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Arizona Corporation Commission

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CASE/COMPANY NAME:
In the matter of the Application of Duke Energy Maricopa, L.L.C. in Conformance with the Requirements of Arizona Revised Statutes Section 40-360.03 and Section 40-360.06 for a Certificate of Environmental Compatibility Authorizing
D/B/A: the Construction of a Natural Gas-Fired Combined Cycle Generating Facility and Associated Transmission Line Near Arlington in Maricopa County, AZ

DOCKET NO. E-00000P-99-0098

NATURE OF ACTION OR DESCRIPTION OF DOCUMENT Please mark the item that describes the nature of the case/filing:

___ 01 **NEW APPLICATIONS**

___	NEW CC&N	___	MAIN EXTENSION
___	RATES	___	CONTRACT/AGREEMENTS
___	INTERIM RATES	___	COMPLAINT (Formal)
___	CANCELATION OF CC&N	___	RULE VARIANCE/WAIVER REQUEST
___	DELETION OF CC&N TERRITORY	___	SITING COMMITTEE CASE
___	EXTENTION OF CC&N (TERRITORY)	___	SMALL WATER COMPANY –SURCHARGE (Senate Bill 1252)
___	TARIFF - NEW (NEXT OPEN MEETING)	___	NOTICE OF OPPORTUNITY
___	REQUEST FOR ARBITRATION	___	SALE OF ASSETS & TRANSFER OF OWNERSHIP
	(Telecommunication Act)	___	SALE OF ASSETS & CANCELLATION OF CC&N
___	FULLY OR PARTIALLY	___	FUEL ADJUSTER/PGA
	ARBITRATED INTERCONNECTION	___	MERGER
	AGREEMENT (Telecom. Act)	___	FINANCING
___	VOLUNTARY INTERCONNECTION		
	AGREEMENT (Telecom. Act)	___	MISCELLANEOUS
			Specify_____

___ 02 **REVISIONS/AMENDMENTS TO PENDING OR APPROVED MATTERS**

___APPLICATION
COMPANY_____
DOCKET NO._____

____TARIFF
___PROMOTIONAL
DECISION NO._____
DOCKET NO._____
___COMPLIANCE
DECISION NO._____
DOCKET NO._____

MISCELLANEOUS FILINGS

___	04	AFFIDAVIT	___	29	STIPULATION
___	12	EXCEPTION	___	38	NOTICE OF INTENT
___	18	REQUEST FOR INTERVENTION			(Only notification of future action/no action necessary)
___	48	REQUEST FOR HEARING	___	43	PETITION
___	24	OPPOSITION	___	46	NOTICE OF LIMITED APPEARANCE
___	50	COMPLIANCE ITEM FOR APPROVAL	X	39	**OTHER**

Specify Land Mgmt. Plan for the Arlington Valley Energy Project and Siting Report for the Proposed Duke Energy Maricopa 525 KV Transmission Line

DATED: May 1, 2000

Thomas H. Campbell, LEWIS AND ROCA LLP
Print Name of Applicant/Company/contact person
Attorneys for Duke Energy Maricopa LLC

PLEASE SEE NOTICE ON REVERSE SIDE

(1/98)

Duke Energy Maricopa, LLC

Land Management Plan for the Arlington Valley Energy Project

April 2000

Duke Energy®

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Duke Energy Maricopa, LLC (Duke) proposes to construct a 580 megawatt (nominal) combined cycle merchant power plant in Maricopa County, Arizona. The project will be located approximately 50 miles west of Phoenix in unincorporated Maricopa County near Arlington, Arizona. The proposed location consists of approximately 2,800 acres of agricultural lands. Some of these lands are still under production, but most of the lands have been fallow for several years. Since the power plant and its associated support facilities will utilize only a small portion of this acreage, Duke intends to implement a land management plan for the remaining acreage. The primary purpose of this plan will be to return these former agricultural lands to beneficial use as open space that will attract wildlife and enhance the surrounding environment.

In creating its Land Management Plan, Duke consulted with numerous state organizations including the Department of Environmental Quality, the Department of Water Resources, the Game and Fish Department, the State Land Department, the University of Arizona Office of Arid Lands Studies, Maricopa County representatives and Arlington Valley community members. Through these consultations, Duke was able to focus its efforts on the best and most effective resource management alternatives for the property.

The Land Management Plan includes three main elements.

- Installation of a professionally designed landscape plan for the entrance of the facility and along Elliot Road.
- A comprehensive revegetation program that will restore a large portion of the property with plant communities similar to the adjacent desert lands.
- A partnership with the Arizona Game and Fish Department to provide enhanced wildlife habitat on lands that border Centennial Wash.

Implementation of the site management plan will begin prior to construction of the facility. Duke estimates that revegetation efforts will be complete within six years of operation of the facility.

BACKGROUND

Duke Energy Maricopa, LLC (Duke) has applied for a Certificate of Environmental Compatibility from the Arizona Corporation Commission (Commission) to construct a 580 megawatt (nominal) combined cycle facility (Facility) in western Maricopa County, Arizona.

The project will be located approximately 50 miles west of Phoenix in unincorporated Maricopa County near Arlington, Arizona. The proposed location consists of approximately 2,800 acres of agricultural lands. Some of these lands are still under production, but most of the lands have been fallow for several years or more. Since the power plant and its associated support facilities will utilize only a small portion of this acreage, Duke intends to implement a land management plan for the remaining acreage. The primary purpose of this plan will be to return these former agricultural lands to beneficial use as open space that will attract wildlife and enhance the surrounding environment.

Duke consulted with numerous entities including the Arizona Game and Fish Department, the University of Arizona Office of Arid Lands Studies, the Arizona Department of Water Resources, the Arizona Department of Environmental Quality, the Arizona State Land Department, Maricopa County representatives and members of the Arlington Valley community to develop a plan to beneficially reclaim the former agricultural lands. Information on potential reclamation options for the site was also gathered through site visits by the Game and Fish Department and the University of Arizona. Through these meetings, Duke was not only able to determine the most effective methods of reclaiming the land, but also established potential partnerships with state and non-governmental organizations that will greatly enhance the reclamation project.

The role of each organization:

- The Arizona Department of Environmental Quality was involved in Duke's assessment for the purposes of addressing air quality concerns that may arise with respect to blowing dust at the site.
- The Arizona Department of Water Resources was involved in Duke's assessment for the purpose of determining the legal mechanisms available to Duke to obtain water critical to the reclamation plan.
- The Arizona State Land Department was involved for the purpose of developing a potential partnership since it has lands that border Duke's proposed reclamation area.
- The Arizona Game and Fish Department was involved for the purpose of developing a partnership to foster wildlife management goals through the enhancement of wildlife habitat.
- The University of Arizona was involved because it has one of the foremost experts on revegetation and land reclamation in Arizona.

Challenges of Land Reclamation in Arizona

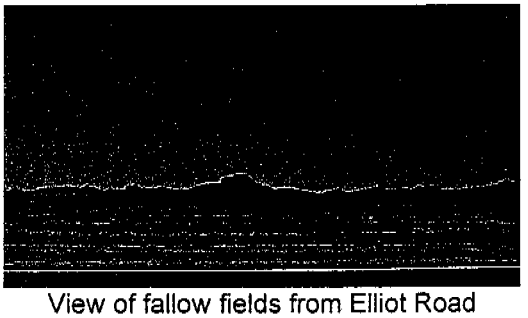
Revegetation of former agricultural lands in Arizona is a complex procedure that presents numerous challenges such as:

- Lack of established methodology: Establishing arid adapted vegetation on reclaimed agricultural lands is an evolving science. There have been few examples of attempting revegetation of a site as large as the project area and the experts are unable to identify a single methodology as the preferred alternative.
- Dust management: Undisturbed soils develop a crust that limits the amount of dust capable of becoming airborne. Disturbance of the soil breaks up the crust leading to increased potential for dust problems.
- Management of noxious weeds (i.e., salt cedar and tumbleweed): Large stands of salt cedar are already established in sumps adjacent to the project area. Irrigation for revegetation efforts will provide increased opportunity for salt cedar to become further established. Likewise, tumbleweed can become a nuisance if not properly managed.
- Wildlife impacts on plants and irrigation systems: Wildlife will be attracted to any plantings and irrigation systems that are placed at the site. Therefore, plants will need to be protected from foraging wildlife and irrigation systems must be properly designed to withstand local wildlife.

SITE ASSESSMENT

Duke's Arlington Valley Energy Project site consists of approximately 2,800 acres of active and fallow agricultural lands. Of this total property, only a small portion of the acreage will actually be used for the Facility. The site currently consists of three types of land: fallow agricultural lands, current agricultural lands and lands in Centennial Wash.

Fallow agricultural lands: Approximately 65% of the site consists of fallow agricultural lands. These lands have been out of production for a period of time ranging from 5 to 15 years. Soils have been highly compacted and have formed a crust on the surface. Portions of these fallow lands, especially the lands adjacent to Centennial Wash, have been used as rangeland for grazing cattle. Irrigation infrastructure (i.e., ditches and wells) on these lands is generally in disrepair, making revegetation plans harder to implement.

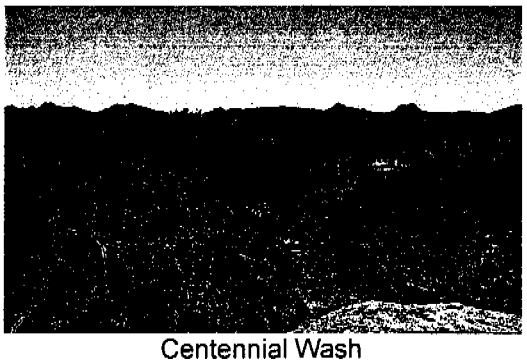


View of fallow fields from Elliot Road looking south.

Vegetation on these lands consists primarily of salt cedar, tumbleweed, Bermuda grass and other weeds typically found on retired farmland in Arizona. This sparse vegetative cover contrasts with the adjacent lands that have not been farmed.

Agricultural Fields

Current agricultural lands: Approximately 35% of the site is currently farmed utilizing flood irrigation. Irrigation ditches and wells are in good working order.



Centennial Wash

Centennial Wash: Only 2% of the site is currently in a wash. Centennial Wash has extensive stands of mesquite, acacia, and native grasses. This area provides valuable habitat for birds, mammals and reptiles.

Creosote bush flat adjacent to project area

Adjacent Lands: The lands adjoining the site consist primarily of creosote bush flats and saltbush flats. Winters Wash, adjacent to the northern portion of the site, and Centennial Wash located along the southern boundary of the site contain mesquite, acacia, forbs and native grasses.

Figure 2 (page 13) identifies existing land cover classifications at the Arlington Valley Energy Project. See Table 1 for approximate acreage for each land type.

Land Cover Classification	Acreage (approximate)	Percentage (approximate)
Fallow fields	1810	65%
Agriculture - irrigated	910	33%
Centennial Wash	60	2%
Total	2780	100%

Table 1: Land Cover Classifications
Arlington Valley Energy Project

GOALS & OBJECTIVES

After numerous meetings and visits to the site with AGFD and the U of A, Duke established the following goals for the land management plan:

- Establish a visual buffer between the Facility and Elliot Road.
- Reestablish arid adapted vegetation throughout the site that is self-sustaining and representative of adjacent plant communities.
- Provide enhanced wildlife habitat and public access to wildlife habitat areas.
- Protect quality riparian vegetation already existing in washes
- Minimize dust and tumbleweed production.

In order to meet these goals, Duke has developed a multi-component plan. The entire site has been divided into zones based upon current land use classification and desired future use.

MANAGEMENT PLAN

Duke has developed a multi-component plan to manage its beneficial reclamation program. This proposal was developed in consultation with the University of Arizona and the Arizona Game and Fish Department with input from the Arizona Department of Water Resources and the Arizona State Land Department.

The site has been divided into five different zones each with its own proposed management activities. In addition to the activities for each zone, Duke will actively manage tumbleweed resulting from land disturbing activities associated with construction. See Figure 3 (page 14) for a drawing depicting the locations of each zone.

Zone 1: Elliot Road and Facility Entrance Road.
Goal: Develop a visual buffer between the facility and Elliot Road.

Duke contracted with The Planning Center, a professional landscape-planning firm, to develop a landscape plan for the most visible portion of the site. The plan was designed to provide a visual buffer between the Facility and Elliot Road. This plan utilizes arid-adapted plant species to provide a naturalistic setting to the entrance of the Facility.

Table 2: Partial List of Landscape Plants

Trees	
White thorn acacia	Sweet acacia
Blue Palo Verde	Velvet Mesquite
Little leaf Palo Verde	Chilean Mesquite
Shrubs	
Four-wing Saltbush	Brittle bush
Creosote bush	Desert Marigold
Flattop Buckwheat	Globe Mallow
Accents	
Saguaro	Ocotillo
Desert Spoon	Red Yucca

The landscape plan (Figure 1) includes a 100'-wide swath of trees, shrubs and accent plants along the southern edge of Elliot Road and both sides of the entrance road to the Facility. The overall concept of the plan is to create a landscape that replicates a naturally occurring environment. Topography will rise in naturalistic

mounds and fall to valleys to create additional visual buffering and collect rainwater for passive irrigation. Groups of trees will be placed in the areas where they would be found naturally, that is in low areas where water collects. Heartier plants needing less water will be placed on the crest of berms. Plants will vary in height and texture to blend with adjacent plant communities. Accent plants will be utilized in key locations to provide additional visual appeal. Table 2 includes a partial list of plant species to be utilized in the landscaping effort. As one travels from Elliot Road along the entrance road to the Facility, the landscape will become less naturalized and take on a more structured appearance. A drip irrigation system will be installed and heavily utilized during plant establishment; irrigation requirements will decline once the plants are established.

Implementation of the landscape plan would begin in concert with construction of the facility.

Zone 2: Irrigated Agricultural Lands.
Goals: Reestablish arid adapted vegetation that is self-sustaining and representative of adjacent plant communities.
Minimize dust and tumbleweed production.

With the exception of approximately 50 acres of land that would be utilized by the University of Arizona for the study described below, current agricultural lands would remain in agriculture until the associated irrigation water is needed for operation of the facility. Keeping these lands in agriculture will ensure that the irrigation ditches and wells remain in good repair, prevent potential dust problems associated with recently retired farmland and minimize tumbleweed and salt cedar growth.

University of Arizona (U of A) Cooperative Project: Since no definitive methods are available for revegetation of retired farmland in Arizona, test plantings are the best way to determine which species and which planting methods are most adapted to the site and can be utilized with success. In cooperation with Duke and through funding to be established by Duke, the U of A is proposing a three-year study to evaluate the efficacy of a number of different techniques for large-scale revegetation of retired agricultural lands.

Preliminary Revegetation Research Plan
Prepared by Martin M. Karpiscak, Office of Arid Lands Studies, The University of Arizona

Ideally, the best method to prevent the problems associated with abandoned farmland is to use the existing infrastructure of active farms and establish a lasting cover as the last crop on the land. To some degree, traditional crop residues could act as a protective mulch for emerging seedlings, thus improving the chances of successfully establishing a stand and reducing the amount of irrigation water required for establishment of the desert-adapted climax plant community. Furrows remaining after the last commercial crop also may make it easier to apply irrigation during the revegetation process.

Plant Species and Establishment Techniques

The appropriate mixture of plant species will depend on the climate and soils of the site, and the intended use of the site. Observing the vegetation growing nearby allows preliminary determination of which plants are potential candidates for use in revegetation. This native vegetation has survived and responded to stresses imposed by climatic conditions, soils, and grazing and trampling by wildlife and livestock. A limitation to this approach is that these surrounding areas are typically degraded sites that do not contain all possible plant species that are adapted to the site. A further consideration is that the land's history of irrigation may have increased the soil salinity, making plant establishment difficult. Soil type is a critical factor in determining which species are adapted to the site. Typical climax species for the Arlington Valley site include:

Acacia	*Acacia constricts, Acacia greggi*
Bursage	*Ambrosia dumosa*
Creosote bush	*Larrea tridentata*
Palo Verde	*Cercidium floridium, Cercidium microphylla*
Saltbush	*Atriplex canescens, A. polycarpa, A. lentiformis*
Mesquite	*Prosopis juliflora*

A problem with direct seeding trees and shrubs is that seedlings are slow to start and can be at a severe disadvantage compared to containerized shrubs and trees as well as weeds. U of A researchers have successfully direct-seeded creosote bush and four-wing saltbush. On particularly severe sites, only trees and shrubs may be adapted. Transplanting containerized seedlings and applying irrigation is the most reliable method of establishing trees and shrubs, but it is also the most expensive.

Irrigation will be needed to keep the surface of the soil moist until seedlings are established. It may be possible to irrigate using existing furrows or water harvesting techniques. If containerized transplants are used it is vital that the soil be kept moist until roots grow from the root ball into the surrounding soil.

The constraints discussed above were considered when designing the U of A project. Accordingly, the study as currently proposed consists of two phases: Phase I would be a pilot project and Phase II would involve the application of lessons learned from Phase I.

Phase I: Phase I would consist of an approximately 50-acre test plot with different techniques utilized to grow arid adapted vegetation. Before any field planting will begin, it will be necessary to conduct soil surveys. Information is needed on the nutrient status of the soil as well as the presence or absence of a plow layer that may have to be deep-ripped to provide adequate access for deep-rooted plants.

Potential techniques to be evaluated during Phase I may include:

- No treatment (control)
- Surface rip
- Surface rip and seed
- Surface rip, seed and select planting (focused irrigation)
- Deep rip only
- Deep rip and seed
- Deep rip, seed and select transplanting (focused irrigation)
- Deep rip in catchment and berm for water harvesting; seed only
- Deep rip in catchment and berm for water harvesting; seed and select transplanting (focused irrigation)
- Land imprinting with no surface preparation
- Land imprinting with surface preparation and seeding
- Grade for water harvesting, seed and select transplanting (focused irrigation)

Limited flood irrigation, bubbler and drip irrigation would be used. The U of A estimates that approximately 50 AFY of water will be required for Phase I of the project. During the third and final year of Phase I, plants will be weaned from irrigation. Test plots would be developed in the fall or early spring to provide the greatest opportunities for plant survival.

Phase II: Ideally the pilot projects should be observed for a number of years to determine the long-term survivability of the species. However, preliminary observations of test plants after about one to two years of growth can be used to begin the revegetation process while continued observation will provide increased reliability. Therefore, when the pilots have been underway for 1½ years, the efficacy of the various processes investigated during the pilot will be evaluated. The U of A will identify the most successful processes and develop a plan for implementation of these processes on the currently farmed lands. Revegetation of the irrigated agricultural lands with arid-adapted vegetation will take place immediately following the cessation of agricultural activities on these fields.

Revegetation efforts will focus on providing a self-sustaining seed source that will propagate into adjacent open areas. By creating swaths of seed sources intermixed with fallow lands, Duke and the U of A hope to create an effective large-scale revegetation program that will gradually return this former agricultural land to beneficial desert communities. These efforts will result in plant communities that mimic adjacent plant communities; in other words, revegetation efforts will result in lands with vegetative cover densities comparable to natural communities. Limited irrigation of these swaths of arid-adapted plants will occur during their first three years in order to provide an opportunity for the plants to become well established. The U of A currently estimates that approximately one AFY of water will be required per acre of land revegetated. This estimate is subject to confirmation during the pilot. During the third year of irrigation, plants will be weaned from irrigation such that they will be able to survive on normal rainfall amounts.

Zone 3: Fallow agricultural lands.
Goal: Reestablish arid-adapted vegetation that is self-sustaining and representative of adjacent plant communities.

Due to soil crust currently established throughout Zone 3, dust and tumbleweed production should not become an issue unless these lands are disturbed. Since these lands are unlikely to change substantially without active management, Duke will revegetate these lands after arid-adapted vegetation is established on the recently irrigated agricultural lands. Revegetation efforts will utilize those processes identified during the U of A study as the most effective for the site. As in Zone 2, swaths of plants will be irrigated for three years in order to establish them and will establish seed sources throughout Zone 3. Duke anticipates that revegetation efforts will be completed within six years of construction of the facility.

Zone 4: Wildlife Habitat Management Area.
Goal: *Provide enhanced wildlife habitat in the project area.*

The Arizona Game and Fish Department (AGFD) is interested in partnering with Duke to provide enhanced wildlife habitat at the project site. AGFD staff who have toured the site have stated that the southern portion of the site, essentially those Duke lands south of the railroad line, offers tremendous opportunities for wildlife habitat enhancement. Accordingly, Duke has reserved this portion of the site for wildlife habitat enhancement activities to be identified by AGFD.

Duke and AGFD are currently investigating and considering the development of the following activities at the project area.

- **Waterfowl Habitat Enhancement:** AGFD is evaluating the potential for developing a Wetland Project on the project area. These activities would be designed to provide waterfowl habitat during migration.

  Initial scoping of the project site revealed opportunities to develop both seasonal moist soil units and permanent wetlands that would attract a variety of waterfowl and other birds. These activities would be located adjacent to the riparian areas of Centennial Wash. The size of the moist soil units and permanent wetlands is still under consideration and would be dependent upon water availability and other resource constraints. Due to the early stage of discussions between the interested parties, resource requirements and constraints are still unclear.

- **Wildlife food plots:** AGFD is evaluating options for establishing wildlife food plots to benefit a number of wildlife species including doves. The food plots would be developed in the upland portions of the wildlife management area.

Duke and AGFD recognize this project as an opportunity to develop a partnership between private, state, federal, and non-governmental organizations. AGFD has committed to work with Duke to identify specific wetland design, costs, management needs and potential partner organizations. There are numerous sources of both funding and tech-

nical assistance available to implement the activities identified above. Options currently under investigation include:

- **North American Wetlands Conservation Act (NAWCA).** The NAWCA program currently provides funding (up to 1 million dollars) to entities to achieve long-term wetland conservation. Funding is available at several levels.
- **Gila River Wetland Restoration Project**. This project, still in the conceptual phase, could seek the maximum funding amount of $1,000,000 from the NAWCA granting program. The Middle Gila River has been identified as a wetland focus area under the Intermountain West Joint Venture which is sanctioned by the North American Waterfowl Management Plan. The Arlington Valley Energy Project Wetland Project could become a component of this larger landscape project that could include additional partners such as Ducks Unlimited, Inc. As the NAWCA program looks favorably on projects with many partners, AGFD would seek additional partners for the project. It appears that a proposal could feasibly be developed and submitted for the August 2001 cycle.
- **Additional Partners:** Additional entities could be interested in participating in a project like this. Ducks Unlimited, Inc. has already expressed interest in learning more about the project. Additional partners that could be involved include the Audubon Society, the Natural Resources Conservation Service and others.

Duke and AGFD are excited about the potential opportunities to enhance wildlife habitat on portions of former agricultural lands. The resulting project would meet AGFD goals by establishing a productive wildlife management area. The project would also establish the area as a local recreational resource and further its use and enjoyment by the local community. Duke and AGFD recognize, however, that this concept will require additional efforts before it becomes a reality. Duke is committed to supporting this effort and making the project successful.

In the event that additional evaluation demonstrates that wildlife habitat management at the site is not feasible, Duke will implement the above described revegetation strategies on the remaining lands. This revegetation effort would commence after revegetation efforts in Zone 3 are complete. If this occurs, revegetation efforts would require an additional three years.

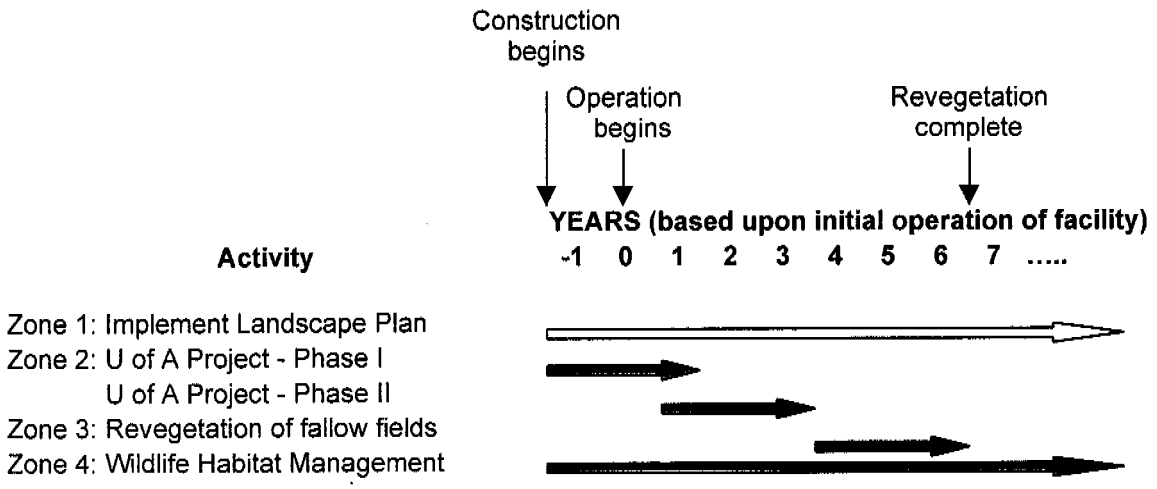
Zone 5: Centennial Wash.
Goal: Protect existing riparian vegetation

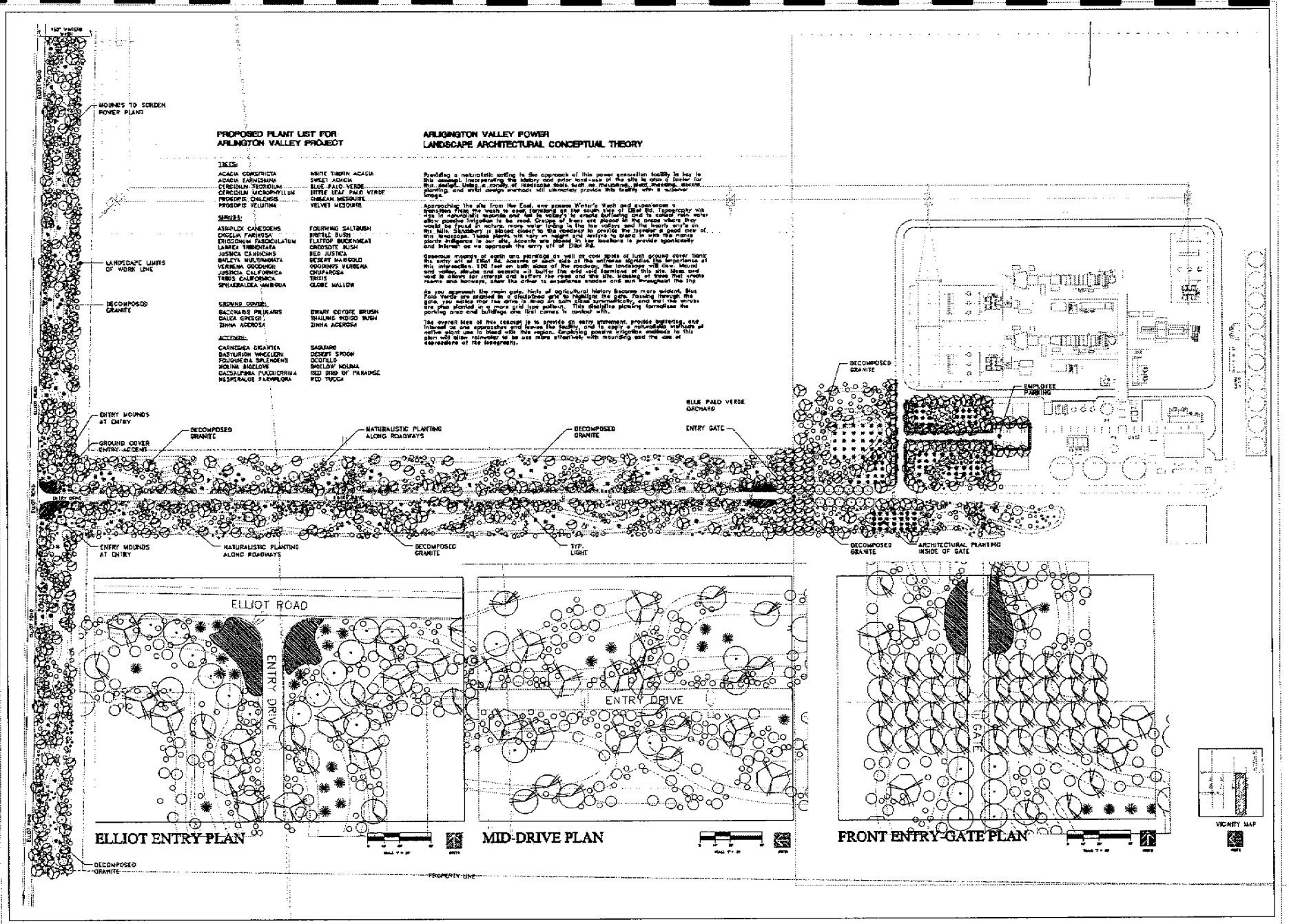
The project site contains only a small portion of land that has not been extensively managed for agricultural production. This area located in the southeastern portion of the site is in Centennial Wash and contains a functioning riparian ecosystem. Duke proposes to maintain this area in its current state.

CONCLUSION

The five activities outlined above provide an efficient process for managing Duke's Arlington Valley Energy Project site in such a way that provides numerous benefits to the community. This plan maximizes the effectiveness of revegetation efforts and provides enhanced wildlife habitat while minimizing dust, noxious weed growth and water use. In addition, the U of A study could lead to valuable knowledge that can be transferred from Duke's project to other reclamation efforts in Arizona.

Timeline for Implementation of Land Management Activities





Arlington Valley Energy
Duke Energy Maricopa, L.L.C.

Figure 1: Conceptual Landscape Plan

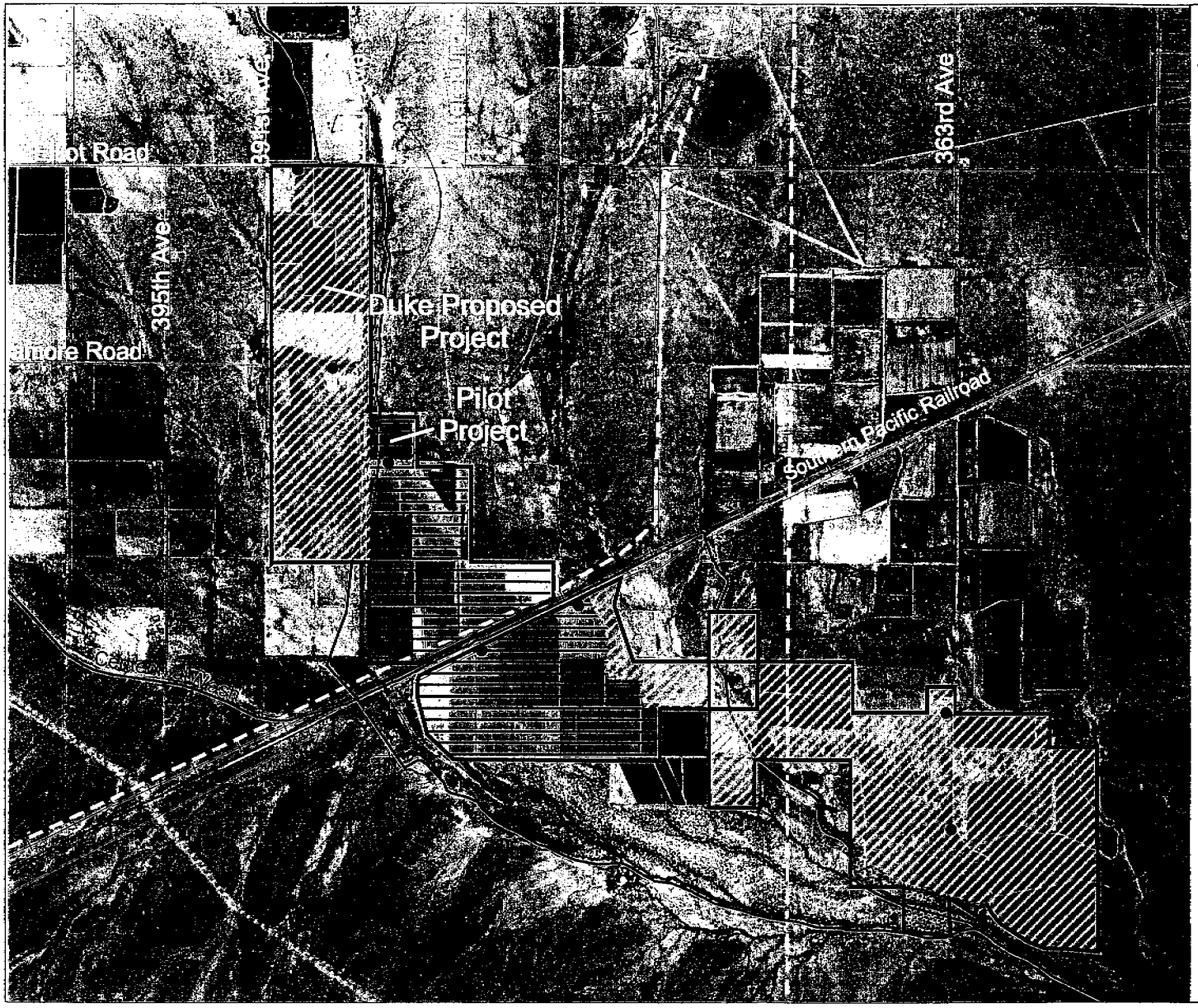


Figure 2
Arlington Valley Energy Project
Land Cover Classifications

LEGEND

- Proposed Arlington Valley Energy Project
- Duke Energy Property
- Streets
- Hydrographic Feature
- Existing Powerlines
- Natural Gas Pipeline
- Railroad
- Existing Production Wells

Land Cover

- Fallow Agricultural Lands
- Irrigated Agricultural Lands
- Sonoran Riparian

0 0.5 1
Miles

Note: All boundaries shown are approximate

Duke Energy
Arlington Valley Energy

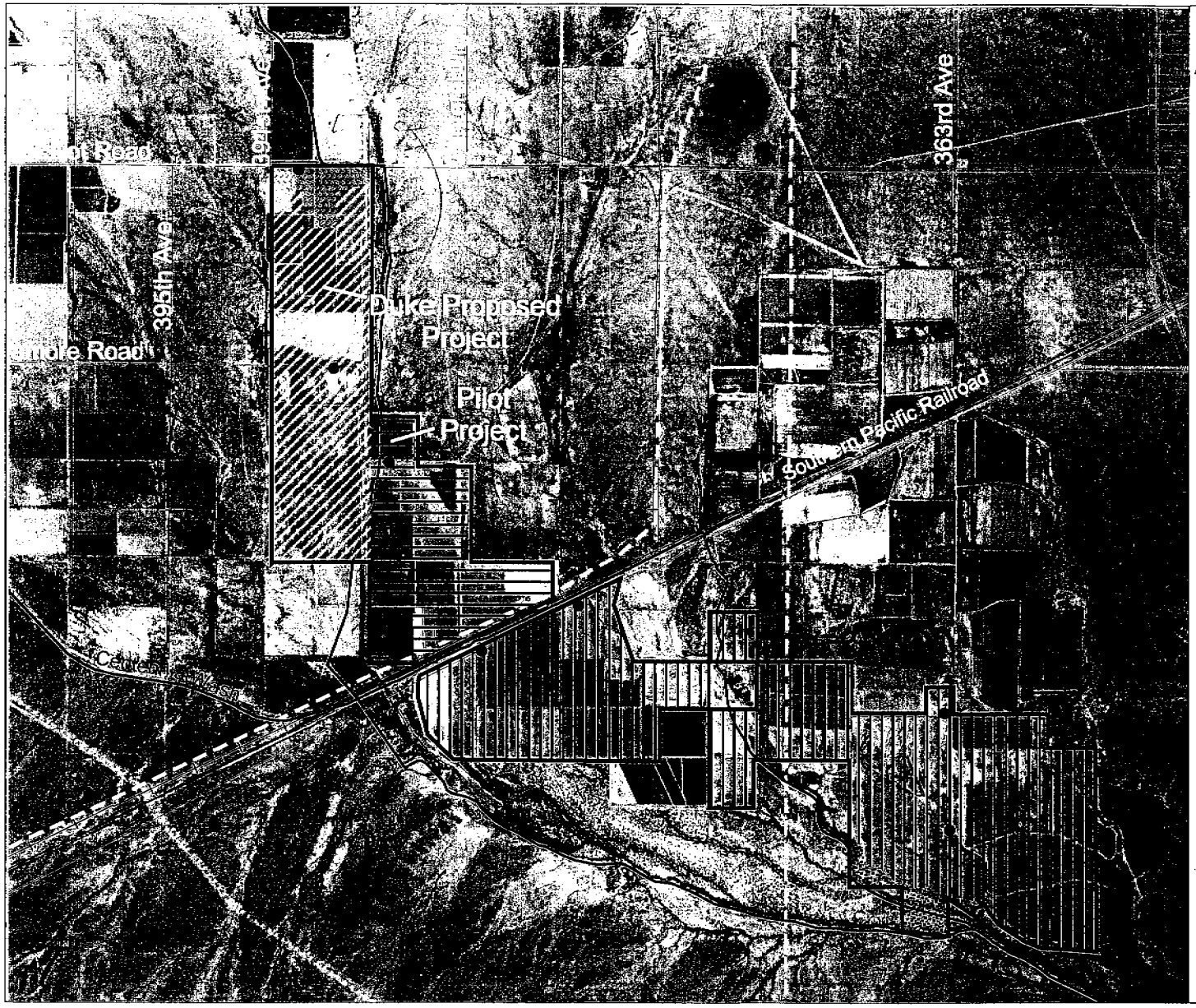


Figure 3
Arlington Valley Energy Project Site Vegetation Management Plan

LEGEND

- Proposed Arlington Valley Energy Project
- Duke Energy Property
- Streets
- Hydrographic Feature
- Existing Powerlines
- Natural Gas Pipeline
- Railroad
- Existing Production Wells

Management Zones

- Zone 1: Landscape Plan
- Zone 2: Irrigated Agricultural Lands
- Zone 3: Fallow Agricultural Lands
- Zone 4: Wildlife Habitat Management Area
- Zone 5: Sonoran Riparian

0 0.5 1
Miles

Note: All boundaries shown are approximate

Duke Energy
Arlington Valley Energy

ORIGINAL

DUKE ENERGY MARICOPA, LLC

Maricopa County, Arizona

SITING REPORT

FOR THE PROPOSED

DUKE ENERGY MARICOPA

525KV TRANSMISSION LINE

April 2000

Prepared for:

Duke Energy Maricopa, LLC
P. O. Box 1642
Houston, TX 77251-1642

Prepared by:

Duke Engineering and Services, Inc.
P. O. Box 1004
Charlotte, NC 28201-1004

DUKE ENERGY MARICOPA, LLC

Maricopa County, Arizona

SITING REPORT
FOR THE PROPOSED
DUKE ENERGY MARICOPA
525KV TRANSMISSION LINE

April 2000

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EXECUTIVE SUMMARY

Introduction

Electrical energy supply studies have concluded that additional electrical generation capacity must be added in the southwestern region of the United States to supply current and future demand for electrical energy. Duke Energy Maricopa, LLC, a Houston-based energy company, is responding to the demand for increased electrical energy by proposing the construction of a 580-megawatt combustion turbine electrical generation plant in the immediate vicinity of the Palo Verde Nuclear Plant *(Figure 1)* in western Maricopa County, Arizona.

The Duke Energy Maricopa 580-Megawatt Electrical Generation Plant's electrical capacity will be added to the region's existing electrical transmission network through a connection at the future Palo Verde South Switchyard. To make this connection, a new 525kV transmission line must be built. After applying its detailed siting methodology, as described in this report, Duke has determined that the most environmentally compatible location for this transmission line is along the southern edge of a road corridor (Elliot Road) that fronts the future plant and switchyard sites.

Duke Energy's siting methodology integrates environmental, engineering, real estate, socio-economic, and regulatory requirements and accounts for each throughout the siting effort—from a project's inception until its completion.

The Duke Energy Transmission Line Siting Process was first developed in 1989, after an in-depth review of both existing and emerging siting issues, technologies, industry-wide siting practices, and regulations affecting siting. Since then it has undergone continuous improvement to keep pace with changing technologies, community expectations, and regulatory requirements, keeping it the best siting process available.

Key attributes of the process are the following:

- Rational progression from global identification and consideration of all practical routing opportunities to a narrowing of candidate routes, based on quantifiable and objective data;
- A framework for making rational, objective routing decisions that are defensible and traceable;

- Integrated real estate, engineering, environmental, land-use, and regulatory considerations, at appropriate levels and times, throughout the siting process; and,
- Proactive identification of issues and appropriate consideration of those issues within the decision-making framework.

The following report documents how this process was implemented for this project and its findings.

Transmission Line Route Selection

The primary objective of Duke Energy's siting study methodology is to select a route that minimizes effects on environmental resources and land use. All viable routes must be explored.

The first step is to establish a siting study area—an area encompassing all of the area through which it would be practical to route a transmission line. The two factors primarily controlling the study area for this project were:

1. The location of the proposed Duke Energy Maricopa 580-Megawatt Electrical Generation Plant; and,
2. The location of the Palo Verde South Switchyard.

These fixed locations were determined prior to commencement of the transmission line siting study *(Figure 1)*.

Establishing a Siting Study Area: Generally, Duke Energy siting experts establish siting study area boundaries that are expanded sufficiently from a straight line between the fixed terminal points to eliminate any consideration of routes beyond the boundaries (in this case, the terminal points are the future generation plan and switchyard). Any line extending beyond the delineated area would increase the overall route length to such an extent that impacts would be unacceptable due to excessive line length and land acreage in the right-of-way when compared to alternate routes within the siting study area.

The siting study area for the Maricopa 525kV Transmission Line was generously expanded to include 16.3 square miles. The east to west straight-line distance between the proposed Duke Energy Maricopa 580-Megawatt Electrical Generation Plant and the Palo Verde

South Switchyard is 10,000 feet. The siting study area's northern boundary was set approximately 10,000 feet north of the straight line; the southern boundary is approximately 12,000 feet south of the straight line.

Other factors considered in establishing the Maricopa 525kV siting study area were two existing 525kV transmission lines—one north of Elliot Road and one south of Elliot Road, running parallel to the Southern Pacific Railroad. Duke Energy siting experts and engineers concluded that any new route should not cross these lines because of issues associated with reliability.

The east and west siting study area boundaries were each extended over one mile beyond the Duke Energy Maricopa 580-Megawatt Electrical Generation Plant and Palo Verde South Switchyard sites. Any new routes extended beyond these boundaries would require unnecessary doubling back to reach terminal points.

Data Collection and Entry Into A Computerized System: The next step in the siting process was to collect and manage any factors or data that would influence siting decisions. Aerial photographs, topographic maps, Geographic Information Systems (GIS) databases, field investigations, and agency contacts were used to gather information about land use, natural resources, development, and infrastructure in the siting study area. Land cover was modeled from satellite imagery, using remote sensing software and supplemented by field reconnaissance. During this data collection effort, the following federal, state, and local agencies were visited and consulted by the Duke Energy siting staff:

- Arizona Department of Game and Fish
- Arizona Department of Agriculture
- Maricopa County Tax Assessor
- Arizona State Historic Preservation Office
- Arizona Department of Transportation
- US Fish and Wildlife Service
- US Department of Agriculture - Natural Resources Conservation Service

Identification of Alternate Routes: Data gathered from these agencies, from the field investigations, and from aerial photography were entered into the GIS by the Duke Energy siting staff. The data were organized into six layers in the GIS, according to the type of data:

- Archaeological Sites and Historic Properties
- Hydrography
- Land Cover
- Land Use
- Occupied Buildings
- Flood Zones

These six data layers are mapped and included in this report (*Figures 2 through 7*). Duke Energy used these data in conjunction with in-field analyses to identify four alternate route corridors, Routes A, B, C and D, that avoid sensitive resources identified and mapped during the data collection effort (*Figure 8*).

Evaluation and Comparison of the Alternate Routes: After careful consideration of the information gathered during the siting study, Duke Energy developed five route evaluation categories and used them to compare the four alternate routes. These categories are:

- Land Cover Factors
- Cultural and Natural Resource Factors
- Flood Zone Factors
- Land Use Factors
- Occupied Building Factors

Within each category, criteria were selected to measure the potential impact of the line on the area and its resources. Duke Energy then quantified each criterion (e.g., acres of clearing, acres of clearing near riparian areas, number of archaeological sites within right-of-way, number of houses from 250-500 feet, etc.) for each alternate route.

Route A had the lowest overall environmental and land-use impacts of all the routes under consideration and was the only one of the four alternate routes to rank in the lowest impact range in all evaluation categories. It will minimize impacts to environmental resources and land use over the full array of factors.

Note that the Duke Energy Transmission Line Siting Process is designed to prevent any single factor from having an undue or artificial influence on siting decisions. The process accounts for all substantive factors affecting routing decisions and applies them in a fair, balanced way that evaluates each line route's potential effect on cumulative data, rather than singular data.

Selecting the Environmentally Preferred Route: Following the intensive evaluation and quantitative comparison of the routes, Route A was selected as the preferred route because of these key factors:

- It avoids bisecting the sensitive, high-quality riparian/short tree-scrub community along Winters Wash.
- It takes advantage of the existing Elliot Road corridor and thus avoids additional edge effect impacts and possible habitat fragmentation. Typically, natural resource agencies prefer to parallel existing corridors and thus reduce habitat and wildlife impacts. (*This assumption was substantiated in discussions with the Arizona Department of Game and Fish, which strongly prefers that the route be along Elliot Road.)*
- No transmission line structure will be required in any high-value riparian community.
- By paralleling the existing roadway corridor, access for construction and operation/maintenance can be developed from the existing road. This will minimize the loss to habitat and vegetation.
- Loss of native vegetation and soil disturbance will be minimal when compared to all other alternate routes.
- No active agricultural land is crossed by the route.
- No cultural resources will be affected.
- No 100-year flood zones will be impacted.
- No private or Arizona Public Trust Lands will be bisected. Rather, the line will cross the Arizona Public Trust Lands parallel and adjacent to the existing Elliot Road corridor. (*The Arizona Land Department has indicated, in conversations held after the study was completed*

and land-crossing applications were filed, that it, too, would prefer the corridor along Elliot Road.)

- Current plans call for developing the private land that will be crossed as an electrical generation facility. The corridor along the road is the only portion of this private land that will not be occupied by some part of the generating facility's infrastructure.

- Because of the relatively flat terrain, the absence of screening vegetation, and the existing corridors, the visual effects of Route A will be similar to those of the alternate routes considered.

Project Cost Estimate: Following the selection of Route A as the preferred route, Duke Energy's transmission line engineers prepared construction estimates for each of the alternate routes. The following table summarizes the cost estimate comparisons.

ESTIMATED COSTS *
OF THE PROPOSED 525KV TRANSMISSION LINE
BY ALTERNATIVE ROUTE

Route A	$672,000 / linear mile x 2.4 miles	=	$1,612,800**
Route B	$672,000 / linear mile x 2.4 miles	=	$1,612,800
Route C	$672,000 / linear mile x 3.4 miles	=	$2,284,800
Route D	$672,000 / linear mile x 5.8 miles	=	$3,897,600

* Estimated costs include all construction costs along alternate routes except right-of-way acquisition.

** Route A is the selected route based on the siting study results.

Final Route Selection: After careful consideration, Duke Energy selected Route A.

- Route A minimizes environmental impacts across the range of environmental issues considered; and,

- All indications are that Route A is preferred by directly affected property owners.

The Affected Environment

The proposed Duke Energy Maricopa transmission project consists of a new 525kV transmission line to connect the proposed combustion turbine plant to the proposed Palo Verde South 525kV substation. Duke Energy Maricopa's combustion turbine plant will be south of Elliot Road, approximately four miles due west of 355th Avenue, near the village of Arlington Station. The substation will be located just south of Elliot Road, approximately 2 miles west of 355th Avenue.

The project area can be characterized as rural, transitioning to light industrial land uses. The Palo Verde Nuclear Plant and its associated enclosed facility lands are north of Elliot Road and east of Wintersburg Road. Several agricultural parcels border the study area on the west, south, and east boundaries; they are associated with irrigated fields of alfalfa, cotton, and barley. Most of these agricultural parcels have been fallow for at least five years. The proposed plant site on Elliot Road is associated with a fallow cotton field. Most of the occupied buildings within the study area are associated with ranches in the agricultural areas. Several 525kV transmission line corridors, a Southern Pacific Railroad, and an El Paso Natural Gas pipeline are also found in the study area. The remaining portions of the study area consist of Sonoran Desert natural communities (*Figure 3*).

The study area is situated in western Maricopa County, at the northeastern end of the Tonopah Desert (a division of the Sonoran Desert), west of the Hassayampa Plain and immediately south of the Palo Verde Hills. Like other portions of the Sonoran Desert, the area is a relatively flat plain, with elevations ranging from 850 feet along the Southern Pacific Railroad to approximately 1,240 feet at the summit of the isolated buttes.

Several ephemeral washes (arroyos) are found within the study area. Winters Wash, approximately 1.6 miles east of the western boundary, originates in the Palo Verde Hills and eventually terminates at Centennial Wash. Centennial is a very large wash located at the extreme southwestern boundary of the study area; it eventually drains into the Gila River. A small, unnamed wash in the central part of the study area eventually feeds Centennial Wash. There are no permanent watercourses within the study area.

State and federal records list no rare, threatened or endangered plant or wildlife species in the project area. State records list one historic site and five archaeological sites in the study area. None of the sites will be affected by the project.

Environmental Consequences of the Proposed Action

The proposed 525kV transmission line will have no significant long-term effects on the environment of the study area. The route minimizes impacts to environmental resources, land use, and aesthetics. No known threatened or endangered species or historic and archaeological resources will be affected by the project. The proposed transmission line will span locally important habitats, such as the riparian zone margins. The project will not be in a designated 100-year floodplain. Minor land clearing (e.g., of creosotebush scrub) will be required only at the specific structure locations.

Duke Energy Maricopa, LLC, will take appropriate measures to prevent construction-related short-term impacts (e.g., erosion and sedimentation) to the ephemeral washes. Any washes crossed by the proposed transmission line will be spanned. Due to the terrain and the low-growing natural communities, clearing will be required at the tower sites only, and that will be minimal. Because the transmission corridor is adjacent to Elliot Road, no access road construction will be necessary. All necessary state and federal requirements and permits associated with environmental protection will be obtained before construction begins.

1.0 INTRODUCTION

Duke Energy Maricopa, LLC, a Duke Energy Company, is headquartered in Houston, Texas. Duke Energy Maricopa is a domestic power developer and unregulated electric generation operator for Duke Energy.

Electrical energy supply studies have concluded that additional electrical generation capacity must be added in the southwestern region of the United States to supply current and future demand for electrical energy. In response to that need, Duke Energy Maricopa is proposing that a 580-megawatt combustion turbine electrical generation plant be constructed approximately 3 miles south of the Palo Verde Nuclear Plant in western Maricopa County, Arizona *(Figure 1)*. The Duke Energy Maricopa 580-Megawatt Electrical Generation Plant's electrical capacity will be added to the existing electrical transmission network in the region through a connection at the future Palo Verde South Switchyard.

This report documents the siting study that led to the selection of a 2.4-mile route for the 525kV transmission line that will connect the Duke Energy Maricopa plant to the switchyard.

2.0 FACILITY DESCRIPTION

2.1 Facility Description

The Duke Energy Maricopa project involves building a proposed 525kV transmission line to connect the proposed combustion turbine plant to the proposed Palo Verde South 525kV substation. The transmission line will originate at Duke Energy Maricopa's 580-Megawatt Electrical Generation Plant south of Elliot Road, approximately 0.7 miles due west of 383rd Avenue (Wintersburg Road). It will terminate at the substation, just south of Elliot Road, approximately 2 miles west of 355th Avenue.

The project is located in western Maricopa County, Township 1S, Range 6W (Sections 1-24, 27-30). The USGS 7.5-minute topographic quadrangles Gillespie and Arlington are associated with the project area.

The proposed 525kV transmission line will be 2.4 miles long. From its connection at the proposed plant, it will run north approximately 1,900 feet to a point approximately 355 feet south of Elliot Road, then turns east towards the proposed switchyard. From that point it will run approximately 10,000 feet (roughly parallel with Elliot Road) to the future Palo Verde South Switchyard.

The transmission line will utilize 525kV, single-circuit steel lattice structures consisting of direct-embedded foundations (i.e., grillage depth of 10 feet) (*Figure 9*) supporting 2,515 KCM 76/19 ACSR conductors. Suspension insulator strings will be used to support each conductor. The typical structure height will be 117 feet, as shown in the structure diagram *(Figure 9)*. The ruling span (structure spacing) for this type of construction is 1,300 feet. Minimum conductor clearance over open ground will be 45 feet.

The line's design will meet or exceed all requirements of the National Electrical Safety Code in effect at the time of construction. The transmission line will connect directly to the appropriate bay at the proposed substation. The proposed right-of-way width for this line will be 200 feet.

3.0 PURPOSE AND NEED FOR THE PROJECT

Electrical energy supply studies have concluded that additional electrical generation capacity must be added in the southwestern region of the United States to supply current and future demand for electrical energy.

The Duke Energy Maricopa 580-Megawatt Generation project is proposed as a result of the region's need for additional electrical generation capacity. The 580 megawatts of generated electrical capacity will be transported throughout the region on the existing network of high-voltage electrical transmission lines from the interconnection point at the Palo Verde South Switchyard. The proposed Duke Energy Maricopa 525kV Transmission Line will connect the 580 megawatt generation station to the Palo Verde South Switchyard.

4.0 ALTERNATIVES

4.1 Alternative Transmission Line Routes

The primary objective of Duke Energy's siting study methodology is to select a route that minimizes effects on environmental resources and land use. All viable routes must be explored.

The first step in accomplishing this is to establish a study area encompassing all of the area through which it would be practical to route a transmission line. The two factors primarily controlling the study area for this project were:

1. The location of the proposed Duke Energy Maricopa 580-megawatt electrical generation plant; and,
2. The location of the Palo Verde South Switchyard.

These fixed locations had been determined prior to commencement of the transmission line siting study *(Figure 1)*.

Establishing a Siting Study Area: Generally, Duke Energy siting experts establish siting study area boundaries that are expanded sufficiently from a straight line between the fixed terminal points to eliminate any consideration of routes beyond the boundaries. Any line extending beyond the delineated area would increase the overall route length to such an extent that impacts would be unacceptable due to excessive line length and land acreage in the right-of-way when compared to alternate routes within the siting study area.

The siting study area for the Maricopa 525kV Transmission Line was generously expanded to include 16.3 square miles. The east to west straight-line distance between the proposed Duke Energy Maricopa Electrical Generation Plant and the Palo Verde Switchyard is 10,000 feet. The siting study area's northern boundary was set approximately 10,000 feet north of the straight line; the southern boundary is approximately 12,000 feet south of the straight line.

The east and west siting study area boundaries were each extended over one mile beyond the Duke Energy Maricopa Generation Plant and Palo Verde South Switchyard sites. Any new

routes extended to these boundaries would require unnecessary doubling back to reach terminal points.

Data Collection and Entry Into A Computerized System: The next step in the siting process was to identify and record any factors or data that might influence siting decisions. Aerial photographs, topographic maps, Geographic Information Systems (GIS) databases, field investigations, and agency contacts were used to gather information about land use, natural resources, development, and infrastructure in the siting study area. Land cover was modeled from satellite imagery, using remote sensing software and supplemented by field reconnaissance.

During this data collection effort, the following federal, state, and local agencies were visited and consulted by the Duke Energy siting staff:

- Arizona Department of Game and Fish
- Arizona Department of Agriculture
- Maricopa County Tax Assessor
- Arizona State Historic Preservation Office
- Arizona Department of Transportation
- US Fish and Wildlife Service
- US Department of Agriculture - Natural Resources Conservation Service

Identification of Alternate Routes: Data gathered from these agencies, from the field investigations, and from the remote sensing techniques were entered into the GIS by the Duke Energy siting staff. The data were organized into six layers in the GIS, according to the type of data:

- Archaeological Sites and Historic Properties
- Hydrography
- Land Cover
- Land Use
- Occupied Buildings
- Flood Zones

These six data layers are mapped and included in this report (*Figures 2 through 7*). Duke Energy used these data in conjunction with in-field analyses to identify four alternate route corridors, Routes A, B, C and D, that avoid sensitive resources identified and mapped during the data collection effort (*Figure 8*). A physical characterization of the alternate routes follows.

- **Route A** – Length: 2.4 miles. Acres in the right-of-way: 57.0. This alternative exits the proposed Duke Energy Maricopa Generation Plant and runs due north approximately 1,900 feet to a point 355 feet south of Elliot Road. It then turns 90 degrees east and parallels the south side of Elliot Road for approximately 8,800 feet. It then turns 12 degrees to the south and runs southeast for 650 feet before turning 12 degrees to the east and continuing in that direction for 1500 feet to the terminus at the proposed Palo Verde South Switchyard. This 2.4-mile route spans Winters Wash, an unnamed wash, and a Southern Pacific Railroad spur. The current land ownership of this alternative is as follows: Duke Energy Maricopa, 21

percent (12.2 Acres); Arizona State Trust Lands, 43 percent (24.2 Acres); private ownership, 36 percent (20.6 Acres).

- **Route B** – Length: 2.4 miles. Acres in the right-of-way: 56.6. This alternative exits the Duke Energy Maricopa Generation Plant and runs north approximately 320 feet before turning 90 degrees and proceeding east for approximately 6,030 feet. The route then turns north for approximately 1570 feet before it turns 90 degrees east at a point 355 feet south of Elliot Road, and runs 2750 feet roughly parallel with Elliot Road. It then turns 12 degrees to the south and runs southeast for 650 feet before turning 12 degrees to the east and continuing in that direction for 1500 feet to the terminus at the proposed Palo Verde South Switchyard. This 2.4-mile route spans Winters Wash, the unnamed wash, and the railroad spur. The current land ownership of this alternative is as follows: Duke Energy Maricopa, 9 percent (5.0 Acres); Arizona State Trust Lands, 55 percent (31.0 Acres); private ownership, 36 percent (20.6 Acres).

- **Route C** – Length: 3.4 miles. Acres in the right-of-way: 78.0. This route exits the Duke Energy Maricopa Generation Plant and proceeds south 1,500 feet before turning 30 degrees southeast and proceeding another 960 feet. The route then turns 60 degrees and proceeds east for 5,470 feet. The route then turns 90 degrees and runs due north for 4840 feet, to a point 355 feet south of Elliot Road. It then turns 90 degrees east again and runs 2,750 feet, roughly parallel with Elliot Road. It then turns 12 degrees to the south and runs southeast for 650 feet before turning 12 degrees to the east and continuing in that direction for 1500 feet to the terminus at the proposed Palo Verde South Switchyard. This 3.4-mile route also spans Winters Wash, the unnamed wash, and the railroad spur. The current land ownership of this alternative is as follows: Duke Energy Maricopa, 15 percent (12.0 Acres); Arizona State Trust Lands, 58 percent (45.4 Acres); private ownership, 27 percent (20.6 Acres).

- **Route D** - Length: 5.8 miles. Acres in the right-of-way: 135.8. This route exits the Duke Energy Maricopa Generation Plant and runs 1,500 feet due south before turning 32 degrees southeast and running another 950 feet. It then turns 32 degrees and proceeds due south again for approximately 4,500 feet. The route then turns 28 degrees southeast and proceeds 3,740 feet before turning 88 degrees and running northeast for 4,340 feet, parallel to an existing 525kV line and the Southern Pacific Railroad. It then turns 62 degrees and proceeds

north for 5,250 feet. It then turns 13 degrees and runs north-northeast for 950 feet before turning back 12 degrees to the north and proceeding due north for 4,500 feet to a point 355 feet south of Elliot Road. It then turns 90 degrees east and runs 2,750 feet parallel with Elliot Road. It then turns 12 degrees to the south and runs southeast for 650 feet before turning 12 degrees to the east and running in that direction for 1500 feet to the terminus at the proposed Palo Verde South Switchyard. This 5.8-mile alternative also spans Winters Wash and the railroad spur. It bisects the unnamed wash. The current land ownership of this alternative is as follows: Duke Energy Maricopa, 49 percent (66.2 Acres); Arizona State Trust Lands, 33 percent (45.2 Acres); private ownership, 18 percent (24.4 Acres).

Evaluation and Comparison of the Alternate Routes: After carefully considering the information gathered during the siting study, Duke Energy siting staff developed five route evaluation categories and used them to compare the four alternate routes quantitatively. These categories are:

- Land Cover Factors
- Cultural and Natural Resource Factors
- Flood Zone Factors
- Land Use Factors
- Occupied Building Factors

Within each category, criteria were selected to measure the potential impact of the line on the area and its resources. Duke Energy then quantified each criterion (e.g., acres of clearing, acres of clearing near riparian areas, number of archaeological sites within right-of-way, number of houses from 250-500 feet, etc.) for each alternate route.

Route A had the lowest overall environmental and land-use impacts of all the routes under consideration; and it was the only one of the four alternate routes to rank in the lowest impact range in all evaluation categories. It will minimize impacts to natural resources and land use over the full array of factors that were considered in the siting study.

Note that the Duke Energy Transmission Line Siting Process is designed to prevent any single factor from having an undue or artificial influence on siting decisions. It accounts for all

substantive factors affecting routing decisions and applies them in a fair, balanced way that evaluates each route's potential effect on cumulative data, rather than singular data.

Following is a comparison of the alternate routes in each of the evaluation categories:

1. Land Cover Factors Category

From the standpoint of habitat value, the following communities are ranked according to overall wildlife use, relative frequency of habitat, vegetative diversity, and wildlife diversity. The list goes from most important to least important.

- **Sonoran Riparian/Short Tree and Scrub** (e.g., Winters Wash and an unnamed wash area): Uncommon habitat, high vegetation diversity, and highly important for food, cover, and water.

- **Sonoran Creosotebush Scrub** (e.g., siting study area interior): A common natural community.

- **Active Agriculture** (e.g., currently in production as alfalfa, etc.): Irrigated, with surface water availability; some wildlife importance.

- **Fallow Agriculture** (specifically, the Duke Energy Maricopa Generation Plant site, an old cotton field now covered with non-native weed species): Value as wildlife habitat is relatively poor.

- **Current Industrial Land** (specifically, Palo Verde Nuclear Generating Station).

<u>Route A</u>

- It avoids bisecting the sensitive, high-quality riparian/short tree-scrub community along Winters Wash.

- It takes advantage of the existing Elliot Road corridor and thus avoids additional edge-effect impacts and possible habitat fragmentation. Typically, natural resource agencies prefer to parallel existing corridors and thus reduce habitat and wildlife impacts.

- No structures are required in the high-value riparian community of Winters Wash. The community will be spanned along its natural edge at Elliot Road.

- By paralleling the existing road corridor, access for construction and operation/maintenance can be developed from the existing road. This will minimize the loss to habitat and vegetation.

- Loss of native vegetation in the natural communities will be limited to the immediate area around structures. Soil disturbance will be minimal.

- No active agricultural land is crossed by the route.

Route B

- It bisects the high-quality riparian community along Winters Wash.

- Habitat fragmentation is unavoidable.

- No structures are required in the high-value riparian community of Winters Wash. It will be spanned.

- Access to structures for construction and operation/maintenance will have to be through natural desert communities, either off Elliot Road or along the transmission line right-of-way.

- Compared to Route A, there will be both a greater loss of native vegetation and an increased soil disturbance because of structure placement and access road construction.

- No active agricultural is land crossed by the route.

Route C

- It bisects two high-quality riparian communities along Winters Wash and the unnamed wash.

- Habitat fragmentation will occur.

- Structure placement in the unnamed wash community is unavoidable; an angle tower must be placed in the wash.

- Construction and operation/maintenance access to structures will have to be through natural desert communities, either off Elliot Road or along the transmission line right-of-way.

- Compared to Route A the loss of native vegetation will be greater, and there will be increased soil disturbance, due to both structure placement and access roads.

- There is an increase of overall habitat impacts because of its increased length over Routes A and B.

- No active agricultural land is crossed by the route.

Route D

- It not only bisects a high-quality riparian community (the unnamed wash) it would also require that several structures be placed in it.

- Habitat fragmentation will occur.

- Access to structures for construction and operation/maintenance will have to be through natural desert communities.

- It involves the greatest loss of native vegetation and the most soil disturbance, due to both structure placement and access roads.

- There is an increase of overall habitat impacts because of its increased length over Routes A, B, and C.

- Active agricultural lands are crossed by the route.

- It is located within fallow agricultural lands through the first portion of the route.

- It follows an existing 525kV corridor for a portion of the route.

2. Cultural and Natural Resource Factors Category

Routes A, B, C, and D

No known cultural resources (archaeological or historic) are affected.

3. Flood Zone Factors Category

Routes A, B, and C

There are no 100-year flood zone encroachments.

Route D

There are 100-year flood zone encroachments along 35% of the route.

4. Land Use Factors Category

Route A

Arizona Public Trust lands are not bisected because of this route's paralleling of Elliot Road. The route's effect on the future highest and best use of the property in the immediate vicinity will be minimal. (At the time that this report is being finalized, the Arizona Land Department has distributed the application for right-of-way easement for agency comment. Conversations with the department indicate that the route along Elliot Road is the route most favored by agencies and the Arizona Land Department.)

The land immediately to the east of the Public Trust Lands is being developed as an electrical generating facility. Based on preliminary plans, the only part of this tract that is not being used for the generating facility (and therefore is available for use) is a 400-foot strip along Elliot Road.

Route B

Arizona Public Trust lands are bisected by the route. It may have a limiting effect on the highest and best use of property in the vicinity of the project (i.e., large industrial-use tracts). Also, because of the development of the adjoining tract to the east, this route will need to turn north along the eastern border of the Public Trust Land before again turning east along Elliot Road.

The land immediately to the east of the Public Trust Lands is being developed as an electrical generating facility. Based on preliminary plans, the only part of this tract that is not being used for the generating facility (and therefore is available for use) is a 400-foot strip along Elliot Road.

Route C

Arizona Public Trust lands are not bisected by this route, but a corridor would be required along the southern and eastern edges of the property to reach the only possible crossing of the private property described in Route A.

Route D

Arizona Public Trust lands are not bisected by this route, but a corridor will be required along the western edge of Section 22, TS1, R6W, and the eastern edge of Section 16, TS1, R6W, to reach the private property crossing described in Route A. The section of the route along the western edge of Section 22 will introduce a new, separate utility corridor between the Public Trust land and one of the few private properties that is not being developed as an electrical generating facility. It may have a limiting effect on the highest and best use of the property of the project (i.e., large industrial use tracts).

5. Occupied Buildings Category

Routes A, B, C and D

The siting study evaluation and comparison of the routes screened for occupied buildings within 500 feet of each route. There are no buildings within this distance on any of the alternative routes; thus none of the routes will effect occupied buildings.

Visibility: It is noteworthy that visual effects are often considered in the evaluation of alternate routes. The visual implications of substations and transmission lines are influenced by several factors:

- the distance from the viewer to the facility
- the number of structures viewed
- whether visible structures are seen against backdrops (vegetation, terrain, or man-made elements) or silhouetted against the skyline
- the amount of vegetative modification that contrasts with surrounding landscapes
- the overall scenic condition (landscape content or context) of the area in which the line structures will be seen.

A Duke Energy landscape architect with extensive experience in assessing the visual implications of transmission line projects carefully considered the potential visibility of the Maricopa 525kV Transmission Line and reached the following conclusions:

1. The landscape content of the area is already highly modified by utility facilities. The Palo Verde Nuclear Plant is located in the immediate project vicinity (approximately 3 miles northeast of the future Duke Energy Maricopa Generation Plant) and is connected to the region's transmission grid via numerous transmission lines. A major railroad line runs through the area, and rail spur lines extend to the Palo Verde Plant. The visual effects of a new line anywhere within the siting study area will be significantly mitigated by the existing landscape content.

2. There are no vegetative or topographic elements or features in the area that present an opportunity to develop an alternate route that takes advantage of natural screening--either foreground or background. A line located in any portion of the siting study area will be as recognizable as new lines located in other portions of the siting study area. A new line located anywhere in the siting study area will be silhouetted against the skyline from all primary viewpoints (roadways or occupied buildings). The screening afforded by vegetation over any route in the siting study area will be virtually the same.

3. The position of the future Palo Verde South Switchyard, Duke Energy Maricopa Generation Plant, and other proposed electrical generating infrastructure will be adjacent to Elliot Road. These additions will significantly add to the current landscape content of an area that is already marked by utility facilities. The Duke Energy Maricopa plant and Palo Verde South Switchyard will be approximately 10,000 feet apart; other electrical facilities are planned for the area between the two. As motorists travel along Elliot Road, their visual recognition of one facility will diminish only somewhat before their visual recognition of the next facility increases. Consequently, the area along Elliot Road on either side of the switchyard and plant and the distance between them will be significantly characterized by electrical utility facilities. This developing landscape content factor will mitigate the visual effect of a future transmission line viewed from

Elliot Road, including a line closely parallel to Elliot Road and running between the two future facilities.

4. A new line in any location in the siting study area will pose no change in visual conditions to any residences, schools, churches, parks, recreation facilities, hospitals, nursing homes, public facilities, cemeteries, unique scenic features, or commercial facilities.

Selecting the Environmentally Preferred Route: Following the intensive evaluation and quantitative comparison of the routes, Route A was selected as the preferred route because of these key factors:

- Loss of native vegetation and soil disturbance will be minimal when compared to all other alternate routes.
- It avoids bisecting the sensitive, high-quality riparian/short tree-scrub community along Winters Wash.
- It takes advantage of the existing Elliot Road corridor and thus avoids additional edge-effect impacts and possible habitat fragmentation. Typically, natural resource agencies prefer to parallel existing corridors and thus reduce habitat and wildlife impacts.
- No structures are required in the high-value riparian community of Winters Wash. The community will be spanned along its natural edge at Elliot Road.
- By paralleling the existing road corridor, access for construction and operation/maintenance can be developed from the existing road. This will minimize the loss to habitat and vegetation.
- Loss of native vegetation in the natural communities will be limited to the immediate area around structures. Soil disturbance will be minimal.
- No active agricultural land is crossed by the route.
- No cultural resources will be affected.

- No 100-year flood zones will be impacted.
- No private or Arizona Public Trust Lands will be bisected.
- Because of the relatively flat terrain, the absence of screening vegetation and the existing corridors, the visual effects of Route A will be similar to those of the other alternate routes considered.

Project Cost Estimate: Following the selection of Route A as the preferred route, Duke Energy's transmission line engineers estimated construction costs for each of the alternate routes considered. The following table summarizes those cost estimates.

ESTIMATED COSTS *
OF THE PROPOSED 525KV TRANSMISSION LINE
BY ALTERNATIVE ROUTE

Route A	$672,000 / linear mile x 2.4 miles	=	$1,612,800**
Route B	$672,000 / linear mile x 2.4 miles	=	$1,612,800
Route C	$672,000 / linear mile x 3.4 miles	=	$2,284,800
Route D	$672,000 / linear mile x 5.8 miles	=	$3,897,600

* Estimated costs include all construction costs except right-of-way acquisition.

** Route A is the selected route, based on the siting study results.

Final Route Selection: After careful consideration, Duke Energy Maricopa selected Route A.

- Route A minimizes environmental impacts across the range of environmental issues considered; and,
- All indications are that Route A is preferred by directly affected property owners.

5.0 THE AFFECTED ENVIRONMENT

Duke Energy Maricopa compiled information on the affected environment by conducting a literature review, interpreting aerial photography, contacting resource agencies, and performing a field inventory of the project study area. The GIS was used to manage, analyze, and model the data. This process provided a quantitative description of the existing environment, which was used in the subsequent comparison of the environmental consequences of the alternative transmission line routes.

The proposed 525kV transmission line runs generally in an easterly direction from the proposed combustion turbine plant along Elliot Road (i.e., just west of Winters Wash) and terminates at the proposed Palo Verde South substation, approximately 2 miles west of 355th Avenue.

5.1 Land Use

The project area can be characterized as rural, transitioning to light industrial land uses. The Palo Verde Nuclear Plant and its associated fenced-off facility lands are located north of Elliot Road and east of Wintersburg Road. There are several irrigated agricultural parcels associated with fields of alfalfa, cotton, and barley that border the study area on the west, south, and east boundaries. Most of these agricultural parcels have been fallow for at least five years. The proposed plant site along Elliot Road is associated with a fallow cotton field. Most of the occupied buildings within the study area consist of farmhouses or small ranches associated with the irrigated fields. Several 525kV transmission line corridors, a Southern Pacific Railroad mainline corridor and its spur to the nuclear plant, and an El Paso Natural Gas pipeline are also in the study area. The remaining portions of the study area consist of Sonoran Desert natural communities. Several additional facilities associated with the generation and distribution of electrical energy are planned for the area.

Land ownership is divided among Arizona State Trust Lands, private ownership, and utility-owned lands (i.e., Palo Verde Nuclear Plant, Duke Energy Maricopa, SEMPRA Energy, and Pinnacle West Energy). Figures 2, 3, and 4 display land use, land cover, and occupied buildings in the study area.

5.2 Topography

The study area is situated in western Maricopa County, at the northeastern end of the Tonopah Desert (a division of the Sonoran Desert), west of the Hassayampa Plain and immediately south-southeast of the Palo Verde Hills. Much like other portions of the Sonoran Desert, the study area is a relatively flat plain, with elevations ranging from 850 feet along the Southern Pacific Railroad to approximately 1,240 feet at the summit of the isolated buttes.

Several ephemeral washes (arroyos) are found within the study area. Winters Wash, approximately 1.6 miles east of the western boundary, originates in the Palo Verde Hills and eventually terminates at Centennial Wash. Centennial is a very large wash located at the extreme southwestern boundary of the study area; it eventually drains into the Gila River. An unnamed wash is located in the central part of the study area and eventually feeds Centennial Wash. There are no permanent watercourses within the study area.

5.3 Geology and Soils

The underlying geology of the study area is primarily igneous and metamorphic rock consisting of granite-gneiss, schist, rhyolite, basalt, and limestone. The study area is characterized by three distinct soil associations (USDA 1977). The first association includes those soils formed in recent alluvium, such as Gilman loam and Gilman fine sandy loam. These soils are found on the broad, flat valley plains and low wash terraces, such as those along Winters Wash and the associated agricultural areas. Alluvium is classified as unconsolidated gravels, sand, silt, and clay deposited by streams.

The second association, which is classified as old alluvium, includes the majority of the soils found in the study area. Soils (such as the Gunsight-Rillito complex, the Laveen series, and the Harqua series) consist of nearly level sandy and gravelly loams on old alluvial fans and valley plains. These soils tend to be strongly limey or alkaline and saline.

The third and most uncommon soil type in the study area consists of those associated with rock outcrops and isolated buttes. Cherioni soils, found on the low buttes, are very gravelly loams about 11 inches deep, which typically have an indurated or cemented hardpan about 7 inches thick over bedrock. Basalt boulders are common in these areas.

5.4 Surface Water Hydrology

The mean annual precipitation in the study area is approximately 7.5 inches (USDA 1977). Most of this rainfall is associated with summer thunderstorms that often cause flash flooding in the washes and shallow sheet flow over most of the study area.

There are no permanent, natural watercourses within the study area. Several ephemeral washes are found there (*Figures 1* and *3*). Winters Wash, located east of the western boundary, originates in the Palo Verde Hills and eventually terminates at Centennial Wash. Centennial is a very large wash located at the extreme southwestern boundary of the study area; it eventually drains into the Gila River. An unnamed wash is located in the central part of the study area (i.e., due south of the nuclear plant) and eventually feeds Centennial Wash. The riparian areas (with more diverse vegetation) are typically associated with the margins of these washes.

The agricultural areas found within the study area are sustained by a series of surface irrigation canals, ditches, and deep groundwater wells. There are no jurisdictional wetland areas within the study area, as determined by the National Wetland Inventory maps or subsequent field reconnaissance.

Federal Emergency Management Agency National Flood Insurance Program maps indicate that the majority of the study area is outside the 100-year floodplain. Most of the study area is designated as Zone X (areas within the 500-year flood zone). The only 100-year flood zone in the study area is associated with Centennial Wash, along the extreme southwestern boundary (*Figure 6*). Route D, in the extreme southern portion of the study area, is the only alternative route in a 100-year flood zone, with approximately 9,000 linear feet located there.

5.5 Land Cover

An inventory of land cover was made through aerial photography, existing GIS sources, and field investigations (*Figure 3*). The area is mostly rural, consisting of fallow agricultural fields that were once irrigated, Sonoran creosotebush scrub, and Sonoran riparian/leguminous short-tree scrub. The current industrial development is associated entirely with the Palo Verde Nuclear Plant along the north-central edge of the study area. More industrial development is planned for the near future. Scattered single-home residential development (i.e., five farms and ranches) is found around the Elliot Road and Narramore Road corridors. The Southern Pacific

railroad corridor is situated along the south boundary of the study area. A railroad spur to the nuclear plant and several 525kV transmission line corridors bisect the study area.

The vegetative communities that are found along the proposed transmission line rights-of-way and at the proposed substation site include fallow irrigated agricultural areas, Sonoran creosotebush scrub, and Sonoran riparian/leguminous short tree scrub. The Sonoran scrub communities are ecological components of the larger Lower Colorado River Sonoran Desert Scrub Natural Community.

The Sonoran creosotebush scrub community is the most common natural community in the study area. It is typically associated with nearly level and coalescing alluvial fans (i.e., bajada) and valley plains. Soils in this community are typically alkaline and saline sandy loams, loams, and clay loams such as the Laveen series. The dominant plants in this community include creosotebush (*Larrea tridentata*), four-wing saltbush (*Atriplex canescens*), and triangle bursage (*Ambrosia deltoidea*). The only cactus species observed in the lower elevations (i.e., alluvial fans) are found along the extreme eastern edge of the study area. Documented species include widely scattered teddybear cholla (*Opuntia bigelovii*) and buckhorn cholla (*O. acanthocarpa*). A representative area of this creosotebush community is found north of Elliot Road, between the road and the nuclear plant (photograph, *Appendix C*).

The area's isolated buttes contain the above-mentioned species in addition to several other plants, including the saguaro cactus (*Carnegiea gigantea*), barrel cactus (*Ferocactus wislizenii*), pincushion cactus (*Mammillaria grahamii*), and yellow paloverde (*Cercidium microphyllum*). The small butte southeast of the nuclear plant is representative of this community.

The Sonoran riparian/leguminous short tree scrub community is associated with the margins of the area's three washes. This relatively diverse community is characterized by various shrubs of the pea family, including catclaw acacia (*Acacia greggii*) and velvet mesquite (*Prosopis velutina*), as well as desert broom (*Baccharis sarothroides*) and four-wing saltbush. Most of these shrubs and small trees are no taller than 14 feet. The shrubs can form dense thickets, or they can be sparsely spaced. The herbaceous layer, dense in several areas, includes grasses such as Panic grasses (*Panicum* spp.), big galleta (*Pleuraphis rigida*), and grama-grass (*Bouteloua* spp.). Ephemeral wildflowers such as the fetid-marigold (*Pectis angustifolia*),

chuckwalla's delight (*Bebbia juncea*), desert globemallow (*Sphaeralcea ambigua*), and scorpionweed (*Phacelia crenulata*) are also anticipated in these areas. The Winters Wash area along Elliot Road is representative of this natural community (photograph, *Appendix C*).

The remaining vegetative communities found in the study area include the fallow agricultural areas. Several years ago these areas were evidently used for cotton production. Most of the vegetation in these fallow areas includes species such as Russian thistle (i.e., tumble-weed) (*Salsola iberica*), white horse-nettle (*Solanum elaeagnifolium*), pigweed (*Amaranthus albus*), purslane (*Portulaca oleracea*), ragweed (*Ambrosia ambrosoides*), salt-cedar (*Tamarix pentandra*), four-wing saltbush, and mesquite. The proposed combustion turbine plant site along Elliot Road (i.e., immediately west of Winters Wash) is representative of this community.

5.6 Wildlife

Land use and natural communities strongly influence the wildlife of the area. The riparian communities associated with the wash margins provide the most diverse wildlife communities in the study area. These areas, such as those found along Winters Wash, provide vegetative stratification layers ranging from herbs to shrubs and small trees. These wash areas provide seeds, insects, and small prey as a food source as well as essential escape cover. The riparian scrub community provides habitat for reptile species such as the western diamondback rattlesnake (*Crotalus atrox*), Sonoran gopher snake (*Pituophis melanoleucus affinis*), desert side-blotched lizard (*Uta stansburiana*), and the desert spiny lizard (*Sceloporous magister*). The Great Plains toad (*Bufo cognatus*) is one of the few amphibians that can be found in the area. Avian species are common in this type of habitat, due to the diversity and density of vegetation. Representative species include the Gambel's quail (*Callipepla gambelii*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), mourning dove (*Zenaida macroura*), Say's phoebe (*Sayornis saya*), phainopepla (*Phainopepla nitens*), Costa's hummingbird (*Calypte costae*), rufous-winged sparrow (*Aimophila carpalis*), and the house finch (*Carpodacus mexicanus*). Mammals observed in this area include the desert cottontail (*Sylvilagus auduboni*), blacktail jackrabbit (*Lepus californicus*), Ord kangaroo rat (*Dipodomys ordi*), coyote (*Canis latrans*), whitetail deer (*Odocoileus virginianus*), and the javelina (*Pecari angulatus*). Wildlife signs (e.g., tracks, scats, and ground burrows) are abundant in this type of habitat.

The reptiles of the creosotebush scrub flats include the Arizona desert whiptail (*Cnemidophourus tigris gracilis*), the side-blotched lizard, and the western diamondback rattlesnake. The avian life includes the golden eagle (*Aquila chrysaetos*), turkey vulture (*Cathartes aura*), white-winged dove (*Zenaida asiatica*), greater roadrunner (*Geococcyx californianus*), and common raven (*Corvus corax*). Mammals found in this habitat include the kangaroo rat, blacktail jackrabbit, coyote, and whitetail deer.

Wildlife populations in fallow agricultural areas are typically poor because of the scarcity and poor diversity of vegetation. Older fallow areas typically have greater wildlife diversity, due to the developed vegetative structure. Typical species include the side-blotched lizard, mourning dove, horned lark (*Eremophila alpestris*), house finch, blacktail jackrabbit, and whitetail deer.

5.7 Rare, Threatened, or Endangered Resources

Information was gathered from the Arizona Department of Game and Fish, Arizona Department of Agriculture, and the US Fish and Wildlife Service regarding rare, threatened or endangered plant and animal species in the project area. Although there are quite a few listed plant and wildlife species found in Maricopa County, there are no known records of listed species or critical habitats in the study area (Personal communication, William Knowles, Habitat Specialist-Arizona Department of Game and Fish). Habitat for listed species such as the cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*) (Federally endangered) and the southwestern willow flycatcher (*Empidonax traillii extimus*) (Federally endangered) was deemed to be poor by the Arizona Department of Game and Fish and several past surveys.

In central and southern Arizona, the pygmy owl's primary habitat is riparian cottonwood, mesquite bosques, and Sonoran desertscrub associations of paloverde, bursage, ironwood (*Olneya tesota*), acacia, and giant cactus, such as saguaro (Federal Register 1999). The desert scrub areas are often found along washes, where the increased abundance and variety of vegetation and food sources (e.g., small mammals, lizards, and birds) provide favorable habitat. The pygmy owl nests in a cavity in a tree or large cactus. Cavities may be naturally formed or excavated by woodpeckers. Trees must have a diameter equal to or greater than six inches to accommodate pygmy owl nest cavities. In the study area, especially in those distinctive riparian areas such as Winters Wash, trees or cacti of a suitable diameter are lacking. The southwestern willow flycatcher, a neotropical migrant, breeds in low-elevation dense willow, cottonwood, and

tamarisk thickets and woodlands along streams and rivers. This riparian habitat type is not found within the study area.

A list of federally listed plant and wildlife species for Maricopa County can be found in Appendix B.

5.8 Cultural Resources

A database and archived regional reports from the Arizona State Historic Preservation Office (SHPO) list one historical property and five archaeological sites in the study area (*Figure 7*). These sites range from disturbed aboriginal sites, such as rock enclosures and trails, to a disturbed homestead site determined ineligible for listing on the National Historic Register. The five archaeological sites (designated as NA 12500; NA 12498; NA 12496; NA 12508, and NA 12550) are associated with the isolated buttes north of Elliot Road and adjacent to the nuclear facility. All that remains of an old homestead site (site AZ T:9:1) in the vicinity of the Southern Pacific Railroad corridor are remnants of a trash dump (e.g., bottles and cans), a few support blocks, and a layout of old irrigation canals. None of these sites would be adversely affected by any of the proposed transmission line corridors.

5.9 Visual Resources

The visual conditions within the study area have been modified by electric generating facilities and their associated infrastructure. The Palo Verde nuclear plant and its switchyard are located three miles north of the proposed line. Several 525kV transmission lines and a rail spur supporting the plant cut through the study area (Various Photographs, *Appendix C*). Otherwise, the visual character is typical of rural central Arizona and the Sonoran Desert landscape. Most of the study area consists of Sonoran Desert scrub habitats and fallow agricultural areas. The several washes that traverse the study area (e.g., Winters Wash) offer views relatively more diverse with vegetation. The photograph of the Elliot Road crossing of Winters Wash offers a good example of a representative central Arizona ephemeral wash and associated riparian margin (*Appendix C*).

Most of the topography is relatively flat, with only a few small, isolated buttes scattered in the area. The visually interesting Palo Verde Hills lie to the immediate northwest, and the

Yellow Medicine Hills can be observed to the southwest. Moderate- to long-distance views of the surrounding countryside and area mountain ranges are available along Elliot Road. On a clear day, one can see geologic formations as far as ten miles away.

6.0 ENVIRONMENTAL CONSEQUENCES

The 525kV transmission project (Route A) will impact the immediate environment of the proposed substation yard, transmission line structure locations, and line corridor (*Figure 1*). Other areas within the right-of-way will not be affected. The corridor associated with the proposed project will be aligned along the least environmentally damaging and most practicable route. This chapter describes short- and long-term impacts of the transmission line.

6.1 Soils

Prudent construction and erosion-control measures will be used to avoid minor, short-term impacts. Duke Energy Maricopa will use clearing, revegetation, and erosion-control procedures which meet or exceed the standards set forth in local, state, and federal regulations. Measures will also be taken to prevent sediment, trash, debris, and other man-made pollutants from entering sensitive areas. Overall, soil disturbance will be kept to a minimum and will take place only at the specific structure locations.

6.2 Water Resources

The proposed project will cross two ephemeral washes (*Figure 5*). These washes include Winters Wash, just east of the proposed merchant plant site, and an unnamed wash west of the substation site. No permanent water bodies will be crossed by the transmission line.

Duke Energy Maricopa will use prudent design, construction, and erosion control measures to avoid minor, short-term impacts to these washes. Duke Energy Maricopa will comply with all stormwater management and sediment reduction regulations related to water-quality protection. All activities will be conducted in a manner that will not jeopardize the State water quality standards and existing water uses. The erosion control measures and Best Management Practices (BMP's) employed will be sufficient to prevent any sediment movement beyond construction limits during a 25-year storm event. Measures will also be taken to prevent sediment, trash, debris, and other man-made pollutants from entering sensitive areas. No riparian vegetation will need to be cut or cleared in association with the construction of the transmission line. All the washes and their associated riparian areas will be spanned by the

project. No structures will be installed in these areas; thus a Section 404 Permit from the US Army Corps of Engineers is not anticipated.

Based on information from National Wetlands Inventory maps, aerial photographs, and field reconnaissance, there are no wetland crossings associated with the proposed project.

6.3 Flood-Prone Areas

Federal Emergency Management Agency National Flood Insurance Program maps were reviewed to determine the extent of flood-prone areas in the study area (*Figure 6*). The preferred route, Route A, will not cross any documented 100-year floodplain areas; thus it will not pose an obstacle for floodwaters and associated debris.

6.4 Wetlands

Wetlands are defined by 33 CFR Part 328 and protected by Section 404 of the Clean Water Act. No jurisdictional wetlands or navigable waters were found within the preferred right-of-way. The wetland field-reconnaissance effort followed the current delineation methodology (Environmental Laboratory 1987).

6.5 Wildlife

The proposed 525kV transmission line will have minimal impact upon the wildlife resources of the study area. The most diverse wildlife habitats are associated with ephemeral washes, such as Winters Wash. The proposed transmission line will span these washes; thus no ground disturbance and clearing will be required in these riparian areas. The only clearing necessary will be associated with the specific structure locations. This minor clearing will be located in the creosotebush scrub habitats, and it is anticipated that only a few creosotebush shrubs will need to be removed at each structure location. Because the corridor is adjacent to Elliot Road, no access road construction will be required for this project. Due to the relatively small clearing areas and the habitat type, only minor and short-term construction impacts to wildlife (e.g., noise and temporary displacement) are expected.

6.6 Rare, Threatened, or Endangered Resources

The Arizona Department of Game and Fish, Arizona Department of Agriculture, and the US Fish and Wildlife Service were contacted regarding listed state and federal rare plant and animal species in the project area. Although there are quite a few listed plant and wildlife species found in Maricopa County, there are no species or critical habitats in the study area (Personal communication, William Knowles, Habitat Specialist-Arizona Department of Game and Fish). Thus, the proposed transmission line will affect no listed species.

Destruction or removal of any protected native plants (e.g., cactus species) found at transmission structure construction sites within state trust land or private ownership land will require an Arizona Department of Agriculture "Notice of Intent to Clear Land" permit and an "Arizona Protected Native Plants and Wood Removal Application." However, based on field reconnaissance, impacts to protected plants such as the saguaro or teddybear cholla are not anticipated. Due to the location of the line, very little clearing will be required for this transmission line project. Information concerning this issue is found in Appendix B.

An issue associated with protected birds such as the golden eagle and peregrine falcon, as well as other raptors, is their vulnerability to power line electrocution. Their large size and perching behavior during hunting make them susceptible to electrocution on certain transmission pole designs. Power poles with inadequate spacing between phases (i.e., less than 60 inches of separation between conductors and/or grounded hardware) can electrocute raptors.

With this in mind, the US Fish and Wildlife Service has recommended, under authority of the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act, that all new structures be equipped with design features that prevent these electrocutions. These features typically include designs that (1) make the distance between phase conductors greater than the wingspread of the bird that is landing, perching, or taking off; and (2) increase the distance between grounded hardware (e.g., ground-wires) and an energized conductor to more than the largest bird's wingspread or the distance from the tip of the bill to the tip of the tail. The 525kV structures designed for this project are "raptor safe" and meet the guidelines recommended in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996* (Avian Power Line Interaction Committee 1996). The 525kV structures are designed with suspended phase conductors that provide adequate spacing between phases and allow for safe perching on the pole top and structure arms, and spacing

between the phases and ground-wires is much greater than the recommended 60 inches. Thus, raptor electrocutions are not anticipated with this project.

6.7 Cultural Resources

A database and several archived regional reports from the Arizona State Historic Preservation Office (SHPO) showed one historical property and five aboriginal sites in the study area (*Figure 7*). These sites range from disturbed aboriginal sites, such as rock enclosures, to a disturbed homestead site determined ineligible for listing on the National Historic Register. None of these sites will be adversely affected by the transmission line project.

If any archaeological resources are discovered during transmission line construction, the Arizona SHPO will be contacted immediately. These sites will be clearly marked and protected during the construction period. Duke Energy Maricopa will forward complete documentation to the state and local agencies and will cooperate with them to develop appropriate and specific mitigation plans, if needed.

6.8 Visual Resources

The visual effect of the proposed transmission line will be influenced by several factors. They are:

- The distance visible transmission line elements (towers, conductor) are from the viewer;
- The number of transmission structures seen from singular vantage points;
- The condition of the structures seen in relation to the horizon and vegetation (i.e., whether visible structures are silhouetted against the skyline or against a vegetative backdrop);
- The amount of modification to existing vegetation that will occur as a result of the project, especially modifications that will render texture and color contrast to the existing, surrounding vegetation; and
- The scenic condition of the area in which the transmission line will be seen (i.e., natural or modified).

The visual effect of the proposed Maricopa 525kV Line will be significantly influenced by the existing landscape content. The presence of major transmission lines and the Palo Verde Nuclear Plant in the immediate vicinity of the proposed line will serve to mitigate the overall visual effect of the proposed line. Also, the future Palo Verde South Switchyard and the Duke Energy Maricopa Electrical Generation Plant will further modify the existing scenic condition within the immediate area of the proposed line and, thus, will serve to mitigate the visual effect of the proposed line.

A 525kV transmission line built on any of the alternate routes considered would be visible from viewpoints along Elliot Road because of the relatively flat terrain and absence of screening vegetation. Because the selected route is immediately adjacent to Elliot Road, the visual recognition of the line from Elliot Road viewpoints, when compared to other alternate routes considered, will be higher. However, its effect will be significantly mitigated by existing and planned electrical facilities.

Residing within a 2-mile segment along Elliot Road will be the Palo Verde South Switchyard and the Duke Maricopa Generation Plant---both on the south side of the road. Additionally, two existing 525kV transmission lines cross Elliot Road within this distance. The proposed line will traverse a short segment of open property (approximately 1.5 miles) between the Maricopa Electrical Generation Plant and the Palo Verde Switchyard. The inclusion of the proposed transmission line in this immediate area along Elliot Road will consolidate major electrical generation and transmission facilities to a limited region, thus limiting the visual effect of the proposed line to the minimum area possible between the future generation plant and switchyard.

6.9 Recreation

If possible, Duke Energy Maricopa will acquire only the right to build and maintain a transmission line where the proposed line crosses private ownership or state trust lands. These rights will impose certain restrictions upon the owners' land use (e.g., a building may not be erected within the transmission corridor, and/or a well may not be installed within the right-of-way). Other than these restrictions, which are necessary for the safe and reliable operation of the line, the land will remain under the owners' control.

6.10 Noise Interference

The proposed line could, under certain weather conditions, operate with a low level of sound. Audible noise from transmission lines of 345kV or higher is primarily associated with wet weather conditions. During these periods, water droplets collect on the conductors, producing a large number of corona discharges (i.e., crackling and sizzling noises). It is estimated that during wet conditions a typical 525 kV line produces a noise level of about 54 dB(A) underneath the conductors (EPRI 1982)—equivalent to the noise level of a typical business office. The noise level diminishes with distance from the conductors. For example, the noise level about 65 feet away would be 48.5 dB(A). The audible noise drops to 45.5 dB(A) (equal to that of a suburban living room) when measured 100 feet from the edge of the right-of-way. Information from the 1982 EPRI report shows that all of the above mentioned noise values are below the EPA's guidelines for outdoor activities (i.e., 55 dB(A). Considering the environmental context of the proposed transmission line (e.g., the existing 525 kV line, the nuclear plant, and the rural nature of the study area) and the above information, the additional noise levels should not be an adverse impact. There will be some noise during the clearing and construction phases of the project, but it will be localized and temporary. Thus, noise generated by the line will cause no long-term adverse effects.

6.11 Aviation

The proposed line will not be located in proximity to any airports, nor will any structure be more than 200 feet above ground level.

6.12 Human Health and Safety

To provide for public safety and protection, Duke Energy Maricopa will design and construct the proposed transmission line in such a way that it will comply with, or exceed, the National Electrical Safety Codes in effect during the construction period. Further, Duke Energy Maricopa's experience in designing, building, and operating this type of facility indicates that the facilities are durable, structurally sound, and pose no threat to public health and safety under normal operating conditions and anticipated emergency conditions.

Electric and magnetic fields (EMF) exist anywhere there is electricity, whether that electricity is being produced, distributed, or consumed. Thus EMF is created by power lines,

residential wiring, appliances, and even by the earth itself. Since the early 1970's, hundreds of studies have debated the possible health effects of EMF. In 1996, the National Academy of Sciences (NAS), National Research Council, completed its review of the literature on the possible health risks of residential exposure to power-frequency electric and magnetic fields. In 1999, the National Institute of Environmental Health Sciences (NIEHS) completed a comprehensive program of research and analysis to clarify the potential health risks from exposure to extremely low frequency electric and magnetic fields.

The NAS report stated, "Based on a comprehensive evaluation of published studies relating to the effects of power frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard." The NAS went on to say, "No conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."

NIEHS concluded that the evidence for a risk of cancer and other human disease from the electric and magnetic fields around power lines is "weak." They stated that "(t)he results of the EMF-RAPID program do not support the contention that the use of electricity poses a major unrecognized public-health danger." NIEHS Director Kenneth Olden, Ph.D., said, "The lack of consistent, positive findings in animal or mechanistic studies weakens the belief that this association is actually due to EMF, but it cannot completely discount the epidemiological findings. For that reason, and because virtually everyone in the United States is routinely exposed to EMF, efforts to encourage reductions in exposure should continue."

The relationship between EMF and distance serves to minimize exposures. EMF levels drop sharply with increased distance from a power source. For the substation, the EMF level at the edge of the property will probably be lower than the levels found around electrical appliances in a typical home. Similarly, the field levels at the edge of the right-of-way will be lower than those of many household electrical appliances. Therefore, since there will be relatively low field levels associated with this project and because of the consensus that EMF exposure does not pose a human health hazard, no adverse impact can be anticipated.

High-voltage transmission facilities may, under some conditions, produce small amounts of ozone as a consequence of corona discharge. This discharge is caused by abrasions on conductors or foreign-particle contamination of the insulators or hardware. Engineering, construction, and maintenance personnel take care to eliminate or minimize corona discharge from random arcing through careful design and handling of the connections, fittings, hardware, and insulation.

Organizations such as the Illinois Institute of Technology have conducted extensive field tests under various weather conditions to detect ozone around high-voltage substations and 765kV lines. These tests showed no significant adverse effects on plants, animals, or humans from levels of ozone that may be produced in operating transmission facilities at voltages up to 765kV.

The proposed project should not produce any detectable amount of ozone under any operating conditions, and thus it poses no threat to environmental quality.

APPENDIX A

DATA SOURCES

Agencies Consulted

Arizona Department of Game and Fish

Arizona Department of Agriculture

Arizona State Historic Preservation Office

Arizona Department of Transportation

U. S. Department of Interior, Fish and Wildlife Service

U.S. Department of Agriculture - Natural Resources Conservation Service

Maricopa County Tax Assessor's Office

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APPENDIX B

RARE, THREATENED, OR ENDANGERED RESOURCES LIST

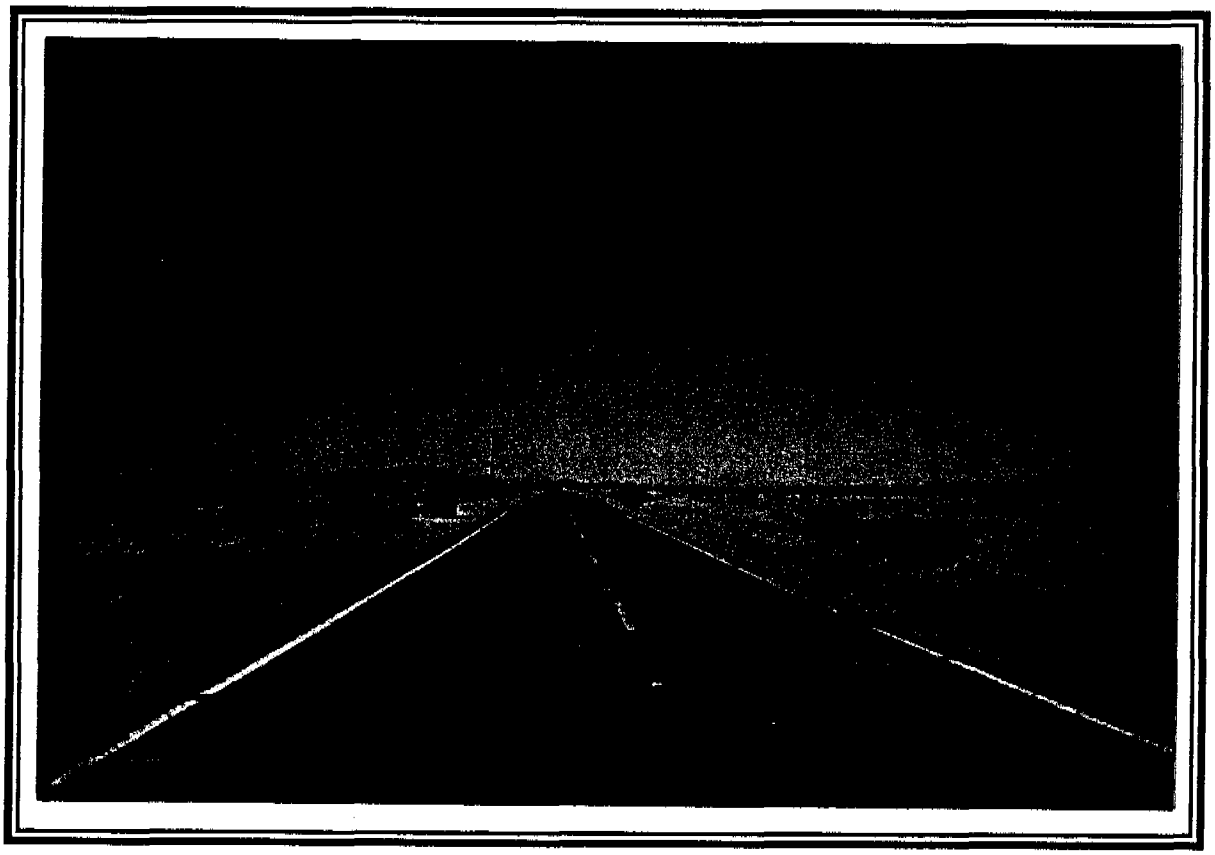
FEDERALLY LISTED SPECIES OF MARICOPA COUNTY, ARIZONA

Common Name	Scientific Name	Status
American Peregrine Falcon	*Falco peregrinus anatum*	Endangered
Arizona Agave	*Agave arizonica*	Endangered
Arizona Cliffrose	*Purchia subintegra*	Endangered
Arizona Hedgehog Cactus	*Echinocereus triglochidiatus*	Endangered
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Bonytail Chub	*Gila elegans*	Endangered
Cactus Ferruginous Pygmy Owl	*Glaucidium brasilianum Cactorum*	Endangered
Desert Pupfish	*Cyprinodon macularis*	Endangered
Gila Topminnow	*Poeciliopsis occidentalis*	Endangered
Lesser Long-Nosed bat	*Leptonycteris curasoae yerbabuenae*	Endangered
Mexican Spotted Owl	*Strix occidentalis lucida*	Endangered
Razorback Sucker	*Xyrauchen texanus*	Endangered
Sonoran Pronghorn	*Antilocapra americana Sonoriensis*	Endangered
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Endangered
Yuma Clapper Rail	*Rallus longirostris yumanensis*	Endangered

List provided by the USFWS, Southwest Region, Phoenix Field Office. 1999

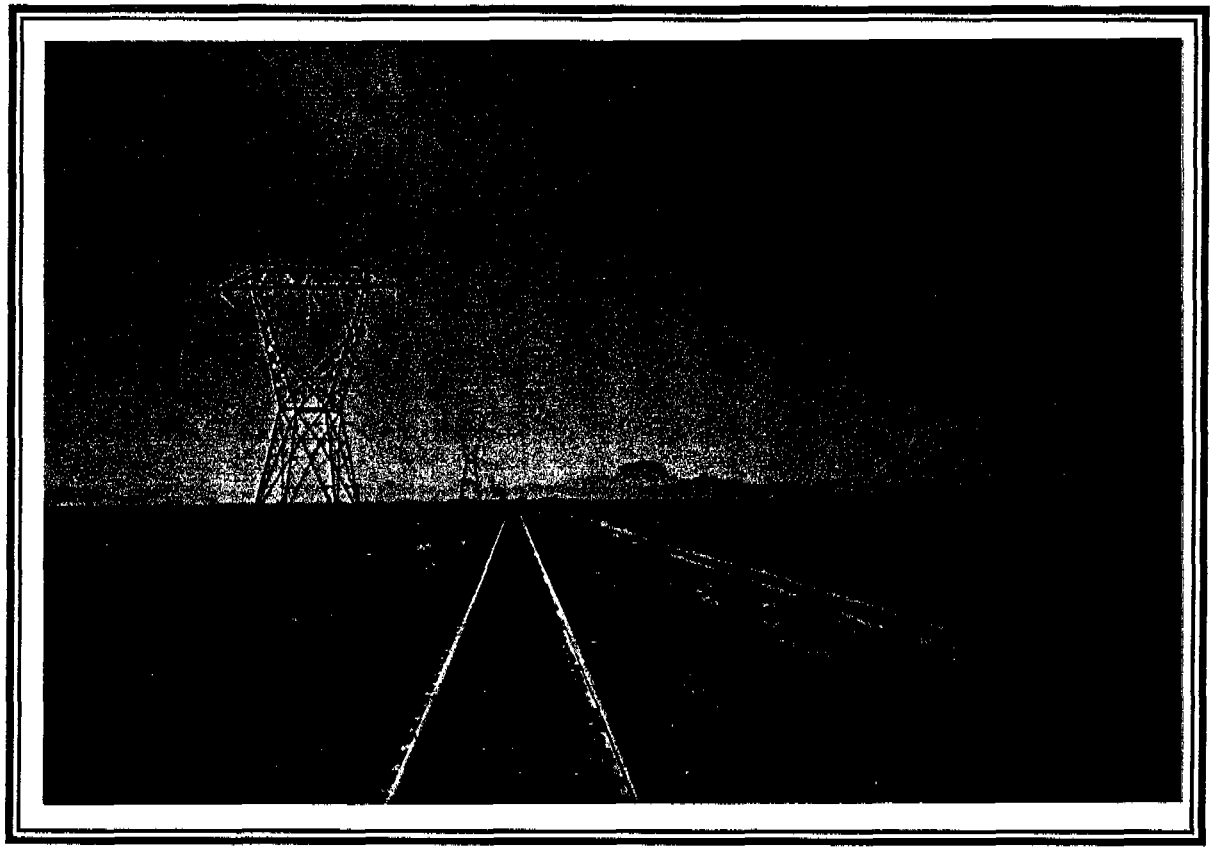
APPENDIX C

REPRESENTATIVE PROJECT PHOTOGRAPHS



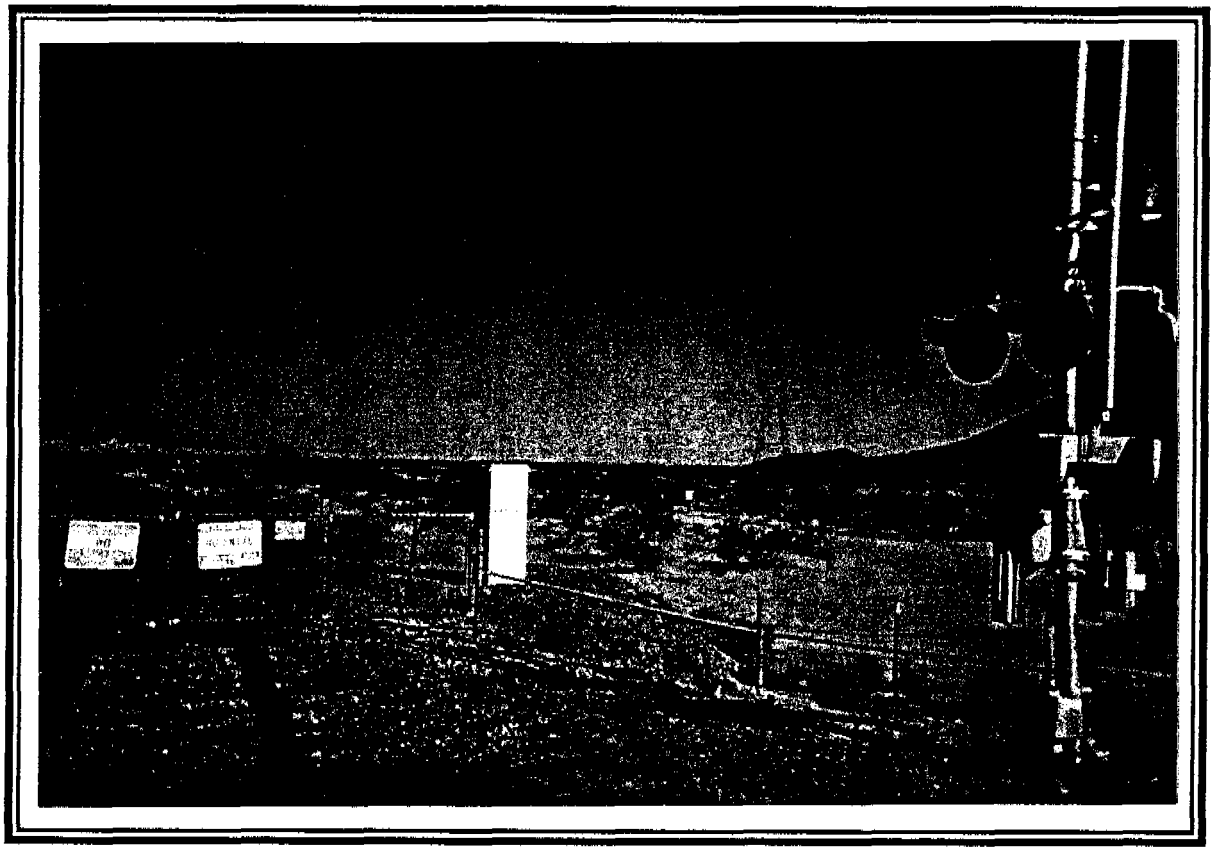
View of the study area.

Looking west along Elliot Road. Areas to the north and south of the road are fallow agricultural fields.



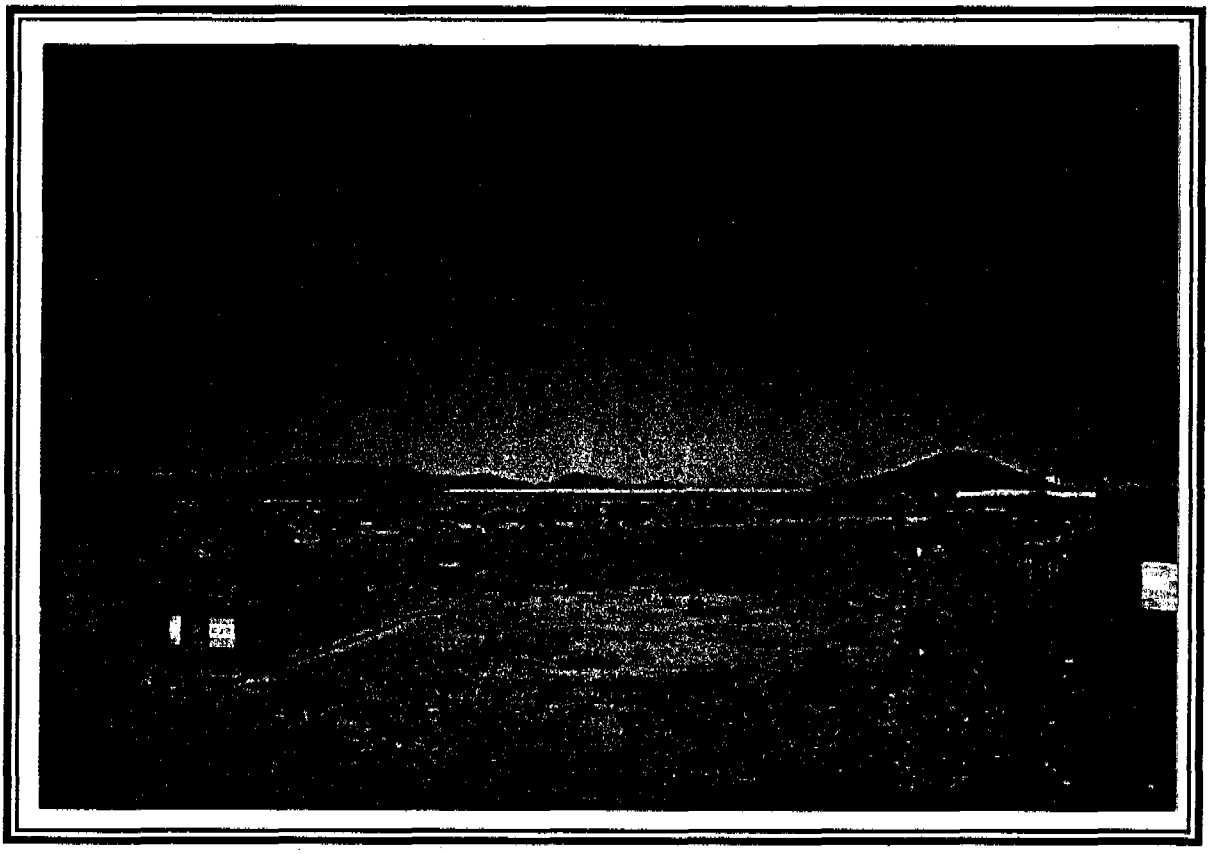
View of the study area.

Looking south from Elliot Road along the Southern Pacific Railroad spur and the existing 525kV transmission line. Typical Sonoran creosotebush scrub habitat is surrounding this corridor.



View of the study area.

Looking north from Elliot Road along the Southern Pacific Railroad spur and the existing 525kV transmission line. This enclosed area is associated with the Palo Verde Nuclear Plant.



View of the study area.

Looking northwest from Elliot Road. The Palo Verde Nuclear Plant is in the far right corner of the photograph. The Palo Verde Hills are viewed in the far left corner.

View of the study area.

Looking southwest from Elliot Road across the proposed merchant plant site. This area consists of fallow agricultural fields.

View of the study area.

Looking south along the man-made levee between Winters Wash and the proposed merchant plant site. The Gila Mountains are in the background.

View of the study area.

Looking south through Winters Wash. The proposed merchant plant and the associated 525kV transmission line will be located in the far right of the photograph (outside of the wash).

View of the study area.

Looking southeast through the riparian margin of Winters Wash.

TABLES

AND

FIGURES

Cultural and Natural Resource Factors	Route A	Route B	Route C	Route D
Number of recorded archaeological sites in the R/W	0	0	0	0
Number of recorded archaeological sites within 150' of the proposed line	0	0	0	0
Number of historic cemeteries in the R/W	0	0	0	0
Number of historic cemeteries within 150' of the proposed line	0	0	0	0
Number of recorded Natural Heritage sites in the R/W	0	0	0	0
Number of recorded Natural Heritage sites within 150' of the proposed line	0	0	0	0
Number of National Register historic buildings in the R/W	0	0	0	0
Number of National Register historic buildings within 250' of the proposed line	0	0	0	0
Number of National Register historic buildings between 250' and 500' of the proposed line	0	0	0	0
Number of National Register historic buildings between 500' and 1000' of the proposed line	0	0	0	0
Number of historic buildings of local interest in the R/W	0	0	0	0
Number of historic buildings of local interest within 250' of the proposed line	0	0	0	0
Number of historic buildings of local interest between 250' and 500' of the proposed line	0	0	0	0
Number of historic buildings of local interest between 500' and 1000' of the proposed line	0	0	0	0

NOTE: Right - Of - Way width is 200'.

Land Cover Factors	Route A	Route B	Route C	Route D
Acres of Sonoran Riparian / Leguminous Short-Tree Scrub **not** parallel and adjacent to an existing R/W	0.0	3.3	11.9	28.0
Acres of Sonoran Riparian / Leguminous Short-Tree Scrub parallel and adjacent to an existing road R/W	3.9	0.0	0.0	0.0
Acres of Sonoran Riparian / Leguminous Short-Tree Scrub parallel and adjacent to an existing transmission R/W	0.0	0.0	0.0	0.1
Acres of Sonoran Creosotebush Scrub **not** parallel and adjacent to an existing R/W	9.7	37.2	43.6	30.1
Acres of Sonoran Creosotebush Scrub parallel and adjacent to an existing road R/W	32.5	12.7	12.7	12.7
Acres of Sonoran Creosotebush Scrub parallel and adjacent to an existing transmission R/W	0.0	0.0	0.0	0.0
Acres of agriculture land in production **not** parallel and adjacent to an existing utility R/W	0.0	0.0	0.0	14.5
Acres of agriculture land in production parallel and adjacent to an existing road R/W	0.0	0.0	0.0	0.0
Acres of agriculture land in production parallel and adjacent to an existing transmission R/W	0.0	0.0	0.0	19.9
Acres of industrial land **not** parallel and adjacent to an existing utility R/W	0.0	0.0	0.0	0.0
Acres of industrial land parallel and adjacent to an existing road R/W	0.0	0.0	0.0	0.0
Acres of industrial land parallel and adjacent to an existing transmission R/W	0.0	0.0	0.0	0.0

NOTE: Right - Of - Way width is 200'.

Flood Zone Factors	Route A	Route B	Route C	Route D
Acres of R/W **not** parallel and adjacent to existing R/W across X1 zone (500 year flood zone)	18.3	46.1	68.3	78.8
Acres of R/W parallel and adjacent to existing road R/W across X1 zone (500 year flood zone)	40.5	12.7	12.7	12.7
Acres of R/W parallel and adjacent to existing transmission R/W across X1 zone (500 year flood zone)	0.0	0.0	0.0	0.0
Acres of R/W **not** parallel and adjacent to existing R/W across AE zone (100 year flood zone)	0.0	0.0	0.0	22.5
Acres of R/W parallel and adjacent to existing road R/W across AE zone (100 year flood zone)	0.0	0.0	0.0	0.0
Acres of R/W parallel and adjacent to existing transmission R/W across AE zone (100 year flood zone)	0.0	0.0	0.0	12.7
Acres of R/W **not** parallel and adjacent to existing R/W across FW zone (floodway)	0.0	0.0	0.0	6.9
Acres of R/W parallel and adjacent to existing road R/W across FW zone (floodway)	0.0	0.0	0.0	0.0
Acres of R/W parallel and adjacent to existing transmission R/W across FW zone (floodway)	0.0	0.0	0.0	7.3

NOTE: Right - Of - Way width is 200'.

Land Use Factors	Route A	Route B	Route C	Route D
Acres of R/W **not** parallel and adjacent to existing R/W across lands used or optioned by Duke Energy North America	8.6	5.0	12.0	48.5
Acres of R/W parallel and adjacent to existing road R/W across lands used or optioned by Duke Energy North America	3.6	0.0	0.0	0.0
Acres of R/W parallel and adjacent to existing transmission R/W across lands used or optioned by Duke Energy North America	0.0	0.0	0.0	17.7
Acres of R/W **not** parallel and adjacent to existing R/W across lands used by private owners	8.8	8.8	8.8	12.3
Acres of R/W parallel and adjacent to existing road R/W across lands used by private owners	11.8	11.8	11.8	11.8
Acres of R/W parallel and adjacent to existing transmission R/W across lands used by private owners	0.0	0.0	0.0	0.3
Acres of R/W **not** parallel and adjacent to existing R/W across lands under state trust	0.0	30.6	45.0	44.8
Acres of R/W parallel and adjacent to existing road R/W across lands under state trust	24.2	0.4	0.4	0.4
Acres of R/W parallel and adjacent to existing transmission R/W across lands under state trust	0.0	0.0	0.0	0.0
Acres of R/W **not** parallel and adjacent to existing R/W across lands used by Palo Verde Nuclear Plant	0.0	0.0	0.0	0.0
Acres of R/W parallel and adjacent to existing road R/W across lands used by Palo Verde Nuclear Plant	0.0	0.0	0.0	0.0
Acres of R/W parallel and adjacent to existing transmission R/W across lands used by Palo Verde Nuclear Plant	0.0	0.0	0.0	0.0

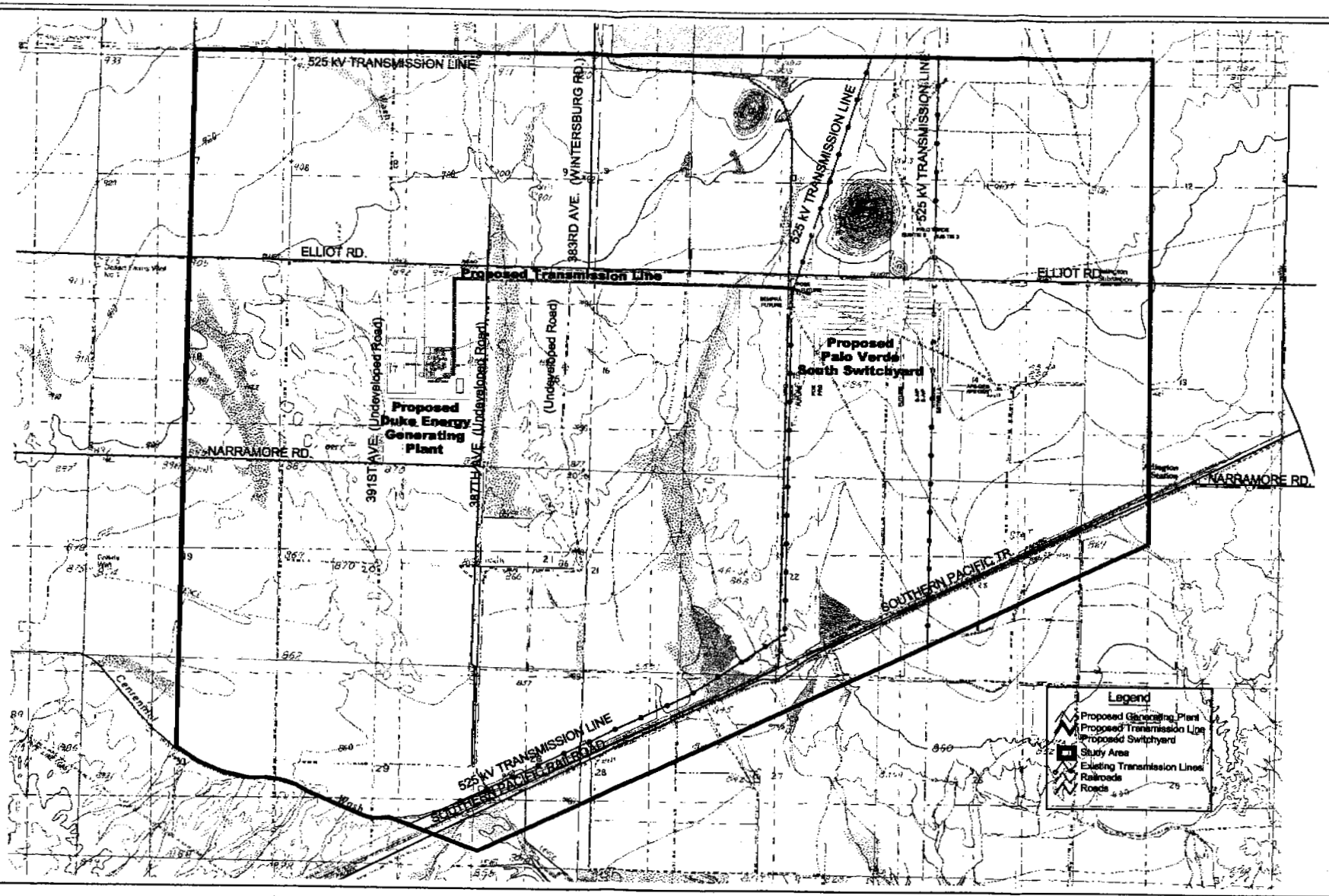
NOTE: Right - Of - Way width is 200'.

Occupied Buildings Factors	Route A	Route B	Route C	Route D
Number of single-family residences within the proposed line's R/W	0	0	0	0
Number of single-family residences outside of the R/W and within 250' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of single-family residences outside of the R/W and within 250' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of single-family residences between 250' and 500' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of single-family residences between 250' and 500' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of community buildings within the proposed line's R/W	0	0	0	0
Number of community buildings outside of the R/W and within 250' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of community buildings outside of the R/W and within 250' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of community buildings between 250' and 500' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of community buildings between 250' and 500' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of school buildings within the proposed line's R/W	0	0	0	0
Number of school buildings outside of the R/W and within 500' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of school buildings outside of the R/W and within 500' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of multi-family residences within the proposed line's R/W	0	0	0	0
Number of multi-family residences outside of the R/W and within 250' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of multi-family residences outside of the R/W and within 250' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of multi-family residences between 250' and 500' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of multi-family residences between 250' and 500' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0

NOTE: Right - Of - Way width is 200'.

Occupied Buildings Factors (Continued)	Route A	Route B	Route C	Route D
Number of church buildings within the proposed line's R/W	0	0	0	0
Number of church buildings outside of the R/W and within 250' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of church buildings outside of the R/W and within 250' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of church buildings between 250' and 500' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of church buildings between 250' and 500' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of commercial buildings within the proposed line's R/W	0	0	0	0
Number of commercial buildings outside of the R/W and within 250' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of commercial buildings outside of the R/W and within 250' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of commercial buildings between 250' and 500' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of commercial buildings between 250' and 500' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of emergency response buildings (EMF/Fire) within the proposed line's R/W	0	0	0	0
Number of emergency response buildings (EMF/Fire) outside of the R/W and within 250' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of emergency response buildings (EMF/Fire) outside of the R/W and within 250' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0
Number of emergency response buildings (EMF/Fire) between 250' and 500' of the proposed line where the proposed line is **not** parallel and adjacent to an existing line	0	0	0	0
Number of emergency response buildings (EMF/Fire) between 250' and 500' of the proposed line where the proposed line is parallel and adjacent to an existing line	0	0	0	0

NOTE: Right - Of - Way width is 200'.



1 : 30,000

2000 0 2000 4000 Feet

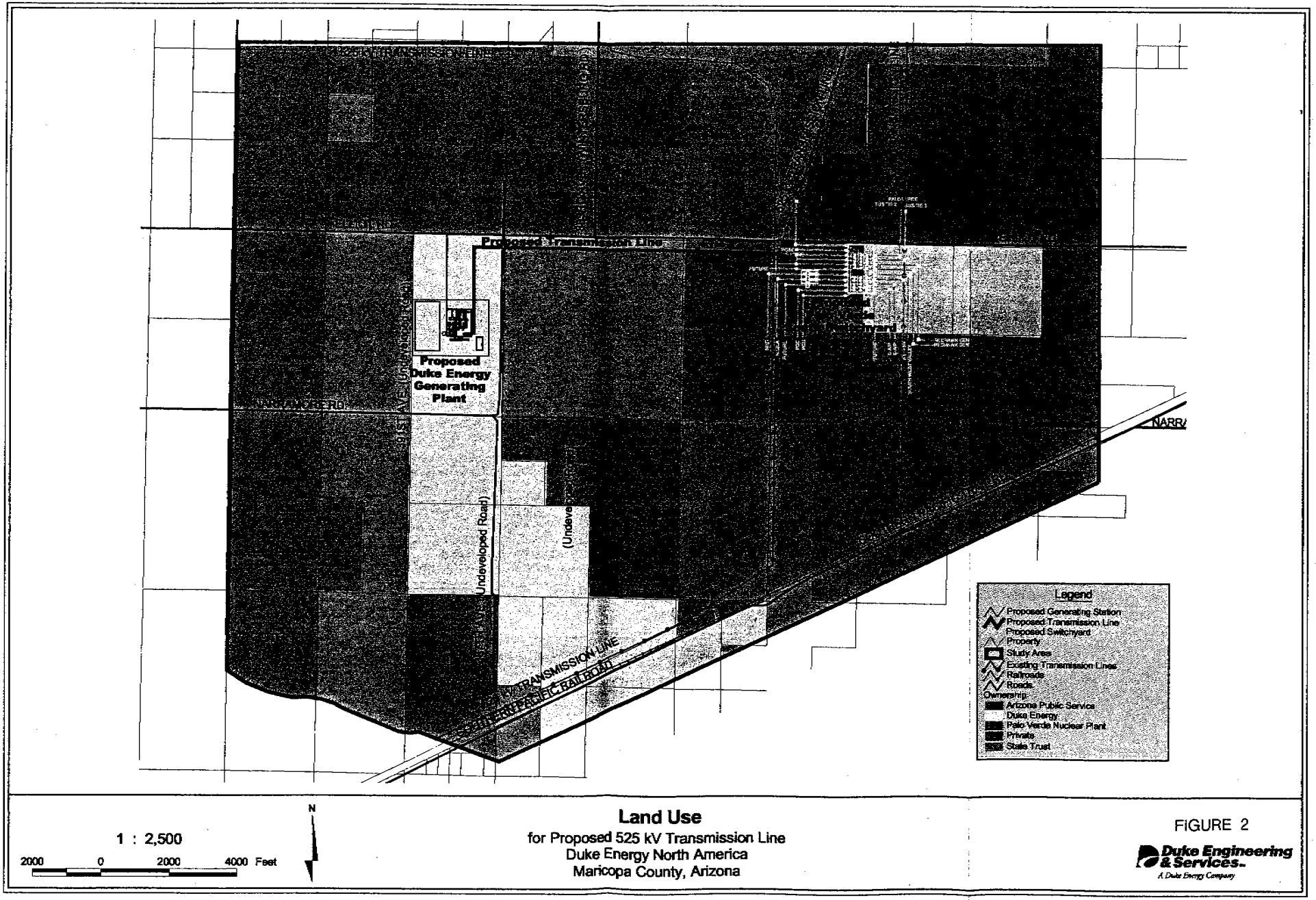
N

Study Area

for Proposed 525 kV Transmission Line
Duke Energy North America
Maricopa County, Arizona

FIGURE 1

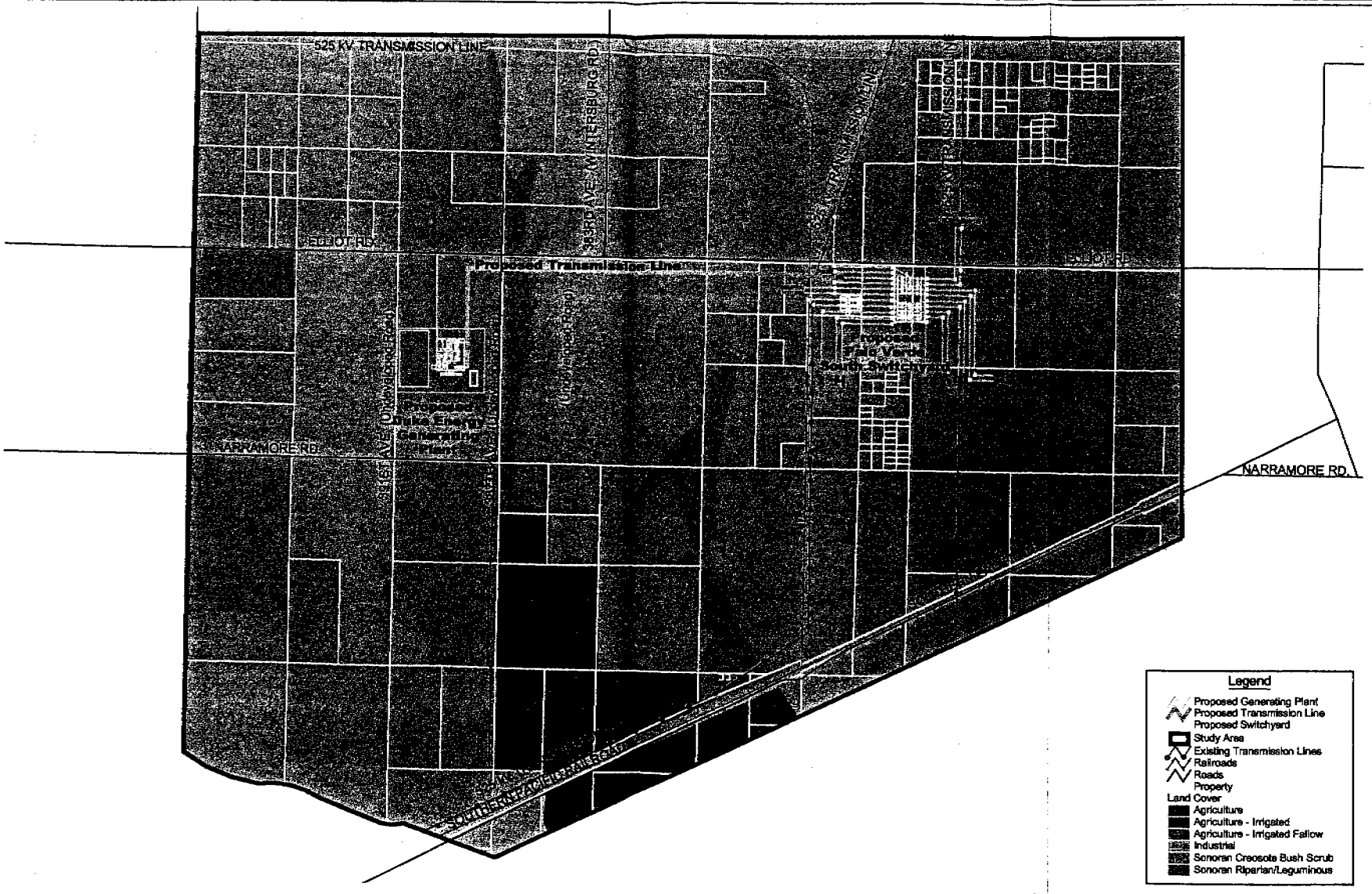
Duke Engineering & Services
A Duke Energy Company



Land Use
for Proposed 525 kV Transmission Line
Duke Energy North America
Maricopa County, Arizona

FIGURE 2

Duke Engineering & Services
A Duke Energy Company

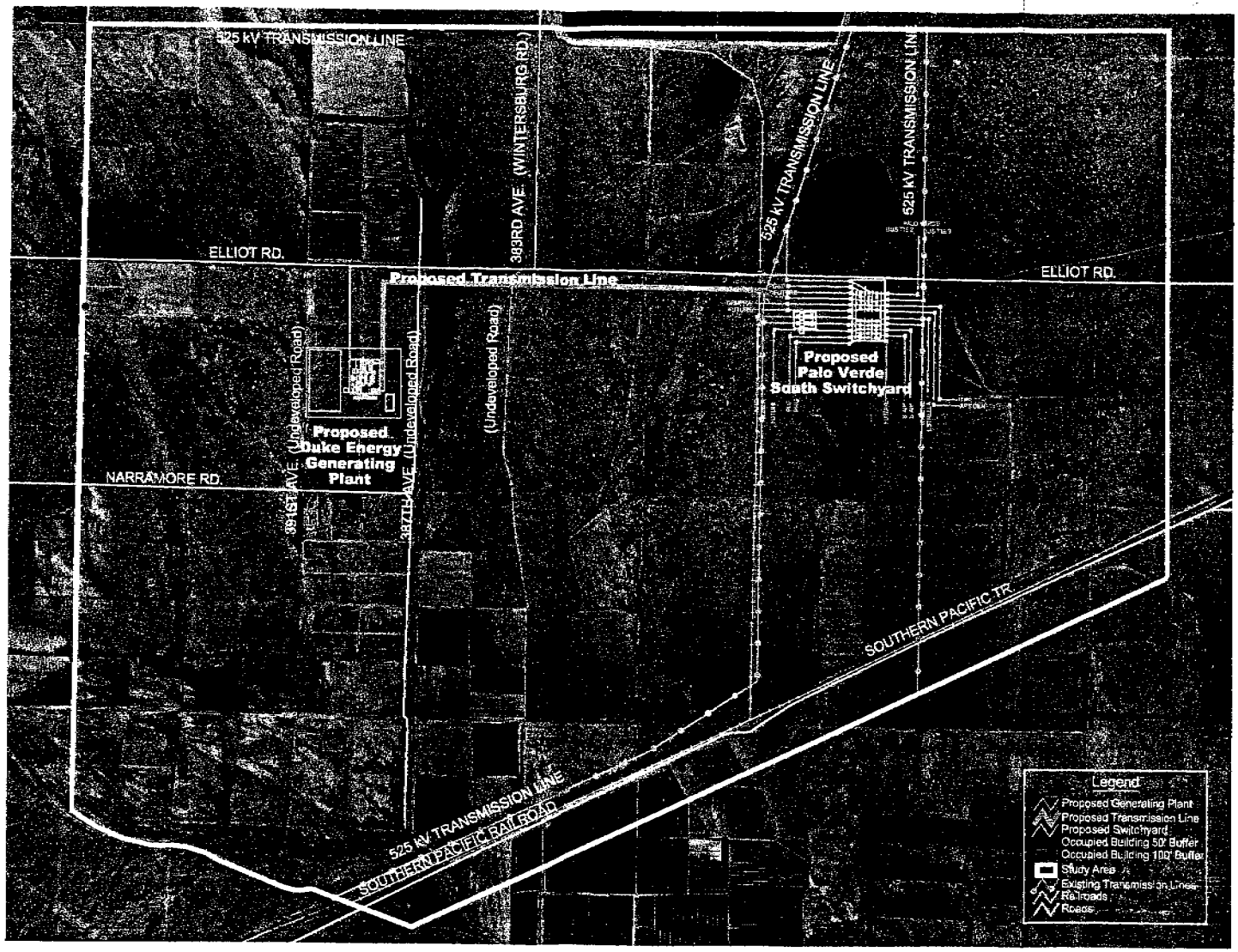


Land Cover

for Proposed 525 kV Transmission Line
Duke Energy North America
Maricopa County, Arizona

FIGURE 3

Duke Engineering & Services
A Duke Energy Company



1 : 2,500

2000 0 2000 4000 Feet

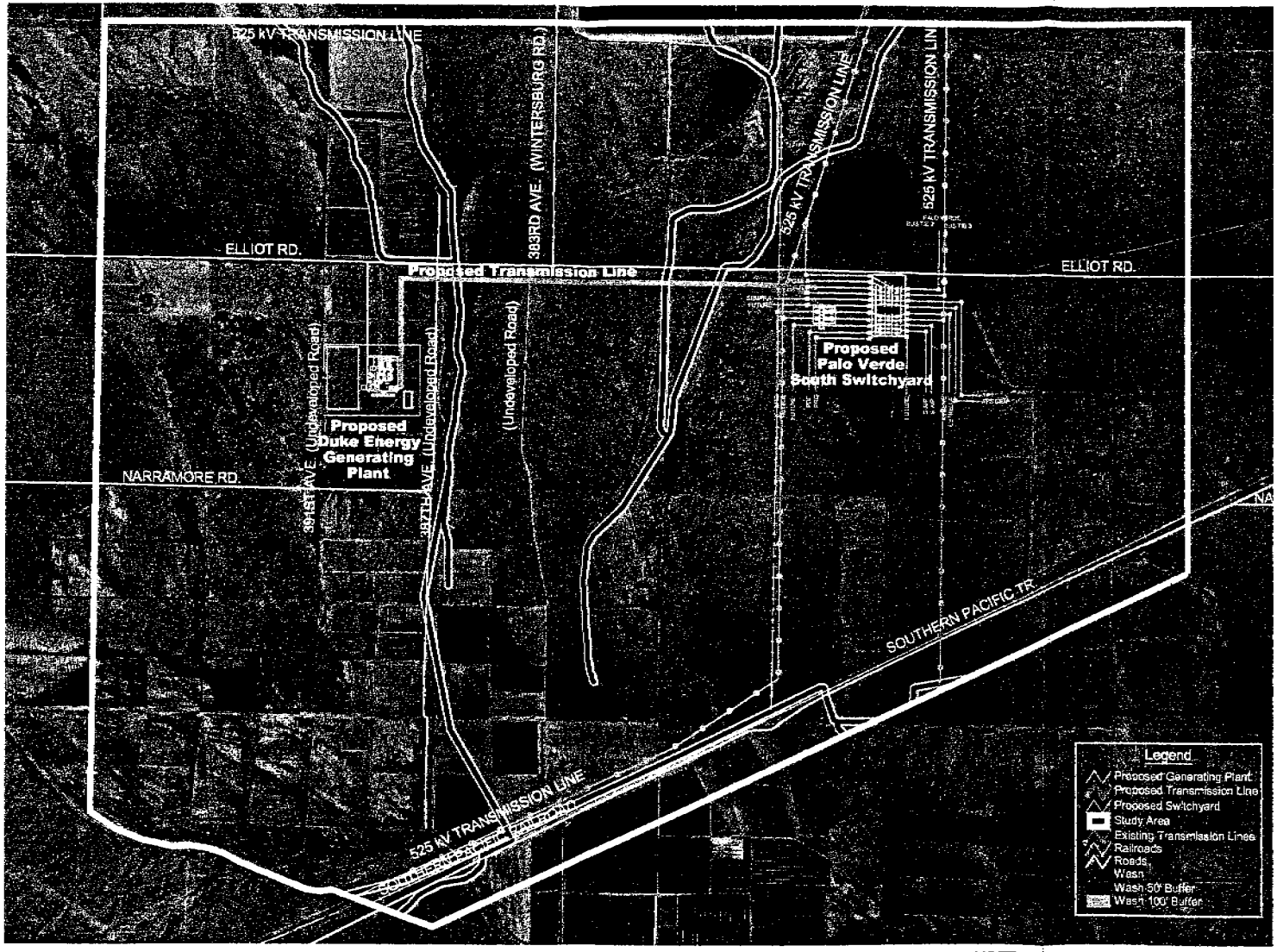
N

Occupied Buildings

for Proposed 525 kV Transmission Line
Duke Energy North America
Maricopa County, Arizona

FIGURE 4

Duke Engineering & Services
A Duke Energy Company



NOTE: The hydrography features consist of ephemeral washes.

1 : 2,500

2000 0 2000 4000 Feet

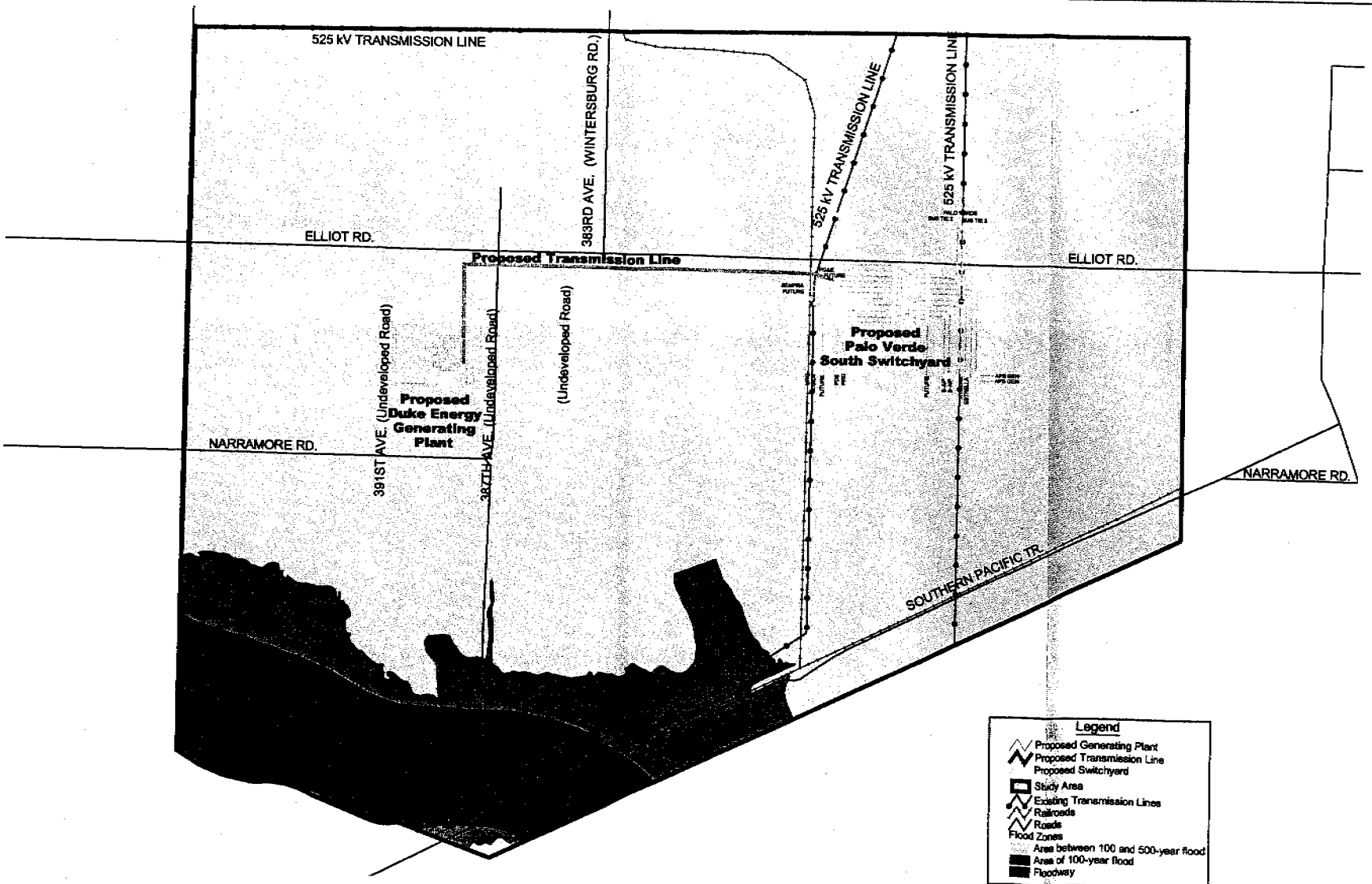
N

Hydrography

for Proposed 525 kV Transmission Line
Duke Energy North America
Maricopa County, Arizona

FIGURE 5

Duke Engineering & Services
A Duke Energy Company

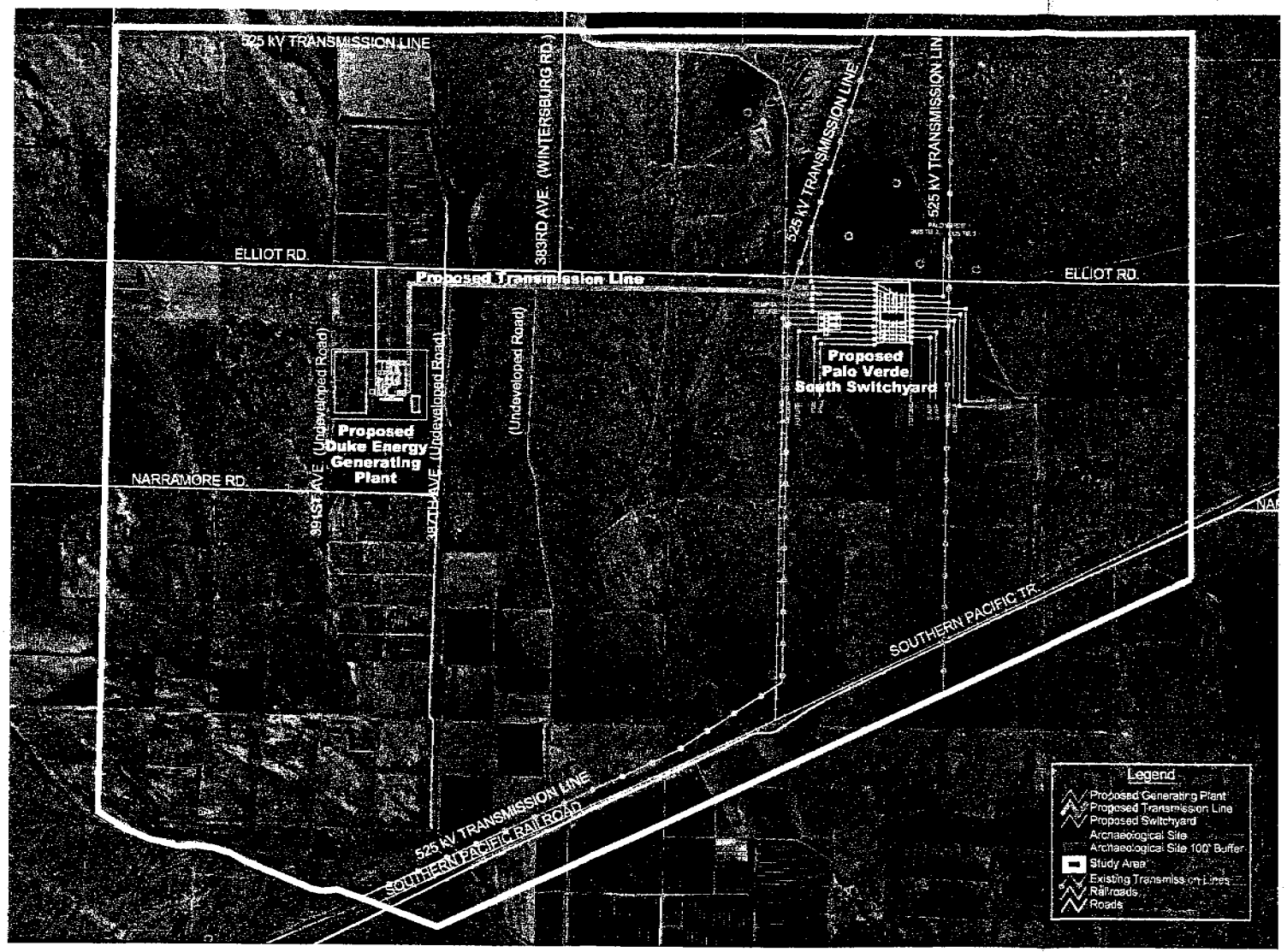


Flood Zones

for Proposed 525 kV Transmission Line
Duke Energy North America
Maricopa County, Arizona

FIGURE 6

Duke Engineering & Services
A Duke Energy Company



1 : 2,500

2000 0 2000 4000 Feet

N

Cultural Resources
for Proposed 525 kV Transmission Line
Duke Energy North America
Maricopa County, Arizona

FIGURE 7

Duke Engineering & Services
A Duke Energy Company

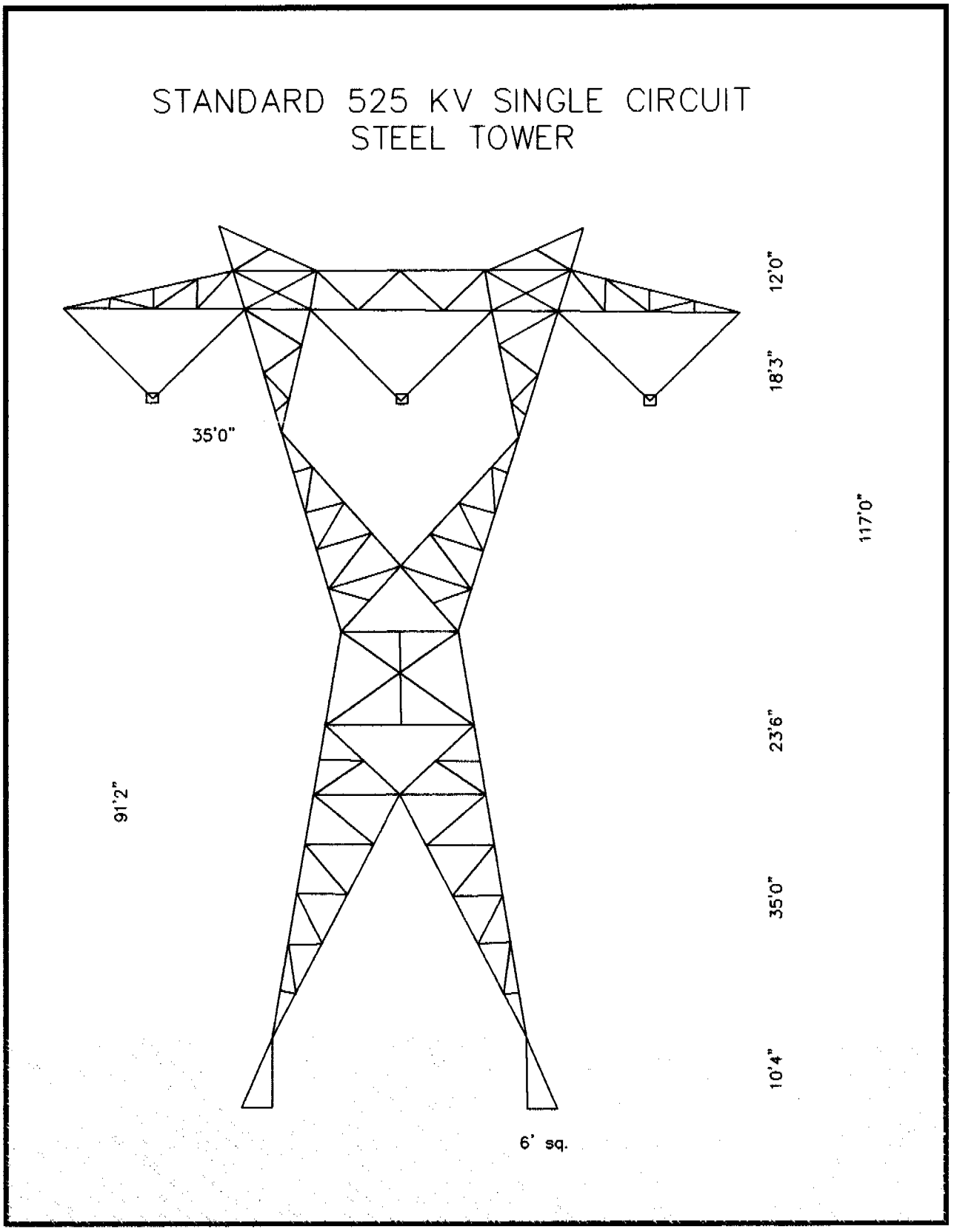

STANDARD 525 KV SINGLE CIRCUIT
STEEL TOWER
12'0"
18'3"
35'0"
117'0"
23'6"
91'2"
35'0"
10'4"
6' sq.

FIGURE 9