Land Uses

Page 2

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
2	30.1	recorded subdivision (Sunny Lake Ranches Unit 1)	recorded subdivision (Sunny Lake Ranches Unit 1)
3/5	34.4	recorded subdivision (Hualapai Valley Unit 1)	recorded subdivision (Hualapai Valley Estates Unit 1)
		recorded subdivision (Realsite Arizona Ranchettes Units 1-7)	recorded subdivision (Realsite Arizona Ranchettes Units 1,2,3,5-9)
		recorded subdivision (Lake Mead Rancheros Units 1,2,6,7,13,14, 16-17)	recorded subdivision (Lake Mead Rancheros Units 1-3, 5-8, 12-17)
		recorded subdivision (Lake Mead Rancheros Unit 20)	recorded subdivision (Valle Vista Tract No. 1207B)
		recorded subdivision (Shadow Mountain Acres Unit 3)	recorded subdivision (Lake Mead Rancheros Unit 20)
		recorded subdivision (Shadow Mountain Acres Unit 2)	recorded subdivision (Ranchero Heights)
		recorded subdivision (Sunny Highlands Estates Tract No. 1132)	recorded subdivision (Shadow Mountain Acres Unit 3)
		recorded subdivision (Hackberry Townsite)	recorded subdivision (Shadow Mountain Acres Unit 2)
13	14.6	recorded subdivision (Sierra Vista Estates)	recorded subdivision (Sierra Vista Estates)

(2) Indicates 1989 changes.

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TABLE B-10 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Other Future Land Uses

Page 3

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
14a	25.0	recorded subdivision (Sierra Vista Estates)	
14b	22.4	recorded subdivision (Accolade Ranches)	recorded subdivision (Accolade Ranches)
		recorded subdivision (Sandy River Rancheros)	recorded subdivision (Sandy River Rancheros)
14c/17/ 58/18	16.8		
10/20	42.5		
21a	10.5	unsubdivided land sales area (Whispering Ranch)	recorded subdivision (Vulture City)
		recorded subdivision (Patton Acres)	unsubdivided land sales area (Whispering Ranch)
78	3.1	unsubdivided land sales area (Whispering Ranch)	unsubdivided land sales area (Whispering Ranch)
		(2) proposed Sun Valley mixed use development	(2) proposed Sun Valley mixed use development
77	4.6	(2) proposed Sun Valley mixed use development	(2) proposed Sun Valley mixed use development

(2) Indicates 1989 changes.



TABLE B-10 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Other Future Land Uses

Page 4

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
35/36/37c	16.2	recorded subdivision (Bellamy Subdivision) (2) proposed Sun Valley mixed use development urban residential (White Tanks/Agua Fria Policy and Development Guide - Maricopa County) rural residential (White Tanks) potential development aviation hazard area (White Tanks) recorded subdivisions (Sun City West, Units 1, 1A, 12, 15, 16, 17, 17A, 18, 19, 20),... master development plan (2) general industrial/business park (Comprehensive Development Plan - Town of Surprise) (2) medium density residential (Comprehensive Development Plan - Town of Surprise)	recorded subdivisions (Bellamy Subdivision; Beardsley Ranchitas No. 1; Martin Acres) urban residential (White Tanks) rural residential (White Tanks) major detention basin (Trilby Wash/White Tanks) potential development aviation hazard area (White Tanks) activity center (White Tanks) recorded subdivisions (Sun City West Units 1, 1A, 12, 15, 16, 17, 17A, 18, 19, 20),... master development plan (2) general industrial/business (Comprehensive Development Plan - Town of Surprise) (2) medium density residential (Comprehensive Development Plan - Town of Surprise)

(2) Indicates 1989 changes.



TABLE B-10 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Other Future Land Uses

Page 5

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
35/36/37c (cont.)	16.2	(2) low density residential (Comprehensive Development Plan - Town of Surprise	(2) low density residential (Comprehensive Development Plan - Town of Surprise
		(2) proposed truck yard	(2) golf course under construction
		(2) _____ Race Track	
68	2.4	rural residential (White Tanks)	rural residential (White Tanks)
		floodplain (White Tanks)	floodplain (White Tanks)
		urban residential (General Land Use Plan - City of Peoria, Arizona)	recorded subdivision (Phoenix Fig Farms)
		commercial (General Land Use Plan - City of Peoria, Arizona)	activity center (White Tanks)
			master development plan
			recorded subdivision (Sun City West Units 1, 1A, 12, 15, 16, 17, 17A, 18, 19, 20), ...
			urban residential (General Land Use Plan - City of Peoria, Arizona)
	commercial (General Land Use Plan - City of Peoria, Arizona)		

(2) Indicates 1989 changes.



TABLE B-11
IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: LAND USE: OTHER FUTURE LAND USES CROSSED

PAGE NO. 1

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s)	Prel. Residual Impact	Significant Impact	Committed Mitigation Measure(s)	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
0	13.5	12.5-13.5	4	L	No	Crosses Colorado River Commission - plan pending	No	L	-	-	L		
		0.0-12.5	4	N	No	Crosses Colorado River Commission - plan pending	No	N	-	-	N		
76	0.7	0.0- 0.7	-	N	No	None	No	-	-	-	N		
1	16.7	0.0-16.7	-	N	No	None	No	-	-	-	N		
2	30.1	11.3-11.5	1	L	-	Crosses undeveloped recorded subdivision (Sunny Lake Ranchos, Unit 1) (quality - low)	No	L	-	-	L		
3/5	34.4	4.5- 4.7	1	L	-	Crosses undeveloped recorded subdivision (Hualapai Valley Estates, Unit 1) (quality - low)	No	L	-	-	L		
		7.2- 7.4	1	L	-	Crosses undeveloped recorded subdivision (Realsite Arizona Ranchettes, Unit 4) (quality - low)	No	L	-	-	L		
		8.7- 8.9	1	L	-	Crosses undeveloped recorded subdivision (Realsite Arizona Ranchettes, Unit 5) (quality - low)	No	L	-	-	L		
		10.1-10.3	1	L	-	Crosses undeveloped recorded subdivision (Realsite Arizona Ranchettes, Unit 1) (quality - low)	No	L	-	-	L		
		11.5-11.7	1	L	-	Crosses undeveloped recorded subdivision (Realsite Arizona Ranchettes, Unit 2) (quality - low)	No	L	-	-	L		
		14.3-14.5	1	L	-	Crosses undeveloped recorded subdivision (Lake Mead Rancheros, Unit 17) (quality - low)	No	L	-	-	L		

¹Indicates 1989 changes.



TABLE B-11 (continued)
 IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: LAND USE: OTHER FUTURE LAND USES CROSSED

PAGE NO. 2

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s)	Prel. Residual Impact	Significant Impact	Committed Mitigation Measure(s)	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
3/5 (cont.)	34.4	15.8-16.0	1	L	-	Crosses undeveloped recorded subdivision (Lake Mead Rancheros, Unit 13) (quality = low)	No	L	-	-	L		
		17.2-17.4	1	L	-	Crosses undeveloped recorded subdivision (Lake Mead Rancheros, Unit 1) (quality = low)	No	L	-	-	L		
		27.9-28.9	1	L	-	Crosses undeveloped recorded subdivision (Sunny Highlands Estates, Tr. 1132) (quality = low)	No	L	-	-	L		
13	14.6	0.0-14.6	-	N	No	None	No	-	-	-	N		
14a	25.0	0.0-25.0	-	N	No	None	No	-	-	-	N		
14b	22.4	5.8- 6.9	1	L	-	Crosses undeveloped recorded subdivision (Accolade Ranches) (quality = low)	No	L	-	-	L		
		11.6-12.5	1	L	-	Crosses undeveloped recorded subdivision (Sandy River Rancheros) (quality = low)	No	L	-	-	L		
		13.7-13.8	1	L	-	Crosses undeveloped recorded subdivision (Sandy River Rancheros) (quality = low)	No	L	-	-	L		
14c/17/ 58/18	16.8	0.0-16.8	-	N	No	None	No	-	-	-	N		
10/20	42.5	0.0-42.5	-	N	No	None	No	-	-	-	N		
21a	10.5	5.6-10.5	1	L	-	*Crosses unsubdivided land sales area (Whispering Ranch, partially settled) (quality = moderate)	No	L	-	-	L		

¹Indicates 1989 changes



TABLE B-11 (continued)
 IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: LAND USE: OTHER FUTURE LAND USES CROSSED

PAGE NO. 3

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s)	Prel. Residual Impact	Significant Impact	Committed Mitigation Measure(s)	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
78	3.1	0.0- 3.1	-	N	No	None	No	-	-	-	N		
77	4.6	0.0- 4.6	-	N	No	None	No	-	-	-	N		
35/36/37	16.2	16.0-16.2	5	L	-	Crosses area identified as future "rural residential" (quality = low)	No	L	-	-	L		
68	2.4	0.0- 2.4	5	L	-	Crosses area identified for future "rural residential" (quality = low, mod., and high)	No	L	-	-	L		

*Indicates 1989 changes.

¹Impact Types

1. Displaces, alters or otherwise physically affects any existing, developing, or planned (officially recorded) residential, commercial, industrial, or institutional use or activity.
4. Displaces, alters, or otherwise physically affects any existing or planned air facility or air travel-related activity.
5. Affects applicable general and regional plans and/or approved, adopted or officially stated policies, goals, or operations of communities or governmental agencies.



**TABLE B-12
LINK DESCRIPTION**

RESOURCE STUDY: Land Use: Parks, Recreation and Preservation
 Note: Milepost designations are identified if feature is crossed.

Page 1

Link Number	Length	Mileposts		Description
		Begin	End	
0	13.5	-	-	no changes
76	0.7	-	-	no changes
1	16.7	-	-	preliminary proposal to move Willow Beach development, including 9 NPS buildings and 39 trailers
2	30.1	-	-	no changes
3/5	34.4	28.9	29.0	Route 66 between Kingman and Seligman now designated an Arizona Historic Highway
13	14.6	-	-	no changes
14a	25.0	-	-	no changes
14b	22.4	12.9	15.1	BLM WSA Unit #2-60 previously recommended as expansion area; excluded in the Proposed Action of the Final Wilderness EIS formerly proposed BLM Burro Creek Riparian Management Area now designated as BLM Riparian Management Area formerly proposed BLM Burro Creek Riparian Management Area now designated as BLM Riparian Management Area
		14.9	19.3	
		20.1	21.0	



TABLE B-12 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Parks, Recreation and Preservation
Note: Milepost designations are identified if feature is crossed.

Page 2

<u>Link Number</u>	<u>Length</u>	<u>Mileposts</u>		<u>Description</u>
		<u>Begin</u>	<u>End</u>	
		-	-	BLM WSA Unit #2-60 proposed action in the Final Wilderness EIS included a 0.25 mile withdrawal on the southern edge to allow for utility corridor
		-	-	BLM potential scenic overlook within 1 mile of route
14c/17/ 58/18	16.8	-	-	BLM WSA Unit #2-204 previously recommended as expansion area; excluded in the Proposed Action of the Final Wilderness EIS
10/20	42.5	-	-	BLM WSA Unit #2-204 previously recommended as expansion area; excluded from the Proposed Action of the Final Wilderness EIS
21a	10.5	-	-	no changes
78	3.1	-	-	no changes
77	4.6	-	-	no changes
35/36/37c	16.2	-	-	two proposed golf courses (Sun City West and Happy Trails) located 1 to 2 miles from link
68	2.4	-	-	no changes



TABLE B-13
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed:
Parks, Recreation and Preservation

Page 1

Link Number	Length	Mileposts		Description
		Begin	End	
0	13.5	12.2	13.1	Nevada Natural Heritage Site (McCullough Mountains)
76	0.7	0.0	0.7	none
1	16.7	0.0	0.8	none
		0.8	16.6	Lake Mead National Recreation Area
		9.9	10.0	Lake Mohave/Colorado River
		16.6	16.7	none
2	30.1	0.0	30.1	none
3/5	34.4	0.0	28.9	none
		28.9	29.0	(2) Arizona Historic Highway (US 66: Kingman - Seligman portion)
		29.0	34.4	none
13	14.6	0.0	14.6	none
14a	25.0	0.0	25.0	none
14b	22.4	0.0	14.9	none
		14.9	19.3	(2) BLM Burro Creek Riparian Management Area
		19.3	20.1	none
		20.1	21.0	(2) BLM Burro Creek Riparian Management Area
		21.0	22.4	none

(2) Indicates 1989 changes.



TABLE B-13 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Uses Crossed:
Parks, Recreation and Preservation

Page 2

Link Number	Length	Mileposts		Description
		Begin	End	
14c/17/ 58/18	16.8	0.0	1.7	none
		1.7	2.4	proposed Arizona Natural Area (Burro Creek South)
		1.7	9.2	Potential National Natural Landmark (Bigelow Beargrass)
		9.2	16.8	none
10/20	42.5	0.0	0.6	none
		0.6	0.7	Arizona Potential Candidate Road for Scenic, Historic or Parkway Designation (US 93: Joshua Tree Parkway)
		0.7	42.5	none
21a	10.5	0.0	10.5	none
77	4.6	4.5	4.5	proposed equestrian trail (Maricopa County)
78	3.1	-	-	none
35/36/37c	16.2	0.0	16.2	none
68	2.4	0.0	2.4	none



**TABLE B-14
LINK DESCRIPTION**

RESOURCE STUDY: Land Use: Nearby Uses: Parks, Recreation and
Preservation

Page 1

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
0	13.5	Nevada Natural Heritage Site (McCullough Mtns)	Nevada Natural Heritage Site (McCullough Mtns.)
Link 0 was not included in original route.			
*76	0.7	proposed equestrian trail (Boulder City) 1 proposed community park	rifle range (Boulder City) proposed equestrain trail (Boulder City) golf course (Boulder City Municipal) Boulder City scenic drive Boulder City scenic drive pullout proposed regional park/ proposed community parks 1 proposed neighborhood park horse stables Boulder City schools (3) Whalen baseball field city softball field Villa del Prado Park Oasis Park city park complex

*Includes area surrounding Mead Substation, approximate location of corridor subject to terminal site.



TABLE B-14 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Parks, Recreation and
Preservation

Page 2

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
1	16.7	Lake Mead National Recreation Area	Lake Mead National Recreation Area
		National Park Service (NPS) Recommended Wilderness Area (#8, 9, 10)	NPS Recommended Wilderness Area (#8, 9, 10)
		NPS Potential Wilderness Addition (#11)	NPS Potential Wilderness Addition (#11)
		proposed equestrian trail (Boulder City)	rifle range (Boulder City)
		Willow Beach Development Site - NPS (2) proposal to move all development to another site	motor-cross area (Boulder City)
			National Fish Hatchery (Willow Beach)
		Lake Mohave/Colorado River	Willow Beach Development Site - NPS (2) proposal to move all development to another site
	BLM WSA Unit #2-01A		
	Lake Mohave/Colorado River		
2	30.1	none	BLM WSA Unit #2-01A
			proposed Arizona Natural Area (Red Lake)



TABLE B-14 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Parks, Recreation and
Preservation

Page 3

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
3/5	34.4	proposed Arizona Natural Area (Red Lake)	proposed Arizona Natural Areas (Red Lake and Grand Wash Cliffs)
		(2) Arizona Historic Highway (U.S. 66: Kingman-Seligman portion)	(2) Arizona Historic Highway (U.S. 66: Kingman-Seligman portion)
		school (Hackberry)	
13	14.6	-	Roadside Rest Area (1-40)
14a	25.0	potential national natural landmark (Trout Creek)	potential national natural landmark (Trout Creek)
14b	22.4	(2) BLM WSA Unit #2-60, with .25 mile withdrawal to allow for utility corridor (BLM's proposed in the upper Sonoran Final wilderness EIS)	BLM WSA Unit #2-60 (BLM's proposed action as proposed in the upper Sonoran Final wilderness EIS)
		(2) BLM riparian management area (Burro Creek)	(2) BLM riparian management area (Burro Creek)
		proposed Arizona Natural Area (Kaiser Spring Canyon)	proposed Arizona Natural Area (Kaiser Spring Canyon)
		potential national natural landmarks (Kaiser Spring Canyon, Burro Creek)	potential national natural landmarks (Kaiser Spring Canyon, Burro Creek)



TABLE B-14 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Parks, Recreation and
Preservation

Page 4

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
14b (cont.)	22.4	campground (Burro Creek- BLM) & planned overlook interpre- tive site	BLM WSA Unit #2-60
		BLM WSA Unit #2-60 lower Burro Creek	
		(2) BLM potential scenic overlook	
14c/17/ 58/18	16.8	campground (Burro Creek- BLM)	BLM WSA Unit #2-59
		BLM WSA Unit #2-60	BLM WSA Unit #2-60 potential national natural landmark (Burro Creek)
			(2) BLM riparian management area (Burro Creek)
			proposed Arizona Natural Area (Burro Creek South)
			BLM WSA Unit #2-59 (Arrastra Mtn.)
		BLM WSA Unit #2-60 (Lower Burro Creek)	BLM WSA Unit #2-60 (Lower Burro Creek)
		BLM WSA Unit #2-59 (Arrastra Mtn.)	BLM WSA Unit #2-59 (Arrastra Mtn.)
		proposed Arizona Natural Area (Burro Creek South)	proposed Arizona Natural Area (Burro Creek South)
		potential national natural landmark (Bigelow Beargrass)	potential national natural landmark (Bigelow Beargrass)



TABLE B-14 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Parks, Recreation and
Preservation

Page 5

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
		roadside rest area (U.S. 93)	(2) BLM proposed action for WSA Unit #2-59 does not come within two miles of the utility corridor
		Arizona potential candidate road for scenic, historic or parkway designation (U.S. 93: Joshua Tree Parkway)	Sonoran Final Wilderness EIS BLM WSA Unit #2-204 (Black Mountain - Ives Peak)
10/20	42.5	Arizona potential can- didate road for scenic, historic or parkway designation (U.S. 93: Joshua Tree Parkway)	Arizona potential candidate road for scenic, historic or parkway designation (U.S. 93: Joshua Tree Parkway)
		roadside rest area (U.S. 93)	roadside rest area (U.S. 60)
		BLM WSA Unit #2-204 (Black Mountain- Ives Peak)	BLM WSA Unit #2-204 BLM WSA Unit #2-204 (Black Mountain-Ives Peak)
21a	10.5		campgrounds (Vulture Mine at Wickenburg and Carole City) proposed BLM scenic corridor (Vulture Mine Road)
78	3.1	-	-
77	4.6	proposed equestrian trail (Maricopa County)	proposed equestrian trail (Maricopa County)



TABLE B-14 (continued)
LINK DESCRIPTION

RESOURCE STUDY: Land Use: Nearby Uses: Parks, Recreation and
Preservation

Page 6

Link Number	Length	Description	
		ROW to 1 Mile	1 Mile to 2 Miles
35/36/37c	16.2	proposed equestrian trail (Maricopa County)	proposed equestrian trail (Maricopa County)
		rifle range (Peoria Rod and Gun Club)	potential national natural landmark (White Tanks Mountains)
			registered Arizona natural area (White Tanks)
			County Park (White Tanks Mountain Regional Park - Maricopa County)
			potential County Park addition (White Tanks Mountain Regional Park - Maricopa County)
			horse stable
			race track (Phoenix Raceway Park)
68*	2.4		proposed golf course (Sun City West)
			proposed golf course (Happy Trails)
			golf courses: Briarwood County Country Club; Stardust; Echo Mesa
			1 proposed golf course (Surprise)



TABLE B-15
IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: LAND USE: PARKS, RECREATION AND PRESERVATION CROSSED

PAGE NO. 1

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s) ²	Prel. Residual Impact	Significant Impact	Committed Mitigation Measure(s) ²	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
0	13.5	1.3- 2.2	5	M	Yes	Crosses Nevada Natural Heritage Site	B	L	-	-	L		
76	0.7	0.0- 0.7	-	N	No	None	No	-	-	-	N		
1	16.7	0.8-16.6	6	L	-	Crosses Lake Mead National Recreation Area (using designated utility corridor) (quality = low)	No	L	-	-	L		
2	30.1	0.0-30.1	-	N	No	None	No	-	-	-	N		
3/5	34.4	28.9-29.0	6	L	-	*Crosses Arizona Historic Highway (U.S. 66-Kingman to Seligman) (quality = low)	No	L	-	-	L		
13	14.6	0.0-14.6	-	N	No	None	No	-	-	-	N		
14a	25.0	0.0-25.0	-	N	No	None	No	-	-	-	N		
14b	22.4	12.9-15.1	-*	N		*Crosses or borders BLM previously recommended expansion of Wilderness Study Area, excluded in proposed action (WSA) #2-60 (quality = low)	No*	*	-	-*	N*		
		15.1-19.3	6	L	-	*Crosses BLM-designated Burro Creek Riparian Management Area (quality = low)	No	L	-	-	L		
		20.1-21.0	6	L	-	*Crosses BLM-designated Burro Creek Riparian Management Area (quality = low)	No	L	-	-	L		

*Indicates 1989 changes



TABLE B-15 (continued)
IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: LAND USE: PARKS, RECREATION AND PRESERVATION CROSSED

PAGE NO. 2

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s) ²	Prel. Residual Impact	Significant Impact	Committed Mitigation Measure(s) ²	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
14c/17/ 58/18	16.8	1.7- 2.4*	6	M	Yes	Crosses proposed Arizona natural area (Burro Creek South) (quality = low)	B	L	-	B	L		
		1.7- 9.2*	6	L	-	Crosses potential national natural landmark (Bigelow Beargrass) (quality = low)	No	L	-	-	L		
10/20	42.5	0.6- 0.7	6	L	-	Crosses Arizona potential candidate road for scenic, historic or parkway designation (U.S. 93-Joshua Tree Parkway) (quality = low)	No	L	-	-	L		
21a	10.5	0.0-10.5	-	N	No		No	-	-	-	N		
78	3.1	0.0- 3.1	-	N	No	None	No	-	-	-	N		
77	4.6	0.0- 4.4	-	N	No	None	No	-	-	-	N		
		4.4- 4.5	6	L	-	Crosses proposed equestrian trail (Maricopa County) (quality = low)	No	L	-	-	L		
		4.5- 4.6	-	N	No	None	No	-	-	-	N		
35/36/37	16.2	8.0- 8.1	-	N	No		No	-	-	N			
68	2.4	0.0- 2.4	-	N	No	None	No	-	-	N			

*Indicates 1989 changes

¹Impact Types:

5. Affects applicable general and regional plans and/or approved, adopted or officially stated policies, goals or operations of communities or governmental agencies.

6. Alters or otherwise physically affects any established, designated, or planned recreation, preservation, education, or scientific facility, use area, or activity.

²Mitigation Measures:

8. In designated areas structures will be placed so as to avoid sensitive features and/or to allow conductors to clearly span the features, within limits of



TABLE B-16
CHANGES IN VISUAL MANAGEMENT CLASSES

Page 1

<u>Links</u>	<u>Class II</u>	<u>Class III</u>	<u>Class IV</u>
21a		1.3-10.5 (9.2)	0.0-1.3 (1.3)
78		0.0- 3.1 (3.1)	



TABLE B-17
IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: VISUAL RESOURCES

PAGE NO. 1

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s) ²	Prel. Residual Impact	Significant Impact	Committed Mitigation Measure(s) ²	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
21a	10.5	0.0 - 0.3	1	L	No	Class IV - Seldom seen visibility/ Moderate structures	No				L		
		0.3 - 1.3	1,4	M	Yes	Class IV - Background and moderate visibility/strong contrast (Vulture Road)	7,8	L	No	7,8	L	No	
	1.3 - 1.9	1,3,4	H	No	Class III - fg/mg distance zone Moderate visibility/moderate contrast	6,7,8	M	Yes	Yes	M	No	Residences 1-2 miles away	
	1.9 -10.5	1,3	H		Class III - High visibility/strong structural contrast	5,6,7,8	H	Yes	Yes	H		High impact to residences +Approx. 56 houses/ trailers within 1 mile of line +19 houses within 1-2 miles	
78	3.1	0.0 - 1.6	3	H	Yes	Class III - High visibility/strong structure contrast	6,7,8	H	Yes		H		1 house west of lin within 1-2 miles
		1.6 - 3.1	3	H	Yes	Class III - Moderate visibility/strong structure contrast	5,6,7,8	M	Yes		M		1 house within 1-2 miles
77	4.6					(no change)							

Impact Levels:

- H - High
- M - Moderate
- L - Low

¹Impact Types

1. Affect the quality of any scenic resource.
3. Affect the view from or modify the visual setting of any residential, commercial, institutional or similarly visually sensitive land use.
4. Affect the view from or alter the visual setting of any road or travel route.

²Mitigation Measures

5. Special tower design may be utilized to minimize ground disturbance, operational conflicts, visual contrast and /or avian conflicts.
6. The finish on steel towers will be dulled in designated areas to reduce visual contrast.
7. In designated areas conductors will be constructed of nonspecular material to reduce visual contrast.
8. In designated areas structures will be placed so as to avoid sensitive features and/or to allow conductors to clearly span the features, within limits of standard tower design. This would minimize amount of sensitive feature disturbed and/or reduce visual contrast.



**TABLE B-18
LINK DESCRIPTION**

RESOURCE STUDY: Biological Resources; Wildlife

Page 1

<u>Link Number</u>	<u>Length</u>	<u>Mileposts</u>		<u>Description</u>
		<u>Begin</u>	<u>End</u>	
0	13.5			no changes
1	16.7	7.0	11.0	Peregrine falcon nesting area on Colorado River
2	30.1			no changes
3/5	34.4	0.0	31.0	Raptor nesting and wintering area; new nesting of Swainson's and ferruginous hawks
13	14.6	12.0	14.6	Category III desert tortoise habitat
14a	25.0	0.0	25.0	Category III desert tortoise habitat
14b	22.4	0.0	22.4	Category III desert tortoise habitat
		17.0	19.0	Potential bald eagle nesting area
14c	1.3	0.0	1.3	Category III desert tortoise habitat
17/58/18	15.5	0.0	4.8	Category I desert tortoise habitat
		4.8	15.5	Category II desert tortoise habitat
10/20	42.5	0.0	12.0	Category III desert tortoise habitat
		17.0	33.2	Category III desert tortoise habitat
		33.2	39.0	Category II desert tortoise habitat
		39.0	41.3	Category III desert tortoise habitat
21a	25.2	1.7	6.2	Category III desert tortoise habitat
		6.2	10.5	Category II desert tortoise habitat
78	3.1	0.0	3.1	Category III desert tortoise habitat
77	4.6	0.0	3.0	Category III desert tortoise habitat
35/36/37c	24.9			no changes
68	2.4			no changes



TABLE B-19
IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: BIOLOGICAL RESOURCES

PAGE NO. 1

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s) ²	Pre1. Residual Impact	Significant Impact	Committed Mitigation Measure(s) ²	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
0	13.5					No changes							
1	16.7	7-11	1,5	H	Yes	High sensitivity, peregrine falcon nesting area on the Colorado River	8,13,11,14,15	L		8,13,11,14,15	L		
2	30.1					No changes							
3/5	34.4	0.0-31.0	2,5	M		Moderate sensitivity, new nesting of ferruginous and Swainson's hawks	11,13,8,15	L		11,13,8,15	L		
		31.0-34.4				No changes							
13	14.6	12.0-14.6	2,5	M		Category III desert tortoise habitat	8,13	L		13,8	L		
14a	25.0	0.0-25.0	2,5	M		Category III desert tortoise habitat	8,13	L		13,8	L		
14b	22.4	0.0-22.4	1,2,5	M		Category III desert tortoise habitat. Potential bald eagle nesting area Milepost 17-19	8,13,11,15	L		13,8,11,15	L		
14c	1.3	0.0- 1.3	2,5	M		Category III desert tortoise habitat	8,13	L		8,13	L		
17/58/18	15.5	0.0- 4.8	2,5	H	Yes	Category I desert tortoise habitat	8,13,2,16,17	M		8,13,2,16,17	M		
		4.8- 15.5	2,5	H	Yes	Category II desert tortoise habitat	8,13,2,16,17	L		8,13,2,16,17	L		
10/20	42.5	0.0-12.0	2,5	M		Category III desert tortoise habitat	8,13	L		8,13	M		
		17.0-33.2	2,5	M		Category III desert tortoise habitat	8,13	L		8,13	L		
		33.2-39.0	2,5	H	Yes	Category II desert tortoise habitat	8,13,2,16,17	L		8,13,2,16,17	L		
		39.0-41.3	2,5	M		Category III desert tortoise habitat	8,13	L		8,13	L		
21a	25.2	1.7-6.2	2,5	M		Category III desert tortoise habitat	8,13	L		8,13	L		
		6.2-10.0	2,5	H	Yes	Category II desert tortoise habitat	8,13,2,16,17	L		8,13,2,16,17	L		
78	3.1	0.0-3.1	2,5	M		Category III desert tortoise habitat	8,13	L		8,13	L		
77	4.6	0.0-3.0	2,5	M		Category III desert tortoise	8,13	L		13,8	L		
35/36/37c	24.9					No changes							
68	4.2					No changes							



TABLE B-19 (continued)
 IMPACT ASSESSMENT/MITIGATION PLANNING CHART

RESOURCE STUDY: BIOLOGICAL RESOURCES

PAGE NO. 2

Link No.	Length (Miles)	Milepost	Type ¹	Initial Impact	Significant Impact	Impact Description	Recommended Mitigation Measure(s) ²	Pre-Residual Impact	Significant Impact	Committed Mitigation Measure(s) ²	Residual Impact	Significant Impact	Significant Unavoidable Adverse Impact Description
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Impact Levels:

- H = High
- M = Moderate
- L = Low

¹Impact Types:

1. Affect any federally listed threatened or endangered species or critical habitat thereof.
2. Affect any state-listed protected, threatened, unique, or otherwise sensitive species of habitat thereof.
5. Alter the diversity of any biotic community or population numbers of any plant or animal species.

²Mitigation Measures:

2. No widening or upgrading of existing access roads will be taken.
8. In designated areas structures will be placed so as to avoid sensitive features and/or to allow conductors to clearly span the features, within limits of standard tower design. This would minimize amount of sensitive feature disturbed and/or reduce visual contrast.
11. In designated areas, if deemed appropriate by pre-construction surveys (see 13 below), construction activities will be modified during breeding or non-hibernation season of sensitive, listed or proposed threatened or endangered species. This would reduce disturbance to sensitive species.
13. Prior to construction, an ecological field review of tower and access-road design will be conducted by a qualified professional to identify site-specific impacts to threatened, endangered, or otherwise sensitive vegetation and wildlife and to determine the most effective means to mitigate those impacts. Possible mitigation measures could include minor adjustments in tower and road locations, closing access roads, relocating sensitive species, habitat improvements, etc.
14. In designated areas high visibility (orange) balls will be placed on power lines to reduce bird collision hazards.
15. Pre-construction surveys will be conducted to determine the presence of any active raptor nests within one mile of construction. If active nests are found, construction within one mile of the nest(s) will be delayed until fledging has occurred.
16. Any Category I or II desert tortoise habitat lost to construction will be compensated for in accordance with BLM requirements.
17. In areas where Category I or II desert tortoise habitat is crossed, a biologist will be present, especially when clearing and leveling of tower pads and clearing of access roads takes place. The biologist will assist in removing tortoises from burrows and relocating them when necessary.



APPENDIX C - MAPS



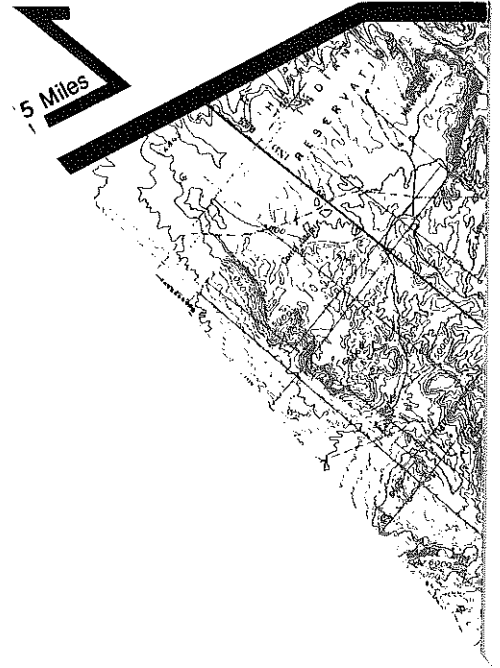


Figure C-1
Project Route Map



Figure C-2
Land Jurisdiction

Changes To The MEAD-PHOENIX PROJECT

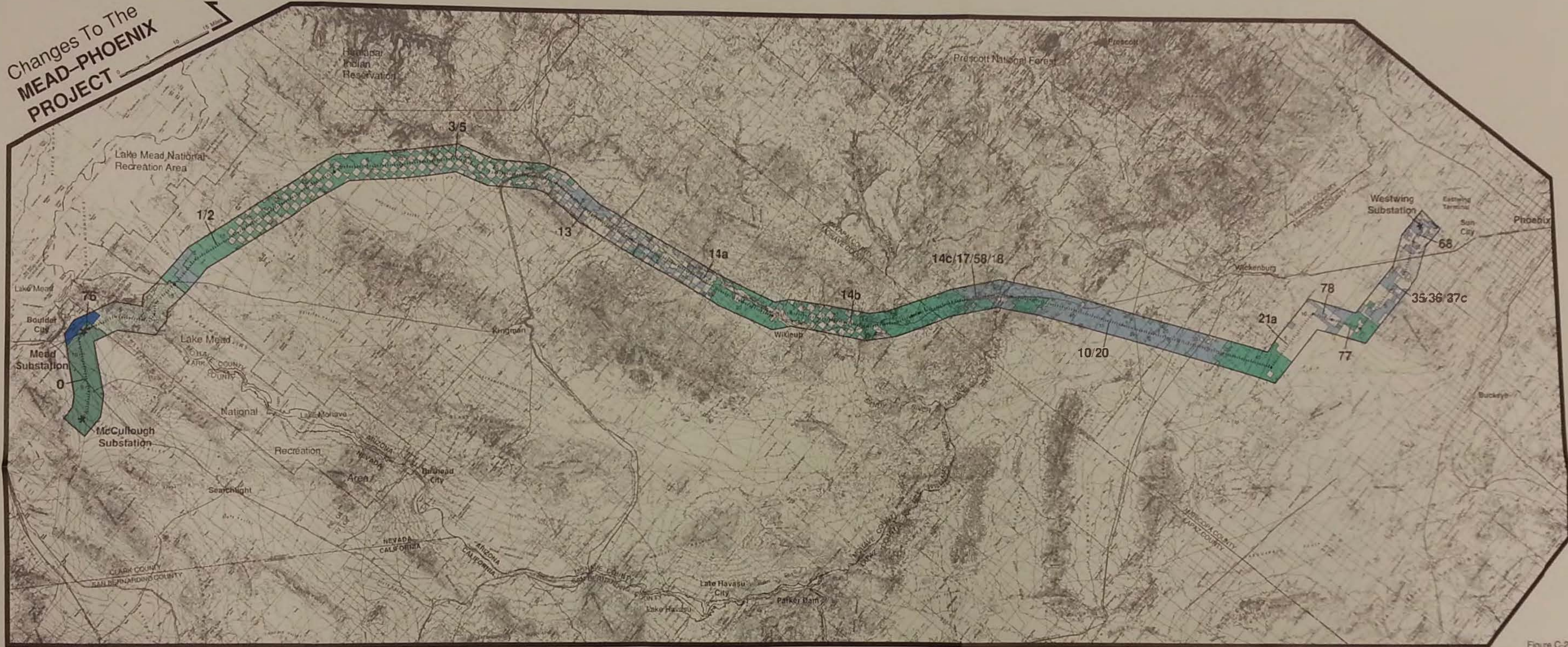


Figure C-2

Land Jurisdiction

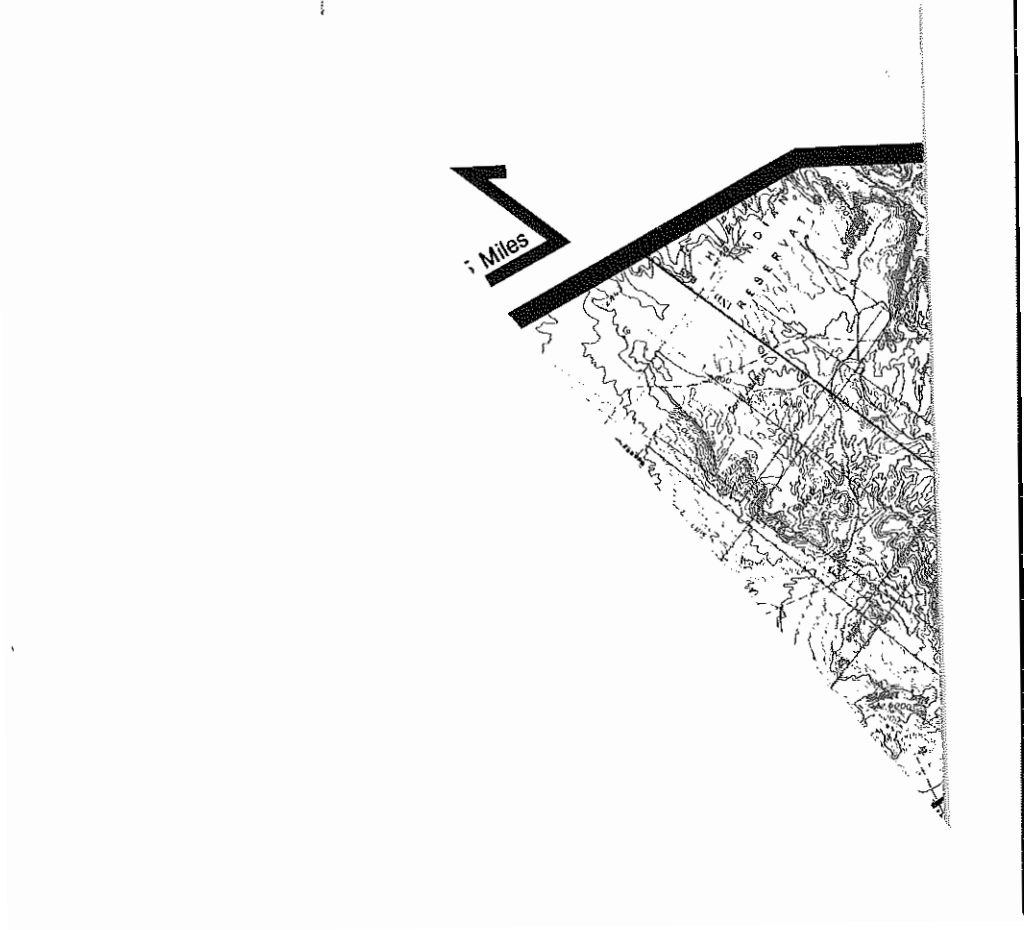


Figure C-3
Existing Land Use Inventory

Changes To The MEAD-PHOENIX PROJECT

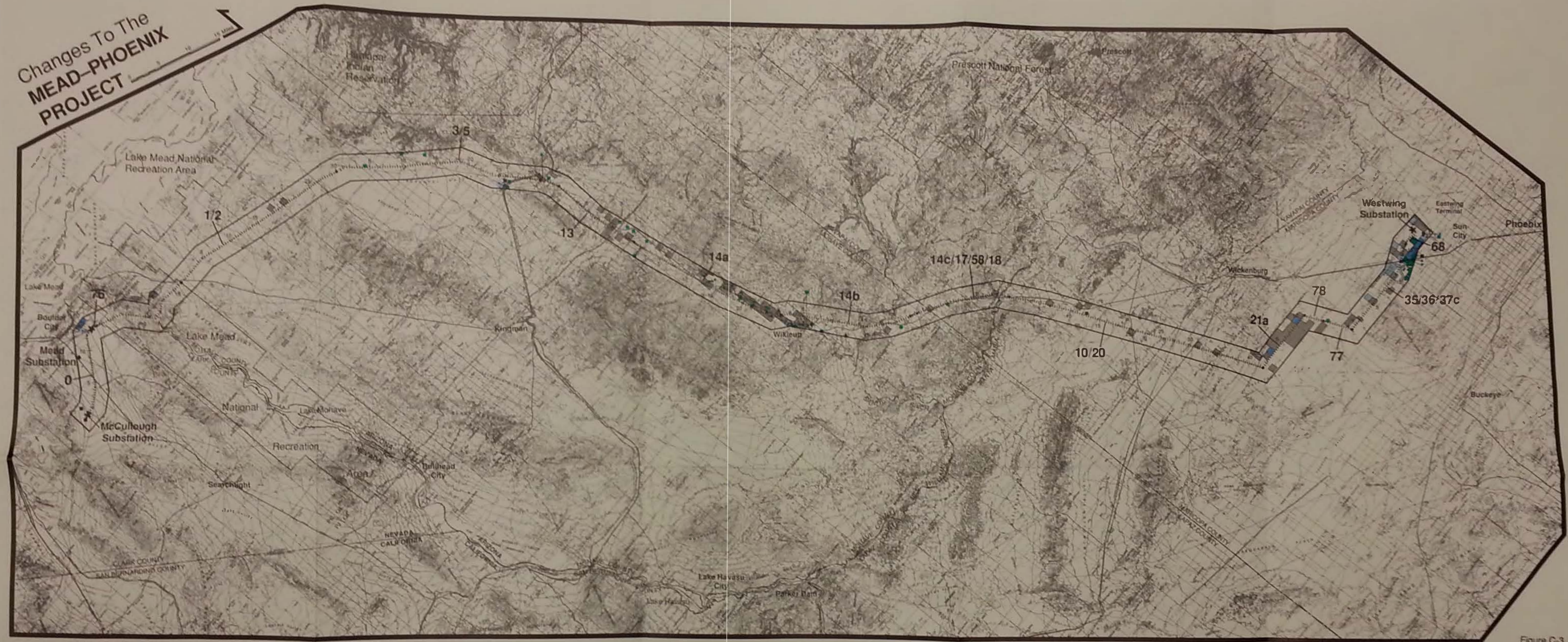


Figure C-3

- Residential Dwelling Units Within 2 Miles by Section**
- Dwellings Within an Area of Another Major Land Use
 - 1-9 Dwellings in a Section
 - 10-49 Dwellings in a Section
 - 50 or more Dwellings in a Section

- Commercial and Industrial**
- ▲ Commercial (General)
 - Industrial (Light, Heavy)
 - Industrial (Extractive)

- Public and Quasi-Public**
- ▲ School
 - ▲ Church
 - ◆ Cemetery
 - Major Dam
 - Airport/Altairip with Interference Zone

- Other Governmental
- Other Institutional
- ★ Utility
- Northwest Regional Landfill
- Auto Test Track

- Agricultural**
- Cropland and Pasture
 - Cropland out of Production
 - Vacant/Undeveloped

Land Use: Existing

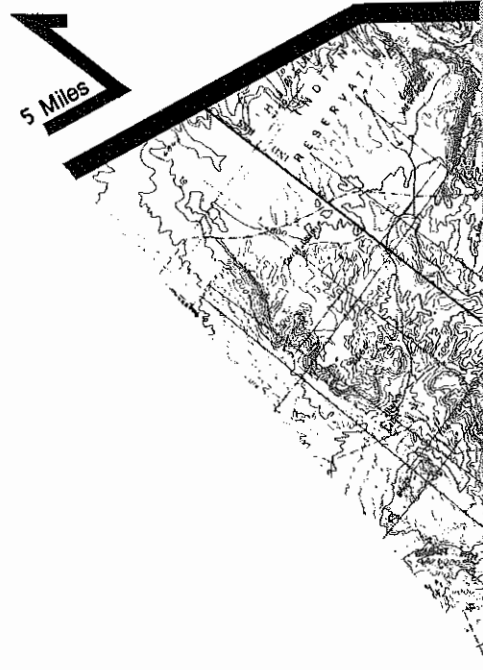
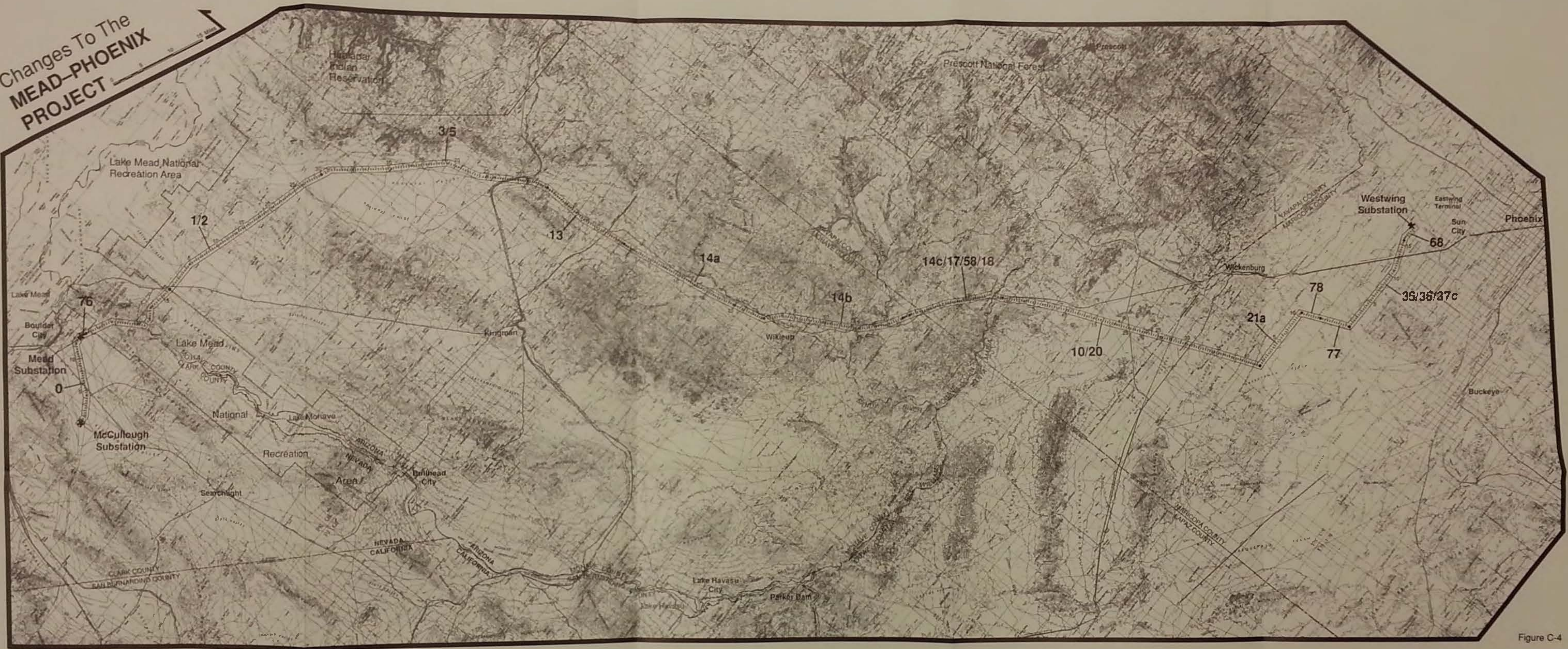


Figure C-4
Existing Land Use Impacts

Changes To The MEAD-PHOENIX PROJECT



Residual Impact

- Low
- No Identifiable

**Land Use:
Existing**

Figure C-4

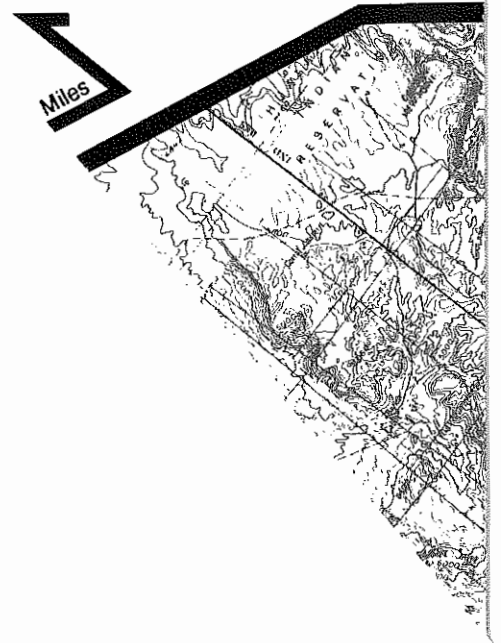
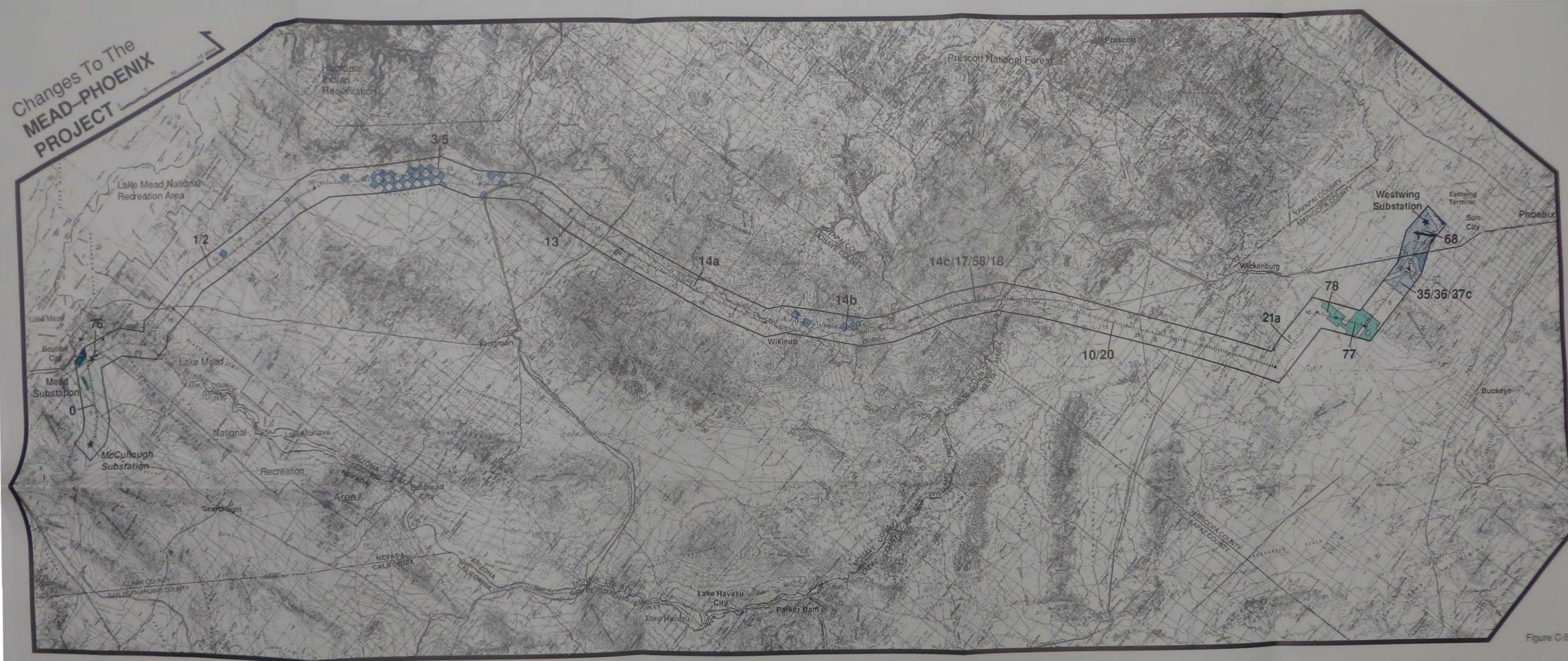


Figure C-5
Future Land Use Inventory

Changes To The MEAD-PHOENIX PROJECT



- | | | | |
|-----------------------|-------------------------------|-----------------------------------|----------------------------|
| General Plans | | Specific Development Plans | |
| Rural Residential | Aviation Hazard Area | Recorded Subdivision | Proposed Development Plan |
| Urban Residential | Military Flight Path | Master Development Plan | Proposed Veterans Cemetery |
| Activity Center | Potential Pumped Storage Site | Potential Development | Airport Site |
| Floodplain | General Plan Pending | Industrial | |
| Major Detention Basin | | | |

**Land Use:
Future**

Figure C-5



Figure C-6
Future Land Use Impacts

Figure C-7
Parks, Recreation and Preservation Inventory

Changes To The MEAD-PHOENIX PROJECT



- | | | | | |
|---|---|---|---|---|
| <ul style="list-style-type: none"> Nevada Natural Heritage Site Proposed Arizona Natural Area Potential National Natural Landmark Proposed Riparian Management Area Joshua Tree Parkway County Park | <ul style="list-style-type: none"> BLM WSA Recommended Wilderness NPS Recommended Wilderness Area NPS Potential Wilderness Addition Arizona Potential Candidate Road for Scenic Historic or Parkway Designation Arizona Historic Highway Proposed BLM Scenic Overview | <ul style="list-style-type: none"> Lake Mead National Recreation Area Lake Mead NRA Development Site or Proposed Site Roadside Rest Area Proposed Roadside Rest Area Campground Scenic Overview | <ul style="list-style-type: none"> National Fish Hatchery Proposed/Potential Equestrian Trail Proposed Open/Recreation Existing and Proposed City/Community Park and Recreation Facilities (Excluding Schools) Golf Course Proposed/Potential Golf Course | <ul style="list-style-type: none"> Proposed or Existing Racetrack Other Recreational Facilities |
|---|---|---|---|---|

Land Use: Parks, Recreation & Preservation

Figure C-7

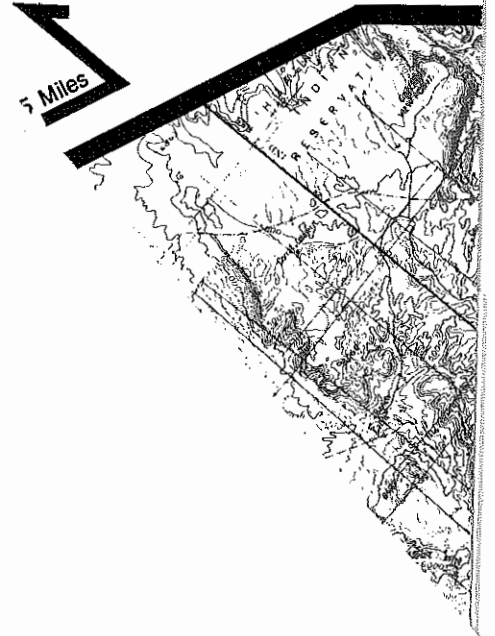


Figure C-8
Parks, Recreation and Preservation Impacts

Changes To The MEAD-PHOENIX PROJECT



Residual Impact
 ■ Low
 □ No Identifiable

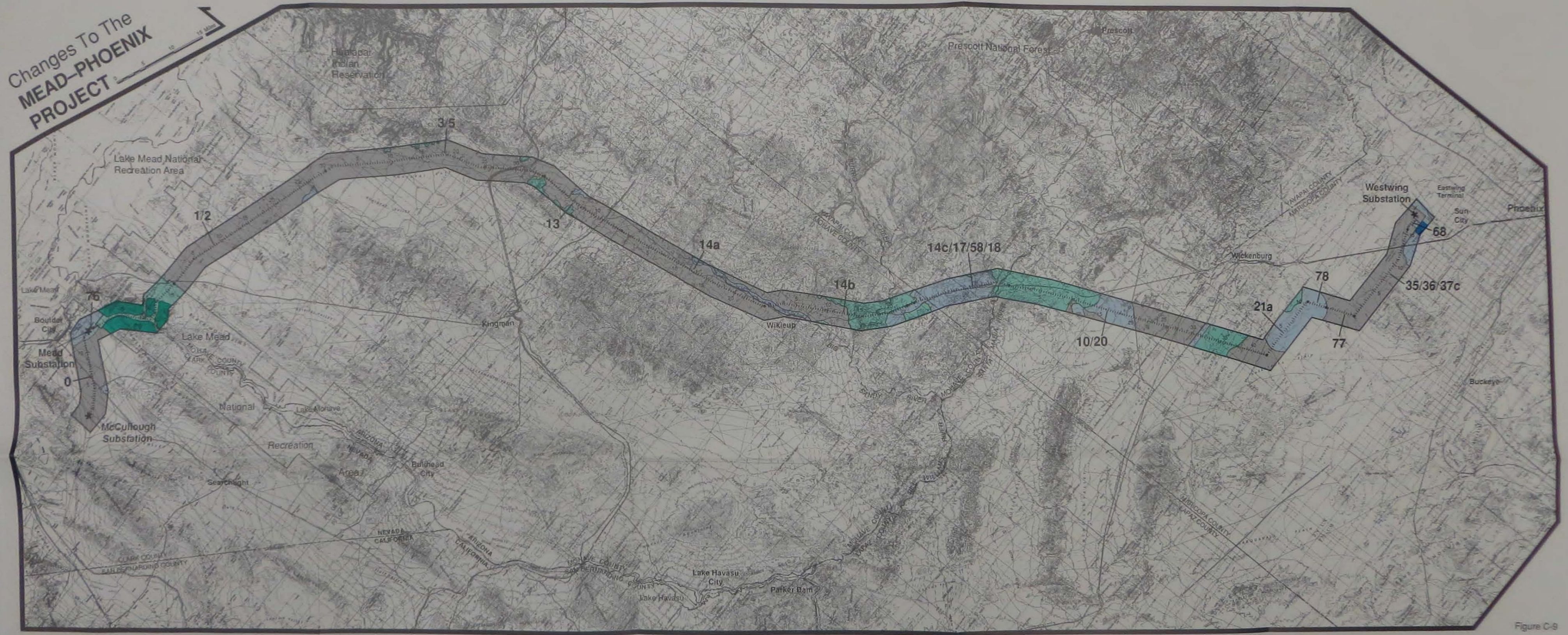
**Land Use:
 Parks, Recreation
 & Preservation**

Figure C-8



Figure C-9
Visual Resources Inventory

Changes To The MEAD-PHOENIX PROJECT



Management Classes

- Urban
- Class I
- Class II
- Class III
- Class IV

Visual Resources

Figure C-9

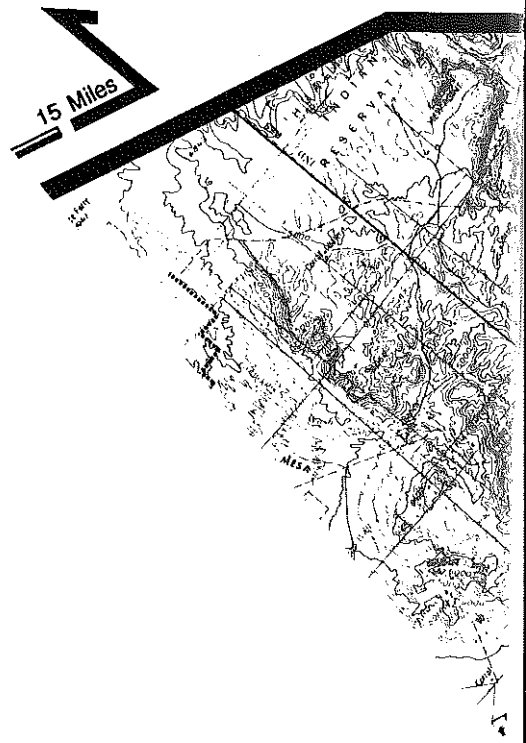
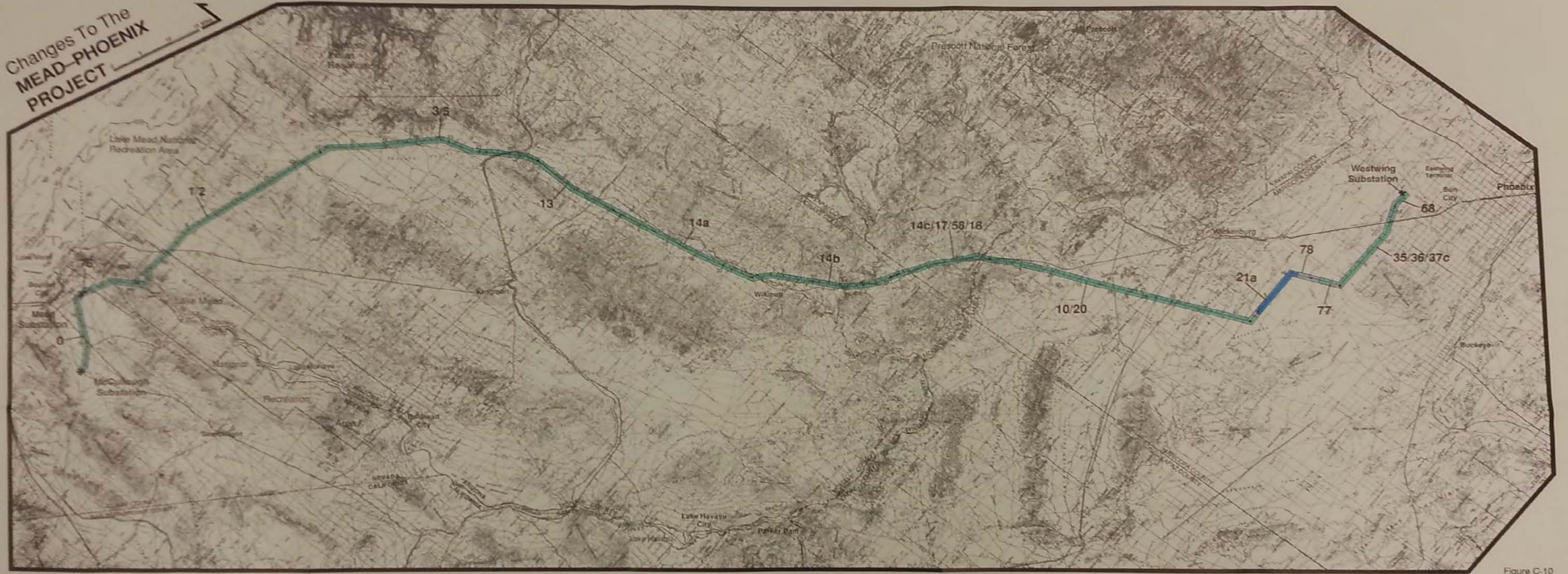


Figure C-10
Visual Resources Impacts

Changes To The
MEAD-PHOENIX
PROJECT



Residual Impact

- High
- Medium
- Low

Visual Resources

Figure C-10

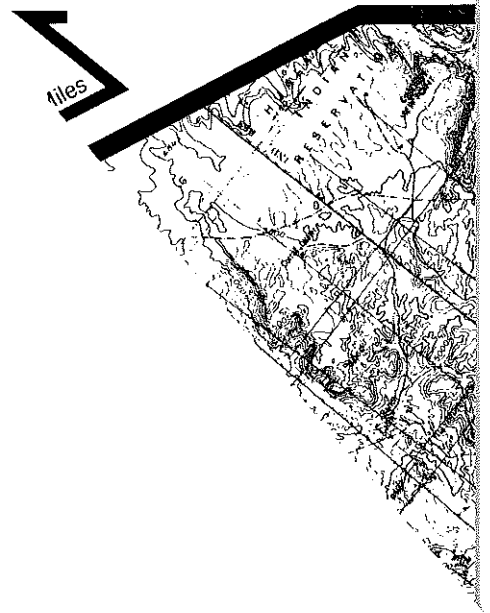


Figure C-11
Wildlife Inventory

Changes To The MEAD-Phoenix PROJECT

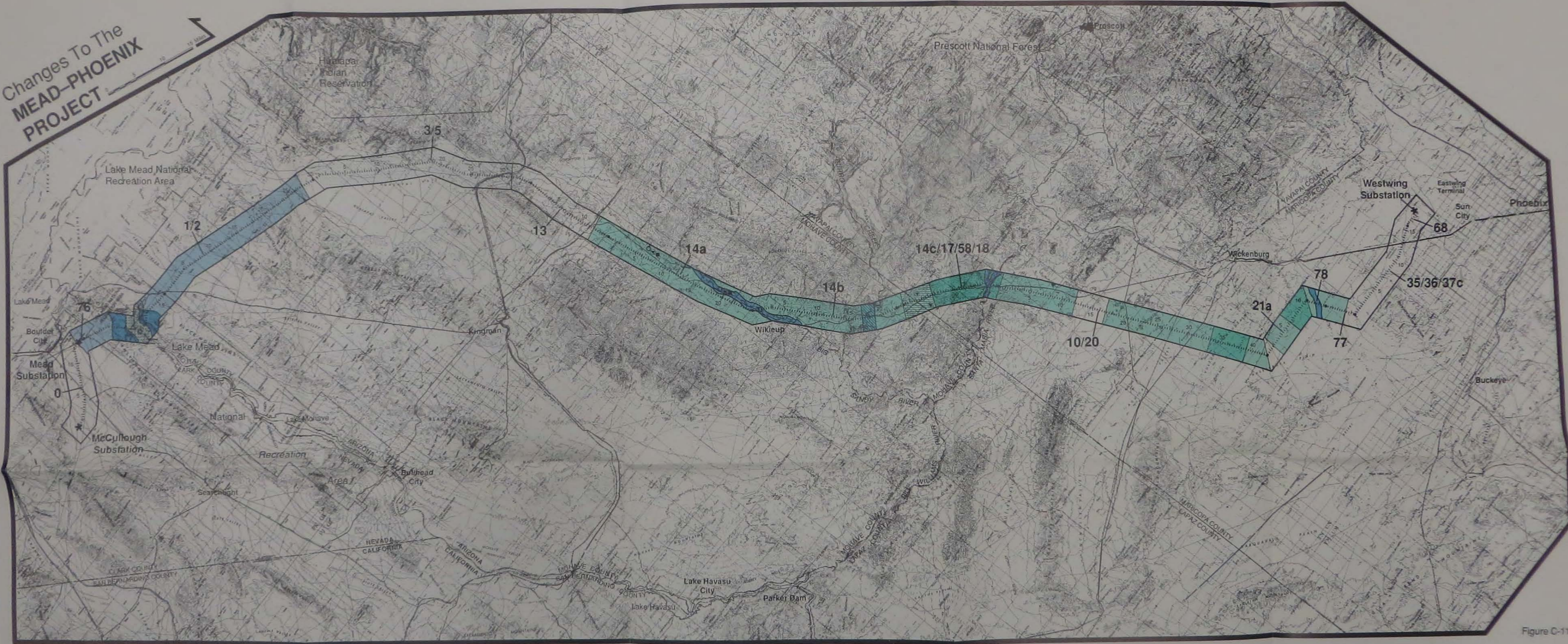


Figure C-11

Approximate Known Distribution of Some Special-Status Species and Habitats of Particular Concern

Desert Tortoise:

- Interim Category III Habitat
- Interim Category II Habitat
- Interim Category I Habitat

Areas Identified by BLM as Known Low Density Populations and/or Areas of Known Occurrence Without Density Data

- Desert Bighorn
- Critical Area — Summer Water Source Related
- Raptor Use Area
- Nesting and Wintering Swainson's and Ferruginous Hawks

Riparian and Riparian Scrub Habitats Federally Threatened or Endangered

- Bald Eagle — Potential Nesting Area
- Peregrine Falcon Nesting Area
- Bald Eagle

Arizona Game and Fish Department Threatened Native Wildlife

- Great Egret, Snowy Egret
- Gilbert Skink
- Mohave Fringtoed Lizard

Biological Resources: Wildlife

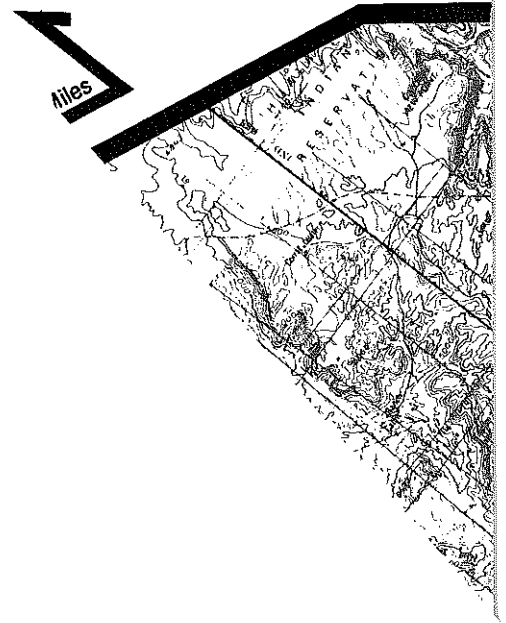
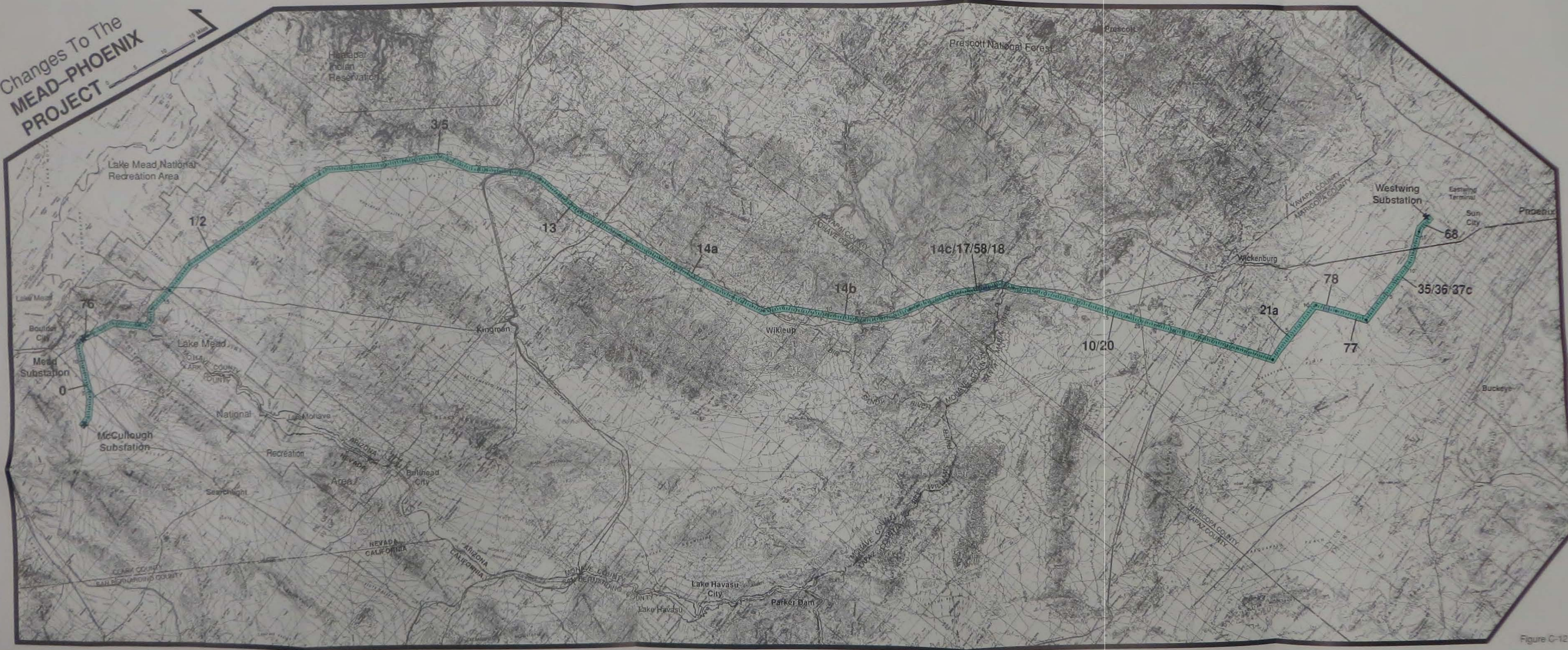


Figure C-12
Wildlife Impacts

Changes To The MEAD-PHOENIX PROJECT



Residual Impact
 ■ Moderate
 ■ Low

**Biological Resources:
 Wildlife**

Figure C-12