US Army Corps of Engineers®
Albuquerque District

ENVIRONMENTAL ASSESSMENT

for the

SECTION 595 WATER RESOURCES DEVELOPMENT ACT

Constructed Wetlands Wastewater Treatment Lagoons
Pueblo of Zuni
McKinley County, NEW MEXICO

Prepared by

U.S. ARMY CORPS OF ENGINEERS
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Finding of No Significant Impact
Constructed Wetlands Wastewater Treatment Lagoons
Pueblo of Zuni, New Mexico

The U.S. Army Corps of Engineers (Corps), Albuquerque District, in cooperation with and at the request of the Pueblo of Zuni, New Mexico, is planning a project to increase the capacity of their secondary wastewater treatment wetlands. The construction work is authorized under Section 595 of the Water Resources Development Act of 1999 (Public Law 106-53; 33 U.S.C. 2201 *et seq.*), as amended. The Act authorizes the Corps to provide assistance for design and construction for water-related environmental infrastructure and resource protection and development projects in Idaho, Montana, rural Nevada, New Mexico, and rural Utah. The Pueblo of Zuni is the local sponsor. The proposed construction period for the first two wetland cells is nine months, and is expected to start in September 2008.

The proposed action involves the construction of 10 secondary treatment wetland cells within a 200-acre fenced area on Pueblo of Zuni land. The overall wetland system was designed to contain a total of 12 wetland cells at this site. Two of the 12 wetland cells already have been constructed. The proposed action would complete the system by adding 10 cells. Of these 10 cells, two cells would be constructed initially, followed by 8 additional cells as funding becomes available. The two wetland cells proposed for initial construction in 2008 would be located immediately northwest of the two existing wetland cells that were completed in 2001. These initial two cells would provide the greatest capacity for wastewater treatment given the available budget. The completion of the ten additional wetland cells would provide the Pueblo with wastewater treatment capacity sufficient for effluent disposal given the current population and conditions while addressing existing deficiencies. The entire Pueblo of Zuni would benefit from the proposed expansion of the secondary treatment wetlands.

Cultural resources surveys of the project area were conducted in 1999 and 2000, when the U.S. Environmental Protection Agency was the lead Federal agency for this project. Archaeological and traditional cultural properties reports were prepared by Zuni Cultural Resources Enterprise (ZCRE) and reviewed by the New Mexico State Historic Preservation Officer (SHPO). Of the 10 archaeological sites that were recorded, nine are eligible to the National Register of Historic Places under criterion “d”. The strategy proposed by ZCRE was to avoid impacts to the sites through a combination of restricting construction in certain locations, fencing, and monitoring during construction. The recommendations in the report were concurred with by SHPO. The Corps would adhere to the recommendations in the ZCRE report; therefore, the Corps has determined that there would be "No Historic Properties Affected" by construction of the project.

The potential environmental effects of the proposed action are minimal compared to the No-Action alternative, with the difference being that the No-Action alternative does not provide sufficient capacity to accommodate existing wastewater flows. The deficiency of the existing system forces incompletely treated effluent to be discharged on land near the Zuni River. By eliminating discharge of incompletely treated effluent on land near the Zuni River, the proposed action has a net environmental benefit.

The proposed work would not affect waters of the United States regulated by Section 404 of the Clean Water Act; therefore a Section 404 (b)(1) analysis would not be needed for the project. The proposed construction of the wetland cells would occur outside the floodplain and would not significantly alter any use or natural feature of the area. Therefore, the planned action is consistent with Executive Order 11988 (Floodplain Management). The proposed work complies with Executive Order 11990 (Protection of Wetlands) as wetlands are increased within the project area.

Pursuant to Section 402 of the Clean Water Act, a Storm Water Pollution Prevention Plan (SWPPP) is required for this project under National Pollution Discharge Elimination System general permit guidance. Best management practices to control storm water discharges, dust, and emissions from construction vehicles would be incorporated into the contractor's SWPPP and Environmental Protection Plan.

Only short-term, minor adverse impacts to aesthetics, soils, air, noise, vegetation, and wildlife would occur during construction. No long-term impacts would occur to climate, air, special status species, floodplains, socioeconomics, environmental justice or cultural resources. Minor beneficial impacts would occur to human health and safety, water quality in the Zuni River, and wetlands. Minor long-term impacts would occur to soils and land use by converting an open field to wetlands. The proposed project would not result in any moderate or significant, short-term, long-term, or cumulative adverse effects to the human environment.

The planned action has been fully coordinated with Federal and tribal agencies with jurisdiction over the ecological, cultural, and hydrological resources of the project area. Based upon these factors and others discussed in detail in the Environmental Assessment, the planned action would not have a significant effect on the human environment. Therefore, an Environment Impact Statement will not be prepared for the proposed construction of the Zuni secondary treatment wetland cells.

25 Jul 08
Date

Kimberly M. Colloton
Lieutenant Colonel, U.S. Army
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1.0 INTRODUCTION

1.1 Background and Location

The United States Army Corps of Engineers (Corps), Albuquerque District, in cooperation with and at the request of the Pueblo of Zuni, is planning to construct ten wetland/evaporation cells for secondary and tertiary wastewater treatment. The proposed cells are needed to increase the capacity of the wetlands wastewater treatment system to a design capacity of 12 cells (two cells currently exist).

The work would be conducted under Section 595 of the Water Resources Act of 1999 (Public Law 106-53) as amended. The Act authorizes the Corps to provide assistance in the form of design and construction for water-related environmental infrastructure, resource protection, and development projects in Idaho, Montana, rural Nevada, New Mexico, and rural Utah. Types of projects included under the Act are: wastewater treatment and related facilities, stormwater retention and remediation, surface water resource protection and development, and sewer and water line replacement.

Provisions under the Act require that the project be publicly owned to receive Federal assistance. As such, the non-Federal sponsor for the proposed project is the Pueblo of Zuni. The Act further requires that a cooperative agreement be established between the Federal and non-Federal interests. In general, the Federal share of project costs under each cooperative agreement is 75 percent of the total project cost.

The proposed project area is located within the Pueblo of Zuni lands, McKinley County, New Mexico (see Figures 1 and 2). The site is south of the Zuni River and north of Ojo Caliente Road, approximately 2.5 miles southwest of the Pueblo of Zuni Village. The 200-acre site is currently an open field with upland vegetation and two constructed wetland cells (see Figure 3). The proposed construction period for the first two new cells is nine months and is expected to start in September 2008. The remaining 8 cells would be constructed as funding becomes available.

The existing primary treatment facility consists of a lagoon system with a total surface area of 33.4 acres ("Existing Primary Treatment Lagoons" shown in Figure 2). This primary treatment system was constructed in 1969 and expanded in 1971 by the Indian Health Service. No significant improvements have been made to these lagoons since 1971. The Indian Health Service funded a project in 2004 for $424,000.00 to rehabilitate and provide improvements to this system. That project proposes to clean out accumulated sludge, rebuild broken berms, replace valves between cells, repair fencing, and conduct effluent quality monitoring. Preliminary work for sludge removal is anticipated this summer.

A lift station was funded by the U.S. Environmental Protection Agency (USEPA), State of New Mexico and the Pueblo of Zuni. An Environmental Assessment and FONSI were completed August 20, 1998 (USEPA 1998). That project to pump effluent from the treatment lagoons to the wetlands was completed in June 2003. The 10-inch effluent line from the lift station to the wetlands was completed in 2001. The two existing constructed wetland cells were

constructed by in-house personnel of the U.S. Bureau of Reclamation in 2001. The Zuni Fish and Wildlife Department is presently operating and maintaining the two existing cells.

In June 2005, a wastewater treatment study was completed for the Pueblo of Zuni. This study recommends that, in coordination with the Indian Health Service Project, the middle two primary treatment lagoons be deepened with aerators installed and serpentine channels with appropriate vegetation be constructed in the lower two cells. The upper two cells would be used as receiving and settlement cells with monitoring inlet devices. Sludge drying beds were recommended to be provided at approved sites for future sludge removal. Although not part of the current project, these recommendations would improve the quality of effluent entering the secondary/tertiary treatment wetlands. The 2005 report also recommends the continuation of construction of cells in the constructed wetlands to design capacity.

1.2 Purpose and Need

The purpose of this project is to add ten additional constructed wastewater treatment cells to the Pueblo of Zuni secondary and tertiary treatment wetland area ("Zuni Wetlands Project Area" shown in Figure 2). The design of the wetlands is based on an ultimate system of twelve treatment cells total to provide enough evaporative capacity to prevent overflow. The first phase of this project will provide two cells in addition to two that were constructed previously, for a total of four. As additional funds become available, more cells will be constructed until the design capacity of twelve cells is reached.

The most significant health issue related to the wastewater treatment system is that of the intermittent overflow from the wetlands system. The overflow occurs when atmospheric conditions slows the evaporation rate and during periods of peak water usage. At this time, no residences are located near or down stream of the facilities. The overflow is overland and may migrate to the Zuni River approximately 1800 feet north of the existing lagoons. The Zuni River is an intermittent stream and only flows during heavy rainfall or from an unusually heavy snow pack. The only known human interaction with the wastewater would be downstream on the Zuni River in Arizona.

The wastewater system for Pueblo of Zuni lacks the capacity to adequately treat the amount of wastewater generated at its present population. The Pueblo's population is growing at a rate of 2.2% per year. The Pueblo has managed to construct components of the planned treatment system but has fallen behind in treating the amount of wastewater generated. Therefore, the Pueblo is in need of assistance to fund the construction in phases to complete the planned system.

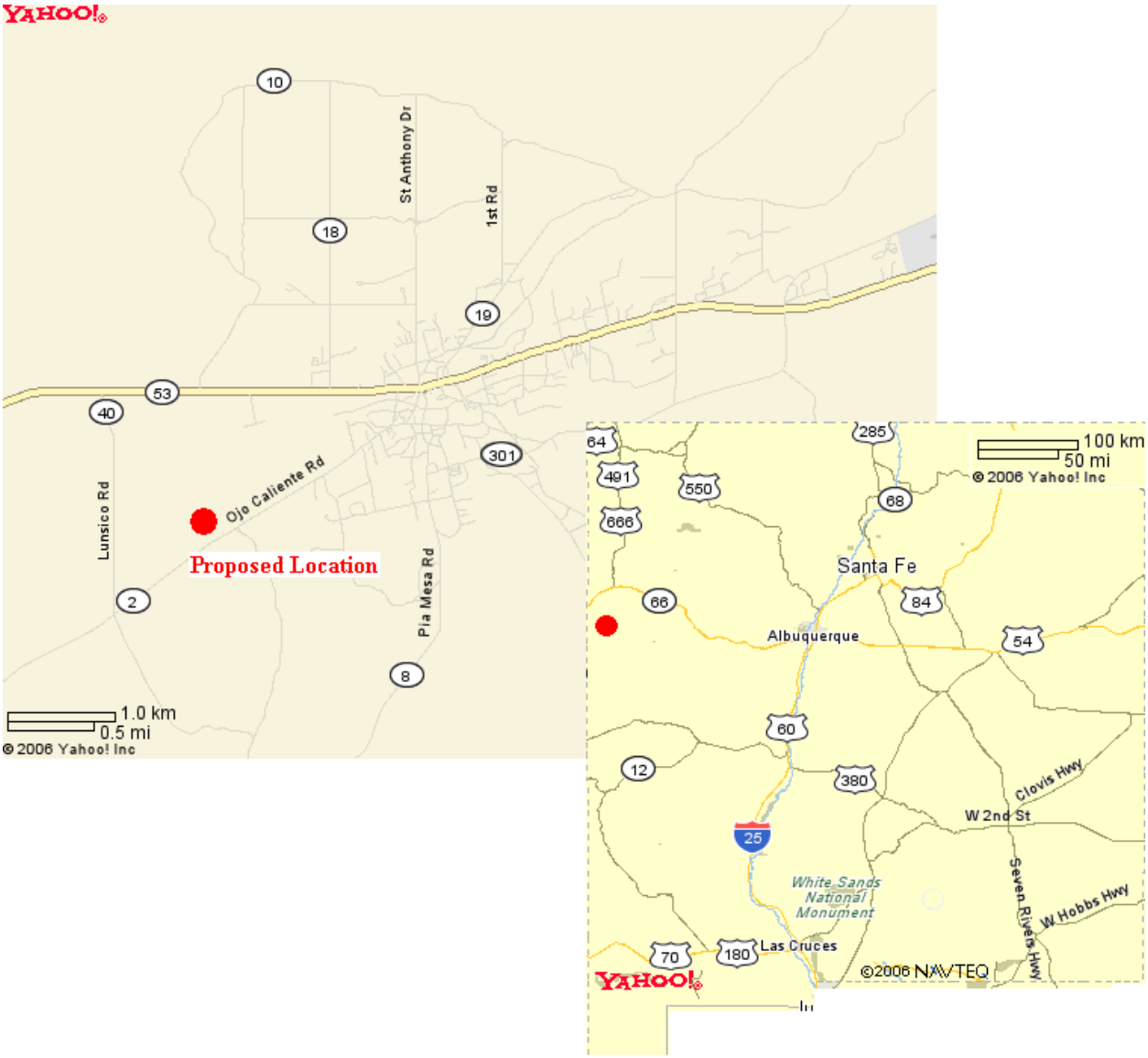

Figure 1. Vicinity Map of Proposed Project Area for the Wastewater Collection System Improvement, Pueblo of Zuni, McKinley County, New Mexico.

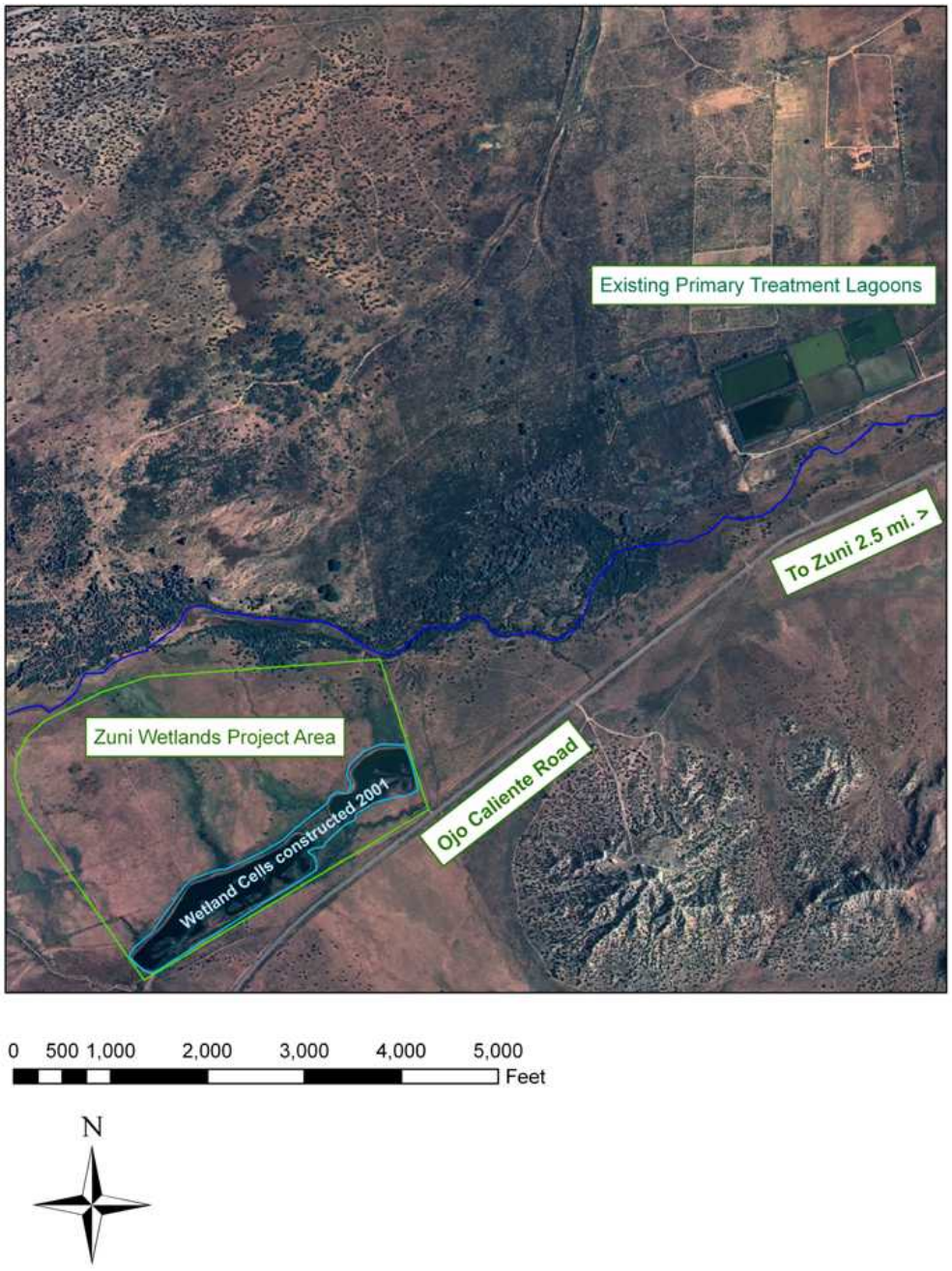

Figure 2. Location of Proposed Secondary Treatment Lagoons, Pueblo of Zuni, McKinley County, New Mexico

Figure 3. Proposed Project Area Looking North from north side of existing wetland cells

Regulatory Compliance

This Environmental Assessment (EA) was prepared by the Corps, Albuquerque District, in compliance with all applicable Federal Statutes, Regulations, and Executive Orders, including the following:

- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470)
- Clean Water Act of 1972 and Amendments of 1977(CWA)
- Clean Air Act of 1972, as amended (42 U.S.C. 7401 *et seq.*)
- Endangered Species Act of 1973, (ESA) as amended (16 U.S.C. 1531 *et seq*.)
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, 1994
- Floodplain Management (Executive Order 11988)
- National Environmental Policy Act of 1969, as amended (42 U.S.C 4321 *et seq*.)
- Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500 *et seq*.)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq*.)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 *et seq*.)
- Protection and Enhancement of the Cultural Environment (Executive Order 11593)
- Protection of Wetlands (Executive Order 11990)
- U.S. Army Corps of Engineers' Procedures for Implementing NEPA (33 CFR 230; ER 200-2-2)
- Farmland Protection Policy Act of 1981, as amended (7 U.S.C. 4201 *et seq.*)
- Executive Order 13112, Invasive Species
- Noxious Weed Act of 1974 (PL93-269; 7 U.S.C. 2801)

This EA also reflects compliance with all applicable Tribal regulations, statutes, policies, and standards for conserving the environment such as water and air quality, endangered plants and animals, and cultural resources.

2.0 DESCIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The Pueblo of Zuni's existing wastewater treatment system collects and delivers wastewater to a six-cell primary treatment lagoon. After the primary treatment process is completed, the outflow is pumped approximately one mile to the secondary process wetland/evaporation cells. Currently, there are two secondary treatment wetland cells (shown as cells 1 and 2 on p. C-01 of Appendix D), which were constructed by the U.S. Bureau of Reclamation in 2001, located within a fenced 200-acre site. The construction of these two cells was the result of the "Pueblo of Zuni Wastewater Treatment and Disposal Facilities Plan" prepared by a contractor for the Pueblo of Zuni (Molzen-Corbin & Associates 1997a). The Facilities Plan and the accompanying "Lagoon Renovation and Wetland Project- Zuni Wetland Phase" Plan identify the 200-acre site as the location for 12 wetland/evaporation cells. As their

budget allows, Zuni Pueblo plans to have all of these cells constructed. This EA discusses the potential environmental effects of constructing 10 additional wetland cells to complete the design capacity of 12 cells.

The first phase of the proposed project is to construct two secondary treatment wetland/evaporation cells, cells 4 and 5 (Appendix D, C-01). These two cells would provide the greatest capacity for processing effluent given the Pueblo's available budget. The alignment of the two cells would utilize the design and cross section found in the Project Plans (Appendix D, C-02). The size of cell 4 would be 400' x 1,200' and cell 5 would be 400'x 1,300'. Construction would involve shallow excavation of existing soils, which would be used to construct berms for the wetland cells. Soil testing has been conducted to verify the previous subsurface investigations into its suitability for use in constructing berms. This information will be used to specify the construction compaction requirements for the berms at both lagoons. The total construction cost for the first phase is $607,500. Federal costs would be $455,625 and non-Federal costs would be $151,875. The duration of the proposed construction would be nine months and is expected to start in September 2008.

2.2 Alternatives Considered

Initial alternatives for providing additional wastewater treatment/disposal capacity were considered in the development of the original Project Plans (Wilson and Associates 1992; Molzen-Corbin & Associates 1997b; USEPA 1998). These included: surface water discharge; landscape, crop or rangeland irrigation; and construction of sub-surface wetlands. These methods were evaluated for their ability to treat secondary effluent while meeting budget constraints, minimizing operations and maintenance requirements, and creating wetland habitat. The current proposal using surface wetland cells would best meet these criteria. Other sites were considered initially, and the proposed site was selected for its feasibility and proximity to the existing treatment facility (Molzen Corbin Associates 1997a). Other cells within the facilities plan were considered for construction in the first phase; however, they could not provide sufficient capacity to accommodate existing wastewater flows. Alternatives considered and rejected were discussed in detail in the USEPA's 1998 EA. For the current project, analysis of alternative locations and methods of treatment are limited due to constraints in compatibility with the existing treatment system.

2.3 The No-Action Alternative

Under the No-Action alternative, there would not be any construction of the additional secondary treatment wetland cells. No Federal funding would be expended and there would be no new effects to the project site or surrounding environment. However, the No-Action alternative would not provide the Pueblo of Zuni with secondary wastewater treatment sufficient for current and future effluent disposal. The No-Action alternative should be perceived as an environmentally unsound course of action with regard to the deficiency of the existing system, forcing incompletely treated sewage to overflow onto land adjacent to and into the Zuni River.

3.0 EXISTING ENVIRONMENT AND FORESEEABLE EFFECTS

3.1 Physiography, Geology, and Soils

Soils within the project area are mapped as Aquima-Hawaikuh silt loams, 1 to 5 percent slopes (ca. 84% of area) and Nuffel-Vendadito Complex, 1 to 3 percent slopes (ca. 16% of the area) (USDA 2008). Aquima and Hawaikuh silt loams occur on alluvial fans and stream terraces and are described as well drained, not susceptible to flooding or ponding, and with a depth or greater than 80 in. to the water table. Nuffel and Venadito soils occur on flood plains and swales on valley floors. They are well drained, with depth to water table of greater than 80 inches. However, these mapped soil units may not reflect specific conditions on site. Soil testing indicates that soils onsite actually have low permeability.

A soils report prepared in 2000, by Geo-Test, Albuquerque, New Mexico indicates soils predominantly classified as CL (lean clay) and SC (clayey sand) according to the Unified Soil Classification System (USCS). “Lean clay” refers to the soil’s structural properties; this classification indicates clay that does not have overly expansive (shrink/swell) properties. Soils had Plasticity Index values (PIs) ranging from 6 to 26. The project specifications required earth embankments to be constructed of soils with PI values less than 20.

Corps Geotechnical Engineers visited the project site in April 2006 and sampled soils. All soil tested characterized as lean clay or lean clay with sand, with Plasticity Index ranging from 10 to 24. The results were very similar to the results obtained by Geo-Test and both soil reports indicate that tested site soils are suitable for use as embankment fill.

The soils in the proposed wetlands area are classified in the loamy and clayey ecological sites (Aquima-Hawaikuh) and clayey bottomland and bottomland ecological sites (Nuffel-Vendadito Complex). The vegetation of these ecological sites is short and medium grasses, forbs, and shrubs. These soils are used for range, wildlife, dryland farming, and irrigated farming. There would be no effect to soils by the No-Action alternative. The proposed project would have a minor, long-term effect to soils by changing the site’s topography and converting areas of upland soil to wetland and open water. The No-Action alternative would have no effect on soils.

3.2 Climate

McKinley County has a semiarid climate. However, the climate is highly varied because of the wide range in elevation and the uneven topography. Elevation ranges from 6,100 feet near the Zuni river to over 8,000 feet in the Zuni Mountains. The elevation at the project site is 6220-6240 feet. The average winter temperature at Zuni is 33.7 degrees F, with an average daily minimum of 18.2 degrees. Summer temperature averages 68.6 degrees F, with average daily maximum of 86.6 degrees. Average annual precipitation ranges from about 8 to 18 inches within the county and is 12.88 inches in Zuni. About 40% of the total precipitation falls during the frost-free season of May to September, with most falling as brief, generally heavy thunderstorms in the period of July through September (USDA 2005, 2008). A minor increase in humidity in

the immediate project area can be expected from this project, while other climate parameters would not be affected. The No-Action alternative would have no effect on climate.

3.3 Water Quality

Section 402 of the Clean Water Act (CWA; 33 U.S.C. 1251 *et seq.*), as amended, regulates point-source discharges of pollutants into waters of the United States and specifies that storm-water discharges associated with construction activities shall be conducted under the National Pollution Discharge Elimination System (NPDES) guidance. Construction activities characterized by clearing, grading, and excavation are associated with storm-water discharges, subjecting the underlying soils to erosion by storm-water. The NPDES general permit guidance would apply to this project because the total project area is greater than one acre. Therefore, a Storm-Water Pollution Prevention Plan (SWPPP) is required and would be prepared by the contractor for this project. Standard Best Management Practices to prevent on- and off-site erosion, sediment and stormwater discharges would be incorporated in contract specifications and the SWPPP, and would include silt fences, straw bales, geotextiles, or similar measures. Impacts from storm-water are expected to be negligible.

Section 404 of the CWA, (CWA; 33 U.S.C. 1251 *et seq.*) as amended, provides for the protection of waters of the United States through regulation of the discharge of dredged or fill material. The Corps' Regulatory Program (33 CFR Parts 320-330) requires that a Section 404 evaluation be conducted for all proposed construction that may affect waters of the United States. Section 404 of the CWA does not apply to this project, as there would be no discharge of dredged or fill material into waters of the United States.

Section 401 of the CWA, (CEA; 33 U.S.C. 1251 *et seq.*) as amended, requires that a Water Quality Certification Permit be obtained for anticipated discharges associated with construction activities or other disturbance within waterways. Section 401 of the CWA does not apply to this project, as there would be no discharge associated with construction activities or other disturbance within waterways.

The Clean Water Act Amendments of 1972 (P.L. 92-500; 33 U.S.C. 1251) stipulated broad national objectives to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Under the No-Action alternative, water quality in the Zuni River would worsen as incompletely treated sewage effluent would be released to land adjacent to the river during periods of high flows. The proposed project would ensure compliance with these Clean Water Act objectives by ensuring that wastewater effluent does not reach the river, thereby protecting water quality in the Zuni River.

3.4 Floodplains and Wetlands

Executive Orders 11988 (Floodplain Management) provides Federal guidance for activities within the floodplains of inland and coastal waters. The order requires Federal agencies to take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values

served by floodplains. The proposed project area is not located within any special flood hazard areas inundated by the 100-year flood. It is located in Zone X of the floodplain map, which is designated as areas that are outside the 500-year floodplain (Federal Emergency Management Agency 2008).

Executive Order 11990 (Protection of Wetlands) requires the avoidance, to the greatest extent possible, of both long and short-term impacts associated with the destruction, modification, or other disturbance of wetland habitats. There are no naturally occurring wetlands within the project area, and therefore, no impacts to wetlands would occur. The constructed wetlands would result in a net gain of wetlands in the project area. The No-Action alternative would result in no change in wetland acreage in the area.

3.5 Air Quality, Noise, and Aesthetics

The New Mexico Environment Department (NMED)'s continuous air quality monitoring sites closest to the Pueblo of Zuni are located in San Juan County. The Pueblo of Zuni has recently implemented an air quality monitoring program, but this data is not available through NMED. Air quality in the project area is generally known to be good. However, in August of 2005, the Ciniza gasoline-fractioning plant outside of Gallup was found to have violated Clean Air Act statutes. Under a consent order between Ciniza and NMED, funding was provided to implement an air monitoring project in the Pueblo of Zuni. Data from this program have not yet been analyzed; however, preliminary data suggests that particulates are the major potential air quality concern in the area (personal communication, S. Beran, Zuni Division of Natural Resources).

The Class I air quality areas closest to the Pueblo of Zuni are the Gila and Leopold Wilderness Areas within the Gila National Forest, approximately 200 kilometers (125 miles) to the south of the project area. Class I areas are special areas of natural wonder and scenic beauty, such as national parks, national monuments, and wilderness areas, where air quality should be given special protection. Class I areas are subject to maximum limits on air quality degradation. El Morro National Monument, 56 kilometers (35 miles) east of the Pueblo of Zuni, is not a designated Class I area but has rock inscriptions that would be vulnerable to air pollution.

The proposed project would result in a temporary but negligible increase in suspended dust particles from construction activities. Best Management Practices to be followed during construction to minimize dust include wetting of access roads and berms. All vehicles involved in transporting rubble and spoil from the project site to the deposition area would be covered and would have required emission control equipment. These practices would minimize dust and emissions-related air quality impacts during construction. Once construction is complete, the wetland treatment cells would have no further effects on air quality. Therefore, air quality in the Pueblo of Zuni, McKinley County, El Morro National Monument, and the Gila National Forest would not be affected by the proposed project or by the No-Action alternative.

Background noise levels in the proposed project area are relatively low. During construction, noise would temporarily increase in the vicinity during vehicle and equipment operation. The Noise Center (League for the Hard of Hearing, 2008) advises that noise levels

above 85 decibels will harm hearing over time and noise levels above 140 decibels can cause damage to hearing after just one exposure. However, the increase in noise during construction would be minor and temporary, ending when construction is complete. Therefore, the proposed project would have no significant affect on noise.

Aesthetically, the terrain of the project area is characterized by two existing secondary treatment wetland cells and open space. The area receives minimal recreational use with the intent of viewing scenery. The proposed project would have a temporary effect on aesthetics. During construction, heavy equipment would be visible in the work area and from Ojo Caliente Road. After project completion, opportunities for wildlife viewing would increase, adding recreational or educational opportunity in the area. Aesthetic conditions would not be affected by the No-Action alternative.

3.6 Vegetation Communities

The project area is part of the Great Basin Conifer Woodland biotic community (Brown and Lowe 1977; Brown 1982). Site visits by Corps personnel on August 5, 2005 and April 22, 2008, revealed a 200-acre, relatively open lot, containing upland vegetation and two existing wetland cells with well-established wetland plants on their perimeters. Within the open area, vegetation consists of alkalai sacaton (*Sporobolus airoides*), snakeweed (*Gutierrezia sarothrae*), scattered one-seed juniper (*Juniperus monosperma*), gray rabbitbrush (*Ericameria nauseosa*), big sagebrush (*Artemisia tridentata*), fourwing saltbush (*Atriplex canescens*), sand sagebrush (*Artemisia filifolia)*, Russian thistle (*Salsola tragus)* and kochia (*Kochia scoparia*). Grama grasses (*Bouteloua* spp.) and Indian ricegrass (*Achnatherum hymenoides*) are common in the area (Quam 2000). The No-Action alternative would result in no effects to this vegetation.

Under the proposed project, much of this upland vegetation would be converted to wetland vegetation. Species that occur in the existing wetland cells would be transplanted into the cells proposed for construction. These include cattails (*Typha latifolia*), smartweed (*Polygonum* spp.), softstem, hardstem and three square bulrush (*Scirpus validus, S. acutus, S. americanus*), Torrey's rush, knotted rush (*Juncus torreyi, J. nodosus*), yellow monkey flower (*Mimulus guttatus*), and arrowhead or duck potato (*Sagittaria cuneata, S. latifolia*). The upland vegetation community is common and does not support rare species, while wetlands are less common and provide important wildlife habitat and foraging areas. Therefore, the conversion of upland to wetland vegetation under the proposed project would be beneficial.

3.7 Wildlife

A variety of species are known to occur within the project area and are included in the Great Basin Conifer Woodland biotic community. Some of these species may include: Stephen's woodrat (*Neotoma stephensi*), deer mouse (*Peromyscus maniculatus*), desert cottontail (*Sylvilagus audubonii*), mule deer (*Odocoileus hemionus*), Gunnison's prairie dog (*Cynomys gunnisoni*), red- and yellow- shafted flicker (*Colaptes auratus*), redtail hawk (*Buteo jamaicensis*), Northern Harrier (Circus cyaneus), common raven (*Corvus corax*), black-tailed jackrabbit (*Lepus californicus*), and coyote (*Canis latrans*). Domestic animals that graze within the 200-acre area include cattle (*Bos taurus*) (Quam 2000).

On the April, 2008 site visit, a variety of waterfowl and wetlands-associated species were observed using the existing wetland cells, including mallard (*Anas platyrhynchos*), shoveler (*Anas clypeata*), cinnamon teal (*Anas cyanoptera septentrionalium*), ruddy ducks (*Oxyura jamaicensis rubida*), American coot (*Fulica americana*), and a great blue heron (*Ardea herodias)* eating a salamander. Pueblo of Zuni personnel reported observing red-winged and yellow-headed blackbirds (*Agelaius phoeniceus*, *Xanthocephalus xanthocephalus*), Canada geese (*Branta canadensis)*, and migrating songbirds and white-faced ibis (*Plegadis chihi*) using the wetlands. Bald eagle (*Haliaeetus leucocephalus*) has been observed in the area by Pueblo of Zuni personnel and may forage at the wetlands.

The proposed project construction would take place entirely within the 200-acre fenced area. Some wildlife species would be temporarily displaced during construction but are expected to return after construction is complete. No direct negative impacts should occur to wildlife as a result of the proposed project or the No-Action alternative. The created wetland cells are expected to benefit species of wildlife that use riparian and wetland habitat. The No-Action alternative would provide no additional habitat for wetland and riparian species.

3.8 Special Status Species

Three agencies have primary responsibility for protecting and conserving plant and animal species within the proposed project area. The United States Fish and Wildlife Service (USFWS), under authority of the Endangered Species Act of 1973, has the responsibility for Federal listed species. The New Mexico Department of Game and Fish (NMDGF) has the responsibility for state-listed wildlife species. The New Mexico State Forestry Division (Energy, Minerals, and Natural Resources Department) has the responsibility for state-listed plant species. Special status species that occur in McKinley County and may occur near the proposed project area are listed below in Table 1 (USFWS 2008, NMDGF 2008).

Table 1. Federal and State Special Status Species Listed for McKinley County, New Mexico, that have the Potential to Occur in the Vicinity of the Proposed Project.

Common Name	Scientific Name	Federal Status (USFWS)[a]	State of New Mexico status (NMDGF)[b]
Animals			
Bald Eagle	*Haliaeetus leucocephalus*	DM	T
Black-footed Ferret	*Mustela nigripes*	E, EXPN	---
American Peregrine Falcon	*Falco peregrinus anatum*	---	T
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E	E
Least Tern	*Sterna antillarum athalassos*	E	E
Mexican Spotted Owl	*Strix occidentalis lucida*	T	S
Zuni Bluehead Sucker	*Catostomus discobolus yarrowi*	C	E
Artic Peregrine Falcon	*Falco peregrinus tundrius*	---	T
Costa's Hummingbird	*Calypte costae*	---	T
Yellow-billed Cuckoo	*Coccyzus americanus*	C	S
Gray Vireo	*Vireo vicinior*	---	T

[a] **Endangered Species Act (ESA)** (as prepared by U.S. Fish and Wildlife Services) **status:** Only Endangered and Threatened species are protected by the ESA.

E= Endangered: any species that is in danger of extinction throughout all or a significant portion of its range.

T= Threatened: any species that is likely to become and endangered species within the foreseeable future throughout all or a significant portion of its range.

C= Candidate: taxa for which the Services has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species.

DM= Delisted Taxon, Recovered, Being Monitored First Five Years

EXPN = Experimental Population, Non-Essential

P= Proposed for listing in the identified category listed above.

S/A= Similarity of Appearance.

[b] **State of New Mexico status:**

E= Endangered: Animal species whose prospects of survival or recruitment within the state are in jeopardy.

T= Threatened: Animal species whose prospects of survival or recruitment within the state are likely to become jeopardized in the foreseeable future.

S= Sensitive Taxa (informal).

The Bald Eagle, a Federally delisted and State Threatened species, is normally found near major waterways and larger lakes where adequate food supplies may be found. The Bald Eagle

is known to occur in New Mexico primarily during the late fall and winter months. Bald Eagles utilizes large trees for perching and forage primarily for fish, ducks, and carrion along rivers and at local reservoirs. No preferred habitat exists within or near the project area. Due to the lack of large trees for roosting and the limited disturbance of the proposed project, there would be no effect to the Bald Eagle.

The Gray Vireo (*Vireo vicinior)*, a State-threatened species, is known to occur on Pueblo of Zuni lands and prefers open juniper woodland habitat. The project area contains very few junipers and is therefore unlikely to support breeding or summer resident vireos. Because of lack of preferred habitat and timing of construction, there would be no affect to the Gray Vireo.

The Zuni Bluehead Sucker, a Federal Candidate and State Endangered species, is endemic in the Zuni River drainage (NMDGF, 2006). Currently, the quality and quantity of habitat in the watershed appropriate for Zuni bluehead sucker vary (Carmen, 2004). Continuous flow is not present from the headwaters downstream to the Arizona/New Mexico border; surface flow is generally only continuous during heavy spring runoff. Many stream reaches are dry except near perennial springs. The Zuni River is located north of the proposed project and would not be affected by the proposed project. The last recorded occurrence of Zuni Bluehead Sucker in the Zuni River adjacent to the project area was in 1994. Currently known populations of the Zuni Bluehead Sucker are located 21 miles upstream of the proposed project area. Because the Zuni River would not be affected by the proposed project, there would be no effect to the Zuni Bluehead Sucker.

Other special status animals listed in Table 1 have not been detected in the project area and would not affected by the proposed project due to the limited disturbance and the lack of preferred habitat in the project area.

The New Mexico Department of Minerals, Natural Resources, Forestry Division has the responsibility for maintaining the list of state-listed endangered plant species. The New Mexico Rare Plants Technical Council list indicates that there are fifteen rare plant species that occur in McKinley County (New Mexico Rare Plants Technical Council 2008; see Table 2) One of these plants, Zuni fleabane, is Federally listed as endangered. Although these plants are known to exist in McKinley County, they are not likely to occur within the project area. Most occur at higher elevations or on specialized substrates that do not occur in the project area. Also, there was no presence of these species during the site visit to the project area. Therefore, there would be no effect to these rare plants by the proposed project or the No-Action alternative.

Table 2. Rare, Threatened and Endangered Plant Species Listed for McKinley County, New Mexico

Chuska milkvetch	(*Astragalus chuskanus*)
Clifford's milkvetch	(*A. cliffordii)*
Heil's milkvetch	*(A. heilii)*
Chaco milkvetch	(*A. micromerius*)
Zuni milkvetch	(*Astragalus missouriensis* var. *accumbens*)
Naturita milkvetch	(*Astragalus naturitensis*)
Acoma fleabane	(*Erigeron acomanus*)
Zuni fleabane	(*Erigeron rhizomatus*)
Sivinski's fleabane	(*Erigeron sivinskii*)
Clipped wild buckwheat	(*Eriogonum lachnogynum* var. *colobum)*
Sarah's wild buckwheat	(*Eriogonum lachnogynum* var. *sarahiae)*
Navajo muhly	(*Muhlenbergia arsenei)*
Navajo bladderpod	(*Lesquerella navajoensis*)
Parish's alkali grass	(*Puccinellia parishii*)
Clifford's groundsel	(*Senecio cliffordii)*

3.9 Cultural Resources

The National Historic Preservation Act of 1966, as amended, requires Federal agencies, Tribes, and project sponsors seeking Federal funding and/or permits to conduct cultural resources surveys to locate, identify, and evaluate historic and prehistoric resources, traditional cultural properties, and other areas of Tribal concern in advance of construction implementation. In 1999 and 2000, when the USEPA was the lead Federal Agency for this project, the proposed location was surveyed for archaeological resources, and traditional cultural property (TCP) interviews were conducted by the Zuni Cultural Resources Enterprise (ZCRE). Archaeological and traditional cultural properties reports were prepared by ZCRE and reviewed by the Zuni Tribal Historic Preservation Officer (THPO) and the New Mexico State Historic Preservation Officer (SHPO). The recommendations in the report were concurred with by SHPO. Of the 10 archaeological sites that were recorded, nine are eligible to the National Register of Historic Places under criterion "d". The strategy proposed by ZCRE was to avoid impacts to the sites through a combination of restricting construction and/or salt cedar removal in certain locations, fencing, and monitoring during construction.

The earliest archaeological record of the project area is similar to that of the greater Southwest; it is not until relatively recent times that material identified as ancestral Zuni occurs. The earliest inhabitants of this area, nominally beginning around 10,000 B.C., were the mobile hunter-gatherers of the late Pleistocene Period who pursued such large, now extinct, mega-fauna as mammoth, mastodon, bison, cave bear, and the ground sloth. The Paleo-Indians were followed in turn by the hunter-gatherers of the Archaic Period who lived in an essentially modern environment. They pursued plants and animals that remain today. By about 5000 B.C. the transition to a modern environment was complete. Towards the end of the Archaic,

populations were increasing, territories were being reduced in size, and the transition to reliance on agriculture was under way. Sites from either of these two periods are rare in the Zuni area; most archaeological finds for this period are diagnostic isolated spear points sometimes found in secondary contexts (Quam 2000:11).

The subsequent Pueblo Period is subdivided into seven or eight temporal periods, each defined by combinations of differing location, arrangements of above and below ground architecture, stone and/or adobe construction, pottery form and decoration. During the earliest portion of this period, the Basketmaker (A.D. 1-700) villages of generally small numbers of people living in fully- to semi-subterranean single room structures with earthen floors and above ground storage features were dispersed across the Zuni region. Several such sites have been excavated and others recorded during survey. During the Pueblo I Period (A.D. 700-950) the habitations generally consisted of deep pit structures with plastered earthen walls and prepared masonry floors. Numerous Pueblo I sites occur in the Zuni area (Quam 2000:11).

Based on the number of recorded sites, there was a marked increase in the Zuni area population during the Pueblo II Period (A.D. 950-1150). The structures consist of room blocks with full-height masonry walls built in conjunction with circular underground ceremonial structures known as kivas. At least one large ceremonial center that was an outlier location of the developments in Chaco Canyon some 75 miles north of Zuni dates to this period. It was partially excavated in the 1930s and in addition to integrating the Zuni area population into the Chacoan system, it also served as a locus for the local community interaction (Quam 2000:11).

The population of the Zuni area also increased during the following Pueblo III Period (A.D. 1150-1300). Site layout and construction were similar to the preceding period; however, average sites were larger, and plazas were incorporated into and adjacent to the room blocks. The Pueblo IV Period (A.D. 1300-1540) is not well understood here. The bulk of the Zuni population moved westward to the Zuni River and were living in six large towns, including the current Pueblo, when Coronado arrived in 1540 (Quam 2000:12).

The Historic Period is initiated by the arrival of the Spanish in 1540. After the Pueblo Revolt in 1680, the Zuni moved to the top of the nearby Dowa Yalanne Mesa. Following the Spanish return to New Mexico in 1692, the Zuni returned to Zuni Pueblo and have remained there ever since. They also established outlying seasonally-occupied residences located for defense, farming, and herding. With the American acquisition of New Mexico in 1948, the Zuni came into increasingly frequent contact with Hispanics, Anglos, technological innovations, and the cash economy. After 1945, over-grazing, environmental degradation, clear-cutting, erosion, and the cash economy caused a decrease in the importance of farming (Quam 2000:12).

The project area is Pueblo of Zuni Trust Land and is within the traditional hunting and agricultural lands of the Zuni. The area was surveyed for archaeological resources in November and December, 1999, by archaeologists from the Zuni Cultural Resources Enterprise who conducted a 100 percent intensive inventory of the project area. A total of seven new sites were discovered and two previously recorded sites were rerecorded (Quam 2000:12). Due to a slight change in the project's location an additional survey was conducted on four days in April 2000. One additional site and six isolated occurrences were recorded (Nieto 2001). The sites include a

multicomponent Pueblo II ceramic and stone scatter, Historic Zuni ceramic scatter, historic wells and associated features, ceramic and stone scatters from the Basketmaker III, Pueblo I, II, III, and IV Periods, and an old sheep corral (Quam 2000:15-31).

Of the 10 archaeological sites recorded by the two surveys, nine were recommended eligible for the National Register of Historic Places. This recommendation was concurred with by the Zuni THPO and the New Mexico SHPO. The THPO proposed that the project be designed to avoid impacts to the sites and a portion of the construction work be monitored by qualified archaeologists so that there will be no inadvertent impacts to the sites. The SHPO concurred with this proposal (letter from Pueblo of Zuni dated 26 April 2000 and concurred with by SHPO on 8 May 2000; NMCRIS No. 059698).

In addition to the archaeological surveys, the Zuni Historic Preservation Office conducted a Traditional Cultural Properties (TCP) assessment for the project location. The project was described to the Zuni Cultural Resources Advisory Team and the team then visited the location for two days in October 1999. In addition to considering the archaeological sits as TCPs several other locations and items of concern in and near to the work area were indicated. The avoidance and monitoring strategy noted above were devised in consultation among the members of the Cultural Resources Advisory Team and the Zuni Historic Preservation Office (Panteah and Damp 2000).

The proposed project would have no effect on the archaeological sites or traditional cultural properties in the area. The archaeological sites would be fenced in cooperation with the Zuni THPO and their locations indicated on the construction plans. The staging areas, access routes, and construction zone would be marked and situated such that the heavy equipment would not cause inadvertent damage. The work would be monitored by archaeologists from the Pueblo of Zuni. In the event that buried materials are exposed, work would stop in the vicinity of the discovery and appropriate representatives from the Zuni THPO and Cultural Resources Advisory Team would be contacted. No work would resume in the location of the discovery until the situation has been resolved to the satisfaction of all concerned.

3.10 Socioeconomic Considerations and Land Use

The Pueblo of Zuni encompasses about 450,000 acres in southwestern McKinley County, New Mexico (Pueblo of Zuni 2008). The population of the Pueblo in 2000 was 6,367 (U.S. Census Bureau, 2000). Within the Pueblo of Zuni, the ethnic background is: Native American, 97.0%; Anglo, 2.1%; African-American, less than 0.1%; Asian, less than 0.1%; Other race or two or more races, 0.8%. In 2000, the estimated median household income in the Pueblo of Zuni was $22,559 with 43% of individuals living in poverty. Major employment sectors are: educational, health and social services; manufacturing; retail; public administration; and construction (U.S. Census Bureau, 2000). The annual average unemployment rate for McKinley County in 2007 was 4.5% compared to the statewide rate of 3.6% (New Mexico Department of Workforce Solutions 2008). The Pueblo of Zuni operates several tribal enterprises including the A:shiwi A:wan Museum & Heritage Center, Pueblo of Zuni Arts & Crafts, Zuni Forest Products & Services Enterprise, and Zuni Cultural Enterprise (Pueblo of Zuni, 2008).

The proposed project would take place entirely within the 200-acre fenced property. Besides the two existing lagoons, the majority of the property is an open field. Adjacent land uses and features include roads, rangeland, and the Zuni River. The proposed project would not affect land use or socioeconomic resources in the project area. The entire Pueblo of Zuni would benefit from the proposed construction of the secondary treatment lagoons. Under the No-Action alternative, socioeconomic conditions would likely decline because of insufficient wastewater treatment capacity.

3.11 Indian Trust Assets

Indian Trust Assets are legal interests in property held in trust by the United States for Indian tribes or individuals. Examples of trust assets include land, minerals, hunting and fishing rights, and water rights. The United States has an Indian Trust Responsibility to protect and maintain rights reserved by or granted to Indian tribes or individuals by treaties, statues, executive orders, and rights further interpreted by the courts. This trust responsibility requires that all Federal agencies take all actions reasonably necessary to protect such trust assets. There would be no effect on Indian Trust Assets by the proposed project, as this project takes place on Pueblo of Zuni land by the Pueblo's request and is being coordinated with Pueblo input and approval.

3.12 Human Health and Safety

Currently, the Pueblo of Zuni's wastewater treatment system lacks sufficient capacity to accommodate existing wastewater flows. The deficiency of the existing system forces incompletely treated sewage effluent to overflow onto land adjoining the Zuni River, which is a health threat to the residents of Zuni Pueblo and downstream water users. Under the No-Action alternative, increased wastewater flow from continued population growth will worsen the current situation and pose a greater health risk to the public.

Therefore, the proposed construction of the ten additional secondary treatment lagoons is needed to provide the Zuni Pueblo with sufficient capacity for effluent disposal and to address existing deficiencies. This would alleviate the problem of having effluent overflow into the Zuni River. Human health and safety would be beneficially affected due to the proposed project.

During the construction of the proposed treatment lagoons there is a potential of worker exposure to untreated sewage. To mitigate this risk, a certified industrial hygienist will be on-site during construction and will specifically address this issue in the Health and Safety Plan. No other hazardous or toxic wastes or substances have been identified as concerns.

3.13 Environmental Justice

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Low-Income Populations; February 11, 1994) was designed to focus the attention of federal

agencies on the human health and environmental conditions of minority and low-income communities. It requires federal agencies to adopt strategies to address environmental justice concerns within the context of agency operations and proposed actions. The 1995 EPA guidance document, "Environmental Justice Strategy: Executive Order 12898" defines the approaches by which the EPA will ensure that disproportionately high environmental and/or socioeconomic effects on minority and low-income communities are identified and addressed. Further, it establishes agency wide goals for all Native Americans with regard to Environmental Justice issues and concerns.

The Pueblo of Zuni Wastewater Collection System Improvement Project would be conducted under Section 595 of the Water Resources Development Act of 1999 (Public Law 106-53; 33 U.S.C. 2201 *et seq*.) as amended. This program is largely intended to provide needed assistance (technical, financial, etc.) to communities in which water resources are degrading and in need of improvement. As such, this project would benefit an area within a minority and low-income community. All areas of the Pueblo of Zuni would be serviced by the proposed improvements. These improvements could decrease health risks to nearby rural residents from the inadequate treatment that currently exists. No adverse impacts on minority and low-income populations are expected. Under the definition of Executive Order 12898, there would be no adverse environmental justice impacts under the proposed action. Conversely, under the No-Action alternative, Native American and low-income populations would continue to experience adverse health effects due to the inadequacy of the present wastewater treatment system.

3.14 Noxious Weeds and Invasive Species

The Federal Noxious Weed Act of 1974 (Public law 93-269; 7 U.S.C. 2801) provides for the control and eradication of noxious weeds and their regulation in interstate and foreign commerce. Executive Order 13112 directs Federal agencies to prevent the introduction of invasive (exotic) species and to control and minimize the economic, ecological, and human health impacts that invasive species cause. In order to prevent new infestations of noxious weeds and invasive species, all equipment would be cleaned with a high-pressure water jet before entering the area. Following construction, native wetland species would be planted in the wetland cells, minimizing the opportunity for invasive species to colonize the area. Therefore, the proposed project is in compliance with the Federal Noxious Weed Act and Executive Order 13112.

3.15 Cumulative Impacts

NEPA defines cumulative effects as "…the impact on the environment which results from the incremental impact of the action when added to other, past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."

The footprint of the proposed project lies within a rural area. The proposed location for the secondary treatment wetland cells is located within a 200-acre fenced area where two existing lagoons are located. The construction of ten secondary treatment cells would not significantly impact the current conditions of the local environment. Positive wastewater

treatment improvements are anticipated to occur from the proposed project that would enhance the quality of life for residents in the area. The risk of wastewater pollution over time would be reduced with the completion of additional wetland cells. For these reasons, the proposed project when combined with past, present, or future activities in the Zuni Pueblo would not significantly add to or raise local cumulative environmental impacts to a level of significance.

4.0 CONCLUSIONS AND SUMMARY

This Environmental Assessment addresses the method and potential effects for the construction of ten secondary and tertiary treatment wetland cells. The proposed location for the wetland/evaporation cells is within a 200-acre fenced area where two cells have previously been constructed. Impacts to the environment would be non-significant and short-term. Long-term benefits to wildlife, wetland vegetation, water quality in the Zuni River, socioeconomics, and human health and safety would result from the creation of wetlands. The proposed secondary treatment wetlands would benefit the entire Pueblo of Zuni. The proposed project would not result in any moderate or significant, short-term, long-term, or cumulative adverse effects. Therefore, construction of the proposed project would not significantly affect the quality of the human environment and is recommended for implementation.

5.0 PREPARATION, CONSULTATION AND COORDINATION

5.1 Preparation

This Environmental Assessment was prepared for the Pueblo of Zuni by the U.S. Army Corps of Engineers, Albuquerque District. Personnel primarily responsible for preparation include:

Danielle A. Galloway	Biologist
Dana M. Price	Botanist
Suzi R. Hess	Geologist
Shelley D. Ramos	Geologist
Lara E. Beasley	Environmental Engineering Section
George E. Diewald	Structural
Richard O. Zaragoza	Structural
Al Lopez	Real Estate
Mark L. Paulus	Civil Engineer
Kerry L. Horner	Civil Engineer
John D. Schelberg	Archaeologist
Alan R. CDeBaca	Cost Estimator
Terresa L. Reed	Civil Engineer
Paul H. Gendron	Mechanical Engineer
Pete K. Doles	Project Manager
Michael P. Martinez	Project Manager

5.2 Quality Control

This EA has been reviewed for quality control purposes. Reviewers include:

Julie A. Alcon	Chief, Environmental Resources Section
Champe B. Green	Ecologist
Gregory Everhart	Archaeologist
Ondrea Hummel	Acting Chief, Environmental Resources Section
Louis Gross	Construction Project Manager, Pueblo of Zuni
Nelson Luna	Director, Pueblo of Zuni Fish and Wildlife Department

5.3 General Consultation and Coordination

Agencies and entities to which this Environmental Assessment was distributed include:

Mr. Wally Murphy
US Fish and Wildlife Service
New Mexico Ecological Services Field Office

Mr. Rob Lawrence
US Environmental Protection Agency, Region 6
Office of Planning and Coordination

Mr. John Poland
US Bureau of Reclamation

Mr. Don Borda
Chief, Regulatory Branch
US Army Corps of Engineers

Mr. Leigh Hubbard
Indian Health Service

Mr. Robert Sivinski
NM Forestry and Resources Conservation Division
Energy, Minerals, and Natural Resources Department

Mr. Matt Wunder
NM Department of Game and Fish
Conservations and Services Division

Ms. Marcy Leavitt
Water and Waste Management Division
NM Environmental Department

Mr. John R. D'Antonio, Jr.
NM State Engineer

Mr. Estevan Lopez
NM Interstate Stream Commission

Honorable Norman Cooeyate
Governor, Pueblo of Zuni

Mr. Andrew Othole
Pueblo of Zuni Office of Planning and Development

Mr. Roman Pawluk
Director, Pueblo of Zuni Conservation Department

Mr. Nelson Luna
Director, Zuni Fish and Wildlife Department

Mr. Jonathan Damp
Zuni Cultural Preservation Office

A copy of the EA was also provided to:
Zuni Public Library
P.O. Box 339
Zuni, New Mexico 87327

5.4 **Comments received and Corps' responses:**

The Draft Environmental Assessment (DEA) was available for public review and comment from April 30 to May 29, 2008. A Notice of Availability was published in the Gallup Independent on April 30 and May 3, 2008. The DEA was available on the Corps' website, at the Zuni Public Library, and at the Pueblo of Zuni Office of Planning and Development. Comments were received from: the Pueblo of Zuni Office of Planning and Development (letter dated May 20, 2008); the Pueblo of Zuni Department of Fish and Wildlife (e-mail dated May 20, 2008); and the New Mexico Energy, Minerals, and Natural Resources Department (e-mail dated May 2, 2008). A generic letter was received from the U.S. Fish and Wildlife Service (letter dated May 15, 2008; Appendix B). No other comments were received.

1: New Mexico Forestry and Resources Conservation Division, Energy, Minerals, and Natural Resources Department: The wetland plant *Rumex crispus* (curly dock) is non-native and invasive, and should not be propagated in the constructed wetlands.

Corps Response: Concur. We have removed *Rumex crispus* from the list of wetland plants (Section 3.6). After discussion, the Zuni Fish and Wildlife Department has agreed to take measures to control the spread of this species.

2: Pueblo of Zuni Fish and Wildlife Department: Comments were submitted electronically and a list of wetland plants for the first two wetland cells was provided. Comments included:

- Low elevation for McKinley County should be the Zuni River
- Add two wildlife species common in the area to Section 3.7
- Air quality Class I areas should address El Morro National Monument
- The last recorded occurrence of Zuni Bluehead Sucker in the project area was in 1994
- Known populations of the sucker are located 21 miles upstream of the project area
- Isolated prairie dog burrows occur in the project area; related to black-footed ferret.

Corps' Response: Corrected information on the low elevation along the Zuni River, wildlife and plant species, and Zuni Bluehead Sucker populations has been incorporated into the Final EA. El Morro National Monument is not a designated Class I air quality area, but has been addressed because its rock inscriptions could be damaged if air quality in the area were to deteriorate. Gunnison's prairie dog is included in the list of wildlife species. In the special status species discussion (Section 3.8) we do not discuss the black-footed ferret in detail because habitat is not present in the project area. The ferret requires extensive prairie dog colonies for survival and is considered extirpated from the state of New Mexico.

3: Pueblo of Zuni Office of Planning and Development: Comments were submitted by letter (following page).

Corps' Response: Concur. Comments have been incorporated into the Final EA.

4: U.S. Fish and Wildlife Service: The Service's letter (Appendix B) raised a concern regarding possible wildlife toxicity from exposure to domestic wastewater, and suggested consulting their Website and taking appropriate measures.

Corps' Response: The Corps followed up with phone calls to the Service's New Mexico Ecological Services Field Office (NMESFO) and to the Pueblo of Zuni Fish and Wildlife Department to determine the appropriate course of action. The Service suggested regular monitoring of the wetlands' water quality and reporting of any bird or wildlife mortalities. The Pueblo of Zuni Fish and Wildlife Department staff monitors the Constructed Wetlands on a bi-weekly schedule and if need be on a daily basis to address maintenance operations. Monitoring is by senses; odor, water color and nutrient load, plant growth, waterfowl behavior, and potential hazards are verified with appropriate consultation. Furthermore, the Indian Health Service is expected to monitor the effluent from the primary treatment lagoons as part of their project to improve this part of the wastewater system. Currently the Zuni Fish and Wildlife Department has points of contact with the Service's Region 2 office and the NMESFO. The Corps believes that the potential for wildlife toxicity is minimal in this secondary treatment wetlands and that any conditions hazardous to wildlife will be detected, reported and alleviated.

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Appendix A

Cultural Resources Coordination

MALCOLM B. BOWEKATY
Governor

BARTON MARTZA
Lt. Governor

ELDRED P. BOWEKATY
Head Councilman

DAVID W. WYACO, SR.,
Councilman

PUEBLO OF ZUNI
P.O. Box 339
1203-B State Highway 53
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ARDEN KUCATE
Councilman

DAN SIMPLICIO
Councilman

VIVIAN M. HATTIE
Councilwoman

ANTHONY OTTO LUCIO
Councilman

26 April 2000

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RECEIVED
APR 28 2000
JvB
HISTORIC PRESERVATION DIVISION

CULTURAL RESOURCE ENTERPRISE
MAY 10 2000

Ms. Jan Biella
State Historic Preservation Division, Office of Cultural Affairs
Villa Riveria, Room 101
228 E. Palace Avenue
Santa Fe, New Mexico 87503

Ms. Biella:

The Pueblo of Zuni and the Zuni Heritage and Historic Preservation Office present to you for your review and comment a copy of a technical report prepared by Zuni Cultural Resource Enterprise. The lead agency for this project is the Environmental Protection Agency. The Bureau of Reclamation is also involved in the undertaking but is not so named in the report, as this information was only recently made available. The report is entitled:

> *A Cultural Resource Survey of the Zuni Wetlands Project, Zuni Indian Reservation, McKinley County, New Mexico* by Donovan K. Quam

with an appendix entitled:

> *Zuni Traditional Cultural Properties Assessment for Zuni Waste Water Lagoons and Wetland Disposal Project, Zuni Indian Reservation, McKinley County, New Mexico* by Loren Panteah and Jonathan E. Damp

We concur with the findings and recommendations of the report and recommend that the archaeological sites and the traditional cultural properties be avoided. Avoidance of the archaeological sites can be accomplished by establishing protective fencing at a 10-meter buffer outside each site. Avoidance of the traditional cultural properties can be accomplished by in-field consultation between construction personnel and the Zuni Cultural Resource Advisory Team. Because of the esoteric, privileged, and sensitive nature of the traditional cultural properties not all information is divulged within the report.

If you have any questions regarding this report please call Jonathan Damp at (505) 782-4814.

Sincerely,

Malcolm B. Bowekaty
Governor, Pueblo of Zuni

Jonathan E. Damp
Director, Zuni Heritage and Historic Preservation Office

cc: project files 047-96

Concur with recommendation of eligibility and/or effects as proposed.

Jan J Biella 5/8/00 for
State Historic Preservation Officer

Eligibility for archaeological sites under criterion "c" eligibility for TCPs under "a"

Appendix B

Biological Resources Coordination

U.S. Fish and Wildlife Service letter

Please send S.L. 5/5/8

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
4101 JEFFERSON PLAZA NE
ALBUQUERQUE NM 87109-3435

April 28, 2008

RECEIVED
MAY 01 2008
USFWS-NMESFO

Planning, Project and Program Management Division
Planning Branch
Environmental Resources Section

Mr. Wally Murphy
Field Supervisor
U.S. Fish and Wildlife Service
NM Ecological Services Field Office
2105 Osuna Road NE
Albuquerque, NM 87113

Dear Mr. Murphy:

The U.S. Army Corps of Engineers (Corps), Albuquerque District, in cooperation with the Pueblo of Zuni, is planning a project to increase the capacity of the Zuni secondary wastewater treatment wetlands. The proposed work would construct ten additional secondary treatment wetland cells within a 200-acre area on Zuni Pueblo land, southwest of Zuni village in southwestern McKinley County. Two cells would be constructed initially, and future cells would be added as funding becomes available. The proposed construction period is nine months and is expected to start in the fall of 2008.

Enclosed for your review is the Draft Environmental Assessment (DEA), entitled **"Pueblo of Zuni Constructed Wetlands Wastewater Treatment Lagoons, McKinley County, New Mexico"**. The Corps is sending copies of the DEA to solicit comments from Federal, State, and local interests to comply with the National Environmental Policy Act and the Endangered Species Act.

The Corps would appreciate information on state endangered and threatened animal species or species of concern within McKinley County and the proposed project area that could be affected by the proposed project. Please see Section 3.8 for Special Status Species.

Please review the DEA and provide any written comments to the above address, Attn: Ms. Dana Price, Environmental

Resources Section. Written comments must be received **no later than May 29, 2008,** so that comments can be addressed and revisions made to the DEA in a timely manner. If we do not receive comments by this date, we will assume you have no concerns or have no objections to the project. You may also facsimile your correspondence to (505) 342-3668 or e-mail to dana.m.price@usace.army.mil. If you need additional information, please contact Ms. Dana Price at (505) 342-3378.

Sincerely,

Ondrea Hummel

Ondrea Hummel
Chief, Environmental Resources Section

Enclosure

Copies Furnished:

U.S. Environmental Protection Agency (Lawrence)
U.S. Bureau of Reclamation (Poland)
U.S. Army Corps of Engineers (Borda)
U.S. Indian Health Service (Hubbard)
New Mexico State Forestry Division (Sivinski)
New Mexico Department of Game and Fish (Wunder)
New Mexico Environmental Department (Kelley)
New Mexico State Engineer (D'Antonio)
New Mexico Interstate Stream Commission (Lopez)
Pueblo of Zuni Governor's Office (Cooeyate)
Pueblo of Zuni Office of Planning and Development (Othole)
Pueblo of Zuni Fish and Wildlife Department (Nelson)
Pueblo of Zuni Cultural Preservation Office (Damp)
Pueblo of Zuni Conservation Department (Pawluk)
Zuni Public Library (Hooee)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

MAY 15 2008

Thank you for your recent request for information on threatened or endangered species or important wildlife habitats that may occur in your project area. The New Mexico Ecological Services Field Office has posted lists of the endangered, threatened, proposed, candidate and species of concern occurring in all New Mexico Counties on the Internet. Please refer to the following web page for species information in the county where your project occurs: http://www.fws.gov/southwest/es/NewMexico/SBC_intro.cfm. If you do not have access to the Internet or have difficulty obtaining a list, please contact our office and we will mail or fax you a list as soon as possible.

After opening the web page, find New Mexico Listed and Sensitive Species Lists on the main page and click on the county of interest. Your project area may not necessarily include all or any of these species. This information should assist you in determining which species may or may not occur within your project area.

Under the Endangered Species Act, as amended (Act), it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with us further. Similarly, it is their responsibility to determine if a proposed action has no effect to endangered, threatened, or proposed species, or designated critical habitat. If your action area has suitable habitat for any of these species, we recommend that species-specific surveys be conducted during the flowering season for plants and at the appropriate time for wildlife to evaluate any possible project-related impacts. Please keep in mind that the scope of federally listed species compliance also includes any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect or cumulative effects.

Candidates and species of concern have no legal protection under the Act and are included on the web site for planning purposes only. We monitor the status of these species. If significant declines are detected, these species could potentially be listed as endangered or threatened. Therefore, actions that may contribute to their decline should be avoided. We recommend that candidates and species of concern be included in your surveys.

Also on the web site, we have included additional wildlife-related information that should be considered if your project is a specific type. These include communication towers, power line safety for raptors, road and highway improvements and/or construction, spring developments and livestock watering facilities, wastewater facilities, and trenching operations.

Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. We recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could impact floodplains or wetlands. These habitats should be conserved through avoidance, or mitigated to ensure no net loss of wetlands function and value.

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, nests, and eggs, except as permitted by the U.S. Fish and Wildlife Service. To minimize the likelihood of adverse impacts to all birds protected under the MBTA, we recommend construction activities occur outside the general migratory bird nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until nesting is complete.

We suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding fish, wildlife, and plants of State concern.

Thank you for your concern for endangered and threatened species and New Mexico's wildlife habitats. We appreciate your efforts to identify and avoid impacts to listed and sensitive species in your project area.

Sincerely,

Wally Murphy
Field Supervisor

Appendix C

Public Review Letters

April 28, 2008

Planning, Project and Program Management Division
Planning Branch
Environmental Resources Section

XXXXXX

Dear :

The U.S. Army Corps of Engineers (Corps), Albuquerque District, in cooperation with the Pueblo of Zuni, is planning a project to increase the capacity of the Zuni secondary wastewater treatment wetlands. The proposed work would construct ten additional secondary treatment wetland cells within a 200-acre area on Zuni Pueblo land, southwest of Zuni village in southwestern McKinley County. Two cells would be constructed initially, and future cells would be added as funding becomes available. The proposed construction period is nine months and is expected to start in the fall of 2008.

Enclosed for your review is the Draft Environmental Assessment (DEA), entitled **"Pueblo of Zuni Constructed Wetlands Wastewater Treatment Lagoons, McKinley County, New Mexico"**. The Corps is sending copies of the DEA to solicit comments from Federal, State, and local interests to comply with the National Environmental Policy Act and the Endangered Species Act.

Please review the enclosed DEA and provide any written comments to the above address, Attn: Ms. Dana Price, Environmental Resources Section. Written comments must be received **no later than May 29, 2008,** so that comments can be addressed and revisions made to the DEA in a timely manner. If we do not receive comments by this date, we will assume you have no concerns or have no objections to the project. You may also facsimile your correspondence to (505) 342-3668 or e-mail to Dana.m.price@usace.army.mil. If you have any questions or need additional information, please contact Ms. Dana Price at (505) 342-3378.

Sincerely,

Ondrea Hummel
Chief, Environmental Resources Section

Notice of Availability

Affidavit of Publication

STATE OF NEW MEXICO
) SS
COUNTY OF MCKINLEY

LYDIA JOE being duly sworn upon oath, deposes and says:

As LEGAL CLERK of The Independent, a newspaper published in and having a general circulation in McKinley County, New Mexico and in the City of Gallup, New Mexico and having a general circulation in Cibola County, New Mexico and in the City of Grants, New Mexico and having a general circulation in Apache County, Arizona and in the City of St. Johns and in the City of Window Rock, Arizona therein: that this affiant makes the affidavit based upon personal knowledge of the facts herein sworn to. That the publication, a copy of which is hereto attached was published in said newspaper during the period and time of publication and said notice was published in the newspaper proper, and not in a supplement thereof, for two time, the first publication being on the 30th day of April, 20 08, the second publication being on the _____ day of _____ 20_____, the third publication being on the _____ day of _____ 20_____,

and the last publication being on the 3rd day of May, 20 08. That such newspaper, in which such notice or advertisement was published, is now and has been at all times material hereto, duly qualified for such purpose, and to publish legal notices and advertisements within the meaning of Chapter 12, of the statutes of the statutes of the State of New Mexico, 1941 compilation,

Lydia Joe
Affiant.

Sworn and subscribed to before me this 5th day of May, A.D., 20 08.

Gloria M Lopez
Notary Public

My commission expires:
February 9, 2009

LEGAL NOTICE
Zuni-McKinley County
New Mexico

Notice of Availability
Draft Environmental Assessment for the Pueblo of Zuni Constructed Wetlands

The U.S. Army Corps of Engineers (Corps), Albuquerque District, has completed the **Draft Environmental Assessment (DEA)** entitled **"Pueblo of Zuni Constructed". The Wetlands Wastewater Treatment Lagoons, McKinley County, New Mexico".** The Corps, in cooperation with the Pueblo of Zuni, is planning a project to increase the capacity of the Zuni secondary wastewater treatment wetlands. The proposed work would construct ten additional secondary treatment wetland cells within a 200-acre area on Zuni Pueblo land, southwest of Zuni village in southwest McKinley County. Two cells would be constructed initially, and future cells would be added as funding becomes available. The proposed construction period is nine months and is expected to start in the fall of 2008.

The DEA is available at the Corps website (under "FONSI/Environmental Assessments") at: http://www.spa.usace.army.mil or hard copy will be sent upon written request to the following address:

U.S. Army Corps of Engineers
Albuquerque District
Environmental Resources Section
Attn: CESPA-PM-LE (Ms. Dana Price)
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435

Paper copies of this document are also available for review at:

Zuni Public Library
27 E. Chavez Circle
Zuni, New Mexico 87327

Pueblo of Zuni Office of Planning & Development
Avenue D, Building 100 - Blackrock Area
Zuni, New Mexico 87327

The public review will extend from April 30 to May 29, 2008. Written comments should be sent to the above address. For more information or to send comments electronically please contact Ms. Dana Price, USACE, at (505)342-2278 or dana.m.price@usace.army.mil.

Legal #9606 Published in The Independent April 30 & May 3, 2008.

Pueblo of Zuni Office of Planning and Development letter

NORMAN J. COOEYATE
Governor

DANCY SIMPLICIO
Lt. Governor

SHELLY C. CHIMONI
Head Councilwoman

DIXIE J. TSABETSAYE
Councilman

PUEBLO OF ZUNI
Office of
Planning & Development

P.O. Box 339
1203-B State Highway 53
Zuni, New Mexico 87327-0339

505-782-3054 (☎)
505-782-2628 (🖷)

CARLETON P. ALBERT SR.
Councilman

ARDEN KUCATE
Councilman

WINONA S. PEYNETSA
Councilwoman

CHARLOTTE T. BRADLEY
Councilwoman

Officially known as the Zuni Tribe of the Zuni Indian Reservation

May 20, 2008

Department of the Army
Albuquerque District, Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, N.M. 87109-3435

Attn: Ms. Dana Price

The following are our comments for the Draft Environmental Assessment entitled "Pueblo of Zuni Constructed Wetlands Wastewater Treatment Lagoons, McKinley County, New Mexico".

1.1 Fourth paragraph, 3rd sentence replace with: The 200-acre site is currently an open field with upland vegetation and two constructed wetland cells (see Figure 3).

1.2 Second paragraph, 6th sentence replace with: Preliminary work for sludge removal is anticipated this summer.

1.2 Fourth paragraph, 4th sentence replace with: Sludge drying beds were recommended to be provided at approved sites for future sludge removal.

2.1 Second paragraph, 7th sentence replace with: The size of cell 4 would be 400' x 1,200' and cell 5 would be 400' x 1,300'.

2.1 Second paragraph, 8th & 9th sentences replace with: The total construction cost for the first phase is $607,500. Federal costs would be $455,625 and non-Federal costs would be $151, 875.

3.5 First paragraph, 5th sentence: Delete entire sentence.

3.5 Third paragraph, 3rd , 4th & 5th sentences: Delete the three sentences. State of New Mexico does not have jurisdiction for this in Zuni Tribal Lands.

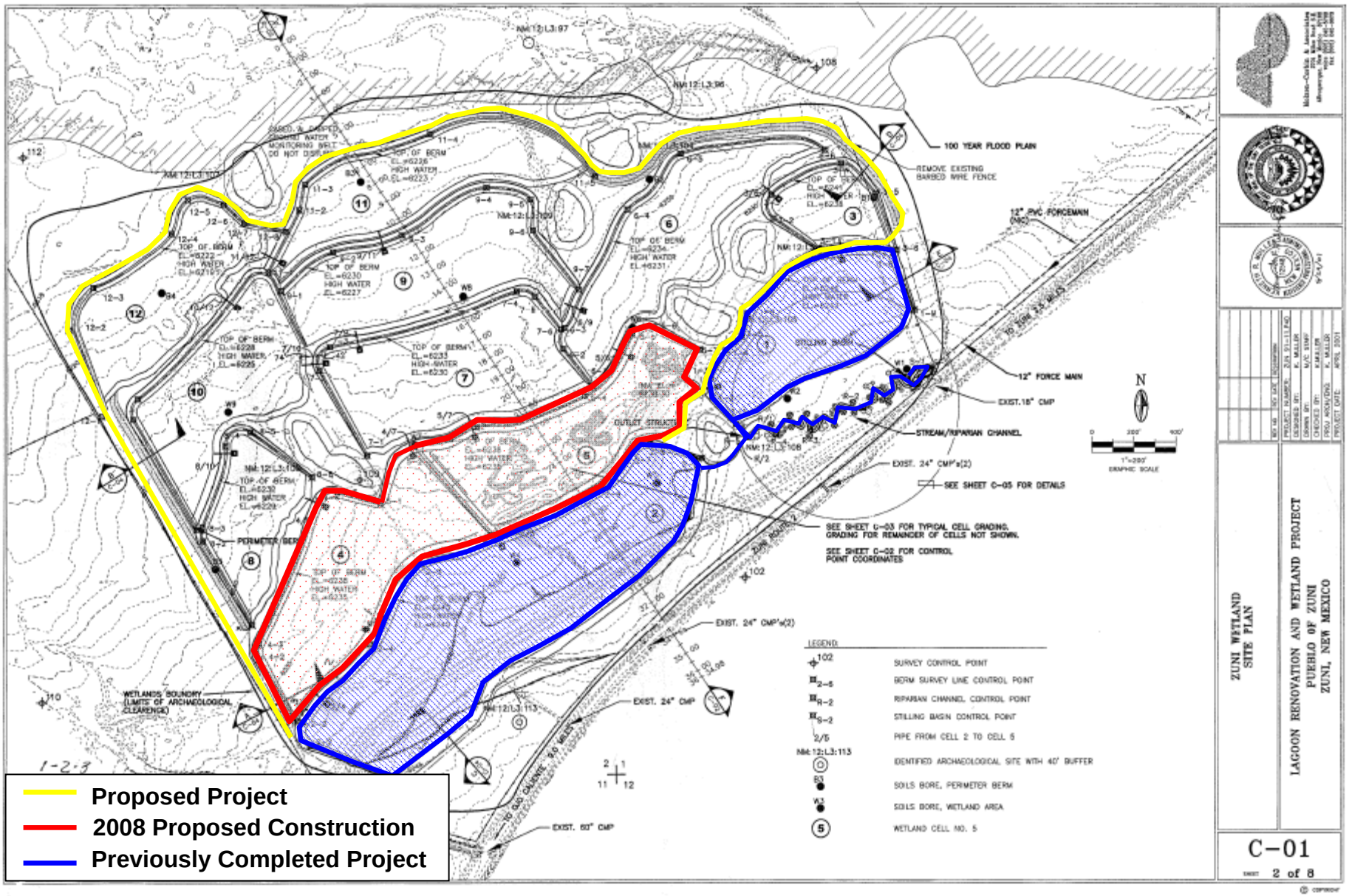
Sincerely,

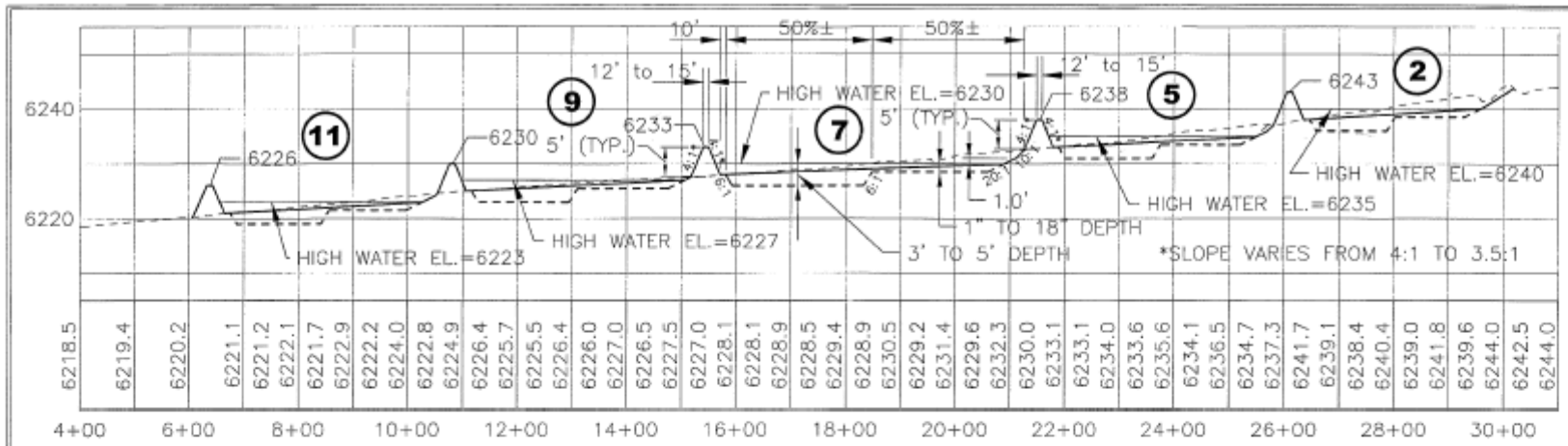
Andrew Othole, Director

Cc: Norman J. Cooeyate, Governor
Cedric Lupee, Interim Tribal Administrator
Nelson Luna, Director, Fish & Wildlife
Roman Pawluk, Director , Conservation Department

Appendix D

Zuni Pueblo Wetland Project Plans


Proposed Project
2008 Proposed Construction
Previously Completed Project
100 YEAR FLOOD PLAIN
REMOVE EXISTING BARBED WIRE FENCE
12" PVC FORCEMAIN (NEW)
12" FORCE MAIN
EXIST.18" CMP
STREAM/RIPARIAN CHANNEL
EXIST. 24" CMP's(2)
SEE SHEET C-05 FOR DETAILS
SEE SHEET C-03 FOR TYPICAL CELL GRADING. GRADING FOR REMAINDER OF CELLS NOT SHOWN.
SEE SHEET C-02 FOR CONTROL POINT COORDINATES
EXIST. 24" CMP's(2)
EXIST. 24" CMP
EXIST. 60" CMP
WETLANDS BOUNDRY (LIMITS OF ARCHAEOLOGICAL CLEARENCE)
PERIMETER BERM
OUTLET STRUCTURE
STILLING BASIN
TO SOME 3.5 MILES
TO OLD CALIENTE 3.0 MILES
N
1"=200'
GRAPHIC SCALE
LEGEND:
SURVEY CONTROL POINT
BERM SURVEY LINE CONTROL POINT
RIPARIAN CHANNEL CONTROL POINT
STILLING BASIN CONTROL POINT
PIPE FROM CELL 2 TO CELL 5
IDENTIFIED ARCHAEOLOGICAL SITE WITH 40' BUFFER
SOILS BORE, PERIMETER BERM
SOILS BORE, WETLAND AREA
WETLAND CELL NO. 5
ZUNI WETLAND SITE PLAN
LAGOON RENOVATION AND WETLAND PROJECT
PUEBLO OF ZUNI
ZUNI, NEW MEXICO
C-01
SHEET 2 of 8



F / C-01 GENERALIZED SITE CROSS SECTION

SEE SHEET C-03 FOR DETAILED TYPICAL CELL SECTION

Survey Control Points:

Point No.	Northing	Easting	Elevation
102	-991.68	-1220.31	6248.84
108	1539.46	-884.28	6230.01
109	-424.39	-3060.54	6233.97
110	-1495.47	-4577.32	6224.65
112	1118.23	-4673.22	6212.23
113	2045.69	-3366.72	6219.94

Riparian Stream Control Points:

Point No.	Northing	Easting	Invert Elevation
R-1	29	-423	6246.0
R-2	-83	-660	6245.6
R-3	-195	-901	6245.0
R-4	-213	-1074	6244.9
R-5	-223	-1215	6244.4

Berm Survey Line Control Points:

Point No.	Northing	Easting	Top of Berm Elevation
1-1	-161	-1286	6246
1-2	-29	-1378	6246
1-3	57	-1386	6246
1-4	191	-1313	6246
1-5	258	-1239	6246
1-6	399	-1213	6246
1-7	673	-595	6246
1-8	653	-519	6246
1-9	385	-416	6246

Point No.	Northing	Easting	Top of Berm Elevation
2-1	-1873	-2965	6243
2-2	-1703	-3295	6243
2-3	-1560	-3329	6243
2-4	-1245	-3013	6243
2-5	-829	-2770	6243
2-6	-408	-1832	6243
2-7	-297	-1758	6243
2-8	-251	-1674	6243
2-9	-324	-1427	6243

Point No.	Northing	Easting	Top of Berm Elevation
3-1	674	-873	6241
3-2	823	-1069	6241
3-3	936	-1101	6241
3-4	1086	-768	6241
3-5	941	-802	6241
3-6	670	-901	6241

Berm Survey Line Control Points (cont.):

Point No.	Northing	Easting	Top of Berm Elevation
4-1	-1586	-3359	6238
4-2	-1285	-3538	6238
4-3	-1216	-3542	6238
4-4	-520	-3256	6238
4-5	-482	-3166	6238
4-6	-689	-2430	6238

Point No.	Northing	Easting	Top of Berm Elevation
5-1	-540	-2961	6238
5-2	-265	-2901	6238
5-3	-176	-2507	6238
5-4	-27	-1987	6238
5-5	266	-1761	6238
5-6	303	-1659	6238
5-7	195	-1439	6238

Point No.	Northing	Easting	Top of Berm Elevation
6-1	19	-1949	6234
6-2	168	-2091	6234
6-3	299	-2084	6234
6-4	865	-1787	6234
6-5	1132	-1533	6234
6-6	1150	-840	6234

Point No.	Northing	Easting	Top of Berm Elevation
7-1	-310	-3026	6233
7-2	88	-3256	6233
7-3	208	-3206	6233
7-4	472	-2314	6233
7-5	449	-2226	6233
7-6	292	-2101	6233

Point No.	Northing	Easting	Top of Berm Elevation
8-1	-1116	-3575	6232
8-2	-715	-3809	6232
8-3	-646	-3813	6232
8-4	-284	-3702	6232
8-5	-197	-3563	6232
8-6	-411	-3290	6232

Point No.	Northing	Easting	Top of Berm Elevation
9-1	478	-3436	6230
9-2	662	-3192	6230
9-3	742	-2864	6230
9-4	972	-2460	6230
9-5	913	-2248	6230
9-6	785	-2236	6230
9-7	480	-2017	6230

Berm Survey Line Control Points (cont.):

Point No.	Northing	Easting	Top of Berm Elevation
10-1	-660	-3838	6228
10-2	-137	-4144	6228
10-3	-39	-4123	6228
10-4	531	-3801	6228
10-5	518	-3470	6228
10-6	210	-3320	6228

Point No.	Northing	Easting	Top of Berm Elevation
11-1	568	-3500	6226
11-2	865	-3352	6226
11-3	988	-3335	6226
11-4	1228	-2731	6226
11-5	1024	-1942	6226

Point No.	Northing	Easting	Top of Berm Elevation
12-1	-121	-4295	6222
12-2	263	-4452	6222
12-3	455	-4336	6222
12-4	750	-3963	6222
12-5	914	-3886	6222
12-6	892	-3713	6222
12-7	800	-3614	6222
12-8	762	-3415	6222

Stilling Basin Control Points:

Point No.	Northing	Easting	Top of Berm Elevation
S-1	104	-401	6250
S-2	103	-333	6250
S-3	83	-380	6250

Cell Pipe Coordinates:

Pipe No.	Upstream/Downstream	Northing	Easting	Invert Elevation	Diameter
R/1	Upstream	-211	-1218	6244.60	15"
R/1	Downstream	-176	-1232	6244.20	15"
R/2	Upstream	-228	-1218	6244.60	15"
R/2	Downstream	-258	-1244	6244.20	15"
1/3	Upstream	832	-783	6240.00	12"
1/3	Downstream	899	-771	6239.04	12"
1/5	Upstream	16	-1362	6240.00	12"
1/5	Downstream	8	-1429	6238.30	12"
2/4	Upstream	-1496	-3220	6237.00	12"
2/4	Downstream	-1453	-3270	6236.04	12"
2/5	Upstream	-738	-2382	6237.00	12"
2/5	Downstream	-674	-2404	6236.04	12"
3/6	Upstream	919	-1099	6235.00	12"
3/6	Downstream	985	-1120	6233.63	12"
4/7	Upstream	-355	-2808	6232.00	12"
4/7	Downstream	-241	-2832	6228.62	12"
4/8	Upstream	-548	-3232	6232.00	12"
4/8	Downstream	-921	-3294	6230.63	12"
5/6	Upstream	182	-1573	6232.00	12"
5/6	Downstream	192	-1834	6231.04	12"
5/7	Upstream	-214	-2513	6232.00	12"
5/7	Downstream	-149	-2536	6231.04	12"
6/9	Upstream	383	-2001	6228.00	12"
6/9	Downstream	408	-2064	6227.04	12"
7/9	Upstream	203	-3065	6227.00	12"
7/9	Downstream	259	-3090	6224.88	12"
7/10	Upstream	131	-3232	6227.00	12"
7/10	Downstream	125	-3300	6225.84	12"
8/10	Upstream	-297	-3867	6226.00	12"
8/10	Downstream	-298	-3735	6225.04	12"
9/11	Upstream	672	-2948	6224.00	12"
9/11	Downstream	737	-2968	6223.04	12"
10/12	Upstream	403	-3853	6222.00	12"
10/12	Downstream	443	-3708	6220.63	12"
11/12	Upstream	614	-3438	6220.00	12"
11/12	Downstream	645	-3499	6218.85	12"

REV. NO.	REV. DATE	DESCRIPTION
PROJECT NUMBER		ZUNI 97-17.PTS
DESIGNED BY:		WM / JSL
DRAWN BY:		W/E STAFF
CHECKED BY:		WM
KW		ENGINEER
PROJECT DATE:		APRIL 2001

ZUNI WETLAND
SITE CROSS SECTION
AND COORDINATE POINTS

LAGOON RENOVATION AND WETLAND PROJECT
PUEBLO OF ZUNI
ZUNI, NEW MEXICO

C-02

SHEET 3 of 8

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