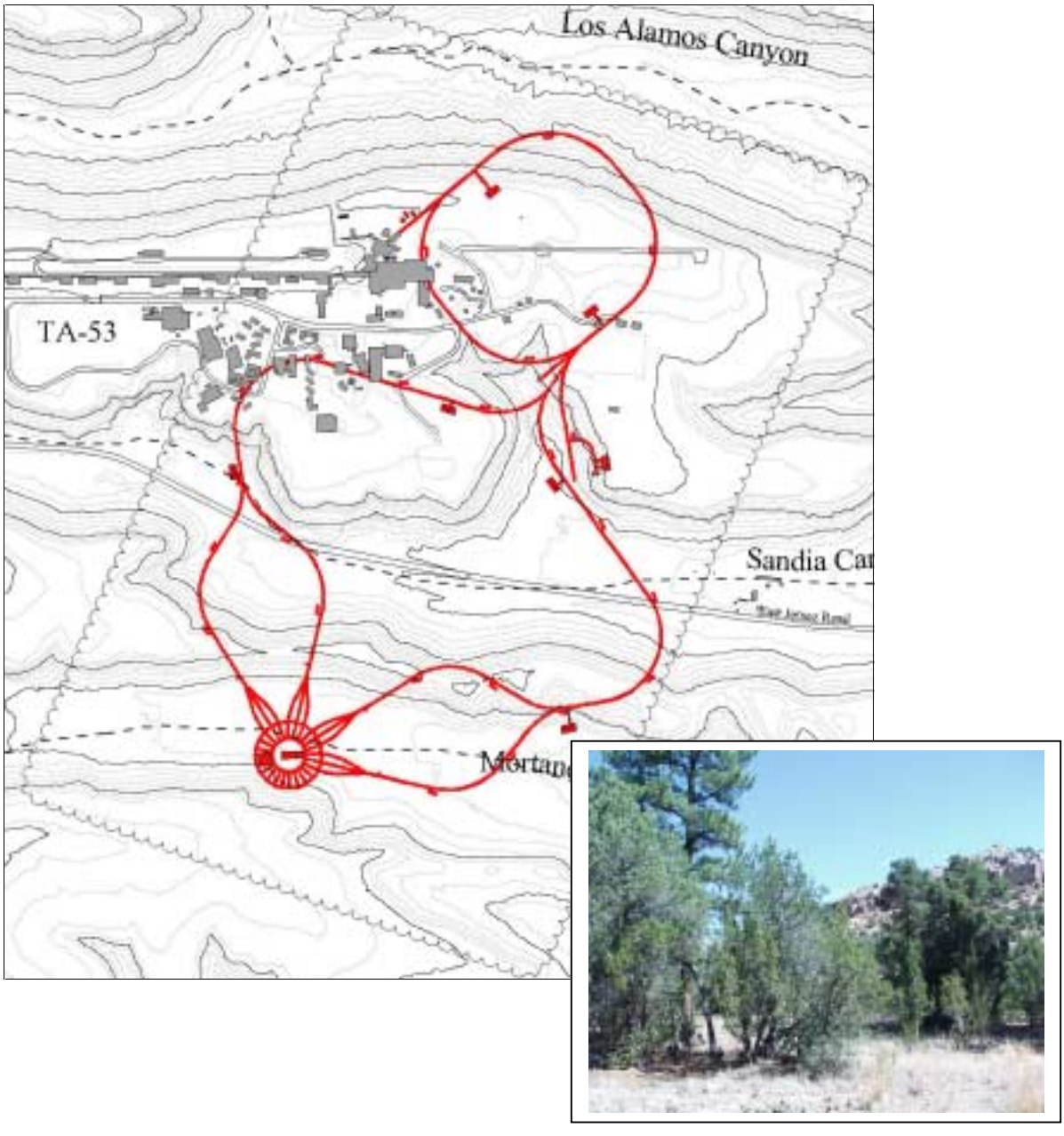
A Biological Information Document for the Potential Siting of the Advanced Hydrodynamic Facility at LANL

LA-UR-01-1832

AHF Project WBS 1.19 ESH/Safety Analysis



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Date: July 10, 2001

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EXECUTIVE SUMMARY

In this document Los Alamos National Laboratory (LANL) staff describe the potential environmental effects of the Advanced Hydrodynamic Facility (AHF) project and propose possible methods for limiting potential environmental impacts. LANL staff have conducted a preliminary review of the proposed AHF based on the available information. We have examined the impacts of the project on threatened and endangered plant and animal species, wetlands, floodplains, and non-listed wildlife species and summarized this information for each category by regulatory driver, issue, and resolution. There is the potential for the loss of 97 ha (240 ac) of suitable Mexican spotted owl habitat during this proposed action, which is 1.4% of the total available habitat at LANL. This project would require a biological assessment (BA) that is reviewed and concurred with by the US Fish and Wildlife Service (USFWS). The biological evaluation of this site would require significant analysis and regulatory compliance activities with the USFWS over federally protected species and could take up to a year once the process has begun. The potential effects on non-listed wildlife of concern would require an assessment that would make recommendations on reducing potential effects and document the final potential impacts of the action. The potential effects on wetlands and floodplains would require an assessment that would make recommendations on reducing effects and document the final potential impacts of the action. The assessments for the non-listed wildlife, wetlands, and floodplains would not be as involved as the BA and would involve the New Mexico Department of Game and Fish and the US Army Corps of Engineers, respectively.

1.0 INTRODUCTION

1.1 Project Description

The potential location is in the northeast portion of LANL (Figure 1). The project would be oriented north-south from Los Alamos Canyon in the north to Mortandad Canyon in the south, approximately 1.6 km (1 mi) in length and 1.1 km (0.7 mi) in width (Figure 2), which is approximately 180 ha (435 ac). The potential project would consist of approximately 6 km (4 mi) of tunnels 15 m (50 ft) under the lowest point of the canyons with numerous surface control and support structures. The potential complex would operate in areas of Los Alamos, Sandia, and Mortandad Canyons that are currently not heavily used or developed.

1.2 Federal Threatened or Endangered Species

Five federally listed threatened or endangered species (TES) have the potential to occur within or near the AHF project and are discussed in detail in Sections 3.0 and 4.0. The Department of Energy (DOE) - National Nuclear Security Administration (NNSA) must consult with the USFWS on any project that may impact one or more listed species. The five species are listed as follows.

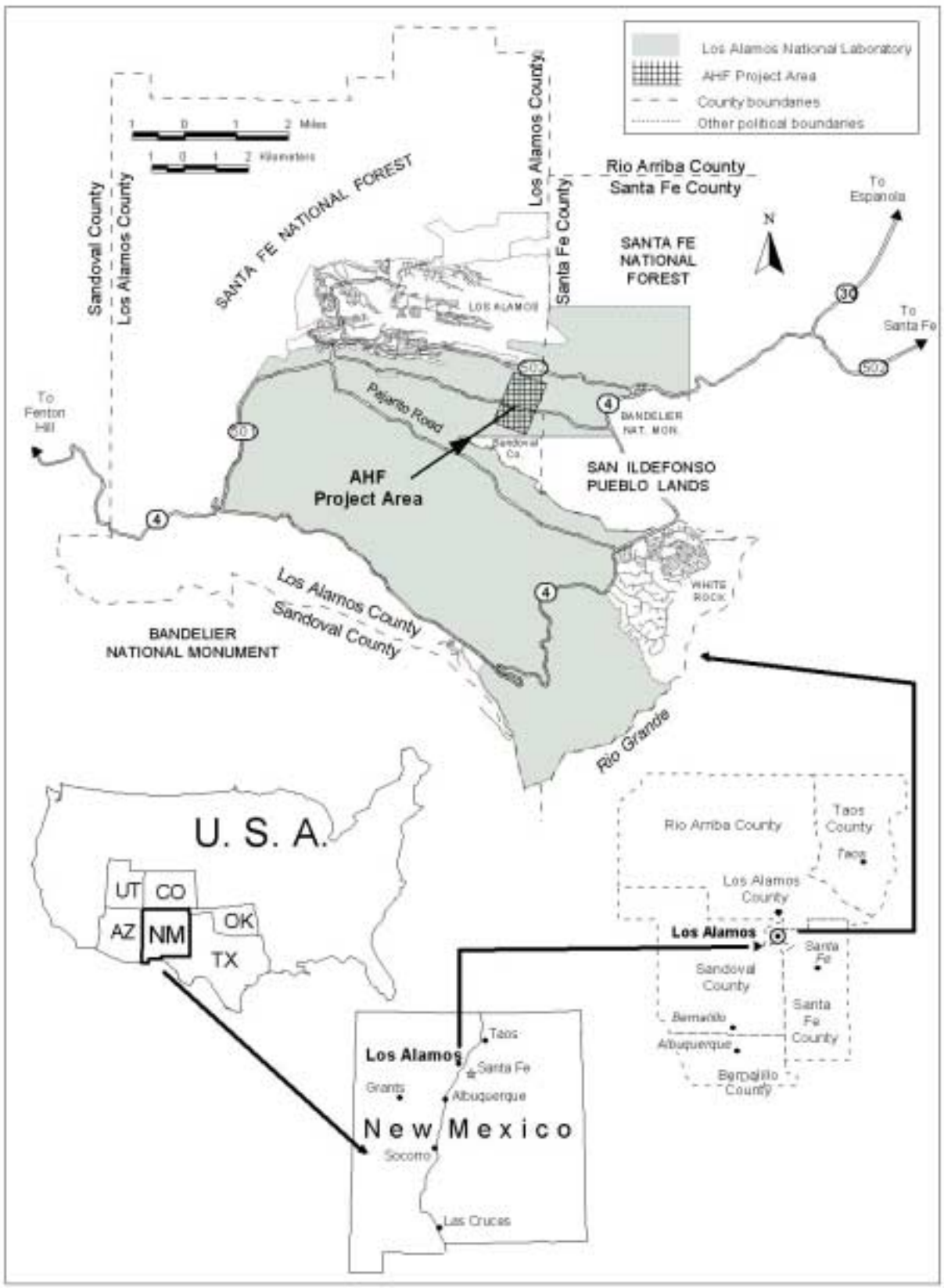

Figure 1. Location of Los Alamos National Laboratory.

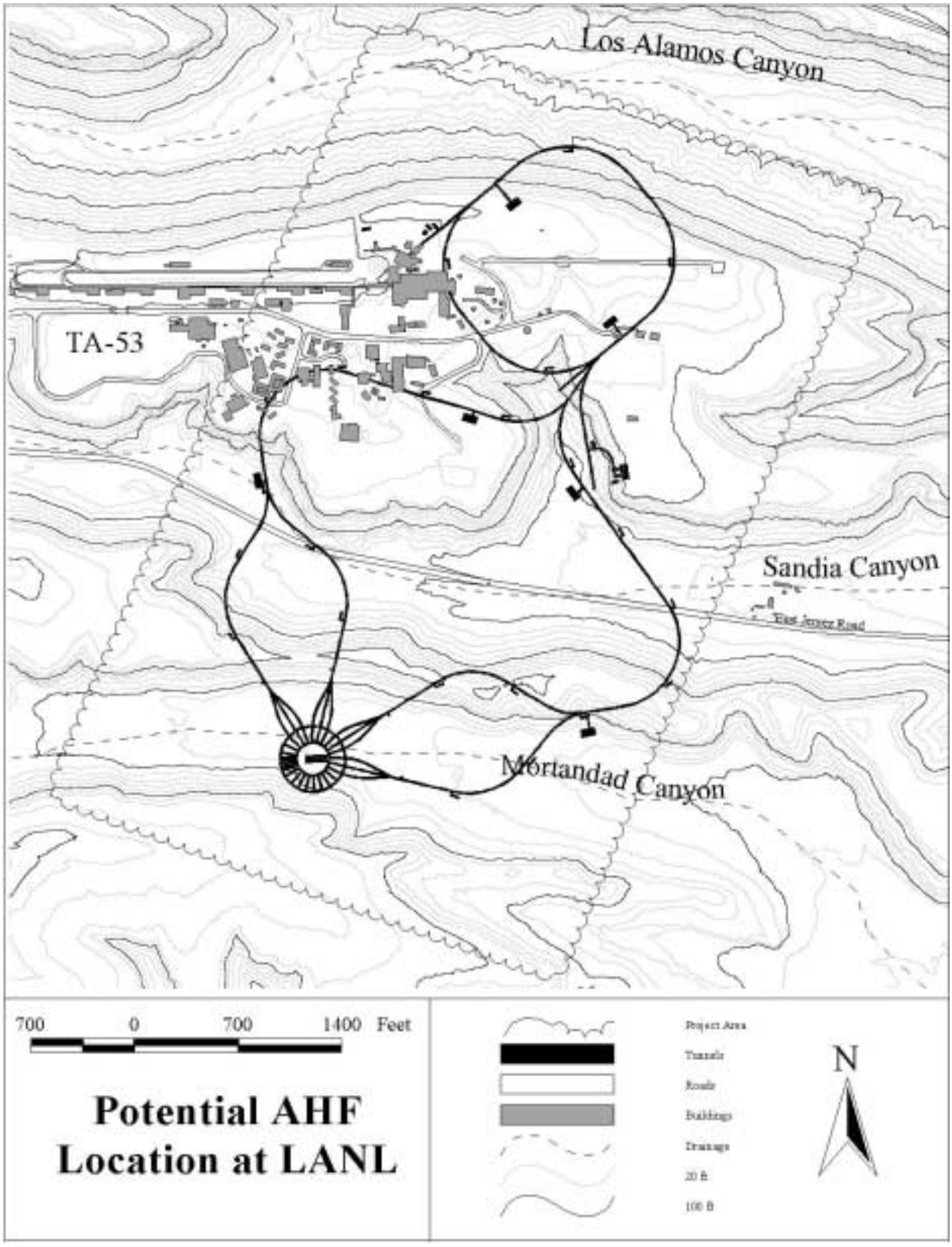

Figure 2. Proposed facility and anticipated area of disturbance.

- **Mexican Spotted Owl (*Strix occidentalis lucida*)**

The potential AHF occurs in a portion of two Areas of Environmental Interest (AEIs) that contain potential Mexican spotted owl nesting, roosting, and foraging habitat in the Los Alamos, Sandia, and Mortandad Canyon systems. AEIs are areas within LANL that are being managed and protected because of their significance to biological or other resources. In general, a TES species AEI consists of a core area that contains important breeding or wintering habitat for a specific species and a buffer area around the core area. The buffer protects the core area from disturbances that would degrade the value of the core area to the species. AEI core areas were defined geographically based on the habitat requirements of the TES. Defining AEIs was a multistep process that included a literature review, development of a land cover map, species surveys, data and technical reviews from regional species experts, guidance from state and federal regulatory agencies, and output from habitat suitability models. Buffer zones were established around each core zone based on regulatory guidance and literature information on species' reactions to disturbance.

The AHF construction would need to be analyzed in a BA that is submitted to the USFWS. Formal consultation for the Mexican spotted owl would be necessary for this assessment. The USFWS would have up to 180 days to comment on the BA once it is submitted.

- **Southwestern Willow Flycatcher (*Empidonax traillii extimus*)**

Suitable habitat for the southwestern willow flycatcher may exist in the AHF project area. Surveys need to be conducted to determine the habitat status. The AHF construction would need to be analyzed in a BA that is submitted to the USFWS. Informal consultation for the southwestern willow flycatcher in this document would be necessary for this assessment.

- **Bald Eagle (*Haliaeetus leucocephalus*)**

The proposed AHF occurs in potential bald eagle foraging habitat. Since there would be a loss of potential foraging habitat for the bald eagle, the AHF construction would need to be analyzed in a BA that is submitted to the USFWS. Informal consultation for the bald eagle would be necessary for this assessment.

- **Whooping Crane (*Grus americana*) and Black-Footed Ferret *(Mustela nigripes*)**

Suitable habitat for these two species does not occur in the AHF project area. Therefore, the project would need to be analyzed in a BA that is submitted to the USFWS. Informal consultation for the whooping crane and black-footed ferret would be necessary for this assessment.

NNSA would initiate Section 7 formal consultation on the Mexican spotted owl and informal consultation on the other federal species through a written BA submitted to the USFWS. The consultation process,

including data collection, impact analysis, report writing, and USFWS reviews can take up to 12 months to complete.

1.3 Potential Listed Species

Up to 25 wildlife species in the potential project area have the potential to become listed as threatened or endangered under the Endangered Species Act during the course of the proposed AHF construction. These species are discussed in more detail in Section 5.0. The project could face delays and incur additional costs should any of these species be elevated to TES status.

An active program of assessment and monitoring for these species would help establish the presence or absence of these species in the project area and reduce or eliminate project delays due to compliance with the Endangered Species Act.

1.4 Non-Listed Species of Concern

Non-listed species of concern are wildlife species that have no specific regulatory protection but impacts to these species could have impacts to public safety and general environmental stewardship. These species are discussed in more detail in Section 6.0. The construction of new facilities can produce unexpected consequences. For instance, fences and structures can force large mammals, such as elk and deer, to change their movement patterns in such a way as to impact public safety if they are forced to cross roads more often or in new locations. Changes in the canyon cliffs would remove bat habitat. Some Laboratory facilities have had problems with smaller mammals, such as raccoons, activating security alarms. The Migratory Bird Treaty Act protects almost all birds from direct harm.

Studies of elk and deer movement would enable us to predict the impact of fences and structures on these animals and enable us to recommend installations that limit these threats to public safety. Songbird surveys and capture-recapture studies would enable us to monitor the facility's impact on migratory bird populations. Bat surveys and capture studies would enable us to monitor the new facility's potential impacts on sensitive bat species.

1.5 Floodplains

One-hundred-year floodplains are present in Los Alamos, Sandia, and Mortandad Canyons within the project area (see Section 7.0 for more detail). Regulations require that structures or utilities built within floodplains conform to applicable floodplain protection standards. In addition, the storage of large amounts of excavation soil material poses a threat to floodplain quality, including surface water and ground water quality.

Engineering controls for the prevention of the loss of life and property in floodplains need to be considered in the building design. Excavated soils should not be stored in the floodplain unless no other alternative is available. A stringent storm water control plan would need to be developed to assure floodplain protection from sediment and potential contaminant migration. A floodplain assessment would need to be prepared for the AHF. A floodplain assessment would include a detailed project description, floodplain effects, including direct and indirect and long- and short-term effects, alternatives, and measures to mitigate the adverse effect.

1.6 Wetlands

Wetlands as defined by the 1987 *Corps of Engineers Wetlands Delineation Manual* (the 1987 Manual) are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. There are no wetlands in the project area by this definition, however, some drainage channels may qualify as "Waters of the US" under the Clean Water Act and may be subject to Section 401 permitting (see Section 7.0 for more detail). Since there is perched water within the canyon areas, tunnel excavation has the potential to modify the natural hydrology of these perched waters. The modifications could result in changes to upstream and downstream wetlands.

Information on structure location and construction activity is needed to determine if a Section 401 permit is required. Additional analysis is necessary to determine the significance of possible hydrological changes on nearby wetlands. A wetland assessment would need to be prepared.

2.0 ENVIRONMENTAL BASELINE FOR THE POTENTIAL AHF PROJECT AREA

2.1 Regional Description

LANL and the associated residential areas of Los Alamos and White Rock are located in Los Alamos County, north-central New Mexico, approximately 100 km (60 mi) north-northeast of Albuquerque and 40 km (25 mi) northwest of Santa Fe (Figure 1). The 11,596-ha (28,654-ac) LANL site is situated on the Pajarito Plateau. This plateau is a series of finger-like mesas separated by deep east-to-west-oriented canyons cut by intermittent streams. Mesa tops range in elevation from approximately 2,400 m (7,800 ft) on the flanks of the Jemez Mountains to about 1,900 m (6,200 ft) at their eastern termination above the Rio Grande.

Most LANL and community developments are confined to mesa tops. The surrounding land is largely undeveloped. Large tracts of land north, west, and south of the LANL site are held by the Santa Fe

National Forest, Bureau of Land Management, Bandelier National Monument, General Services Administration, and Los Alamos County. The Pueblo of San Ildefonso borders LANL to the east.

LANL is divided into technical areas (TAs) that are used for building sites, experimental areas, waste disposal locations, roads, and utility rights-of-way. However, these uses account for only a small part of the total land area. Most land provides buffer areas for security and safety and is held in reserve for future use.

2.2 Geologic Setting

Most of the finger-like mesas in the Los Alamos area are formed from Bandelier Tuff, which is composed of ash fall, ash fall pumice, and rhyolite tuff. The tuff, ranging from nonwelded to welded, is more than 300 m (1,000 ft) thick in the western part of the plateau and thins to about 80 m (260 ft) eastward above the Rio Grande. It was deposited after major eruptions in the Jemez Mountains' volcanic center about 1.2 to 1.6 million years ago.

Surface water in the Los Alamos area occurs primarily as short-lived or intermittent reaches of streams. Perennial springs on the flanks of the Jemez Mountains supply base flow into upper reaches of some canyons, but the volume is insufficient to maintain surface flows across the LANL site before they are depleted by evaporation, transpiration, and infiltration. Runoff from heavy thunderstorms or heavy snowmelt reaches the Rio Grande several times a year in some drainages. Effluents from sanitary sewage, industrial waste treatment plants, and cooling-tower blowdown enter some canyons at rates sufficient to maintain surface flows for varying distances.

In portions of Pueblo, Los Alamos, and Sandia Canyons, perched groundwater occurs beneath the alluvium at intermediate depths within the lower part of the Bandelier Tuff and within the underlying conglomerates and basalts. Perched groundwater has been found at depths of about 37 m (120 ft) in the midreach of Pueblo Canyon to about 137 m (450 ft) in Sandia Canyon near the eastern boundary of LANL. This intermediate-depth perched water discharges at several springs in the area of Basalt Spring in Los Alamos Canyon. These intermediate-depth groundwaters are formed in part by recharge from the overlying perched alluvial groundwaters and show evidence of radioactive and inorganic contamination from LANL operations.

The main aquifer of the Los Alamos area is the only aquifer in the area capable of serving as a municipal water supply. The surface of the aquifer rises westward from the Rio Grande within the Tesuque Formation (part of the Santa Fe Group) into the lower part of the Puye Formation beneath the central and western part of the plateau. Depth to the main aquifer is about 300 m (1,000 ft) beneath the mesa tops in

the central part of the plateau. The main aquifer is separated from alluvial and perched waters by about 110 to 190 m (350 to 620 ft) of tuff and volcanic sediments with low (less than 10%) moisture content.

2.3 Topographic Setting

LANL and its surrounding environments encompass a wide range of environmental conditions. This is due in part to the prominent elevational gradient in the east-west direction. This is also attributable to the complex, local topography that is found throughout much of the region.

The spectacular scenery that is a trademark of the Los Alamos area is largely a result of the prominent elevational gradient of the region. The difference between its lowest elevation in the eastern extremities and its highest elevation on the western boundaries represents a change of approximately 1,568 m (5,146 vertical feet). At the lowest point along the Rio Grande, the elevation is approximately 1,631 m (5,350 ft) above mean sea level. At the opposite elevational extreme, the Sierra de los Valles, which is part of the more extensive Jemez Mountains, forms a continuous backdrop to the landscapes of the study region. The tallest mountain peaks in the Sierra include Pajarito Mountain at 3,182 m (10,441 ft), Cerro Rubio at 3,185 m (10,449 ft), and Caballo Mountain at 3,199 m (10,496 ft).

2.4 Weather and Climate

Los Alamos has a temperate, semiarid mountain climate. However, its climate is strongly influenced by elevation, and large temperature and precipitation differences are observed in the area because of the topography.

Los Alamos has four distinct seasons. Winters are generally mild, but occasionally winter storms produce large amounts of snow and below-freezing temperatures. Spring is the windiest season of the year. Summer is the rainy season in Los Alamos, when afternoon thunderstorms and associated hail and lightning are common. Fall marks the end of the rainy season and a return to drier, cooler, and calmer weather. The climate statistics discussed below summarize analyses given in Bowen (1990 and 1992).

Winter temperatures range from -1°C to 10°C (30°F to 50°F) during the daytime to -9°C to -4°C (15°F to 25°F) during the nighttime. The record low temperature recorded in Los Alamos (as of 1992) is -28°C (18°F). Summer temperatures range from 21°C to 31°C (70°F to 88°F) during the daytime to 10°C to 15°C (50°F to 59°F) during the nighttime.

The average annual precipitation in Los Alamos is 47.57 cm (18.73 in.). The average snowfall for a year is 149.6 cm (58.9 in.). The snow is usually a dry, fluffy powder, with an average equivalent water-to-snowfall ratio of 1:20.

The summer rainy season accounts for 48% of the annual precipitation. During the July–September period, orographic thunderstorms form when moist air from the Gulf of Mexico and the Pacific Ocean moves up the sides of the Jemez Mountains.

2.5 Plant Communities

The Pajarito Plateau, including the Los Alamos area, is biologically diverse. This diversity of ecosystems is due partly to the dramatic 1,500-m (5,000-ft) elevation gradient from the Rio Grande on the east to the Jemez Mountains 20 km (12 mi) to the west, and partly to the many steep canyons that dissect the area. Five major vegetative cover types are found in Los Alamos County: juniper (*Juniperus monosperma* [Engelm.] Sarg.)-savanna, piñon (*Pinus edulis* Engelm.)-juniper, ponderosa pine (*Pinus ponderosa* P. & C. Lawson), mixed conifer, and spruce-fir. The juniper-savanna community is found along the Rio Grande on the eastern border of the plateau and extends upward on the south-facing sides of canyons at elevations between 1,700 to 1,900 m (5,600 to 6,200 ft). The piñon-juniper cover type, generally in the 1,900- to 2,100-m (6,200- to 6,900-ft) elevation range, covers large portions of the mesa tops and north-facing slopes at the lower elevations. Ponderosa pines are found in the western portion of the plateau in the 2,100- to 2,300-m (6,900- to 7,500-ft) elevation range. These three cover types predominate, each occupying roughly one-third of the LANL site. The mixed conifer cover type, at an elevation of 2,300 to 2,900 m (7,500 to 9,500 ft), overlaps the ponderosa pine community in the deeper canyons and on north-facing slopes and extends from the higher mesas onto the slopes of the Jemez Mountains. Subalpine grassland is at higher elevations of 2,900 to 3,200 m (9,500 to 10,500 ft). Twenty-seven wetlands and several riparian areas enrich the diversity of plants and animals found on LANL lands.

2.5.1 Post-Fire Plant Communities

In May 2000, the Cerro Grande Fire burned over 43,000 acres of forest on and around LANL. Most of the habitat damage occurred on Forest Service property to the west and north of LANL. An assessment of fire-induced vegetation mortality (Table 1) was made by the Burned Area Emergency Rehabilitation Team (BAER 2000). Vegetation mortality was broken into four classes, 0% to 10%, 10% to 40%, 40% to 70%, and 70% to 100%. Although the vegetation will recover, the amount of time for recovery, the ultimate composition and distribution of vegetation types, and the effect on TES are unknown.

Table 1. Summary of the Effects of the Cerro Grande Fire on Vegetation Mortality (acres/hectares)

Plant Associations	0%-10%	10%-40%	40%-70%	70%-100%	Totals
Aspen	349/141	297/120	128/52	550/223	1,324/536
Grass	215/87	1,392/563	293/119	153/62	2,063/831
Grass-Shrub Complex	133/54	622/251	140/57	32/13	927/375
Meadow	25/10	13/5	0	0	38/15

Table 1 cont.

Plant Associations	0%-10%	10%-40%	40%-70%	70%-100%	Totals
Mixed Conifer	1,605/649	2,209/894	938/380	4,989/2,019	9,741/3,942
Oak	7/3	220/89	84/34	462/187	773/313
Piñon-Juniper	109/44	2,213/896	1,117/452	1,608/651	5,0472,043
Ponderosa Pine	805/326	6,872/2,781	5,252/2,125	8,886/3,596	21,815/8,828
Riparian/Evergreen	0	50/20	0	0	50/20
White Fir	0	18/7	280/113	379/153	677/273
Totals	3,248/1,314	13,906/5,628	8,232/3,331	17,059/6,904	42,445/17,177

3.0 FEDERAL THREATENED, ENDANGERED, AND CANDIDATE SPECIES

3.1 Regional Lists

Table 2 presents the list of TES potentially occurring in or near the proposed AHF location.

Table 2. TES Wildlife Potentially Occurring within or near the Project Areas

Scientific Name	Common Name	Status*	Habitat	Potential to Occur⊗
Strix occidentalis lucida	Mexican spotted owl	FT	Forested mountains and canyons. Generally uneven-aged, multistoried forest with closed canopy.	Moderate
Empidonax traillii extimus	Southwestern willow flycatcher	FE	Riparian areas with stands of willow, buttonbush, or tamarisk.	Low
Haliaeetus leucocephalus	Bald eagle	FT	Permanent rivers, lakes, and large streams, cliffs or associated large trees.	Low
Grus americana	Whooping crane	FE	Rivers, marshes, and swamps.	Low
Mustela nigripes	Black-footed ferret	FE	Greater than 32 ha (80 ac) of prairie dog towns.	Low

***Codes for Legal Status**
FE = federally endangered
FT = federally threatened

⊗Potential to Occur
High = species is known to occur in the area
Moderate = the area has some species habitat components
Low = the area does not have species habitat components

3.2 Status of Species

Table 3 presents the list of TES potentially occurring in or near the proposed AHF location and their population trends.

3.3 Habitat Evaluations

The LANL Habitat Management Plan (HMP) for TES (LANL 1998) is a document prepared by Ecology group personnel as part of the Dual-Axis Radiographic Hydrodynamic Test Facility Mitigation Action Plan. The purpose of the HMP is to provide for the protection of TES and their habitats on LANL. The HMP is designed to be a comprehensive landscape-scale management plan that will balance the current operations and future development needs of LANL with the habitat requirements of TES. It will also facilitate NNSA compliance with the Endangered Species Act and related federal regulations.

Table 3. Population Trends of Federally Listed Threatened and Endangered Species

Species	Current Legal Status	Regional Trends	State Trends	Local Trends
Mexican spotted owl *Strix occidentalis lucida*	Federally Threatened	In 1993, 2,160 owls existed and now 20% of owl habitat has been rendered no longer suitable (Federal Register 1993).	In 1994, 250 to 300 territories occupied (NMDGF 2001).	Surveys for Mexican spotted owls have been conducted on LANL since 1994. In 1995, a pair of Mexican spotted owls was located as well as a nest (Keller et al., 1996). Each subsequent year the nest has been occupied and resulted in two young fledged per year.
Southwestern willow flycatcher *Empidonax traillii extimus*	Federally Endangered	300 to 500 breeding pairs remain (USFWS 1995).	1993-95 surveys found 100 breeding pairs and 75% occurred in a local area. Surveys and data gathered in 1987, 1991, and 1994 suggest the population is declining (NMDGF 1994).	Willow flycatcher surveys have been conducted at LANL and Bandelier National Monument since 1995. Willow flycatchers have been detected, but no nesting flycatchers have been found. Willow flycatchers have been found nesting along the Rio Grande in Española (Keller et al., 1996).
Bald eagle *Haliaeetus leucocephalus*	Federally Threatened	South of Canada, bald eagles declined drastically in numbers and range. Some US populations have recovered in recent years (NMDGF 2001).	Numbers of wintering bald eagles have increased in recent years averaging about 430 birds per year during 1990-1994 (early 1980s, 220 birds). Only two known nesting pairs in the state (NMDGF 1994 and NMDGF 2001).	Since 1979, average winter counts near Cochiti area have doubled. As total counts have increased, the number of bald eagles using areas farther upstream has increased. Surveys in March 1992 were conducted for roost tree use on LANL lands. This survey indicated occasional bald eagle use of trees near the mouths of Water and Chaquehui Canyons (Keller et al., 1996).
Whooping crane *Grus americana*	Federally Endangered	Historically entire populations numbered only 1,300 to 1,400 individuals. In 1941, only 21 birds known. In 1987-1988, wintering wild populations stood at 153 birds (NMDGF 2001).	The experimental Rocky Mountains flock that winters in New Mexico peaked at 33 birds but, because pairing and reproduction never occurred, experiment concluded in 1989. Flock has since dwindled to four birds (NMDGF 2001).	Whooping cranes and sandhill cranes follow the Rio Grande during migration. However, there are no reports of actual Laboratory use by cranes.
Black-footed ferret *Mustela nigripes*	Federally Endangered	In 1992, the black-footed ferret was listed as the rarest mammal in North America. In 1981, a remnant population in northwest Wyoming was removed for captive breeding and reintroduction. Reintroduction has begun in Wyoming, Montana, and South Dakota (Finch 1992).	Last reported in New Mexico in 1934 (NMDGF 2001). Although NMDGF (2001) stated that ferrets were once common in New Mexico, there is no evidence to support this statement. We know of no records in recent years. If any animals survive, the northwestern part of the state is the most likely area (Findley et al., 1975).	No reported sightings of black-footed ferrets in Los Alamos County for at least the last 50 years. In addition, no large prairie dog towns have been observed on LANL lands.

The HMP defines site plans and monitoring plans for TES that occur or may occur on LANL. Currently, there are site plans for each of the following federally threatened or endangered species occurring or potentially occurring at LANL: bald eagle, southwestern willow flycatcher, and Mexican spotted owl.

The purpose of site plans is to provide guidelines that ensure LANL operations do not adversely affect these species or their habitats. Suitable habitats for these species, along with a protective buffer area surrounding the habitats, have been designated as AEIs. Site plans provide information on the location of AEIs and guidelines for their management. AEIs are areas within LANL that are being managed and protected because of their significance to biological or other resources. In general, a TES AEI consists of a core area that contains important breeding or wintering habitat for a specific species and a buffer area around the core area. The buffer protects the core area from disturbances that would degrade the value of the core area to the species. AEI core areas were defined geographically based on the habitat requirements of the TES.

Site plans identify the particular areas of LANL where operations might impact TES. They also provide a broad list of activities, which, if they are conducted in accordance with the guidelines in the site plan, will not adversely affect TES.

3.4 Database Review

Under the HMP for LANL, a project management tool has been created using the ARC-VIEW© computer program that uses layers of information compiled in visual form (Foxx et al., 1996). This tool contains information about species from the recent federal lists recorded by the USFWS, plant cover types developed from remote sensing and field studies (Koch et al., 1996), National Wetland Inventory layers and field-identified wetlands, and disturbed developed areas. It also contains layers of roads, development, and geology that have been developed by the Earth and Environmental Sciences group at LANL. The Biology Team ARC-VIEW© tool has an associated look-up table that has information about the needs of each endangered, threatened, or sensitive species identified for Los Alamos County.

3.4.1 Methods

We conducted an initial TES screening analysis on the proposed project using an application developed on a desktop geographic information system (GIS), ARC-VIEW© (Foxx et al., 1996). From the application, we determined the land cover types within the proposed project area, a list of federally protected species that use those land cover types, and known locations of federally listed species within 400 m (0.25 mi) of the project area. This information is obtained for the entire project area and/or for zones of different project influences. In addition, we obtained information from previous studies or

surveys conducted in the same area of the proposed project. Maps and tables from databases were generated from the GIS application. Bennett (1997) provides the systematic instructions for the use of the screening analysis application. All data used for the screening are maintained in an ARC/INFO GIS database (Bennett et al., 1996).

3.4.2 Results

Using the database tool, the project area was found to have four plant cover types: grassland, piñon/juniper, ponderosa pine, and mixed conifer (Figure 3) (Koch et al., 1996). The site of the proposed AHF is a relatively undisturbed area with the exception of West Jemez Road and the developed mesa top at TA-53 (see Figure 2). The areas of Los Alamos, Sandia, and Mortandad Canyons where this project is proposed to take place currently do not have any major areas of development. Contaminants have been discovered in potential release sites (PRSs) on the mesa containing TA-53 as well as Sandia, Los Alamos, and Mortandad Canyons. The levels of contamination in all of the project area have not been completely investigated and further areas of concern may exist. LANL biologists then compared the vegetation types, areas of disturbance, and PRS areas with specific habitat requirements for all TES listed as potentially occurring in Los Alamos County by the USFWS. If the habitat requirements of a particular TES were not met, the biologists considered the site unsuitable habitat, and no further surveys for that species were conducted. If any of the habitats could be used by TES, a database search was conducted. From the database, we determined that one species, the Mexican spotted owl, listed in Section 4.0, could potentially be affected by this project. The other four species that could be affected and that are discussed in Section 4.0 were found to have minimal use of the proposed project location. However, this site is considered suitable foraging habitat for the bald eagle, and wetlands (potentially suitable for the southwestern willow flycatcher) do exist in the project area so the proposed location was evaluated for possible use by these species.

3.5 Cerro Grande Fire

In May 2000, the Cerro Grande Fire burned over 43,000 acres of forest on and around LANL. Most of the habitat damage occurred on Forest Service property to the west and north of LANL. A large percentage of the potential AHF project area was burned during the fire. Vegetation mortality in the project area was classified as moderate with areas where 10% to 40% of the vegetation was killed (Figure 4). Areas where 40% to 70% of the vegetation was killed were a mosaic of moderate and high mortality. Although the vegetation in the project area will recover, the amount of time for recovery, the ultimate composition and distribution of vegetation types, and the effect on TES are unknown.

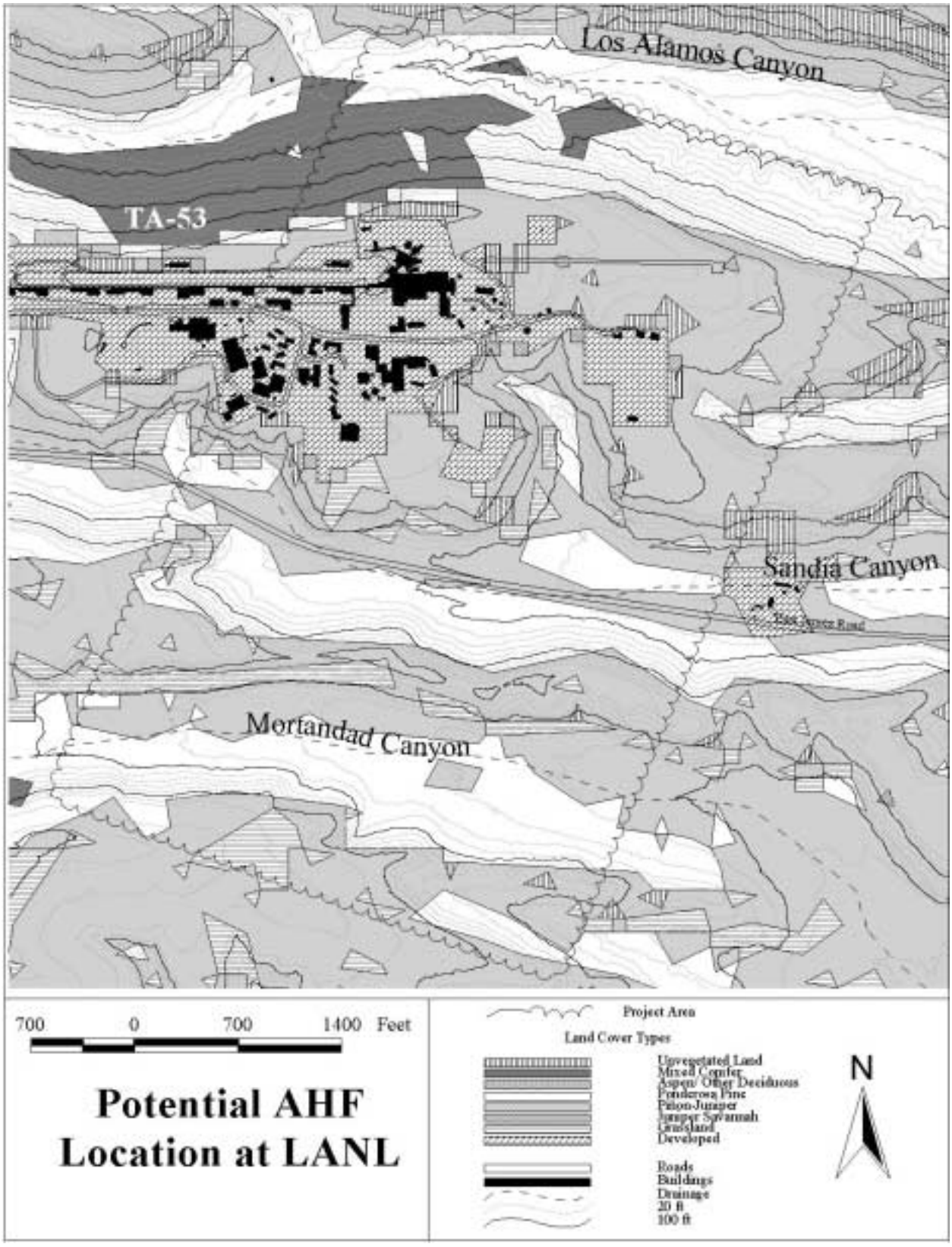

Figure 3. Land cover types in the AHF project area.

4.0 SPECIES-SPECIFIC EVALUATIONS

A species-specific survey was conducted for one TES potentially occurring within the survey area. Based on habitat evaluation, it was determined that a species-specific survey for the Mexican spotted owl was required at the proposed AHF project. The bald eagle, southwestern willow flycatcher, whooping crane, and black-footed ferret were determined to be very unlikely to utilize the project area because of lack of required habitat components. However, there is a slight chance that the bald eagle and southwestern willow flycatcher could utilize the project area. Therefore, these species were included in the analysis.

4.1 Mexican Spotted Owl

4.1.1 Habitat Description

The Mexican spotted owl inhabits mixed conifer and ponderosa-Gamble's oak forests in mountains and canyons in the southwestern US and northern Mexico with the following characteristics (USFWS 1995):

- high canopy closure,
- high stand diversity,
- multilayered canopy resulting from an uneven age stand,
- large and mature trees,
- downed logs,
- snags, and
- stand decadence as indicated by the presence of mistletoe.

In addition, spotted owls favor narrow, steep canyons where there is little light penetration and temperatures are cool. A spotted owl nests in trees, crevices, or small caves (Travis 1992) and tends to prefer north-facing slopes (USFWS 1995). Locations in the proposed AHF contain suitable owl habitat and are capable of supporting Mexican spotted owl nesting and roosting. Three to seven years of surveys were conducted at this site (Keller 1993 to 2000). Although the surveys have not located Mexican spotted owls, site-specific mitigation measures would need to be followed to protect the habitat.

4.1.2 Potential Effects of the Proposed Action

The AHF project area contains portions of two Mexican spotted owl AEIs (Figure 5). Mexican spotted owls have not been found nesting in the project area during surveys. Los Alamos Canyon has been surveyed for seven years and Sandia and Mortandad Canyons have been surveyed for three years. There are no known Mexican spotted owl historic nesting or roosting sites in the project area. Approximately 180 ha (435 ac) could be disturbed as a result of this proposed action. During the mating and breeding season (1 March – 31 August), noise from heavy equipment and increased human activity within 400 m (0.25 mi) of a spotted owl nest habitat could disturb mating and nesting owls and lead to nest abandonment. Removal of or damage to vegetated areas could decrease prey species densities, which

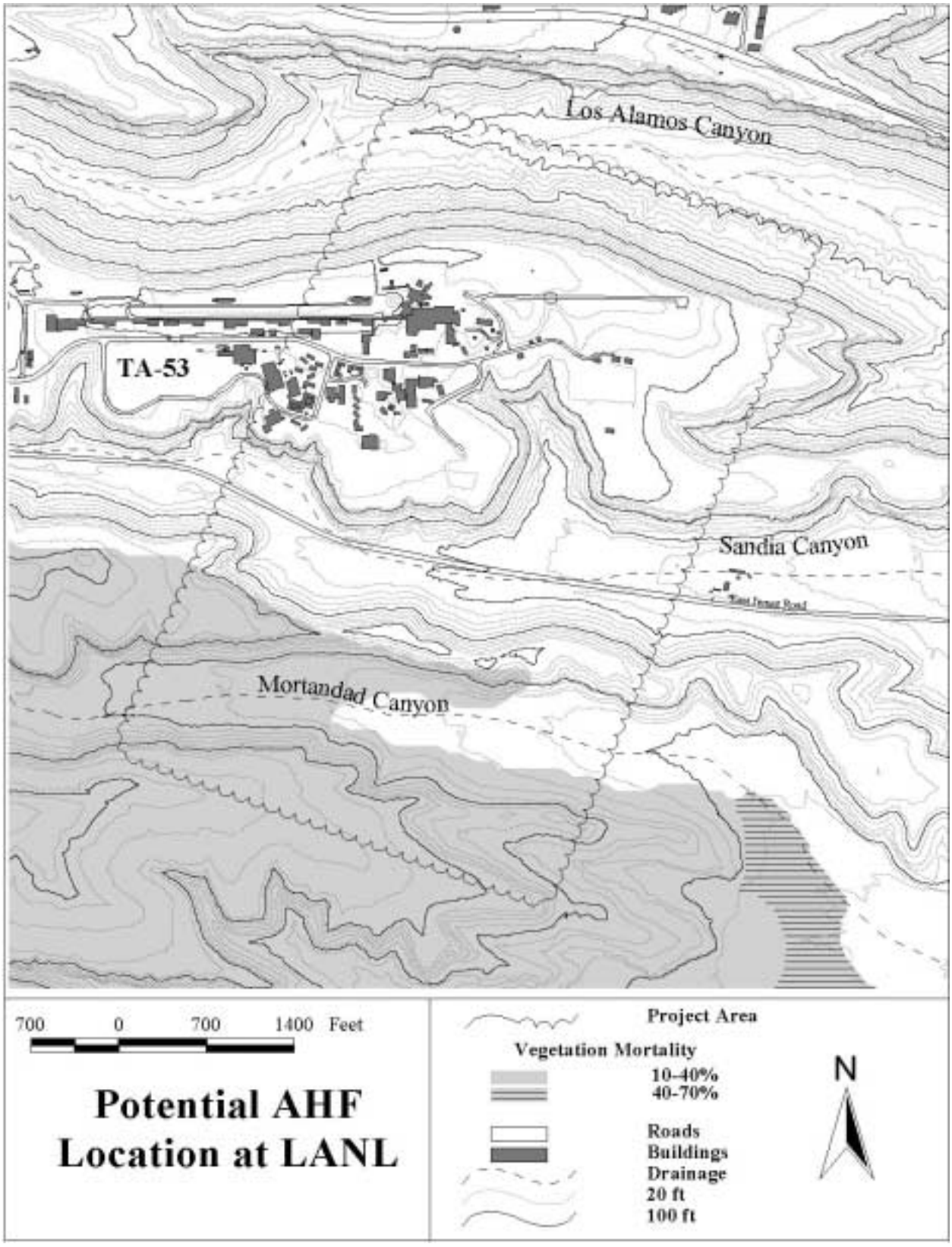

Figure 4. Vegetation mortality at the AHF project area.

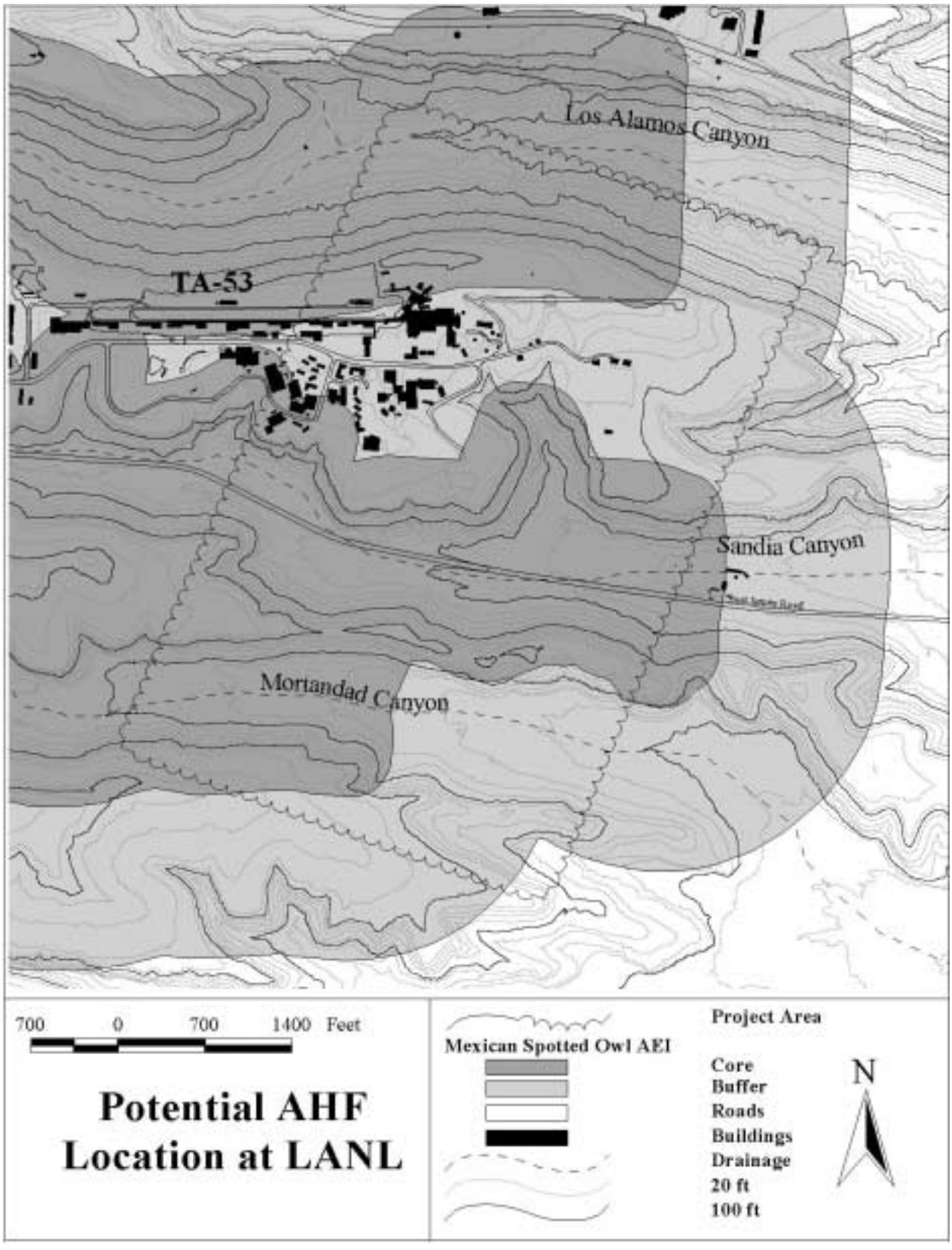

Figure 5. Mexican spotted owl AEIs in the AHF project area.

could decrease the use of that area by spotted owls. All habitat components exist near the AHF project area, and the construction is expected to adversely impact this species because suitable nesting and roosting habitat would be removed during the construction. There is the potential for the loss of 97 ha (240 ac) of suitable Mexican spotted owl habitat during this proposed action, which is 1.4% of the total available habitat at LANL. This proposed complex would be located within 400 m (0.25 mi) of suitable nesting and roosting habitat. However, the proposed project is not located near any historic or present nest sites.

4.2 Southwestern Willow Flycatcher

4.2.1 Habitat Description

The southwestern willow flycatcher breeds in dense riparian habitats along rivers, streams, or other wetlands. Southwestern willow flycatchers inhabit areas near water with 4- to 7-m (13- to 23-ft) high thickets of willow (*Salix* spp.), buttonbush (*Cephalanthus occidentalis* var. *pubescens*), seepwillow (*Baccharis glutinosa*), and tamarisk (*Tamarix pentandra*) (Tibbitts et al., 1994). Occasionally, a sparse overstory of cottonwoods (*Populus* spp.) is associated with this species. In some areas, the flycatcher will nest in habitats dominated by the introduced tamarisk and Russian olive (*Eleagnus angustifolia*). One of the most important characteristics of the habitat appears to be the presence of dense vegetation, usually throughout all vegetation layers present. Almost all southwestern willow flycatcher breeding habitats are within proximity (less than 20 yards) of water or very saturated soil. This water may be in the form of large rivers, smaller streams, springs, or marshes. At some sites, surface water is present early in the nesting season, but gradually dries up as the season progresses. Ultimately, the breeding site must have a water table high enough to support riparian vegetation.

4.2.2 Potential Effects of the Proposed Action

Approximately 1.2 ha (3 ac) of stream channel could be disturbed as a result of this proposed action. During the mating and breeding season (15 May – 31 July), removal of or damage to wetland vegetated areas could decrease prey species densities, which could decrease the use of that area by this flycatcher. The stream channel areas in the project area do not currently support suitable southwestern willow flycatcher habitat. In addition, the proposed project is not located in or near any historic or present nest sites.

4.3 Bald Eagle

4.3.1 Habitat Description

The bald eagle primarily occurs in habitats along permanent streams and lakes. Although this species can occasionally be found along other types of riparian areas, it prefers habitat with permanent water and

suitable shelter for roosting, but will also forage for rabbits and carrion on the mesa tops. Wintering bald eagles have been sighted regularly along the eastern edge of the Laboratory property near the Rio Grande. However, it is possible that the project area is occasionally used as foraging habitat. The bald eagle winters along the Rio Grande. Winter roosts have been observed at Cochiti Lake and north of the lake along the Rio Grande.

4.3.2 Potential Effects of the Proposed Action

Approximately 97 ha (240 ac) of potential non-riparian foraging habitat could be lost in the project area. Construction noise could disturb the normal behavior patterns of this species if they come within 400 m (0.25 mi) of the construction activity. If all 97 ha (240 ac) are lost as foraging habitat during this action, it would result in a loss of 0.35% of the foraging habitat in Los Alamos County. The bald eagle has not been recorded foraging on or near the proposed construction location.

4.4 Whooping Crane

4.4.1 Habitat Description

The whooping crane nests along the marshy areas among bulrushes, cattails, and sedges that provide food and protection from predators. Cranes eat snails, larval insects, leeches, frogs, minnows, small rodents, and berries. They may scavenge dead ducks, marsh birds, or muskrats. During migration, they stop to eat aquatic animals, roots of plants, and waste grain in stubble fields.

In late April, cranes arrive at their breeding area in Wood Buffalo National Park, which extends into northeast Alberta, Canada, from the Northwest Territory. By the end of September, the cranes leave for the 4,000-km (2,485-mi) flight south to the Aransas National Wildlife Refuge in Texas. The whooping crane is an internationally recognized symbol of wildlife conservation, classified as an endangered species in both Canada and the US. Currently, the only wild breeding population of whooping cranes migrates between Wood Buffalo National Park in the Northwest Territories and Aransas National Wildlife Refuge in Texas (NMDGF 1996).

An effort to create a wild flock with an alternate migratory route was initiated in 1975, using sandhill cranes as "foster parents." Whooping crane eggs were placed in the nests of sandhill cranes on their nesting grounds at the Grays Lake National Wildlife Refuge in Idaho. The sandhill cranes reared the chicks as their own, teaching them feeding habitats and ultimately a new 1,368-km (850-mi) migratory path to the Bosqué del Apache National Wildlife Refuge in New Mexico. Unfortunately, these whooping cranes became so accustomed to their sandhill parents that they would not mate with other whooping

cranes. Today, there are four whooping cranes left in this flock. The birds from this unsuccessful experiment are expected to be the only occurrences of this species in New Mexico.

4.4.2 Potential Effects of the Proposed Action

Most of the suitable habitat occurs along the Rio Grande in Los Alamos and Santa Fe counties. The project areas are located more than 8 km (5 mi) from the Rio Grande. The habitat in the project area does not have suitable nesting, wintering, or foraging habitat for the whooping crane.

4.5 Black-footed Ferret

4.5.1 Habitat Description

The black-footed ferret has a historical range that included 12 states (Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming) and the Canadian provinces of Alberta and Saskatchewan. There is prehistoric evidence of this ferret occurring from the Yukon Territory in Canada south to New Mexico and Texas (Anderson et al., 1986). Black-footed ferrets primarily prey on prairie dogs and use their burrows for shelter and reproduction and depend almost exclusively on prairie dogs for food and shelter (NMDGF 1996). Ferret range is coincident with that of prairie dogs (Anderson et al., 1986), with no documentation of black-footed ferrets breeding outside of prairie dog colonies. There are specimen records of black-footed ferrets from ranges of three species of prairie dogs: the black-tailed prairie dog (*Cynomys ludovicianus*), white-tailed prairie dog (*Cynomys leucurus*), and Gunnison's prairie dog (*Cynomys gunnisoni*) (Anderson et al., 1986). Researchers have found that only prairie dog colonies with a combined area greater than 32 ha (80 ac) are large enough to support black-footed ferrets.

4.5.2 Potential Effects of the Proposed Action

There are no colonies of the appropriate size in Los Alamos County, and there are no prairie dog colonies near the proposed site of the AHF.

5.0 POTENTIAL LISTED SPECIES

Table 4 presents the list of federal candidate, proposed, and species of concern and the State of New Mexico threatened, endangered, and sensitive species (potential listed species) that could be affected by the AHF project. Ecology group biologists compared the vegetation cover types with specific habitat requirements for all species listed as potentially occurring in Los Alamos, Rio Arriba, Sandoval, and Santa Fe counties by the NMDGF BISON database. If the habitat requirements of a particular TES were not met, the species was dismissed from evaluation. Field survey data are required to make accurate assessments of the effects of the proposed project. Field survey data from past and ongoing Ecology

group monitoring programs were used when available and appropriate. Unfortunately, field survey data were generally not available for these species in the area of the proposed action.

5.1 Status of Species

Table 5 presents the population trends of potential listed species that could be affected by the AHF project. Habitat requirements and survey methods for all species will be discussed in the following sections.

5.2 Potential Effects of the Proposed Project

Approximately 97 ha (240 ac) of potential habitat could be lost in the project area. Construction noise could disturb the normal behavior patterns of these species. The increased activity in the project area could discourage the use and future use of the project area.

6.0 NON-LISTED WILDLIFE OF CONCERN

The AHF would be located in several canyons and mesa tops and would potentially impact many species of plants and animals. The AHF region is biologically diverse. This diversity is illustrated by the presence of over 57 species of mammals; 200 species of birds, including 112 species known to breed in Los Alamos County; 28 species of reptiles; 9 species of amphibians; and over 1,200 species of arthropods. Approximately 180 ha (435 ac) could be disturbed as a result of this proposed action. This section of the biological informational document describes these species in more detail.

Four species of large mammals are known to occur within the project area (Table 6). Of these, mule deer and elk are the most common. Table 6 lists possible project impacts to large mammals. Further studies on movement patterns of large game species may be required before a comprehensive assessment of the impacts of the AHF can be determined. Over 12 medium-sized mammal species occur in the project area. Of these species, three are listed by the State of New Mexico as threatened, endangered, or sensitive.

Table 6 lists possible project impacts to medium-sized mammals. Further medium-sized mammal studies may be required before a comprehensive assessment of the impacts of the AHF can be made. At least 29 species of small mammals occur in the project area. Of these species, seven are listed by the State of New Mexico as threatened, endangered, or sensitive. Further small mammal studies may be required before a comprehensive assessment of the impacts of the AHF can be made. Over 13 species of bats occur in the project area. Of these species, nine are listed by the State of New Mexico as threatened, endangered, or sensitive. Table 6 lists possible project impacts to small mammals. Further bat studies may be required before a comprehensive assessment of the impacts of the AHF can be made.

Table 4. New Mexico TES Potentially Occurring within or near Proposed AHF Project

Scientific Name	Common Name	Status*	Habitat	Potential to Occur⊗
Charidryas acastus acastus	Pearly Checkerspot Butterfly	FSOC	Sagebrush scrub, piñon-juniper woodlands, dry gulches	Low
Plethodon neomexicanus	Jemez Mountains Salamander	NMT	This small woodland salamander is found in mixed conifer and spruce-fir forests above 2,160 m (7,200 ft) in specific microhabitat conditions. Preferred microhabitat is generally characterized by relatively high humidity and soils with specific rock structure, although populations have been found outside these parameters (NMDGF 2001).	Moderate
Bufo boreas boreas	Western Boreal Toad	NME FC	This toad lives near springs, streams, ponds, and lakes in foothill woodlands, mountain meadows, and moist sub-alpine forest to 3,200 m (10,560 ft) (NMDGF 2001). This toad occupies a variety of habitats over its range -- including springs and streams in arid lowlands upward into high mountain meadows (NMDGF 2001). In New Mexico, the species appears to be exclusively a high-mountain form (i.e., above 2,600 m [8,580 ft]), and it is usually associated with beaver ponds (NMDGF 2001). The western boreal toad is totally dependent on standing or running water for breeding.	Low
Accipiter gentilis	Northern Goshawk	FSOC NMS	The small New Mexico population occurs locally in mature, closed-canopied coniferous forests of mountains and high mesas (NMDGF 2001).	Low
Lanius ludovicianus	Loggerhead Shrike	FSOC	This bird is found in Douglas fir, ponderosa pine, aspen (hardwoods), chaparral, and piñon-juniper forest types (NMDGF 2001).	Low
Ammodramus bairdii	Baird's Sparrow	FSOC NMT	In New Mexico, Baird's sparrow has been found in a variety of habitats, ranging from desert grasslands in the south to prairies in the northeast and mountain meadows in the San Juan and Sangre de Cristo mountains--including to an elevation of 3,540 m (11,800 ft).	Low
Vireo vicinior	Gray Vireo	NMT	In New Mexico, the gray vireo is most often found in arid juniper woodlands on foothills and mesas, these are most often associated with oaks and usually in habitat with a well-developed grass component (NMDGF 2001).	Moderate
Cypseloides niger borealis	Black Swift	NMS	River, riparian woodland, subalpine marsh with inaccessible cliffs. Occurs at elevations near water where stream conditions provide sufficient permanent moisture for emergent plants.	Low

Table 4 cont.

Scientific Name	Common Name	Status*	Habitat	Potential to Occur⊗
Charadrius montanus	Mountain Plover	FT NMS	This is a lowland grassland species and is not found in the mountains, in spite of its common name (NMDGF 2001). Mountain plovers are considered to be strongly associated with sites of heaviest grazing pressure to the point of excessive surface disturbance (NMDGF 2001). Currently, the mountain plover is also attracted to human-made landscapes (e.g., sod farm, cultivated fields) that mimic the natural habitat associations, or sites with grassland characteristics (alkali flats, other agricultural lands). Mountain plover nesting sites are dominated by short vegetation and bare ground, often with manure piles or rocks nearby (NMDGF 2001).	Low
Myotis ciliolabrum melanorhinus	Western Small-footed Myotis Bat	FSOC NMS	Uses cliffs, rock outcrops, and snag trees in mixed conifer, ponderosa pine, and piñon/juniper habitat.	High
Myotis lucifugus occultus	Little Brown Occult Bat	FSOC NMS	Uses cliffs, rock outcrops, and snag trees in mixed conifer, ponderosa pine, and piñon/juniper habitat.	Moderate
Myotis lucifugus carissima	Little Brown Bat	NMS	Uses cliffs, rock outcrops, and snag trees in mixed conifer, ponderosa pine, and piñon/juniper habitat.	Moderate
Myotis thysanodes thysanodes	Fringed Bat	FSOC NMS	Uses cliffs, rock outcrops, and snag trees in mixed conifer, ponderosa pine, and piñon/juniper habitat.	High
Myotis yumanensis yumanensis	Yuma Bat	FSOC NMS	Uses cliffs, rock outcrops, and snag trees, in mixed conifer, ponderosa pine, and piñon/juniper habitat.	Moderate
Myotis volans interior	Long-legged Bat	FSOC NMS	Uses cliffs, rock outcrops, and snag trees in mixed conifer, ponderosa pine, and piñon/juniper habitat.	High
Myotis evotis evotis	Long-eared Bat	FSOC NMS	Uses cliffs, rock outcrops, and snag trees in mixed conifer, ponderosa pine, and piñon/juniper habitat.	High
Euderma maculatum	Spotted Bat	FSOC NMT	Spotted bats have been recorded in a wide variety of habitats, from riparian and piñon-juniper woodlands to ponderosa pine and spruce-fir forests (NMDGF 2001). In New Mexico, the species has been taken from the lower Rio Grande Valley near Las Cruces (1,200 m [3,940 ft]) to near the summit of Mt. Taylor (3,230 m [10,600 ft]). Most records are in or near forested areas--usually of bats captured in nets placed over bodies of water. Spotted bats may summer in forested areas and migrate through lower elevations at other seasons (NMDGF 2001). This bat has been recorded on LANL.	High
Plecotus townsendii pallescens	Townsend's Pale Big-eared Bat	FSOC NMS	Uses cliffs, rock outcrops, and snag trees in mixed conifer, ponderosa pine, and piñon/juniper habitat.	High

Table 4 cont.

Scientific Name	Common Name	Status*	Habitat	Potential to Occur⊗
Nyctinomops macrotis	Big Free-tailed Bat	FSOC NMS	Uses cliffs, rock outcrops, and snag trees in mixed conifer, ponderosa pine, and piñon/juniper habitat.	Moderate
Bassariscus astutus	Ringtail	NMS	Ringtails live in extensive rocky areas and cliffs in grassland and woodland. They are not usually found more than 800 m (2,640 ft) from water (NMDGF 2001).	Moderate
Spilogale gracilis	Western Spotted Skunk	NMS	Rock outcrops. They are found in cottonwood and rabbitbrush riparian habitats.	Moderate
Vulpes vulpes	Red Fox	NMS	The red fox is commonest in open woodlands, pasturelands, riparian, and agricultural lands. It favors areas with a mixture of the vegetation types occurring in small mosaics with good development of ground cover (NMDGF 2001).	Moderate
Ochotona princeps nigrescens	Goat Peak Pika	NMS	*O .p. nigrescens* occupy virtually every patch of appropriate talus in the Jemez Mountains down to 2,640 m (8,800 ft).	Low
Zapus hudsonius luteus	New Mexico Meadow Jumping Mouse	NMT	Jemez Mountains habitat may be characterized as the narrow grass-forb-willow streamside riparian zone along permanent waterways and is described in Morrison (1990).	Moderate
Martes americana origenes	American Marten	NMT	The pine marten has been verified in the San Juan and Sangre de Cristo mountains and reported without verification in the Jemez Mountains (NMDGF 2001). Martens occur in spruce-fir forests and marginal alpine habitat.	Low

*Codes for Legal Status
NME = New Mexico endangered
NMT = New Mexico threatened
NMS = New Mexico sensitive
FSOC = Federal Species of Concern
FC = Federal Candidate
FT = Federally Threatened

⊗POTENTIAL TO OCCUR

High = species is known to occur in the area
Moderate = the area has some species habitat components
Low = the area does not have species habitat components

Table 5. Population Trends of Potential Listed Species

Species	Current Legal Status*	Regional Trends	State Trends	Local Trends
Pearly Checkerspot Butterfly	FSOC	Apparently secure in its whole range.	Unknown	Has not been found on LANL lands.
Jemez Mountains Salamander	NMT	Only found in Jemez Mountains of New Mexico.	Only found in Jemez Mountains of New Mexico.	Although the species is quite numerous in some localities (e.g., Williams 1972, 1973), habitat alteration continues to be a major threat to its existence. However, the fire in May of 2000 may have had a serious impact to the species.
Western Boreal Toad	NME FC	Apparently secure in its whole range.	Decreasing in population in New Mexico. At or near extinction in New Mexico population.	Only found in Rio Arriba County to date.
Northern Goshawk	FSOC NMS	Globally very secure.	Imperiled in New Mexico, decreasing in population.	Found in the Jemez west of LANL.
Loggerhead Shrike	FSOC	Very secure.	Demonstrably secure in New Mexico.	Very rare on LANL lands.
Baird's Sparrow	FSOC NMT	Baird's sparrow seemed to have declined throughout its range (NMDGF 2001). In the Southwest it is much less frequently reported than in the past (NMDGF 2001). Drought, agriculture, and grazing are primarily responsible for habitat loss.	Baird's sparrow has declined throughout its range, including in New Mexico. Although occasional sightings continued to be recorded in New Mexico, the species has not been reliably reported from the state since 1977 (NMDGF 2001).	Due to the lack of extensive grasslands, this species is unlikely to occur on LANL except as an occasional transient.
Gray Vireo	NMT	The species summers from southern California to western Oklahoma, and southward locally to northern Baja California, southern Arizona, southern New Mexico, western Texas, and northern Coahuila (NMDGF 2001).	This vireo summers very locally west of the eastern plains, from the San Juan Valley, Santa Fe area, and at least formerly near Montoya (Quay County) southward to the southern border (NMDGF 2001).	Recent surveys found the species in new areas and in unexpected numbers. There are up to 25 territories in the Manzano Mountains, 2 in the Sandia Mountains, and up to 6 in the San Andres Mountains (NMDGF 2001).
Black Swift	NMS	Apparently secure.	Critically imperiled in New Mexico, decreasing in population and distribution.	Occasional vagrant at LANL.
Mountain Plover	FT NMS	Globally rare or imperiled.	Considered imperiled in New Mexico.	Has not been observed in Los Alamos County.

Table 5 cont.

Species	Current Legal Status*	Regional Trends	State Trends	Local Trends
Western Small-footed Myotis Bat	FSOC NMS	In general, declining throughout most of their range.	Considered secure in New Mexico.	Captured at LANL.
Little Brown Occult Bat	FSOC NMS	In general, declining throughout most of their range.	Rare or uncommon in New Mexico.	Has not been captured on LANL lands.
Little Brown Bat	NMS	In general, declining throughout most of their range.	Limited in their distribution. Considered at high risk due to being easily impacted and disturbed.	Has not been captured on LANL lands.
Fringed Bat	FSOC NMS	In general, declining throughout most of their range.	Considered a sensitive taxa (informal) in New Mexico. Considered at high risk due to being easily impacted and disturbed.	Captured at LANL.
Yuma Bat	FSOC NMS	In general, declining throughout most of their range.	Considered a sensitive taxa (informal) in New Mexico. Considered at high risk due to being easily impacted and disturbed.	Captured near LANL.
Long-legged Bat	FSOC NMS	In general, declining throughout most of their range.	Considered a sensitive taxa (informal) in New Mexico. Considered at high risk due to being easily impacted and disturbed.	Captured at LANL.
Long-eared Bat	FSOC NMS	In general, declining throughout most of their range.	Considered a sensitive taxa (informal) in New Mexico. Considered at high risk due to being easily impacted and disturbed.	Captured at LANL.
Spotted Bat	FSOC NMT	The species occurs very locally from central California, southern British Columbia, central Montana, and the Big Bend region of Texas southward through north-central Mexico to Queretaro (NMDGF 2001).	This bat has been found in New Mexico from the vicinity of the Rio Grande Valley westward, occurring most regularly in the Jemez, San Mateo, and Mogollon mountains and on Mt. Taylor (in the San Mateo Mountains) (NMDGF 2001).	*Euderma maculatum* was recorded on the grounds of LANL and found on Bandelier National Monument, Sandoval and Los Alamos counties (Bogan et al., 1996).
Townsend's Pale Big-eared Bat	FSOC NMS	In general, declining throughout most of their range.	Considered a sensitive taxa (informal) in New Mexico. Considered at high risk due to being easily impacted and disturbed.	Captured at LANL.
Big Free-tailed Bat	FSOC NMS	In general, declining throughout most of their range.	Considered a sensitive taxa (informal) in New Mexico. Considered at high risk due to being easily impacted and disturbed. At risk due to pollutants and contaminants.	Captured adjacent to LANL lands.

Table 5 cont.

Species	Current Legal Status*	Regional Trends	State Trends	Local Trends
Ringtail	NMS	Secure in its population.	Apparently secure in New Mexico.	Has been observed on LANL lands.
Western Spotted Skunk	NMS	Secure in its population.	Apparently secure in New Mexico.	
Red Fox	NMS	Secure in its population.	Rare or uncommon in New Mexico.	
Goat Peak Pika	NMS	Only found in New Mexico.	Rare or uncommon.	Additional survey work would have been required to determine the species current trends (NMDGF 2001).
New Mexico Meadow Jumping Mouse	NMT	Globally they are considered restricted or uncommon.	Imperiled in New Mexico.	Has been found around LANL.
American Marten	NMT	Globally they are apparently secure.	Imperiled in New Mexico.	Has not been confirmed in the LANL, Los Alamos area.

*Codes for Legal Status
FSOC = Federal Species of Concern
FC = Federal Candidate Species
NME = New Mexico Endangered
NMT = New Mexico Threatened
NMS = New Mexico Sensitive

Table 6. Possible Project Impacts to Non-listed Species

Category	Typical Species	Possible Impact*
Large Mammals	Elk, deer	A, B, C, D
Medium Mammals	Bobcat, Raccoon	A, B, C, D
Small Mammals	Rodents, Gophers	A, B, C, D
Birds	Goldfinch, towhee	A, B, D
Reptiles	Bull snake, fence lizard	B, D
Amphibians	Salamander, toad	B, D
Terrestrial Invertebrates	Cricket, beetle	B, D
Aquatic Invertebrates	Mayflies, dragonflies	B, D

* A = Disturbance (light and noise), B = Loss of habitat, C= Travel corridors, D = Food base disturbance

Over 200 species of birds occur in the project area. Of these species one is federally listed as threatened and 10 are listed by the State of New Mexico as threatened, endangered, or sensitive. Table 6 lists possible project impacts to birds. Bird surveys would need to be conducted in the project area to determine the exact type and distribution of these species.

Over 25 species of reptiles occur in the project area. At least 12 species of amphibians occur in the project area. Of these species, one is a New Mexico threatened species and one is a New Mexico endangered species. Table 6 lists possible project impacts to reptiles and amphibians. Further studies on the populations of these reptiles and amphibians may be needed to determine potential impacts from this project.

There are at least 164 families of terrestrial arthropods that occur in the AHF project area. While many of these species would be displaced, there would not likely be any negative impacts to invertebrate populations at LANL. Table 6 lists possible project impacts to invertebrates. At least 89 aquatic insect families occur in the project area. The project is not expected to negatively impact aquatic invertebrate populations. Table 6 lists possible project impacts to aquatic invertebrates.

6.1 Potential Effects of the Proposed Action

Approximately 180 ha (435 ac) of potential habitat could be lost in the project area. Construction noise could disturb the normal behavior patterns of these species. The increased activity in the project area could discourage the use and future use of the project area. This project could change the large-scale patterns of movement by these species. Changes in the movement patterns around the project area could cause an increase in human-animal interactions such as vehicle collisions.

7.0 FLOODPLAINS AND WETLANDS EVALUATIONS

7.1 Floodplains

7.1.1 Regulations

Specific floodplains protection was outlined by the 1977 Executive Order (EO) 11988, Floodplain Management. In 1978, the US Water Resource Council issued guidance for implementing the EO through the "Floodplain Management Guidelines" (43 FR 6030). EO 11988 mandates each federal agency reduce the flood risk, minimize impacts of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains. In addition to the EO, the National Flood Insurance Act of 1968 (42 USC 4001) and the Flood Disaster Protection Act of 1973 (Public Law 93-234 87 Stat 975) provide legislation for the protection against adverse impacts to human occupancy and modifications in floodplains.

7.1.2 Identification of Floodplains

One-hundred-year floodplains were modeled by McLin (1995) using the Corps of Engineers Hydrologic Engineering Center's computer-based Flood Hydrographic Package and the Water Surface Profiles Package. One-hundred-year floodplains were defined in Los Alamos, Sandia, and Mortandad Canyons within the project area (Figure 6).

7.1.3 Potential Effects of the Proposed Action

Approximately 22 ha (54 ac) could be affected as a result of this proposed action. Construction of structures or utilities within the floodplain should conform to applicable state or local floodplain protection standards. Appropriate engineering controls for the prevention of loss of life and property need to be considered in the building design.

Storage of large amounts of excavation material poses a threat to floodplain quality, including surface water and groundwater quality. Excavated soils should not be stored in the floodplain unless no other alternative is available. A stringent storm water control plan would need to be developed to assure floodplain protection from sediment and potential contaminant migration.

7.1.4 Results

A detailed Floodplain Assessment would need to be prepared for the AHF. A Floodplain Assessment would include a detailed project description, floodplain effects, including direct and indirect and long- and short-term effects, alternatives, and measures to mitigate possible adverse effects.

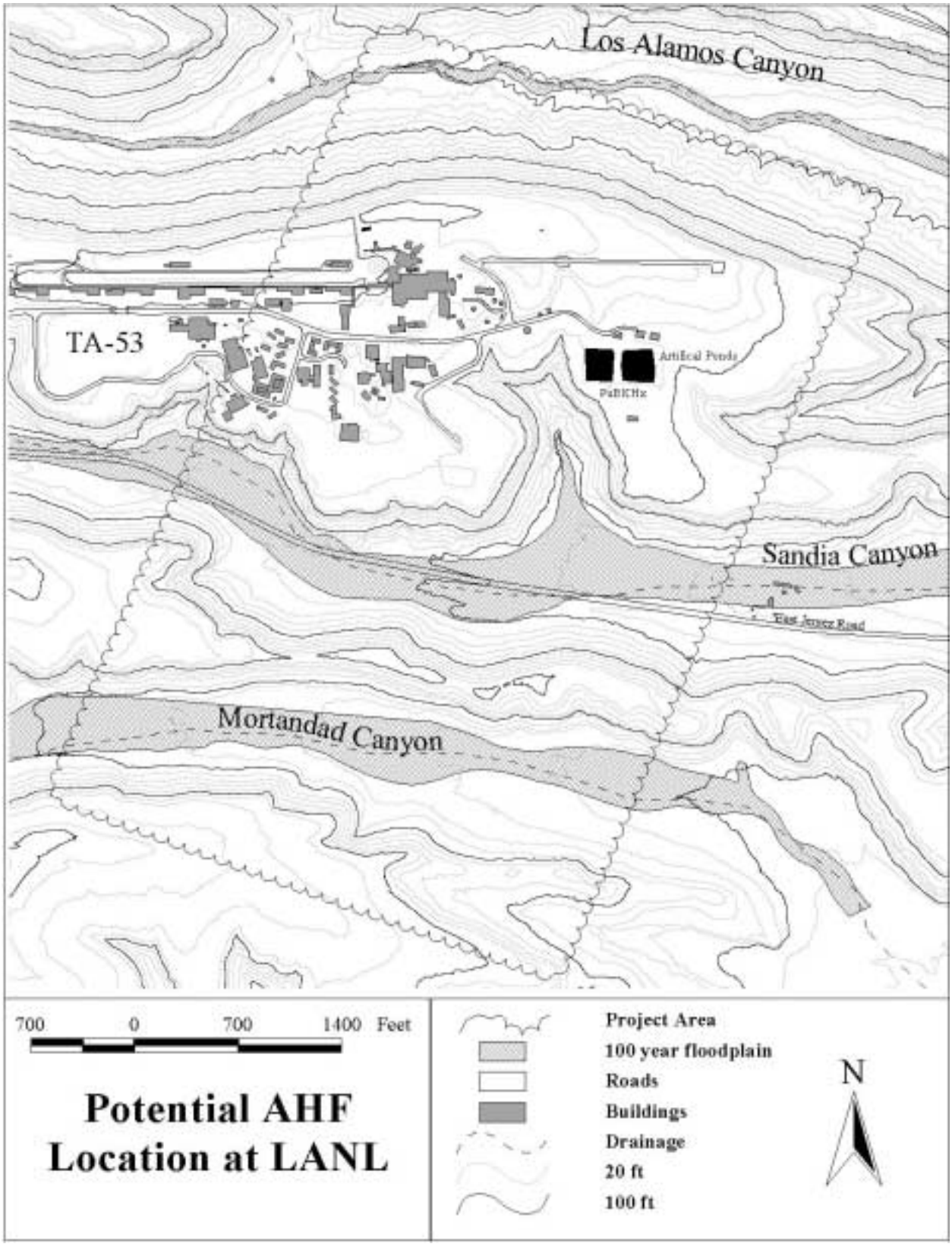

Figure 6. Floodplains in AHF project area.

7.2 Wetlands

7.2.1 Regulations

EO 11990, "Protection of Wetlands," requires all federal agencies to issue or amend existing procedures to ensure that wetland protection is considered during the decision-making process. In addition to this EO, the Clean Water Act (33 U.S.C. 1344) provides regulations of the waters of the United States, including wetlands. Section 404 of the Act requires a 401 permit for the discharge of dredged or fill material into a wetland.

7.2.2 Identification of Wetlands

Under the National Wetland Inventory, the USFWS broadly mapped wetlands within the project area. Wetlands are of a riverine and temporarily flooded type (labeled as R4SBA) and were identified in the area of influence of the AHF (Figure 7). The riverine wetlands are found in Sandia Canyon and Los Alamos Canyon along sections of the stream channel. These wetland areas do not meet the three requirements of vegetation, hydric soils, and hydrology specified by the 1987 Corps of Engineers Wetland Delineation Manual to qualify as a jurisdictional wetland. These areas are typically associated with stream channels, which only flow during times of heavy rain events or from spring snowmelt. The dominant vegetation in these areas is not hydrophytic and is usually classified as upland.

An additional National Wetland Inventory wetland was identified within the developed area of TA-53. This wetland has been designated as an excavated palustrine, permanently and artificially flooded wetland (labeled as PuBKHx). This palustrine wetland is a human-made lagoon used for the disposal of industrial waste (Figure 7).

7.2.3 Potential Effects of the Proposed Action

7.2.3.1 Direct Impacts

There are no wetlands in the project area that meet the Corps of Engineers requirements of a wetland. However, drainage channels representing the National Wetland Inventory areas do exist in the project area. These areas may qualify as "Waters of the U.S." under the Clean Water Act and be subject to 401 permitting. Most work in the stream channels would require a 401 permit before that portion of the project could proceed.

7.2.3.2 Indirect Impacts

Excavating in the canyon bottoms has the potential to modify the natural hydrology of perched waters in the canyons. Modifications could result in changes to upstream and downstream wetlands. Excavation of the tunnels could change the hydrological flow in the canyon bottoms resulting in changes of stream flow

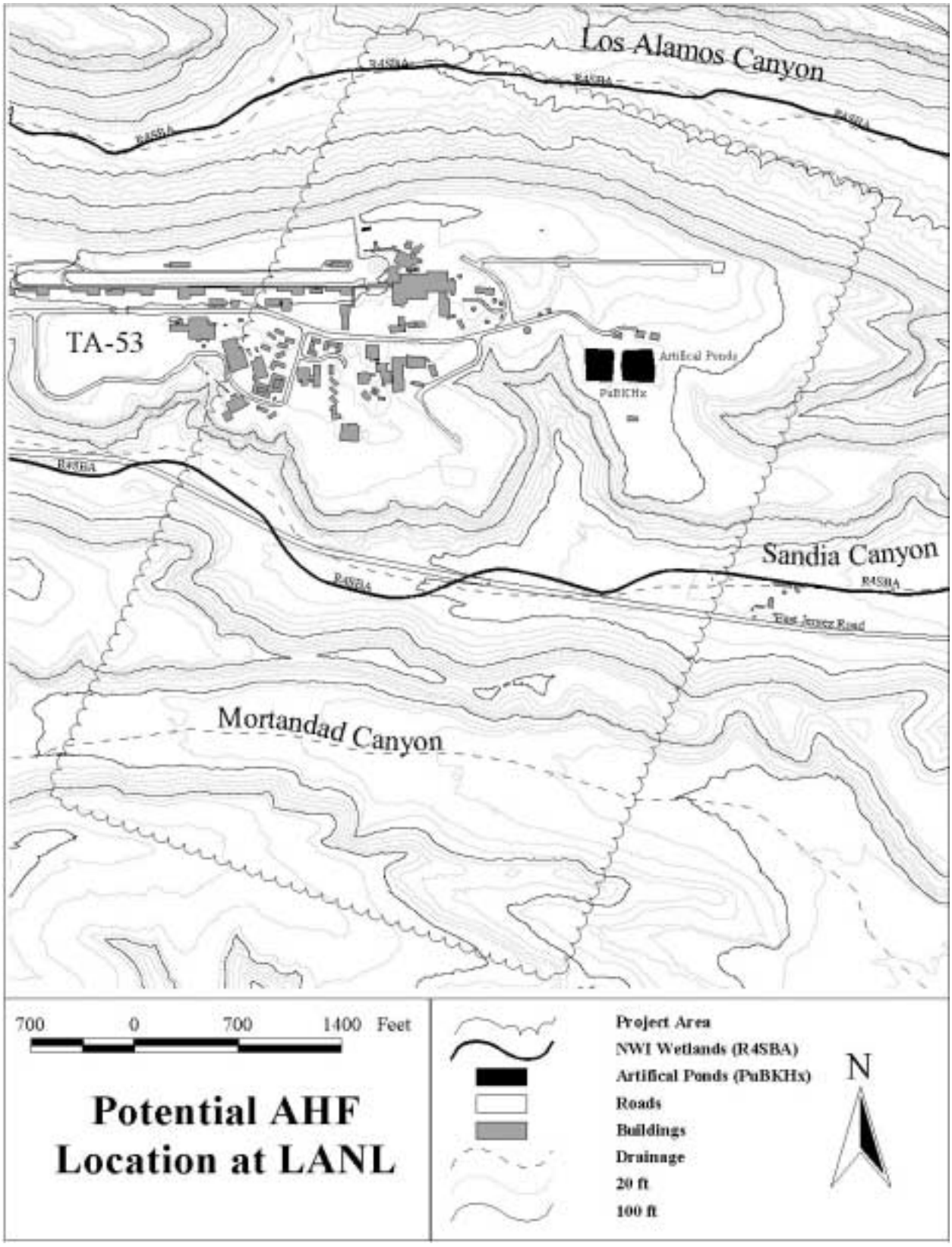

Figure 7. Wetlands in AHF project area.

below the excavations. However, more information needs to be gathered to determine the significance of possible changes.

7.2.4 Results

A detailed Wetland Assessment would need to be prepared for the AHF. A Wetland Assessment would include a detailed project description, stream channel and wetland effects, including direct and indirect and long- and short- term effects, alternatives, and measures to mitigate possible adverse effects.

8.0 CONCLUSIONS

8.1 Federal Threatened and Endangered Species

LANL reviewed and summarized historical information and biological reports of previous biological surveys within the vicinity of the proposed AHF. Habitat at the site was characterized according to vegetative information collected during habitat evaluation surveys. The Ecology Group biology TES database was searched for a listing of potential species that could occur within the habitat types associated with the proposed AHF. Species on the state or federal protection list known to occur in grassland, ponderosa pine, mixed conifer, piñon-juniper, or riparian areas of Los Alamos County and surrounding counties were identified.

Species-specific surveys have been conducted for one TES: the Mexican spotted owl. The Mexican spotted owl has not been found near the project area. Habitat necessary to support the nesting of the Mexican spotted owl would be lost because of this proposed action. The bald eagle could use the project area for foraging. The loss of vegetation and disturbance are not significant enough to discourage future foraging by the bald eagle. The southwestern willow flycatcher, black-footed ferret, and whooping crane were found to have no potential habitat in the AHF project area. A Biological Assessment would have to be prepared and submitted to DOE to initiate formal consultation with the USFWS.

8.2 Potential Listed Wildlife

Twenty-five species were identified as having a potential to be listed within the lifetime of the AHF project. Surveys will be required to fully document and describe the extent of these species at this site.

8.3 Non-Listed Wildlife of Concern

The AHF would be located in several canyons and mesa tops and would potentially impact many species of plants and animals. The AHF region is biologically diverse. This diversity is illustrated by the presence of over 57 species of mammals; 200 species of birds, including 112 species known to breed in

Los Alamos County; 28 species of reptiles; 9 species of amphibians; and over 1,200 species of arthropods.

All of the birds in the project area are protected by the Migratory Bird Treaty Act and its subsequent EO. Bird surveys, in conjunction with an aggressive disturbance management plan, would allow LANL to demonstrate our good faith effort in the adherence to this Act and to wildlife conservation in general.

Surveys will be required to fully document and describe the extent of the wildlife species at this site.

8.4 Floodplains

One-hundred-year floodplains were identified in all three canyon systems in the AHF project area. A detailed Floodplain Assessment would need to be prepared for the AHF. A Floodplain Assessment would include a detailed project description, floodplain effects (including direct and indirect and long- and short-term effects), alternatives, and measures to mitigate possible adverse effects.

8.5 Wetlands

Riverine wetlands were identified in Sandia Canyon and Los Alamos Canyon along sections of the stream channel. These areas are typically associated with stream channels, which only flow during times of heavy rain events or from spring snowmelt. In addition, a human-made National Wetland Inventory wetland was identified within the developed area of TA-53.

A detailed Wetland Assessment would need to be prepared for the AHF. A Wetland Assessment would include a detailed project description, stream channel and wetland effects (including direct and indirect and long- and short-term effects), alternatives, and measures to mitigate possible adverse effect.

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