

# **TAWA'OVI COMMUNITY DEVELOPMENT PROJECT PROGRAMMATIC ENVIRONMENTAL ASSESSMENT**

Prepared for

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## ACRONYMS AND ABBREVIATIONS

ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
amsl	above mean sea level
APS	Arizona Public Service Company
AUYL	animal units per year long
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CATT	Hopi Compliance Assistance Task Team
CDC	community development corporation
CFR	Code of Federal Regulations
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FONSI	Finding of No Significant Impact
gpm	gallons per minute
HPL	Hopi Partitioned Land
HPTP	Historic Properties Treatment Plan
HUD	U.S. Department of Housing and Urban Development
IAM	Indian Affairs Manual
ISDA	Indian Self Determination Act
maf	million acre-feet
NEPA	National Environmental Policy Act
NOA	notice of availability
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTUA	Navajo Tribal Utility Authority
OCPED	Office of Community Planning and Economic Development
PCD	Tawa'ovi Planned Community District
PCDD	Planned Community Development District
PEA	programmatic environmental assessment
SHPO	State Historic Preservation Office
SWCA	SWCA Environmental Consultants
SWPPP	Stormwater Pollution Prevention Plan
Tawa'ovi Community	Tawa'ovi Community Development project
TCDT	Tawa'ovi Community Development Team
TCP	Traditional Cultural Property
TPS	Thompson Pollari Studio
Tunaty'a at 2000 Plan	The Hopi Tunaty'a at 2000: The Hopi Strategic Land Use and Development Plan
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
WLB	WLB Group, Inc.

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# CONTENTS

<b>Statement of No Conflict of Interest.....</b>	<b>vii</b>
<b>Chapter 1. Introduction.....</b>	<b>1</b>
Project Location .....	1
project Background .....	2
HopitTunatya’at 2000: The Hopi Strategic Land Use and Development Plan.....	2
Planned Community Developments and Development Districts.....	5
Tawa’ovi Community Master Plan .....	5
Purpose and Need.....	5
Overview of the environmental review process .....	6
Programmatic Environmental Assessment .....	6
Tiering.....	6
Regulatory Context .....	7
Indian Trust Assets .....	7
Compliance with Applicable Laws, Executive Orders, Regulations, Policies, and Community Ordinances .....	7
Public Input, Agency Scoping, and Tribal Consultation .....	10
Pre-NEPA Stakeholder Outreach.....	10
NEPA Scoping .....	11
Environmental Issues addressed .....	14
<b>Chapter 2. Proposed Action and Alternatives.....</b>	<b>15</b>
Alternatives Development.....	15
No-action alternative.....	15
No-Action Alternative .....	15
Proposed Action Alternative .....	15
Master Lease.....	15
Master Plan .....	16
Housing.....	16
Infrastructure.....	18
Best Management Practices .....	19
Alternatives Considered but Eliminated from further analysis.....	20
80-acre Tawa’ovi .....	20
No Master Plan, Provide Services in Other Villages .....	20
<b>Chapter 3. Affected Environment .....</b>	<b>23</b>
Introduction.....	23
Land Resources.....	24
Topography .....	24
Soils .....	24
Geology, Mineral, and Paleontological Resources .....	25
Water Resources .....	25
Surface Water .....	25
Groundwater .....	27
Water Quality.....	28
Water Rights .....	29
Living Resources.....	29

Vegetation .....	29
Wildlife .....	30
Federally Listed Species .....	30
Species of Concern—Culturally Significant Species.....	30
Agriculture .....	30
Cultural Resources .....	31
Cultural Setting.....	31
Historical and Archaeological Resources (Recent Investigations) .....	37
Traditional Cultural Properties .....	37
Traditional Cultural Knowledge and Tribal Governance .....	38
Socioeconomics .....	39
Demographic Trends.....	39
Employment and Income .....	39
Housing.....	40
Community Infrastructure.....	41
Lifestyle and Cultural Values .....	41
Tourism.....	42
Environmental Justice.....	42
Resource Use Patterns.....	42
Transportation Networks .....	42
Current Land Uses/Land Use Plans .....	43
Other Values .....	44
Public Health and Safety.....	44
Noise and Light.....	44
Visual .....	45
Climate Change.....	45
Introduction.....	47
Land Resources.....	47
No-Action Alternative .....	47
Proposed Action Alternative.....	48
Water Resources .....	48
No-Action Alternative .....	48
Proposed Action Alternative.....	49
Living Resources.....	49
No-Action Alternative .....	49
Proposed Action Alternative.....	50
Cultural Resources .....	51
No-Action Alternative .....	51
Proposed Action Alternative.....	51
Socioeconomics .....	52
No-Action Alternative .....	52
Proposed Action Alternative.....	52
Resource Use Patterns.....	53
No-Action Alternative .....	53
Proposed Action Alternative.....	53
Other Values .....	54

No-Action Alternative .....	54
Proposed Action Alternative.....	54
Public Health and Safety .....	54
Noise and Light.....	54
Visual .....	54
Climate Change.....	54
Cumulative Impacts .....	55
Water Resources .....	55
Vegetation and Wildlife.....	55
Socioeconomics and Environmental Justice .....	55
Resource Use Patterns .....	56
Impact summary.....	56
<b>Chapter 5. Consultation and Coordination .....</b>	<b>57</b>
<b>Chapter 6. List of Preparers .....</b>	<b>59</b>
<b>Chapter 7. Literature Cited .....</b>	<b>61</b>

## Appendices

<b>Appendix A.</b> Tribal Resolution H-067-2011
<b>Appendix B.</b> Scoping Summary
<b>Appendix C.</b> Cumulative Impacts
<b>Appendix D.</b> Potential Fossil Yield Classification system
<b>Appendix E.</b> Navajo county USFWS Species List
<b>Appendix F.</b> Federally Listed Species Potentially Occurring in Navajo County, Arizona
<b>Appendix G.</b> SHPO Letter and Response
<b>Appendix H.</b> Agency Public Notice

## Figures

1-1.	General location of project area.....	3
1-2.	Project area location. ....	4
2-1.	Master Plan for the Tawa’ovi Community. ....	17
3-1.	Regional groundwater basins.....	26

## Tables

1-1.	Public Scoping Meetings.....	11
2-1.	Tawa’ovi Community Plan Elements and Estimated Parcel Acreages .....	18
3-1.	Historical Population Characteristics .....	39
3-2.	Industry Employment on the Hopi Reservation .....	40
3-3.	Total Housing Units, Occupancy Rate, Median Home Value.....	41
3-4.	Roadway Type and Characteristics of Roadways in the Immediate Vicinity of the Project Area .....	43
4-1.	Impact Summary .....	56



## STATEMENT OF NO CONFLICT OF INTEREST

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SWCA Environmental Consultants, Inc. (SWCA), warrants that it holds no public or private financial interest in the Hopi Tawa'ovi Development Corporation or any other entity of the Hopi Tribe, or in the development or non-development of any proposed facilities as a result of this action.

On behalf of SWCA:



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Ken Houser  
SWCA Principal  
April 12, 2013

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## CHAPTER 1. INTRODUCTION

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This programmatic environmental assessment (PEA) has been prepared for the approval of a Master Lease Agreement for a proposed 463.75-acre Tawa’ovi Community Development project (Tawa’ovi Community) on Hopi Partitioned Lands (HPL) (the Proposed Action), in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and Hopi Tribal laws and regulations.

The Proposed Action requires Bureau of Indian Affairs (BIA) approval of a long-term land lease involving subleases for commercial, institutional, and residential property, to allow both Hopi and non-Hopi tenants to lease space in the new facilities. This federal action requires the preparation of a PEA in accordance with NEPA, the Council on Environmental Quality Regulations for Implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508), and the BIA NEPA Guidebook (59 Indian Affairs Manual [IAM] 3-H; BIA 2012). NEPA requires that environmental consequences associated with the Proposed Action and the Alternatives to the Proposed Action be evaluated in this document.

SWCA Environmental Consultants (SWCA), on behalf of the Tawa’ovi Community Development Team (TCDDT) and under the direction of the BIA, has been contracted to prepare this PEA. Environmental analysis of the resources potentially susceptible to cumulative impacts from construction, operation, and maintenance of the Proposed Action found no significant negative impacts along with minor beneficial impacts. This PEA describes the Proposed Action and No-Action alternatives, the affected environment, environmental consequences, and mitigation measures. The key areas analyzed in the PEA include land resources, water resources, air resources, biological resources (including special status species, wildlife, and vegetation), cultural resources, socioeconomic and environmental justice conditions, resource use patterns (land use plans), and other values (wilderness, sound and noise, visual, solid and hazardous waste treatment, and public health and safety).

## PROJECT LOCATION

The proposed project area is located in portions of Sections 25, 26, 35, and 36, Township 31 North, Range 17 East and Sections 1 and 2, Township 30 North, Range 17 East (U.S. Geological Survey [USGS] Hard Rocks 7.5-minute quadrangle) in Navajo County, Arizona. This area is located approximately 15 miles north of Second Mesa on the Hopi Reservation, near the intersection of BIA Route 4 and BIA Route 8 (Hard Rock Road). It is situated just north of Oraibi Wash within Hopi Partitioned Land outside of District 6. HPLs are the result of a 1974 Congressional Act partitioning the disputed 1882 Executive Order Hopi Reservation. HPL are wholly administered by the tribal government (Office of Community Planning and Economic Development [OCPED] 2001).

The project area size has grown since its first conception; Tribal Council Resolution H-43-91, dated January 9, 1991, authorized the “Turquoise Community” in HPL Range Unit 351 by issuance of a special land assignment of 69.5 acres. In September 1999, the Hopi Tribe began the process of creating the Tawa’ovi Community Master Plan within a limited area of the HPL (REA et al. 2000), which has developed into its current size and location. The current 463.75 land assignment (Turquoise Community) was approved by Tribal Resolution H-067-2011 (Appendix A). The original land assignment was expanded to 463.75 acres to allow development of the parcel in accordance with the Tunatya’at 2000 Plan (OCPED 2001); see “Planned Community Developments and Development Districts” and “Tawa’ovi Community Master Plan” sections that follow for a full discussion of the Tunatya’at 2000 Plan.

The Hopi Reservation was created by presidential executive order (EO) on December 16, 1882, and encompassed 2,472,320 acres. In 1936, the BIA divided the 1882 reservation into 18 land management

districts, designating District 6 (650,238 acres) for exclusive Hopi use, whereas the remaining districts were intended for joint use by the Hopi and Navajo. District 6 includes the area immediately surrounding the traditional Hopi Mesa villages along the south perimeter of Black Mesa. On December 22, 1974, Congress enacted the Navajo and Hopi Land Settlement Act of 1974, partitioning 911,041 acres of the Hopi Executive Order Reservation to the Navajo Nation, thereby reducing the Hopi Reservation to 1,561,279 acres. The project is located on HPL adjacent to the Navajo Indian Reservation to the east. The general vicinity of the project area is depicted in Figure 1-1, and the precise boundaries of the project area are shown in Figure 1-2.

## PROJECT BACKGROUND

### HopitTunatya'at 2000: The Hopi Strategic Land Use and Development Plan

The HopitTunatya'at 2000: The Hopi Strategic Land Use and Development Plan (hereafter referred to as the "Tunatya'at 2000 Plan") is an initiative of the Hopi Tribe (1995, 2011; H-045-97), facilitated by the OCPED. The plan was built on a community vision and was generated after a tribal-wide public participation process. A series of public workshops was held with the Hopi general public, along with a Youth Visioning Session, and interviews with key community individuals (OCPED 2001: Appendix I).

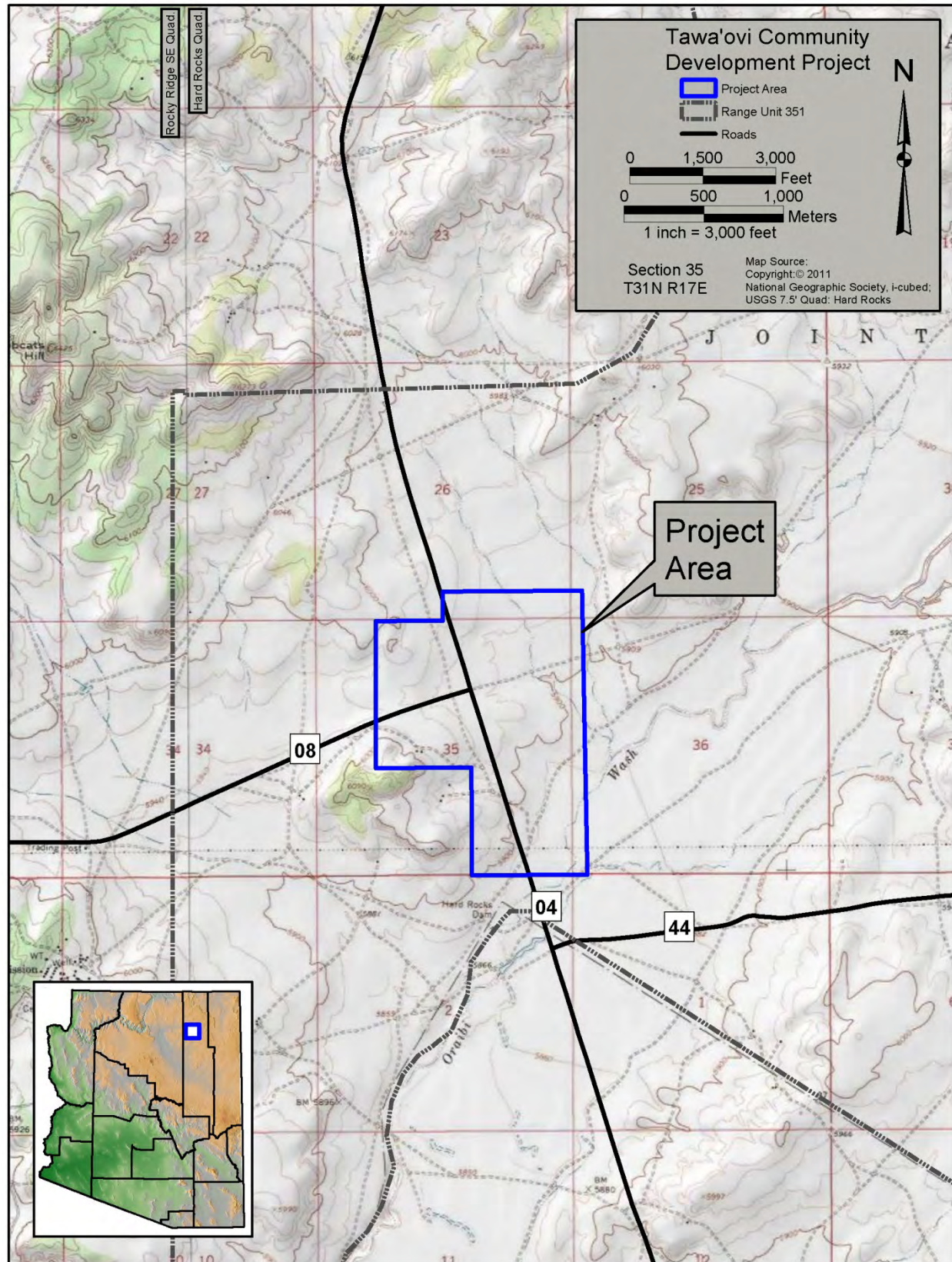
In addition to visioning, the public participation process generated ideas on how the community can achieve a needed land use vision. Four scenarios were proposed and discussed:

New development surrounds existing villages in District 6 and is in planned development districts in the HPL (this scenario was ultimately selected for the land use plan, and the basis for the Proposed Action herein).

1. All new development takes place in District 6 around the existing villages (expanding existing villages).
2. All new development takes place in planned unit developments in the HPL.
3. Development continues in the current haphazard fashion all over the Hopi Reservation.

A full summary of the development concepts discussed during the visioning process is provided in Appendix I of the Tunatya'at 2000 Plan. It is important to note that these were development concepts considered during land use planning for the whole Reservation. The principles and feedback provided resulted in the plan and its goals (OCPED 2001).

The Tunatya'at 2000 Plan called for the creation of six Planned Community Development Districts (PCDDs): five on the main Reservation and one on the Moenkopi District. These were envisioned to be large tracts of land over several thousand acres, in which a Planned Community could be developed. They would all be located on HPL, and include a mix of residential, commercial, institutional, and recreational land uses. The Tawa'ovi Planned Community District (PCD) was one of those planned. All six PCDDs are needed to fulfill the vision of the Tunatya'at 2000 Plan; the six PCDDs are not intended to be alternative options for development (OCPED 2001).



**Figure 1-1.** General location of project area.



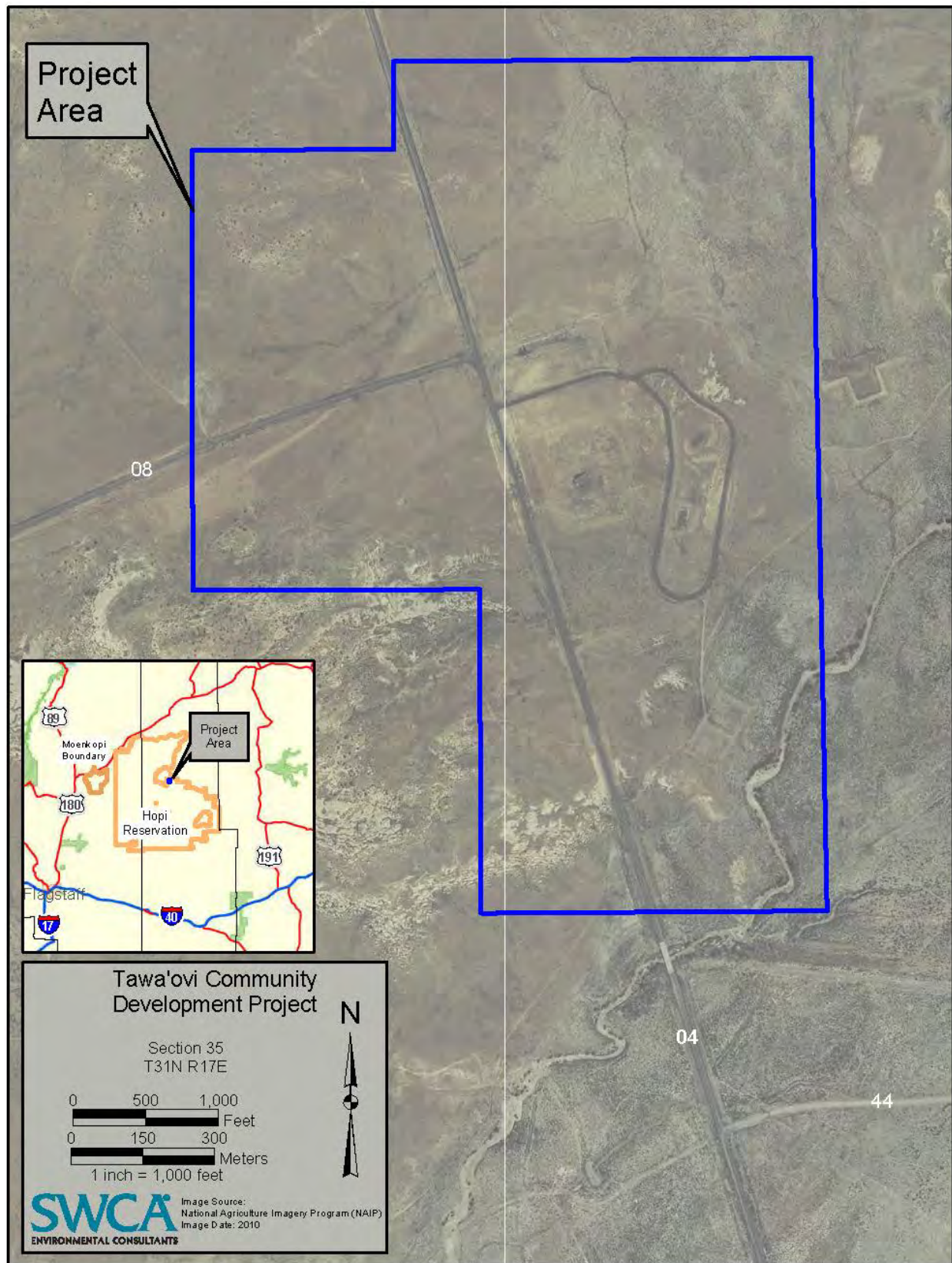


Figure 1-2. Project area location.

## Planned Community Developments and Development Districts

The Planned Community Development District and Planned Community Districts (PCDD/PCD) concept is a planning and design concept to allow and integrate new community development with the existing management practices for the HPL, as implemented by various offices in the Hopi Department of Natural Resources (OCPED 2001). The concept provides for separate master plans for each PCDD, with a focus on continuing land use and management practices while allowing development within a district.

The Tunatya'at 2000 Plan (OCPED 2001) concept for PCD suggested 400- to 500-acre sites where community land uses (residential, commercial, and institutional) would be clustered, and supported by the appropriate infrastructure (roads, water, etc.). The goal was for each PCD to become an incorporated community under tribal jurisdiction.

The Tawa'ovi PCD was planned for approximately 500 acres and “should be implemented as rapidly as possible” (OCPED 2001:46). Five additional PCDD/PCDs were identified in the 2000 plan: Howell Mesa, Side Rock Well, Yu Weh Loo Pahki, Moenkopi District, and Winslow. Of these, the Yu Weh Loo and Moenkopi District PCDs are in the early development and supplementary planning stages. Planning efforts for Side Rock Well began, but are essentially on hold.

## Tawa'ovi Community Master Plan

The Tawa'ovi Community Master Plan is the result of over 25 years of planning efforts, initiatives, and Tribal Council resolutions. Planning initiatives for the Master Plan were formulated by the *Hopi Patskwaniat: Hopi Tribal Consolidated Strategic Plan of 1995* (Hopi Tribe 1995; updated 2011), which set goals focusing on economic development, employment, and housing opportunities. This strategic plan began the series of planning initiatives on the Reservation that would address the broad needs, standards, and values of the Hopi Tribe.

Hopi Tribal Council Resolution H-43-91 (January 1991) authorized the Turquoise Community in HPL Range Unit 351. Hopi Tribal Council Resolution H-055-99 authorized creation of a regionally based master plan for the Turquoise Community, creation of a project steering committee to oversee the master plan work, and changed the name from Turquoise Community to the Tawa'ovi Community. In September 1999, the Hopi Tribe began the process of creating the Tawa'ovi Community Master Plan within a limited area of HPL. The Master Plan work was approved by Hopi Tribal Resolution H-044-2001, which also authorized the creation of the Tawa'ovi Development Team to oversee implementation of the Tawa'ovi Community Master Plan. The resolution also authorized additional technical studies as required for implementation of the Master Plan, with the primary technical analysis work being accomplished in 2005 (Thompson Pollari Studio [TPS] 2005) on the initial 80-acre study parcel. (Note: that was centered on the 69.5-acre legal parcel from Tribal Council Resolution H-43-91.)

A scientific and technical analysis for 80 acres of Tawa'ovi was completed in 2005 (TPS 2005), and subsequently updated for a master development plan and legal parcel of 463.75 acres that was approved by Tribal Council in 2011 (Tribal Council Resolution H-067-2011). The 463.75-acre legal parcel is the basis for the Master Lease for the Community.

## PURPOSE AND NEED

The purpose of the new Master Lease and associated Tawa'ovi Community Development project is to provide adequate housing and associated commercial services and infrastructure on the Hopi Reservation.

The need for development is based on a persistent housing shortage and lack of employment on the Reservation. The Tribe has identified the need for a variety of housing types to be built to meet the needs of the Hopi people and provide housing for tribal staff in both work-force and market rate models.

The Hopi Tribe has long-range goals of self-determination and self-sufficiency set forth in the Hopi Pötskwaniat (Strategic Plan) (revised 2001). Specifically, “that every Hopi Family is provided the opportunity to own or rent a decent, safe and sanitary home according to their needs and income” (Strategic Plan, revised 2001). The Tawa’ovi Community will help meet these goals through investment in facilities that will provide goods and services to meet local and regional needs, and a growing national and international tourism market. While efforts are being made to develop housing sites in the communities of Moenkopi, Hotevilla, Kykotsmovi, and Polacca, the need for additional housing exceeds the supply of home sites for the Hopi Tribal Housing Authority, tribal employees, and for individuals who wish to build privately financed homes.

## OVERVIEW OF THE ENVIRONMENTAL REVIEW PROCESS

Environmental assessments (EAs) are prepared by federal agencies to aid in determining if a proposed action has the potential to significantly affect the quality of the human environment. According to Section 1508.0(a) of the Council on Environmental Quality Guidelines, a PEA serves to:

1. briefly provide sufficient evidence and analysis for determining whether to prepare a Finding of No Significant Impact (FONSI) or an environmental impact statement (EIS);
2. aid an agency’s compliance with NEPA when an EIS is not necessary; and
3. facilitate preparation of an EIS when one is necessary.

After considering this PEA, the BIA will determine whether to issue a FONSI or to require an EIS. If a FONSI is prepared, the BIA will issue a public notice of availability (NOA) of the FONSI for at least 30 days prior to any decision on the Master Lease. If the BIA determines that an EIS is required, it will follow the more involved notices and comment procedures of NEPA applicable to the EIS process.

## Programmatic Environmental Assessment

The PEA is intended to analyze the typical effects anticipated as a result of the individual actions that make up a program, as well as the total effects of the overall program, such as the Proposed Action (master lease approval).

The project description (see Proposed Action in Chapter 2, below) of the proposed master plan is fairly conceptual. The conceptual nature of the project is the reason a PEA is being prepared. Separate environmental documents can and will need to be prepared in support of an individual action and can be tiered to this PEA. The project will not be “shovel ready” when the PEA process is complete. See the discussion of “tiering” below.

## Tiering

Subsequent EAs or categorical exclusions will need to be prepared to analyze project-specific actions. These documents can tier from, or incorporate sections of, this PEA. Tiering from the PEA allows any further NEPA documentation to narrow the range of alternatives and concentrate solely on the issues not already addressed. Tiering is appropriate when the analysis for the Proposed Action will be a more site-specific or project-specific refinement or extension of the existing PEA. Tiering to the PEA will allow the



preparation of an EA or CATEX for the individual action as long as the remaining effects of the individual action are not significant. Tiering to this PEA would allow the Hopi Tribe and TCDT and future community development corporation (CDC) to develop project-specific analyses that are consistent with the interdisciplinary resource goals and objectives of the PEA and to concentrate on the issues specific to the proposed project.

## REGULATORY CONTEXT

### Indian Trust Assets

Indian Trust Assets are legal interests in assets held in trust by the United States for Native American tribes or individual Native Americans. Assets are anything owned that have monetary value. The asset need not be owned outright but could be some other type of property interest, such as a lease or right of use. Assets can be real property, physical assets, or intangible property rights such as intellectual property. The United States has an Indian Trust responsibility to protect and maintain rights reserved by or granted to Native American tribes or individuals by treaties, statutes, and executive orders, which rights are sometimes further interpreted through court decisions and regulations.

Accordingly, the BIA is mandated by federal law to manage Indian lands held in trust for the benefit of the Indian owners. The BIA is committed to the policy of sustained-yield management and to providing management plans based on guidelines set forth in 25 CFR 163 and the Indian Forest Management Handbook (BIA 2009). The BIA is also committed to a policy of Indian self-determination as required under law, and has a duty to consult and coordinate land and resource activities on tribal and allotted lands with the Tribes. The BIA is responsible for trust lands, however the purpose of the Indian Self Determination Act (ISDA) is “to end Federal Government domination of Indian programs and services whereby Indian tribes may assume control over federal programs and services by contract.” Additionally, per the ISDA, “The essence of the self-determination policy is that Indian actions and Indian decisions shall determine the Indian future.” Finally, “It is the policy of the Bureau of Indian Affairs to provide for maximum delegation of authority to the service delivery level while insuring full compliance with all applicable laws, regulations, and policies to ensure sound management control and business decisions” (BIA 2006:1).

### Compliance with Applicable Laws, Executive Orders, Regulations, Policies, and Community Ordinances

The following is a summary of selected statutes, regulations, and EOs applicable to this project.

**National Environmental Policy Act of 1969. Public Law 91-190, 42 United States Code (USC) 4321–4370(e), as amended.** NEPA requires federal agencies to take into consideration the environmental consequences of proposed actions as well as input from state and local governments, Indian tribes, the public, and other federal agencies during their decision-making process. The Council on Environmental Quality was established under NEPA to ensure that all environmental, economic, and technical considerations are given appropriate consideration in this process. This PEA complies with NEPA statutes and regulations and the BIA NEPA Guidebook (BIA 2012).

**Clean Water Act of 1977, as amended.** Section 404 of this Act identifies conditions under which a permit is required for construction projects that result in the discharge of dredged or fill material into waters of the U.S. There are no jurisdictional waters of the U.S. within the project area.

**Safe Drinking Water Act of 1974, as amended.** Section 1424 of this Act regulates underground injection into an aquifer, which is the sole or principal drinking water source for an area. The aquifer beneath the project area is not a designated sole source aquifer; therefore, this Act does not apply.

**Executive Order 11988, Floodplain Management, May 24, 1977.** EO 11988 requires avoiding or minimizing harm associated with the occupancy or modification of a floodplain. The project area is not located within any designated floodplain; therefore, no modification would take place.

**EO 11990, Protection of Wetlands, May 24, 1977.** EO 11990 requires federal agencies or federally funded projects to restrict uses of federal lands for the protection of wetlands through avoidance or minimization of adverse impacts. The order was issued to “avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands whenever there is a practicable alternative.” No wetlands will be affected by this project.

**Wild and Scenic Rivers Act of 1968.** This Act requires consideration of wild and scenic rivers in planning water resources projects. Developing water resources projects is prohibited on any river designated for study as a potential component of the national wild and scenic river system. There are no such rivers or candidates in the area that would be affected by this project.

**Farmland Protection Policy Act of 1994.** This Act is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. For the purpose of the Act, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland does not have to be currently used for cropland to be subject to the Act’s requirements. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land. There is no prime farmland, unique farmland, or land of statewide or local importance within the parcel proposed for development.

**Fish and Wildlife Coordination Act of 1934, as amended.** This Act requires coordination with federal and state wildlife agencies (U.S. Fish and Wildlife Service [USFWS] and Arizona Game and Fish Department) for the purpose of mitigating losses of wildlife resources caused by a project that impounds, diverts, or otherwise modifies a stream or other natural body of water. There are no such rivers or candidates in the area that would be affected by this project.

**Endangered Species Act of 1973, as amended.** Section 7 of the Act requires federal agencies to consult with the USFWS to ensure that undertaking, funding, permitting, or authorizing an action is not likely to jeopardize the continued existence of listed species, or destroy or adversely modify designated critical habitat. Critical habitat, as defined under the Act, exists only after USFWS officially designates it. Critical habitat are 1) areas within the geographic area, including features essential to the conservation of the species and that may require special management consideration or protection; and 2) those specific areas outside the geographic area, occupied by a species at the time it is listed, essential to the conservation of the species.

**The Bald and Golden Eagle Protection Act of 1940, as amended.** This Act prohibits anyone, without a permit issued by the Secretary of the Interior, from “taking” bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle...[or any golden eagle], alive or dead, or any part, nest, or egg thereof.” The Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” There is no suitable foraging or nesting habitat on the project area.

**Clean Air Act of 1963, as amended.** This Act requires any federal entity engaged in an activity that may result in the discharge of air pollutants to comply with all applicable air pollution control laws and regulations (federal, state, or local). This act directs the attainment and maintenance of the National Ambient Air Quality Standards for six different criteria pollutants, including carbon dioxide, ozone, particulate matter, sulfur oxides, nitrogen oxides, and lead.

**EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994.** This order directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority populations and low-income populations. The project would not introduce disproportionately high and adverse human health and environmental effects on the surrounding population; there would be no adverse effect as defined by this EO.

**EO 13007, Indian Sacred Sites, 1996.** EO 13007 requires that all Executive Branch agencies having responsibility for the management of federal lands will, where practicable, permitted by law, and not clearly inconsistent with essential agency functions, provide access to and ceremonial use of Indian sacred sites by Indian religious practitioners and will avoid adversely affecting the integrity of such sacred sites. The order also requires that federal agencies, when possible, maintain the confidentiality of sacred sites.

**National Historic Preservation Act of 1966, as amended.** Federal undertakings must comply with Section 106 of National Historic Preservation Act, which mandates that potential effects on historic properties be considered prior to approval of such undertakings. Historic properties are defined as sites, districts, buildings, structures, and objects listed on or eligible for listing on the National Register of Historic Places (NRHP). Consideration of these resources is to be made in consultation with the State/Tribal Historic Preservation Office and other interested agencies and parties.

**Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001-3013).** This Act requires protection and repatriation of Native American cultural items found on, or taken from, federal or tribal lands, and requires repatriation of cultural items controlled by federal agencies or museums receiving federal funds. Should previously unidentified cultural resources, especially human remains, be encountered during construction, work will stop immediately at that location and the BIA's Cultural Resources staff will be notified to ensure proper treatment of these resources.

**American Indian Religious Freedom Act of 1978 (Public Law 95-341, 42 USC 1996 and 1996a).** This Act ensures the protection and preservation of traditional religions of Native Americans. It includes access to sites, use and possession of sacred objects, and the freedom to worship through ceremonies and traditional rites.

**Hopi Tribal Council Resolutions, Ordinances and Plans:** In addition, the Proposed Action would comply with the following Hopi Tribal Council resolutions, ordinances, and other plans.

1. Hopi Comprehensive Plan (Hopi Tunatya'at 2000 [OCEPD 2001])
2. Hopi Patskwaniat: Hopi Tribal Consolidated Strategic Plan of 1995 (updated November 29, 2011)
3. Hopi Water Code, Hopi Tribal Council Resolution H-107-97
4. Hopi Tribal Council Resolution H-43-91 – authorized Turquoise Community and initial 69.5-acre special land assignment
5. Hopi Tribal Council Resolution H-044-2001 – authorized Master Plan and Tawa'ovi Development Team

6. Hopi Tribal Council Resolution H-1108-90 – enacted Hopi Comprehensive Development Plan (HCDP)
7. Hopi Tribal Council Resolution H-131-91 – authorized Phase I engineering for planning and construction of Turquoise Community
8. Hopi Tribal Council Resolution H-03-93 – approved FY 93 General Fund Budget
9. Hopi Tribal Council Resolution H-150-93 – Directs Tribal Treasurer to transfer funds to Capital Projects Fund for construction of housing at the Turquoise Community
10. Hopi Tribal Council Resolution H-045-97 – Hopi Tunatya’at 2000
11. Hopi Tribal Council Resolution H-055-99 – authorized TCDT, changed name to Tawa’ovi Community
12. Hopi Tribal Council Resolution H-067-2011 – authorized 463.75-acre special land assignment
13. Hopi Ordinance #44, Solid Waste Management Ordinance
14. Hopi Tribal NEPA Process #H-055-2001

## **Public Input, Agency Scoping, and Tribal Consultation**

Public and agency input are an essential component of the NEPA process and were obtained for the project through stakeholder outreach, scoping, and tribal consultation. The purpose of scoping was to determine the issues related to the proposed development and to identify the significant issues to be addressed in this PEA.

### ***Pre-NEPA Stakeholder Outreach***

Though not part of the NEPA process, since 2005 the Hopi Tribe and TCDT have conducted a series of pre-NEPA outreach meetings and internal discussions. The project team participated in meetings with the Hopi Housing Summits and Fairs, the Hopi Compliance Assistance Task Team (CATT), and with grazing-permit holders and ranchers. The goals of these meetings were to give internal Hopi departments and the public early notification of the project and begin to work with interested stakeholders on development options.

The following public outreach and scoping events were held between 2005 and 2012:

- Pre-NEPA Stakeholder Outreach:
  - September 2005 Hopi Housing Summit
  - June 2005 CATT meeting
  - December 2005 CATT meeting
  - December 2006 CATT team review of Tawa’ovi Concept Plan
  - September 2009 Hopi Housing Summit
  - October 2010 CATT meeting
  - October 2010 Flagstaff public meeting
  - November 2010 ranchers meeting at Second Mesa
  - April 2012 HUD (U.S. Department of Housing and Urban Development) Grant Meeting #2 at Moenkopi Legacy Inn
  - April 2012 site visit with HUD contingent
  - Housing Fairs 2010–2012

## NEPA Scoping

For this PEA, a scoping notice was mailed to federal, state, local, and Tribal agencies on October 9, 2012. The public scoping notice was also posted at the local U.S. post offices, Hopi Village Community Service Centers, and the BIA Hopi Agency headquarters. In addition, the scoping notice was published in the October 2, 2012 edition of the tribal newspaper, *Hopi Tutuveni*, and the October 10 and 17, 2012 newsprint editions of the *Navajo-Hopi Observer*. The project was also announced in the community calendar segment of the local 88.1 FM KUYI radio station from October 15 to November 1, 2012. Mailing, publication, and posting of the scoping notice initiated a 30-day public and agency scoping period, during which the public had the opportunity to provide input on potential issues to be addressed in the PEA.

The BIA and Hopi Tribe hosted six public scoping meetings (Table 1-1). These meetings served to provide information on project planning activities to date and to give members of the public the opportunity to ask questions or make comments. Presentations were given at each meeting by the TCDT and the BIA; the project team provided a slide presentation that described the NEPA process, the proposed Tawa'ovi Community Development Project, resources that will be considered for the PEA, and the schedule for completion of the PEA. They also presented several poster boards detailing the project location and the proposed development plan. Meeting attendees were encouraged to ask questions and provide oral comments after the presentation. BIA asked attendees to submit their comments in writing, as no court reporter was present and the meetings were not recorded.

The Hard Rock Chapter of the Navajo Nation requested a separate meeting for their chapter. Members of the BIA and TCDT presented information to the Hard Rock Chapter on November 5, 2012.

**Table 1-1.** Public Scoping Meetings

Date	Time	City, State	Number of Attendees
October 23, 2012	7:00 pm	Polacca, Arizona (First Mesa)	3
October 24, 2012	7:00 pm	Second Mesa, Arizona	1
October 25, 2012	7:00 pm	Hotevilla, Arizona (Third Mesa)	0
October 26, 2012	2:00 pm	Kykotsmovi, Arizona	1
October 30, 2012	6:30 pm	Flagstaff, Arizona	18
November 1, 2012	6:30 pm	Phoenix, Arizona	6

## SCOPING COMMENTS

Although the public meetings did not have high attendance, the project team was able to gather valuable information from attendees and develop issues to be studied further in the PEA. Eight written comments were received during the scoping period; oral comments made at each scoping meeting were noted by TCDT's consultants from TPS and SWCA. Those comments are considered in the scoping summary (Appendix B).

Comments are summarized below in narrative form for each resource issue area (e.g., all comments specific to "water quality" are included under the water quality category, etc.). The comment excerpts below are abbreviated and summarized from the original comments submitted.

Following the scoping summary is a list of list of resource issues and alternatives that are considered for analysis in the PEA. All substantive issues raised by respondents within the scope of the BIA's decision are included in the PEA in Chapters 3 and 4.

## **Alternatives**

- Can you look at an alternative that has the proposed Tawa'ovi Community at First Mesa?
- We don't need the development; we need housing and services in the villages.
- Specify what mitigation measures will be implemented.

## **Land Resources**

### ***Geology, Mineral, and Paleontological Resources***

- Will there be minerals or mineral rights in the project area that will be affected? Is there any coal?

### ***Water Resources***

- Is there adequate water in the nearby well for the project? Development of the Turquoise Well will be a long-term value to the Tribe.
- The proposed development will be in competition for drinking water for existing villages and development. There are arsenic problems at First and Second Mesa.
- Will water from Hard Rock area be delivered to the development?
- What will be the impacts of water runoff from this development?
- Are the plans for the water development in compliance with Tribal surface water/groundwater codes?
- Make sure to reference conditions from the Hopi Water Code and pending Wastewater Code, as applicable.
- Evaluate the project's water quality, groundwater, pump test, and landfill reports in the EA.
- Address floodplains and wetlands in the analysis.
- Provide more information regarding the discharge of wastewater. Will a Clean Water Act Section 404/401 permit be required?
- There is a nearby landfill/dump, what effect could the dump have on groundwater? Are the cells at the land dump lined?

## **Living Resources**

### ***Wildlife***

- Consider migratory birds and potential impacts to nesting eagles in the PEA.

### ***Agriculture (livestock, crops, prime and unique farmland)***

- Analyze impacts to the permitted ranchers in Range 351 for grazing in the project area, including the impacts of relocating those ranchers, or any range improvements.
- Consider the effects of community farming within the new community. Will the area support only local household or demonstrating gardening?

## **Cultural Resources**

- Consider impacts to cultural resources in the PEA, including documenting what type of consultation and compliance with Section 106 of the National Historic Preservation Act will be conducted.

## **Socioeconomic Conditions**

### ***Demographic Trends***

- Analyze the population base for the proposed community, including where people will live and work.

### ***Employment and Income***

- Consider all the potential impacts and benefits from the new services the community would supply, including employment and income.

### ***Lifestyle and Cultural Values***

- Concerns about the potential impacts to, and changes to, traditional cultural values need to be analyzed in the PEA.
- Concerns that the Tawa'ovi Community will detract from traditional tribal life in the villages. The proposed development is "off-reservation"–style living and not compatible with village life.
- Consider how residents of the new community will travel to and from the development and between other villages if they do not have transportation.

### ***Community Infrastructure***

- Discuss the proposed community elements and infrastructure available to the Tawa'ovi Community and elsewhere on the Reservation.

## **Resource Use Patterns**

### ***Transportation Networks***

- Discuss how the project is situated within the existing transportation network on the Reservation and any proposed changes.

### ***Land Use plans***

- Disclose if there any claims of traditional clan land in the proposed development area.

## **Other Values**

### ***Public Health and Safety***

- Identify the general location of the uranium and heavy metal contamination sites, if any.
- Discuss if the nearby land dump site or on-site wastewater treatment plant would have any impacts to the public health and safety of the proposed community.

## ENVIRONMENTAL ISSUES ADDRESSED

In accordance with NEPA, based on internal scoping, public scoping, and consultation with local, state, and federal agencies summarized above, Chapters 3 and of this PEA evaluates the environmental consequences of the Proposed Action on the following resources:

- Land Resources
- Water Resources
- Living Resources
- Cultural Resources
- Socioeconomic Conditions
- Resource Use Patterns
- Other Values

A more detailed list of resources and their subcategories is presented in Chapter 3. Several resources or resources subcategories were eliminated from analysis due to negligible impact in and around the project area (i.e., Wilderness Areas, Lumber, Hunting/Fishing, Recreation) or low probability of occurrence (Mineral Extraction).



## **CHAPTER 2. PROPOSED ACTION AND ALTERNATIVES**

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### **ALTERNATIVES DEVELOPMENT**

This federal action requires the preparation of a PEA in accordance with NEPA and the Council on Environmental Quality Regulations for Implementing NEPA (40 CFR 1500–1508) and the BIA NEPA Guidebook 59 IAM 3-H (August 2012).

The following chapter describes the two alternatives evaluated in this document: the Proposed Action Alternative and the No-Action Alternative. Included in the Proposed Action Alternative is a description of the intended uses of the parcel following approval of the lease. Also included in this chapter is a discussion of the alternatives considered but eliminated from further consideration. Previous planning efforts that lead to the development of the Proposed Action are summarized in Chapter 1 (see Section 1.3, Project Background).

### **NO-ACTION ALTERNATIVE**

#### **No-Action Alternative**

Under the No-Action Alternative, the BIA would not approve a Master Lease for the Tawa’ovi Community and TCDT would not be authorized to develop or sub-lease space under the Master Lease.

The Hopi Tribe could move forward with elements of the Tawa’ovi Community project or other tribal projects using tribal money as long as no other lease, right-of-way, or approval is required that might trigger a federal action. Alternatively, existing land use at the site could continue and the site could remain undeveloped.

### **PROPOSED ACTION ALTERNATIVE**

#### **Master Lease**

Under the Proposed Action Alternative, the BIA would approve a Master Lease, as requested by the TCDT, for the development and management of the Tawa’ovi Community. This lease would authorize the TCDT and future CDC to sublease community space within the Master Planned community. The terms of the subleases would be consistent with the conditions set forth in the Master Lease and would be negotiated between the potential tenants and the CDC.

The Master Lease would be structured with a CDC that would facilitate new private and public joint venture enterprises for housing, commercial and office ventures, service ventures, low-impact/high-tech industries, and renewable energy infrastructure.

The CDC would administer and conduct management of the master lease, review proposed business development ventures, and be led by a Tribal administrative team that would provide business leadership and create partnerships with Hopi governmental entities such as the Hopi Tribal Housing Authority, a future Utility Authority, and the new department of Public Works. The CDC would also administer a Tawa’ovi Development and Zoning Code to regulate overall community design, maintenance, ownership, and lease and rental policies.

## Master Plan

The following description of the proposed master plan is conceptual, but based on planning and Tribal input over the last 7 years. Individual elements of the plan are subject to change over time. The following description discusses plan elements, but the exact footprint of each element, timing or types of construction, etc., are to be developed. The Tawa'ovi CDC may, at its discretion, approve and modify the parcels within the project boundary once the Master Lease is approved. As discussed above, the conceptual design of the project is the reason a PEA has been prepared.

The Community is planned for a total build-out of approximately 157 acres of high-intensity land use within the legal parcel of 463.75 acres (TPS 2012). Land use areas are separated by open space, protected cultural sites, and topographic features that will link neighborhood development with the natural landscape (Figure 2-1). Community land use and town concepts include the mixed-use commercial and educational Town Center which includes the C-1 Town Square (inner) District and the C-2 Town Center (outer) District. Other primary districts within the parcel provide space for light industrial services, institutional uses, cultural preservation sites, a cultural center, and three Housing Villages. Utility Districts are also planned for the south waste treatment plant, and Turquoise Well site. A site for future institutional (detention) or housing uses would be located on the north side of Oraibi Wash, in the upper northeast corner of the legal parcel.

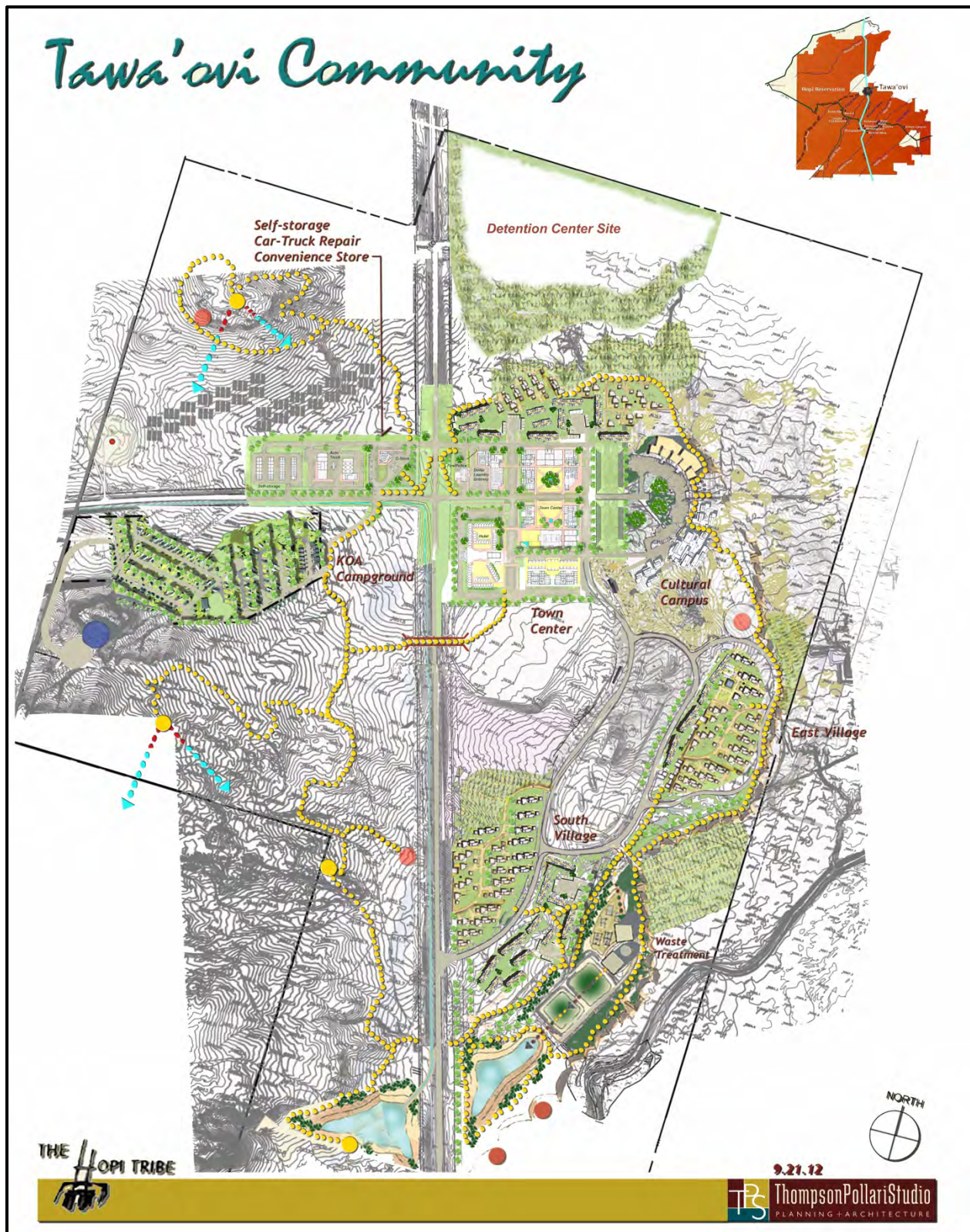
The master plan also includes necessary residential amenities including a gas station, police station, and future school site. Residential amenities will be provided in the three Housing Development Areas and include community centers, shared play areas and open spaces, elder-care homes, and farming plots. A focal point of the land use design is physical adjacency between complementary programs like elder-care homes and the residential neighborhoods, to enhance social connections between Hopi elders and youth. As summarized in Table 2-1 below, in general, land use in the planning areas will be dominated by residential (12%), commercial (8%), educational and services (32%), cultural zones (5%), and agricultural and open space (43%).

The 2012 Master Plan map for the Tawa'ovi Community is provided in Figure 2-1. The entirety of this development is referred to as the Proposed Action. Table 2-1 gives a list of proposed District areas and development types, as identified in the Tawa'ovi 2005 Master Plan and updated by 2012 Phase I Plan.

## Housing

A range of housing types would be developed, including single-family dwellings, medium-density housing including apartments, and condominium-type units. The architecture would employ traditional architectural and construction design, as well as village massing styles common to the Hopi people. The architecture and design of the community would be based on sustainable principles with a focus on passive solar design, energy efficient design, and rainwater collection. Environmental sustainability for the community would incorporate water catchment and a wastewater treatment plant to treat effluent that could be used to irrigate non-edible crops, plants, and trees.

Approximately 400 units of residential housing are planned across three housing neighborhoods. A mix of housing types will be developed, from single-family homes on 1/5-acre lots to apartment units in multi-family housing projects. The first housing project planned is for 18 single-family homes in the North Housing Area.



**Figure 2-1.** Master Plan for the Tawa'ovi Community.

**Table 2-1.** Tawa'ovi Community Plan Elements and Estimated Parcel Acreages

<b>Zoning District</b>	<b>Land Use (acres)</b>
Town Square (inner) District	4.45
Town Square (outer) District	9.81
Services District	14.31
Utility District	16.83
Heritage Preservation District	23.99
Heritage Cultural Center District	13.89
Institutional District	21.55
Preserve / open	69.81
Preserve / agricultural and ranching	123.25
Preserve / renewable energy production	43.52
Low-density housing cluster / single family	13.15
Medium-density housing cluster / apartments	15.77
Parcel for future housing or institutional (detention)	21.07
Tourism District	18.30
Roads and setbacks	54.05
	<b>463.75</b>

## Infrastructure

The Tawa'ovi Community would utilize the existing Turquoise Well as a potential domestic water source. As tested for design of the Community, the well would have a discharge rate of 250–270 gallons per minute (gpm) with improvements, with a 190,000-gallon first phase water storage tank and backup generator for the pump.

Two existing lagoons in the south portion of the site, on the north side of the Oraibi Wash, would be improved to create the first two sewer system lagoons for the Community. The initial gravity-flow sewer system is planned as a facultative lagoon system that would make use of the existing two lagoons (rehabilitated and upgraded as required), with lines sized for trunk lines that would allow for future expansion to meet expected build-out levels of the community. Future improvements to the sewer system may include development of additional lagoons to improve capacity and effluent treatment for the creation of reclaimed water that can be utilized for culturally approved uses. The potential for future batch reactor plant is also possible based on available land area.

The electrical system is planned as a completely underground three-phase system within the site. Electrical services, from either the Navajo Tribal Utility Authority (NTUA) facilities located at Hard Rock and /or from Arizona Public Service (APS) located at Second Mesa, is being pursued by the Tribe. Grading and drainage has been designed to respect the existing terrain and capture stormwater for agricultural use along the east and south borders of the legal parcel bounded by Oraibi Wash.

Roadways have been conceptually designed to be phased-in over time, as Community build-out proceeds, with design specifications for stormwater conveyance, groundwater perk via stabilized decomposed

granite roadways where possible, and urban heat island reduction through consistent use of a light colored chip-coat on all paved roadways.

There would also be development of an educational trail system within the site that would provide access to interpretive sites for the archeological sites and prominent topographic and biotic conditions. The interpretive trail system would be designed for “continued preservation (of the archeological sites) so as to be available as part of a cultural education component within the community” (Yeatts 2011).

Other projects under development near the Tawa’ovi Community are discussed in Appendix C, Cumulative Impacts.

## ***Best Management Practices***

The following best management practices are included in the Proposed Action in an effort to minimize the impacts of the Proposed Action to social and environmental resources. More specific mitigation would need to be developed for project-specific analyses in the future:

- Construction activities should be conducted in a manner that would minimize disturbance to existing vegetation by limiting vegetation thinning and restricting construction activities to the extent possible.
- If any Migratory Bird Treaty Act–protected bird with an active nest is observed before or during construction, measures should be taken to protect the nest (USFWS 2012a)
- Drainage structures should be installed and maintained in roads to reduce concentration of water runoff. Road drainages should direct flow into stable areas of vegetation and cover and could potentially feed agricultural fields located adjacent the housing villages.
- New culvert outfalls should be installed with either riprap or another form of energy dissipater, if applicable.
- Roads should be graveled or have erosion structures installed where activities cross a drainage, if needed.
- Roads should be maintained in a manner that provides for water quality protection.
- Regulations and procedures outlined in the Hopi Water Code (Daniel B. Stephens and Associates, Inc. [Stephens] 1997) should be implemented and integrated into surface water use and groundwater use plans.
- An on-site staging area for heavy equipment should be identified to protect existing vegetation surrounding the project area from damage during construction.
- A noxious weed management plan should be developed and implemented. The plan could include elements such as plan implementation responsibility, monitoring and inventory, if needed, etc.
- A Historic Properties Treatment Plan (HPTP) shall be developed in consultation with the Hopi Cultural Preservation Office, BIA, and State Historic Preservation Office (SHPO). At a minimum, the HPTP shall indicate that all NRHP-eligible sites would be avoided, and that no ground-disturbing activities will take place within cultural site boundaries.
- All re-seeded sites should be monitored. Preference would be given to perennial native bunchgrasses for seeding (low nutrient-demanding) and preferred grasses for grazing in applicable adjacent grazing areas.



## ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

Federal agencies are required under NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). As noted at the start of this chapter, previous planning efforts that lead to the development of the Proposed Action are summarized in Chapter 1 (see Project Background).

The following alternatives were considered but eliminated from further analysis.

### 80-acre Tawa'ovi

An 80-acre parcel was selected by the TDCT in 2004 for further master planning and technical study work. A full range of technical studies were accomplished on this 80-acre parcel, including site visual surveys, topographic and aerial surveys, a geotechnical evaluation, and a master hydrology study. The Turquoise Well was tested as a viable water supply for the Community. Also during this planning phase, space programming was accomplished for governmental offices and services, and housing design. Based on this programming and a subsequent update to the Master Plan, it was determined in 2005 that the 80-acre parcel would not provide sufficient land area for the required programs for the Community. It was at this time that the outline of the 463.75-acre special land assignment was defined and surveyed by the TPS team, with subsequent approval of the special land assignment in 2011 by Hopi Tribal Council Resolution H\_067-2011.

As discussed in Chapter 1, the Tunatya'at 2000 Plan (OCPED 2001) concept for PCD suggested 400- to 500-acre sites, where community, residential, commercial, and institutional land uses would be clustered, and supported by the appropriate infrastructure (roads, water, etc.). The Tawa'ovi PCD was planned for approximately 500 acres. As a result, the project was expanded in 2011 to consider a 463.75-acre site (see the Proposed Action) and the 80-acre site, though incorporated into the larger site, was withdrawn from further consideration. Specifically, the alternative was eliminated from detailed study because it is insufficient to meet with the Tunatya'at 2000 Plan goal to develop a community on approximately 500 acres of HPL.

### No Master Plan, Provide Services in Other Villages

A few members of the public commented that the Tawa'ovi Community is not needed, and that housing and support services should be provided in and near villages elsewhere on the Reservation, with Polacca cited as a possible location.

Developing housing elsewhere within the District Six Hopi Villages and not within the proposed Tawa'ovi Community will not provide a more comprehensive benefit to Hopi tribal membership, in terms of the project purpose and need, than the Proposed Action.

This alternative is not viable for the following reasons:

1. It is possible to develop retail, residential, and commercial development in and near District 6 Villages now, without approval of the Master Lease required for this project.
2. There are no master plan(s) in place at District 6 Villages to govern development in accordance with the best interests of the Hopi Tribe.
3. There is limited existing utility infrastructure (i.e., roadways, water, wastewater, etc.) elsewhere on the Reservation to accommodate new development in other areas.

4. There is a lack of available land (approximately 500 acres) elsewhere, specifically limited open land area (not under tenure) for development.
5. There is a lack of adequate water supply elsewhere on the Reservation.
6. There would be a conflict with Tribal Resolution H-43-91 (January 9, 1991) that authorized the “Turquoise Community” (now Tawa’ovi) in HPL and Range Unit 351 by issuance of a special land assignment.
7. There would be a conflict with Tunatya’at 2000 Plan goal to develop the Tawa’ovi Community on approximately 500 acres of HPL.

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## CHAPTER 3. AFFECTED ENVIRONMENT

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### INTRODUCTION

The purpose of this chapter is to describe the existing environment that may potentially be affected by implementation of either of the project alternatives. The resources that are analyzed in detail, based on internal, agency, and public scoping as described in Chapter 1, include:

- Land Resources
  - Topography
  - Soils
  - Geology, Minerals and Paleontological Resources
- Water Resources
  - Surface Water
  - Groundwater
  - Water Quality
- Living Resources
  - Vegetation
  - Wildlife
  - Agriculture
- Cultural Resources
  - Cultural Setting
  - Historical and Archaeological Resources
  - Cultural and Religious Traditional Cultural Properties
  - Traditional Cultural Knowledge and Tribal Governance
- Socioeconomics
  - Demographic Trends
  - Employment and Income
  - Housing
  - Community Infrastructure
  - Lifestyle and Cultural Values
  - Tourism
- Environmental Justice
- Resource Use Patterns
  - Transportation Networks
  - Current Land Uses/Land Use Plans
- Other Values
  - Public Health and Safety
  - Visual
  - Noise and Light
  - Climate Change

Several resources or resources subcategories were eliminated from analysis due to negligible impact in and around the project area (Wilderness Areas, Lumber, Hunting/Fishing, Recreation), or low probability of occurrence (Mineral Extraction).

Chapter 4, Environmental Consequences, examines environmental conditions and the description of the alternatives (see Chapter 2). The types and magnitudes of impacts anticipated to occur from each alternative were identified and quantified to the extent practicable, given the stage of the project.

## LAND RESOURCES

### Topography

Topographically, the Tawa'ovi Community Development site slopes gently to the east and southeast, towards Oraibi Wash, a major southwest-trending drainage course. Elevations on-site vary from a high of approximately 6,000 feet above mean sea level (amsl) near the northwest corner to a low of approximately 5,800 amsl near the southeast corner, resulting in relief of 80 feet. A low hill in the southwestern corner rises to approximately 6,040 feet amsl. Drainage is mainly via sheet flow to Oraibi Wash or its tributaries (GeoTek Insite, Inc. [GeoTek] 2005a).

Approximately 9.27 acres or 2% of the site was previously disturbed through acts of road construction, rough grading, and well development that were funded either by the Tribe or BIA. Previous alterations include cuts, fills, and paving. Grading created slopes, pads, and areas of exposed sandstone bedrock (GeoTek 2005a).

Existing paved roads on the site totals approximately 0.7 acre, which includes BIA Route 4, Hard Rock Road, and the mobile housing loop roadway. Previous grading on the site was accomplished for construction of the roadbeds for BIA Route 4 and Hard Rock Road, with fill material for the roadways taken directly from the site. An area of approximately 3 acres of grading is evident on both the north and south sides of the loop roadway's entry from BIA Route 4. Other areas of previous grading include two lagoons in the south portion of the site, on the north side of the Oraibi Wash, and an area of previous "borrow" (approximately 0.2 acre) located south of the Turquoise Well.

### Soils

The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) submitted a custom soil resource report for the project during scoping (NRCS 2012). A variety of soil types are mapped in the project area; soils are primarily loam and sand. Over 50% of the project area is mapped as Penistaja-Begay complex with 1%–8% slopes. This soil is a deep, well-drained soil that formed in alluvium and eolian deposits that formed from sandstone, and is found on plateaus. This soil makes up approximately 56% of the project area.

Kydestea-Zyme-Tonolea (5%–50% slopes), Jeddito loamy sand (0–5% slopes) and Tewa very fine sandy loam (1%–5% slopes) account for another 30% of project area soils. These soils are deep, well drained soils that formed from mixed alluvium derived from sandstone and shale, and are found on fan terraces and stream terraces.

The steeper parts of the project area are mapped as Ustic Torriorthents (10%–35% slopes) and account for approximately 6% of the project area. This well-drained soil is found on hills and convex slopes, and was formed from mixed alluvium and/or colluvium derived from sedimentary rock. This soil is fairly shallow, and paralithic bedrock is encountered at 4 to 60 inches below the modern ground surface (NRCS 2012).

## Geology, Mineral, and Paleontological Resources

The project area is underlain by two types of geologic materials—sandstone bedrock of the Mesa Verde Group (map symbol Kmv) under the higher elevations, and alluvial/colluvial deposits (map symbol Qal) are present at the lower elevations along Oraibi Wash and its tributaries (GeoTek 2005a).

The Mesa Verde Group is a sedimentary deposit laid down along the margins of a shallow sea during the Late Cretaceous, approximately 65 to 94 million years ago. The Mesa Verde Group is characterized as gray to buff sandstone with interbedded shale and coal. The Mesa Verde Group on the project area is a resistant, well-indurated, relatively massive, fine-grained sandstone with bedding planes within several degrees of horizontal.

The alluvial/colluvial deposits underlying the drainage course areas have been moved downstream or downslope by water or gravity, respectively. These deposits are characterized as loose or poorly consolidated fine sandy silts with clay. They thin near the bedrock/alluvium interface and thicken to several hundreds of feet in depth at the center of Oraibi wash (GeoTek 2005a).

No known minerals or mineral rights exist in the project area.

No known paleontological resources are documented in the project footprint. The Potential Fossil Yield Classification (PFYC) system was used to identify the paleontological potential in the project area. Using a PFYC system initially developed by the U.S. Forest Service, and later adopted by the BLM (BLM 2007), paleontological potential levels have been assigned to each geological formation. The PFYC system is outlined in Appendix D. The PFYC system classifies geological units based on 1) the relative abundance of vertebrate fossils or of scientifically significant invertebrate and plant fossils and 2) the potential of these fossils to be adversely impacted. A higher class number indicates a higher potential for the presence of paleontological resources.

As noted above, the Mesa Verde Group is a sedimentary deposit laid down during the Late Cretaceous; the PFYC rating of these deposits would be Class 3 (moderate or unknown potential). The undifferentiated alluvium dates to the Pleistocene/Holocene period; the PFYC of these deposits would be Class 2 (low potential).

## WATER RESOURCES

### Surface Water

Surface runoff on the project area is presumed to generally follow local topography (southeast toward Oraibi Wash near the southeastern corner of the project area) at a rate of approximately 200 feet per mile (GeoTek 2005a). Oraibi Wash flows toward the south-southwest. The flow path between Oraibi Wash and the Colorado River includes Polacca Wash, Corn Creek Wash, and Little Colorado River, totaling approximately 65 river miles, most of which are ephemeral.



Drainage from other properties does not appear to be directed onto the site (GeoTek 2005a). No delineation of waters of the U.S. has been completed for this project. Future projects with proposed ground disturbance would need to evaluate the potential for waters of the U.S. on-site and coordinate with the Hopi Water Resources Program and U.S. Army Corps of Engineers regarding Clean Water Act Section 401 and Section 404 compliance and permitting.

No Federal Emergency Management Agency (FEMA) floodplain maps are available for the project area (WLB Group, Inc. [WLB] 2005).

## Groundwater

Groundwater, specifically water quality, on the Reservation is managed by the Hopi Tribe Water Code (Stephens 1997) and Hopi Tribe Groundwater Enforcement Ordinance #57 (adopted in 2011).

The project area is located near the center of the Eastern Plateau Planning Area (Figure 3-1) of the Arizona Water Atlas (Arizona Department of Water Resources [ADWR] 2009). This planning area is unique in that it is composed of one groundwater basin, the Little Colorado River Plateau Basin.

The planning area is relatively high in elevation and is geographically diverse, with the highest peaks in the state as well as deep sandstone canyons and large mesas. Almost two-thirds of the land area is under Tribal ownership. The planning area is bounded on the north by the Arizona–Utah border, on the east by the Arizona–New Mexico border, on the south by the Mogollon Rim, and on the west by the Coconino Plateau Basin and Paria Basin in the Western Plateau Planning Area of the Arizona Water Atlas, where boundaries coincide closely with U.S. Route 89. The Mogollon Rim forms a hydrologic boundary between the Eastern Plateau Planning Area and the basins of the Central Highlands and Southeastern Arizona Planning Areas. The Eastern Plateau Planning Area includes parts of four watersheds, including the Little Colorado River Watershed (hydrologic unit code No. 150200) which covers about 19% of the state, including the project area.

The Eastern Plateau Planning Area is almost entirely within the Colorado Plateau physiographic province, which covers the northern two-fifths of Arizona. This province is characterized by mostly level, horizontally stratified sedimentary rocks that have been eroded into canyons and plateaus, and by some high mountains. All of the Hopi Indian Reservation is located within this planning area.

A significant portion of the planning area, including the project area, is underlain by Mesozoic to Paleozoic sedimentary and volcanic rocks that form the area's regional aquifers. The sedimentary rocks consist of sandstones and limestones stacked on top of one another and generally separated by low permeability shales and siltstones. The three largest regional aquifers are the D-, N-, and C- aquifers. Each has a very large areal extent within the basin and except for the D- and N-aquifers, there is little vertical hydrologic connection between them (WLB 2004). These water-bearing formations gain thickness towards the center of the basin resulting in artesian conditions. Primary recharge areas are along the southern and eastern periphery of the planning area.

Groundwater flow direction varies and is generally south and west or north and west. The N-aquifer is generally unconfined but there are artesian conditions in the Black Mesa area and near Window Rock and much of the aquifer underlying the Hopi Reservation is unconfined.

The N-aquifer occurs north of the Little Colorado River and has an area extent of 6,250 square miles. The Navajo and Wingate Sandstones are the main water-bearing units in the N-aquifer. Natural recharge to the N-aquifer has recently been estimated at 2,600 to 20,246 acre-feet per year. Water is discharged via

springs, baseflow to streams, and as underflow to drainages. N-aquifer storage estimates vary from 166 million acre-feet (maf) to 526 maf.

According to ADWR online well database, there are no registered wells within 10 miles of the project area (ADWR 2013). Regionally, water levels measured in selected wells drilled in the N-aquifer vary in depth from 17 feet to 851 feet below ground surface. Recent adjudication investigation on the Hopi Reservation showed median well depths of 745 feet for claimed wells. Well yields are typically low (<100 gpm) north of the Little Colorado River (WLB 2004).

## Water Quality

As noted above, water quality on the Reservation is managed by the Hopi Tribe Water Code (Stephens 1997), the Hopi Tribe Groundwater Enforcement Ordinance #57 (adopted in 2011), and the Hopi Tribe Wellhead and Source Protection Ordinance #58 (adopted in 2011).

N-aquifer water quality is generally good with total dissolved solids of 600 or more. Sodium, bicarbonate, chloride, and sulfate are the dominant ions. The N-aquifer is the main source of supply for the Hopi Reservation. The N-aquifer is the only aquifer of sufficient quality and accessibility to supply reliable drinking water to the Hopi villages on the three mesas (ADWR 2009).

Natural recharge to the N-aquifer has recently been estimated at 2,600 to 20,246 acre feet annually (Office of Surface Mining Reclamation and Enforcement 2008). Water is discharged via springs, baseflow to streams, and as underflow to drainages. N-aquifer storage estimates vary from 166 maf to 526 maf (ADWR 2009).

The D-aquifer overlays portions of the N- and C-aquifer in the planning area and is the smallest of the three regional aquifers. It covers about 3,125 square miles under the Navajo and Hopi Reservations. Community wells across the Reservation primarily tap the confined N-aquifer, although they are frequently drilled through the southern reaches of the D-aquifer to reach the N-aquifer source. As of 2000, of the 24 existing wells on the Reservation, three were threatened and six were contaminated (OCPED 2001).

As discussed in Chapter 2, the existing Turquoise Well is a potential domestic water source for the Tawa'ovi Community. The well draws from the N-aquifer. The BIA constructed the well as a source of water for the construction of BIA Route 4; once construction was completed, the pump and mechanicals were removed and the well sat dormant. The head is currently protected by a small concrete block well "house" that is locked and secured. Planned improvements to the Turquoise Well to provide the primary water source for the Community is discussed under "Infrastructure" in Chapter 2. The well was reportedly drilled to a depth of approximately 2,400 feet below the existing ground surface, and cased to an undetermined depth. Based on a review of well logs (WLB 2004) and pump testing, the well has a capacity of approximately 250–275 gpm. Additionally, water quality testing confirmed that the water extracted met current parameters set by the U.S. Environmental Protection Agency (EPA) for domestic water sources, including the parameters for arsenic (WLB 2004).

In subsequent studies, the Indian Health Service used the results of the Tawaovi project team's testing to substantiate a projected rate of 1,000 gpm for a refurbished (new casing and/or screens) or new well at the Turquoise Well location (Indian Health Service 2012). This projection was the basis for the first stage of their arsenic remediation project, which consists of a three-well field in a proposed area of Range Unit 351 south of the Tawa'ovi site.

## Water Rights

Water law and procedure in Arizona is complicated, and consists not only of statute, regulation, and guidance, but is also affected by continually changing rulings by courts involved in water rights adjudication proceedings. Groundwater use outside of the State's designated Active Management Areas does not require a groundwater right.

Surface water is subject to the "doctrine of prior appropriation" and rights to use surface water are designated through a permitting process. Indian water right claims are based on "reserved water rights" for federal reservations established under the "Winters Doctrine" which states that a federal reservation includes an amount of water necessary to fulfill the reservation's purpose including historic and cultural water uses, tribal resources and economic base, development plans, and current and future populations (ADWR 2010). Starting in 1974 and continuing today, the Arizona superior court system has undertaken general adjudication of the Little Colorado and Gila watersheds. The Navajo Nation and Hopi Tribe have been in on-going negotiations with non-Indian water users in the Little Colorado watershed, the State of Arizona and the federal government.

## LIVING RESOURCES

### Vegetation

The Hopi Reservation is home to three biotic communities: Great Basin Desertscrub, Great Basin Grassland, and Great Basin Confer Woodland. Great Basin Desertscrub is characteristic of the lower slope of the Lower Colorado Valley. Great Basin Grassland is typical on the higher flanks of the Little Colorado Valley on southern Black Mesa, including much of the Hopi Mesas. The Great Basin Confer Woodland biotic community is found on Antelope Mesa (easternmost of the Hopi Mesas) and farther north on Black Mesa.

Vegetation in the project area and surrounding landscape has been modified by years of livestock grazing. The project area is located within the Great Basin Desertscrub biotic community. Dominant species in the project area include four-wing saltbush (*Atriplex canescens*), broom snakeweed (*Gutierrezia sarothrae*), blue grama (*Bromus* sp.), rabbitbrush (*Chrysothamnus nauseosus*), and narrowleaf yucca (*Yucca angustissima*). Other plant species observed within the project area include threadleaf groundsel (*Senecio longilobus*), Russian thistle (*Salsola tragus*), corn-kernel milkweed (*Asclepias latifolia*), littleleaf globemallow (*Sphaeralcea parvifolia*), slim leaf bursage (*Ambrosia* sp.), and Utah juniper (*Juniperus osteosperma*) (Brown 1994). The trees are all young specimens and the shrubs in the area are low-growing, typically less than 2 feet in height; thus, the area lacks a tall vegetative canopy.

Similar vegetation was observed within the project area on a rocky bluff south of Hard Rock Road; however, this area also supports a number of Utah juniper trees at various stages of maturity, significantly less four-wing saltbush, a predominance of broom snakeweed, and the addition of winterfat (*Ceratoides lanata*) and several species of cacti in low densities. Cacti observed on the bluff included old-man prickly-pear (*Opuntia erinacea*), staghorn cholla (*Cylindropuntia* sp.), and hedgehog cactus (*Echinocereus triglochidiatus*).

Oraibi Wash is located near but outside the project area, and supports species typical of disturbed high desert riparian vegetation. The canopy consists exclusively of mature saltcedar (*Tamarix* sp.), with four-wing saltbush and rabbitbrush being the predominant species in open areas and on sandbars. No cottonwood (*Populus* sp.) trees of any age class were observed in the riparian corridor.



## Wildlife

The desertscrub community in and around the project area supports wildlife species such as small mammals, reptiles, and songbirds. It also provides foraging habitat for mammalian predators and raptors. Wildlife species observed within the project area include ravens (*Corvus corax*), sparrows (*Spizella* sp.), plateau striped whiptail lizards (*Cnemidophorus velox*), and jackrabbits (*Lepus californicus*). Evidence of predators such as coyotes (*Canis latrans*) or bobcats (*Lynx rufus*) was observed, including scat containing bone fragments and hair, and rabbit bones strewn about under rock overhangs. Signs of previous prairie dog (*Cynomys gunnisoni*) inhabitation were observed in a survey (SWCA 2004), including abandoned burrows and skeletal remains. Deer and elk have been observed in areas surrounding the project area (personal communication, BIA Hopi Agency, March 28, 2013).

The rocky bluffs west of the project area may provide suitable nesting habitat for raptors in the form of mature juniper trees; however, no nests or raptors were observed during the site visits on October 5 and 6, 2010.

### **Federally Listed Species**

The USFWS list of threatened, endangered, and sensitive species for Navajo County was analyzed to determine the potential presence of these species within the proposed project area (USFWS 2012b; Appendix E). SWCA conducted a survey of the project area on October 5 and 6, 2010, to evaluate the area for potential use by and suitable habitat for threatened, endangered, and sensitive species.

None of the 16 species listed for Navajo County by the USFWS are likely to occur in the project area. The project area is either clearly beyond the known geographic or elevational range of these species, or it does not contain vegetation or landscape features known to support these species, or both. Habitat requirements, potential for occurrence, and possible effects on these species are summarized in Appendix F.

### **Species of Concern—Culturally Significant Species**

Several raptor species are culturally significant to the Hopi Tribe, including the bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), Cooper's hawk (*Accipiter cooperii*), gray hawk (*Buteo nitidus*), red-tailed hawk (*B. jamaicensis*), ferruginous hawk (*B. regalis*), and northern harrier (*Circus cyaneus*) (personal communication, Darren Talayumptewa, Coordinator for the Hopi Wildlife and Ecosystems Management Program). At least one active red-tailed hawk nest is known to exist along power lines within 1 mile of the project area.

Although none of these raptor species are listed species under the ESA, they are protected by the federal Migratory Bird Treaty Act, and the bald eagle and golden eagle are also protected under the federal Bald and Golden Eagle Protection Act.

## Agriculture

Across the Reservation, livestock grazing and agricultural land uses are the most common land uses. In particular, livestock grazing dominates, but Hopi agriculture and traditional gathering also occur. The Hopi Tribe is developing a range management program (Hopi Office of Range Management) that supports and invests in range management improvements such as drinkers, stock tanks, fences, etc.



According to the Tunatya'at 2000 Plan, the potential carrying capacity of the ranges on the Reservation is 24,500 animal units per year long (AUYL) under ideal conditions, but generally it varies. Stocking rates typically average 50% of the AUYL. Carrying capacity on Range Unit 351 is estimated at 365 (75 Animal Units and 292 Sheep Units).

No prime or unique farmland exists within the proposed project footprint and the project area is not farmed.

The proposed development is located within one of six pastures in Range Unit 351. Five of the six pastures are currently in rotation for grazing. Six Hopi ranchers currently use Range Unit 351 for grazing a total of 86 head of cattle. The range management plan for the area is currently being revised and updated with funding from the BIA. The NRCS is working with ranchers to improve the grazing units by installing fencing and initiating water development projects including water catchments and livestock wells. One livestock corral exists within approximately 100 feet of the project area and is used by a rancher.

## CULTURAL RESOURCES

### Cultural Setting

The following cultural setting is excerpted from Yeatts (2011:5–11):

The area comprising the Hopi Reservation has probably been occupied continuously for 2,000 years and the area has probably been inhabited, at least periodically, going back 10,000 to 12,000 years; archaeological and historical data support this assertion.

Hays and Ahlstrom (1991) provide a detailed summary of Hopi prehistory in the Hopi Cultural Resource Inventory, from which this section is excerpted.

*The Paleoindian Period (ca. 10,000 to 7000 B.C.) has not been identified on Hopi Reservation lands, but a single Folsom point found near Second Mesa (Gumerman 1966) suggests that the area was at least visited by the mobile hunter-gatherers. Paleoindians seem to have focused on hunting large game animals. Clovis points, dating as early as 10,000 B.C., have been found near Kayenta (Ayres 1966) and in the Winslow area (Sims and Daniel 1967). There is, in addition, a poorly known site with Agate Basin points located in the Cow Springs area, immediately northwest of Hopi Partitioned Lands (Nichols and Smiley 1984:90). This site was recorded in 1977 by Bruce Harrill of MNA. It is important to note that this site was discovered after a three-year drought had killed the vegetation in the area, allowing aeolian activity to expose the location. For a few years, stone tools, debitage and hearths were visible; then the same aeolian activity that had exposed the site again covered it with sand.*

*The Desert Culture (ca. 7000 to 500 B.C.) describes the southwest adaptation known as the Archaic Period that follows the Paleoindian Period. In contrast to the Paleoindian, the Archaic peoples hunted small game and gathered a wide variety of plant foods. Flannery refers to the Archaic lifeways as a "broad spectrum" adaptation. The change in lifeways was preceded by, or took place in concert with, changes in climate and in fauna. Most of the continent became warmer and drier about 10,000 years ago, and many of the large game animals became extinct.*

*Few sites that can be positively dated to this period have been located on Hopi land. This gap in the chronology of known sites probably reflects a gap in research, and not a hiatus in the occupation of the Reservation. For example, Archaic sites have been recorded to the south in the Little Colorado River Valley (Sims and Daniel 1967; Wendorf and Thomas 1951; Longacre 1970) and at least one on Black Mesa (Nichols and Smiley 1984:92-39).*

*Archaic sites are generally difficult to find because they lack the kinds of materials and features that make later sites highly visible on the surface. Architecture was very simple and ephemeral during this period, because people practiced a nomadic economy. The predominant features on Archaic sites are hearths, and the only artifacts found are chipped and groundstone tools.*

*Following the Archaic period is the Basketmaker II (ca. 500 B.C. to A.D. 500) period, which is characterized by peoples who practiced limited cultivation of corn and squash, but did not produce pottery. They probably moved seasonally, because they still relied on hunted and gathered resources. They lived at least part of the year in pithouses. These pithouses were not clustered in permanent settlements. Rockshelters, where available, were favored for habitation in some seasons. Basketmaker II sites are typified by the presence of characteristic projectile points, by slab-lined storage cists, and by the absence of ceramics.*

*The beginning date for maize cultivation in the Hopi Mesa area is currently a source of much debate. Until recently, the earliest known maize in this area was dated to about 100 B.C. Remains from the Kayenta sites of White Dog Cave and Kidder and Guernsey Caves 1 and 2 were re-dated using new C-14 techniques, and yielded dates of about 500 B.C. Excavation of a rockshelter on the North Rim of Black Mesa, Three Fir Shelter, yielded dates on maize as early as 800 B.C., although the overwhelming majority of dates from the site fell into a range spanning about 200-100 B.C. (Smiley and Parry 1990). For now, a beginning date of 500 B.C. is accepted for the advent of maize cultivation, and thus the beginning of the Basketmaker II period, but it is possible that earlier dates will soon be generated.*

*The Basketmaker III period (A.D. 500-750) is characterized by a greater reliance on agricultural subsistence and the introduction of year round pithouse habitation. Pithouses of this period are larger than before, and families often gathered in pithouse communities or villages. Beans were added as an agricultural product. Turkeys were also domesticated, but their use appears more as a source of feathers in the production of blankets and other items, rather than as food. The bow and arrow was added to the technology of hunting. Ceramics consisted of plain gray wares and occasional vessels decorated with simple black designs. Sites are recognized by the presence of pithouse depressions, slab-lined cists, and plain gray pottery. Fifty-eight such sites have been located and recorded on the Hopi reservation, and 38 of these are in the vicinity of the Hopi Mesas, including Antelope Mesa.*

*One Basketmaker III site, Jeddito 264, on the Hopi Mesas was excavated as part of the Peabody Museum's Awatovi Expedition and the results published (Daifuku 1961). Jeddito 264 contained six pithouses and 43 storage pits. The structures at the site probably reflect two occupations, or two construction episodes in a site that was used for a long period of time in the late 600s and early 700s. In the early occupation, pithouse inhabitants constructed scattered and clustered cists for storage. In the late occupation, one pithouse was accompanied by an arc of small, contiguous surface rooms that were used for storage.*

*The Pueblo I period (A.D. 750-1000) is defined by the change from pithouse to surface architecture in most areas, and by the appearance of polished black-on-white pottery and neck-banded gray pottery. This transition begins as early as A.D. 700 in some areas, such as the Chaco Canyon area, and as late as A.D. 800 in others. Pithouses continue to be used in many*

areas, for example, the Hopi Buttes and Homol'ovi areas (Gumerman 1988, Young 1987). Population increases are seen both on the Hopi Mesas and on Northern Black Mesa. People began to use above-ground storage rooms, and gradually moved from pithouses to surface rooms, although, as noted, pithouses persist in some areas.

The Pueblo II period (A.D. 1000-1150) witnesses a continued increase in population. Some people lived in small pueblos scattered about on tops of the Hopi Mesas and northern Black Mesa. Pueblo II sites recorded on Hopi land are more numerous than sites of any other time category (401 sites have been previously recorded). Many of these pueblos have formalized designs consisting of blocks of surface masonry rooms with kivas in front of the rooms. Trash is usually deposited in middens nearby. One of the few excavated and published Pueblo II unit pueblos on Hopi land is the Little Kiva Site, AZ:J:6:1 (ASU) (Rice 1986). The early component, at least, at this site dates to Pueblo II and includes a kiva, a mealing room, two masonry rooms, and a couple of jacal surface rooms.

Archaeologists usually think of unit pueblos like the Little Kiva Site as typical of the Pueblo II period, although there is a great deal of variation. Some people continue to live in pithouses at this time. An example is Jeddito Site 111 (Smith 1972:147-155), located about 2.5 miles northeast of Awatovi. This site dates to late Pueblo II, in the eleventh century. Harvard Peabody excavators determined that it contained at least six scattered, unconnected semi-subterranean and subterranean rooms and three or four scattered pits and fireplaces. The structures contained no masonry, and probably had jacal superstructures. Two structures were rectangular, one was round, and three had more complex shapes, suggesting use as kivas.

On and near the Hopi Mesas, during Pueblo III (A.D. 1150-1300) times, the villages continued to grow. A wide variety of kiva forms are found, including round, D-shaped, and rectangular. Tree-ring evidence suggests that D-shaped kivas were more common in the 1200s (Ahlstrom 1985). The Hopi-style kiva, a rectangular structure with a raised platform at one end, had appeared by A.D. 1300 (Smith 1972; Ahlstrom 1985; Adams 1991). In addition to the continuation of the black-on-white ceramic tradition, orange pottery with designs in black, white, and red became very common (see Smith 1971). Three hundred thirty-six sites with Pueblo III occupations have been recorded on the Hopi Reservation. Only a very small number of these have been excavated.

Jeddito Site 108 is a small Pueblo II-Pueblo III period village on Antelope Mesa, about halfway between Awatovi and Kawaika'a (Smith 1972). It had about nine rectangular surface masonry rooms and a semi-subterranean D-shaped kiva. The kiva had been partly dug into the soft sandstone bedrock, and its upper walls were masonry. It contained a hearth, deflector, and ventilator complex, with a wall niche, bench, and small holes in the floor were probably used to anchor looms. One small hole near the hearth may have represented the Sipapuni.

The Pueblo IV period (A.D. 1300-1629) can be usefully broken down into three parts. The fourteenth century was a period of rapid population growth on the Hopi Mesas. The primary cause of growth was immigration from the Little Colorado River Valley, the Kayenta area, and probably from many other areas as well. Very large pueblos were built on the Hopi Mesas and nearby to the south, at Homol'ovi and Bidahochi. Most of these pueblos have rectangular, enclosed plazas, containing rectangular kivas. Small field house sites also occur at this time. Over 180 sites used during this time period have been recorded on and near the Hopi Mesas.

The advent of katsina religion at this time is reflected in ceramics, kiva murals, rock art, and painted stone slabs (Adams 1989, 1991; Hays 1989; Cole 1989). The appearance of yellow-ware

*ceramics defines the beginning of this period. Many vessels were probably produced by specialists. Coal mines and pottery firing areas were extensive (Colton 1936; Hack 1942; Powers 1976). Hopi pottery was traded extensively from 1300 to about 1400 or 1450. Trade dropped off after that time, but decorative style continued to become more elaborate.*

*The late 1400s and early 1500s represent a gap in reliable data. The "type site" for this period is Sikyatki - because most of the pottery from this site places it later than the early 1400s, and it was known to have been abandoned before the arrival of the Spaniards in the mid-1500s. However, Sikyatki was not systematically excavated. Data exist from systematic excavations at Awatovi and Kawaika'a, but have not yet been systematically analyzed and compiled to produce any useful documentation of this period.*

*The historic period at Hopi began with the arrival of Coronado in the Southwest in 1540. After a violent start the Spanish finally "pacified" the Hopi in 1598 when Onate received their submission to royal authority. Spanish influence grew with the establishment of missions at Awatovi and Oraibi in 1628 and 1629.*

### ***Hopi Traditional History, Clan Migrations, and the Archaeological Record***

The section above is the tradition description of southwest culture history derived primarily from archaeological evidence and interpretation of the prehistoric period. The following section presents a traditional Hopi understanding (albeit very cursory due to the complexity of Hopi clan histories and esoteric nature of much of the information) of the history of the Colorado Plateau. This is presented in part to integrate Hopi traditional histories with the general archaeological approach to understanding the cultural development of the Hopi Indian Reservation and the greater Colorado Plateau.

***Aliksa'i!** Listen! What follows is an account of the Hopi origin. The Hopi emerged into this, the Fourth World, from the **Sipapuni** in the Grand Canyon. Upon emerging, they encountered **Ma'saw**, the Guardian of the Fourth World. A spiritual pact was made with **Ma'saw**, wherein the Hopi would act as the stewards of the earth. As a part of this pact, the Hopi vowed to place their footprints throughout the lands of the Fourth World as they migrated in a spiritual quest to find their destiny at the center of the universe. Hopi clans embarked on a long series of migrations that led them throughout the Southwest and beyond, settling for a time in various places. Following divine instructions, the Hopi continued their migrations until after many generations they arrived at their rightful place on the Hopi mesas.*

*During the period of migrations, the Hopi clans established themselves throughout the land by cultivating and caring for the earth. As directed by **Ma'saw**, the setting of Hopi "footprints" included the establishment of ritual springs, pilgrimage trails, shrines, and petroglyphs. As the Hopi migrated they left behind their ancestors, as well as ruins, potsherds, grinding stones, and many other artifacts ... as evidence that they had vested the land with their spiritual stewardship and fulfilled their pact with **Ma'saw**. These archaeological sites today constitute monuments by which Hopi people verify their clan histories and religious beliefs. Archaeological sites thus provide physical proof that the Hopi have valid claims to a wide region. Yes, this is the way it is. **Ta'ay, yanhaqam** (Ferguson et al 1993:27).*

The ancestral archaeology of the Hopi Indians covers an area that extends far beyond the Hopi Reservation, encompassing all of the areas the Hopi lived in and traveled through on their migrations to the Hopi Mesas. The Hopi people do not conceptualize prehistory in the same terms as those used by archaeologists. The Hopi people use the term Motisinom ("first people") to refer to what archaeologists call the Paleo-Indian and Archaic. The Hopi term Hisatsinom refers to what

archaeologists call the Basketmaker and Anasazi. Hisatsinom is literally translated as "people of long ago" but the Hopi generally use the term to mean "ancestral people." Many Hopi find the term Anasazi to be offensive since it is derived from a Navajo word meaning "ancient enemies" (Plog 1979:108).

The Hopi's understanding of their relationship to the Hisatsinom is defined and strengthened within individual clan migration histories and in Hopi religious ceremonies. Even though archaeologists and Hopi perceive prehistory in different conceptual terms, there is a long history of archaeologists researching and acknowledging the relationship between Hopi clans and the prehistoric cultural traditions of the Colorado Plateau (e.g., Fewkes 1898, Adams 1989).

The individual clan histories recount in detail the gradual movement of particular clans across the Southwest until their eventual arrival at the Hopi Mesas. Understanding the complex history of Hopi clan migrations is complicated by the variation that exists in the oral traditions of different Hopi villages and by the time span of over 1,000 years during which clans came to join one of the villages on the Hopi mesas. The various clans came to different villages at different times from different areas. Each village thus has a unique compilation of clan histories that serves to document how it came into existence as a social entity (Ferguson and Dongoske 1994:26). While not completely exhaustive the following discussion of clan migrations is used for illustrative purposes to indicate the breadth and depth of Hopi clan migration traditions.

Some of the Hopi clans migrated into the Southwest from the south. The Kokyangngyam (Spider Clan), Kookopngyam (Fire Clan), and Masngyam (Ma'saw Clan) migrated from the southwest, settling at Wupatki to the east of the San Francisco Peaks. They were joined at Wupatki by the Tsungyam (Rattlesnake Clan) and Kuukutsngyam (Lizard Clan) that migrated from the south, and the Honngyam (Bear Clan), Piqösngyam (Bearstrap Clan), Torsngyam (Bluebird Clan), Awatngyam (Bow Clan), Tepngyam (Greasewood Clan), Paaqapngyam (Reed Clan), Hoongyam (Arrow Clan), and Poosiwngyam (Roadrunner Clan) that migrated from the southeast.

The Kokyangngyam (Spider Clan) left the Wupatki area and traveled far to the northwest before migrating to the Hopi Mesas. The Kokyangngyam migrations thus took them into and beyond the State of Nevada. The Awatngyam (Bow Clan), Tepngyam (Greasewood Clan), and Paaqapngyam (Reed Clan) migrated from Wupatki to the Little Colorado River and up the Grand Canyon northward into Utah and Colorado. Similarly, the Piqösngyam (Bearstrap Clan) migrated northward into Utah, passing through the vicinity of Page, Arizona (Ferguson and Dongoske 1994:27).

The Patkingyam (Water Clan) and Pikyasngyam (Side Corn Clan) migrated into Homolovi from the south, along with the Taawangyam (Sun Clan), Qalngyam (Sun Forehead Clan), Kwaangyam (Eagle Clan), and Isngyam (Coyote Clan) which came from the southeast. Many of these clans subsequently migrated through the Wupatki area. The Kwaangyam migrated from Homolovi to the Ganado area, and then to the Hopi Mesas. Other clans migrated from Homolovi directly to the Hopi Mesas.

The Atokngyam (Crane Clan) and Kelngyam (Sparrow Hawk Clan) migrated from the south into Chaco Canyon in New Mexico, where they were joined by the Kyarungyam (Parrot Clan), Katsinngyam (Katsina Clan), Qaöngyam (Corn Clan), Angusngyam (Crow Clan), Pipngyam (Tobacco Clan) and Tapngyam (Rabbit Clan). The Tepngyam (Arrow Clan), and Poosiwngyam (Roadrunner Clan) also arrived at Chaco Canyon after migrating through the area in the vicinity of Farmington, New Mexico. The Qaöngyam migrated from Chaco Canyon into Canyon de Chelly before proceeding on to the Hopi Mesas (Ferguson and Dongoske 1994:28).

The Leengyam (Flute Clan), Honanngyam (Badger Clan), and Aalngyam (Deer Clan) migrated through northeastern Arizona into the Mesa Verde region of Colorado. Some of these clans then traveled through Canyon de Chelly on their way to the Hopi Mesas. The Tsungyam (Rattlesnake Clan) occupied the region surrounding Tokonavi (Navajo Mountain) during their migrations before proceeding to the Hopi Mesas.

Around AD 1300 the prehistoric population in northern Arizona began to consolidate their settlements on the Hopi Mesas. Many archaeologists perceive this as the "abandonment" of the Colorado Plateau. From the Hopi perspective, however, this process is seen as "the gathering of the clans," an event that is described in most accounts of clan migrations (Adams 1989:5; Gladwin 1957:273-299).

The archaeological record shows a dramatic reduction in the number of sites occupied through time in the Hopi area, accompanied by a trend towards the occupation of much larger sites (Adams 1978:16-17). During the period from AD 1100 to 1300 there were at least 47 pueblos occupied in the vicinity of the Hopi Mesas.

The occupation of 36 of these sites was relinquished after AD 1300. The eleven remaining sites and three new sites housed the Hopi population in the period from AD 1300 to 1540. The late prehistoric sites range in size from about fifty rooms to over a thousand rooms, most of them oriented around plazas. These sites represent the development of the modern Hopi culture, including the florescence of the Hopi Katsina religion (Adams 1991).

### ***The Hopi Pueblos***

By the end of the prehistoric era, all of the Hopi clans had settled at one of the three Hopi mesas. They were joined by a group of Tewa following the Pueblo Revolt of 1680 (Stanislawski 1979:587). Once on the Hopi Mesas, clan members continued to return to many of the villages formerly occupied by their clan to conduct rituals at shrines located at those sites and to collect water from adjacent springs (Fewkes 1898:592; Hough 1906). A network of trails and pilgrimage routes was maintained to provide access to these sites. Thus, although the occupation of many villages was relinquished, the territory through which the Hopi migrated was not abandoned. It continues to play an essential role in the performance of the Hopi religion, as dictated in the covenant the Hopi made with the deity Ma'saw.

The Hopi are centered on three mesas that project from the southwestern side of Black Mesa, and have probably been resident in that area since before AD 1300. The village of Oraibi has been (continuously) occupied since around AD 1100 (Ellis 1974). Various components of the modern Hopi population moved to the Hopi Mesas from both the north and south as northern Black Mesa and the Little Colorado Valley were depopulated during the Pueblo IV period. The Hopi were first visited by Onate's expedition in 1604 and by 1630 the Spanish had established three missions among the Hopi villages (Scurlock 1991).

Spanish presence at Hopi decreased after the Pueblo Revolt in 1680. At that time missionaries were killed and churches destroyed, in response to harsh treatment from the Spanish. Spanish influence continued to diminish until their withdrawal from sovereignty in the Southwest with the 1823 Mexican Revolt. Before their fall from power in the Southwest, the Spanish introduced the Hopi to sheep, goats, horses, burros, peaches, onions, chili peppers, watermelon, and other garden crops, thus altering the traditional Puebloan economy.

The aftermath of the Pueblo Revolt was a time of upheaval on the Hopi Mesas. Many people sought refuge from Spanish reprisals atop the mesas. The village of Shungopavi moved to its

present location at this time on top of Second Mesa. People from the Rio Grande Valley moved to Hopi and settled villages such as Hano, located next to Sichomovi on First Mesa.

By about 1800, the Navajo had moved into eastern Hopi lands due to pressure from the Utes. The actions of the U.S. military further pressured the Navajo, and they moved into the western and southern Hopi lands as well. After the establishment of the Navajo reservation in 1868, the Navajo completely surrounded the Hopi and entered their lands from all sides (Ellis 1974). This continued even after the establishment of a Hopi reservation in 1882, and it was not until 1962 that the Hopi were given exclusive right of use to a small area near the center of their former lands.

The Hopi made use of much of the land to the south of their home mesas, from New Mexico to the San Francisco Peaks and north of the Little Colorado River. This area is their traditional hunting and gathering territory, and after the arrival of cattle in the 19th century the Hopi grazed a herd there, in the vicinity of the Hopi Buttes. They still maintain shrines and eagle hunting sites in several areas of their original territory, including the Hopi Buttes.

The Hopi maintained a considerable trade network with the Utes, Navajo, and Pai peoples, the Zuni, and the Apache to the south as well. Many of these trade routes were still in use by the time the U.S. military made contact with the Hopi (Colton 1964).

The villages of Kykotsmovi and Polacca were established in the early 20th century, at a time during which many people moved off the mesa tops to the vicinity of schools, trading posts, and water sources. At the same time, Oraibi split in 1906, which resulted in the establishment of Hotevilla and Bacavi and the growth of Moencopi. Finally, the partitioning of the former Hopi-Navajo Joint Use Area (JUA) has opened some new land to Hopi settlement and eliminated other land formerly open to the Hopi. This project area is on the land that was former JUA and as such, had occupation by several Navajo families. After the partitioning, the Navajo occupants were relocated out of the area.

## Historical and Archaeological Resources (Recent Investigations)

A cultural resources survey of the property was completed in 2011 (Yeatts 2011); consultation with the Arizona SHPO was completed in 2012 (SHPO 2012; Appendix G). Eight sites were identified within the project area. Of these, seven were recommended eligible for the NRHP. BIA determined, and SHPO concurred, that there would be no historic properties affected, because the sites would be avoided by project design and implementation (SHPO 2012).

Site types range from a single petroglyph, to Pueblo II, Pueblo III, and Basketmaker III artifact scatters and habitation sites (Yeatts 2011). Summary descriptions of the cultural resources and their locations are described in Yeatts (2011).

## Traditional Cultural Properties

Traditional Cultural Properties (TCPs) can be considered for inclusion in the NRHP based on their traditional cultural significance. Traditional refers in this context to those beliefs, customs, and practices of a living community of people that have been passed down through the generations. A TCP is eligible for the NRHP when it is associated with cultural beliefs or practices that: a) are rooted in that community's history, and b) are important to maintaining the cultural identity of the community.

Traditional cultural activity occurs across the Reservation; there are numerous shrines, sacred springs, and resource gathering areas on the Reservation and throughout the tribal homeland, which now includes the Navajo Reservation. The traditional territory or tribal homeland, for the Hopi is called the *tutsqua*, and includes the entire southeastern portion of the Colorado Plateau and vast areas to the south; the *tutsqua* covers approximately 61,500 square miles (OCPED 2001). “More limited area have been described since the 1950’s as the *Hopi Tutsqua* (James 1974)” (OCPED 2001:14). The *Hopi Tutsqua* has been described as the original land claim of the Hopi Tribe, and covers approximately 21,400 square miles (OCPED 2001).

Many of the traditional cultural activity areas are still visited and used during the Hopi ceremonial cycle to fulfill traditional obligations (OCPED 2001).

Identification of TCPs was carried out on October 4, 2011 (Yeatts 2011). While no separate TCPs were identified within the project area, three of the archaeological sites are eligible as TCPs (in addition to their status as archaeological resources) (Yeatts 2011). These three sites are 008-2004, 12-2010, and 14-209. These sites were visited with Hopi elders as part of the TCP identification effort (Yeatts 2011). A ritual trail to Kiisiwu passes to the south of the project area, and outside the project footprint. The Hard Rock Chapter of the Navajo Nation met with members of the BIA and TCDT on November 2012 during the scoping phase of the project. No specific request to discuss TCP’s was on the agenda, however no TCP’s were noted in the project area through discussions with the Navajo.

## Traditional Cultural Knowledge and Tribal Governance

Old Oriabi (“Orayvi” in Hopi) is reputed to be the longest continually inhabited community in North America (OCPED 2001:14). Contemporary Hopi retain many of their ancestral traditions, particularly religious beliefs and ceremonies. A tribal constitution was adopted in 1936, and under its authority, tribal government was formed. Some villages have adopted forms of government to replace the former traditional governance.

Three forms of local government coexist on the Reservation: traditional leadership, quasi-democracy under the Hopi Constitution, and corporations formed by Tribal ordinance.

Traditional Hopi government is based on the divine plan of life laid out by Maasawu, the guardian of the Hopi Fourth World. From a traditional practice, each village is a complete and independent government. The village leader, *kikmongwi*, is the head of all religious authority, and stewards village and clan lands. These types of traditional villages include First Mesa’s Walpi which oversees Sichomovi and Tewa. Second Mesa includes Mishongovi and Shungopavi; Third Mesa traditional governance has also included Oraibi.

The Upper village of Moenkopi, Kykotsmovi, and Bacavi embrace democratic forms of government authorized by the Constitution, and have village governors and boards of directors. Upper Moenkopi is the only village with an adopted village constitution.

The Tawa’ovi community, as a new secular community, is being planned to model best governance practices through the planned CDC, to model appropriate cultural practices that will be determined by the Community and to support the traditional Hopi Villages for maintaining Tribal culture.



## SOCIOECONOMICS

This section addresses socioeconomic conditions within the study area, including population and demographics, employment and income, economic development and revenue of the tribe, lifestyle and cultural values, and community infrastructure, along with a discussion of environmental justice as it relates to the Proposed Action.

The study area for socioeconomic conditions and environmental justice would include the entire Hopi Reservation and some parts of surrounding Navajo County, which includes partitioned lands and the Navajo Reservation, for the purposes of comparison and analysis. The project area is located entirely within the Hopi Reservation.

### Demographic Trends

Table 3-1 provides detail on population on the Hopi Reservation, and in Navajo and Arizona for 1990, 2000, and 2010. As with other communities in north-central Arizona, populations on the Hopi Reservation are relatively small. Population of the Hopi Reservation decreased between 1990 and 2000, but increased between 2000 and 2010; however, the 2010 population remained below 1990 levels. The decrease in population on the Reservation between 1990 and 2000 could have been due to the relatively high unemployment rate and elderly population. Population in Navajo County and Arizona increased between both 1990 and 2000, and 2000 and 2010.

**Table 3-1.** Historical Population Characteristics

Location	Population			Total Change in Population (%)		Unemployment Rate, 2007–2011
	1990	2000	2010	1990–2000	2000–2010	
State of Arizona	3,665,228	5,130,632	6,246,816	40.0	21.8	8.9%
Navajo County	77,674	97,470	107,060	25.4	9.8	14.6%
Hopi Tribe	7,360	6,946	7,185	–5.6	3.4	17.7%

Sources: Arizona Department of Commerce (2010); U.S. Census Bureau (1990, 2000, 2007–2011),

In 2010, the median age on the Reservation was 28.9 years, down from 29.1 in 2000. In 2010, over 80% of the population over 25 years old on the Reservation had a high school diploma.

### Employment and Income

The primary industry categories on the Hopi Reservation are related to educational, health, and social services, at 35.5%, and public administration at 26.0%. Table 3-2 summarizes the industry employment on the Hopi Reservation. Tribal and federal government sectors are also major employers.

**Table 3-2.** Industry Employment on the Hopi Reservation

Industry	Total Employment	Percentage
Agriculture, forestry, fishing and hunting, and mining	127	4.6%
Construction	66	2.4%
Manufacturing	288	10.3%
Wholesale trade	78	2.8%
Retail trade	224	8.0%
Transportation and warehousing, and utilities	98	3.5%
Information	53	1.9%
Finance and insurance, and real estate and rental and leasing	68	2.4%
Professional, scientific, and management, and administrative and waste management services	88	3.2%
Educational services, and health care and social assistance	989	35.5%
Arts, entertainment, and recreation, and accommodation and food services	207	7.4%
Other services, except public administration	32	1.1%
Public administration	465	16.7%

Source: U.S. Census Bureau (American Community Survey data, 2007–2011).

Household incomes between 2007 and 2011 on the Hopi Reservation were relatively low, with over 18% of the households reporting annual incomes less than \$10,000, compared with 5.1% for Arizona. The median household income for the Hopi Reservation was reported at \$34,094, well below the median household income of \$50,752 reported for the state. Roughly 32% of families on the Hopi Reservation reported incomes below the federal poverty level; 41.6% of individuals on the Hopi Reservation reported incomes below the federal poverty level.

## Housing

According to the 2007–2011 Census American Community Survey, the Hopi Reservation had an occupancy rate of 75%—lower than the state of Arizona, but higher than Navajo County (Table 3-3). Median home values are also shown in Table 3-3. The median home value on the Hopi Reservation between 2007 and 2011 was \$42,400, compared to \$108,600 for the state of Arizona, and \$69,200 for Navajo County.

A significant difference within housing data between Reservation and off-Reservation land is access to basic household infrastructure and utility facilities such as plumbing, telephone, and modern heating sources. Census data from the 2007–2011 American Community Survey estimate 23% of occupied housing units lack complete plumbing, 22% lack complete kitchen facilities, and 10% are without telephone service availability.

**Table 3-3.** Total Housing Units, Occupancy Rate, Median Home Value

Location	Arizona	Navajo County	Hopi Reservation
Total housing units	2,816,719	56,534	2,813
Occupied	2,344,215	34,921	2,109
Percent occupied	83%	62%	75%
Percent vacant	17%	38%	25%
Median home value	\$197,400	\$130,400	\$108,600
Lacking complete kitchen facilities (2007–2011 estimate)	0.8%	7.5%	23%
Lacking complete plumbing facilities (2007–2011 estimate)	1.0%	6.1%	22%
No telephone service available (2007–2011 estimate)	3.9%	8.4%	10%
Households using wood as house heating fuel (2007–2011 estimate)	2.0%	34%	63%

Source: U.S. Census Bureau (2007–2011 American Community Survey).

## Community Infrastructure

Most villages on the Hopi Reservation have some access to public utilities (water, wastewater, electricity, telephone). Wood, coal, and propane are the primary heating sources. APS provides electricity, whereas a number of providers of cell phone and hardline telephone service exist. An existing APS overhead electrical line crosses the southern portion of the site. Water and wastewater systems are operated by individual villages, but service does not reach a considerable number of homes, and most village systems are in need of upgrading (OCPED 2001). Septic systems and community lagoons are prevalent methods for wastewater treatment on the Reservation.

## Lifestyle and Cultural Values

The core strength of the Hopi Tribe lies with the commitment of the Hopi people to the preservation of their culture, language, and religion, and their continuing commitment to education (OCPED 2001). Despite centuries of western civilization encroachment and development in the Southwest, the general philosophy of the Tribe has fostered a long tradition of low-impact resource use that focused on subsistence agriculture. However, as goals and interests have become more diverse over recent years, the Tribe has considered expanding the economic base of activities to encourage economic growth, while maintaining the cultural custom of self-sufficiency. Today, the principal activity occurring on Hopi rangeland is cattle grazing. Corn agriculture remains a large cultural symbol, despite the low percentage in employment.

Housing and shelter within the Tribe has developed by clustering homes, which have been the basis for several villages. Many homes were not built with basic utility infrastructure for several reasons, one being a choice to live without them for traditional purposes. However, modern amenities have become more a part of Hopi lifestyle in the later twentieth and twenty-first centuries, and will continue to grow as a strong component within evolving cultural values.

## Tourism

Data on employment and economic activity generated by tourism are limited to the county level; however, data on the arts, recreation, accommodation, food and entertainment sector are available and serve as a general tourism indicator on the Hopi Reservation. This industry accounts for 7.4% of employment on the Reservation, and 11.4% in Navajo County. Though not a major economic driver in the area, it is still the fourth-largest employment sector. Annual visitors related to tourism were estimated around 100,000 in 2001, up from estimates of 50,000 to 90,000 in 1991 (Schroeder 2001), a 1% to 7% annual increase. It is reasonable to assume that current annual visits have at most increased within this rate range.

Roads provide access to some areas of the Reservation, although most are limited to narrow two-lane, undivided thoroughways with no services. Tourist activity is likely lower due to the limited capabilities of the transportation network and traveling facilities, although it is unclear what improvements would have the highest marginal benefit.

## Environmental Justice

Presidential EO 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 CFR 7629 [1994]), instructs federal agencies to incorporate environmental justice as part of their mission. As such, federal agencies are directed to identify and address as appropriate disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The project area is located within a community with a significant low-income population and a minority population. The Hopi are the only people involved in this development project.

## RESOURCE USE PATTERNS

### Transportation Networks

In total, 606 miles of roads are maintained by BIA Hopi Agency; most of these roads have no right-of-way (Micah Loma'omvaya, personal communication, January 28, 2013). Of that total, 180 miles are improved asphalt and 426 are unimproved dirt and gravel. State Route 264, managed by the Arizona Department of Transportation (ADOT), comprises the major thoroughfare on the Hopi Reservation, connecting the village of Moenkopi to the main Hopi Reservation and then continuing to the eastern boundary. In addition to official roads, there are approximately 3,580 miles of unmaintained off-road trails and tracks catalogued on the Reservation (OCPED 2001).

A majority of villages, residences, schools, businesses, and other services are accessible only by State Route 264 exclusively. State Route 87, also managed by ADOT, provides the most direct access to the border town of Winslow, Arizona, approximately 70 miles away.

In addition to the State Routes there are other routes under the jurisdiction of the BIA providing access to the other border towns of Flagstaff and Holbrook, and then the Interstate routes for interstate travel. These roadways provide access to grocery stores, retail shops, medical care, schools, and other necessities for the Hopi people; however most of these services are up to 1 hour away via car.

Roadways in the vicinity of the project area (Table 3-4) are generally limited to two lanes and are unpaved, with the exception of BIA Route 4 and Hard Rock Road. These two major roads are both two-

way paved roadways without shoulders, and are the primary options for vehicular access to and through the site. BIA Route 4 connects to State Route 264 approximately 15 miles south of the project area. Hard Rock Road also meets with State Route 264 and provides access to a network of unpaved roads to the west. The only other paved road on the site is the “loop roadway” that was constructed for development of a mobile home park for Peabody mine employees that was never fully developed. This is a narrow, single-lane road that provides access from BIA Route 4 just south of the Hard Rock Road intersection, to a north-south elongated loop located in the center of the site. No traffic studies have been conducted in the vicinity of the project area.

**Table 3-4.** Roadway Type and Characteristics of Roadways in the Immediate Vicinity of the Project Area

Roadway Type		Characteristics	Name of Roadway in Project Area
Freeway/State/Reservation highways		<ul style="list-style-type: none"> <li>Carries varied levels of traffic depending on size, but allows for higher speed travel (&gt;50 miles per hour)</li> </ul>	<ul style="list-style-type: none"> <li>BIA Route 4 (two lane, paved)</li> </ul>
Collector <i>Streets that connect neighborhoods to the larger arterial streets and are vital to overall circulation, making up a significant portion of the major street network.</i>	Major	<ul style="list-style-type: none"> <li>Typically two to four lanes</li> <li>Design capacity of 15,000 to 35,000 vehicles per day at 35 to 45 miles per hour</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>
	Minor	<ul style="list-style-type: none"> <li>Two travel lanes (may have a center turn lane/median)</li> <li>Designed for good traffic flow</li> <li>Contains more driveways, left turns, and intersections</li> <li>Design capacity of 5,000 to 15,000 vehicles per day at 35 miles per hour</li> </ul>	<ul style="list-style-type: none"> <li>Hard Rock Road (two lane, paved)</li> <li>BIA Route 42 (unpaved)</li> <li>BIA Route 8 (unpaved)</li> </ul>

## Current Land Uses/Land Use Plans

The proposed project area is currently undeveloped. The area lies within Range Unit 351 and is currently used for cattle grazing. Range Unit 351 consists of a total of six grazing pastures, five of which are currently used in rotation for grazing, and the project area lies within one of these pastures. In 2010, six Hopi ranchers hold grazing permits for a total of 73 head of cattle and 292 sheep. The range management plan for the area is currently being developed with funding from the BIA. The NRCS is working with ranchers to improve the grazing units by installing fencing and initiating water development projects including water catchments and livestock wells. One livestock corral exists within approximately 100 feet of the project boundary and is used by a rancher.

A leveled area with a gravel surface, paved roadway, water faucets, and PVC plumbing was installed for a recreational vehicle (RV) park and was used during construction of BIA Route 4. This area is not currently in use.

As discussed in Chapter 1, the Tunatya’at 2000 Plan was developed for the Hopi Tribe to outline the Tribes’ goals and vision for future development. The Tunatya’at 2000 Plan is a strategic land use and development plan that called for the creation of six PCDDs: five on the main Reservation and one on the Moenkopi District. These were envisioned to be large tracts of land over several thousand acres, in which a Planned Community could be developed. They would all be located on HPL, and include a mix of residential, commercial, institutional, and recreational land uses. The Tawa’ovi PCD was one of those planned (OCPED 2001).

As also discussed in Chapter 1, the Hopi Tribe began the process of creating the Tawa'ovi Community Master Plan within a limited area of HPL in 1995. The Master Plan work was approved by Hopi Tribal Resolution H-044-2001, which also authorized the creation of the Tawa'ovi Development Team to oversee implementation of the Tawa'ovi Community Master Plan. The Tawa'ovi Community Master Plan covers the roughly 463-acre project area.

No additional development is planned adjacent to the project area. Adjacent areas are allotted for grazing; no large-scale projects are currently planned in the vicinity of the project area. Several locations for PCDs (including within HPL, such as Howell Mesa East, Side Rock Well, and Yu Weh Loo Pahki) have been considered at times over the past two decades (OCPED 2001) as the Hopi seek ways to improve economic conditions on the Reservation. Most of these locations lack basic infrastructure and have not moved past the early planning stages.

## OTHER VALUES

### ***Public Health and Safety***

The project area itself is not known to contain any hazardous materials or other safety hazards for the public. The project area was surveyed to determine the likelihood or potential for hazardous substances and pollutants in 2005 and 2011, with no significant findings (SWCA 2005, 2011). The EPA maintains records of known contamination sites and facilities that store, produce, and/or transport pollutants and hazardous materials, including the Radiation Information Database and RCRAInfo, a national program management and inventory system about hazardous waste handlers. None of the EPA databases contain records of spills, radiation contamination sites, or hazardous waste facilities (EPA 2012). A nearby solid waste site, approximately 2 miles to the east of the site has been in operation for approximately 18 years; no reported violations of hazardous waste or evidence of groundwater contamination have occurred.

A portion of the project area was surveyed for radiation levels in February 2002, and results indicated background or slightly higher than background levels (Hopi Tribe 2002). However, these reports were reviewed by a third party later in 2002 (Santa Fe Management 2003) and in 2005 (TPS 2005), and found that further survey of the soils is not warranted and that the levels of radiation are close to or lower than typical background levels for the United States at the project area.

Emergency services are provided by the Tribe, including police, fire, and medical. The BIA Hopi Agency's Police Station and Fire Rescue are located at Keams Canyon, which in case of fire or emergency would be the first responders to the proposed development site. The distance between the project area and emergency services is similar to many other villages. The Hopi Health Care Center is located on State Route 264 between Second Mesa and Polacca. These services would be provided on-site for the Proposed Action.

### ***Noise and Light***

The Noise Control Act of 1972 gives the EPA the authority to establish noise regulations to control major sources of noise, including transportation vehicles and construction equipment. The most widely accepted land use related noise standards are those of the U.S. Department of Transportation's Federal Highway Administration (FHWA) and the U.S. Department of Housing and Urban Development (HUD). The most significant existing ambient noise source is BIA Route 4 adjacent to the West.

Sensitive noise receptors are considered to be residences, hospitals, libraries, recreation areas, churches, and other similar uses. No sensitive receptors exist near the project area.

Light pollution, obtrusive or unwanted nighttime lighting, is a side effect of human-occupied areas. It is a negative externality for activities involved with astronomical observation and wilderness areas. The project area is rural and contains little to no light sources in the vicinity. There are no observatories or designated wilderness areas near the project area.

## ***Visual***

Landscapes and their scenic quality vary according to the diversity of landforms, vegetation, and cultural or human-made features present. In general, landscapes with greater diversity of features are considered to be of higher scenic quality. The Hopi Plan does address visions, goals, and policies for landscapes and open space. In general, the goal for landscapes and open space in Coconino County is to ensure the preservation of open space for purposes including “for the purposes of preserving scenic viewsheds” (Coconino County 2003).

The project area and immediately adjacent lands offer little topographic variation, and vegetation consists of grasslands and range land. The project area has also been partially cleared and contains access roads. Surrounding views are wide and few obstructions or large natural features are present in adjacent areas.

## ***Climate Change***

On February 18, 2010, the CEQ issued three draft guidance documents, one of which addresses when and how Federal agencies should consider greenhouse gas emissions and climate change in their proposed actions, and the other addresses when agencies need to monitor commitments made in EAs and EISs (40 CFR Parts 1500-1508). Where the proposed activity is subject to GHG emissions accounting requirements, such as Clean Air Act reporting requirements that apply to stationary sources that directly emit 25,000 metric tons or more of CO<sub>2</sub>-equivalent GHG on an annual basis, the agency should include this information in the NEPA documentation for consideration by decision makers and the public (CEQ 2010). However, it is not currently useful for the NEPA analysis to attempt to link specific climatological changes, or the environmental impacts thereof, to the particular project or emissions, as such direct linkage is difficult to isolate and to understand. The estimated level of GHG emissions can serve as a reasonable proxy for assessing potential climate change impacts, and provide decision makers and the public with useful information for a reasoned choice among alternatives.

The project area exists in a low CO<sub>2</sub> emission region, as little economic or natural processes exist that contribute to greenhouse gases. BIA Route 4 is a two lane road that supports limited automobile traffic and commensurate CO<sub>2</sub> emissions, and the landfill 2 miles east may contribute emissions in the form of CO<sub>2</sub> release from organic material decay. The Hopi reservation in general is a sparsely populated, low carbon intensity area, with little to no heavy industry, commercial or institutional activity.

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## CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

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### INTRODUCTION

This chapter describes the changes or impacts to the human and natural environment that can be expected from implementing the Proposed Action or the No-Action Alternative. As discussed in Chapter 2, the Proposed Action includes conceptual plan elements, but the exact footprint of each element, timing or types of construction, etc., are unknown. As a result, the following impact analysis is programmatic in nature. Potential impacts are described in terms of type, context, duration, and intensity. Definitions are defined as follows.

- **Type** describes the classification of the impact as either beneficial or adverse, direct or indirect:
  - *Beneficial*: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
  - *Adverse*: A change that moves the resource away from a desired condition or detracts from its appearance or condition.
  - *Direct*: An effect that is caused by an action and occurs at the same time and place.
  - *Indirect*: An effect that is caused by an action but occurs later in time or is farther removed in distance, but is still reasonably foreseeable.
- **Context** describes the area or location in which the impact would occur. Are the effects site-specific, local, regional, or even broader?
- **Duration** describes the length of time an effect would occur, either short-term or long-term:
  - *Short-term* impacts generally last only during construction, and the resources resume their pre-construction conditions following construction.
  - *Long-term* impacts last beyond the construction period, and the resources may not recover to their pre-construction conditions for a longer period of time following construction.
- **Intensity** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major.

Impacts are considered minor if project-related impacts would occur, but resources would retain existing character and overall baseline conditions. Impacts are considered moderate if project-related impacts would occur, and resources would partially retain existing character. Some baseline conditions would remain unchanged. Finally, project-related impacts would occur that would create a high degree of change within the existing resource character and overall condition of resources.

### LAND RESOURCES

#### No-Action Alternative

Under the No-Action Alternative, the BIA would not approve a Master Lease for the Tawa'ovi Community. Existing land use at the site would continue, and TCDT would not be authorized to lease

space, submit grants or requests for many types of funding, or construct any buildings or improvements on the property. No changes to land resources at the site (topography, soils, and geology, minerals or paleontological) are anticipated.

The Hopi Tribe could move proceed with elements of the Tawa'ovi Community project or other tribal projects using tribal money as long as no other lease, right-of-way, or approval is required that might trigger a federal action. Impacts would thus be similar or less significant than those discussed under the proposed action alternative. Alternatively, existing land use at the site could continue and the site could remain undeveloped.

## **Proposed Action Alternative**

Under the Proposed Action, TCDT would be able to develop the parcel consistent with the terms of the Master Lease. The timing, phasing, and extent of development are unknown, however site-wide grading would be necessary for utilities, buildings, and roadways prior to construction. Approximately 9.3 acres or 2% of the site has been previously disturbed through acts of road construction, rough grading, and well development that were funded either by the Tribe or BIA. Added disturbances for the Proposed Action would have a minor impact on existing topography both during the short term and long term. Direct impacts resulting from the Proposed Action would include exposure of soils and increased risk of erosion, as well as the potential for soil compaction. Indirect impacts resulting from the Proposed Action could include increased risk of erosion from increased storm runoff across paved areas and from wind in disturbed areas.

The potential for paleontological resources in the project area is low to moderate (Class 2 or 3 using the PFYC system described in Chapter 3). Monitoring during ground disturbing is only required for areas classified as 4 or higher (see Appendix D).

TCDT would be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit to ensure that erosion-control measures are implemented during construction. Buildings would be constructed to meet nationally adopted building codes that will be adopted under the Tawa'ovi Zoning Code. Due to the implementation of mitigation and project design features, the Proposed Action would have long-term, negligible, direct, and indirect impacts to land resources in the project area and minor beneficial impacts to topography through enhancement of existing rock outcroppings, and to soils through improved landscape and agricultural practices.

## **WATER RESOURCES**

### **No-Action Alternative**

Under the No-Action Alternative, existing land use at the site would continue and there would be no change to water resources at the site (surface water or groundwater). However, the Hopi Arsenic Mitigation Project (HAMP) network of wells would still include the Turquoise well, which would serve as a redundancy supply for existing Hopi Villages (TPS 2012). Water demands would only be commensurate with existing demands from existing Hopi developments, meaning its use under the no action alternative would have little to no net effect to the local aquifer.

## Proposed Action Alternative

The Proposed Action would result in the construction of infrastructure, housing, and buildings for future commercial, institutional, and residential tenants. In terms of surface water, ground disturbance and grading would cause increased risk of erosion and scouring during storm events. This could result in a short-term increase in surface flow from discharge of wastewater in Oraibi Wash; this is estimated to be 0.27–0.90 cubic feet per second (WLB 2004). Construction wastes, and equipment fuels and lubricants could be drawn into local watersheds. In addition, an increase in surface flows could result in a diversion of surface water from Oraibi Wash to areas in the Tawa'ovi Community and could result in a decrease of intermittent flows in the wash. However, on-site construction over 1 acre would require preparation of a Stormwater Pollution Prevention Plan (SWPPP), per Section 402 of the Clean Water Act, and would mitigate potential impacts to surface water quality.

In terms of groundwater, the N-aquifer has relatively high transmissivity, which results in relative ease of movement of water through the rock, and withdrawal in nearby areas of the N-aquifer may affect the amount of water available at Tawa'ovi. Previous memorandums by the Hopi Water Rights Hydrologist have indicated that, over time (long term), other nearby wells could interfere with the Tawa'ovi Well. Area wells include Hard Rock, Rocky Ridge, and Peabody Coal Company Black Mesa Mine, all located and serving communities and industry on the surrounding Navajo Nation Indian Reservation (GeoTek 2005a).

The Proposed Action would result in the continuous (long-term) use of the Turquoise Well, which was proven to produce 345 gpm. The maximum anticipated daily demand from the project would require 250 gpm. This is approximately 400 acre-feet of water per year, a relative small amount considering the N-aquifer storage is estimate to be over 166 maf. One year of continuous pumping at the maximum demand rate would result in approximately 150 feet of well drawdown that attenuates with distance from the wellhead, although 250 gpm is the maximum anticipated daily withdrawal rate and the drawdown will be a function of the rate and duration of withdrawal. Additionally, groundwater level was shown to recover quickly, 90% recovery within 9 hours after the end of pumping following the 24-hour testing (GeoTek 2005b). To allow for reserve supplies, well recovery, and natural head pressure for water lines while meeting continuous water demand, a 190,000-gallon Phase One storage tank would be constructed on a nearby hill to the west at an appropriate elevation.

The Hopi Water Resource Program oversees water management on the Hopi Reservation and the Hopi have the right to withdraw groundwater beneath the Reservation for on-Reservation beneficial use in accordance with any groundwater management plan which may be developed by the Tribe. Regulations and procedures outlined in the Hopi Tribe Water Code (Stephens 1997) would be implemented and integrated into surface water use and groundwater use plans. The Proposed Action would have short- and long-term, minor, direct, and indirect impacts to water resources in the project area.

## LIVING RESOURCES

### No-Action Alternative

Under the No-Action Alternative, existing land use at the site would continue and there would be no change to living resources at the site (vegetation and wildlife). Cattle grazing would continue within the project area, resulting in continued modification of vegetative cover. However, since this area has already been disturbed by cattle grazing, these impacts would be negligible.

## Proposed Action Alternative

As noted in Chapter 3, vegetation in the project area has already been modified from years of grazing. The Proposed Action would include ground disturbance and site grading that would result in the additional modification of vegetation and grazing habitat in areas where construction, excavation, and paving are planned (short term). Ground disturbance also increases the potential for invasive plant species to propagate because of disturbance of areas and possible seed introduction from machinery. Best management practices identified in Chapter 2 are expected to mitigate the introduction of invasive species.

Ground disturbance and grading that would remove vegetation would result in habitat modification in the project footprint; however, the proposed project area does not contain prominent physical features such as ridgelines, cliff faces, caves (or cracks and fissures), unique vegetation communities, riparian areas, water, or forage sources attracting and concentrating wildlife populations. Wildlife would likely avoid the area during construction (short-term) activities. This could result in disturbances to individual wildlife from increased human presence in the area including vehicle traffic, recreational uses, and other activities. There would also be an increased potential for road mortality due to increased vehicle traffic in the area. Overall, the Hopi Reservation is rural and undeveloped, providing undisturbed habitat for the vast majority of its area. An important sustainability concept that drives planning within Tawa'ovi is the desire to remediate the interior and perimeter landscape with captured runoff and improved range development techniques. Ranchers from Range Unit 351 have been integral in determining that a range improvement program could not only replace range initially lost to the townsite, but increase range productivity through agricultural research based at Tawa'ovi. Internal town landscapes will rely on captured roof and surface water runoff focused on specific landscape development zones. Design for shade, wind breaks, and improved micro-climates, not to mention the obvious benefits of food production, is expected to enhance living resource conditions. The Proposed Action would likely result in some short- and long-term impacts to habitat and individual wildlife, however in the context of overall habitat available on the Reservation; these impacts are expected to be minor. The Proposed Action would have short- and long-term, negligible, direct, and indirect impacts to vegetation and wildlife in the project area, particularly with implementation of project sustainability features.

No designated critical habitat for any threatened or endangered species exists on or near the proposed project area. Suitable habitat for all threatened and endangered species with the potential to occur within Navajo County does not exist within the proposed project area; therefore the Proposed Action alternative will not impact any federally listed species.

As noted in Chapter 3, one active red-tailed hawk nest is known to exist within 1 mile of the project area along nearby transmission lines. Although the project area could potentially provide foraging habitat for raptors and may provide nesting habitat for raptors on the bluff south of Hard Rock Road, no raptors or raptor nests were observed during the site survey. In addition, development of the project area would not significantly affect the available food supply, foraging patterns, or nesting areas of bald eagle, golden eagle, Cooper's hawk, gray hawk, red-tailed hawk, ferruginous hawk, and/or northern harrier.

Guidelines developed by the BLM indicate that a distance of 0.50 to 0.75 mile should be maintained between active construction sites and active raptor nests during nesting season (BLM 2008). The USFWS guidelines for minimizing raptor disturbance suggest that a distance of 0.13 mile (660 feet) is sufficient if the construction activity is visible from the nest, and suggests avoiding disturbance to raptors during the nesting season (USFWS 2010). However, the development of this project area would not significantly affect the red-tailed hawk or its habitat since the known nest is located more than 0.5 mile (over 2,640 feet) from the project area. The Proposed Action would not impact any culturally significant species.

Implementation of the Proposed Action would result in a change in land use of the area from livestock grazing to residential housing, commercial businesses, institutional offices, and recreational use; this would be a loss of acres available for livestock grazing within Range Unit 351. The project area would impact one of the six pastures within Range Unit 351. It is expected that up to 12 AUYLs will be displaced by the development. In addition, the Proposed Action could have indirect impacts to the nearby corral, which lies within close proximity to the project area, and would most likely become unsuitable for cattle due to the increased development. Alternative grassland improvement would complement rancher needs in the vicinity with augmented water reclamation and soil treatment. Range demarcation will be discussed in open forum with ranchers and other stakeholders; fencing, edges, and barricades will reinforce Tawa'ovi neighborhood development and agricultural access near the residential zones. The Proposed Action alternative would have short- and long-term, moderate, direct and indirect impacts to agriculture (grazing) in the project area and minor beneficial impacts through planned range improvement programs.

## **CULTURAL RESOURCES**

### **No-Action Alternative**

Under the No-Action Alternative, no construction activities and, therefore, no additional ground disturbance would occur in the project area. There would be no new impacts to cultural resources under the No-Action Alternative.

### **Proposed Action Alternative**

Although eight archaeological sites have been identified in the project footprint, consultation with the Arizona SHPO concluded that no historic properties would be affected by the Proposed Action if the sites are avoided during development (SHPO 2012). Three of these sites were identified as TCPs (Yeatts 2011). However, all eligible sites/TCPs would be avoided by the project, therefore the Proposed Action would have no effects on these resources, particularly with implementation of an HPTP (see Chapter 2 Best Management Practices).

Traditional cultural knowledge and tribal governance are not expected to change, however implementation of the project could impact people's perceptions of village life. Throughout the Tunatya'at 2000 planning process (OCPED 2001), and through scoping for this project, members of the public expressed concern about development such as Tawa'ovi outside of traditional villages and the potential impacts these developments might have on village life. Alternatively, some members of the public indicated they would prefer to see new developments away from villages, to preserve traditional village life (OCPED 2001: Appendix I). The Proposed Action could have long-term, minor, direct, and indirect impacts to cultural resources in terms of traditional cultural knowledge and tribal governance; however the extent of these impacts depends on the perspective of the individual or community. The secular CDC will meld traditional Hopi cultural values with the master plan concepts developed as part of the HUD sustainable community's format. This hybrid governance is intended to allow community development without interfering in traditional village life or being encumbered by pre-established jurisdictions or individual or clan ownership.

The Proposed Action could have minor beneficial impacts through development of an educational trail system within the project development that would provide access to interpretive sites for the archaeological sites which are eligible as TCPs, and prominent topographic and biotic conditions. As discussed in Chapter 2, the interpretive trail system would be designed for "continued preservation

(of the archaeological sites) so as to be available as part of a cultural education component within the community” (Yeats 2011).

## **SOCIOECONOMICS**

### **No-Action Alternative**

Under the No-Action Alternative, the BIA would not approve a Master Lease for the Tawa’ovi Community and existing land use at the site would continue, and TCDT would not be authorized to lease space, request funding, or construct any buildings or improvements on the property. The need for additional housing development on the Reservation would not be met by this Proposed Action. The Hopi Tribal Council would not realize tribal land use goals of developing a major development center as part of their self-determination efforts as a tribal nation on the HPL.

### **Proposed Action Alternative**

The Proposed Action would result in a short-term increase in available jobs in the area during construction. There could be a minor, short-term increase in population as workers would likely come from the Reservation and Reservation people returning home from Winslow, Flagstaff, and other locations for these construction jobs.

After the development is complete, an increase in commercial services in the area, and newly available housing to Hopi residents would result, including an increase in attendant employment. Additional housing at Tawa’ovi is intended to alleviate the Reservation-wide housing shortage, therefore no increase in population is expected in the long term.

Housing would be designed to meet a full range of housing needs for ownership and rental conditions. Up to 400 homes, each capable of supporting between six and 10 residents, would present modern housing alternatives to a large number of tribal members living on and off the Reservation, relative to the current housing stock. Given the housing inventory listed in Chapter 3, the Proposed Action would increase the percentage of homes on the Hopi Reservation that contain telephone access by approximately 1%, increase access to full plumbing and kitchen facilities by 2%–3%, and reduce the number of homes using wood as a primary heating source by 8%.

Reservation-wide, there is a limited network of developed infrastructure. Tawa’ovi would include requisite infrastructure such as sewage, electricity, water, wastewater, etc. Additional income received by the Tribe from tourism and commercial activities at Tawa’ovi are expected to cover maintenance of the new infrastructure, increased trash, police and fire services, and utility costs.

In terms of lifestyle and cultural values, as noted above in Cultural Resources, some tribal members prefer not to see secular, non-traditional developments like Tawa’ovi. Alternatively, other tribal members welcome new development and housing options. Tribal members can live in new housing at Tawa’ovi voluntarily, therefore people can continue to live in traditional villages, or live at Tawa’ovi. Governance administered by the CDC is expected to allow for community development that will not interfere with traditional village life, but would support Village life by bringing Hopi people back to the Reservation through provision of much-needed jobs and housing. As with cultural resources, the Proposed Action could have long-term, minor, direct, and indirect beneficial impacts to socioeconomics in terms of lifestyle and cultural values; however the extent of these impacts depends on the perspective of the individual or community.

Indirect impacts would include a potential increase in tourism in the area, because the Tawa'ovi Community would provide an anchor and gateway for tourist activity on the Reservation. Increased tourism activity would result in an increase in incomes for Tribal residents and general revenues for the Hopi Tribe.

The Hopi Reservation is considered an environmental justice community (minority and low-income). Implementation of the Proposed Action would result in short- and long-term employment opportunities, potentially leading to an increase in local resident income. Development of housing and associated facilities at Tawa'ovi would raise the availability of housing on the Reservation that include full plumbing and other utility access. No disproportionately high or adverse impacts to environmental justice communities are anticipated. The Proposed Action will result in short- and long-term, minor, direct, and indirect beneficial impacts to minority and low-income populations on the Reservation.

## **RESOURCE USE PATTERNS**

### **No-Action Alternative**

Under the No-Action Alternative, the BIA would not approve a Master Lease for the Tawa'ovi Community and existing land use at the site would continue. No changes to transportation networks or land use would result. There would be no increase in vehicular traffic on project area roadways.

### **Proposed Action Alternative**

The proposed project would be located at the intersection of BIA Route 4 and BIA Route 8 (also known as Hard Rock Road) (see Figure 1-1). No traffic studies have been completed that estimate potential increases quantitatively, however increased development, and government and commercial activities at Tawa'ovi would lead to an attendant increase in vehicular traffic on project area roadways. Additionally, if tourism activity increases and Tawa'ovi is a tourist gateway, tourism-related vehicular traffic would also increase.

Tawa'ovi is located approximately 15 to 20 miles from the other villages on the Reservation. The development includes potential plans for a transportation and maintenance center that could be used to house up to 40 buses. The existing Hopi Senom Transit Program (established in 1989) provides transportation services for tribal employees commuting daily for employment in Winslow, Arizona, as well as affordable transportation to the general public as well as employees at various agencies on the Reservation. Tribal members who live at Tawa'ovi could make use of the Hopi Senom Transit Program to ensure that the basic mobile needs of residents are met. Otherwise, tribal members who do not own automobiles would have trouble accessing Tawa'ovi without use of the Senom Transit Program.

As discussed in Living Resources, the main land use change at the project site would be conversion of grazing lands (Range Unit 351) to the master-planned Tawa'ovi development. No other land use changes are anticipated.

The Proposed Action will result in short- and long-term, minor, direct, and indirect impacts to resource use patterns on the Reservation.

## OTHER VALUES

### No-Action Alternative

Under the No-Action Alternative, the BIA would not approve a Master Lease for the Tawa'ovi Community and existing land use at the site would continue. No changes beyond current conditions are anticipated.

### Proposed Action Alternative

#### *Public Health and Safety*

The Proposed Action includes plans for an institutional campus, space for health and wellness services within the Town Center, sites for a fire station and police station, sites for elder housing within the housing neighborhoods, and possibly a detention facility. Public health and safety would be addressed within the developed community.

The Proposed Action would result in generation of domestic trash, which would be accommodated by the Office of Solid Waste Management. The project is not expected to generate or utilize hazardous chemicals during construction. Additional waste generated would be transported to the solid waste landfill 2 miles east, which is lined to protect groundwater supplies. Radiation has not been a problem in the vicinity of the project area, but if concerns about radon are raised during construction processes, additional surveys can be completed after the earthwork construction is complete.

#### *Noise and Light*

The development of the Proposed Action Alternative would result in no significant long-term increase in noise or light over that presently occurring in the project area. Construction noise would be intermittent and temporary. Activities within the development will generate ambient noise through vehicle, electric, and other infrastructure equipment. Noise receptors would only be created within the proposed action, although

Outdoor lighting would comply with Hopi development guidelines and ordinances to minimize the effects of light pollution. The proposed development is not expected to contribute to significant light pollution; lighting at the proposed facility would comply with Hopi ordinances to minimize the effects of light pollution from the facility by use of shields, dimmers, and/or full cutoff lighting fixtures.

#### *Visual*

Similarly, the development of the Proposed Action Alternative would result in no significant decrease in the scenic quality of the landscape, and would not obstruct or detract from viewsheds, except in within the immediate area of buildings. The development will include buildings designed with facades, shapes and at heights to maintain goals of the Hopi Reservation, which include balancing economic development and traditional values (OCPED 2001: Appendix I).

#### *Climate Change*

The proposed development will not be subject to laws and regulations of the Clean Air Act, as no major or minor point sources are anticipated in future development. No individual facilities within the proposed



action are expected to be subject to GHG emissions accounting requirements. Cumulatively, it is unlikely whether additional facilities will meet Clean Air Act reporting requirements that apply to stationary sources that directly emit 25,000 metric tons or more of CO<sub>2</sub>-equivalent GHG on an annual basis. Cumulatively, this is also unlikely from a complete buildout. The proposed action would also include a solar electric generating facility to offset carbon output, but accurate measurements are not available to indicate what percentages of power used by Tawa'ovi would come from low carbon sources.

The Proposed Action will result in short- and long-term, negligible, direct, and indirect impacts to public health and safety, Noise and Light, Visual, and Climate Change.

## **CUMULATIVE IMPACTS**

The cumulative impacts analysis area includes the project footprint and the Hopi Reservation. The projects considered in the cumulative effects analysis are listed in Appendix C, Table C-1.

### **Water Resources**

Low- to medium-density residential housing is expected to develop slowly throughout the village areas, but population projections are modest, and residential water uses are significantly lower than agricultural or industrial uses. Ranching has gradually replaced traditional dry agriculture as an income source. Because ranching is more water intensive, low-density residential allotments are not expected to significantly contribute to water use. Agricultural uses are sparse in the vicinity and overall do not contribute to significant depletion of the N-aquifer. Proposed residential and commercial facilities do not contribute to large water demands relative to overall demands. The Proposed Action will not contribute significant cumulative impacts to groundwater depletion, as water used for demolition, construction, and operation will come from an existing well. Additional demands on the Turquoise Well may arise if it becomes integrated into the village network of wells and storage, but the future growth is expected to be modest on the Reservation. The Proposed Action is not expected to significantly influence the current or projected water delivery amounts for the region.

### **Vegetation and Wildlife**

Cumulative impacts on vegetation and wildlife from ongoing development would include removal of native vegetation, but would be limited as existing tree and shrub coverage is very low, and the area is used for grazing. Additionally, adjacent land is HPL under grazing leases; thus, it is anticipated that the surrounding region would remain in its current condition. Cumulative impacts to habitat in the area would not be significant.

### **Socioeconomics and Environmental Justice**

Approval by the BIA of the Master Lease would enable the Hopi Tribe to generate new revenues, both directly through leasing of facilities and indirectly by attracting customers to other cultural and recreational amenities in the immediate area. This would have the potential cumulative effect of contributing to greater employment opportunities, delivery of quality services and improved quality of life for Tribal members.

## Resource Use Patterns

The increase in traffic discussed above would result in a minor incremental cumulative impact to the modest growth within the Reservation, particularly near the villages.

The possible extension of BIA Route 4 to U.S. Route 160 would become an important future roadway into Hopi from the north, creating much-needed connections with tourism traffic in the area. With extensions of this roadway would come future improvements to the existing BIA Route 4 roadway, necessary for the increased traffic.

If multiple construction activities occur simultaneously, then cumulative impacts from demolition construction noise could occur. In the future, when construction of buildings takes place, the CDC would be responsible for assessing other construction activities in the area to determine whether the project would cause noise or air quality impacts. If multiple construction projects are implemented at the same time, construction activities can be phased to minimize noise and air quality impairment.

## IMPACT SUMMARY

**Table 4-1.** Impact Summary

<b>Resource/ Resource Use</b>	<b>No-Action Alternative</b>	<b>Proposed Action Alternative</b>
Land Resources (Topography)	No impact expected.	Negligible impacts to topography.
Land Resources (Soils)	No impact expected.	Negligible impacts to soils.
Land Resources (Geology, Minerals, Paleontology)	No impact expected.	Negligible impacts to geology.
Water Resources (Surface)	No impact expected.	Minor impacts to surface water.
Water Resources (Ground)	No impact expected.	Minor impacts to ground water.
Living Resources (Vegetation)	No impact expected.	Negligible impacts to vegetation.
Living Resources (Wildlife)	No impact expected.	Negligible impacts to vegetation.
Living Resources (Agriculture)	No impact expected.	Moderate impacts to agriculture (grazing)
Cultural Resources	No impact expected.	No impact expected. All NRHP-eligible sites will be avoided.
Socioeconomics	Revenues unrealized and no additional temporary or permanent jobs. No additional housing.	Minor beneficial impacts expected through additional housing, job creation, and revenue generation.
Environmental Justice	No impact expected.	Minor beneficial impacts expected through additional housing, job creation, and revenue generation.
Resource Use Patterns (Transportation)	No impact expected.	Minor impacts to transportation.
Resource Use Patterns (Land Use)	No impact expected.	Minor impacts to land use.
Other Values (Public Health and Safety, Noise and Light, Visual and Climate Change)	No impact expected.	Negligible impacts to public health and safety.

## CHAPTER 5. CONSULTATION AND COORDINATION

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As discussed in the agency scoping summary in Chapter 1, federal, state, local, and Tribal agencies and adjacent landowners were contacted during project development. The contacted parties are listed below. A copy of the agency and public scoping notice is provided in Appendix H.

### Federal Agencies

U.S. Army Corps of Engineers, Los Angeles District, Phoenix Office  
U.S. Department of Agriculture, Natural Resources Conservation Service, Arizona State Office  
U.S. Environmental Protection Agency, Region 9, Tribal Program Office  
U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office  
U.S. Federal Highway Administration – Arizona Division  
Indian Health Services  
Housing and Urban Development, Southwest Office of Native American Programs

### State Agencies

Arizona Department of Environmental Quality – Southwest Arizona  
Arizona Department of Public Safety – Highway Patrol Division  
Arizona Department of Transportation – Communications and Community Partnerships  
Arizona Department of Water Resources  
Arizona Game and Fish Department  
Arizona State Governor's Office – Honorable Janice K. Brewer  
Arizona State Historic Preservation Office

### Local Agencies

Navajo County Assistant County Manager  
Navajo County Department of Transportation  
Navajo County Environmental Services  
Navajo County Flood Control District

### Hopi Agencies

First Mesa Consolidated Villages  
Village of Bacavi  
Village of Hotevilla  
Village of Kykotsmovi  
Village of Moenkopi (Upper)  
Village of Moenkopi (Lower)  
Village of Shungopavi  
Village of Sichomovi  
Village of Sipaulovi  
Village of Mishongnovi  
Village of Tewa  
Village of Walpi  
Yu Weh Loo Pah Ki (Spider Mound Community)

**Navajo Agencies**

Division of Transportation

Forest Lake Chapter

Hardrock Chapter

Navajo Tribal Utility Authority Office of the President and Vice President of the Navajo Nation

Pinon Chapter

**Other Tribes**

San Juan Southern Paiute Tribe

**Adjacent Property Owners/Other Interested Parties**

Arizona Public Service Company

Hopi Health Care Center

Hopi Tribe Office of Range Management

Peabody Energy

U.S. Bureau of Indian Affairs Hopi Agency – Wildland Fire Management

U.S. Bureau of Indian Affairs Hopi Agency – Law Enforcement Services

## CHAPTER 6. LIST OF PREPARERS

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Amy Heuslein, Western Regional Office

### **Hopi Tribe**

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Chris Query, Geographic Information Systems Specialist  
Danielle Desruisseaux, Technical Editor

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**APPENDIX A.**  
**TRIBAL RESOLUTION H-067-2011**

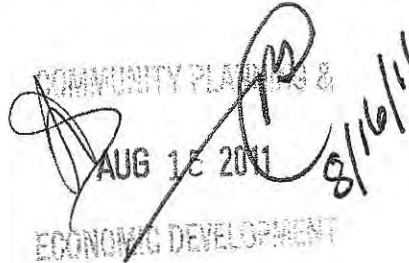
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# THE



# OPI TRIBE



LeRoy N. Shingoitewa  
CHAIRMAN

Herman G. Honanie  
VICE-CHAIRMAN

## MEMORANDUM

**TO:** Royce Jenkins, Director  
Office of Community Planning & Economic Development

*Martha A. Mase*  
**FROM:** Martha A. Mase, Tribal Secretary  
Hopi Tribal Council

**DATE:** August 11, 2011

**SUBJECT:** TAWAOVI COMMUNITY DEVELOPMENT PROJECT  
A.I. #073-2011

The Hopi Tribal Council on August 8, 2011 by motion and unanimous vote approved Resolution H-067-2011.

By passage of this Resolution the Tribal Council amends Resolution H-043-91 to increase the land assignment acreage in the amount of 394.25 for the development of the Tawa'ovi Community.

Should you have any questions, you may contact me at (928) 734-3133.

c: Office of the Chairman  
Office of the Vice Chairman  
Office of the Tribal Treasurer  
Office of General Counsel  
Department of Natural Resources  
Office of Financial Management  
file

HOPI TRIBAL COUNCIL  
RESOLUTION  
H-067-2011

WHEREAS, the Constitution and By-Laws of the Hopi Tribe (the "Tribe"), as amended, states in ARTICLE VI-POWERS OF THE TRIBAL COUNCIL, SECTION 1(a) that the Hopi Tribal Council has the authority "To represent and speak for the Hopi Tribe in all matters for the welfare of the Tribe, . . ."; and

WHEREAS, on January 9, 1991 the Hopi Tribal Council (the "Council") adopted Resolution H-43-91, whereby the Council approved the conditional grant of a special use land assignment to the Hopi people of 69.5 acres of land in Range Unit 351 on the Hopi Reservation, pursuant to the Special Use Land Assignments provisions of the Tribe's land assignment policy, for development of a community subdivision known as the Turquoise Community (i.e. consisting of 45 acres of housing and 24.5 acres of commercial uses; the "Turquoise Community") (the "Turquoise Land Assignment"); and

WHEREAS, in connection with the comprehensive final planning of the Turquoise Community, the development has become more in depth than what was originally intended and involves a complete community master plan, including community, commercial light industrial storage and government operations; and

WHEREAS, pursuant to Resolution H-044-2011, the Council adopted the Tawa'ovi Community Master Plan (the "Master Plan") developed by the Tawa'ovi Community Development Team (the "TCD Team") for the Tawa'ovi Community Development Project (the "Project"); and

HOPI TRIBAL COUNCIL  
RESOLUTION  
H-067-2011

WHEREAS, the Project supports several Tribal goals as established in the Hopi Pitskwaniat (Hopi Tribal Consolidated Strategic Plan, Revised 2001) (i.e., ensuring “that every Hopi family is provided the opportunity to own or rent a decent, safe and sanitary home according to their needs and income” and increasing “Hopi employment opportunities”); and

WHEREAS, the Project encompasses the development of what was originally known as the Turquoise Community and involves the greater development of the community subdivision that is now known as the Tawa’ovi Community (the “Tawa’ovi Community”); and

WHEREAS, the development of the Tawa’ovi Community in accordance with the Master Plan requires an increase in the land area of the Turquoise Land Assignment in the amount of 394.25 acres, for a new total of 463.75 acres; and

WHEREAS, the TCD Team therefore has requested that the Council amend Resolution H-43-91 in order to grant an additional special use land assignment in the amount of 394.25 acres (the “Additional Land Assignment”), for a total of 463.75 acres, for the purpose of developing the Tawa’ovi Community in accordance with the Master Plan (the Turquoise Land Assignment and the Additional Land Assignment, collectively, the “Tawa’ovi Land Assignment”); and

WHEREAS, the land that is the subject of the Tawa’ovi Land Assignment is located in Range Unit 351 in a portion of section 25, 26, 35 & 36, T31N, R17E, of the Gila and Salt River Meridian Navajo County, Arizona, as is shown in the Boundary Survey for

HOPI TRIBAL COUNCIL  
RESOLUTION  
H-067-2011

the Project, which is attached hereto as Exhibit "A" and is hereby made a part of this Resolution (the "Boundary Survey"); and

WHEREAS, the Council has determined that the development of the Tawa'ovi Community in accordance with the Master Plan is in furtherance of the welfare of the Tribe and therefore that the granting of the Additional Land Assignment, pursuant to the Special Use Land Assignments provisions of the Tribe's land assignment policy and subject to all applicable conditions of the Turquoise Land Assignment, is in the best interests of the Tribe.

NOW THEREFORE BE IT RESOLVED that the Council hereby approves the Additional Land Assignment, pursuant to the Special Use Land Assignments provisions of the Tribe's land assignment policy, in order for the TCD Team to properly develop the Tawa'ovi Community in accordance with the Master Plan.

BE IT FURTHER RESOLVED by the Council that" (i) Resolution H-043-91 is hereby amended by this Resolution as may be necessary in order to accomplish the intents and purposes of this Resolution; and (ii) any part of Resolution H-43-91 not amended by this Resolution shall remain in full force and effect.

BE IT FURTHER RESOLVED by the Council that the Tawa'ovi Land Assignment shall be subject to any and all applicable conditions of the Special Use Assignments provisions of the Tribe's land assignment policy, including the conditions set forth in Resolution H-43-91.



HOPI TRIBAL COUNCIL  
RESOLUTION  
H-067-2011

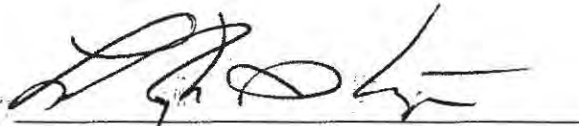
BE IT FURTHER RESOLVED that the Council hereby commits to the Project on behalf of the  
Tribe.

BE IT FINALLY RESOLVED that the Council hereby grants to the TCD Team such authority  
as may be necessary to accomplish the intents and purposes of this Resolution  
throughout the duration of the Project.

HOPI TRIBAL COUNCIL  
RESOLUTION  
H-067-2011

CERTIFICATION

The Hopi Tribal Council duly adopted the foregoing Resolution on August 8, 2011, at a meeting at which a quorum was present with a vote of 14 in favor, 0 opposed, 0 abstaining (Chairman presiding and not voting) pursuant to the authority vested in the Hopi Tribal Council by ARTICLE VI-POWERS OF THE TRIBAL COUNCIL, SECTION 1 (a) of the Hopi Tribal Constitution and By-Laws of the Hopi Tribe of Arizona, as ratified by the Tribe on October 24, 1936, and approved by the Secretary of Interior on December 19, 1936, pursuant to Section 16 of the Act of June 18, 1934. Said Resolution is effective as of the date of adoption and does not require Secretarial approval.



LeRoy N. Shingoitewa, Chairman  
Hopi Tribal Council

ATTEST:



Martha A. Mase, Tribal Secretary  
Hopi Tribal Council

HOPI TRIBAL COUNCIL  
RESOLUTION  
H-\_\_\_\_-2011

Exhibit "A":  
Boundary Survey

HOPI TRIBAL COUNCIL  
RESOLUTION  
H-\_\_\_\_-2011

Exhibit "A":  
Boundary Survey





## **APPENDIX B.**

### **SCOPING SUMMARY**

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## 1.0 INTRODUCTION

A programmatic environmental assessment (PEA) will be prepared for the approval of a Master Lease Agreement for a proposed 463.75-acre Tawa'ovi Community Development project (Tawa'ovi Community) on Hopi Partition Lands in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and Hopi Tribal laws and regulations.

To comply with the requirements of NEPA, a PEA is being prepared to disclose the potential environmental impacts associated with the potential approval of the master lease. The proposed project requires Bureau of Indian Affairs (BIA) approval of a long-term land lease involving subleases for commercial property to allow non-Hopi tenants to lease space in the new facilities. The BIA is the lead federal agency for the preparation of this PEA.

This NEPA scoping summary is intended to outline the efforts taken by the BIA and TCDT to solicit feedback from the public, as well as aid in clarifying preliminary issues, concerns, and opportunities, determining the appropriate scope of environmental analysis, and gathering input on alternatives development from comments received. The following summary includes public scoping comments received, as well as internal issue and comments from different departments of the Hopi tribe from the past seven years.

### 1.1 Scoping Meetings

For this PEA, a scoping notice was mailed to Federal, State, local and Tribal agencies on October 9, 2012. The public scoping notice was also posted at the local post office, Hopi Community Service Center, and BIA Hopi Agency headquarters. In addition, the scoping notice was published in the October 2, 2012 edition of *Hopi Tutuveni*, the October 10 and 17, 2012 edition of the *NavaHopi Observer*. The project was also announced in the community calendar segment of the KUYI radio station from October 15 to November 1, 2012. Mailing, publication, and posting of the scoping notice initiated a 30-day public and agency scoping period, during which the public had the opportunity to provide input on potential issues to be addressed in the PEA.

The BIA and Hopi tribe hosted 6 public scoping meetings (see Table 1). These meetings served to provide information on project planning activities to date and to give members of the public the opportunity to ask questions or make comments. Presentations were given at each meeting by the Tawa'ovi Community Development Team (TCDT) and BIA; the project team provided a slide presentation that described the NEPA process, the proposed Tawa'ovi Community Development Project, resources that will be considered for the EA, and the schedule for completion of the EA. They also presented several poster boards detailing the project location and the proposed development plan. Meeting attendees were encouraged to ask questions and provide oral comments after the presentation. BIA asked attendees to submit their comments in writing, as no court reporter was present and the meetings were not recorded.

The Hard Rock Chapter of the Navajo Nation requested a separate meeting for their chapter; members of the BIA and TCDT presented information to the Hard Rock Chapter on November 5<sup>th</sup>, 2012.

**Table 1.** Public Scoping Meetings

<b>Date</b>	<b>Time</b>	<b>City, State</b>	<b>Number of Attendees</b>
October 23, 2012	7:00 pm	Polacca, Arizona (First Mesa)	3
October 24, 2012	7:00 pm	Second Mesa, Arizona	1
October 25, 2012	7:00 pm	Hotevilla, Arizona (Third Mesa)	0
October 26, 2012	2:00 pm	Kykotsmovi, Arizona	1
October 30, 2012	6:30pm	Flagstaff, Arizona	18
November 1, 2012	6:30pm	Phoenix, Arizona	6

## 1.2 Scoping Comments

Although the public meetings did not have high attendance, the project team was able to gather valuable information from attendees and develop issues to be studied further in the EA. Eight written comments were received during the scoping period; oral comments made at each scoping meeting were noted by TCDT's consultants from Thompson Pollari Studios and SWCA Environmental Consultants. Those comments are considered and summarized here.

Comments are summarized below in narrative form for each resource issue area (e.g., all comments specific to "water quality" are included under the water quality category; etc.). The comment excerpts below are abbreviated and summarized from the original comments submitted.

Following the scoping summary is a list of preliminary list of resource issues and alternatives to be considered for analysis in the PEA. All substantive issues raised by respondents within the scope of the BIA's decision will be included in the PEA.

### **Alternatives**

- Can you look at an alternative that has the proposed Tawa'ovi community at First Mesa?
- We don't need the development, we need housing and services in the villages.
- Specify what mitigation measures will be implemented.

### **Land Resources**

#### **GEOLOGY, MINERAL, AND PALEONTOLOGICAL RESOURCES**

- Will there be minerals or mineral rights in the project area that will be affected? Is there any coal?

### **Water Resources**

- Is there adequate water in the nearby well for the project? Development of the Turquoise well will be a long term value to the Tribe.
- The proposed development will be in competition for drinking water for existing villages and development. There are arsenic problems at First and Second Mesa.
- Will water from Hard Rock area be delivered to the development?
- What will be the impacts of water runoff from this development?
- Are the plans for the water development in compliance with Tribal surface/ground water codes?
- Make sure to reference conditions from the Hopi Water Code and pending Wastewater Code, as applicable.
- Evaluate the project's water quality, groundwater, pump test and landfill reports in the EA.

- Address floodplains and wetlands in the analysis.
- Provide more information regarding the discharge of waste water. Will a CWA Section 404/401 permit be required?
- There is a nearby landfill/dump, what effect could the dump have on ground water? Are the cells at the land dump lined?

## ***Living Resources***

### **WILDLIFE**

- Will migratory birds be analyzed in the EA?
- Will any eagle nesting sites be disturbed?

### **AGRICULTURE (LIVESTOCK, CROPS, PRIME AND UNIQUE FARMLAND)**

- Can you please provide information on the range unit name, permitted ranchers, and animal units grazed and any range unit management plans in coordination with the Natural Resources Planner, Office of Range Management, and Office of Community Planning and Development.
- There are currently ranchers using pastures in the project area, I think it should be easy to move them to another pasture.
- Will the proposed community include an area for farming?
- I am concerned about the potential for trespass ranching from Navajo lands to the north.
- Is the development accepted by livestock grazers within the proposed range unit? How did the ranchers react to the encroachment on range lands?
- Removal of the land from Range 351 is already helping Office of Range Management with enforcement of better pasture rotation schedule and improving range conditions.
- Please detail the actual impact on grazing resources, permitted animal units and range management plans
- In terms of farming, the area would not support anything more than local household or demonstration gardening. Demonstration garden would be excellent in sharing how Hopi farming is done and possibly providing for future seedbank support or local farmer's markets.
- Who is going to implement the alternative grassland improvement with augmented water reclamation and soil treatment? Where is funding coming from?

## ***Cultural Resources***

- Provide cultural resource survey report and compliance documentation from SHPO and BIA.
- Several types of sites have been identified. Should some type of recovery/avoidance plan be developed?

## ***Socioeconomic Conditions***

### **DEMOGRAPHIC TRENDS**

- What is the population base for the community? Who do you expect to live and work there?

### **EMPLOYMENT AND INCOME**

- This remote section of the reservation will benefit from the proposed services offered by the project.
- The solar plant construction will increase financial viability of the community.
- Would the proposed development be open to everyone, including jobs and other opportunities such as markets and businesses
- After the construction of the project how many jobs will continue for the community?

- This sounds like a well thought out self-sustaining development that will create jobs and bring community members back home.

### **LIFESTYLE AND CULTURAL VALUES**

- Tawa'ovi will provide a much needed opportunity for housing for Hopi people who want to come home (i.e. from urban areas) and cannot find homes or space to live in their home villages
- When will construction on the project begin?
- Will land or homeowners be required to use the proposed housing style's proposed? People might want to build a house in their own style.
- Will land for privately financed homes be available? If so how many acres per house?
- What are the footprints (size) of the housing and farming areas? How do these differ from the current HPL land assignments?
- HPL land assignments are often very remote and without services. People returning to the reservation from urban communities often find this very difficult and do not want to live at these sites.
- We don't feel there really is a housing shortage, there is plenty of land to build houses on.
- This development should be built on First Mesa where it is closer to SR 264.
- We are concerned that the Tawa'ovi community will detract from traditional tribal life in the villages. The proposed development is "off-reservation" style living and not compatible with village life.
- Tawa'ovi will be more of a Navajo home than a Hopi home. The proposed development would not have a kiva to maintain traditional/cultural practices so the people would have to travel considerable distance to villages for ceremonies.
- How will this development impact the current cultural values and traditions?
- How will employees or residents in Tawa'ovi get from the community to the villages? This is especially important if there are low-income families in Tawa'ovi. It is important for people to get to the villages for ceremonies.
- I am concerned about the remoteness of the proposed community and the distance from the rest of the Hopi villages.
- It is important to involve Hopi elders and delegates in the development of this community, especially in the design of homes and buildings and the use of renewable energy.
- The Tawa'ovi development is another "taking" of traditional First Mesa grazing and ceremonial lands and impacts village jurisdiction and constitution – it needs each village support with village resolution.

### **COMMUNITY INFRASTRUCTURE**

- Is there adequate sewer and electrical services? Where will it come from?
- The EA should discuss plans regarding infrastructure which I understand is a challenge for this project.
- We do not need a need community development. The commercial services (i.e. laundromat, bank, etc.) and infrastructure should be put in the villages, not in a new development on HPL. You could also build housing in the villages.
- The fire/police services should be more centrally located.
- Other development lands/sites are available at each village such as First Mesa Valley. The proposed development will take Tribal funding and energy away from development at First Mesa.

## **Resource Use Patterns**

### **TRANSPORTATION NETWORKS**

- Please look at the road that comes from Pinyon, Arizona, I don't understand how the road connects to the Turquoise Trail road.

### **LAND USE PLANS**

- Are there any claims of traditional clan land in the proposed development area?

## **Other Values**

### **PUBLIC HEALTH AND SAFETY**

- Identify the general location of the uranium and heavy metal contamination sites.
- What is going to happen to the operation of the land dump site? Why locate a new community adjacent to this type of site?
- Are there any problems with having the wastewater treatment plant near the proposed community?

## **1.3 Preliminary Resource Issues**

### **Land Resources**

Geology, Mineral, and Paleontological resources

### **Water Resources**

### **Living Resources**

Wildlife

Agriculture (livestock, crops, prime and unique farmland)

### **Cultural Resources**

### **Socioeconomic Conditions**

Demographic Trends

Employment and Income

Lifestyle and Cultural Values

Community Infrastructure

### **Resource Use Patterns**

Transportation Networks

Land Use plans

### **Other Values**

Public health and Safety



## **APPENDIX C.**

### **CUMULATIVE IMPACTS**

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## CUMULATIVE IMPACTS

Council on Environmental Quality regulations implementing NEPA define *cumulative impacts* as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7).

If the actions under each alternative have no direct or indirect effect on a resource, then the cumulative impacts on that resource are not addressed. In any NEPA analysis, it is preferable to quantify the assessment of effects (changes) on each affected resource. This is true for direct, indirect, and cumulative effects. Where possible, the analysis is quantified. Where quantification is not available, a meaningful and qualified judgment of cumulative effects is included to inform the public and the decision maker.

The cumulative impacts analysis area includes the project footprint and the Hopi Reservation. The following projects were considered in the cumulative effects analysis; the actual analyses are presented by resource in Chapter 3, not in this appendix.

## Projects Considered

Past, present, and reasonably foreseeable future actions relevant to this project are considered. The impacts of past and present actions (Table C-1) have been incorporated into the existing condition discussions included within each resource presented in Chapter 3.

**Table C-1.** Past and Present Actions

Past and Present Activities*	Location	General Description	Past, Present, Future
BIA Route 4	Bisects the project area running north-south (see Figure 1-1)	Grading and construction of roadway, plus permanent roadway	Past
BIA Route 8	Bisects the project area to the west (see Figure 1-1)	Grading and construction of roadway, plus permanent roadway	Past
Turquoise Well	Northwest corner of the project area (see Figure 2-1)	Well developed for construction of BIA Route 4	Past
Geotechnical testing	Within project area	WLB 2004; testing conducted for project	Past
Water well testing	Within project area	WLB 2004; testing conducted for project	Past
Hopi Arsenic Mitigation Project (HAMP), Turquoise Well	2 miles southeast of the Tawa’ovi Community	Two additional HAMP wells and a storage tank proposed along with a waterline, located approximately 1 and 2 miles southeast of the Tawa’ovi Community. These would provide/expand/upgrade the network of wells to meet tribal demands, increasing supply stability with high quality water. In addition to the Turquoise Well producing up to 345 gpm, these two wells are estimated at similar capacities.	Ongoing

Past and Present Activities*	Location	General Description	Past, Present, Future
		These wells would contribute to the proposed Turquoise Tank (612,000 gallons), which could serve the Tawa'ovi Community and villages to the south.	
Upgrade Turquoise Well	Northwest corner of the project area (see Figure 2-1)	An Indian Health Services plan to upgrade the Turquoise Well source and drill one additional source nearby, to bring water storage, water supply, and related electrical supply to the Tawa'ovi Community and subsequently to the Hopi Mesa communities.	Ongoing
Turquoise Trail Regional Water System Project	Across Reservation	Well field, water storage, transmission	Ongoing
Hard Rocks Range Unit, grazing pastures	In and near project area	Six grazing pastures and water development improvements	Ongoing
Tawa'ovi Subleases	Future leases, and future project-specific element design	Subleases to the Master Lease	Future
Tawa'ovi Community Electricity/Transmission	To be determined	Power source for community, either APS or NTUA	Future
Five PCDD/PCDs were identified in the 2000 plan: Howell Mesa, Side Rock Well, Yu Weh Loo Pahki, Moenkopi District, and Winslow	Across Reservation	500 acres each. Yu Weh Loo and Moenkopi District PCDs are in the preliminary planning stages. Planning efforts for Side Rock Well began but are essentially on hold	Future
Turquoise Trail Road Connection	Between project area and Kayenta	Extending BIA Route 4 north of the project area to State Route 160, connecting to Kayenta and Black Mesa Coal	Future
Additional housing developments on Hopi Lands	Communities of Moenkopi, Hotevilla, Kykotsmovi, and Polacca	Housing	Future
A program to improve prairie grass density	Adjacent to Tawa'ovi	Intended to improve grazing conditions in the area while providing improved groundcover and reduced run-off	Future

**APPENDIX D.**  
**POTENTIAL FOSSIL YIELD CLASSIFICATION SYSTEM**

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## Potential Fossil Yield Classification (PFYC) System.

Occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources.

Using the Potential Fossil Yield Classification (PFYC) system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. This classification is applied to the geologic formation, member, or other distinguishable unit, preferably at the most detailed mappable level. It is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist in determining the need for further mitigation assessment or actions.

The descriptions for the classes below are written to serve as guidelines rather than as strict definitions. Knowledge of the geology and the paleontological potential for individual units or preservational conditions should be considered when determining the appropriate class assignment. Assignments are best made by collaboration between land managers and knowledgeable researchers.

***Class 1 – Very Low.*** Geologic units that are not likely to contain recognizable fossil remains.

- Units that are igneous or metamorphic, excluding reworked volcanic ash units.
- Units that are Precambrian in age or older.

(1) Management concern for paleontological resources in Class 1 units is usually negligible or not applicable.

(2) Assessment or mitigation is usually unnecessary except in very rare or isolated circumstances.

The probability for impacting any fossils is negligible. Assessment or mitigation of paleontological resources is usually unnecessary. The occurrence of significant fossils is non-existent or extremely rare.

***Class 2 – Low.*** Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils.

- Vertebrate or significant invertebrate or plant fossils not present or very rare.
- Units that are generally younger than 10,000 years before present.
- Recent aeolian deposits.
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

(1) Management concern for paleontological resources is generally low.

(2) Assessment or mitigation is usually unnecessary except in rare or isolated circumstances.

The probability for impacting vertebrate fossils or scientifically significant invertebrate or plant fossils is low. Assessment or mitigation of paleontological resources is not likely to be necessary. Localities containing important resources may exist, but would be rare and would not influence the classification. These important localities would be managed on a case-by-case basis.

**Class 3 – Moderate or Unknown.** Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.

- Often marine in origin with sporadic known occurrences of vertebrate fossils.
- Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently; predictability known to be low.  
(or)
- Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.

**Class 3a – Moderate Potential.** Units are known to contain vertebrate fossils or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for hobby collecting. The potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils.

**Class 3b – Unknown Potential.** Units exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant finds. The units in this Class may eventually be placed in another Class when sufficient survey and research is performed. The unknown potential of the units in this Class should be carefully considered when developing any mitigation or management actions.

(1) Management concern for paleontological resources is moderate; or cannot be determined from existing data.

(2) Surface-disturbing activities may require field assessment to determine appropriate course of action.

This classification includes a broad range of paleontological potential. It includes geologic units of unknown potential, as well as units of moderate or infrequent occurrence of significant fossils. Management considerations cover a broad range of options as well, and could include pre-disturbance surveys, monitoring, or avoidance. Surface-disturbing activities will require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources. These units may contain areas that would be appropriate to designate as hobby collection areas due to the higher occurrence of common fossils and a lower concern about affecting significant paleontological resources.

**Class 4 – High.** Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface disturbing activities may adversely affect paleontological resources in many cases.

*Class 4a* – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two acres. Paleontological resources may be susceptible to adverse impacts from surface disturbing actions. Illegal collecting activities may impact some areas.

*Class 4b* – These are areas underlain by geologic units with high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
- Areas of exposed outcrop are smaller than two contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

(1) Management concern for paleontological resources in Class 4 is moderate to high, depending on the proposed action.

(2) A field survey by a qualified paleontologist is often needed to assess local conditions.

(3) Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered.

(4) Class 4 and Class 5 units may be combined as Class 5 for broad applications, such as planning efforts or preliminary assessments, when geologic mapping at an appropriate scale is not available. Resource assessment, mitigation, and other management considerations are similar at this level of analysis, and impacts and alternatives can be addressed at a level appropriate to the application.

The probability for impacting significant paleontological resources is moderate to high, and is dependent on the proposed action. Mitigation considerations must include assessment of the disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access resulting in greater looting potential. If impacts to significant fossils can be anticipated, on-the-ground surveys prior to authorizing the surface disturbing action will usually be necessary. On-site monitoring or spot-checking may be necessary during construction activities.

**Class 5 – Very High.** Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

*Class 5a* – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface disturbing actions. Unit is frequently the focus of illegal collecting activities.

*Class 5b* – These are areas underlain by geologic units with very high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has very high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
- Areas of exposed outcrop are smaller than two contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

(1) Management concern for paleontological resources in Class 5 areas is high to very high.

(2) A field survey by a qualified paleontologist is usually necessary prior to surface disturbing activities or land tenure adjustments. Mitigation will often be necessary before and/or during these actions.

(3) Official designation of areas of avoidance, special interest, and concern may be appropriate.

The probability for impacting significant fossils is high. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted area. On-the-ground surveys prior to authorizing any surface disturbing activities will usually be necessary. On-site monitoring may be necessary during construction activities.



**APPENDIX E.**  
**NAVAJO COUNTY USFWS SPECIES LIST**

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# Navajo County

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Apache (Arizona) trout	<i>Oncorhynchus gilae apache</i>	Threatened	Yellowish to yellow-olive cutthroat-like trout with large dark spots on body. Dorsal, anal, and caudal fins edged with white. No red lateral band.	Apache, Coconino, Gila, Graham, Greenlee, Navajo	> 5,000 ft	Streams and rivers generally above 6,000 ft. elevation with adequate stream flow and shading; temperatures below 77 degrees F; and substrate composed of boulders, rocks, gravel and some sand and silt.	Presently restricted to drainages in the White Mountains. Hybridization with introduced trout has complicated efforts to maintain the genetic purity of some populations. Special regulations (4d Rule) allow Arizona to manage the species as a sport fish (40 FR 29863).
Black-footed ferret	<i>Mustela nigripes</i>	Endangered	Weasel-like, yellow buff coloration with black on feet, tail tip, and eye mask. It has a blunt light colored nose and is 15-18 inches long and tail length is 5-6 inches	Apache, Coconino, Navajo, Yavapai	< 10,500	Grassland plains generally found in association with prairie dogs.	Unsurveyed prairie dog towns may be occupied by ferrets or may be appropriate for future reintroduction efforts. The Service developed guidelines for surveying prairie dog towns which are available upon request. No wild populations of this species are currently known to exist in Arizona. Reintroduced population exists in Aubrey Valley (Coconino County), Arizona.
California condor	<i>Gymnogyps californianus</i>	Endangered	Very large vulture (47 in., wingspan to 9 1/2 ft, weight to 22 lbs); adult plumage blackish, immature more brownish; adult wing linings white, immature mottled; head and upper parts of neck bare; yellow-orange in adults, grayish in mature.	Apache, Coconino, Mohave, Navajo, Yavapai	Varies	High desert canyons and plateaus.	Recovery program has reintroduced condors to Northern Arizona, with the first release (6 birds) in December 1996. The release site is located at the Vermillion Cliffs (Coconino County), with an experimental/honessential area designated for most of Northern Arizona and Southern Utah. The area in Arizona is within a polygon formed by Hwy 191, Interstate 40, and Hwy 93, and extends north of the Arizona-Utah and Nevada borders. Breeding is documented in Arizona.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Chiricahua leopard frog	<i>Lithobates chiricahuensis</i>	Threatened	Cream colored tubercles (spots) on a dark background on the rear of the thigh, dorsolateral folds that are interrupted and deflected medially, and a call given out of water distinguish this spotted frog from other leopard frogs.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Navajo, Pima, Santa Cruz, Yavapai	3,281-8,890 ft	Restricted to springs, livestock tanks, and streams in upper portion of watersheds that are free from nonnative predators or where marginal habitat for nonnative predators exists.	Critical habitat is designated for 10,346 acres in Apache, Cochise, Gila, Graham, Greenlee, Pima, Santa Cruz, and Yavapai counties in Arizona; and Catron, Hidalgo, Grant, Sierra, and Socorro counties in New Mexico (77 FR 16324).
Little Colorado spinedace	<i>Lepidomeda vittata</i>	Threatened	Small (<4 inches long) silvery minnow.	Apache, Coconino, Navajo	4,000-8,000 ft	Moderate to small streams; found in pools and riffles with water flowing over fine gravel and silt substrate.	Critical habitat includes 18 miles of East Clear Creek, 8 miles of Chavelon Creek, and 5 miles of Nuttoso Creek (52 FR 35034).
Loach minnow	<i>Tiaroga cobitis</i>	Endangered	Small (<3 inches) slender, elongated fish, olive colored with dirty white spots at the base of the dorsal and caudal fins. Breeding males vivid red on mouth and base of fins.	Apache, Cochise, Gila, Graham, Greenlee, Navajo, Pinal, Yavapai	< 8,000 ft	Benthic species of small to large perennial streams with swift shallow water over cobble and gravel. Recurrent flooding and natural hydrograph important.	Presently found in Aravaipa Creek, Deer Creek, Turkey Creek, Blue River, Campbell Blue Creek, Little Blue Creek, San Francisco River, Eagle Creek, North Fork of the East Fork Black River, Boneyard Creek, and White River and East Fork White River in Arizona, and Dry Blue Creek, Pace Creek, Frieborn Creek, the San Francisco River, Tularosa River, Negrito Creek, Whitewater Creek, the East, Middle, and West Forks of the Gila River, mainstem upper Gila River, Bear Creek and Mangas Creek in New Mexico.  Populations have been recently reintroduced in Hot Springs and Redfield canyons in Cochise and Graham counties; Fossil Creek in Gila County; and Bonita Creek in Graham County and Arizona. Critical habitat has been designated in Apache, Cochise, Gila, Graham, Greenlee, Pinal, and Yavapai counties, Arizona, as well as in Catron, Grant, and Hidalgo counties in New Mexico (77 FR 10810).



COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Mexican gray wolf	<i>Canis lupus baileyi</i>	Endangered	Large dog-like carnivore. Head and feet are large in proportion to rest of body. Coat color varies with mix of brown, rust, black, gray, and white. Distinct white lip line around mouth. Adults weigh between 60-90 pounds.	Apache, Gila, Greenlee, Navajo	4,000-12,000 ft	Chaparral, woodland, and forested areas. May cross desert areas.	In January 1998, Mexican gray wolves were reintroduced as an experimental nonessential section 10(j) population under a program to re-establish the subspecies to a portion of its historical range (63 FR 1752). Wolves are released within the experimental boundary into a designated area known as the "Blue Range Wolf Recovery Area" (BRWRA) located in the Apache National Forest in Apache and Greenlee counties. Mexican gray wolves found outside of the experimental nonessential boundary are considered endangered. In 2002, the White Mountain Apache tribe (WMAT) became one of the lead agencies for the reintroduction and allowed wolves on their lands. This effectively expanded the experimental nonessential population into Apache, Gila, and Navajo counties on WMAT lands.
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened	Medium sized with dark eyes and no ear tufts. Brownish and heavily spotted with white or beige.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai	4,100-9,000 ft	Nests in canyons and dense forests with multi-layered foliage structure.	Generally nest in older forests of mixed conifer or ponderosa pine/gambel oak type, in canyons, and use variety of habitats for foraging. Sites with cool microclimates appear to be of importance or are preferred. Critical habitat was finalized on August 31, 2004 (69 FR 53182) in Arizona in Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Navajo, Pima, Pinal, Santa Cruz, and Yavapai counties.
Navajo sedge	<i>Carex specuicola</i>	Threatened	Perennial forb with triangular stems, elongated rhizomes. Flower: white June and July.	Apache, Coconino, Navajo	5,700-6,000 ft	Silty soils at shady seeps and springs.	Designated critical habitat is on the Navajo Nation near Inscription House Ruins. Found at seep springs on vertical cliffs of pink-red Navajo sandstone (50 FR 19370).
Peebles Navajo cactus	<i>Pediocactus peeblesianus</i> var. <i>peeblesianus</i>	Endangered	Very small globose 1 inch tall and about 0.75 inch in diameter. The 4 (3-5) radial spines are arranged in a twisted cross and central spines are absent. Flowers yellow-green 1 inch diameter spring.	Navajo	5,400-5,600 ft	Gravely soils of the Shinarump conglomerate of the Chinle Formation.	Extremely limited geographic range. Difficult to grow in cultivation.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Southwestern willow flycatcher	<i>Empidonax traillii eximius</i>	Endangered	Small passerine (about 6 inches) grayish-green back and wings, whitish throat, light olive-gray breast and pale yellowish belly. Two wingbars visible. Eye-ring faint or absent.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	< 8,500 ft	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	Riparian-obligate bird that occupies migratory/breeding habitat from late April-Sept. Critical habitat was finalized on October 19, 2005 in Apache, Cochise, Gila, Graham, Greenlee, Maricopa, Mohave, Pima, Pinal, and Yavapai counties (70 FR 60886). Revised critical habitat was proposed August 15, 2011 (76 FR 50542) and includes river segments in counties currently designated plus those in La Paz, Santa Cruz, and Yuma counties. The 2005 critical habitat designation remains in effect until the current proposal is finalized. Training seminar/permits required for those conducting call playback surveys.
Northern Mexican Gartersnake	<i>Thamnophis eques megalops</i>	Candidate	Background color ranges from olive, olive-brown, to olive-gray. Body has three yellow or light colored stripes running down the length of the body, darker towards tail. Species distinguished from other native gartersnakes by the lateral stripes reaching the 3rd and 4th scale rows. Paired black spots extend along dorsolateral fields.	Apache, Cochise, Coconino, Gila, Graham, Navajo, Pima, Pinal, Santa Cruz, Yavapai	130-8,500 ft	Cienegas, stock tanks, large-river riparian woodlands and forests, streamside gallery forests.	Core population areas in the U.S. include mid/upper Verde River drainage, mid/lower Tonto Creek, and the San Rafael Valley and surrounding area. Status on tribal lands unknown. Distributed south into Mexico along the Sierra Madre Occidental and Mexican Plateau. Strongly associated with the presence of a native prey base including leopard frogs and native fish.
Roundtail chub	<i>Gila robusta</i>	Candidate	Member of the minnow family Cyprinidae and characterized by streamlined body shape. Color usually olive gray with silvery sides and a white belly. Breeding males develop red or orange coloration on the lower half of the cheeks and on the bases of paired fins. Individuals may reach 49.0 cm (19.3 in) but usually average 25-30 cm (9.8 - 11.8 in).	Apache, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pinal, Yavapai	1,000-7,500 ft.	Cool to warm waters of rivers and streams, often occupy the deepest pools and eddies of large streams.	Historical range of roundtail chub included both the upper and lower Colorado River basins. A 2009 status review determined that the lower Colorado River basin roundtail chub population segment (Arizona and New Mexico) qualifies as a distinct vertebrate population segment (DPS). Populations in the Little Colorado, Bill Williams, and Gila River basins are considered candidate species.



COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Candidate	Medium-sized bird with a slender, long-tailed profile, slightly down-curved bill that is blue-black with yellow on the lower half. Plumage is grayish-brown above and white below, with rufous primary flight feathers.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	< 6,500 ft	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries).	Neotropical migrant that winters primarily in South America and breeds primarily in the U.S. (but also in southern Canada and northern Mexico). As a migrant it is rarely detected; can occur outside of riparian areas. Cuckoos are found nesting statewide, mostly below 5,000 feet in central, western, and southeastern Arizona. Concern for cuckoos are primarily focused upon alterations to its nesting and foraging habitat. Nesting cuckoos are associated with relatively dense, wooded, streamside riparian habitat, with varying combinations of Fremont cottonwood, willow, velvet ash, Arizona walnut, mesquite, and tamarisk. Some cuckoos have also been detected nesting in velvet mesquite, netleaf hackberry, Arizona sycamore, Arizona alder, and some exotic neighborhood shade trees.
American peregrine falcon	<i>Falco peregrinus anatum</i>	Delisted	A crow-sized falcon with slate blue-gray on the back and wings, and white on the underside; a black head with vertical "bandit's mask" pattern over the eyes; long pointed wings; and a long wailing call made during breeding. Very adept flyers and hunters, reaching diving speeds of 200 mph.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	3,500-9,000 ft	Areas with rocky, steep cliffs, primarily near water, where prey (primarily shorebirds, songbirds, and waterfowl) concentrations are high. Nests are found on ledges of cliffs, and sometimes on man-made structures such as office towers and bridge abutments.	Species recovered with over 1,650 breeding birds in the US and Canada.





**APPENDIX F.  
FEDERALLY LISTED SPECIES POTENTIALLY OCCURRING  
IN NAVAJO COUNTY, ARIZONA**

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**Table F-1. Federally Listed Species Potentially Occurring in Navajo County, Arizona**

Range or habitat information is from Heritage Data Management System (HDMS 2010); USFWS Arizona Ecological Services Field Office (USFWS 2010); *Arizona Rare Plant Field Guide* (Arizona Rare Plant Committee n.d.); and Corman and Wise-Gervais (2005).

Common Name (Scientific Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area
Apache trout ( <i>Oncorhynchus apache</i> )	T	Found in small, cold, high-gradient streams at elevations above 5,000 feet amsl in mixed-conifer forests and mountain meadows on substrates that consist of boulders, rocks, and gravel with some sand or silt. Restricted to streams in the upper Salt, Gila, Blue, and Little Colorado drainages in the White Mountains on the White Mountain Apache Indian Reservation and in the Apache-Sitgreaves National Forest. Populations introduced outside the historical range may still exist in the Coronado National Forest and the northern portion of the Kaibab National Forest.	Unlikely to occur. The project area is far from known occurrences of this species and Oraibi Wash is a dry wash.
Black-footed ferret ( <i>Mustela nigripes</i> )	E	Found on grassland plains in mountain basins at elevations below 10,500 feet amsl, usually in association with prairie dogs, which serve as a primary source of food and burrows. Only reintroduced populations are known to exist in the wild. In Arizona, they occur only in the Aubrey Valley in Coconino County.	Unlikely to occur. There are no grassland plains in the project area, and the project area is far from known populations of this species.
California condor ( <i>Gymnogyps californianus</i> )	E	Nesting sites are in caves, crevices, and potholes in isolated regions of the Southwest. USFWS began reintroducing an experimental, nonessential population of California condors into northern Arizona and southern Utah in 1996. On November 5, 2003, a pair successfully fledged one nestling from a cave at Grand Canyon, becoming the first California condor to be successfully hatched and reared in the wild since 1984.	Unlikely to occur. Because of the previous extirpation of the species from Arizona and the reintroduction of individuals a great distance northwest of the project area, it is extremely unlikely that any undocumented breeding pairs would be found in the project area. The project area is located within the "10 J" area, which is the designated non-essential experimental population area of the California condor. The nonessential experimental population status applies to condors only when they are within the experimental population area. Outside of this area condors are considered endangered. Also, the project area does not contain caves, crevices, or potholes associated with nesting and roosting sites.
Chiricahua leopard frog ( <i>Rana chiricahuensis</i> )	T	Restricted to springs, livestock tanks, and streams in the upper portions of watersheds at elevations between 3,281 and 8,890 feet amsl in central, east-central, and southeastern Arizona. Populations in central and east-central Arizona are disjunct from those in southeastern Arizona and may be distinct species.	Unlikely to occur. There are no suitable aquatic habitats in the project area, which is far from known natural and reintroduced populations of this species. Additionally, there are no springs, livestock tanks, or permanent streams in the project area to support the species.
Mexican gray wolf ( <i>Canis lupus baileyi</i> )	E	Occurs primarily in oak, pine, and juniper woodlands and forests. They also occur in grasslands and riparian corridors associated with these habitat types. Generally, wolf habitat occurs at elevations above 4,000 feet amsl.	Unlikely to occur. There is no suitable habitat in the project area, and known wolf packs in Navajo County are limited to the southern mountainous portion of the county.

**Table F-1. Federally Listed Species Potentially Occurring in Navajo County, Arizona**

Range or habitat information is from Heritage Data Management System (HDMS 2010); USFWS Arizona Ecological Services Field Office (USFWS 2010); *Arizona Rare Plant Field Guide* (Arizona Rare Plant Committee n.d.); and Corman and Wise-Gervais (2005).

Common Name (Scientific Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area
Little Colorado spinedace ( <i>Lepidomeda vittata</i> )	T	Inhabits small- to medium-sized streams, where it is characteristically found in pools with fine gravel and silt-mud substrates at elevations between 4,000 and 8,000 feet amsl. Occurs in East Clear Creek and its tributaries (Coconino County); Chevelon and Silver creeks (Navajo County); and Nutrioso Creek and the Little Colorado River (Apache County).	Unlikely to occur. Oraibi Wash is not perennial within the project area, and no pools exist in the project area.
Loach minnow ( <i>Tiaroga cobitis</i> )	T	Found in small to large perennial creeks and rivers, typically in shallow, turbulent riffles with cobble substrate, swift currents, and filamentous algae at elevations below 8,000 feet amsl. The range in Arizona is limited to reaches in the East Fork of the White River (Navajo County); Aravaipa, Deer, and Turkey creeks (Graham and Pinal counties); and the San Francisco and Blue rivers and Eagle, Campbell Blue, and Little Blue creeks (Greenlee County). A population was discovered in the Black River in 1996.	Unlikely to occur. Oraibi Wash is not perennial in this area, and the project area is far from known occurrences of this species.
Mexican spotted owl ( <i>Strix occidentalis lucida</i> )	T	Found in mature, montane forests and woodlands and steep, shady, wooded canyons. Can also be found in mixed-conifer and pine-oak vegetation types. Generally nests in older forests of mixed conifers or ponderosa pine–Gambel oak. Nests in live trees on natural platforms (e.g., dwarf mistletoe brooms), snags, and canyon walls at elevations between 4,100 and 9,000 feet amsl.	Unlikely to occur. There are no suitable forest vegetation communities in or near the project area.
Navajo sedge ( <i>Carex specuicola</i> )	T	Found in seeps and hanging gardens on vertical Navajo sandstone cliffs and alcoves at elevations between 4,400 and 7,000 feet amsl. In Arizona, the range includes the Navajo Creek drainage east to the Rock Point–Mexican Water area.	Unlikely to occur. The species is very rare in Arizona, the project area is far from known occurrences of this species, and there is no suitable habitat in the project area.
Northern Mexican gartersnake ( <i>Thamnophis eques megalops</i> )	C	Occurs at elevations from 130 to 8,497 feet amsl and is considered a riparian obligate. Occurs chiefly in source-area wetlands (e.g., cienegas or stock tanks); large river riparian woodlands and forests; and streamside gallery forests (as defined by well-developed broadleaf deciduous riparian forests with limited, if any, herbaceous ground cover or dense grass).	Unlikely to occur. The project does not contain suitable riparian woodlands habitat.
Peebles Navajo cactus ( <i>Pediocactus peeblesianus peeblesianus</i> )	E	Occurs on low hills in gravelly soils of the Shinarump conglomerate (Chinle Formation) in desertscrub and grassland at elevations between 5,100 and 5,650 feet amsl. Range is restricted to near Holbrook in the Little Colorado River watershed.	Unlikely to occur. This species has a limited known range (near Joseph City to the Marcou Mesa region northwest of Holbrook) and suitable soils do not exist on the project area.
Southwestern willow flycatcher ( <i>Empidonax traillii extimus</i> )	E	Found in dense riparian habitats along streams, rivers, and other wetlands where cottonwood, willow, boxelder, saltcedar, Russian olive, buttonbush, and arrowweed are present. Nests are found in thickets of trees and shrubs, primarily those that are 13 to 23 feet tall, among dense, homogeneous foliage. Habitat occurs at elevations below 8,500 feet amsl.	Unlikely to occur. The riparian corridor in the project area is narrow, is not dense, is removed from the water table by 6 or more feet, and does not support wetland understory foliage. Also, the project area is far from any known occurrences of this species in Arizona.

**Table F-1. Federally Listed Species Potentially Occurring in Navajo County, Arizona**

Range or habitat information is from Heritage Data Management System (HDMS 2010); USFWS Arizona Ecological Services Field Office (USFWS 2010); *Arizona Rare Plant Field Guide* (Arizona Rare Plant Committee n.d.); and Corman and Wise-Gervais (2005).

Common Name (Scientific Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area
Yellow-billed cuckoo ( <i>Coccyzus americanus</i> )	C	Typically found in riparian woodland vegetation (cottonwood, willow, or saltcedar) at elevations below 6,600 feet amsl. Dense understory foliage appears to be an important factor in nest site selection. The highest concentrations in Arizona are along the Agua Fria, San Pedro, upper Santa Cruz, and Verde river drainages and Cienega and Sonoita creeks.	Unlikely to occur. There are no broadleaf riparian woodlands in the project area with dense understory foliage, and there is not enough mature riparian woodland vegetation in or near the project area to support this species. Also, the project area is far from any known occurrences of this species in Arizona.

**\*USFWS Status Definitions**

C = Candidate. Candidate species are those for which USFWS has sufficient information on biological vulnerability and threats to support proposals to list as endangered or threatened under the ESA. However, proposed rules have not yet been issued because they are precluded by other listing activity that is a higher priority. This listing category has no legal protection.

E = Endangered. The ESA specifically prohibits the take of a species listed as endangered. Take is defined by the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct.

T = Threatened. The ESA specifically prohibits the take of a species listed as threatened. Take is defined by the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct.



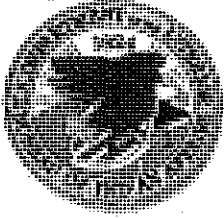
**APPENDIX G.**  
**SHPO LETTER AND RESPONSE**

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SHPO-2004-2195(98120)



United States Department of the Interior

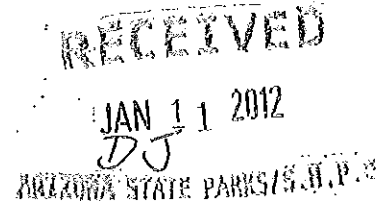
BUREAU OF INDIAN AFFAIRS  
WESTERN REGIONAL OFFICE  
2600 North Central Avenue  
Phoenix, Arizona 85004-3008



IN REPLY REFER TO:  
Environmental Quality Services

JAN - 9 2012

Mr. James Garrison  
State Historic Preservation Officer  
Arizona State Parks  
1300 West Washington  
Phoenix, Arizona 85007



Dear Mr. Garrison:

As Agency Official for purposes of Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), we wish to consult with you pursuant to 36 CFR 800.3(g) about the proposed undertaking, **Tawa'ovi Community Development (Project No. 2011-338)**, on the Hopi Indian Reservation.

In consultation with the Hopi Tribe as identified at 36 CFR 800.3(d), we have made a reasonable and good faith effort to carry out appropriate identification efforts as prescribed at 36 CFR 800.4 and have gathered sufficient information to evaluate the eligibility of the identified properties for the National Register of Historic Places (NRHP). Documentation of this finding is provided in the enclosed report:

*A Cultural Resources Inventory of the Tawa'ovi Community Development, Hopi Indian Reservation, Navajo County, Arizona (HCPO-2010-017) (Yeatts, November 2010).*

The properties are not identified for the purposes of Section 110(a)(2) of the NHPA, as this agency neither owns nor controls the properties.

It is our opinion that application of the National Register criteria has the following result:

Property Designation	Criteria	Eligibility	Historic Properties Affected
Site-008-2004	D & TCP	Yes	No
Site-010-2010	D	Yes	No
Site-011-2010	A-D	No	No
Site-012-2010	D & TCP (C)	Yes	No
Site 013-2010	D	Yes	No
Site E-47/ Site -013-2009	D	Yes	No
Site E-48/ Site -014-2009	D	Yes	No
Cultural Area Site -014-2009	D & TCP (A,D)	Yes	No

We conclude that a determination of "**No Historic Properties Affected**" pursuant to 36 CFR 800.4 (d)(1) is appropriate for the undertaking is appropriate as Sites 008-2004, 010-2010, 012-2010, 013-2010, E-47, E-48, and the cultural area will be avoided by project design and implementation. Site 011-2010 is NRHP-ineligible.

This determination will be included as part of the National Environmental Policy Act (NEPA) documentation associated with the proposed undertaking, which is anticipated to be an Environmental Assessment. As part of the NEPA review process, we will employ corresponding Bureau and tribal notification procedures for addressing our responsibilities as defined at 36 CFR 800.2(d).

As required at 36 CFR 800.5 (c), we are submitting documentation of this finding and await your response within thirty days of receipt. We trust you will agree with this finding and seek your concurrence that the Section 106 consultation process has been successfully completed for the subject undertaking. If there are any questions, please contact Mr. Garry J. Cantley, Regional Archeologist, at (602) 379-6750, extension 1256.

Sincerely,




Deputy Regional Director - Trust Services

Enclosure

cc: Superintendent, Hopi Agency  
Attn: Environmental Coordinator  
Chairman, Hopi Tribe  
Director, Cultural Preservation Office, Hopi Tribe

**CONCUR**



12 JAN 12

Arizona State Historic Preservation Office

**APPENDIX H.**  
**AGENCY PUBLIC NOTICE**

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## United States Department of the Interior

BUREAU OF INDIAN AFFAIRS

HOPi AGENCY

P.O. Box 158, 100 Main Street

Keams Canyon, Arizona 86034

Telephone Number: (928) 738-2228



October 09, 2012

### **RE: Proposed Tawa'ovi Community Development Project Programmatic Environmental Assessment**

Dear Reader:

The U.S. Bureau of Indian Affairs (BIA) and the Hopi Tribe (the "Tribe") are releasing a public notice for public scoping for the proposed Tawa'ovi Community Development Project programmatic environmental assessment (PEA). The approximately 463-acre development would require the BIA to approve a master lease for the Tawa'ovi Community Development Team (TCDT). The TCDT is composed of Hopi tribal representatives from various tribal departments and programs, tribal council and executive offices, and Hopi community development organizations.

#### **Project Description**

The Tribe and the TCDT are in the process of developing a master plan for the proposed Tawa'ovi Community Development project on the Hopi Reservation. This project has been in development for the tribe for the past 20 years, with more detailed planning and stakeholder involvement since 2005. Several Tribal Council-approved land assignments have resulted in a 463.75 acres of land slated for a master plan of potential development, including private and public joint venture enterprises for housing, commercial and office ventures, hi-tech industries, and renewable energy facilities. If the master lease is approved by the BIA, the TCDT would then be authorized to lease lands and authorize construction within the 463.75-acre project area, allowing for development of needed housing and associated employment opportunities.

As specific components of the master plan and future uses within the master planning area are not final, this programmatic EA will document existing conditions and potential impacts for the development area, with an emphasis on reasonably foreseeable actions associated with the proposed development. Supplemental EAs may be prepared as needed for specific projects in the future.

#### **Purpose and Need**

The purpose of the new master lease and associated Tawa'ovi Community Development project is to provide adequate housing and associated commercial services and infrastructure on the Hopi Reservation. The need for development is based on a persistent housing shortage on the reservation. While efforts are being made to develop housing sites in other communities such as Moenkopi, Hotevilla, Kykotsmovi, and Polacca, the overall need for additional housing on the Hopi reservation exceeds the supply of home sites for the Hopi Tribal Housing Authority, tribal employees, and for individuals who wish to build privately financed homes. The Tribe has identified the need for a variety of housing types to be built to meet the needs of the Hopi people and provide housing for tribal staff in both work-force and market rate models.

The Tawa'ovi Community is being designed as a sustainable community with internal amenities for residents including commercial and office ventures, police and fire department facilities, grocery and convenience stores, as well as other government buildings, a waste water treatment plant, and a town center. The Tawa'ovi Community will also function as an attraction for tourism by serving as the "northern gateway" to the Hopi



lands. Public-private partnerships will fund initial infrastructure development to augment Phase I Housing which is slated for construction in 2014. The Tawa'ovi Community would be developed as a modern adjunct to the traditional Hopi villages, providing land to meet needs that cannot be met in traditional settings.

#### **Scoping Period**

As part of the NEPA process, federal agencies are required to take into consideration the potential social and environmental impacts of the proposed action (the master lease). Via this notice, the BIA invites you to provide written comments on the proposed action; the BIA will consider input on issues, concerns, and opportunities related to the proposed action. Further, the BIA, TCDT and the Hopi Tribe will host six (6) public meetings regarding this proposed action at the following dates, times, and locations:

**October 23, 2012 - 7:00 pm, Polacca, AZ - Hopi Tribal Housing Authority Office**

**October 24, 2012 – 7:00 pm, Second Mesa, AZ - Hopi Cultural Center Conference Room**

**October 25, 2012– 7:00 pm, Hotevilla, AZ - Hotevilla Youth/Elderly Center**

**October 26, 2012– 2:00 pm, Kykotsmovi, AZ Hopi Wellness Center**

**October 30, 2012 – 6:30 pm, Flagstaff, AZ – NAU Native American Cultural Center  
NAU Main Campus, Knoles Drive, Bldg. #14**

**November 01, 2012 – 6:30 pm, Phoenix, AZ – Native American Connections  
4520 N. Central Ave suite 600, Phoenix, AZ 85012**

This letter serves as an invitation to your agency to submit any concerns or suggestions regarding this proposed project. Please submit your comments by November 02, 2012, to the following individuals by mail or fax:

Gilbert Becenti, Natural Resource Specialist  
Bureau of Indian Affairs, Hopi Agency  
P.O. Box 158  
Keams Canyon, Arizona 86034  
Telephone Number: (928) 738-2240  
Fax Number: (928) 738-5522

Tawa'ovi Community Development Team  
Attn: NEPA PEA Public Scoping  
P.O. Box 123  
Kykotsmovi, AZ 86039  
Telephone Number: (928) 734-3242  
Fax Number: (928) 738-3248

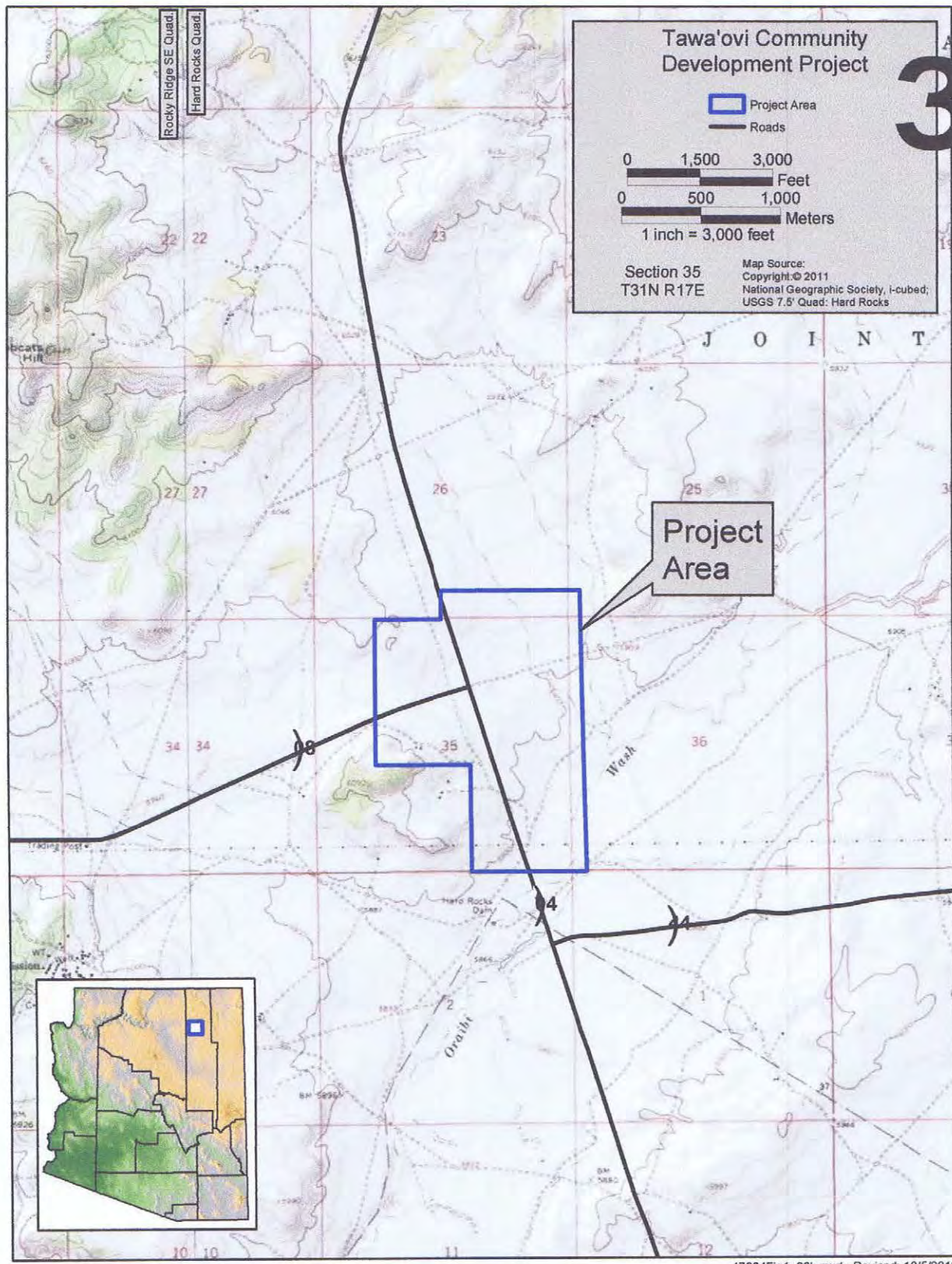
Sincerely,



Wendell Honanie, Superintendent  
Bureau of Indian Affairs, Hopi Agency

Enclosure: Map of the project area and preliminary plan layout





**Figure 1.** General location of the project area.



# Tawa'ovi Community



Self-storage  
Car-Truck Repair  
Convenience Store

Police/Fire  
Dollar Store  
Laundry  
Grocery Store

North Village

KOA  
Campground

Town  
Center

Cultural  
Campus

East Village

South  
Village

Waste  
Treatment

NORTH





## United States Department of the Interior

BUREAU OF INDIAN AFFAIRS  
HOPI AGENCY

P.O. Box 158, 100 Main Street  
Keams Canyon, Arizona 86034  
Telephone Number: (928) 738-2228



October 9, 2012

### **RE: Proposed Tawa'ovi Community Development Project Programmatic Environmental Assessment**

Dear Reader:

The U.S. Bureau of Indian Affairs (BIA) and the Hopi Tribe (the "Tribe") are releasing a public notice for public scoping for the proposed Tawa'ovi Community Development Project programmatic environmental assessment (PEA). The approximately 463-acre development would require the BIA to approve a master lease for the Tawa'ovi Community Development Team (TCDT). The TCDT is composed of Hopi tribal representatives from various tribal departments and programs, tribal council and executive offices, and Hopi community development organizations.

#### **Project Description**

The Tribe and the TCDT are in the process of developing a master plan for the proposed Tawa'ovi Community Development project on the Hopi Reservation. This project has been in development for the tribe for the past 20 years, with more detailed planning and stakeholder involvement since 2005. Several Tribal Council-approved land assignments have resulted in a 463.75 acres of land slated for a master plan of potential development, including private and public joint venture enterprises for housing, commercial and office ventures, hi-tech industries, and renewable energy facilities. If the master lease is approved by the BIA, the TCDT would then be authorized to lease lands and authorize construction within the 463.75-acre project area, allowing for development of needed housing and associated employment opportunities.

As specific components of the master plan and future uses within the master planning area are not final, this programmatic EA will document existing conditions and potential impacts for the development area, with an emphasis on reasonably foreseeable actions associated with the proposed development. Supplemental EAs may be prepared as needed for specific projects in the future.

#### **Purpose and Need**

The purpose of the new master lease and associated Tawa'ovi Community Development project is to provide adequate housing and associated commercial services and infrastructure on the Hopi Reservation. The need for development is based on a persistent housing shortage on the reservation. While efforts are being made to develop housing sites in other communities such as Moenkopi, Hotevilla, Kykotsmovi, and Polacca, the overall need for additional housing on the Hopi reservation exceeds the supply of home sites for the Hopi Tribal Housing Authority, tribal employees, and for individuals who wish to build privately financed homes. The Tribe has identified the need for a variety of housing types to be built to meet the needs of the Hopi people and provide housing for tribal staff in both work-force and market rate models.

The Tawa'ovi Community is being designed as a sustainable community with internal amenities for residents including commercial and office ventures, police and fire department facilities, grocery and convenience stores, as well as other government buildings, a waste water treatment plant, and a town center. The Tawa'ovi



Community will also function as an attraction for tourism by serving as the “northern gateway” to the Hopi lands. Public-private partnerships will fund initial infrastructure development to augment Phase I Housing which is slated for construction in 2014. The Tawa’ovi Community would be developed as a modern adjunct to the traditional Hopi villages, providing land to meet needs that cannot be met in traditional settings.

**Scoping Period**

As part of the NEPA process, federal agencies are required to take into consideration the potential social and environmental impacts of the proposed action (the master lease). Via this notice, the BIA invites you to provide written comments on the proposed action; the BIA will consider input on issues, concerns, and opportunities related to the proposed action. Further, the BIA, TCDT and the Hopi Tribe will host six (6) public meetings regarding this proposed action at the following dates, times, and locations:

**October 23, 2012 - 7:00 pm, Polacca, AZ - Hopi Tribal Housing Authority Office**

**October 24, 2012 – 7:00 pm, Second Mesa, AZ - Hopi Cultural Center Conference Room**

**October 25, 2012– 7:00 pm, Hotevilla, AZ - Hotevilla Youth/Elderly Center**

**October 26, 2012– 2:00 pm, Kykotsmovi, AZ Hopi Wellness Center**

**October 30, 2012 – 6:30 pm, Flagstaff, AZ – NAU Native American Cultural Center  
NAU Main Campus, Knoles Drive, Bldg. #14**

**November 01, 2012 – 6:30 pm, Phoenix, AZ – Native American Connections  
4520 N. Central Ave suite 600, Phoenix, AZ 85012**

This letter serves as an invitation for you to submit any concerns or suggestions regarding this proposed project. Please submit your comments by November 02, 2012, to the following individuals by mail or fax:

Gilbert Becenti, Natural Resource Specialist  
Bureau of Indian Affairs, Hopi Agency  
P.O. Box 158  
Keams Canyon, Arizona 86034  
Telephone Number: (928) 738-2240  
Fax Number: (928) 738-5522

Tawa’ovi Community Development Team  
Attn: NEPA PEA Public Scoping  
P.O. Box 123  
Kykotsmovi, AZ 86039  
Telephone Number: (928) 734-3242  
Fax Number: (928) 738-3248

Sincerely,



Wendell Honanie, Superintendent  
Bureau of Indian Affairs, Hopi Agency

Enclosure: Map of the project area and preliminary plan layout



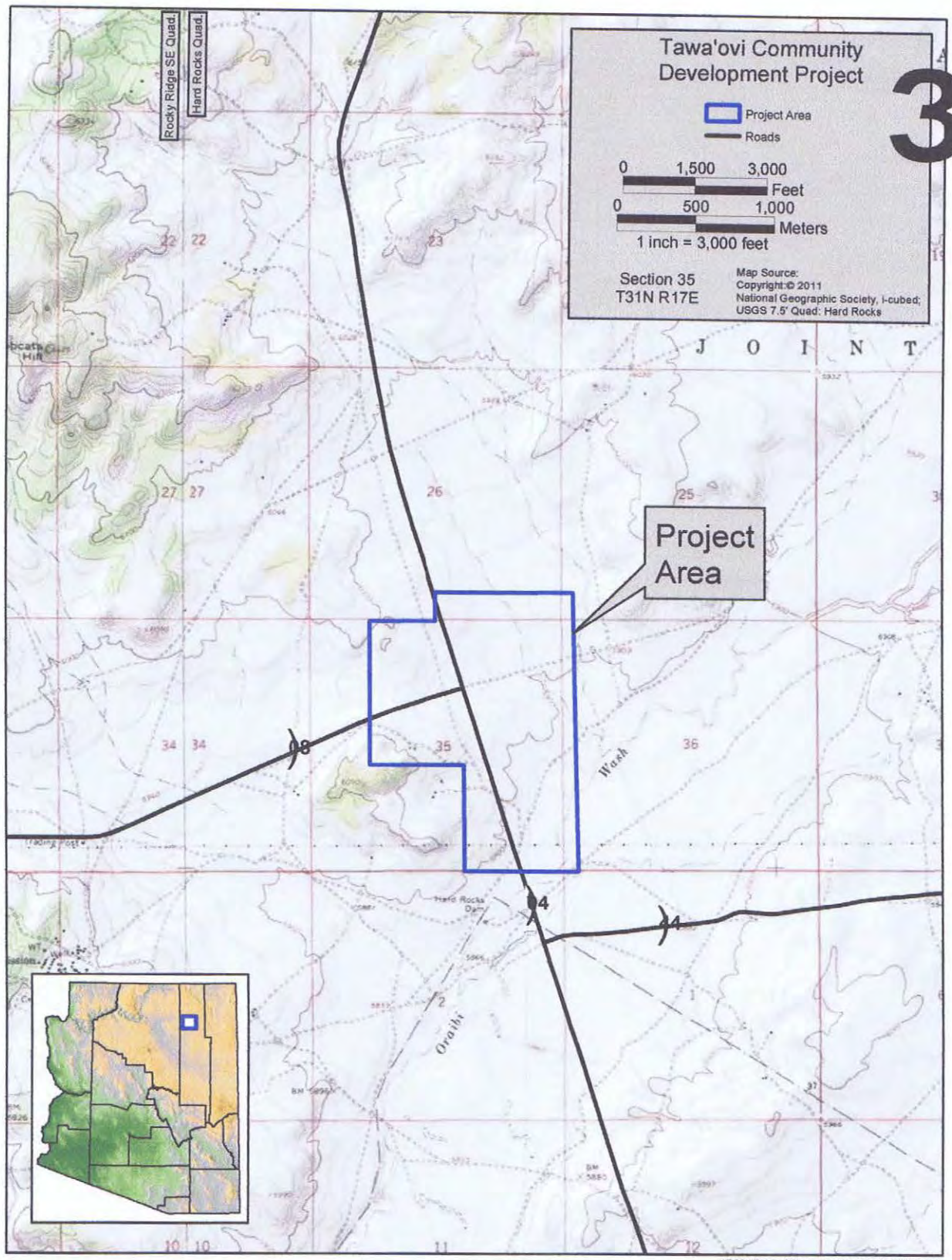


Figure 1. General location of the project area.



# Tawa'ovi Community

